INOVANCE

FORWARD, ALWAYS PROGRESSING



ME320LN^{new} Series Elevator AC Drive

User Guide

Industrial Automation | Intelligent Elevator | New Energy Vehicle | Industrial Robot | Rail Transit

Data code 19010493 B00

Preface

Introduction

Thank you for purchasing the ME320LN^{new} series elevator AC drive.

The ME320LN^{new} series elevator AC drive is a high-performance elevator vector control AC drive of the new generation developed and manufactured by Suzhou MONARCH Control Technology Co., Ltd. Based on our years of experience in the elevator applications, this dedicated AC drive is designed with advanced algorithms such as motor vector control and smooth curve calculation, featuring high flexibility, professionalism, and easy-to-use. The ME320LN^{new} elevator AC drive supports connection to the one-key operating panel through the RJ45 interface, making the elevator operation and commissioning simpler and easier.

Precautions

- For the illustration purpose, some drawings in this guide show the product without covers or protective guards.
- Remember to install the covers or protective guards as specified before using the product. Operate the product following the instructions.
- Drawings in this guide are for illustration only. The structural details may not match the product you purchase.
- The information in this guide is subject to changes due to product upgrades or specification modifications, as well as efforts to increase the accuracy and convenience of the guide.
- If you have any questions, please contact Inovance for technical support.

Cautions for New Users

Read this user guide carefully when you use the AC drive for the first time. If you have any problem concerning the functions or performance of the product, contact our technical support personnel for help.

Revision History

Date	Version	Description
December 2022	B00	• Added description of the 90 kW model. • Updated the AC input reactor models. • Updated software parameters.
September 2020	A02	Corrected some minor errors.
October 2018	A01	Updated the logo.
March 2015	A00	First release.

How to Obtain

This guide is not delivered with the product, but an electronic PDF version is available. To obtain it, visit

www.inovance.eu/downloads, click Downloads, search for the keyword, and download the guide.

Warranty Statements

For faults or damage that occur during normal use within the warranty period, Inovance provides free repair service. (For details about the warranty period of the equipment, see the order list.) Out of the warranty period, Inovance will charge a fee for the repair service.

Even in the warranty period, Inovance will charge a fee for repair of the following damage.

- Damage caused by improper operation
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by use beyond the intended scope of application
- Damage caused by use under unintended working conditions
- Secondary damage caused by force majeure events (such as natural disaster, earthquake, and lightning stroke)

The maintenance fee is charged according to the latest Price List of Inovance if not otherwise agreed upon.

For details, see the MONARCH Product Warranty Card.

Table of Contents

Preface 1
Safety Precautions 7
1 Overview 16
2 Product Information 18
2.1 Model and Nameplate 18
2.2 Electrical Specifications 19
2.3 Technical Specifications 20
2.4 Components 22
2.5 Installation Dimensions 25
2.6 Options 28
2.7 Selection of Braking Components 29
3 Mechanical and Electrical Installation 30
3.1 Mechanical Installation 30
3.1.1 Installation Environment Requirements 30
3.1.2 Installation Clearance Requirements 30
3.1.3 Installation Guide 31
3.1.4 Removing and Installing the Front Cover 38
3.2 Electrical Installation 39
3.2.1 Selection of Peripheral Electrical Components 39
3.2.2 Usage of Peripheral Electrical Components 40
3.2.3 Electrical Wiring 41
3.2.3.1 Description and Wiring of Main Circuit Terminals 43
3.2.3.2 Description and Wiring of Main Control Board Terminals 45
3.2.3.3 Description and Wiring of I/O Extension Board Terminals 51
3.2.3.4 Wiring and Description of PG Card for Elevator Specialized Rotary Encoder Interface Board 54
3.3 EMC Problems and Solutions 60
3.3.1 Impact of Harmonics 60
3.3.2 Electromagnetic Interference and Solutions 60
3.3.3 Leakage Current and Solutions 61
4 Commissioning and Trial Operation 63
4.1 Overview 63
4.1.1 Command Source 63
4.1.2 Control Mode 63
4.1.3 Operating Mode 63
4.1.4 System State 63
4.2 Operating Panel 64
4.3 Methods of Viewing and Operating Parameters 67

4.3.1 Three-Level Menu Operation Flowchart. 67
4.3.2 Viewing Status Parameters 68
4.3.3 Reading Fault Information. 69
4.3.4 Monitoring DI/DO Terminal State 70
4.4 Password Setting 70
5 List of Parameters 71
5.1 Introduction 71
5.2 Parameter Groups 72
5.3 Parameter List. 72
6 Explanation of Parameters. 88
6.1 Group F0: Basic Parameters 88
6.2 Group F1: Motor Parameters 91
6.3 Group F2: Vector Control Parameters 95
6.4 Group F3: V/f Parameters 99
6.5 Group F4: Input Function Parameters 105
6.6 Group F5: Output Function Parameters 110
6.7 Group F6: Speed Parameters. 112
6.8 Group F7: Auxiliary Function Parameters 120
6.9 Group F8: Auxiliary Management Parameters 124
6.10 Group F9: Protection Function Parameters 128
6.11 Group FA: PG Parameters. 131
6.12 Group FB: Communication Parameters (Reserved) 133
6.13 Group FC: Special Enhanced Function Parameters 133
6.14 Group FD: Special Function Parameters. 137
6.15 Group FU: Monitoring Parameters 139
6.16 Group FF: Factory Parameters (Reserved) 145
6.17 Group FP: User Parameters 145
7 Application and Commissioning. 146
7.1 Multi-Speed as Speed Reference Source 146
7.1.1 Wiring Diagram 146
7.1.2 Parameter Setting. 147
7.2 AI as Speed Reference Source. 152
7.2.1 Wiring Diagram 153
7.2.2 Parameter Setting. 153
7.3 Inspection Running 154
7.3.1 Wiring Diagram 155
7.3.2 Parameter Setting and Running Curve. 155

7.4 Emergency Evacuation at Power Failure . . . 157
7.4.1 Emergency Evacuation Modes at Power Failure . . . 158
7.4.2 UPS . . . 160
7.5 Analog Load Cell Commissioning . . . 161
7.5.1 Parameter Setting . . . 161
7.5.2 Commissioning When Balance Coefficient Incorrect . . . 162
7.5.3 Commissioning When Running Direction Incorrect . . . 162
7.6 No-Load-Cell Commissioning . . . 163
7.6.1 Parameter Setting . . . 163
7.6.2 Commissioning Instructions . . . 163
7.7 Commissioning of Direct Travel Ride . . . 163
7.7.1 Wiring Diagram . . . 163
7.7.2 Parameter Setting . . . 164
7.7.3 Time Sequence . . . 165
7.7.4 Commissioning Description . . . 166
7.8 Calculating Speed Switchover Point . . . 167
8 Troubleshooting . . . 168
8.1 List of Faults . . . 168
8.2 Faults and Troubleshooting . . . 178
9 Routine Maintenance . . . 180
9.1 Routine Maintenance Checklist . . . 180
9.1.1 Routine Inspection Checklist . . . 180
9.1.2 Routine Cleaning Checklist . . . 180
9.2 Periodic Inspection Checklist . . . 181
9.3 Part Replacement . . . 181
9.4 Storage . . . 182
10 Appendix A EMC . . . 183
10.1 CE Certification . . . 183
10.2 Definition of Terms . . . 183
10.3 Introduction to EMC Standard . . . 184
10.3.1 EMC Standards . . . 184
10.3.2 Installation Environment EMC Requirements . . . 184
10.3.3 Conditions for Compliance with the EMC Directive . . . 185
10.3.4 Selection of Peripheral EMC Devices . . . 185
10.3.4.1 Installation of EMC Input Filter on Power Input Side . . . 185
10.3.4.2 Installation of AC Input Reactor on the Power Input Side . . . 186
10.4 Shielded Cable . . . 186
10.4.1 Requirements for Shielded Cable . . . 186
10.4.2 Installation Precautions for Shielded Cables . . . 188
10.4.3 Cable Routing Requirements . . . 188

10.5 Solutions to EMC Interference 189

Safety Precautions

Safety Disclaimer

- This section presents essential safety instructions for proper use of the AC drive. Before operating the equipment, read through the guide and comprehend all the safety instructions. Failure to comply with the safety instructions may result in damage to equipment, severe injuries, or even death.
- "CAUTION", "WARNING", and "DANGER" messages in the guide are supplementary only and do not cover all safety precautions.
- Use the equipment according to the designated environment requirements. Malfunction or damage caused by improper use is not covered by warranty.
- Inovance shall take no responsibility for any physical injuries or property damage caused by improper use.

Safety Levels and Definitions

	indicates that failure to comply with the notice will result in severe physical injuries or even death.
	indicates that failure to comply with the notice may result in severe physical injuries or even death.
	indicates that failure to comply with the notice may result in minor physical injuries or damage to the equipment.

Safety Precautions

- Some drawings in the guide may show the product without covers or protective guards to illustrate more details. Remember to install the covers or protective guards as specified before performing any operations in accordance with the instructions.
- Drawings in the guide are shown for illustration only and may be different from the product you purchased.

Unpacking and Acceptance

• Do not install the equipment if you find any damage, rust, or signs of use on the equipment or its accessories upon unpacking. • Do not install the equipment in case of water seepage in the equipment, part missing, or part damage. • Do not install the equipment if the packing list does not match the product you received.



- Before unpacking, check whether the packing is intact without damage, water seepage, damp, and deformation.
- Unpack the package layer by layer. Do not strike the package violently.
- Check the surface of the equipment and accessories for any damage, rust, and scratches.
- Check the equipment, accessories, and materials in the package against the packing list.

Storage and Transportation



- Use specialized hoisting devices and qualified staff to move large-scale or heavy equipment. Failure to comply may result in physical injuries or equipment damage.
- Before hoisting the equipment, ensure that the equipment components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in physical injuries or equipment damage.
- Never stand or stay below a lifted or hoisted equipment.
- When lifting the equipment with a steel wire rope, lift it steadily at a constant rate to protect it against vibration, shock, and turnover. Do not keep the equipment lifted for a long time. Failure to comply may result in physical injuries or equipment damage.



- Handle the equipment with care and mind your steps. Failure to comply may result in physical injuries or equipment damage.
- When carrying the equipment with bare hands, hold the equipment casing firmly with care to prevent parts from falling. Failure to comply may result in physical injuries.
- Store and transport the equipment in strict accordance with the storage and transportation requirements. Failure to comply may result in equipment damage.
- Avoid storage and transportation in environments subject to water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing the equipment for more than 3 months. Conduct stricter protection and necessary inspections if long-term storage is required.
- Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
- Never transport the equipment with devices or materials that may damage or have negative impacts on the equipment.

Installation



- Ensure that the installation is performed by professional personnel with electrical expertise only. Installation by non-professionals is strictly prohibited.



- Read through the guide and safety precautions before installation.
- Do not install this equipment in places with strong electric or magnetic fields.
- Before installation, ensure that the installation position is mechanically strong enough to bear the weight of the equipment. Failure to comply may result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in an electric shock.
- When installing the equipment in an enclosed environment (such as a cabinet or casing), ensure adequate cooling of the environment by using cooling devices (such as a fan or an air conditioner). Failure to comply may result in equipment overheating or fire.
- Do not modify the equipment.
- Do not fiddle with the bolts used to fix equipment components or the bolts marked in red.
- When installing the equipment in a cabinet or final assembly, provide a fireproof enclosure with adequate electrical and mechanical protection conforming to relevant IEC standards and local laws and regulations.
- Before installing any devices with strong electromagnetic interference, such as a transformer, install an electromagnetic shielding device for this equipment to prevent malfunctions.
- Install the equipment onto an incombustible object such as metal and keep it away from combustible materials. Failure to comply may result in fire.



- Cover the top of the equipment with cloth or paper during installation to prevent unwanted objects such as metal chippings, oil, and water from falling into the equipment and causing faults. After installation, remove the cloth or paper to prevent over-temperature caused by poor ventilation due to blocked ventilation holes.
- Resonance may occur when a machine supposed to run at a constant speed is running at variable speeds. In this case, install the anti-vibration rubber under the motor frame or use the vibration suppression function to reduce the resonance.

Wiring



- Do not allow non-professionals to install, wire, inspect, or maintain the equipment or replace any parts of the equipment.
- Cut off all power supplies before wiring. Wait for at least the time specified on the equipment warning label after power-off so that residual voltage can discharge safely. Measure the DC voltage on the main circuit to ensure that it is within the safe voltage range. Failure to comply may result in an electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board when power is on. Failure to comply may result in an electric shock.
- Ensure that the AC drive and related devices are properly grounded. Failure to comply may result in an electric shock.



- Do not connect the input power cable to output terminals of the product or other devices. Failure to comply may result in equipment damage or even fire.
- When connecting the drive to a motor, ensure consistency of terminal phase sequences between the drive and the motor to prevent reverse motor rotation.
- Use cables with required diameter and shield. Properly ground one end of the shield if a shielded cable is used.
- Tighten terminal screws with tightening torque specified in this guide. Failure to comply may result in overheating and damage to the connection parts or even fire.
- After wiring, ensure that all cables are connected properly and no screws, washers, or exposed cables are left inside the equipment. Failure to comply may result in an electric shock or equipment damage.



- During wiring, follow the proper electrostatic discharge (ESD) procedures, and wear an anti-static wrist strap. Failure to comply may result in damage to internal circuits of the equipment.
- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment. Failure to comply may result in equipment malfunction.

Power-on



- Before power-on, ensure that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Before power-on, ensure that the power supply meets requirements. Failure to comply may result in equipment damage or even fire.
- After power-on, do not open the cabinet door or protective cover, touch any terminal, or disassemble any device or components. Failure to comply may result in an electric shock.



- After wiring and parameter setting, carry out a trial run to ensure safe and proper functioning of the equipment. Failure to comply may result in physical injuries or equipment damage.
- Before power-on, ensure that the voltage of the power supply matches the rated voltage of the equipment. An improper voltage may result in fire.
- Before power-on, ensure that no one is near the equipment, motor, or machine. Failure to comply may result in physical injuries or even death.

Operation



- Do not allow non-professionals to operate the equipment. Failure to comply may result in physical injuries or even death.
- Do not touch any wiring terminals or disassemble any device or component of the equipment during operation. Failure to comply may result in an electric shock.



- Do not touch the housing, fan, or resistor of the equipment to check temperature. Failure to comply may result in burns.
- During operation, prevent metal and other foreign objects from falling into the equipment. Failure to comply may result in fire or equipment damage.

Maintenance



- Do not allow non-professionals to install, wire, inspect, or maintain the equipment or replace any parts of the equipment.
- Do not carry out maintenance when power is on. Failure to comply may result in an electric shock.
- Before maintenance, cut off all equipment power supplies and wait for at least the time specified on the product warning label.
- In case of a permanent magnet motor, do not touch the motor terminals immediately after power-off because the motor terminals will generate induced voltage during rotation even after the equipment power supply is cut off. Failure to comply may result in an electric shock.



- Perform routine and periodic inspection and maintenance on the equipment according to maintenance requirements and keep a maintenance record.

Repair



- Do not allow non-professionals to install, wire, inspect, or maintain the equipment or replace any parts of the equipment.
- Do not repair the equipment when power is on. Failure to comply may result in an electric shock.
- Before inspection or repair, cut off all equipment power supplies and wait for at least the time specified on the product warning label.



- Require repair services according to the equipment warranty agreement.
- When the fuse is blown or the circuit breaker or earth leakage current breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply may result in equipment damage, physical injuries, or even death.
- When the equipment fails or is damaged, arrange for qualified technicians to troubleshoot and repair the equipment in accordance with the maintenance instructions and retain a maintenance record.
- Replace quick-wear parts of the equipment according to the replacement instructions.
- Do not use damaged equipment. Failure to comply may result in further damage to equipment, physical injuries, or even death.
- After replacing equipment, re-check wiring and parameter settings.

Disposal
WARNING • Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, physical injuries, or even death. • Recycle retired equipment in accordance with waste disposal standards of the industry to avoid environmental pollution.

Safety Label

For safe equipment operation and maintenance, comply with the safety labels on the equipment. Do not damage or remove the safety labels. The following table describes the safety labels.

Safety Label	Description
 WARNING	• Electric shock • Wait for at least 10 minutes after power-off before opening the front cover. • Read through the user guide and safety precautions carefully before operating the equipment.

Other Precautions

- Requirements for the RCD
  The equipment generates high leakage current during running, which flows through the protective grounding conductor. Therefore, install a type-B residual current device (RCD) at the primary side of the power supply. When selecting the RCD, take into consideration the transient and steady-state leakage current to ground that may be generated at startup and during running of the equipment. You can select a specialized RCD with the function of suppressing high-order harmonics or a general-purpose RCD with relatively large residual current.
- Warning of high leakage current to ground
  The equipment generates high leakage current during running. Ground the equipment reliably before connecting the input power supply. Earthing must comply with local regulations and IEC standards.
- Motor insulation test
  Perform the insulation test when the motor is used for the first time, after long-time storage, or in a periodic inspection, to prevent damage to the elevator AC drive caused by the poor insulation of motor windings. The motor must be disconnected from the AC drive during the insulation test. A 500 V megger is recommended for the test. The insulation resistance must not be less than 5 MΩ.
- Motor thermal protection

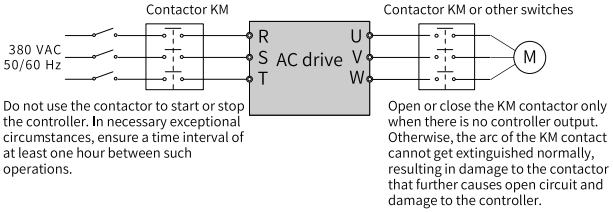
If the rated capacity of the motor selected does not match that of the ME320LN^{new} AC drive, especially when the rated power of the ME320LN^{new} AC drive is greater than that of the motor, adjust the motor protection parameters or install a thermal relay before the motor for protection.

- Running above mains frequency
  Do not operate the equipment above mains frequency (default: 50 Hz). If such use is required, take into consideration the strength and service life of all mechanical devices of the elevator.

- Motor heat and noise
  The output voltage of the AC drive is pulse width modulation (PWM) wave with certain harmonics. Therefore, the motor temperature rise, noise, and vibration are slightly greater than those at operation with the mains frequency.

- Voltage-sensitive device or power factor optimized capacitor on the output side of the AC drive
  The ME320LN^{new} AC drive outputs PWM waves. Therefore, do not install the capacitor for improving power factor or voltage dependent resistor for lightning protection on the output side of the AC drive. Otherwise, the AC drive may suffer transient overcurrent or even be damaged.

- Switching device such as contactor on the input and output sides of the ME320LN^{new} AC drive
  When a contactor is installed between the input side of the AC drive and the power supply, the AC drive must not be started or stopped by switching on or off the contactor. When a switching device such as a contactor is installed between the output side of the AC drive and the motor, do not switch on or off the contactor when the AC drive has output. Otherwise, modules may be damaged.



- Use outside the rated voltage
  Do not use the ME320LNnew AC drive outside the allowable operating voltage range specified in this guide. Otherwise, components inside the AC drive may be damaged. If required, use a corresponding voltage step-up or step-down device.

- Prohibition of three-phase input changed into two-phase input
  Do not change the three-phase input of the ME320LN^{new} series AC drive into two-phase input. Failure to comply may result in a fault or damage to the AC drive.

- Surge protection device
  The AC drive has a built-in voltage dependent resistor for suppressing the surge voltage generated when inductive loads around the AC drive are switched on or off. If the inductive loads generate a very high surge voltage, use a surge protection device for the inductive loads or use a surge protection device together with a diode.

Note

Do not connect the surge protection device to the output side of the AC drive.

- Altitude and derating
  In places where the altitude is above 1000 m and the cooling effect of the AC drive drops due to thin air, it is necessary to derate the AC drive. Contact Inovance for technical support.
- Special usage
  If your needs are not covered by the wiring drawings recommended in the guide, such as DC bus, contact Inovance for technical support.
- Disposal
  The electrolytic capacitors on the main circuits and PCBs may explode when they are burnt. Poisonous gas is generated when the plastic parts are burnt. Treat them as ordinary industrial waste.
- Applicable motor
  - The standard adaptable motor of the ME320LN^{new} series elevator AC drive is the four-pole squirrel-cage asynchronous induction motor and permanent magnet synchronous electrical motors. For other types of motors, select a proper AC drive according to the rated motor current.
  - The cooling fan and rotor shaft of a non-variable-frequency motor are coaxial. Therefore, the cooling effect deteriorates as the motor speed decreases. In this case, add a more powerful fan or use a variable-frequency motor in applications where the motor is overheated.
  - Although the standard parameters of the adaptable asynchronous motor have been configured in the AC drive, you still need to perform motor auto-tuning or change the default parameter values based on actual conditions. Otherwise, the running effect and protection performance will be affected. Dynamic auto-tuning must be performed for permanent magnet synchronous electrical motors.
  - The AC drive will report alarms or even be damaged when the cables or the motor is short-circuited. Therefore, perform insulation and short circuit tests on newly installed motors and cables and during routine maintenance. Ensure

that the AC drive is completely disconnected from the part to be tested before the test.

- Precautions for residual current devices
  Tripping may occur if an improper residual current device is selected when the AC drive drives the motor. This is because the output wave of the AC drive has high-order harmonics and the motor and the cables connecting the AC drive and the motor produce leakage current, which is much larger than the current when the motor runs at the mains frequency. To solve this problem, it is necessary to determine the proper sensitivity of the residual current device based on the general leakage current of the cables and the motor. The leakage current depends on the motor capacity, cable length, insulation class, and wiring method. Generally, the leakage current on the output side of the AC drive is about three times of the current when the motor runs at the mains frequency.

Protection Features

Adopting different protection functions for different levels of faults, the ME320LN^{new} elevator AC drive provides the elevator running system with full abnormality protection.

The ME320LN^{new} AC drive provides the following protection functions:

Protection against drive control abnormalities, including overcurrent, overvoltage/ undervoltage, input/output phase loss, overload, and control storage abnormality. Once a fault occurs, the AC drive performs protection immediately, cuts off the output, blocks the brake, and prohibits running.

1 Overview

Connection with Peripheral Equipment

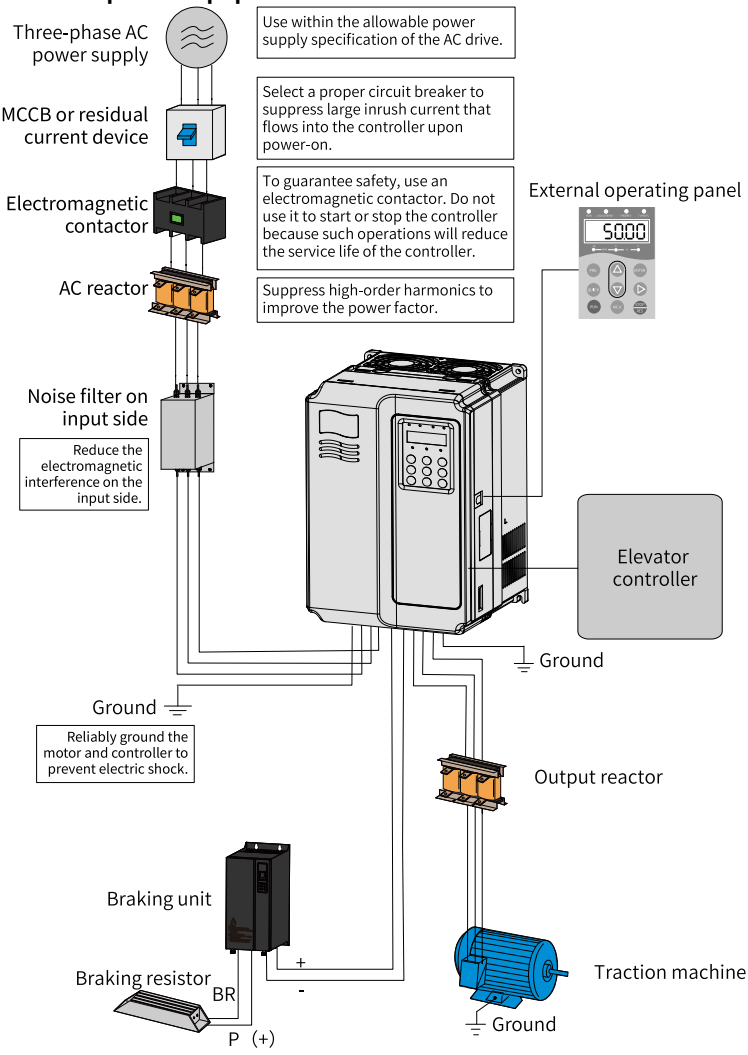


Figure 1-1 Connection between the ME320LN^{new} elevator AC drive and peripheral equipment

Note

- Do not install a capacitor or surge protection device (SPD) on the output side of the AC drive. Otherwise, the AC drive, capacitor, or SPD may be damaged.
- Inputs/Outputs (main circuit) of the AC drive contain harmonics, which may interfere with communication devices near the AC drive. Therefore, install an anti-interference filter to minimize the interference.

Features

- The AC drive can drive both permanent magnet synchronous electrical motors (PMSMs) and asynchronous motors, and provides multiple encoder interfaces.
- It supports motor auto-tuning, including static auto-tuning, and auto-tuning of all motor parameters.
- It supports multi-speed and analog setting as speed reference sources.
- It guarantees good elevator riding comfort with flexible startup curves, multi-segment running curve setting, and four groups of acceleration/deceleration time.
- It supports emergency evacuation at power failure with the 48 V battery power supply.
- It provides various elevator-related functions, including enable detection, brake contactor control, output contactor control, slow-down judgment, overspeed protection, speed deviation detection, advance door opening, contact stuck detection, motor overheat detection, and startup pre-torque compensation, making elevator control simpler and easier.
- It supports connection to the one-key operating panel through the RJ45 interface, making the elevator operation and commissioning simpler and easier. It provides a parameter copy unit to facilitate batch commissioning.
- It provides a built-in DC reactor and a braking unit, which improves the output power factor and reduces costs of peripheral equipment of the electric system.
- The ME320LN^{new} elevator AC drive is designed with separate air ducts, professional lightning protection measures, a professional manufacturing platform, and advanced processes, ensuring the product quality.
- The ME320LN^{new} elevator AC drive is equipped with lightning protection, improving the system reliability. The ME320LN^{new} elevator AC drive has a strong anti-interference capability, compliant with the strict EMC test standards.

2 Product Information

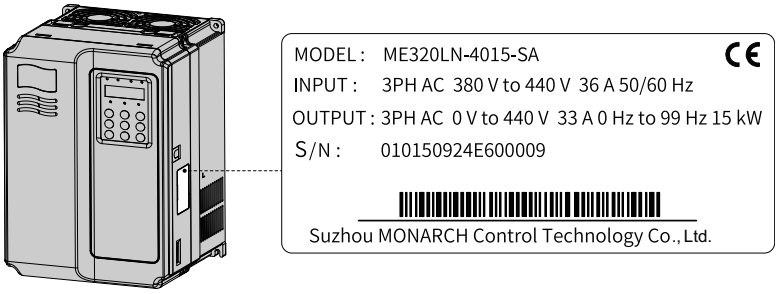
2.1 Model and Nameplate

Model

ME320 L N - 40 15 - SA
① ②③ ④ ⑤ ⑥

① **Series** ME320: AC drive series	④ **Voltage Class** 20: Single-phase/Three-phase 220 V 40: Three-phase 380 V
② **AC Drive Type** L: Specialized for elevators	⑤ **Power Rating** 02: 2.2 kW 03: 3.7 kW ... 30: 30 kW 45: 45 kW 90: 90 kW (220 V model)
③ **AC Drive Structure** N: New structure	⑥ **Type of Applicable Motor** SA: Synchronous/Asynchronous motor integrator

Nameplate



2.2 Electrical Specifications

Table 2–1 General specifications of the ME320LN^{new} AC drive

ME320LN^{new} Model	Input Voltage	Power Capacity (kVA)	Input Current (A)	Output Current (A)	Applicable Motor (kW)
ME320LN-4002-SA	Three-phase 380 V Range: –15% to +20%	4	6.5	5.1	2.2
ME320LN-4003-SA		5.9	10.5	9	3.7
ME320LN-4005-SA		8.9	14.8	13	5.5
ME320LN-4007-SA		11	20.5	18	7.5
ME320LN-4011-SA		17	29	27	11
ME320LN-4015-SA		21	36	33	15
ME320LN-4018-SA		24	41	39	18.5
ME320LN-4022-SA		30	49.5	48	22
ME320LN-4030-SA		40	62	60	30
ME320LN-4037-SA		57	77	75	37
ME320LN-4045-SA		69	93	91	45
220-ME320LN-4090-SA	Three-phase 220 V	75	164	176	90

2.3 Technical Specifications

Table 2–2 Technical specifications of the ME320LN^{new} AC drive

Item	Specifications			
Basic specifications	Carrier frequency	2 kHz to 16 kHz (automatically adjusted based on load characteristics)		
	Input frequency resolution	Digital setting: 0.01 Hz Analog setting: Max. frequency x 0.1%		
	Output frequency accuracy	Digital setting: Max. frequency x ±0.01% Analog setting: Max. frequency x ±0.01%		
	Control mode	SVC, FVC, or V/f control		
	Starting torque	0.5 Hz/180% (SVC) 0 Hz/200% (FVC)		
	Speed range	1:100 (SVC)	1:1000 (FVC)	1:50 (V/f)
	Speed stability accuracy	±0.5% (SVC)	±0.05% (FVC)	-
	Overload capacity	60 seconds for 150% of the rated current; 1 second for 180% of the rated current		
	Motor auto-tuning	With-load auto-tuning and no-load auto-tuning		
	Acceleration/ Deceleration curve	Linear or running curve acceleration/deceleration mode Four groups of acceleration/deceleration time and running curves, supporting various combinations		
	Inspection control	Implemented by multi-speed		
	Multi-speed running	A maximum of 8 speeds supported		
	Automatic voltage regulation (AVR)	Automatically maintain a constant output voltage when the grid voltage changes		
Display and operation	LED display	Display parameters such as frequency reference, output frequency, output voltage, and output current		
	Copy parameter	Support copying parameters quickly by using the LED operating panel		
	Protection	Support over 40 protection functions, including short-circuit detection upon power-on, input/output phase loss protection, overcurrent protection, overvoltage protection, and undervoltage protection		
	Key locking and function selection	Keys on the operating panel can be locked wholly or partially, and the application range of some keys can be defined to prevent misoperation		

Item	Specifications	
Customized functions	Security self-test of peripheral devices after power-on	Perform security self-test for peripheral devices after power-on, such as grounding and short circuit
	Emergency evacuation at power failure	Easy and convenient emergency evacuation solutions
	Overspeed protection	Built-in elevator overspeed protection functions. Multiple protection actions optional
	Speed deviation judgment	Speed deviation judgment function to locate potential elevator risks in time
	Forced speed switchover	Forced speed switchover to prevent elevator from bottom-clashing effectively
	Direct travel ride	Implement no-creeping running with the direct travel ride command
	Motor temperature detection	Monitor motor temperature in time to prevent security hazards
	Startup compensation	Three startup torque compensation modes: analog, digital, and no-load-cell
	QUICK key	User-defined shortcut menu
	Timing control	Support timing control function
Input/output characteristics	RUN command source	Two sources: operating panel and control terminal
	Frequency source	Four sources: digital setting, multi-speed setting, analog voltage 1 setting, and analog voltage 2 setting
	Input terminal	• 10 DI terminals, one for high-speed pulse input (compatible with active PNP or NPN input) • 2 AI terminals, one for voltage input and the other for voltage or current input
	Output terminals	• 3 digital output terminals • 2 relay output terminals • 1 analog output terminal (0 mA/4–20 mA or 0 V/2–10 V), used for frequency reference, output frequency output
Environment	Altitude	Below 1000 m (for applications above 1000 m, derated by 1% for every additional 100 m)
	Ambient temperature	–10°C to +40°C (derated if the ambient temperature is in the range of 40°C to 50°C)
	Humidity	Less than 95% RH, non-condensing
	Vibration	Less than 5.9 m/s^2 (0.6 g)
	Storage temperature	–20°C to +60°C

2.4 Components

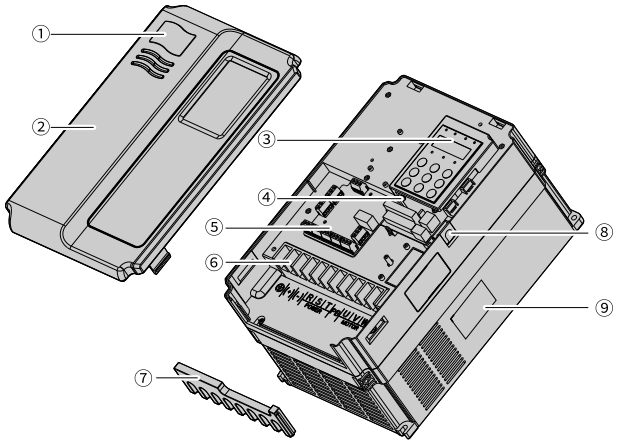


Figure 2-1 Exploded view of the ME320LN^{new} series AC drive (2.2 kW to 15 kW, plastic structure)

No.	Component	No.	Component	No.	Component
①	Company logo	④	Main control board	⑦	Cabling board
②	Upper housing	⑤	I/O board	⑧	External operating panel interface
③	Operating panel	⑥	Power terminal	⑨	AC drive nameplate

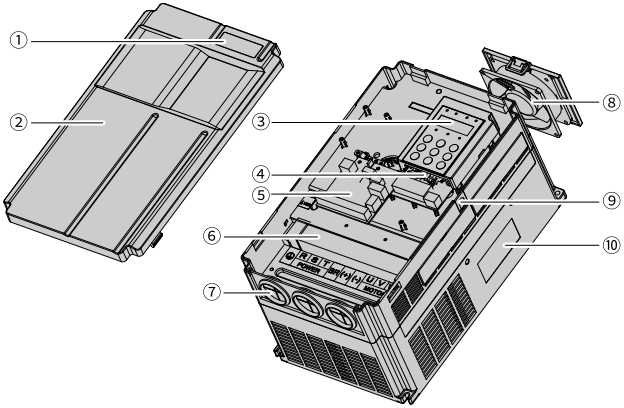


Figure 2-2 Exploded view of the ME320LN^{new} series AC drive (18.5 kW to 22 kW, plastic structure)

No.	Component	No.	Component	No.	Component
①	Company logo	⑤	I/O board	⑨	External operating panel interface
②	Upper housing	⑥	Power terminal	⑩	AC drive nameplate
③	Operating panel	⑦	Protective ring	-	-
④	Main control board	⑧	Fan	-	-

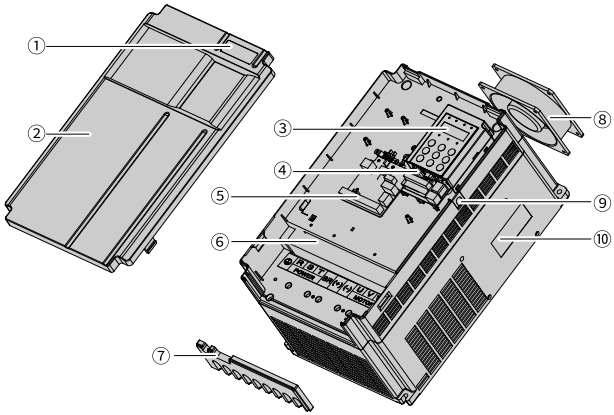


Figure 2-3 Exploded view of the ME320LN^{new} series AC drive (30 kW to 37 kW, plastic structure)

No.	Component	No.	Component	No.	Component
①	Company logo	⑤	I/O board	⑨	External operating panel interface
②	Upper housing	⑥	Power terminal	⑩	AC drive nameplate
③	Operating panel	⑦	Cabling board	-	-
④	Main control board	⑧	Fan	-	-

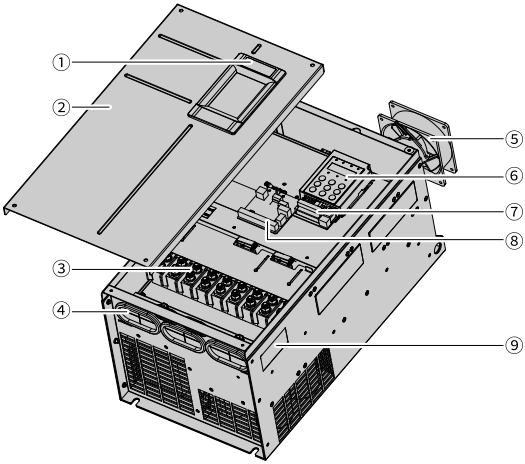


Figure 2-4 Exploded view of the ME320LN^{new} series AC drive (45 kW to 90 kW, sheet metal structure)

No.	Component	No.	Component	No.	Component
①	Company logo	④	Protective ring	⑦	Control board
②	Upper housing	⑤	Fan	⑧	I/O board
③	Power terminal	⑥	Operating panel	⑨	AC drive nameplate

2.5 Installation Dimensions

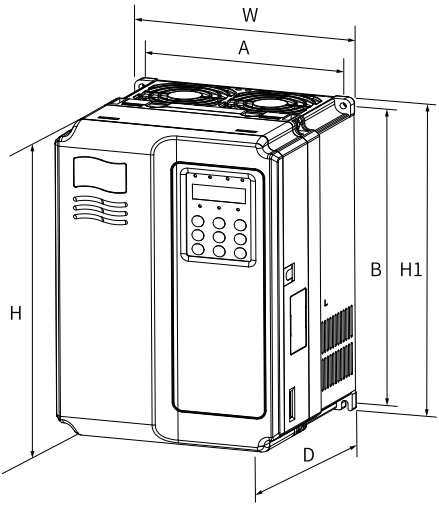


Figure 2-5 Dimensions of the ME320LN^{new} series AC drive (2.2 kW to 15 kW, plastic structure)

Table 2–3 Installation dimensions of the ME320LN^{new} series elevator AC drive

AC Drive Model	Mounting Hole (mm)		Outline Dimensions (mm)				Mounting Hole Diameter (mm)	Weight (kg)
	A	B	H	H1	W	D		
ME320LN-4002-SA	113	172	186	-	125	164	Ø5.0	1.1
ME320LN-4003-SA	148	236	248	-	160	183	Ø5.0	2.5
ME320LN-4005-SA								
ME320LN-4007-SA	190	305	322	-	208	192	Ø6	6.5
ME320LN-4011-SA								
ME320LN-4015-SA								

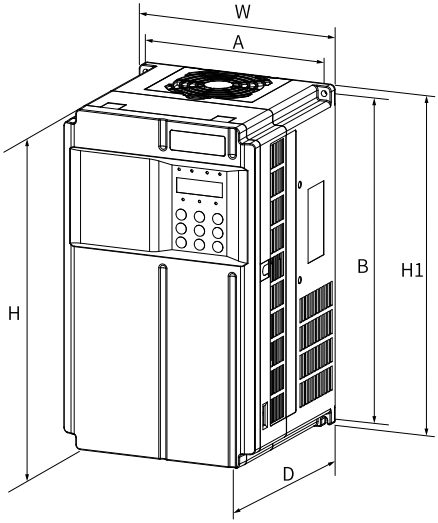


Figure 2-6 Dimensions of the ME320LN^{new} series AC drive (18.5 kW to 37 kW, plastic structure)

Table 2–4 Installation dimensions of the ME320LN^{new} series elevator AC drive

AC Drive Model	Mounting Hole (mm)		Outline Dimensions (mm)				Mounting Hole Diameter (mm)	Weight (kg)
	A	B	H	H1	W	D		
ME320LN-4018-SA	195	335	350	-	210	192	Ø6	7.6
ME320LN-4022-SA								
ME320LN-4030-SA	230	380	400	-	250	220	Ø7	17.5
ME320LN-4037-SA								

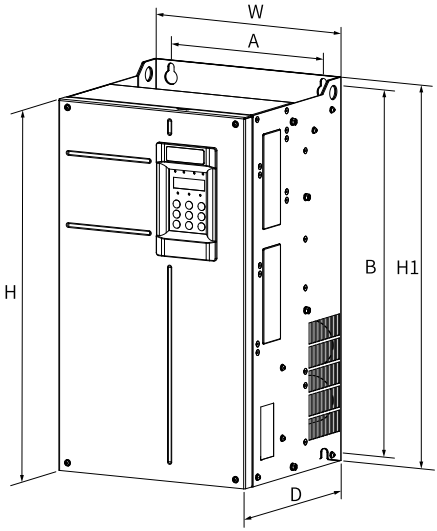


Figure 2-7 Dimensions of the ME320LN^{new} series AC drive (45 kW to 90 kW, sheet metal structure)

Table 2–5 Installation dimensions of the ME320LN^{new} series elevator AC drive

AC Drive Model	Mounting Hole (mm)		Outline Dimensions (mm)				Mounting Hole Diameter (mm)	Weight (kg)
	A	B	H	H1	W	D		
ME320LN-4045-SA	245	523	525	542	300	275	Ø10	35
ME320LN-4090-SA	270	560	554	580	338	315	Ø10	51.5

2.6 Options

Table 2–6 Options of the ME320LN^{new} series elevator AC drive

Name	Model	Function	Remarks
External braking unit	MDBUN	It is provided for models of 37 kW and above.	For details, see *"2.7 Selection of Braking Components" on page 29*
PG card	MCTC-PG-A	Rotary encoder interface card and frequency-division output	It provides 15 V power supply and is adapted to push-pull and open-collector output incremental encoders. Several frequency-division options are available.
	MCTC-PG-B	Rotary encoder interface card and frequency-division output	It provides 5 V power supply and is adapted to line driver output incremental encoders and UVW encoders. Only 1-frequency-division is supported.
	MCTC-PG-C	Rotary encoder interface card and frequency-division output	It provides 5 V power supply and open-collector output and is adapted to sin and cos encoders. Only 1-frequency-division is supported.
	MCTC-PG-C2	Rotary encoder interface card and frequency-division output	It provides 5 V power supply and open-collector output and is adapted to sin and cos encoders. Only 1-frequency-division is supported.
	MCTC-PG-C3	Rotary encoder interface card and frequency-division output	It provides 5 V power supply and frequency-division signal differential output and is adapted to sin and cos encoders. Only 1-frequency-division is supported.
External LED operating panel	MDKE	It is connected to an external LED display and keypad.	It provides the RJ45 interface for remote connection.
	MDKE6	It is connected to an external LED display and keypad and supports parameter copy.	
Extension cable	MDCAB	It is a standard 8-core network cable.	The cable length is 3 meters in the standard configuration.

If any option is required, specify it in your order.

2.7 Selection of Braking Components

The ME320LN^{new} series elevator AC drives of 30 kW and below have a built-in braking unit. You only need to connect an external braking resistor. For models above 30 kW, you need to install an external braking unit and braking resistor.

Table 2–7 Braking component selection for the ME320LN^{new} series elevator AC drive

AC Drive Model	Power of Applicable Motor (kW)	Max. Braking Resistance (Ω)	Min. Braking Resistance (Ω)	Power (W)	Braking Unit
ME320LN-4002-SA	2.2	290	230	600	Built-in (standard)
ME320LN-4003-SA	3.7	170	135	1100	
ME320LN-4005-SA	5.5	115	90	1600	
ME320LN-4007-SA	7.5	85	65	2500	
ME320LN-4011-SA	11	55	43	3500	
ME320LN-4015-SA	15	43	35	4500	
ME320LN-4018-SA	18.5	34	25	5500	
ME320LN-4022-SA	22	24	22	6500	
ME320LN-4030-SA	30	20	16	9000	
ME320LN-4037-SA	37	16	13	11000	MDBUN-60-T
ME320LN-4045-SA	45	14	11	13500	MDBUN-60-T
ME320LN-4090-SA	90	14 x 2	13 x 2	13500 x 2	MDBUN-60-T x 2

3 Mechanical and Electrical Installation

Before installing the AC drive, unpack the package to check:

- Whether the nameplate model and AC drive ratings are consistent with your order. Whether the box contains the device, certificate of conformity, user guide, and warranty card.
- Whether the product is damaged during transportation. If you find any omission or damage, contact Inovance or your local agent immediately.

Note

Follow instructions in the section Safety Precautions when installing and wiring the AC drive.

3.1 Mechanical Installation

3.1.1 Installation Environment Requirements

Table 3–1 Environment requirements

Item	Requirement
Ambient temperature	The AC drive service life is greatly influenced by the ambient temperature. Do not run the AC drive under a temperature exceeding the allowed temperature range (–10°C to +50°C).
Vibration and impact	Install the AC drive in a place not prone to vibration. Ensure the vibration does not exceed 0.6 g. Keep the AC drive away from punch presses and similar devices.
Heat dissipation and ventilation	Install the AC drive on a flame-retardant surface, with sufficient clearance reserved for heat dissipation, as the AC drive generates significant heat during operation. Use screws to fasten the AC drive to the mounting support vertically.
Installation location	Avoid places with direct sunlight exposure, moisture, and water drop. Avoid places with corrosive, combustible, or explosive gas. Ensure that the installation location is free of oil dirt, dust, and metal powder.

3.1.2 Installation Clearance Requirements

The clearance that needs to be reserved varies with the power rating of the ME320LN^{new} series elevator AC drives, as shown in *"Figure 3–1 " on page 31* .

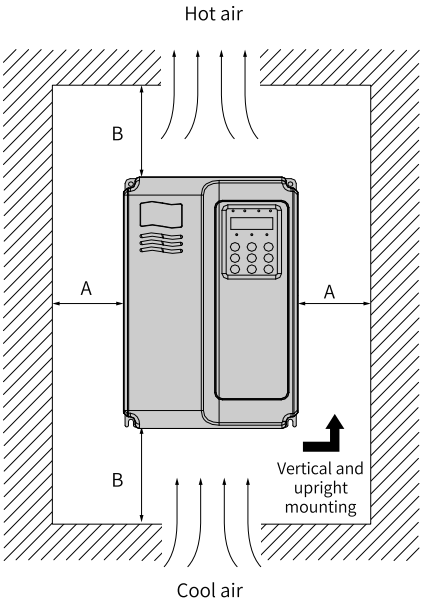


Figure 3-1 Installation location

Power Rating	Clearance	
15 kW and below	A ⩾ 10 mm	B ⩾ 100 mm
18.5 kW to 37 kW	A ⩾ 50 mm	B ⩾ 200 mm
45 kW to 90 kW	A ⩾ 50 mm	B ⩾ 300 mm

To ensure good heat dissipation, pay attention to the following points:

- Install the AC drive vertically upwards to facilitate heat dissipation. Do not install the drive upside down.
- Reserve the installation clearance as specified in the preceding figure to ensure sufficient space for heat dissipation. Take heat dissipation of other components in the cabinet into consideration.
- Use incombustible mounting brackets.
- In scenarios with heavy dust, ensure that the space inside the fully-sealed cabinet is large enough.

3.1.3 Installation Guide

The ME320LN^{new} elevator AC drive provides two housings, plastic and sheet metal, for different power ratings and voltage classes. The AC drive can be installed by using the backplate mounting or through-hole mounting method (installed outside the heatsink cabinet) based on the application scenario.

Backplate mounting of models of 15 kW and below (plastic structure)

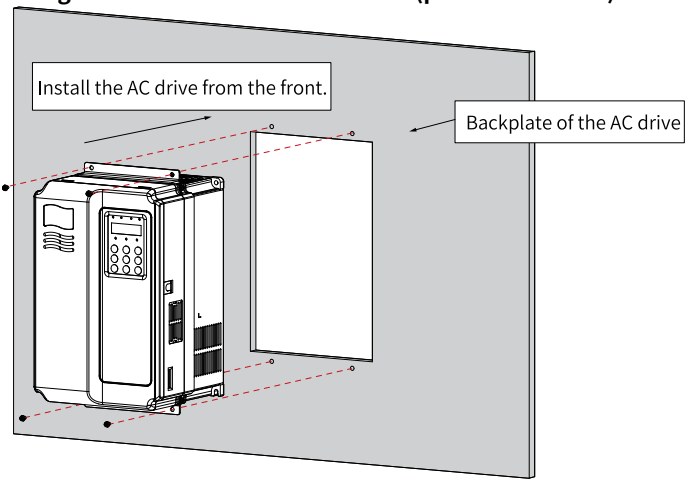


Figure 3-2 Backplate mounting of models of 15 kW and below (plastic structure)

Through-hole mounting of models of 15 kW and below (plastic structure)

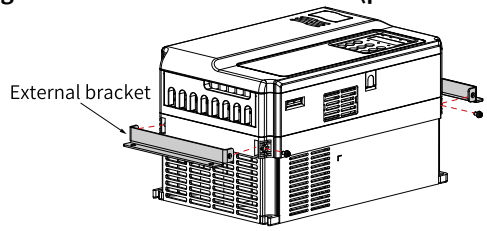


Figure 3-3 External hanging bracket for models of 15 kW and below (plastic structure)

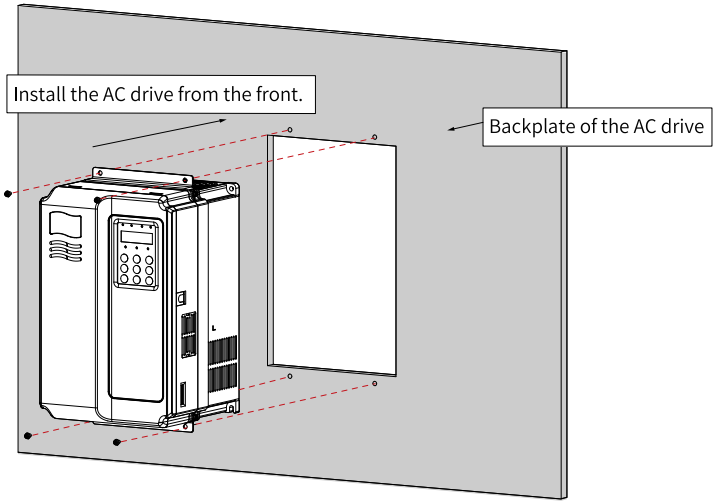


Figure 3-4 Through-hole mounting of models of 15 kW and below (plastic structure)

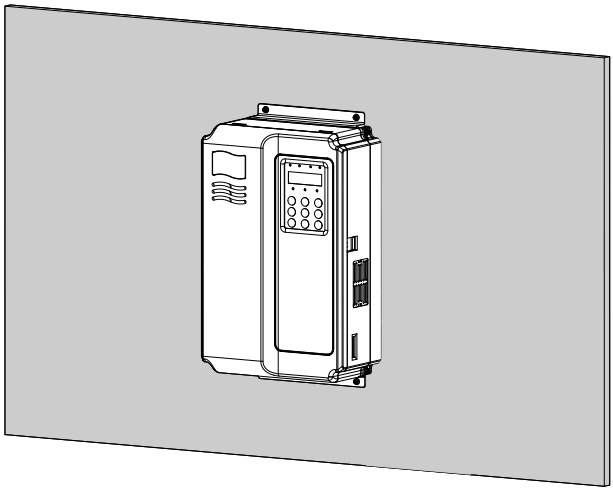


Figure 3-5 Through-hole mounting of models of 15 kW and below (plastic structure)

Backplate mounting of models of 18.5 kW to 37 kW (plastic structure)

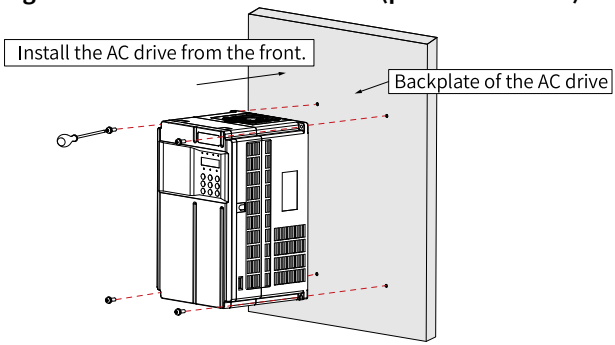


Figure 3-6 Backplate mounting of models of 18.5 kW to 37 kW (plastic structure)

Through-hole mounting of models of 18.5 kW to 37 kW (plastic structure)

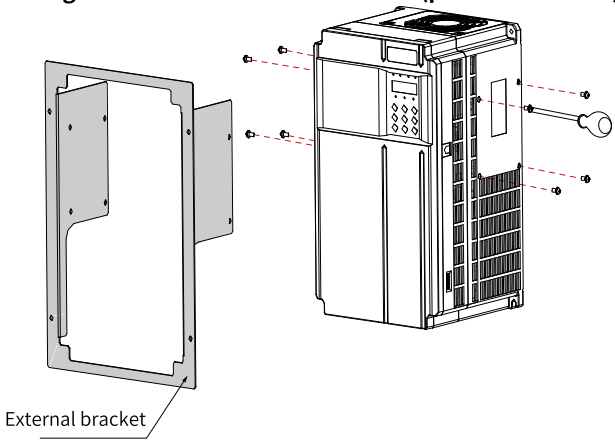


Figure 3-7 External hanging bracket for models of 18.5 kW to 37 kW (plastic structure)

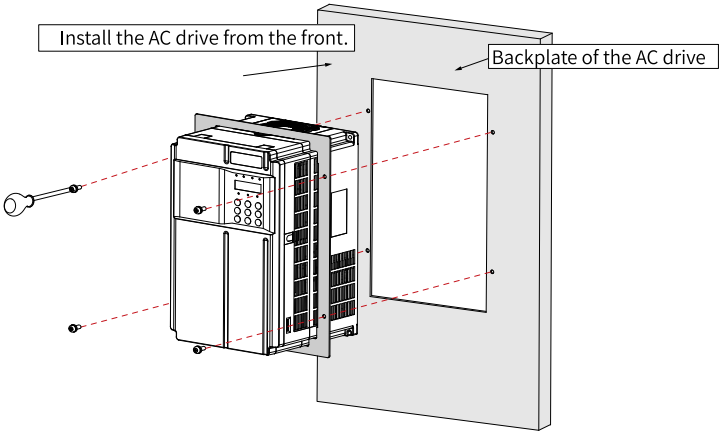


Figure 3-8 Through-hole mounting of models of 18.5 kW to 37 kW (plastic structure)

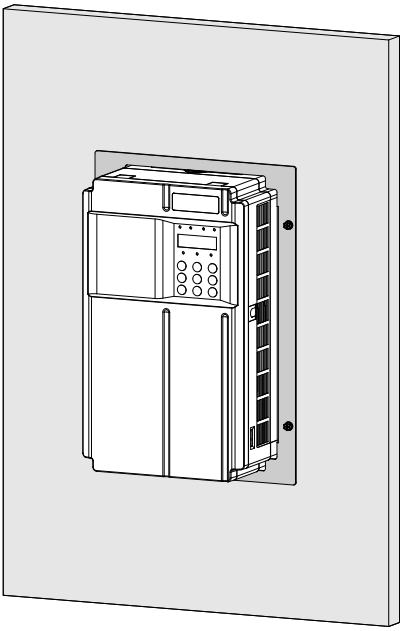


Figure 3-9 Through-hole mounting of models of 18.5 kW to 37 kW (plastic structure)

Backplate mounting of models with a sheet metal structure

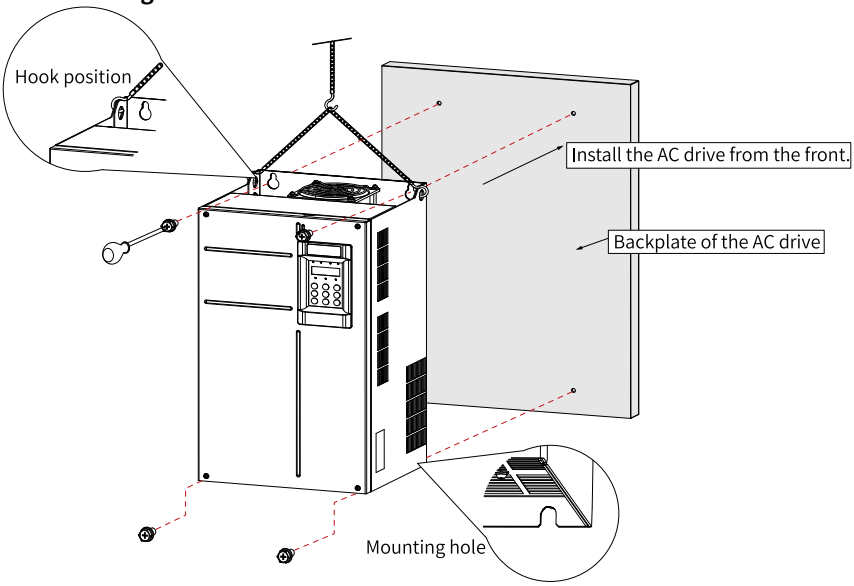


Figure 3-10 Backplate mounting of models with a sheet metal structure

Through-hole mounting of models with a sheet metal structure

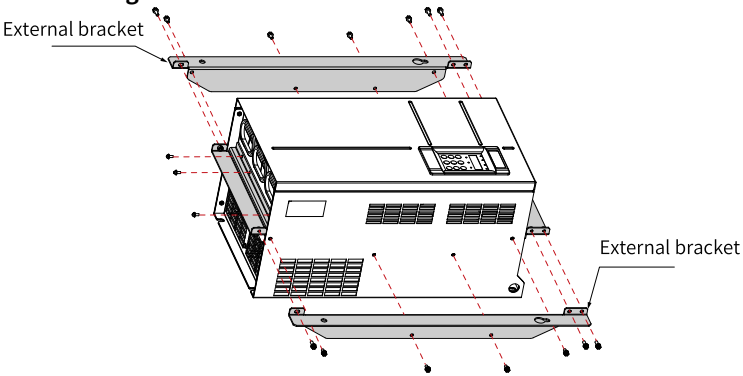


Figure 3-11 External hanging bracket for models with a sheet metal structure

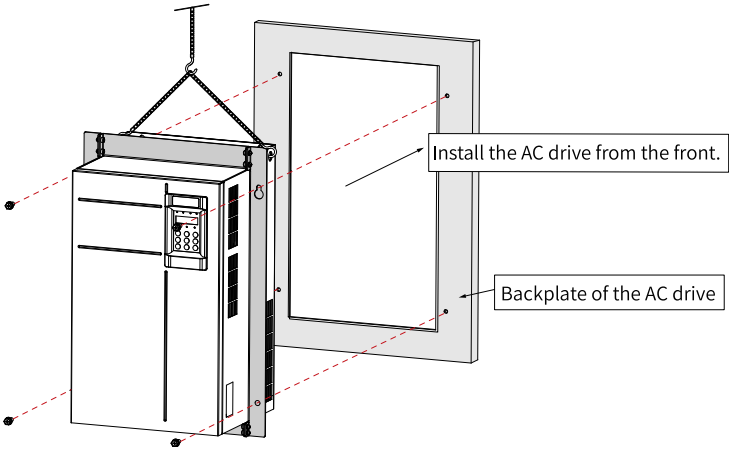


Figure 3-12 Through-hole mounting of models with a sheet metal structure

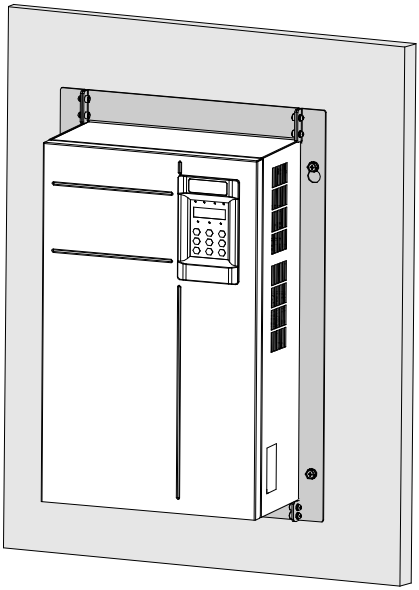


Figure 3-13 Through-hole mounting of models with a sheet metal structure

Mechanical Installation Precautions

Note the following when installing the AC drive:

- Reserve the installation clearances as specified in *"Figure 3–1 " on page 31* to ensure sufficient space for heat dissipation. Take heat dissipation of other components in the cabinet into consideration.

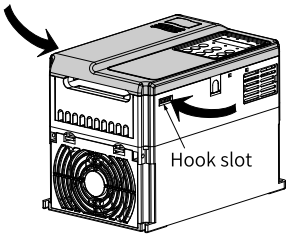
- Install the AC drive upright to facilitate heat dissipation. Install multiple AC drives side by side in a cabinet. For dual-row installation, install an air guide plate, as shown in *"Figure 3–2 " on page 32* .
- Use a mounting bracket made of flame retardant material.
- In scenarios with heavy metal powder, you are recommended to install the heatsink outside the cabinet. Ensure that the room inside the fully-sealed cabinet is as large as possible.

3.1.4 Removing and Installing the Front Cover

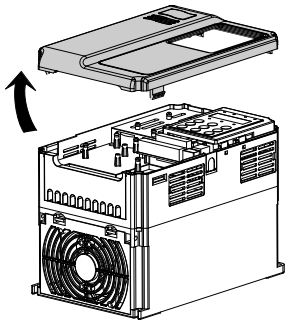
To wire the main circuit and control circuit of the ME320LN^{new} series AC drive, you need to remove the cover first.

To remove the cover of models with a plastic housing, use a tool to forcibly push out the hook of the lower cover to the inside.

1. Press inward symmetrically to disconnect the hook from the hook slot.

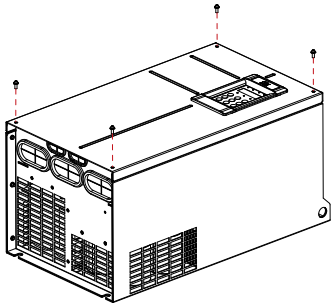


2. Catch the edge of the cover and lift it.

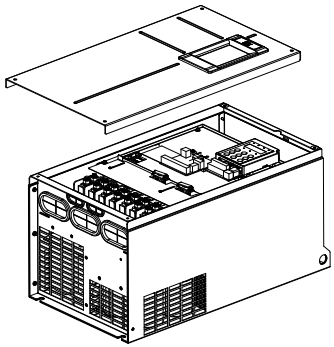


To remove the cover of models with a sheet metal housing, use a tool to loosen screws of the lower cover.

1. Remove the four screws.



2. Lift the lower edge of the cover down and out.



Caution

Be careful when removing the cover to prevent fall-off, which may cause equipment damage or physical injuries.

3.2 Electrical Installation

3.2.1 Selection of Peripheral Electrical Components

Table 3–2 Selection of peripheral electrical components for the ME320LN^{new} series elevator AC drive

AC Drive Model	Air Switch (MCCB) (A)	Contactor (A)	Main Circuit Lead Wire on Input Side (mm^2)	Main Circuit Lead Wire on Output Side (mm^2)	Control Circuit Lead Wire (mm^2)	Grounding Cable (mm^2)
ME320LN-4002-SA	10	9	0.75	0.75	0.75	0.75
ME320LN-4003-SA	16	12	1.5	1.5	0.75	1.5
ME320LN-4005-SA	25	18	2.5	2.5	0.75	2.5

AC Drive Model	Air Switch (MCCB) (A)	Contactor (A)	Main Circuit Lead Wire on Input Side (mm^2)	Main Circuit Lead Wire on Output Side (mm^2)	Control Circuit Lead Wire (mm^2)	Grounding Cable (mm^2)
ME320LN-4007-SA	32	25	4	4	0.75	4
ME320LN-4011-SA	40	32	6	6	0.75	6
ME320LN-4015-SA	50	38	6	6	0.75	6
ME320LN-4018-SA	63	40	10	10	0.75	10
ME320LN-4022-SA	80	50	10	10	1	10
ME320LN-4030-SA	100	65	16	16	1	16
ME320LN-4037-SA	100	80	25	25	1	16
ME320LN-4045-SA	160	95	35	35	1	16
ME320LN-4090-SA	250	205	95	95	1	50

3.2.2 Usage of Peripheral Electrical Components

Table 3–3 Usage of peripheral electrical components for the ME320LN^{new} series elevator AC drive

Component	Installation Location	Description
Air switch	The front end of the power input circuit	Cut off the power supply of the AC drive and provide short circuit protection. It is mandatory.
Contactor	Between the air switch and AC drive input side	Control energization and de-energization of the AC drive. Do not use the contactor to power on or off the AC drive frequently or use the contactor to directly start or stop the AC drive.
AC input reactor	Input side of the AC drive	• Improve the input-side power factor. • Eliminate high-order harmonics at the input side to effectively protect the rectifier bridge. • Eliminate input current unbalance due to unbalance between power phases. Install this AC reactor when the DC reactor cannot meet the performance requirements.

Component	Installation Location	Description
DC reactor	Standard configuration for the ME320LN^{new} series AC drive of models 7.5 kW to 45 kW	• Improve the input-side power factor. • Eliminate impact of high-order harmonics at the input side on the AC drive to effectively protect the rectifier bridge. • Eliminate input current unbalance due to unbalance between power phases, but the effect is inferior to that of the AC input reactor. It features small size, does not cause voltage drop in the circuit, and is the standard configuration.
AC output reactor	Between the AC drive output side and the motor (close to the AC drive)	The output side of the AC drive has much high-order harmonics, when the motor is far from the AC drive, there is much distributed capacitance in the circuit. Certain harmonics may lead to resonance in the circuit, causing two impacts: • Degrade the motor insulation performance and damage the motor in the long run. • Generate large leakage current and cause frequent AC drive protection trips. If the distance between the AC drive and motor is greater than 100 m, it is recommended that an AC output reactor be installed.

3.2.3 Electrical Wiring



- Cut off the power supply before wiring. Failure to comply may result in an electric shock.
- Wiring must be performed by trained professionals. Failure to comply may result in physical injuries or equipment damage.
- Ground the equipment reliably. Failure to comply may result in an electric shock or fire.
- Never connect the braking resistor to the DC bus terminals (+) and (–). Failure to comply may result in serious accidents.

Caution

- Ensure that the power supply meets the input power requirements of the AC drive. Failure to comply may damage the AC drive.
- Ensure that the motor to be connected adapts to the AC drive. Failure to comply may result in motor damage or AC drive protection.
- Do not connect the power supply to the U, V, or W terminal. Failure to comply may damage the AC drive.

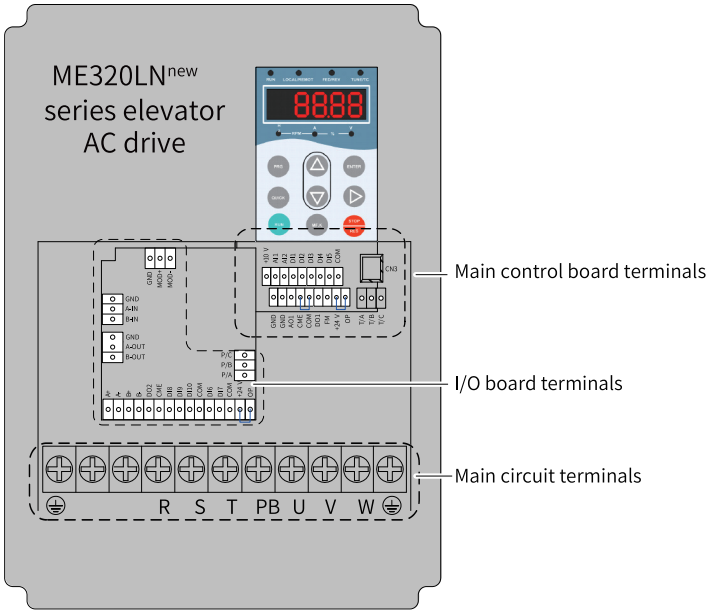


Figure 3-14 Terminal arrangement of the ME320LN^{new} series elevator AC drive

3.2.3.1 Description and Wiring of Main Circuit Terminals

Main Circuit Terminals

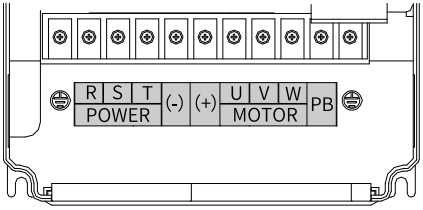


Figure 3-15 Arrangement of main circuit terminals (2.2 kW to 5.5 kW and below)

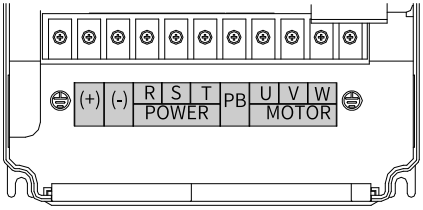


Figure 3-16 Arrangement of main circuit terminals (7.5 kW to 15 kW and below)

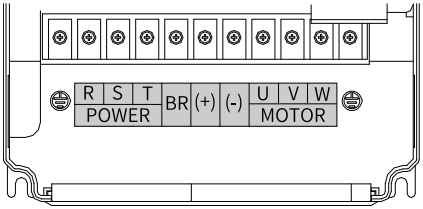


Figure 3-17 Arrangement of main circuit terminals (18.5 kW to 90 kW)

Table 3–4 Main circuit terminals

Symbol	Name	Remarks
R, S, T	Three-phase power input terminals	Input terminals of three-phase 380 VAC power supply
(+), (–)	DC bus positive and negative terminals	Input terminals of the common DC bus, connect models of 37 kW and above
(+), PB	Braking resistor connection terminals	Connect the braking resistor for models of below 37 kW
U, V, W	AC drive output terminals	Connected to a three-phase motor
⏚	Grounding terminal	Grounding terminal

Main Circuit Wiring

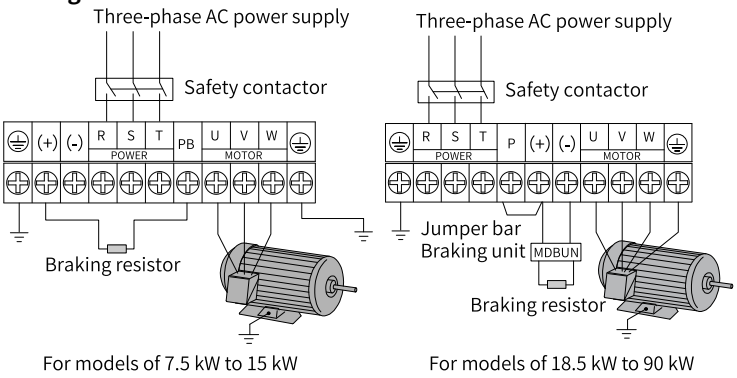


Figure 3-18 Wiring of the main circuit

Wiring Precautions

- A. DC bus terminals (+) and (–)

Caution

Terminals (+) and (–) of the DC bus have residual voltage after the AC drive is powered off. Before touching the terminals, wait until the CHARGE indicator goes off and ensure that the voltage measured with a multimeter is smaller than 36 V.

To release feedback energy when the brake is applied, connect an external braking unit to the DC bus terminals (+) and (–) of the ME320LN^{new} AC drive of 75 kW or above, and connect a braking resistor between the P and PB terminals of the braking unit. Never reverse terminals (+) and (–). Failure to comply may result in AC drive damage or even a fire. The cable length between the braking unit and DC bus terminals (+) and (–) must not exceed 5 m, and that between the braking unit and braking resistor must not exceed 10 m. Use the twisted pair wire or tight pair wires for parallel connection.

Do not connect the braking resistor directly to the DC bus. Failure to comply may result in AC drive damage or even a fire.

- Braking resistor terminals (+) and PB
  The ME320LN^{new} AC drive of below 75 kW has a built-in braking unit. To release feedback energy when the brake is applied, connect a braking resistor between terminals (+) and PB.

- Connect a braking resistor of the recommended model in *"Table 2-7 " on page 29*.
- Ensure that the cable length of the braking resistor is shorter than 5 m.
- The temperature of the braking resistor increases due to energy release. Protection and heat dissipation measures are required.

- U, V, W terminals at the AC drive output side
  - The AC drive output side must be connected to a three-phase motor. When the motor rotating direction is reverse to the required direction, exchange any two of the U, V, and W cables.
  - Do not connect a capacitor or surge protection device to the output side of the AC drive. Otherwise, it may cause frequent AC drive faults or even damage the AC drive.
  - The output circuit must not be short-circuited or grounded.
  - Put the U, V, and W output cables of the AC drive through the grounded metal pipes and separate these cables from the signal cables of the control circuit or lay them vertical to the signal cables.
  - Due to distributed capacitance, overlong cables from the motor to AC drive are very likely to cause resonance in the high frequency current of the circuit, which damages the motor insulation or generates large leakage current, thereby triggering the overcurrent protection mechanism of the AC drive. The cable length must not exceed 100 m. If the motor cable length is greater than 100 m, add an AC output reactor.
- Grounding terminal
  The grounding terminal of the AC drive must be grounded reliably with thick and short conductors. The yellow-green multi-strain copper grounding cable above 4 mm^2 is recommended. Ensure that the grounding resistance does not exceed 5 Ω. The ground electrode must be dedicated. Do not use the neutral wire as the ground electrode.

3.2.3.2 Description and Wiring of Main Control Board Terminals

Terminals on the main control board

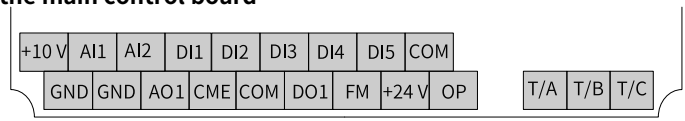


Figure 3-19 Arrangement of terminals on the main control board

Table 3–5 Functions of control terminals

Type	Terminal Mark	Name	Description
Power supply	+10V-GND	+10V external power supply	Provides +10 V power supply to an external device. Maximum output current: 10 mA It is generally used to power an external potentiometer with resistance ranging from 1 kΩ to 5 kΩ.
	+24V-COM	+24V external power supply	Provides +24 V power supply to an external device. It is generally used to power DI terminals and external sensors. Maximum output current: 200 mA
	OP	External power supply input terminal	Connects to +24V by default. When DI1 to DI5 need to be driven by external signal, OP must be disconnected from +24V and then connected to the external power supply.
Analog input	AI1-GND	Analog input terminal 1	Input voltage range: 0 VDC to 10 VDC Input impedance: 100 kΩ
	AI2-GND	Analog input terminal 2	• Input range: 0 VDC to 10 VDC/4 mA to 20 mA, determined by jumper J3 on the control panel • Input impedance: 100 kΩ in voltage input mode, or 500 Ω in current input mode
DI terminal	DI1-COM	Digital input 1	• Photocoupler isolation, compatible with bipolar inputs • Input impedance: 3.3 kW • Voltage upon level input: 9 V to 30 V
	DI2-COM	Digital input 2	
	DI3-COM	Digital input 3	
	DI4-COM	Digital input 4	
	DI5-COM	Digital input 5 (high-speed pulse)	Works as the high-speed pulse input channel in addition to features of DI1 to DI4.
Analog output	AO1-GND	Analog output terminal 1	Voltage or current output, determined by jumper J4 on the control board Output voltage: 0 V to 10 V Output current: 0 mA to 2 mA
Digital output	DO1-CME	Digital output 1	• Photocoupler isolation, bipolar open collector output • Output voltage: 0 V to 24 V • Output current: 0 mA to 50 mA Note: CME and COM are internally insulated. By default, CME and COM are shorted externally (DO1 is driven by +24V by default). To drive DO1 by an external power supply, disconnect the short connection between CME and COM.
	FM-COM	High-speed pulse output terminal	

Type	Terminal Mark	Name	Description
Relay output	T/A-T/B	NC terminal	Driving capacity of the contact: AC: 250 V, 3 A, Cosϕ = 0.4 DC: 30 V, 1 A
	T/A-T/C	NO terminal	
Auxiliary interfaces	J1	Function extension card interface	28-pin terminal, industrial standard for special card interface
	CN3	External operating panel interface	Interface for external operating panel and parameter copy unit

Wiring of terminals on the main control board

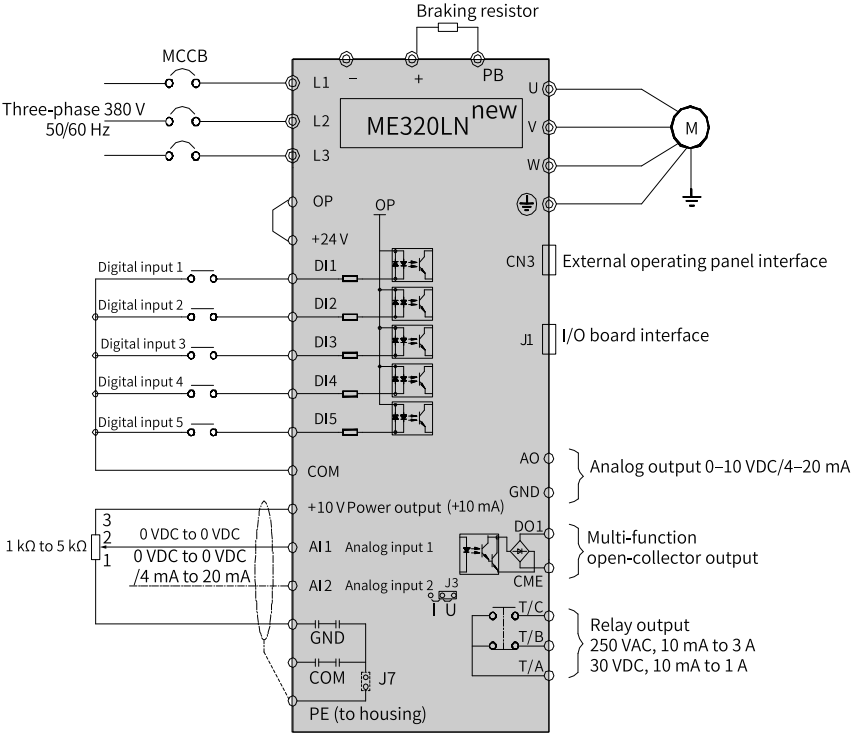


Figure 3-20 Wiring of terminals on the main control board

Note

The wiring modes of all terminals on the main control board of the ME320LN^{new} series AC drive are the same. ◎ indicates the main circuit terminals, and ○ indicates terminals on the main control board.

Precautions for wiring of signal input terminals

- AI terminals
  Weak analog voltage signals are susceptible to external interference. Therefore, a shielded cable is typically required, and the wiring distance should be as short as possible (within 20 m), as shown in *"Figure 3–21 " on page 48* . In scenarios where analog signals experience severe external interference, install a filter capacitor or a ferrite core on the analog signal source, as shown in *"Figure 3–22 " on page 48* .

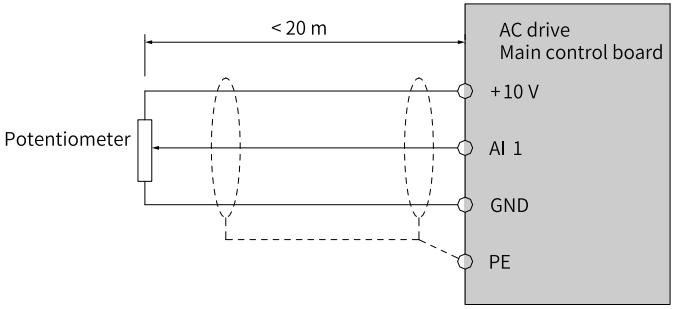


Figure 3-21 Wiring of AI terminals

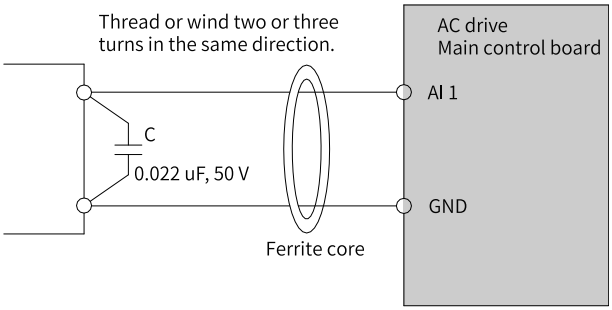


Figure 3-22 Wiring of AI terminals

- DI terminals
  A shielded cable is typically required, and the wiring distance should be as short as possible (within 20 m). When active driving is used, necessary filter measures must be taken to prevent interference to the power supply. The contact control mode is recommended.

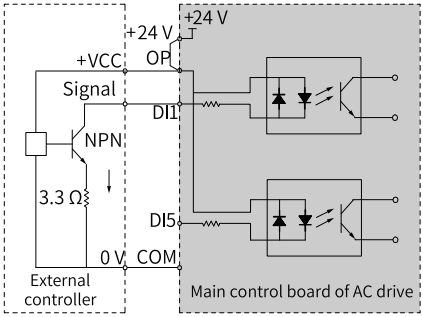


Figure 3-23 Sink wiring

This is the most commonly used wiring mode. To use an external power supply, remove the jumper bar between terminals +24V and OP, and connect the 24V positive pole of the external power supply to OP, and 0V terminal of the external power supply to the DI terminal through the control contact on the AC drive.

Note

This wiring method does not allow DI terminals of different AC drives to be connected in parallel because parallel connection may cause malfunction of the DI terminals. If parallel connection is needed, connect a diode in series to each DI terminal (connect the anode to DI). The diode must meet the following requirements: IF > 10 mA, UF < 1 V. *"Figure 3–24 " on page 49* shows such parallel connection.

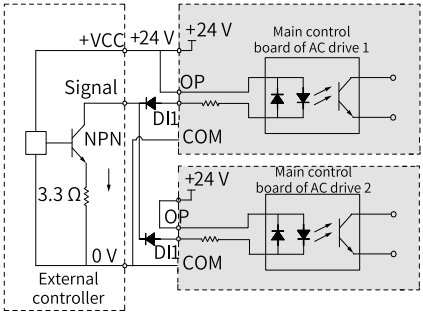


Figure 3-24 Wiring for parallel connection of DI terminals of multiple AC drives in sink mode

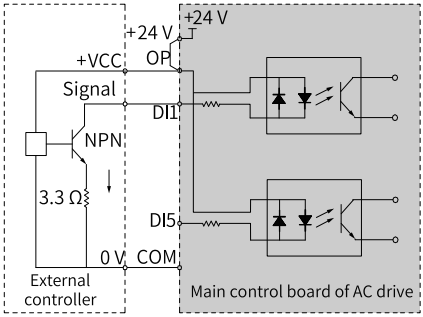


Figure 3-25 Source wiring

In this wiring mode, remove the jumper bar between +24V and OP, and connect +24V to the common terminal of the external AC drive and connect OP to COM. To use an external power supply, remove the jumper bar between +24V and OP, connect OP to 0V of the external power supply, and connect 24V positive pole of the external power supply to the DI terminal through the control contact on the AC drive.

The following part describes wiring of control signal output terminals.

- DO terminals
  To use a DO terminal to drive a relay, install a snubber diode on each side of the relay coil. Otherwise, the 24 VDC power supply may be damaged. Ensure that the driving capacity does not exceed 50 mA.

Note

- Do not reverse the polarity of the snubber diode, as shown in Figure *"Figure 3–26 " on page 51* . Otherwise, the 24 VDC power supply will be damaged immediately once there is digital output.
- CME and COM are internally insulated. By default, CME and COM are shorted externally (DO1 is driven by +24 V by default). To drive DO1 by an external power supply, disconnect the short connection between CME and COM.

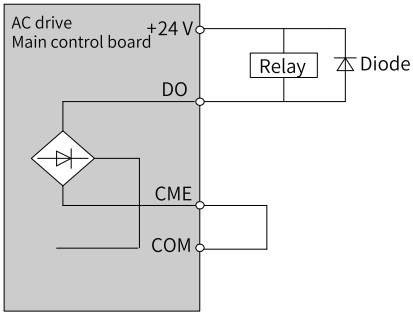


Figure 3-26 Wiring of DO terminals

3.2.3.3 Description and Wiring of I/O Extension Board Terminals

Terminals of I/O Extension Board

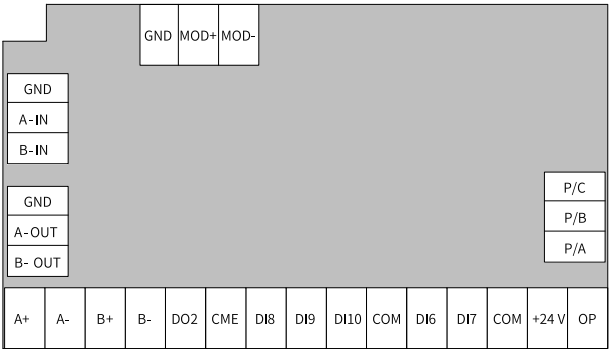


Figure 3-27 Arrangement of terminals on the I/O extension board

Table 3–6 Terminals of I/O Extension Board

Type	Terminal Mark	Name	Description
Power supply	+24V-COM	+24V external power supply	Provides +24 V power supply to an external device. It is generally used as power supply for DI/DO terminals and external sensors. Maximum output current: 200 mA
	OP	External power supply input terminal	Connects to +24V by default. It is disconnected from the +24V power terminal and connected to an external power supply when DI6 to DI10 are driven by external signals.
Digital input	DI6-COM	Digital input 6	• Photocoupler isolation, compatible with bipolar inputs • Input impedance: 3.3 kΩ • Voltage upon level input: 9 V to 30 V
	DI7-COM	Digital input 7	
	DI8-COM	Digital input 8	
	DI9-COM	Digital input 9	
	DI10-COM	Digital input 10	
Digital output	DO2-CME	Digital output 2	Photocoupler isolation, bipolar open collector output Output voltage range: 0 V to 24 V Output current range: 0 mA to 50 mA Note: CME and COM are internally isolated. CME and COM must be shorted externally. To drive DO2 by an external power supply, disconnect the connection between CME and COM.
Relay output	P/A-P/B	NC terminal	Driving capacity of the contact: 250 VAC, 3 A, cosϕ = 0.4 30 VDC, 1 A
	P/A-P/C	NO terminal	
PG card input	A-IN-GND	PG card frequency-division signal A input	• Internally pull up. It can be directly connected to frequency-division output terminal of MCTC-PG-A, PG-B, PG-C, and PG-C2. • It must be connected to the frequency-division output signal of the PG card when the direct travel ride function is used.
	B-IN-GND	PG card frequency-division signal B input	

Type	Terminal Mark	Name	Description
PG card output	A-OUT-GND	PG card frequency-division signal A output	• Open collector output • When the direct travel ride function is used, the frequency-division output signal of the PG card is sent to terminals A-IN and B-IN, and then output by these terminals to the system main board.
	B-OUT-GND	PG card frequency-division signal B output	
	A+ - A-	PG card frequency-division signal A output	• Differential output • When the direct travel ride function is used, the frequency-division output signal of the PG card is sent to terminals A-IN and B-IN, and then output by these terminals to the system main board.
	B+ - B-	PG card frequency-division signal B output	
Communication	MOD+	Communication terminal	RS485 communication terminal
	MOD-		

Wiring of terminals on the I/O extension board

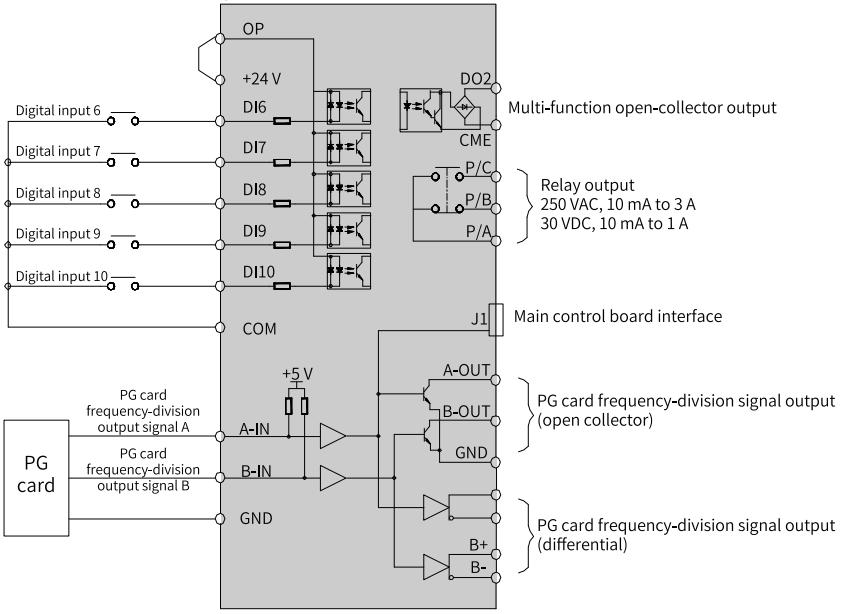


Figure 3-28 Wiring of terminals on the I/O extension board

The frequency-division output signal of the PG card needs to be sent to terminals A-IN and B-IN on the I/O extension board only when the direct travel ride function is used. The system control board obtains this PG card signal from terminals A-OUT and B-

OUT (open collector output) or A+A- and B+B- (differential signal) on the I/O extension board based on needs.

3.2.3.4 Wiring and Description of PG Card for Elevator Specialized Rotary Encoder Interface Board

MCTC-PG-A (matching the open-collector or push-pull incremental encoder for asynchronous motors)

- Technical specifications

Terminal Mark	Function	Response Speed	Output Impedance	Output Current	Frequency-Division Range
+15V, COM	Power supply to encoder	-	About 300 Ω	300 mA	-
PGA, PGB	Signal input from encoder	0 kHz to 80 kHz	-	-	-
OUT-A OUT-B	Frequency-division signal output	0 kHz to 80 kHz	About 30 Ω	100 mA	1 to 62 (even)

- Terminals and DIP switches
  The PG card provides nine terminals. For details, see *"Figure 3–29 " on page 55*. +15PG and COM provide power supply to the encoder. PGA and PGB are encoder signal input terminals. OUT-A, OUT-B, and COM are frequency-division signal output terminals. PE is the shielded cable terminal (connect it to ground during use as the PG card is not grounded internally).

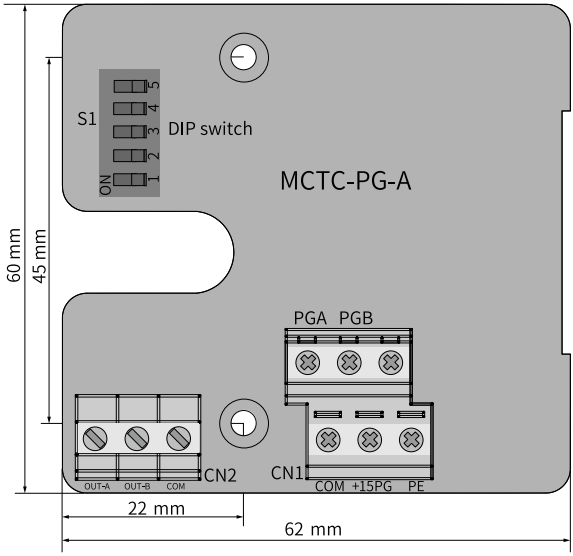


Figure 3-29 MCTC-PG-A asynchronous motor PG card (open-collector or push-pull incremental encoder)

DIP switches are used to set the frequency-division coefficient. Each DIP switch has five binary bits. The one marked with "1" indicates the lowest binary bit and the one marked with "5" indicates the highest binary bit. Frequency-division coefficient is (Value indicated by a binary bit x 2). When a switch is turned to ON, this bit is 1 (active). When this switch is turned to OFF, this bit is 0 (inactive). The following table shows the relationship between the DIP switch bit and the frequency-division coefficient.

Table 3–7 Relationship between the DIP switch bit and the frequency-division coefficient

Decimal	Binary	Frequency-Division Coefficient
0	00000	No frequency-division signal output
1	00001	No frequency-division signal output
2	00010	2 x 2 frequency division
...	...	...
n	...	n x 2 frequency division
31	11111	31 x 2 frequency division

- Wiring

The ME320LN^{new} series elevator AC drive supports PG cards with frequency-division output. Follow the precautions below during wiring:

- Separate the cable between the encoder and the PG card from cables of the control circuit and power circuit. Parallel wiring in close distance is not allowed.
- Use shielded cable for the cable between the encoder and the PG card. Connect the shield to the PE terminal on the AC drive side. To minimize interference, ground only one end.
- Route the cable between the encoder and the PG card in a separate duct and ground the metal shell reliably.

"Figure 3–30 " on page 56 shows the PG card connection.

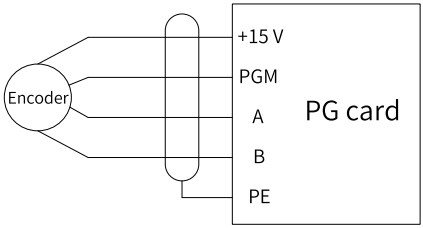


Figure 3-30 Wiring of the MCTC-PG-A asynchronous motor PG card

MCTC-PG-B (matching UVW encoder for synchronous motors or line-driver incremental encoder for asynchronous motors)

- Technical specifications

Terminal Mark	Function	Response Speed	Output Impedance	Output Current	Frequency-Division Range
VCC, GND	Power supply to encoder	-	About 300 Ω	300 mA	-
A+, B+, A–, B–, U+, V+, W+, U–, V–, W–	Signal input from encoder	0 kHz to 80 kHz	-	-	-
OUT-A, OUT-B, COM	Frequency-division signal output	0 kHz to 80 kHz	About 30 Ω	100 mA	1

- Terminals
  The PG card provides 15 terminals. For details, see *"Figure 3–31 " on page 57* . VCC and GND provide power supply to the encoder. A+, B+, A–, B–, U+, V+, W+, U–, V–, and W– are encoder signal input terminals. OUT-A, OUT-B, and COM are frequency-division signal output terminals.

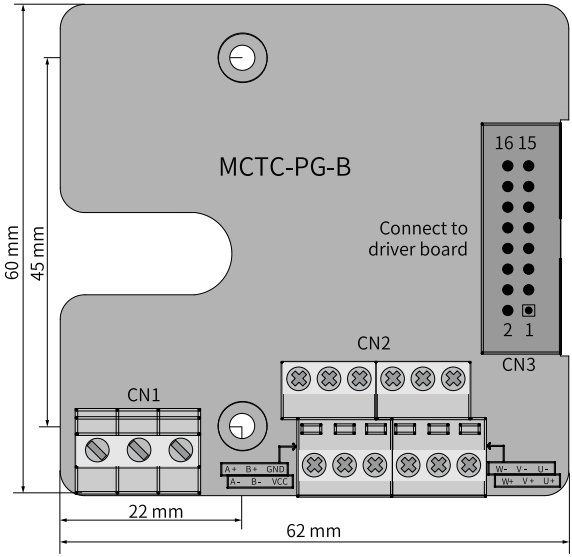


Figure 3-31 MCTC-PG-B synchronous motor PG card (UVW encoder or line-driver output encoder for asynchronous motors)

- Wiring
  - Separate the encoder cable from cables of the control circuit and power circuit. Parallel wiring in close distance is not allowed.
  - Route the encoder cable in a separate duct and ground the metal shell reliably.

MCTC-PG-C (ERN1387 encoder)

- Technical specifications

Terminal Mark	Function	Response Speed	Output Impedance	Output Current	Frequency-Division Range
VCC, GND	Power supply to encoder	-	About 300 Ω	300 mA	-
A+, B+, A–, B–, C+, D+, Z+, C–, D–, Z– OUT-A, OUT-B	Signal input from encoder	0 kHz to 80 kHz	-	-	-
COM	Frequency-division signal output	0 kHz to 80 kHz	About 30 Ω	100 mA	1

- Terminals
  The MCTC-PG-C card provides 15 terminals and a 16-pin interface, as shown in *"Figure 3–32 " on page 58* . VCC and GND provide power supply to the encoder. A+, A–, B+, B–, C+, C–, D+, D–, Z+, and Z– are encoder signal input terminals. OUT-A, OUT-B, and COM are frequency-division signal output terminals. The 16-pin interface is connected to the bottom driver board of the controller.

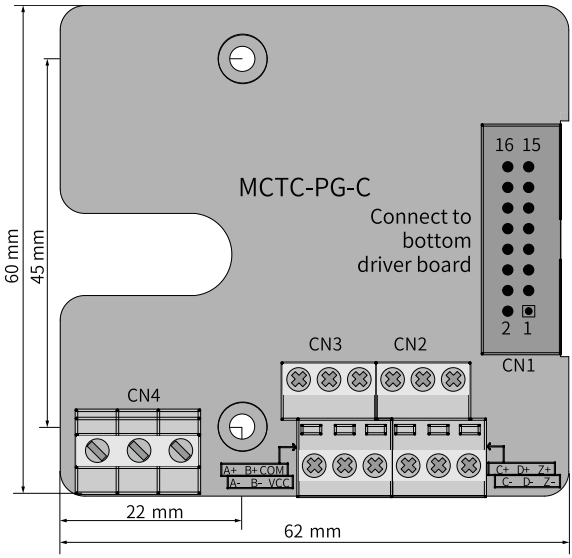


Figure 3-32 MCTC-PG-C (ERN1387 encoder)

MCTC-PG-C2

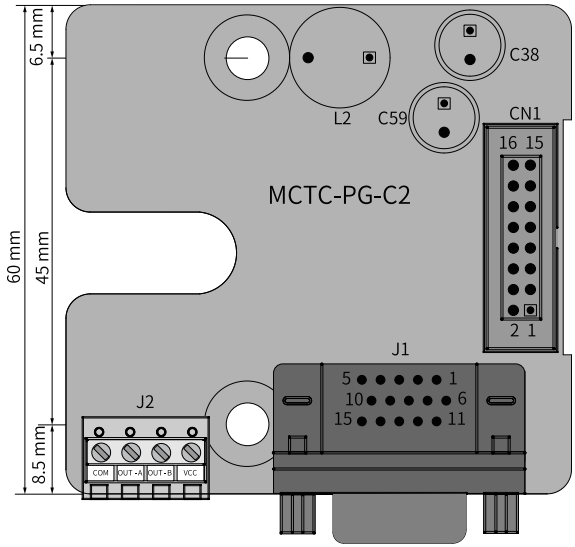


Figure 3-33 MCTC-PG-C2 appearance and dimensions (open-collector output)

Different from MCTC-PG-C, MCTC-PG-C2 provides a type-D 15-pin (DB15) connector as the encoder interface.

MCTC-PG-C3

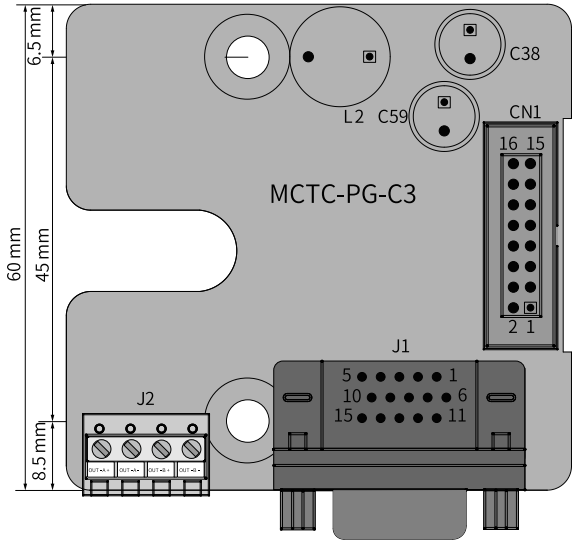
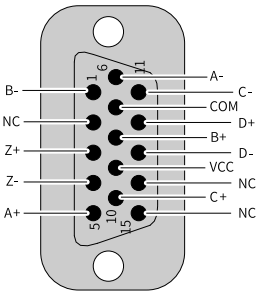


Figure 3-34 MCTC-PG-C3 appearance and dimensions (differential signal output)

Different from MCTC-PG-C2, MCTC-PG-C3 provides differential output.

Both MCTC-PG-C2 and MCTC-PG-C3 use the type-D 15-pin (DB15) connector to connect the ERN1387 SIN/COS encoder. The following table describes the pin definition.

PG Card Model	DB15 Pin Definition	Adaptable Encoder
MCTC-PG-C2 MCTC-PG-C3		ERN1387 SIN/COS encoder

3.3 EMC Problems and Solutions

3.3.1 Impact of Harmonics

- High-order harmonics of the power supply have a great impact on the rectifier bridge. After long-term operation, the rectifier bridge is easily damaged due to work point drift. In applications with poor grid quality, to protect the AC drive, install a filter or an AC input reactor between the power supply and the AC drive or install a DC reactor on the DC bus of the AC drive to suppress harmonics of the input power supply.
- Do not install a capacitor or surge protection device for improving the power factory at the AC drive output side. Otherwise, the circuit current may oscillate and the device may be damaged due to high-order harmonics at the output side of the AC drive.

3.3.2 Electromagnetic Interference and Solutions

Electromagnetic interference is divided into two types. One is interference of peripheral electromagnetic noise on the AC drive, which causes malfunction of the AC drive. Such interference generally has a small impact because the AC drive is designed with effective measures to prevent interference. The other one is interference of the AC drive on peripheral devices. The following describes solutions to each type of interference.

- Measures for interference of peripheral electromagnetic devices on the AC drive

Generally, the AC drive is subject to electromagnetic interference from peripheral relays, contactors, or electromagnetic brakes. When the AC drive has malfunction due to such interference, take the following measures:

- Install a surge protection device on the devices generating interference.
- Install a filter at the signal input end of the AC drive.

- Measures for interference of the AC drive on peripheral devices
  To eliminate interference, ensure that:
  - The AC drive and other electrical devices must be grounded properly. The grounding resistance is no more than 5 Ω.
  - The power cable of the AC drive and the cable of the control circuit must be laid vertically (if possible) rather than in parallel.
  - The power cable of the AC drive should use shielded cable, and the shield must be reliably grounded.
  - For lead wires in exposure to interference, shielded twisted-pair control cables should be used and the shield must be reliably grounded.

  Noises include noise generated by the AC drive and noise generated by the lead wires between the AC drive and the motor. Such radiation makes the surface of peripheral electrical device lead wires exposed to electromagnetic and electrostatic induction.
  - For measuring instruments, receivers, and sensors that have weak signal and are close to the AC drive or installed in the same control cabinet of the AC drive, take the following measures to prevent malfunction caused by interference: keep them away from any interference source; do not arrange the signal cable in parallel with the power cable, let alone bundle them together; use shielded signal cable and power cable; add a linear filter or radio noise filter at the input and output sides of the AC drive.
  - When the affected devices and the AC drive share the same power supply, if the interference cannot be eliminated by the above measures, add a linear filter or radio noise filter between the AC drive and the power supply.
  - Separately grounding the peripherals can eliminate interference generated because the AC drive grounding cable has leakage current when a common ground is used.

3.3.3 Leakage Current and Solutions

AC drive leakage current includes leakage current to ground and leakage current between cables.

- Influencing factors of leakage current to ground and solutions:
  There is distributed capacitance between the lead wire and the ground. The larger the distributed capacitance, the larger the leakage current. Effectively reduce the distance between the AC and the motor to reduce the distributed capacitance. The

larger the carrier frequency, the larger the leakage current. Reduce the carrier frequency to reduce the leakage current. However, reducing the carrier frequency will increase the motor noise. You can add a reactor to reduce the leakage current.

- The leakage current increases with the circuit current. Therefore, a large motor power causes a large leakage current.
- Influencing factors of leakage current between cables and solutions:
  - There is distributed capacitance between output cables of the AC drive. If the circuit current contains harmonics, resonance will occur, which will cause leakage current. If a thermal relay is used in this case, it will have malfunction.
  - A solution is to reduce the carrier frequency or add an output reactor. You are recommended not to add a thermal relay before the motor when using the AC drive; instead, use the electronic overcurrent protection of the AC drive.

4 Commissioning and Trial Operation

4.1 Overview

This chapter describes how to operate the ME320LN^{new} elevator AC drive and set parameters by using the operating panel.

4.1.1 Command Source

The command source indicates the way that the AC drive receives the RUN command and speed references. The ME320LN^{new} AC drive can use only one of the following command sources at a time.

- Operating panel: The RUN command is given by pressing the RUN or STOP key on the operating panel.
- Terminals: The RUN command and speed references are given as input signals by multi-function input terminals.

4.1.2 Control Mode

The ME320LN^{new} AC drive supports three control modes:

- Sensorless vector control (SVC)
- Feedback vector control (FVC)
- V/f control

4.1.3 Operating Mode

Auto-tuning mode: The ME320LN^{new} elevator AC drive supports two motor auto-tuning modes: with-load and no-load. For details, see the description of parameter F1-11.

- Common mode: In the common mode, the AC drive runs under control by the operating panel and analog input.
- Multi-speed mode: In the multi-speed mode, the speed references are given by state combinations of multi-speed terminals.

The AC drive can run in only one mode at a time.

4.1.4 System State

An energized ME320LN^{new} AC drive may be in one of these four states: stop, programming, running, and fault and alarm states.

- Stop state: After power-off or execution of RUN commands, the AC drive enters the stop state. The AC drive exits this state after receiving the RUN command again. In this state, the RUN indicator is off, and the LED display flashes. The parameters can be viewed cyclically by pressing >>.

- Programming state: The AC drive is in the programming state when you view or set parameters on the operating panel.
- Running state (elevator running): When the AC drive is running, the RUN indicator is on. The LED display does not flash.
- Fault and alarm state: The AC drive is faulty and the fault code is displayed.

4.2 Operating Panel

The LED operating panel is a standard configuration for the ME320LN^{new} elevator AC drive. With the operating panel, you can modify parameters, monitor the AC drive states, and operate (start or stop, for example) the ME320LN^{new} elevator AC drive.

The operating panel is shown in *"Figure 4–1 " on page 64* .

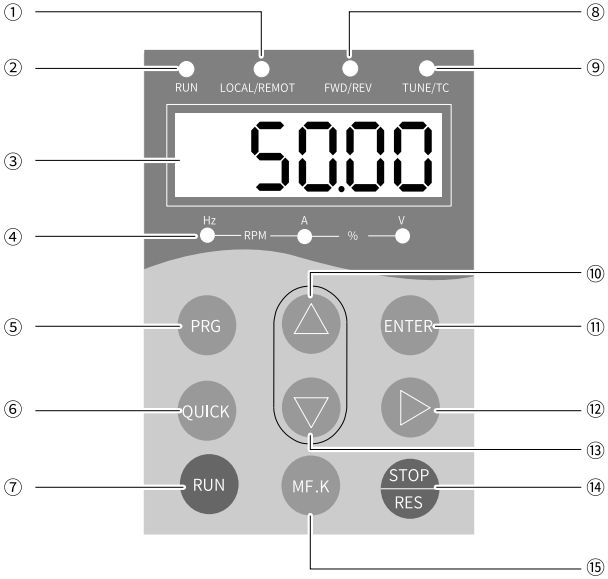


Figure 4-1 Diagram of the operating panel

Table 4–1 Components of the operating panel

No.	Name	No.	Name
①	Command source indicator	⑨	Auto-tuning/Torque control/Fault indicator
②	System state indicator	⑩	Up
③	Data display area	⑪	Confirm
④	Unit indicator	⑫	Shift
⑤	Programming	⑬	Down

No.	Name	No.	Name
⑥	Quick	⑭	Stop/Reset
⑦	Run	⑮	Multi-function
⑧	Running direction indicator	-	-

Table 4–2 Keys

Key	Name	Function
PRG	Programming	Enter or exit Level-1 menu.
ENTER	Confirm	Enter the menu interfaces level by level, and confirm the parameter setting.
△	Up	Increase parameter number or value.
▽	Down	Decrease parameter number or value.
▷	Shift	Select the displayed parameters in turn in the stop or running state, and select the digit to be modified when modifying parameters.
RUN	Run	Start the AC drive in the operating panel control mode.
STOP RES	Stop/Reset	Stop the AC drive when it is in the running state or reset the AC drive when it is in the fault state.
MF.K	Multi-function	Display or hide the fault information in the fault state, which facilitates parameter viewing.
QUICK	Quick	Enter or exit Level-1 quick menu.

In the following table, ☀ indicates ON, ● indicates OFF, and ☾ indicates flashing.

Table 4–3 Indicators on the operating panel

Indicator Status		State Description
RUN System state indicator	RUN	OFF: Stop
	RUN	ON: Running
LOCAL/REMOT Running mode indicator	LOCAL/REMOT	OFF: Up direction
	LOCAL/REMOT	ON: Down direction
FWD/REV Running direction indicator	FWD/REV	OFF: Forward running
	FWD/REV	ON: Reverse running
TUNE/TC Auto-tuning indicator	TUNE/TC	OFF: Non-auto-tuning state
	TUNE/TC	ON: Auto-tuning state
Hz - RPM - A - % - V		Frequency unit: Hz
Hz - RPM - A - % - V		Current unit: A
Hz - RPM - A - % - V		Voltage unit: V
Hz - RPM - A - % - V		Speed unit: RPM
Hz - RPM - A - % - V		Percentage: %

The operating panel provides 5-digit LED display to indicate the frequency reference, output frequency, various monitoring data, and fault codes.

Table 4–4 Mapping between LED display and actual data

LED Display	Actual Data	LED Display	Actual Data	LED Display	Actual Data	LED Display	Actual Data
0	0	6	6	C	C	n	N
1	1	7	7	c	c	P	P
2	2	8	8	d	D	r	R
3	3	9	9	E	E	t	T
4	4	A	A	F	F	U	U
5	5, S	b	B	L	L	u	u

4.3 Methods of Viewing and Operating Parameters

4.3.1 Three-Level Menu Operation Flowchart

This section describes how to set parameters by using the operating panel of the ME320LN^{new} elevator AC drive. The operating panel adopts three-level menus to facilitate parameter query and modification.

The three-level menu structure is parameter group (level 1) > parameter (level 2) > parameter setpoint (level 3). The operation flowchart is shown in *"Figure 4–2 " on page 67*.

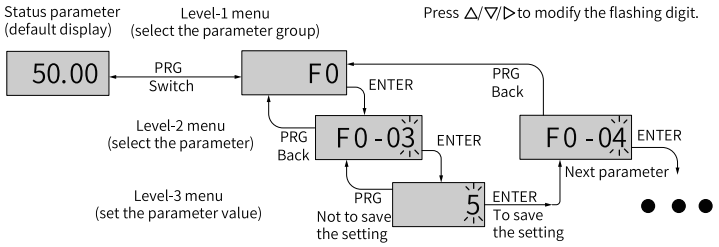


Figure 4-2 Three-level menu operation flowchart

Notes:

- In a level-3 menu, you can press PRG or ENTER to return to a level-2 menu. These two keys are different in that:
  - After you press ENTER, the system saves the current parameter modification, returns to the level-2 menu, and shows the next parameter.
  - After you press PRG, the system does not save the current parameter modification, but directly returns to the level-2 menu and remains at the current parameter.

  Here is an example of changing the value of parameter F0-04 from 50.00 Hz to 15.00 Hz, as shown in *"Figure 4–3 " on page 68* .

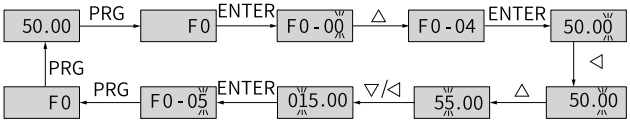


Figure 4-3 Example of changing the parameter value

- In level-3 menu, if a parameter has no flashing digit, it means that the parameter cannot be modified. This may be because:
  - The parameter is an unmodifiable parameter, such as an actual measurement and running record.
  - The parameter can only be modified after the motor stops.

4.3.2 Viewing Status Parameters

You can press the shift key to switch between status parameters.

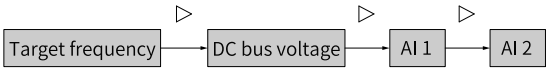


Figure 4-4 Shift between status parameters

When the ME320LN^{new} elevator AC drive is in the stop or running state, its status parameters can be displayed by the LEDs. Decide whether to display a parameter or not by setting parameters F8-01 (Parameter display in the running state) and F8-02 (Parameter display in the stop state) based on binary bits. Press the shift key to switch between these parameters circularly in the stop or running state.

- In the stop state, a total of eight parameters of the ME320LN^{new} elevator AC drive can be viewed circularly by pressing the shift key. They are the target linear speed, target frequency, DC bus voltage, AI1, AI2, and car load (%). Select the parameters

to be displayed by setting F8-02 (converted based on binary bits) and press the shift key to switch between parameters circularly.

- In the running state, a total of 13 parameters can be displayed, including the load speed, running frequency, target frequency, DC bus voltage, output voltage, output current, AI1, AI2, car load (%), startup compensation current (%), and running torque current (%). Select the parameters to be displayed by setting F8-01 (converted based on binary bits) and press the shift key to switch between parameters circularly.

Para.	Name	Value Range	Min. Unit	Default	Property
F8-01	Parameter display in the stop state	1 to 32767 bit0: Load speed bit1: Running frequency bit2: Target frequency bit3: DC bus voltage bit4: Output voltage bit5: Output current bit6: AI1 bit7: AI2 bit8: Car load (%) bit9: Startup compensation current (%) bit10: Running torque current (%) bit11: Input state bit12: Output state	1	32767	☆
F8-02	Parameter display in the stop state	1 to 255 bit0: Target load speed bit1: Target frequency bit2: DC bus voltage bit3: AI1 bit4: AI2 bit5: Car load (%) bit6: Input state bit7: Output state	1	255	☆

4.3.3 Reading Fault Information

When a fault occurs on the AC drive, the operating panel displays the fault code. Based on the fault code, you can analyze the fault causes to rectify the fault quickly. The ME320LN^{new} elevator AC drive records the latest 11 faults, and the frequency, current, bus voltage, and DI/DO terminal state of the latest 3 faults. The following figure shows the details.

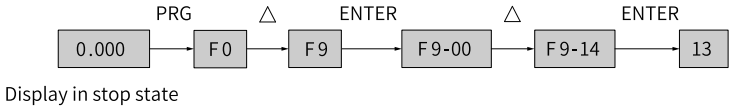


Figure 4-5 Viewing fault information

4.3.4 Monitoring DI/DO Terminal State

The DI/DO terminal state needs to be monitored during running. For details, see the description of parameter F8-00.

4.4 Password Setting

The AC drive provides the password protection function to secure the parameter setting.

"Figure 4–6 " on page 70 shows an example of changing the password to 12345.

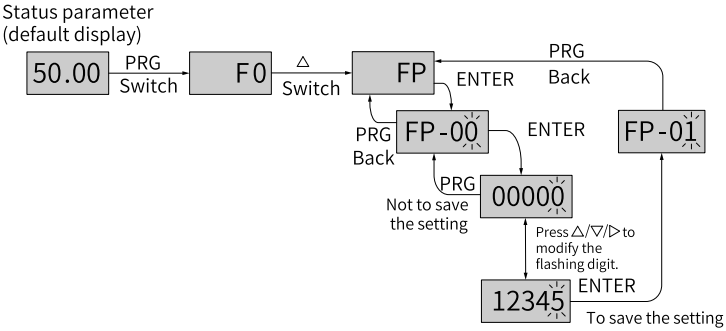


Figure 4-6 Password setting procedure

When FP-00 is set to a non-zero value, the password function is enabled. In this case, if you press PRG in an attempt to edit a parameter, the system requires user password verification by displaying "———". You must enter the correct user password to access the menu. To view factory defaults, you need to enter the correct factory password. Do not try to modify factory defaults because incorrect setting will easily cause abnormality or damage to the AC drive.

During password setting, you can change the user password and the last input is considered as the set password.

To disable the password protection function, access the menu with the correct password and then set FP-00 to 0. The password protection function is enabled if FP-00 is not 0 upon power-on.

5 List of Parameters

5.1 Introduction

Parameters of the ME320LN^{new} series AC drive are divided by function into 18 groups: F0 to F9, FA to FD, FU, FJ, FF, and FP. Each group includes multiple parameters. A three-level menu structure is adopted for these parameters. The character string FX-XX in this guide indicates the XXth parameter in the Xth group. For example, F9-08 indicates the eighth parameter in the F9 group.

All parameter operations in the AC drive are divided into three levels as follows:

- Level-1 menu: parameter group
- Level-2 menu: parameter
- Level-3 menu: parameter setpoint

Table 5–1 Meaning of each column in the parameter list

Para.	Name	Value Range	Min. Unit	Default	Property
Indicates the number of the parameter	Indicates the full name of the parameter	Indicates the valid setting range of the parameter	Indicates the measurement unit of the parameter	Indicates the default setting of the parameter at factory	Indicates whether and in what conditions the parameter can be modified

☆: The parameter can be modified when the ME320LN^{new} elevator AC drive is in the stop or running state.

★: The parameter cannot be modified when the ME320LN^{new} elevator AC drive is in the running state.

●: The parameter value is a measured value and cannot be changed.

Note

The system automatically checks the modification property of all parameters to prevent faulty operation.

The Default column lists the values to which relevant parameters will be reset after the function of restoring default settings is activated. In this case, measured values and recorded values will not be reset.

The AC drive provides the password protection function to secure the parameter setting (for details, see *"4.4 Password Setting" on page 70*).

5.2 Parameter Groups

On the operating panel, press PRG and then △ or ▽. All level-1 menus displayed are the function parameter groups. The following table lists the parameter groups.

Para. Group	Name	Para. Group	Name
F0	Basic parameters	F9	Fault and protection parameters
F1	Motor parameters	FA	PG parameters
F2	Vector control parameters	FB	Communication parameters
F3	Start/stop control parameters	FC	Special enhanced function parameters
F4	Input function parameters	FD	Special function parameters
F5	Output function parameters	FU	Monitoring parameters
F6	Speed parameters	FJ	Reserved parameters
F7	Curve parameters	FF	Factory parameters
F8	Operating panel and display parameters	FP	User parameters

5.3 Parameter List

Para.	Name	Value Range	Min. Unit	Default	Property
Group F0: Basic Parameters					
F0-00	Control mode	0: Sensorless vector control (SVC) 1: Feedback vector control (FVC) 2: V/f control	1	1	★
F0-01	Command source selection	0: Operating panel control 1: Terminal control	1	1	★
F0-02	Speed reference source selection	0: Digital setting 1: Multi-speed 2: AI1 3: AI2 4: Reserved 5: Special multi-speed	1	1	★
F0-03	Digital setting frequency	0.00 to maximum frequency	0.01 Hz	00.00 Hz	☆
F0-04	Running direction	0: Run in the same direction 1: Run in the opposite direction	1	0	★
F0-05	Maximum frequency	0.00 Hz to 90.00 Hz	0.01 Hz	50.00 Hz	★
F0-06	Carrier frequency	0.5 kHz to 16.0 kHz	0.1 kHz	Model dependent	☆

Para.	Name	Value Range	Min. Unit	Default	Property
F0-07	Carrier frequency adjusting mode	0: Fixed PWM 1: Random PWM	1	0	☆
Group F1: Motor Parameters					
F1-00	Encoder type	0: SIN/COS 1: UVW 2: ABZ	1	1	★
F1-01	Rated power	0.4 kW to 110.0 kW	0.1 kW	Model dependent	★
F1-02	Rated voltage	100 V to 500 V	1 V	Model dependent	★
F1-03	Rated current	0.00 A to 655.00 A	0.01 A	Model dependent	★
F1-04	Rated frequency	0 Hz to maximum frequency	0.01 Hz	50.00 Hz	★
F1-05	Rated speed	0 RPM to 30000 RPM	1 RPM	1460 RPM	★
F1-06	Reserved	0 to 65535	1	0	★
F1-07	Encoder angle of synchronous motor at power-off	0.0 to 359.9	0.1	0	★
F1-08	Reserved	0 to 65535	1	0	★
F1-09	Current filter coefficient of synchronous motor	0.0 to 3.0	0.1	0	★
F1-10	Encoder signal check	0 to 65535	1	0	★
F1-11	Motor auto-tuning mode	0: Disable 1: With-load auto-tuning 2: No-load auto-tuning	1	0	★
F1-12	Reserved	0 to 65535	1	0	★
F1-13	Reserved	0 to 65535	1	0	★
F1-14	Stator resistance	0.001 Ω to 65.000 Ω	0.001 Ω	Model dependent	☆
F1-15	Asynchronous motor rotor resistance	0.001 Ω to 65.000 Ω	0.001 Ω	Model dependent	☆
F1-16	Asynchronous motor leakage inductance	0.01 mH to 650.00 mH	0.01 mH	Model dependent	☆
F1-17	Asynchronous motor mutual inductance	0.1 mH to 6500.0 mH	0.1 mH	Model dependent	☆
F1-18	Asynchronous motor no-load current	0.01 A to 650.00 A	0.01 A	Model dependent	☆
F1-19	Synchronous motor D-axis inductance	0.01 mH to 650.00 mH	0.01 mH	0.01 mH	★
F1-20	Synchronous motor Q-axis inductance	0.01 mH to 650.00 mH	0.01 mH	0.01 mH	★
F1-21	Synchronous motor back EMF	0 V to 65535 V	1 V	0 V	★

Para.	Name	Value Range	Min. Unit	Default	Property
F1-25	Motor type	0: Asynchronous motor 1: Synchronous motor	1	1	★
Group F2: Vector Control Parameters					
F2-00	Speed loop proportional gain 1	0 to 100	1	35	☆
F2-01	Speed loop integral time 1	0.01s to 10.00s	0.01s	0.60s	☆
F2-02	Switchover frequency 1	0.00 Hz to F2-05	0.01 Hz	2.00 Hz	☆
F2-03	Speed loop proportional gain 2	0 to 100	1	30	☆
F2-04	Speed loop integral time 2	0.01s to 10.00s	0.01s	0.8	☆
F2-05	Switchover frequency 2	F2-02 to maximum frequency	0.01 Hz	5.00 Hz	☆
F2-06	Current loop proportional gain	10 to 500	1	60	☆
F2-07	Current loop integral gain	10 to 500	1	30	☆
F2-08	Torque upper limit	0.0% to 200.0%	0.10%	150.00%	☆
F2-09	Torque acceleration time	1 ms to 500 ms	1 ms	1 ms	★
F2-10	Torque deceleration time	1 ms to 500 ms	1 ms	350 ms	★
F2-11	Speed filter coefficient	1 to 20	1	10	★
F2-12	Angle-free auto-tuning function selection	0 to 65535 bit1: 0: Disable 1: Enable bit2: 0: Semi-automatic 1: Full-automatic	1	0	★
Group F3: Start/Stop Control Parameters					
F3-00	Startup frequency	0.00 Hz to 10.00 Hz	0.01 Hz	0.00 Hz	☆
F3-01	Torque output delay	0.00s to 10.00s	0.01s	0.20s	★
F3-02	Brake release delay	0.20s to 10.00s	0.01s	0.20s	★
F3-03	Zero-speed delay	0.00s to 10.00s	0.01s	0.30s	★
F3-04	Startup time	0.00s to 10.00s	0.01s	0.00s	★
F3-05	Startup frequency active time	0.00s to 10.00s	0.01s	0.00s	★
F3-06	Brake release delay	0.00s to 10.00s	0.01s	0.20s	★
F3-07	Stop zero-speed delay	0.00s to 10.00s	0.01s	0.30s	★

Para.	Name	Value Range	Min. Unit	Default	Property
F3-08	RUN contactor open delay	0.00s to 10.00s	0.01s	0.00s	★
F3-09	Startup pre-torque setting selection	0: Pre-torque invalid 1: DI setting 2: AI1 setting 3: AI2 setting 4: Using pre-torque initial offset 5: No-load-cell compensation	1	0	★
F3-10	Pre-torque offset	0.0% to 100.0%	0.10%	48.00%	☆
F3-11	Pre-torque gain	0.00 to 1.50	0.01	0.6	★
F3-12	Pre-torque initial offset	–100.0% to +100.0%	0.10%	10.00%	☆
F3-13	DI load cell signal 1	0.0% to 100.0%	0.10%	10.00%	★
F3-14	DI load cell signal 2	0.0% to 100.0%	0.10%	30.00%	★
F3-15	DI load cell signal 3	0.0% to 100.0%	0.10%	70.00%	★
F3-16	DI load cell signal 4	0.0% to 100.0%	0.10%	90.00%	★
F3-17	Filter time of load cell analog input	0.00s to 1.00s	0.01s	0.10s	☆
F3-18	Load cell analog no-load input	0.00 V to 10.00 V	0.01 V	0.00 V	☆
F3-19	Load cell analog full-load input	0.00 V to 10.00 V	0.01 V	10.00 V	☆
F3-20	Load for analog load cell auto-tuning	0 to 100	1	0	☆
F3-21	Analog load cell auto-tuning function selection	0: Disable 1: Enable	1	0	☆
F3-22	Pre-torque direction reversing	0: Disable 1: Enable	1	0	☆
F3-24	Slip test function selection	0: Disable 1: Enable	1	0	★
Group F4: Input Function Parameters					
F4-00	DI filter time	0.001s to 0.200s	0.001	0.020s	☆

Para.	Name	Value Range	Min. Unit	Default	Property
F4-01	DI1 function selection	0: Invalid 1: Forward run (FWD, up) 2: Reverse run (REV, down) 3: Multi-speed terminal 1 4: Multi-speed terminal 2 5: Multi-speed terminal 3 6: Fault reset 7: Enable control 8: Inspection input 9: Emergency input	1	3	★
F4-02	DI2 function selection		1	4	★
F4-03	DI3 function selection		1	5	★
F4-04	DI4 function selection		1	6	★
F4-05	DI5 function selection		1	7	★
F4-06	DI6 function selection		1	1	★
F4-07	DI7 function selection		1	2	★
F4-08	DI8 function selection		1	0	★
F4-09	DI9 function selection		1	0	★
F4-10	DI10 function selection	10: RUN contactor feedback 11: Brake feedback 12: Load cell terminal 1 13: Load cell terminal 2 14: Load cell terminal 3 15: Load cell terminal 4 16: External fault 17: Motor overheat 18: Up speed judgment 19: Down speed judgment 20: Multi-speed logic selection 1 21: Multi-speed logic selection 2 22: Direct travel ride command The value range is 0 to 122. The hundreds position indicates the NO/NC type (1 means NC), and the lowest two digits indicate the selected function (invalid if the value is greater than 22). For example, 106 indicates that the DI is set with the function 06 (Fault reset) and the signal type is NC.	1	0	★
F4-11	Reserved	0 to 65535	1	0	★
F4-12	Reserved	0 to 65535	1	0	★
F4-13	Multi-speed combination filter time	0.000s to 0.200s	0.001	0.020s	☆
Group F5: Output Function Parameters					
F5-00	FM output selection	0: No output 1: Running 2: Zero-speed running (valid in zero-speed running state) 3: Zero-speed signal (output even at stop) 4: Fault signal 5: RUN contactor output control 6: Brake output control 7: Advance door opening signal 8: Bus undervoltage	1	15	★
F5-01	DO1 function selection		1	3	★
F5-02	DO2 function selection		1	0	★
F5-03	Control board relay output selection		1	4	★
F5-04	Extension board relay output selection		1	0	★

Para.	Name	Value Range	Min. Unit	Default	Property
F5-05	Reserved	9: FDT 1 output 10: FDT 2 output 11: Frequency reached 12: Overspeed output 14: Running time reached 15: Ready for RUN 16: Contact stuck output control 17: Re-leveling output 18: Light-load running output Note: FDT means frequency detection. The function is used to detect the output frequency of the AC drive and compare it with the frequency reference. A related signal is output through the DO terminal based on the comparison result.	1	0	★
F5-06	Zero-speed output hysteresis time	0.000s to 2.000s	1	0.000s	★
F5-07	AO function selection	0: Running frequency 1: Frequency reference 2: Output current 3: Output torque 4: Output voltage 5: AI1 6: AI2	1	0	★
F5-08	AO zero offset	–100.0% to +100.0%	0.10%	0.00%	☆
F5-09	AO gain	–10.00 to +10.00	0.01	1	☆
Group F6: Speed Parameters					
F6-00	Speed 0	0 to maximum frequency	0.01 Hz	0.00 Hz	★
F6-01	Speed 1	0 to maximum frequency	0.01 Hz	0.00 Hz	★
F6-02	Speed 2	0 to maximum frequency	0.01 Hz	0.00 Hz	★
F6-03	Speed 3	0 to maximum frequency	0.01 Hz	0.00 Hz	★
F6-04	Speed 4	0 to maximum frequency	0.01 Hz	0.00 Hz	★
F6-05	Speed 5	0 to maximum frequency	0.01 Hz	0.00 Hz	★
F6-06	Speed 6	0 to maximum frequency	0.01 Hz	0.00 Hz	★
F6-07	Speed 7	0 to maximum frequency	0.01 Hz	0.00 Hz	★
F6-08	Acceleration/ Deceleration curve of speed 0	1 to 4	1	1	★
F6-09	Acceleration/ Deceleration curve of speed 1	1 to 4	1	1	★
F6-10	Acceleration/ Deceleration curve of speed 2	1 to 4	1	1	★

Para.	Name	Value Range	Min. Unit	Default	Property
F6-11	Acceleration/ Deceleration curve of speed 3	1 to 4	1	1	★
F6-12	Acceleration/ Deceleration curve of speed 4	1 to 4	1	1	★
F6-13	Acceleration/ Deceleration curve of speed 5	1 to 4	1	1	★
F6-14	Acceleration/ Deceleration curve of speed 6	1 to 4	1	1	★
F6-15	Acceleration/ Deceleration curve of speed 7	1 to 4	1	1	★
F6-16	Inspection speed selection	0 to 7	1	0	★
F6-17	Emergency evacuation selection at power failure	0: Disable 1: UPS 2: 48 V battery power supply	1	0	★
F6-18	Analog minimum input	0.00 V to 10.00 V	0.01 V	0.00 V	☆
F6-19	Corresponding percentage of analog minimum input	0.0% to 100.0%	0.10%	0.00%	☆
F6-20	Analog maximum input	0.00 V to 10.00 V	0.01 V	10.00 V	☆
F6-21	Corresponding percentage of analog maximum input	0.0% to 100.0%	0.10%	100.00%	☆
F6-22	Analog input filter time	0.00s to 1.00s	0.01s	0.10s	☆

Para.	Name	Value Range	Min. Unit	Default	Property
F6-23	AC drive function selection 1	0 to 65535 bit0: 0: Directly stop after the brake is released 1: Cancel the current before stop after the brake is released bit1: 0: No-load-cell compensation invalid during auto-tuning 1: No-load-cell compensation always valid bit2: 0: Jitter prevention upon RUN command at stop 1: No jitter protection bit4: 0: Maximum frequency being 90 Hz 1: Maximum frequency being rated frequency bit5: 0: Analog frequency calculated based on maximum frequency 1: Analog frequency calculated based on rated frequency bit6: Reserved bit7: 0: Running not allowed after stop while external command is not canceled 1: Running allowed upon a frequency reference after stop while external command is not canceled	1	560	☆
F6-23	AC drive function selection 1	bit8: 0: Disable running curve optimization 1: Enable running curve optimization, associated with F6-30 bit9: 0: The Running output signal is synchronized with the brake release signal 1: The Running output signal is synchronized with the internal RUN signal	1	560	☆
F6-24	Motor overheat voltage threshold	0.00 V to 11.00 V	0.01 V	0.0 V	☆

Para.	Name	Value Range	Min. Unit	Default	Property
F6-25	AC drive function selection 2	0 to 65535 bit0: 0: SPI communication fault detection 1: Disable bit1: 0: FA-03 and FA-05 cannot be modified if the system is not in the operating panel control mode. Once they are modified, F0-01 cannot be modified. 1: Can be modified bit2: 0: Faults Err33, Err16, and Err17 cannot be reset 1: Can be reset bit3: 0: No-load-cell startup function disabled during emergency running 1: No-load-cell startup function enabled during emergency running bit4: 0: Only FVC in terminal control mode of synchronous motor 1: No restriction bit5: 0: Check for excessive speed deviation after the running frequency exceeds 1/4 of the rated frequency 1: Check for excessive speed deviation once started bit6: 0: Do not start upon the RUN command in the emergency evacuation state 1: Start upon the RUN command even in the emergency evacuation state bit7: 0: Light-load direction not automatically judged during emergency evacuation 1: Light-load direction automatically judged during emergency evacuation	1	0	☆
F6-27	Zero-speed signal output delay	0 ms to 9999 ms	1	0	☆
F6-28	Upper limit of emergency evacuation speed	0.00 Hz to maximum frequency	0.01 Hz	8.00 Hz	★
F6-29	Analog input filter	0 V to 0.10 V	0.01 V	0 V	★
F6-30	Special acceleration rate adjusting threshold	0 to F0-05	0.01 Hz	2.00 Hz	★

Para.	Name	Value Range	Min. Unit	Default	Property
Group F7: Curve Parameters					
F7-00	Acceleration time 1	1.0s to 100.0s	0.1s	4.0s	☆
F7-01	Deceleration time 1	1.0s to 100.0s	0.1s	4.0s	☆
F7-02	Time proportion of running curve 1 start segment	10.0% to 40.0%	0.10%	40.00%	★
F7-03	Time proportion of running curve 1 end segment	10.0% to 40.0%	0.10%	40.00%	★
F7-04	Acceleration time 2	1.0s to 100.0s	0.1s	4.0s	☆
F7-05	Deceleration time 2	1.0s to 100.0s	0.1s	4.0s	☆
F7-06	Time proportion of running curve 2 start segment	10.0% to 40.0%	0.10%	40.00%	★
F7-07	Time proportion of running curve 2 end segment	10.0% to 40.0%	0.10%	40.00%	★
F7-08	Acceleration time 3	1.0s to 100.0s	0.1s	4.0s	☆
F7-09	Deceleration time 3	1.0s to 100.0s	0.1s	20.0s	☆
F7-10	Time proportion of running curve 3 start segment	10.0% to 50.0%	0.10%	40.00%	★
F7-11	Time proportion of running curve 3 end segment	10.0% to 50.0%	0.10%	40.00%	★
F7-12	Acceleration time 4	0.5s to 100.0s	0.1s	1.0s	☆
F7-13	Deceleration time 4	0.5s to 100.0s	0.1s	1.0s	☆
F7-14	Time proportion of running curve 4 start segment	10.0% to 50.0%	0.10%	40.00%	★
F7-15	Time proportion of running curve 4 end segment	10.0% to 50.0%	0.10%	40.00%	★
F7-16	Slip test acceleration time	0.5s to 10.0s	0.1s	1.0s	★
F7-17	Distance reference of direct travel ride	0.0 mm to 6553.5 mm	0.1 mm	0.0 mm	★
F7-18	Actual distance of direct travel ride	0.0 mm to 6553.5 mm	0.1 mm	0.0 mm	●
Group F8: Operating Panel and Display Parameters					
F8-00	Input and output terminal state	-	-	-	●

Para.	Name	Value Range	Min. Unit	Default	Property
F8-01	LED display of parameters in the running state	1 to 32767 bit0: Load speed bit1: Running frequency bit2: Target frequency bit3: DC bus voltage bit4: Output voltage bit5: Output current bit6: AI1 bit7: AI2 bit8: Car load (%) bit9: Startup compensation current (%) bit10: Running torque current (%) bit11: Input state bit12: Output state	1	32767	☆
F8-02	LED display of parameters in the stop state	1 to 255 bit0: Target load speed bit1: Target frequency bit2: DC bus voltage bit3: AI1 bit4: AI2 bit5: Car load (%) bit6: Input state bit7: Output state	1	255	☆
F8-03	Rated elevator speed	0.001 m/s to 8.000 m/s	0.001 m/s	1.600 m/s	☆
F8-04	Heatsink temperature	0°C to 100°C	1°C	-	●
F8-05	Control board software version	0.00 to 99.99	0.01	-	●
F8-06	Driver board software version	0 to 65535	1	-	●
F8-07	Running time reference	0 h to 65500 h 0: Disable	1 h	0 h	☆
F8-08	Accumulative running time (hour)	0 h to 65500 h	1 h	0 h	●
F8-09	Accumulative running time (second)	0s to 3600s	1s	0s	●
F8-10	High byte of running times	0 to 9999 Note: The value of 1 indicates 10000 times.	1	0	●
F8-11	Low byte of running times	0 to 9999	1	0	●
F8-12	Protection against short circuit to ground upon power-on	0: Disable 1: Enable	1	0	☆

Para.	Name	Value Range	Min. Unit	Default	Property
F8-13	Control board software temporary version	0.00 to 99.99	0.01	-	●
F8-14	Control board software customer version	0.00 to 99.99	0.01	-	●
F8-17	Year	2000 to 2100	1	2014	☆
F8-18	Month and day	0101 to 1231	1	101	☆
F8-19	Hour and minute	00.00 to 23.59	0.01	0	☆
Group F9: Fault and Protection Parameters					
F9-09	Fault auto reset attempts	0 to 3	1	0	☆
F9-11	Auto fault reset delay	0.1s to 100.0s	0.1s	1.0s	☆
F9-12	Input phase loss protection	0: Disable 1: Enable	1	1	☆
F9-13	Output phase loss protection	1 to 3 bit0: 0: Do not detect output phase loss during running 1: Detect output phase loss during running bit1: 0: Do not detect output phase loss at startup 1: Detect output phase loss at startup	1	1	☆
F9-14	1st fault code	0 to 60	1	0	●
F9-15	1st fault subcode	0 to 999	1	0	●
F9-16	1st fault month and day	0 to 1231	1	0	●
F9-17	1st fault hour and minute	00.00 to 23.59	0.01	0	●
F9-18	2nd fault code	0 to 60	1	0	●
F9-19	2nd fault subcode	0 to 999	1	0	●
F9-20	2nd fault month and day	0 to 1231	1	0	●
F9-21	2nd fault hour and minute	00.00 to 23.59	0.01	0	●
F9-22	3rd fault code	0 to 60	1	0	●
F9-23	3rd fault subcode	0 to 999	1	0	●
F9-24	3rd fault month and day	0 to 1231	1	0	●
F9-25	3rd fault hour and minute	00.00 to 23.59	0.01	0	●
F9-26	4th fault code	0 to 60	1	0	●
F9-27	4th fault subcode	0 to 999	1	0	●

Para.	Name	Value Range	Min. Unit	Default	Property
F9-28	4th fault month and day	0 to 1231	1	0	●
F9-29	4th fault hour and minute	00.00 to 23.59	0.01	0	●
F9-30	5th fault code	0 to 60	1	0	●
F9-31	5th fault subcode	0 to 999	1	0	●
F9-32	5th fault month and day	0 to 1231	1	0	●
F9-33	5th fault hour and minute	00.00 to 23.59	0.01	0	●
F9-34	6th fault code	0 to 60	1	0	●
F9-35	6th fault subcode	0 to 999	1	0	●
F9-36	6th fault month and day	0 to 1231	1	0	●
F9-37	6th fault hour and minute	00.00 to 23.59	0.01	0	●
F9-38	7th fault code	0 to 60	1	0	●
F9-39	7th fault subcode	0 to 999	1	0	●
F9-40	7th fault month and day	0 to 1231	1	0	●
F9-41	7th fault hour and minute	00.00 to 23.59	0.01	0	●
F9-42	8th fault code	0 to 60	1	0	●
F9-43	8th fault subcode	0 to 999	1	0	●
F9-44	8th fault month and day	0 to 1231	1	0	●
F9-45	8th fault hour and minute	00.00 to 23.59	0.01	0	●
F9-46	9th fault code	0 to 60	1	0	●
F9-47	9th fault subcode	0 to 999	1	0	●
F9-48	9th fault month and day	0 to 1231	1	0	●
F9-49	9th fault hour and minute	00.00 to 23.59	0.01	0	●
F9-50	10th fault code	0 to 60	1	0	●
F9-51	10th fault subcode	0 to 999	1	0	●
F9-52	10th fault month and day	0 to 1231	1	0	●
F9-53	10th fault hour and minute	00.00 to 23.59	0.01	0	●
F9-54	Latest fault code	0 to 60	1	0	●
F9-55	Latest fault subcode	0 to 999	1	0	●
F9-56	Latest fault month and day	0 to 1231	1	0	●

Para.	Name	Value Range	Min. Unit	Default	Property
F9-57	Latest fault hour and minute	00.00 to 23.59	0.01	0	●
F9-58	Logic information of latest fault	0 to 65535	1	0	●
F9-59	Frequency reference upon latest fault	0.00 Hz to 99.00 Hz	0.01 Hz	0.00 Hz	●
F9-60	Feedback frequency upon latest fault	0.00 Hz to 99.00 Hz	0.01 Hz	0.00 Hz	●
F9-61	Bus voltage upon latest fault	0.0 V to 6500.0 V	0.1 V	0.0 V	●
F9-62	Output voltage upon latest fault	0 V to 65000 V	1 V	0 V	●
F9-63	Output current upon latest fault	0.00 A to 650.00 A	0.01 A	0.00 A	●
F9-64	Torque current upon latest fault	0.00 A to 650.00 A	0.01 A	0.00 A	●
F9-65	Output power upon latest fault	0.00 kW to 99.99 kW	0.01 kW	0.00 kW	●
F9-66	Input function state 1 upon latest fault	0 to 65535	1	0	●
F9-67	Input function state 2 upon latest fault	0 to 65535	1	0	●
F9-68	Output function state 1 upon latest fault	0 to 65535	1	0	●
F9-69	Output function state 2 upon latest fault	0 to 65535	1	0	●
Group FA: PG parameters					
FA-00	Number of PG pulses	100 to 9999	1	1024	★
FA-01	PG disconnection detection time	0.0s to 10.0s (0: The detection function is disabled)	0.1s	1.0s	★
FA-03	PG magnetic pole angle	0.0 to 359.9	0.1	0	★
FA-04	Current angle of PG magnetic pole	0.0 to 359.9	0.1	0	●
FA-05	Encoder wiring mode	0 to 15	1	0	★
FA-06	PG frequency-division coefficient ratio	1 to 256	1	1	★
Group FB: Communication Parameters (Reserved)					
Group FC: Special Enhanced Function Parameters					
FC-00	Action at command abnormality	0: Decelerate to stop 1: Block output immediately	1	1	★
FC-01	Deceleration time at abnormality	0.1s to 300.0s	0.1s	3.0s	★

Para.	Name	Value Range	Min. Unit	Default	Property
FC-02	Up speed detection level	0.00 to maximum frequency	0.01 Hz	45.00 Hz	★
FC-03	Down speed detection level	0.00 to maximum frequency	0.01 Hz	45.00 Hz	★
FC-04	Advance door opening judging frequency	0.00 to maximum frequency	0.01 Hz	5.00 Hz	★
FC-05	Frequency detection level 1	0.00 to maximum frequency	0.01 Hz	50.00 Hz	☆
FC-06	Frequency detection level 2	0.00 to maximum frequency	0.01 Hz	50.00 Hz	☆
FC-07	Frequency detection hysteresis	0.0% to 100.0% (frequency detection level)	0.10%	5.00%	☆
FC-08	Measured width when frequency reached	0.0% to 100.0% (max. frequency)	0.10%	0.00%	☆
FC-09	Overspeed detection threshold	80% to 120%	1%	115%	☆
FC-10	Overspeed detection delay	0.0s to 5.0s	0.1s	1.0s	☆
FC-11	Action at overspeed	0: Decelerate to stop at abnormality 1: Alarm and block output immediately 2: Continue to run	1	1	☆
FC-12	Speed deviation detection threshold	0% to 50%	1%	30%	☆
FC-13	Speed deviation detection delay	0.0s to 5.0s	0.1s	1.0s	☆
FC-14	Action at excessive speed deviation	0: Decelerate to stop at abnormality 1: Alarm and block output immediately 2: Continue to run	1	1	☆
Group FD: Special Function Parameters					
FD-00	Torque boost	0.0: (Automatic) 0.1% to 30.0%	0.10%	1.00%	★
FD-01	Torque boost frequency	0.00 to maximum frequency	0.01 Hz	50.00 Hz	★
FD-02	Slip compensation	0.0% to 200.0%	0.10%	100.00%	★
FD-03	Oscillation suppression gain	0 to 100	1	20	★
FD-04	AC drive function selection 3	0 to 65535 bit0: 0: Asynchronous motor current loop parameters are fixed values 1: Asynchronous motor current loop parameters are set by F2-06 and F2-07	1	0	★
FD-05	Position lock current coefficient	1.0% to 50.0%	0.10%	15.00%	★

Para.	Name	Value Range	Min. Unit	Default	Property
FD-06	Position lock speed loop Kp	0.05 to 1.00	0.01	0.5	★
FD-07	Position lock speed loop Ti	0.05 to 2.00	0.01	0.6	★
Group FU: Monitoring Parameters					
FU-00	Pre-torque current	–200.0% to +200.0%	0.10%	0	●
FU-01	Logic information	0 to 65535	1	0	●
FU-02	Frequency reference	0.00 Hz to 99.00 Hz	0.01 Hz	0.00 Hz	●
FU-03	Feedback frequency	0.00 Hz to 99.00 Hz	0.01 Hz	0.00 Hz	●
FU-04	Bus voltage	0.0 V to 6500.0 V	0.1 V	0.0 V	●
FU-05	Output voltage	0 V to 65000 V	1 V	0 V	●
FU-06	Output current	0.00 A to 650.00 A	0.01 A	0.00 A	●
FU-07	Output torque	0.0% to 200.0%	0.10%	0.00%	●
FU-08	Torque current	0.00 A to 650.00 A	0.01 A	0.00 A	●
FU-09	Output power	–99.99 kW to +99.99 kW	0.01 kW	0.00 kW	●
FU-10	Car load	0.0% to 100.0%	0.10%	0.00%	●
FU-11	Car speed	0.000 m/s to 65.000 m/s	0.001 m/s	0.000 m/s	●
FU-12	Communication interference	0 to 65535	1	0	●
FU-13	Input function state 1	0 to 65535	1	0	●
FU-14	Input function state 2	0 to 65535	1	0	●
FU-15	Output function state 1	0 to 65535	1	0	●
FU-16	Output function state 2	0 to 65535	1	0	●
FU-17	AI1 voltage	0.00 V to 20.00 V	0.01 V	0.00 V	●
FU-18	AI2 voltage	0.00 V to 20.00 V	0.01 V	0.00 V	●
FU-19	AO1 voltage	0.00 V to 20.00 V	0.01 V	0.00 V	●
FU-20	Number of startup rollback pulses	0 to 65535	1	0	●
FU-21	PG card output pulses per second	0 to 65535	1	0	●
Group FP: User Parameters					
FP-00	User password	0 to 65535 0: No password	1	0	☆
FP-01	Parameter update	0: Disable 1: Restore default settings 2: Clear fault records	1	0	★
FP-02	Display of user-defined parameters	0: Disable 1: Enable	1	0	★

6 Explanation of Parameters

6.1 Group F0: Basic Parameters

Para.	Name	Value Range	Min. Unit	Default	Property
F0-00	Control mode	0: Sensorless vector control (SVC) 1: Feedback vector control (FVC) 2: V/f control	1	1	★

- 0: Sensorless vector control (SVC) - open-loop vector
  This mode is applicable to commissioning and fault judgment during maintenance. Note that this mode is applicable only to asynchronous motors. For synchronous motors, only closed-loop control is applicable.
- 1: Feedback vector control (FVC) - closed-loop vector
  This mode is applicable to high-accuracy speed control for elevators. During normal elevator running, the ME320LN^{new} series elevator AC drive must run in this mode.
- 2: V/f control
  This mode is applicable to special elevator applications and does not require a rotary encoder, but the control effect is inferior to that in the vector control mode.

Note that motor auto-tuning must be performed before the vector control mode is enabled. The effect of the vector control mode is dependent on accurate setting of motor parameters. You can adjust the parameters in group F2 to improve the performance.

Para.	Name	Value Range	Min. Unit	Default	Property
F0-01	Command source selection	0: Operating panel control 1: Terminal control	1	1	★

This parameter defines the input channel of the AC drive control commands, including startup and stop.

- 0: Operating panel control (LOCAL/REMOT indicator ON): The RUN commands are given by pressing the RUN and STOP/RES keys on the operating panel. You can change the running direction by using parameter F0-04.

- 1: Terminal control (LOCAL/REMOT indicator OFF): Commands are given by using the multi-function input terminals allocated with functions such as FWD and REV.

Para.	Name	Value Range	Min. Unit	Default	Property
F0-02	Speed reference source selection	0: Digital setting 1: Multi-speed 2: AI1 3: AI2 4: Reserved 5: Special multi-speed	1	1	★

This parameter sets the input channel of AC drive speed references. A total of four channels are available:

- 0: Digital setting. The ME320LN^{new} series elevator AC drive's speed is set by digital setting. The initial speed is the value of F0-03.
- 1: Multi-speed. The AC drive runs in the multi-speed mode. If multi-speed is used, the relationship between signals and frequencies is determined by parameters in groups F4 and F6.
- 2: AI1 3: AI2 The speed reference is given by AI terminals. Two AI terminals are available in the standard configuration of the ME320LN^{new} series elevator AC drive. AI1 supports 0 V to 10 V voltage input. AI2 supports 0 V to 10 V voltage input or 4 mA to 20 mA current input, determined by jumper J3 on the control board.
- 4: Reserved
- 5: Special multi-speed. This mode is used in special applications, and is not used generally.

Para.	Name	Value Range	Min. Unit	Default	Property
F0-03	Digital setting frequency	0.00 to maximum frequency	0.01 Hz	00.00 Hz	☆

This parameter sets the target frequency of the ME320LN^{new} series elevator AC drive when F0-02 is set to 0.

Para.	Name	Value Range	Min. Unit	Default	Property
F0-04	Running direction	0: Run in the same direction 1: Run in the opposite direction	1	0	★

The running direction can be reversed by modifying this parameter without changing the wiring of the traction machine.

Note that the motor will resume operation in the original direction after parameter initialization. Use this function with caution.

Para.	Name	Value Range	Min. Unit	Default	Property
F0-05	Maximum frequency	0.00 Hz to 90.00 Hz	0.01 Hz	50.00 Hz	★

This parameter sets the maximum output frequency of the AC drive. If this parameter is set to a value above the mains frequency, the load of the elevator mechanical part must be taken into full consideration.

Para.	Name	Value Range	Min. Unit	Default	Property
F0-06	Carrier frequency	0.5 kHz to 16.0 kHz	0.1 kHz	Model dependent	☆

The carrier frequency is closely related to the motor noise during running. When the carrier frequency is set to a value above 10 kHz, quiet running is achieved. Set the carrier frequency to the lowest within the allowable noise range.

- However, a lower carrier frequency means increased high-order harmonic components in the output current, resulting in more loss of the motor and larger motor temperature rise.
- By contrast, a higher carrier frequency means less loss of the motor and smaller motor temperature rise, but a higher loss of the system, larger system temperature rise, and stronger interference.

Adjusting the carrier frequency will affect the parameters in the following table.

Performance	Impact
Carrier frequency	Increase
Motor noise	Decrease
Output current waveform	Improve
Motor temperature rise	Decrease
AC drive temperature rise	Increase
Leakage current	Increase
External radiation interference	Increase

Para.	Name	Value Range	Min. Unit	Default	Property
F0-07	Carrier frequency adjusting mode	0: Fixed PWM 1: Random PWM	1	0	☆

- 0: Fixed PWM
- 1: Random PWM

In the random PWM mode, the motor noise has a wide frequency domain. In the fixed PWM mode, the motor noise frequency is fixed.

6.2 Group F1: Motor Parameters

Para.	Name	Value Range	Min. Unit	Default	Property
F1-00	Encoder type	0: SIN/COS 1: UVW 2: ABZ	1	1	★

- 0: SIN/COS encoder
- 1: UVW encoder
- 2: ABZ encoder
- 3: Absolute encoder

Set F1-00 to a proper value according to the type of encoder used together with the motor. Set the PG card parameters in group FA correctly.

Para.	Name	Value Range	Min. Unit	Default	Property
F1-01	Rated power	0.4 kW to 110.0 kW	0.1 kW	Model dependent	★
F1-02	Rated voltage	100 V to 500 V	1 V	Model dependent	★
F1-03	Rated current	0.00 A to 655.00 A (for models of 75 kW and below) 0.00 A to 655.00 A (for models of 90 kW and above)	0.01 A	Model dependent	★
F1-04	Rated frequency	0 Hz to maximum frequency	0.01 Hz	50.00 Hz	★
F1-05	Rated speed	0 RPM to 30000 RPM	1 RPM	1460 RPM	★

Set these parameters according to the motor nameplate.

Accurate setting of motor parameters is the prerequisite for optimal control performance of the ME320LN^{new} series elevator AC drive. The system provides the auto-tuning function for obtaining parameters. Accurate auto-tuning relies on correct setting of motor ratings.

To ensure control performance, configure a motor applicable to the AC drive. If the frequency of the configured motor differs greatly from that of the standard applicable motor, the AC drive control performance may degrade.

Para.	Name	Value Range	Min. Unit	Default	Property
F1-07	Encoder angle of synchronous motor at power-off	0.0 to 359.9	0.1	0	★

This parameter indicates the angle of the motor magnetic pole at power-off. The AC drive records this value and compares it with the value at next power-on.

Para.	Name	Value Range	Min. Unit	Default	Property
F1-09	Current filter coefficient of synchronous motor	0.0 to 3.0	0.1	0	★

This parameter sets the current filter time, which suppresses the periodic vertical jitter. Increase the value gradually at a step of 0.5 to achieve the optimal effect.

Para.	Name	Value Range	Min. Unit	Default	Property
F1-10	Encoder signal check	0 to 65535	1	0	★

It is a factory parameter. Do not change this value without approval from the manufacturer.

Para.	Name	Value Range	Min. Unit	Default	Property
F1-11	Motor auto-tuning mode	0: No auto-tuning 1: With-load auto-tuning 2: No-load auto-tuning	1	0	★

- This parameter sets the auto-tuning mode.
  0 indicates no auto-tuning, 1 indicates with-load static auto-tuning for asynchronous motors or with-load rotary auto-tuning for synchronous motors, and 2 indicates no-load auto-tuning.
- Observe the following precautions during auto-tuning.
  - Ensure that all the installation and wiring comply with the electrical safety specifications.
  - Ensure that the motor wiring is correct (UVW cables of the motor are connected to the UVW terminals of the controller on a one-to-one basis) for with-load auto-tuning. If the motor wiring is incorrect, the motor may jitter or fail to run

after the brake is released. In this case, swap any two phases of the UVW motor cables.

- In a fault alarm state, the system will not enter the auto-tuning state (that is, the panel does not display "TUNE"). Reset the fault before starting the auto-tuning.
- Perform auto-tuning again if the motor cable phase sequence is changed or the encoder of the synchronous motor is replaced.
- For the synchronous motor, perform three or more times of auto-tuning, and compare the obtained PG initial angles (FA-03). If the value deviation is within 5°, the auto-tuning is successful.
- After auto-tuning is completed, perform trial run at the inspection speed. Check whether the current is normal. Check whether the actual running direction is consistent with the direction reference and change the value of F0-04 if not.
- With-load auto-tuning is dangerous because running at the inspection speed is typically an emergency electrical operation in which the shaft safety circuit is shorted. Therefore, ensure that there is no person in the shaft during with-load auto-tuning.

The motor auto-tuning procedure is shown in *"Figure 6–1 " on page 93* .

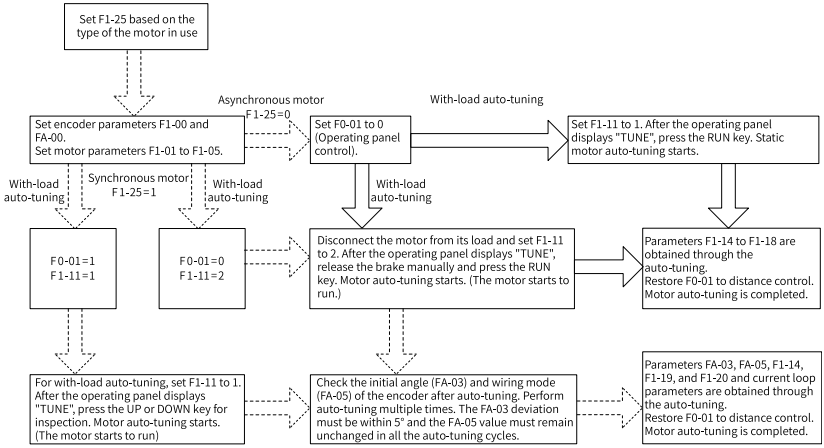


Figure 6-1 Motor auto-tuning flowchart

Instructions on synchronous motor auto-tuning:

- When the ME320LN^{new} series elevator AC drive drives a synchronous motor, an encoder is required to provide feedback signals. Set the encoder parameters correctly before performing auto-tuning.

- During synchronous motor auto-tuning, the motor needs to rotate. The best auto-tuning mode is no-load dynamic auto-tuning. If this mode is impossible, try with-load dynamic auto-tuning.
- For synchronous motors, with-load auto-tuning learns stator resistance, D-axis/ Q-axis inductance, current loop (including position lock) PI parameters, and encoder initial angle. No-load auto-tuning additionally learns the encoder wiring mode.
- For asynchronous motors, static auto-tuning learns stator resistance, rotor resistance, and leakage inductance, and automatically calculates the mutual inductance and no-load current. Auto-tuning of all motor parameters learns the mutual inductance, no-load current, and current loop parameters.

- Output state of the RUN and brake contactors
  For safety in different control modes, the system handles the output commands to the RUN contactor or brake contactor differently. In some situations, it is necessary to release the RUN contactor or the brake contactor manually. The following table lists the output state of the RUN and brake contactors.

Table 6–1 Output state

Control Mode / Output state	No-Load Auto-Tuning	With-Load Auto-Tuning		Operating Panel Control F0-01 = 0	Terminal Control F0-01 = 1
		Synchronous Motor	Asynchronous Motor		
RUN contactor	Output	Output	Output	Not output	Output
Brake contactor	Not output	Output	Not output	Not output	Output

Para.	Name	Value Range	Min. Unit	Default	Property
F1-14	Stator resistance	0.001 Ω to 65.000 Ω	0.001 Ω	Model dependent	☆
F1-15	Asynchronous motor rotor resistance	0.001 Ω to 65.000 Ω	0.001 Ω	Model dependent	☆
F1-16	Asynchronous motor leakage inductance	0.01 mH to 650.00 mH	0.01 mH	Model dependent	☆
F1-17	Asynchronous motor mutual inductance	0.1 mH to 6500.0 mH	0.1 mH	Model dependent	☆
F1-18	Asynchronous motor no-load current	0.01 A to 650.00 A	0.01 A	Model dependent	☆

Para.	Name	Value Range	Min. Unit	Default	Property
F1-19	Synchronous motor D-axis inductance	0.01 mH to 650.00 mH	0.01 mH	0.01 mH	★
F1-20	Synchronous motor Q-axis inductance	0.01 mH to 650.00 mH	0.01 mH	0.01 mH	★
F1-21	Synchronous motor back EMF	0 V to 65535 V	1 V	0 V	★
F1-25	Motor type	0: Asynchronous motor 1: Synchronous motor	1	1	★

To ensure control performance, configure a motor applicable to the system. If the frequency of the configured motor differs greatly from that of the standard applicable motor, the system control performance may degrade.

After motor auto-tuning is completed normally, the values of parameters F1-14 to F1-21 are updated automatically.

If asynchronous motor auto-tuning cannot be performed onsite, manually set relevant parameters by referring to data of the motor with the same nameplate parameters.

Note

For asynchronous motors, every time after F1-01 (Rated motor power) is modified, the system automatically restores parameters F1-14 to F1-18 to their defaults.

6.3 Group F2: Vector Control Parameters

Para.	Name	Value Range	Min. Unit	Default	Property
F2-00	Speed loop proportional gain 1	0 to 100	1	35	☆
F2-01	Speed loop integral time 1	0.01s to 10.00s	0.01s	0.60s	☆
F2-02	Switchover frequency 1	0.00 Hz to F2-05	0.01 Hz	2.00 Hz	☆
F2-03	Speed loop proportional gain 2	0 to 100	1	30	☆

Para.	Name	Value Range	Min. Unit	Default	Property
F2-04	Speed loop integral time 2	0.01s to 10.00s	0.01s	0.8	☆
F2-05	Switchover frequency 2	F2-02 to maximum frequency	0.01 Hz	5.00 Hz	☆

F2-00 to F2-05 are used to adjust the speed loop performance in the vector control mode.

F2-00 and F2-01 are PI regulation parameters when the running frequency is lower than the switchover frequency 1 (F2-02). F2-03 and F2-04 are PI regulation parameters when the running frequency is higher than the switchover frequency 2 (F2-05). For the running frequency between switchover frequency 1 and switchover frequency 2, the PI regulation parameter value is the weighted mean of parameters F2-00, F2-01, F2-03, and F2-04, as shown in *"Figure 6–2 " on page 96* .

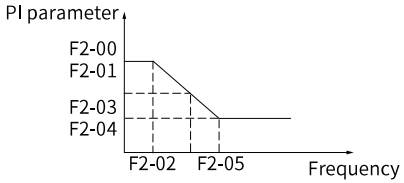


Figure 6-2 Relationship between running frequencies and PI parameters

The speed dynamic response characteristics in the vector control mode can be adjusted by setting the proportional gain and integral time of the speed regulator. To achieve a faster system response, increase the proportional gain or reduce the integral time. A too large proportional gain or too short integral time may lead to system oscillation.

The recommended adjustment method is as follows:

The default setting meets requirements of most applications. In exceptional cases, for example, when the motor power is very low, the default speed loop proportional gain may be large for the motor, and therefore the motor oscillates at startup. In this case, decrease the speed loop proportional gain first to ensure that the motor does not oscillate, and then reduce the integral time to ensure that the system has quick response but small overshoot.

If both switchover frequency 1 and switchover frequency 2 are 0, only F2-03 and F2-04 are valid.

Caution

Improper PI parameter settings may lead to a high overshoot. Even worse, overvoltage may occur when overshoot drops.

Para.	Name	Value Range	Min. Unit	Default	Property
F2-06	Current loop proportional gain	10 to 500	1	60	☆
F2-07	Current loop integral gain	10 to 500	1	30	☆

F2-06 and F2-07 are current loop regulation parameters used in the vector control algorithm. Generally, you do not need to adjust these parameters. The default parameter settings can achieve the desired control performance. If necessary, adjust them by referring to the method of adjusting the speed loop PI parameters.

Para.	Name	Value Range	Min. Unit	Default	Property
F2-08	Torque upper limit	0.0% to 200.0%.	0.10%	150.00%	☆

This parameter sets the torque current upper limit for the ME320LN^{new} AC drive. It is also the pre-torque compensation upper limit during elevator startup. The value 100% corresponds to the rated current of the system integrated controller. The torque output of the applicable motor is calculated as follows: F2-08 x Rated AC drive current/Rated motor current.

Para.	Name	Value Range	Min. Unit	Default	Property
F2-09	Torque acceleration time	1 ms to 500 ms	1 ms	1 ms	★
F2-10	Torque deceleration time	1 ms to 500 ms	1 ms	350 ms	★

These two parameters are used to set the acceleration time and deceleration time of the torque current.

The motor may make a "gong" sound due to motor characteristics when the current is cut off at stop. In this case, increase the torque deceleration time to eliminate the abnormal sound.

Para.	Name	Value Range	Min. Unit	Default	Property
F2-11	Speed filter coefficient	1 to 20	1	10	★

This parameter is used to eliminate the fluctuation of speed feedback and needs not to be adjusted generally.

Para.	Name	Value Range	Min. Unit	Default	Property
F2-12	Angle-free auto-tuning function selection	0 to 65535 bit1: 0: Disable 1: Enable bit2: 0: Semi-automatic 1: Full-automatic	1	0	★

This parameter is used to set the angle-free auto-tuning function.

F2-12 Angle-free auto-tuning function selection			
Bit	Definition	Description	Default
bit1	Angle-free auto-tuning function enable	0: Disable 1: Enable	0
bit2	Angle-free auto-tuning mode (see note 1)	0: Semi-automatic 1: Full-automatic	0

Note

Semi-automatic means the angle-free auto-tuning function is enabled only when the inspection signal is active. Full-automatic means the angle-free auto-tuning function is enabled no matter whether the inspection signal is active.

6.4 Group F3: V/f Parameters

Para.	Name	Value Range	Min. Unit	Default	Property
F3-00	Startup frequency	0.00 Hz to 10.00 Hz	0.01 Hz	0.00 Hz	☆

Set a proper startup frequency to increase the torque at elevator startup. Magnetic flux is set up at motor startup if the startup frequency active time is set. For the ME320LN^{new} series elevator AC drive, the startup frequency function is valid only when the speed reference source is multi-speed. In other modes such as digital setting and analog setting, this function is invalid.

Para.	Name	Value Range	Min. Unit	Default	Property
F3-01	Torque output delay	0.00s to 10.00s	0.01s	0.20s	★
F3-02	Brake release delay	0.20s to 10.00s	0.01s	0.20s	★
F3-03	Zero-speed delay	0.00s to 10.00s	0.01s	0.30s	★
F3-04	Startup time	0.00s to 10.00s	0.01s	0.00s	★
F3-05	Startup frequency active time	0.00s to 10.00s	0.01s	0.00s	★
F3-06	Brake release delay	0.00s to 10.00s	0.01s	0.20s	★
F3-07	Stop zero-speed delay	0.00s to 10.00s	0.01s	0.30s	★
F3-08	RUN contactor open delay	0.00s to 10.00s	0.01s	0.00s	★

F3-01 to F3-08 are used to improve the riding comfort at elevator startup and stop. For specific definition of each parameter, see *"Figure 6–3 " on page 100* (taking multi-speed as an example).

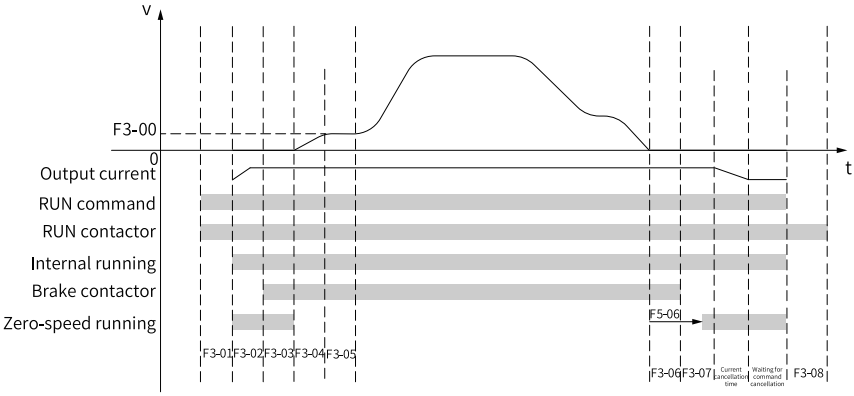


Figure 6-3 Running time sequence

- The current cancellation time depends on the actual current and torque deceleration time (F2-10).
- "Wait for command cancellation" can be set to be always waiting or a maximum of 5s waiting time, according to the setting of F6-23.
- When the RUN contactor output of the ME320LN^{new} series elevator AC drive is not used, the time segments specified in F3-01 and F3-08 are skipped directly.
- When the brake output and running output of the ME320LN^{new} series elevator AC drive are not used, the time segments specified in F3-02 and F3-07 are skipped directly.

Para.	Name	Value Range	Min. Unit	Default	Property
F3-09	Startup pre-torque setting selection	0: Pre-torque invalid 1: DI setting 2: AI1 setting 3: AI2 setting 4: Using pre-torque initial offset 5: No-load-cell compensation	1	0	★

The ME320LN^{new} series elevator AC drive provides five pre-torque settings, among which DI setting, AI1 setting, and AI2 setting are valid only when a load cell is connected. When pre-torque compensation is used, the system outputs the torque matching the elevator load in advance to guarantee the riding comfort at the moment when the brake is released. The output torque is restricted by the torque upper limit (F2-08). When the calculated torque is larger than F2-08, the value of F2-08 is output.

If no load cell is installed, set F3-09 to 4 and adjust the value of F3-12 so that the ME320LN^{new} series elevator AC drive can perform pre-excitation fully before the brake is released, improving the riding comfort at startup. The recommended value of F3-12 is between –15% and +15%.

If no-load-cell compensation is used, set F3-09 to 5 and then adjust FD-05 to FD-07 properly on the basis that FD-05 is 15.0%, FD-07 is 0.50, and FD-08 is 0.60.

Para.	Name	Value Range	Min. Unit	Default	Property
F3-10	Pre-torque offset	0.0% to 100.0%	0.10%	48.00%	☆
F3-11	Pre-torque gain	0.00 to 1.50	0.01	0.6	★

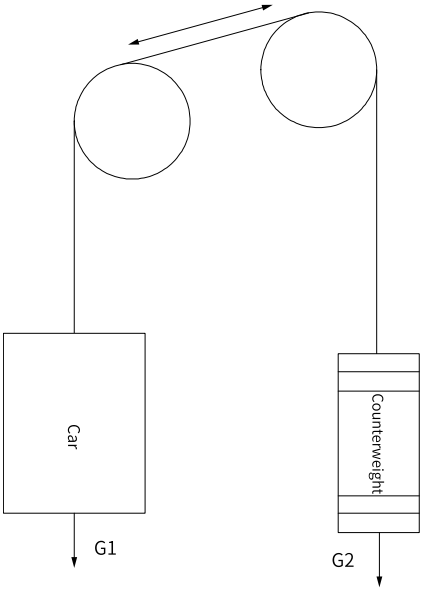


Figure 6-4 Relationship between car load and counterweight

Pre-torque offset, also known as the elevator balance coefficient, indicates the percentage of the counterweight to the elevator rated load. Assume that the no-load weight is G1, counterweight is G2, and rated elevator load is G3, then F3-10 = (G2 – G1)/G3.

Assume that the load in the car is G4, then Motor pre-torque output = F3-11 x |G4 – (G3 x F3-10)|.

The output pre-torque direction is only related to the car load, but irrelative to the running direction. If the car load is larger than (G3 x (F3-10)), the output pre-torque direction is up; otherwise, it is down.

Para.	Name	Value Range	Min. Unit	Default	Property
F3-12	Pre-torque initial offset	–100.0% to +100.0%	0.10%	10.00%	☆

When F3-09 is set to 4 (Fixed pre-torque), the ME320LN^{new} series elevator AC drive outputs the pre-torque current based on the value of F3-12 to perform pre-excitation before the brake is released, improving the riding comfort at startup. The recommended value of F3-12 is between –15% and +15%.

Para.	Name	Value Range	Min. Unit	Default	Property
F3-13	DI load cell signal 1	0.0% to 100.0%	0.10%	10.00%	★
F3-14	DI load cell signal 2	0.0% to 100.0%	0.10%	30.00%	★
F3-15	DI load cell signal 3	0.0% to 100.0%	0.10%	70.00%	★
F3-16	DI load cell signal 4	0.0% to 100.0%	0.10%	90.00%	★

When F3-09 is set to 1, the ME320LN^{new} series elevator AC drive detects the car load and controls the pre-torque output current based on these four DI signals.

F3-13 to F3-16 set the signals of the four load cell DI terminals numbered 1 to 4. The setting is the car load percentage when the signal is active.

For example, if DI load cell signal 1 becomes active when the car load reaches 10%, set F3-13 to 10%. If DI load cell signal 2 becomes active when the car load reaches 30%, set F3-14 to 30%.

Para.	Name	Value Range	Min. Unit	Default	Property
F3-17	Filter time of load cell analog input	0.00s to 1.00s	0.01s	0.10s	☆
F3-18	Load cell analog no-load input	0.00 V to 10.00 V	0.01 V	0.00 V	☆
F3-19	Load cell analog full-load input	0.00 V to 10.00 V	0.01 V	10.00 V	☆

When F3-09 is set to 2 or 3, the ME320LN^{new} series elevator AC drive detects the car load and controls the pre-torque output current based on AI1 or AI2 signal.

F3-17 is the filter time of the analog signal. Increasing this parameter value can improve the anti-interference capability of the load cell signal.

When the analog load cell input is used, the corresponding input voltages at car no-load and full-load must be set to ensure correct pre-torque compensation.

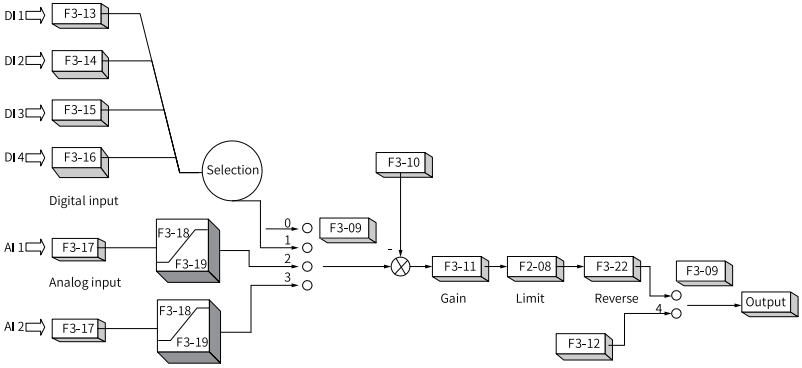


Figure 6-5 Pre-torque compensation principle

Para.	Name	Value Range	Min. Unit	Default	Property
F3-20	Load for analog load cell auto-tuning	0 to 100	1	0	☆
F3-21	Analog load cell auto-tuning function selection	0: Disable 1: Enable	1	0	☆

When analog load cell input is used, load cell auto-tuning can be performed in the car no-load state and full-load state. The results are recorded in F3-18 and F3-19. Perform load cell auto-tuning as follows:

1. Set F3-21 to 1 and F3-09 to 2 or 3 to enable load-cell auto-tuning.
2. Stop the elevator at any floor, with the car in the no-load state. Set F3-20 to 0 and press the ENTER key.
3. Put N% of the rated load in the car. Then set F3-20 to N and press the ENTER key. For example, if you put a 100 kg load in the elevator with a rated load of 1000 kg, set F3-20 to 10. The load cell auto-tuning is completed.

The operation flowchart is shown in *"Figure 6–6 " on page 104* .

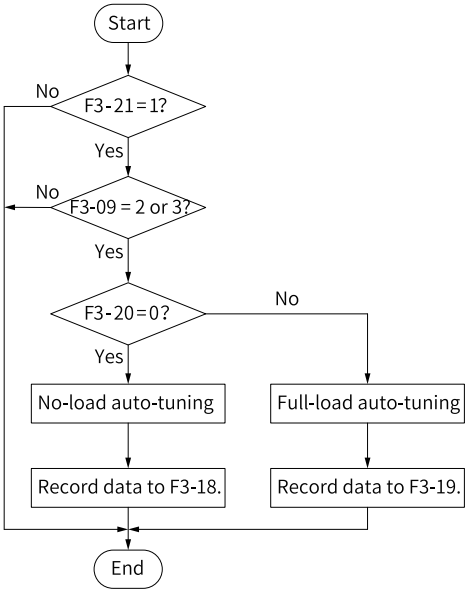


Figure 6-6 Analog load cell auto-tuning flowchart

Note

- Set F3-21 to 1 during auto-tuning and restore its value to 0 after the auto-tuning is completed.
- Do perform no-load auto-tuning before full-load auto-tuning; otherwise, the obtained data is incorrect.

Para.	Name	Value Range	Min. Unit	Default	Property
F3-22	Pre-torque direction reversing	0: Disable 1: Enable	1	0	☆

The pre-torque direction can be reversed directly with no need of changing the pre-torque value.

Para.	Name	Value Range	Min. Unit	Default	Property
F3-24	Slip test function selection	0: Disable 1: Enable	1	0	★

The slip test can be performed only when the inspection input is set and the inspection signal is active.

The slip test procedure is as follows:

1. In the stop state, set F3-24 to 1.
2. Make the inspection input signal of the ME320LN^{new} series elevator AC drive active.
3. Press the inspection key to start inspection.

In the slip test mode, the AC drive accelerates according to the acceleration time set in F7-16. If the slip effect is not obvious, reduce the value of F7-16 as appropriate.

After the slip test is completed, restore F3-24 to 0.

6.5 Group F4: Input Function Parameters

Para.	Name	Value Range	Min. Unit	Default	Property
F4-00	DI filter time	0.001s to 0.200s	0.001	0.020s	☆

This parameter determines the sensitivity of DI terminals. If DI terminals are liable to interference, which may cause malfunction, increase the value of this parameter to enhance the anti-interference capability. However, this will lower the sensitivity of DI terminals.

Para.	Name	Value Range	Min. Unit	Default	Property
F4-01	DI1 function selection	0: Invalid 1: Forward run (FWD, up) 2: Reverse run (REV, down) 3: Multi-speed terminal 1 4: Multi-speed terminal 2 5: Multi-speed terminal 3 6: Fault reset 7: Enable control 8: Inspection input 9: Emergency input 10: RUN contactor feedback 11: Brake feedback 12: Load cell terminal 1 13: Load cell terminal 2 14: Load cell terminal 3 15: Load cell terminal 4 16: External fault 17: Motor overheat 18: Up speed judgment 19: Down speed judgment 20: Multi-speed logic selection 1 21: Multi-speed logic selection 2 22: Direct travel ride command The value range is 0 to 122. The hundreds position indicates the NO/NC type (1 means NC), and the lowest two digits indicate the selected function (invalid if the value is greater than 22). For example, 106 indicates that the DI is set with the function 06 (Fault reset) and the signal type is NC.	1	3	★
F4-02	DI2 function selection		1	4	★
F4-03	DI3 function selection		1	5	★
F4-04	DI4 function selection		1	6	★
F4-05	DI5 function selection		1	7	★
F4-06	DI6 function selection		1	1	★
F4-07	DI7 function selection		1	2	★
F4-08	DI8 function selection		1	0	★
F4-09	DI9 function selection		1	0	★
F4-10	DI10 function selection		1	0	★

F4-01 to F4-10 set the functions of DI terminals. The functions are described in the following table.

<table>
<tr><th>Value</th><th>Function</th><th>Description</th></tr>
<tr><td>0</td><td>Invalid</td><td>Even if there is signal input to the terminal, the AC drive has no response. You can allocate this function to terminals that are not used to prevent malfunction.</td></tr>
<tr><td>1</td><td>Forward run (FWD)</td><td rowspan="2">The external terminal is used to control the forward or reverse running of the AC drive to run the elevator in the up or down direction. Note: The DI terminal must be off once after each running; otherwise, the elevator cannot execute the next running.
<table><tr><th>FWD</th><th>REV</th><th>Meaning</th></tr><tr><td>OFF</td><td>OFF</td><td>Invalid</td></tr><tr><td>ON</td><td>OFF</td><td>Run in forward direction</td></tr><tr><td>OFF</td><td>ON</td><td>Run in reverse direction</td></tr><tr><td>ON</td><td>ON</td><td>Invalid</td></tr></table></td></tr>
<tr><td>2</td><td>Reverse run (REV)</td></tr>
<tr><td>3</td><td>Multi-speed terminal 1 (K1)</td><td rowspan="3">A total of eight speeds can be implemented through state combinations of these three terminals. The following table lists the combinations.
<table><tr><th>K3</th><th>K2</th><th>K1</th><th>Frequency Reference</th><th>Corresponding Para.</th></tr><tr><td>OFF</td><td>OFF</td><td>OFF</td><td>Speed 0</td><td>F6-00</td></tr><tr><td>OFF</td><td>OFF</td><td>ON</td><td>Speed 1</td><td>F6-01</td></tr><tr><td>OFF</td><td>ON</td><td>OFF</td><td>Speed 2</td><td>F6-02</td></tr><tr><td>OFF</td><td>ON</td><td>ON</td><td>Speed 3</td><td>F6-03</td></tr><tr><td>ON</td><td>OFF</td><td>OFF</td><td>Speed 4</td><td>F6-04</td></tr><tr><td>ON</td><td>OFF</td><td>ON</td><td>Speed 5</td><td>F6-05</td></tr><tr><td>ON</td><td>ON</td><td>OFF</td><td>Speed 6</td><td>F6-06</td></tr><tr><td>ON</td><td>ON</td><td>ON</td><td>Speed 7</td><td>F6-07</td></tr></table></td></tr>
<tr><td>4</td><td>Multi-speed terminal 2 (K2)</td></tr>
<tr><td>5</td><td>Multi-speed terminal 3 (K3)</td></tr>
<tr><td>6</td><td>Fault reset input</td><td>The terminal is used to reset faults under external control. It has the same function as the RESET key on the operating panel. Automatic elevator fault reset can be performed with this function.</td></tr>
<tr><td>7</td><td>Enable control</td><td>When the terminal allocated with this function becomes OFF, the AC drive stops immediately and outputs the brake apply command.</td></tr>
</table>

Value	Function	Description
8	Inspection input	When the inspection signal is active, the ME320LN^{new} series elevator AC drive uses the speed (non-zero value) selected in F6-16. If the inspection signal is canceled first during stop, the ME320LN^{new} series elevator AC drive decelerates to 0 based on the speed set in F6-16 until the FWD or REV command is canceled. If the FWD or REV command is canceled directly during inspection running, the ME320LN^{new} series elevator AC drive stops output immediately.
9	Emergency input	After this signal is active, the elevator enters the emergency running state, and the power is supplied by the external 48 V battery or 220 V UPS.
10	RUN contactor feedback input	If DI terminals are allocated with these two functions, the ME320LN^{new} series elevator AC drive detects these two signals after stop (the output contactor opens). If the two signals are still active for 2.5s, the AC drive will output the stuck signal. • If the RUN contactor feedback signal is selected, the ME320LN^{new} series elevator AC drive detects this signal during startup. • If the brake feedback signal is selected, the ME320LN^{new} series elevator AC drive keeps detecting this signal during running.
11	Brake feedback input	
12	Load cell terminal 1 input	These values correspond to digital load cell signals. For details, see the description of F3-13 to F3-16.
13	Load cell terminal 2 input	
14	Load cell terminal 3 input	
15	Load cell terminal 4 input	
16	External fault input	The terminal is used as the point of inputting external faults. When the terminal with this function becomes ON, the system reports a fault and stops running.
17	Motor overheat input	When the DI terminal allocated with function 17 or 117 (NO/MC input) becomes ON, the AC drive reports the motor overheat fault and performs corresponding protection. After the DI terminal becomes OFF, this fault is reset automatically.

Value	Function	Description
18	Up speed judgment input	The slow-down function is implemented by using these two signal functions together with FC-02 and FC-03. In the up direction, after the up speed judgment switch (slow-down switch) acts, the ME320LN^{new} series elevator AC drive compares the current running frequency with FC-02, and immediately decelerates to stop (based on the time set in FC-01) to ensure elevator safety if the current running frequency is higher than FC-02. The processing in the down direction is the same. For details, see the description of parameters in group FC.
19	Down speed judgment input	
20	Multi-speed logic selection 1	These two signals are used for the multi-speed setting mode (F0-02 set to 5) only in special applications.
21	Multi-speed logic selection 2	
22	Direct travel ride command	This signal implements the direct travel ride function. The ME320LN^{new} series elevator AC drive performs direct travel ride after this signal is active during deceleration to stop. For details, see the section "Commissioning of Direct Travel Ride".

Note

The value range is 0 to 122. The hundreds position indicates the NO/NC type (1 means NC, whereas 0 means NO). The lowest two digits indicate the selected function (invalid if the value is greater than 22). For example, 106 indicates that the DI is set with the function 06 (Fault reset) and the signal type is NC.

Para.	Name	Value Range	Min. Unit	Default	Property
F4-13	Multi-speed combination filter time	0.000s to 0.200s	0.001	0.020s	☆

The multi-speed references are given by the external controller. If incorrect multi-speed references exist due to relay delay or discreteness of controller terminals, the elevator running curve may be abnormal. F4-13 is used to filter the references from the multi-speed terminals to avoid incorrect references during multi-speed switchover, as shown in *"Figure 6–7 " on page 110*.

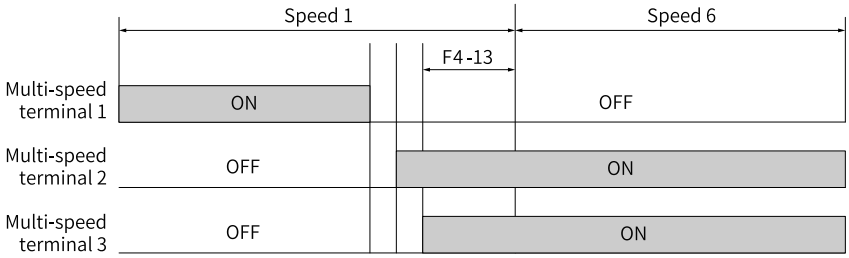


Figure 6-7 Multi-speed switchover diagram

6.6 Group F5: Output Function Parameters

Para.	Name	Value Range	Min. Unit	Default	Property
F5-00	FM output selection	0: No output 1: Running 2: Zero-speed running (valid in zero-speed running state) 3: Zero-speed signal (output even at stop) 4: Fault signal 5: RUN contactor output control 6: Brake output control 7: Advance door opening signal 8: Bus undervoltage	1	15	★
F5-01	DO1 function selection		1	3	★
F5-02	DO2 function selection		1	0	★
F5-03	Control board relay output selection		1	4	★
F5-04	Extension board relay output selection		1	0	★

The functions are described in the following table.

Value	Function	Description
0	No output	The output terminal has no function.
1	Running	When the AC drive is running, this signal becomes ON. Note: You can change the output mode by using bit 9 of F6-23.
2	Zero-speed running	When the AC drive is in zero-speed running state, this signal becomes active.
3	Zero-speed signal	When the AC drive outputs frequency 0 or stops, this signal becomes active.
4	Fault signal	When a fault occurs on the AC drive, this signal becomes active.
5	RUN contactor output control	The terminal with this function controls the actions of the RUN contactor.
6	Brake output control	The terminal with this function controls the actions of the brake contactor.

Value	Function	Description
7	Advance door opening signal	If the output frequency is lower than FC-04 during deceleration of the AC drive, this signal becomes active.
8	Bus undervoltage	When the bus voltage is lower than 280 V, this signal becomes active and the power is supplied by the battery.
9	FDT 1 output	See the description of parameters in group FC.
10	FDT 2 output	
11	Frequency reached	
12	Overspeed output	When the AC drive running frequency exceeds FC-09 for more than the time set in FC-10, this signal becomes active.
14	Running time reached	When the accumulative running time of the AC drive exceeds F8-07, this signal becomes ON.
15	Ready for RUN	When the AC drive can run, this signal becomes ON.
16	Contact stuck output control	When the AC drive detects contact stuck, this signal becomes ON.
17	Re-leveling output	When the AC drive can run and its running frequency is lower than FC-05, this signal becomes ON.
18	Light-load running output	This signal becomes ON in light-load running.

Para.	Name	Value Range	Min. Unit	Default	Property
F5-06	Zero-speed output hysteresis time	0.000s to 2.000s	1	0.000s	★

F5-06 sets the hysteresis time of the output function 2 (Zero-speed running). For details, see *"Figure 6–3 " on page 100* .

Para.	Name	Value Range	Min. Unit	Default	Property
F5-07	AO function selection	0: Running frequency 1: Frequency reference 2: Output current 3: Output torque 4: Output voltage 5: AI1 6: AI2	1	0	★

F5-07 sets the function of AO1 on the main control board of the ME320LN^{new} series elevator AC drive.

The standard output (where zero offset is 0 and gain is 1) is 0 mA to 20 mA (or 0 V to 10 V). The functions that can be set are listed in the following table.

Value	Function	Range
0	Running frequency	0 to maximum output frequency
1	Frequency reference	0 to maximum output frequency
2	Output current	0 to 2 times of rated AC drive current
3	Output torque	0 to 2 times of rated motor current
4	Output voltage	0 to 1.2 times of rated AC drive voltage
5	AI1	0 V to 10 V
6	AI2	0 V to 10 V/0 mA to 20 mA

Para.	Name	Value Range	Min. Unit	Default	Property
F5-08	AO zero offset	–100.0% to +100.0%	0.10%	0.00%	☆
F5-09	AO gain	–10.00 to +10.00	0.01	1	☆

These two parameters can be calculated according to the formula Y = kX + b. In the formula, b indicates zero offset, k indicates gain, Y indicates actual output, and X indicates standard output.

The AO zero offset coefficient 100% corresponds to 10 V (20 mA).

The standard output range of 0 V to 10 V (20 mA) corresponds to the analog output range of 0 to the maximum value.

These parameters are used to correct the zero drift and output deviation of AO terminals, or used to customize the output curve.

For example, if the AO terminal is used to output the running frequency, to implement output of 8 V (16 mA) at 0 Hz and output of 3 V (6 mA) at the maximum frequency, set the gain to –0.50 and the zero offset to 80%.

Note

When the direct travel ride function is enabled, the AO output becomes invalid automatically.

6.7 Group F6: Speed Parameters

When multi-speed is used in the ME320LN^{new} series elevator AC drive, F6-00 to F6-15 must be set to determine the running curve characteristics.

Para.	Name	Value Range	Min. Unit	Default	Property
F6-00	Speed 0	0 to maximum frequency	0.01 Hz	0.00 Hz	★
F6-01	Speed 1	0 to maximum frequency	0.01 Hz	0.00 Hz	★
F6-02	Speed 2	0 to maximum frequency	0.01 Hz	0.00 Hz	★
F6-03	Speed 3	0 to maximum frequency	0.01 Hz	0.00 Hz	★
F6-04	Speed 4	0 to maximum frequency	0.01 Hz	0.00 Hz	★
F6-05	Speed 5	0 to maximum frequency	0.01 Hz	0.00 Hz	★
F6-06	Speed 6	0 to maximum frequency	0.01 Hz	0.00 Hz	★
F6-07	Speed 7	0 to maximum frequency	0.01 Hz	0.00 Hz	★

The eight speeds are set by state combinations of three DI terminals (multi-speed terminals 1 to 3). Set F0-02 to 1 and allocate the three DI terminals with functions 3, 4, and 5 (K1, K2, and K3), respectively.

The following table lists the relationship between DI terminal states and the speeds.

K3	K2	K1	Frequency Reference	Para.
OFF	OFF	OFF	Speed 0	F6-00
OFF	OFF	ON	Speed 1	F6-01
OFF	ON	OFF	Speed 2	F6-02
OFF	ON	ON	Speed 3	F6-03
ON	OFF	OFF	Speed 4	F6-04
ON	OFF	ON	Speed 5	F6-05
ON	ON	OFF	Speed 6	F6-06
ON	ON	ON	Speed 7	F6-07

The combination of multi-speed terminal states determines the target running frequency of the ME320LN^{new} series elevator AC drive. For example, if speed 2 is used, the ME320LN^{new} series elevator AC drive uses the frequency specified in F6-02 as its target frequency. In this way, the system main controller sends commands of multi-speed terminal state combinations to the ME320LN^{new} series elevator AC drive to control the elevator running speed.

Para.	Name	Value Range	Min. Unit	Default	Property
F6-08	Acceleration/ Deceleration curve of speed 0	1 to 4	1	1	★
F6-09	Acceleration/ Deceleration curve of speed 1	1 to 4	1	1	★
F6-10	Acceleration/ Deceleration curve of speed 2	1 to 4	1	1	★
F6-11	Acceleration/ Deceleration curve of speed 3	1 to 4	1	1	★
F6-12	Acceleration/ Deceleration curve of speed 4	1 to 4	1	1	★
F6-13	Acceleration/ Deceleration curve of speed 5	1 to 4	1	1	★
F6-14	Acceleration/ Deceleration curve of speed 6	1 to 4	1	1	★
F6-15	Acceleration/ Deceleration curve of speed 7	1 to 4	1	1	★

The ME320LN^{new} series elevator AC drive provides four groups of acceleration/ deceleration time. For details, see the description of parameters in group F7. F6-08 to F6-15 set the acceleration/deceleration time (1 to 4) of each speed, so that the elevator has different acceleration/deceleration time in different running curves.

Note that the acceleration time and the related running curve of the target speed are used in the acceleration stage. The deceleration time and the related running curve of the target speed are used in the deceleration stage.

For example, assume that F6-01 is 0.00 Hz, F6-03 is 8.00 Hz, F6-05 is 48.00 Hz, F6-09 is 2, F6-11 is 3, and F6-13 is 4.

- When the AC drive accelerates from F6-01 to F6-05, the acceleration time is F6-13 (acceleration/deceleration 4: F7-12).

- When the AC drive decelerates from F6-05 to F6-03, the deceleration time is F6-13 (acceleration/deceleration 4: F7-13).
- When the AC drive decelerates from F6-03 to F6-01, the deceleration time is F6-11 (acceleration/deceleration 3: F7-09).

This is one running process of the elevator under multi-speed control. The high-speed acceleration/deceleration time is generally 3 to 4 seconds. When the AC drive decelerates to zero speed, the deceleration time can be different from the general. In this example, increasing the value of F7-05 makes speed switchover smoother at stop, as shown in *"Figure 6–8 " on page 115* .

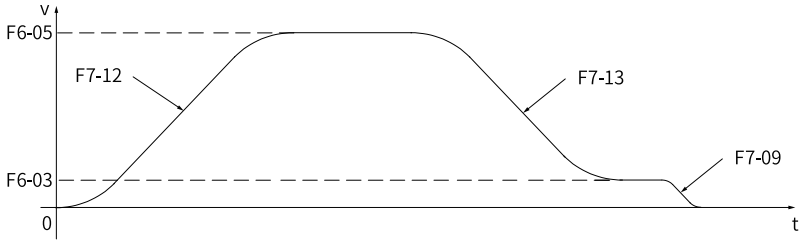


Figure 6-8 Acceleration/Deceleration time

In the ME320LN^{new} series elevator AC drive, different acceleration/deceleration curves are obtained based on the eight speed references and four acceleration/deceleration time groups.

Para.	Name	Value Range	Min. Unit	Default	Property
F6-16	Inspection speed selection	0 to 7	1	0	★

This parameter sets the inspection speed in multi-speed control. For details, see the section "Inspection Running".

Para.	Name	Value Range	Min. Unit	Default	Property
F6-17	Emergency evacuation selection at power failure	0: Disable 1: UPS 2: 48 V battery power supply	1	0	★

For details, see the section "Emergency Evacuation at Power Failure".

Para.	Name	Value Range	Min. Unit	Default	Property
F6-18	Analog minimum input	0.00 V to 10.00 V	0.01 V	0.00 V	☆
F6-19	Corresponding percentage of analog minimum input	0.0% to 100.0%	0.10%	0.00%	☆
F6-20	Analog maximum input	0.00 V to 10.00 V	0.01 V	10.00 V	☆
F6-21	Corresponding percentage of analog maximum input	0.0% to 100.0%	0.10%	100.00%	☆
F6-22	Analog input filter time	0.00s to 1.00s	0.01s	0.10s	☆

These parameters specify the speed setting when the speed reference source is analog setting in the ME320LN^{new} series elevator AC drive. They also define the relationship between the analog input voltage and the corresponding percentage of analog input. When the analog input voltage is larger than the maximum input or smaller than the minimum input, the maximum input or minimum input is used.

When the analog input is current, 1 mA current is equal to 0.5 V voltage.

When AI1 or AI2 is selected in F0-02, the speed reference is equal to the percentage obtained from parameters F6-18 to F6-22 multiplied by the maximum frequency or rated frequency.

Para.	Name	Value Range	Min. Unit	Default	Property
F6-23	AC drive function selection 1	0 to 65535	1	560	☆

This parameter is used to select AC drive functions. Each bit of the parameter defines a function, as described in the following table.

F6-23 AC drive function selection 1			
Bit	Definition	Description	De fault
bit0	Current cancellation at stop	0: Directly stop after the brake is released 1: Cancel the current before stop after the brake is released	0
bit1	No-load-cell compensation function selection	0: No-load-cell compensation invalid during auto-tuning 1: No-load-cell compensation always valid	0
bit2	Stop waiting selection	0: Jitter prevention upon RUN command at stop 1: No jitter protection	0
bit4	Maximum frequency upper limit selection	0: Maximum frequency being 90 Hz 1: Maximum frequency being rated frequency	1
bit5	Analog frequency reference base	0: Analog frequency calculated based on maximum frequency 1: Analog frequency calculated based on rated frequency	1
bit6	Reserved	-	0
bit7	Re-start after stop	0: Running not allowed after stop while external command is not canceled 1: Running allowed upon a frequency reference after stop while external command is not canceled	0
bit8	Running curve optimization selection	0: Disable running curve optimization 1: Enable running curve optimization, associated with F6-30	0
bit9	"Running" signal output selection	0: The Running output signal is synchronized with the brake release signal 1: The Running output signal is synchronized with the internal RUN signal	1

Para.	Name	Value Range	Min. Unit	Default	Proper ty
F6-24	Motor overheat voltage threshold	0.00 V to 11.00 V	0.01 V	0.0 V	☆

This function always uses AI2 for motor overheat judgment. When F6-24 is not 0:

Motor overheat is not judged by the DI terminal set with such function in group F4. When the voltage input to AI2 remains larger than F6-24 (filter time being 0.5s), the AC drive reports the fault Err39. When the voltage input to AI2 remains smaller than F6-24 (filter time being 2s), the motor overheat fault is reset automatically.

The thermistor R2 resistance is 1.33 kΩ. It is recommended that R1 resistance be 2.0 kΩ and F6-24 be set to 3.9 V. The wiring is shown in *"Figure 6–9 " on page 118* .

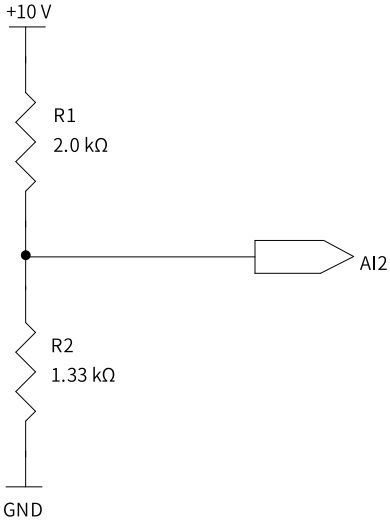


Figure 6-9 Wiring of thermistors

In *"Figure 6–9 " on page 118* , terminals +10V, GND, and AI2 are connected to terminals +10V, GND, and AI2, respectively, on the control board of the AC drive.

Para.	Name	Value Range	Min. Unit	Default	Property
F6-25	AC drive function selection 2	0 to 65535	1	0	☆

This parameter is used to select AC drive functions. Each bit of the parameter defines a function, as described in the following table.

F6-25 AC drive function selection 2			
Bit	Definition	Description	Default
bit0	SPI communication fault detection	0: Enable 1: Disable	0
bit1	FA-03 and FA-05 modification property	0: FA-03 and FA-05 cannot be modified if the system is not in the operating panel control mode. Once they are modified, F0-01 cannot be modified. 1: Can be modified	0

F6-25 AC drive function selection 2			
Bit	Definition	Description	De fault
bit2	Fault reset selection	0: Faults Err33, Err16, and Err17 cannot be reset 1: Can be reset	0
bit3	No-load-cell compensation function selection	0: No-load-cell startup function disabled during emergency running 1: No-load-cell startup function enabled during emergency running	0
bit4	Control mode restriction	0: Only FVC in terminal control mode of synchronous motor 1: No restriction	0
bit5	Threshold selection of excessive speed deviation	0: Check for excessive speed deviation after the running frequency exceeds 1/4 of the rated frequency 1: Check for excessive speed deviation once started	0
bit6	Response to RUN command during emergency running	0: Do not start upon the RUN command in the emergency evacuation state 1: Start upon the RUN command even in the emergency evacuation state	0
bit7	Automatic judgment of light-load direction during emergency evacuation	0: Light-load direction not automatically judged during emergency evacuation 1: Light-load direction automatically judged during emergency evacuation	0

Para.	Name	Value Range	Min. Unit	Default	Proper ty
F6-27	Zero-speed signal output delay	0 ms to 9999 ms	1	0	☆

If the time from the moment when the output frequency becomes 0 reaches the value of this parameter, the AC drive outputs the zero-speed signal.

Para.	Name	Value Range	Min. Unit	Default	Proper ty
F6-28	Upper limit of emergency evacuation speed	0.00 Hz to maximum frequency	0.01 Hz	8.00 Hz	★

When the emergency evacuation speed exceeds the value of this parameter, the AC drive reports the fault Err32 and stops running.

Para.	Name	Value Range	Min. Unit	Default	Property
F6-29	Analog input filter	0 V to 0.10 V	0.01 V	0 V	★

This function prevents the system from mistakenly judging that the AC drive has frequency reference due to circuit reasons when the elevator controller does not have analog setting.

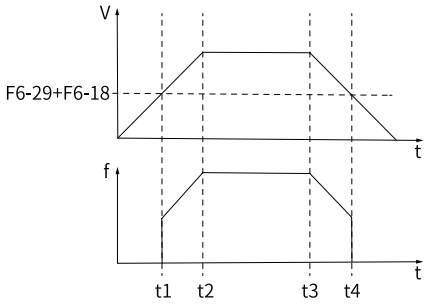


Figure 6-10 Timing diagram

Para.	Name	Value Range	Min. Unit	Default	Property
F6-30	Special acceleration rate adjusting threshold	0 to F0-05	0.01 Hz	2.00 Hz	★

To enable this function, set bit 8 of F6-23 to 1.

When running curve optimization is enabled, the elevator controller modifies the target frequency during acceleration/deceleration and the AC drive optimizes the running curve to make the curve smoother.

If the difference between the current frequency and new target frequency is smaller than the value of F6-30, the running curve is optimized; otherwise, the running curve is not optimized.

6.8 Group F7: Auxiliary Function Parameters

The ME320LN^{new} series elevator AC drive provides four groups of acceleration/deceleration time, implementing four running curves. Each running curve can be set flexibly according to user requirements.

Para.	Name	Value Range	Min. Unit	Default	Property
F7-00	Acceleration time 1	1.0s to 100.0s	0.1s	4.0s	☆
F7-01	Deceleration time 1	1.0s to 100.0s	0.1s	4.0s	☆
F7-02	Time proportion of running curve 1 start segment	10.0% to 40.0%	0.10%	40.00%	★
F7-03	Time proportion of running curve 1 end segment	10.0% to 40.0%	0.10%	40.00%	★
F7-04	Acceleration time 2	1.0s to 100.0s	0.1s	4.0s	☆
F7-05	Deceleration time 2	1.0s to 100.0s	0.1s	4.0s	☆
F7-06	Time proportion of running curve 2 start segment	10.0% to 40.0%	0.10%	40.00%	★
F7-07	Time proportion of running curve 2 end segment	10.0% to 40.0%	0.10%	40.00%	★
F7-08	Acceleration time 3	1.0s to 100.0s	0.1s	4.0s	☆
F7-09	Deceleration time 3	1.0s to 100.0s	0.1s	20.0s	☆
F7-10	Time proportion of running curve 3 start segment	10.0% to 50.0%	0.10%	40.00%	★
F7-11	Time proportion of running curve 3 end segment	10.0% to 50.0%	0.10%	40.00%	★
F7-12	Acceleration time 4	0.5s to 100.0s	0.1s	1.0s	☆
F7-13	Deceleration time 4	0.5s to 100.0s	0.1s	1.0s	☆

Para.	Name	Value Range	Min. Unit	Default	Property
F7-14	Time proportion of running curve 4 start segment	10.0% to 50.0%	0.10%	40.00%	★
F7-15	Time proportion of running curve 4 end segment	10.0% to 50.0%	0.10%	40.00%	★

These four groups of acceleration/deceleration time have the same meaning. You can set the acceleration/deceleration time and running curve characteristics for each speed (or combination of multiple speeds) of the AC drive through parameters F6-08 to F6-15.

- Acceleration time indicates the time t1 for the AC drive to accelerate from 0 Hz to the maximum output frequency (F0-05).
- Deceleration time indicates the time t2 for the AC drive to decelerate from the maximum output frequency (F0-05) to 0 Hz.

See *"Figure 6–11 " on page 122* .

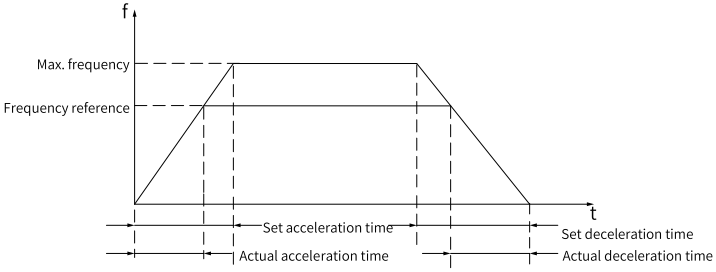


Figure 6-11 Acceleration/Deceleration time

- When the frequency reference is equal to the maximum output frequency, the actual acceleration/deceleration time is equal to the acceleration/deceleration time reference.
- When the frequency reference is less than the maximum output frequency, the actual acceleration/deceleration time is equal to the result of (Set acceleration/deceleration time x (Frequency reference/Maximum frequency)).

The ME320LN^{new} series AC drive provides four different running curves, in which the acceleration segment and deceleration segment are symmetrical to each other. *"Figure 6–12 " on page 123* takes the acceleration segment of running curve 1 as an example. t1 is the time defined in F7-02, during which the output frequency change slope (namely, the speed change rate) increases gradually. t2 is defined by F7-03, during which the output frequency change slope decreases to 0 gradually. Outside

the time segments of t1 and t2, the output frequency change slope remains unchanged.

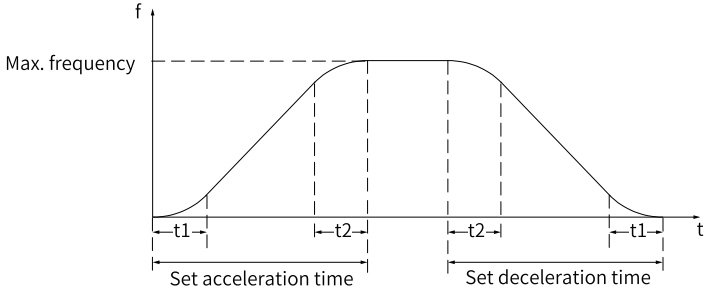


Figure 6-12 Acceleration/deceleration segments on the running curve

In the multi-speed control mode, the ME320LN^{new} series AC drive ensures smooth speed switchover and improves the riding comfort through the multi-speed selection and running curve setting.

Para.	Name	Value Range	Min. Unit	Default	Property
F7-16	Slip test acceleration time	0.5s to 10.0s	0.1s	1.0s	★

This parameter sets the acceleration rate in the slip test mode. For details, see Figure 6-10. If the slip effect is not obvious, reduce this value as appropriate.

Para.	Name	Value Range	Min. Unit	Default	Property
F7-17	Distance reference of direct travel ride	0.0 mm to 6553.5 mm	0.1 mm	0.0 mm	★

This parameter sets the running distance of direct travel ride. For details, see the section "Commissioning of Direct Travel Ride".

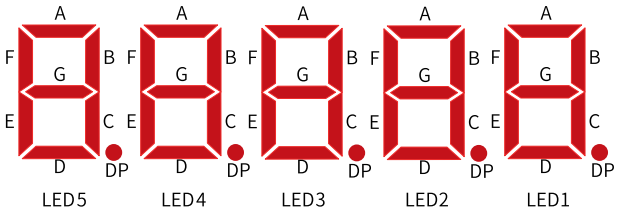
Para.	Name	Value Range	Min. Unit	Default	Property
F7-18	Actual distance of direct travel ride	0.0 mm to 6553.5 mm	0.1 mm	0.0 mm	●

This parameter monitors the actual running distance of direct travel ride, facilitating commissioning. For details, see the section "Commissioning of Direct Travel Ride".

6.9 Group F8: Auxiliary Management Parameters

Para.	Name	Value Range	Min. Unit	Default	Property
F8-00	Input and output terminal state	-	-	-	●

F8-00 indicates the input and output terminal state. The LEDs are numbered 5 to 1 from left to right. The following table describes the information indicated by each LED segment.



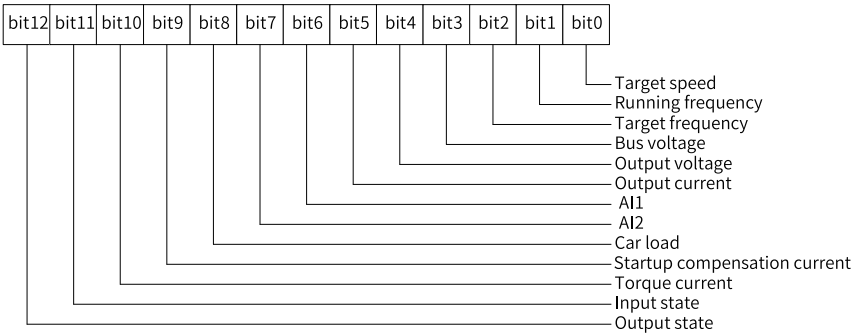
The LEDs numbered 3, 4, and 5 indicate the states of the input/output terminals of the AC drive in a segment display way. The LEDs numbered 1 and 2 are reserved.

The indication of each LED segment is shown in the table below.

LED	Segment	Meaning of ON
3	A	DI1 input active (active means that the input point is connected to the common terminal)
	B	DI2 input active
	C	DI3 input active
	D	DI4 input active
	E	DI5 input active
	F	DI6 input active
	G	DI7 input active
	DP	DI8 input active
4	A	DI9 input active
	B	DI10 input active
	C to DP	Reserved

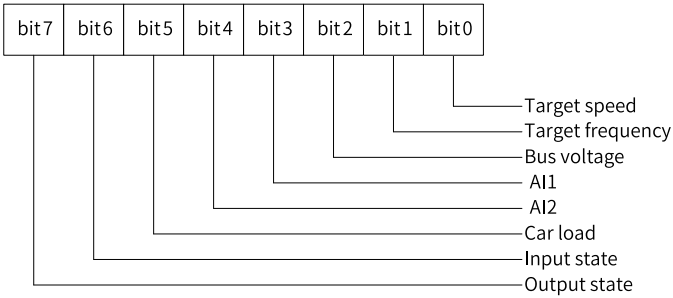
LED	Segment	Meaning of ON
5	A	FM output active
	B	DO1 output active
	C	DO2 output active
	D	Relay1 output active
	E	Relay2 output active
	F to DP	Reserved

Para.	Name	Value Range	Min. Unit	Default	Property
F8-01	LED display of parameters in the running state	1 to 32767	1	32767	☆



To have a parameter displayed during running, set the corresponding bit to 1. Then, convert the binary number to the decimal equivalent and set it in F8-01.

Para.	Name	Value Range	Min. Unit	Default	Property
F8-02	LED display of parameters in the stop state	1 to 255 bit0: Target load speed bit1: Target frequency bit2: DC bus voltage bit3: AI1 bit4: AI2 bit5: Car load (%) bit6: Input state bit7: Output state	1	255	☆



To have a parameter displayed in the stop state, set the corresponding bit to 1. Then, convert the binary number to the decimal equivalent and set it in F8-02.

Para.	Name	Value Range	Min. Unit	Default	Property
F8-03	Rated elevator speed	0.001 m/s to 8.000 m/s	0.001 m/s	1.600 m/s	☆

This parameter sets the car speed corresponding to the rated frequency of the motor.

Para.	Name	Value Range	Min. Unit	Default	Property
F8-04	Heatsink temperature	0°C to 100°C	1°C	-	●

This parameter indicates the temperature of the heatsink in contact with the IGBT of the inverter module. The IGBT over-temperature protection threshold varies with the AC drive model. The ME320LN^{new} series AC drive has a built-in program to automatically handle over-temperature.

Para.	Name	Value Range	Min. Unit	Default	Property
F8-05	Control board software version	0.00 to 99.99	0.01	-	●

This parameter indicates the control board software version.

Para.	Name	Value Range	Min. Unit	Default	Property
F8-06	Driver board software version	0 to 65535	1	-	●

This parameter indicates the driver board software version.

Para.	Name	Value Range	Min. Unit	Default	Property
F8-07	Running time reference	0 h to 65500 h 0: Disable	1 h	0 h	☆

This parameter presets the running time of the AC drive.

When the accumulative running time (F8-08) reaches the value of this parameter, the AC drive outputs the running time reached signal through a DO terminal and stops.

When F8-07 is set to 0, this function is invalid.

Para.	Name	Value Range	Min. Unit	Default	Property
F8-08	Accumulative running time (hour)	0 h to 65500 h	1 h	0 h	●
F8-09	Accumulative running time (second)	0s to 3600s	1s	0s	●

During AC drive running, the value of F8-09 increases by 1 per second. After the value reaches 3600, it is cleared and the value of F8-08 increases by 1.

Para.	Name	Value Range	Min. Unit	Default	Property
F8-10	High byte of running times	0 to 9999 Note: The value of 1 indicates 10000 times.	1	0	●
F8-11	Low byte of running times	0 to 9999	1	0	●

When the ME320LN^{new} series AC drive is not in the operating panel control mode, every time the elevator runs, the number of running times increases by 1. When the value of the low byte of running times exceeds 9999, the value is carried to the high byte of running times. Therefore, the F8-10 value of 1 indicates 10000 running times.

Para.	Name	Value Range	Min. Unit	Default	Property
F8-12	Protection against short circuit to ground upon power-on	0: Disable 1: Enable	1	0	☆

This parameter determines whether to check the motor for short circuit to ground after the AC drive is powered on. If this function is enabled, the AC drive has short-time output at the moment of power-on.

Para.	Name	Value Range	Min. Unit	Default	Property
F8-13	Control board software temporary version	0.00 to 99.99	0.01	-	●

A non-zero value indicates that the software version is used for test or customized functions.

Para.	Name	Value Range	Min. Unit	Default	Property
F8-14	Control board software customer version	0.00 to 99.99	0.01	-	●

A non-zero value indicates that the software version is specially used for the customer.

Para.	Name	Value Range	Min. Unit	Default	Property
F8-17	Year	2000 to 2100	1	2014	☆
F8-18	Month and day	0101 to 1231	1	101	☆
F8-19	Hour and minute	00.00 to 23.59	0.01	0	☆

These parameters are used to set the time of the AC drive.

6.10 Group F9: Protection Function Parameters

Para.	Name	Value Range	Min. Unit	Default	Property
F9-09	Fault auto reset attempts	0 to 3	1	0	☆

When the automatic fault reset function of the AC drive is enabled, this parameter sets the number of automatic reset attempts allowed within one hour after a fault occurs. When this value is reached, the AC drive reports a fault, enters the standby state, and needs to be repaired.

Para.	Name	Value Range	Min. Unit	Default	Property
F9-11	Auto fault reset delay	0.1s to 100.0s	0.1s	1.0s	☆

This parameter defines the waiting time from the moment when a fault is alarmed to the moment when the fault is automatically reset.

Para.	Name	Value Range	Min. Unit	Default	Property
F9-12	Input phase loss protection	0: Disable 1: Enable	1	1	☆

This parameter sets whether to enable the input phase loss protection function.

Para.	Name	Value Range	Min. Unit	Default	Property
F9-13	Output phase loss protection	1 to 3 bit0: 0: Do not detect output phase loss during running 1: Detect output phase loss during running bit1: 0: Do not detect output phase loss at startup 1: Detect output phase loss at startup	1	1	☆

This parameter sets whether to enable the output phase loss protection function.

F9-13 Output phase loss protection			
Bit	Definition	Description	Default
bit0	Output phase loss detection during running	0: Disable 1: Enable	1
bit1	Output phase loss detection at startup	0: Disable 1: Enable	1

Para.	Name	Value Range	Min. Unit	Default	Property
F9-14	1st fault code	0 to 60	1	0	●
F9-15	1st fault subcode	0 to 999	1	0	●

Para.	Name	Value Range	Min. Unit	Default	Property
F9-16	1st fault month and day	0 to 1231	1	0	●
F9-17	1st fault hour and minute	00.00 to 23.59	0.01	0	●
...					
F9-50	10th fault code	0 to 60	1	0	●
F9-51	10th fault subcode	0 to 999	1	0	●
F9-52	10th fault month and day	0 to 1231	1	0	●
F9-53	10th fault hour and minute	00.00 to 23.59	0.01	0	●
F9-54	Latest fault code	0 to 60	1	0	●
F9-55	Latest fault subcode	0 to 999	1	0	●
F9-56	Latest fault month and day	0 to 1231	1	0	●
F9-57	Latest fault hour and minute	00.00 to 23.59	0.01	0	●
F9-58	Logic information of latest fault	0 to 65535	1	0	●
F9-59	Frequency reference upon latest fault	0.00 Hz to 99.00 Hz	0.01 Hz	0.00 Hz	●
F9-60	Feedback frequency upon latest fault	0.00 Hz to 99.00 Hz	0.01 Hz	0.00 Hz	●
F9-61	Bus voltage upon latest fault	0.0 V to 6500.0 V	0.1 V	0.0 V	●
F9-62	Output voltage upon latest fault	0 V to 65000 V	1 V	0 V	●
F9-63	Output current upon latest fault	0.00 A to 650.00 A	0.01 A	0.00 A	●
F9-64	Torque current upon latest fault	0.00 A to 650.00 A	0.01 A	0.00 A	●
F9-65	Output power upon latest fault	0.00 kW to 99.99 kW	0.01 kW	0.00 kW	●

Para.	Name	Value Range	Min. Unit	Default	Property
F9-66	Input function state 1 upon latest fault	0 to 65535	1	0	●
F9-67	Input function state 2 upon latest fault	0 to 65535	1	0	●
F9-68	Output function state 1 upon latest fault	0 to 65535	1	0	●
F9-69	Output function state 2 upon latest fault	0 to 65535	1	0	●

These parameters record the fault types, subcodes, and occurrence dates and time of the last 11 faults. More details are recorded for the latest fault, including the logic state, output frequency, output current, bus voltage, and input/output state upon the latest fault.

For details about faults, see the section "Troubleshooting".

6.11 Group FA: PG Parameters

The ME320LN^{new} series AC drive supports vector control of asynchronous motors and PMSMs. Configure an appropriate interface board (PG card) for the rotary encoder that is used. Set the following parameters correctly based on the rotary encoder and PG card models.

Para.	Name	Value Range	Min. Unit	Default	Property
FA-00	Number of PG pulses	100 to 9999	1	1024	★

FA-00 is used to set the pulses per revolution (PPR) of the rotary encoder, which is indispensable in elevator applications. Set this parameter correctly; otherwise, overcurrent may occur during motor running.

Para.	Name	Value Range	Min. Unit	Default	Property
FA-01	PG disconnection detection time	0.0s to 10.0s (0: The detection function is disabled)	0.1s	1.0s	★

If the encoder pulse signal is lost during elevator running, motor control cannot be performed correctly. The ME320LN^{new} series AC drive keeps detecting the encoder pulse signals. If it detects that the pulse signal abnormal time exceeds FA-01, the ME320LN^{new} series AC reports the encoder fault and stops running. When FA-01 is set to 0, this function is disabled.

Para.	Name	Value Range	Min. Unit	Default	Property
FA-03	PG magnetic pole angle	0.0 to 359.9	0.1	0	★

In the PMSM control mode, the ME320LN^{new} series AC drive judges the rotor position based on the encoder initial angle. To ensure high-accuracy control in different directions, the ME320LN^{new} series AC drive records the encoder initial angle in FA-03. This parameter is obtained through encoder angle position auto-tuning during motor auto-tuning. If the value is known already, you can also set this parameter manually.

The ME320LN^{new} series AC drive can control synchronous motors only when this parameter is set correctly. This parameter is not required for asynchronous motor control.

By default, FA-03 and FA-05 can be modified only when F0-01 is set to 0. After modification, F0-01 can be changed to 1 only upon next power-on.

Para.	Name	Value Range	Min. Unit	Default	Property
FA-04	Current angle of PG magnetic pole	0.0 to 359.9	0.1	0	●

During PMSM control, the encoder feeds back the motor rotor position to the AC drive through FA-04, which is critical to high-accuracy control of PMSMs.

The value of FA-04 is retentive at power failure, and is related only to synchronous motor control.

Para.	Name	Value Range	Min. Unit	Default	Property
FA-05	Encoder wiring mode	0 to 15	1	0	★

FA-05 sets the motor wiring mode. It is valid only for synchronous motors.

Para.	Name	Value Range	Min. Unit	Default	Property
FA-06	PG frequency-division coefficient ratio	1 to 256	1	1	★

When the direct travel ride is enabled, the AC drive main board obtains encoder pulse signals from the frequency-division output terminal of the PG card. FA-06 must be the same as the PG card frequency-division coefficient.

For details about PG card frequency-division coefficient ratio, see the section about PG card wiring in *"3.2.3.4 Wiring and Description of PG Card for Elevator Specialized Rotary Encoder Interface Board" on page 54*.

6.12 Group FB: Communication Parameters (Reserved)

6.13 Group FC: Special Enhanced Function Parameters

Para.	Name	Value Range	Min. Unit	Default	Property
FC-00	Action at command abnormality	0: Decelerate to stop 1: Block output immediately	1	1	★

Command abnormality means that the RUN command of the ME320LNnew series elevator AC drive becomes invalid suddenly during elevator running. For details, see the table below. Upon command abnormality, the AC drive smoothly decelerates to stop according to the normal control logic to ensure a smooth speed change of the elevator, or closes the brake and stops the RUN contactor output immediately, depending on the setting of FC-00.

FWD	REV	Meaning
OFF	OFF	Invalid
ON	OFF	Run in forward direction
OFF	ON	Run in reverse direction
ON	ON	Invalid

Para.	Name	Value Range	Min. Unit	Default	Property
FC-01	Deceleration time at abnormality	0.1s to 300.0s	0.1s	3.0s	★

This parameter sets the time for the AC drive to decelerate from the maximum frequency to 0 Hz at abnormality.

Para.	Name	Value Range	Min. Unit	Default	Property
FC-02	Up speed detection level	0.00 to maximum frequency	0.01 Hz	45.00 Hz	★
FC-03	Down speed detection level	0.00 to maximum frequency	0.01 Hz	45.00 Hz	★

The ME320LN^{new} series elevator AC drive implements slow-down based on settings of FC-02 and FC-03. These two parameters are applicable to elevator upward running (when the AC drive receives the FWD command) and elevator downward running (when the AC drive receives the REV command), respectively. When the up (or down) speed judgment signal (slow-down switch signal) is active, the AC drive detects whether the running frequency exceeds FC-02 (or FC-03). If yes, the AC drive decelerates to stop according to the time set in FC-01. The down frequency judgment signal is inactive in the up direction, and vice versa.

The following figure shows the slow-down principle of the ME320LN^{new} series elevator AC drive.

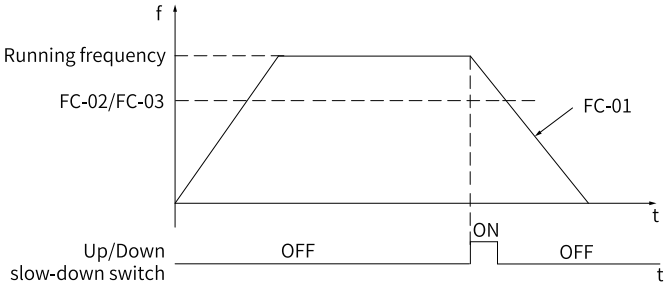


Figure 6-13 Slow-down principle

Para.	Name	Value Range	Min. Unit	Default	Property
FC-04	Advance door opening judging frequency	0.00 to maximum frequency	0.01 Hz	5.00 Hz	★

The ME320LN^{new} series elevator AC drive supports the advance door opening function. When the elevator decelerates to stop, if the output frequency is less than FC-04, the ME320LN^{new} series elevator AC drive outputs the advance door opening signal through a DO terminal, and this signal remains active until stop.

Para.	Name	Value Range	Min. Unit	Default	Property
FC-05	Frequency detection level 1	0.00 to maximum frequency	0.01 Hz	50.00 Hz	☆
FC-06	Frequency detection level 2	0.00 to maximum frequency	0.01 Hz	50.00 Hz	☆
FC-07	Frequency detection hysteresis	0.0% to 100.0% (frequency detection level)	0.10%	5.00%	☆

As shown in *"Figure 6–14 " on page 135* , FC-05 to FC-07 are FDT parameters, where FDT1 setting can be different from FDT2 setting. FDT hysteresis = FDT frequency x FC-07

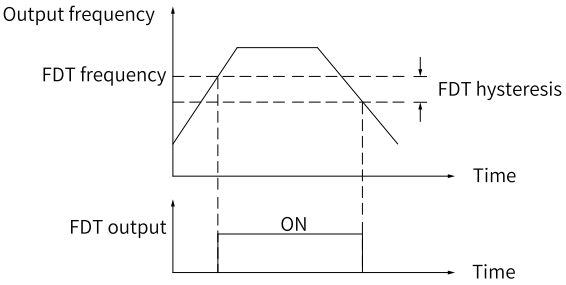


Figure 6-14 FDT signal output principle

Para.	Name	Value Range	Min. Unit	Default	Property
FC-08	Measured width when frequency reached	0.0% to 100.0% (max. frequency)	0.10%	0.00%	☆

This function sets the detection width of whether the AC drive output frequency reaches the frequency reference. Detection frequency amplitude = Maximum frequency x FC-08 The following figure shows the details.

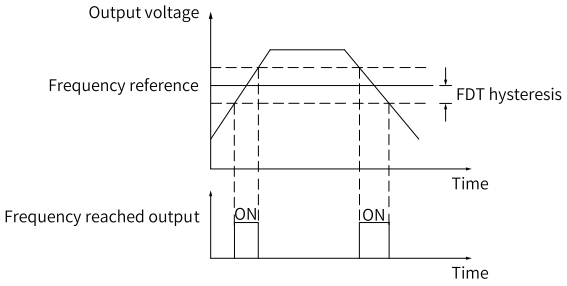


Figure 6-15 Frequency reached signal output principle

Para.	Name	Value Range	Min. Unit	Default	Property
FC-09	Overspeed detection threshold	80% to 120%	1%	115%	☆
FC-10	Overspeed detection delay	0.0s to 5.0s	0.1s	1.0s	☆

The ME320LN^{new} series elevator AC drive supports overspeed detection. The AC drive detects whether overspeed occurs by comparing the current running frequency with FC-09. If the running frequency remains greater than FC-09 for more than the time set in FC-10, the AC drive considers that overspeed occurs.

FC-09 is a percentage relative to the maximum frequency. The value of 100% corresponds to the maximum frequency.

After overspeed occurs, the AC drive acts according to the setting of FC-11, where decelerating to stop means that the AC drive decelerates to stop according to the time set in FC-01.

Para.	Name	Value Range	Min. Unit	Default	Property
FC-11	Action at overspeed	0: Decelerate to stop at abnormality 1: Alarm and block output immediately 2: Continue to run	1	1	☆

If FC-11 is set to 0, the AC drive decelerates to stop according to the time set in FC-01.

Para.	Name	Value Range	Min. Unit	Default	Property
FC-12	Speed deviation detection threshold	0% to 50%	1%	30%	☆
FC-13	Speed deviation detection delay	0.0s to 5.0s	0.1s	1.0s	☆

The ME320LN^{new} series elevator AC drive supports speed deviation detection. The AC drive detects whether the deviation between the running frequency and the frequency reference exceeds FC-12 and lasts for a duration greater than FC-13. If yes, the AC drive considers that the speed deviation is too large.

FC-12 is a percentage relative to the maximum frequency.

After detecting excessive speed deviation, the ME320LN^{new} series elevator AC drive acts according to FC-14.

Para.	Name	Value Range	Min. Unit	Default	Property
FC-14	Action at excessive speed deviation	0: Decelerate to stop at abnormality 1: Alarm and block output immediately 2: Continue to run	1	1	☆

If FC-11 is set to 0, the AC drive decelerates to stop according to the time set in FC-01.

6.14 Group FD: Special Function Parameters

Para.	Name	Value Range	Min. Unit	Default	Property
FD-00	Torque boost	0.0: (Automatic) 0.1% to 30.0%	0.10%	1.00%	★
FD-01	Torque boost frequency	0.00 to maximum frequency	0.01 Hz	50.00 Hz	★

This parameter compensates for insufficient torque production at low frequency in the V/f control mode by boosting the output voltage of the AC drive.

A very large setting will result in motor overheat and AC drive overcurrent. Generally, FD-00 does not exceed 10%.

Adjust this parameter properly to prevent overcurrent during startup. Increase this parameter when a heavy load is applied, and decrease this parameter when a light load is applied.

If FD-00 (Torque boost) is set to 0, automatic torque boost is enabled.

FD-01 sets the torque boost cut-off frequency below which the torque boost is activated and over which the torque boost is deactivated.

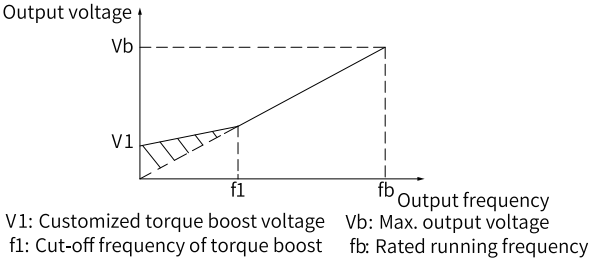


Figure 6-16 Customized torque boost

Para.	Name	Value Range	Min. Unit	Default	Property
FD-02	Slip compensation gain	0.0% to 200.0%	0.10%	100.00%	★
FD-03	Oscillation suppression gain	0 to 100	1	20	★

FD-02 is used to set the slip compensation gain and is valid in the V/f control mode. It is used to compensate for the slip caused by the load during V/f control, to reduce the variation of motor speed with load change during V/f control. Typically, the value of 100% corresponds to the rated slip of the motor with rated load. Adjust the slip coefficient in the following principles: When the rated load is applied, use the default setting 100%, and the motor speed is close to the speed reference. When the load is lower than the rated load, decrease this parameter to a value less than 100%. When the load is higher than the rated load, increase this parameter to a value greater than 100%.

FD-03 is used to set the oscillation suppression gain. Set this parameter to 0 if the motor has no oscillation. Increase this gain properly only when the motor has obvious oscillation. A larger value brings a better oscillation suppression effect. Set this parameter to a value as small as possible in the prerequisite of efficient motor oscillation suppression.

Para.	Name	Value Range	Min. Unit	Default	Property
FD-04	AC drive function selection 3	0 to 65535 bit0: 0: Using fixed values 1: Set by F2-06 and F2-07	1	0	★

This parameter is used to select AC drive functions. Each bit of the parameter defines a function, as described in the following table.

FD-04 AC drive function selection 3			
Bit	Definition	Description	Default
bit0	Asynchronous motor current loop parameter setting	0: Using fixed values 1: Set by F2-06 and F2-07	0

Para.	Name	Value Range	Min. Unit	Default	Property
FD-05	Position lock current coefficient	1.0% to 50.0%	0.10%	15.00%	★
FD-06	Position lock speed loop Kp	0.05 to 1.00	0.01	0.5	★
FD-07	Position lock speed loop Ti	0.05 to 2.00	0.01	0.6	★

These parameters are used to adjust elevator startup in the no-load-cell mode. For details, see the section "No-Load-Cell Commissioning".

6.15 Group FU: Monitoring Parameters

Para.	Name	Value Range	Min. Unit	Default	Property
FU-00	Pre-torque current	–200.0% to +200.0%	0.10%	0	●

This parameter indicates the percentage of the pre-torque current to the rated current (with a positive or negative sign to indicate the motoring or regenerative state).

Para.	Name	Value Range	Min. Unit	Default	Property
FU-01	Logic information	0 to 65535	1	0	●

This parameter indicates the elevator state.

As shown in the following figure, the LEDs are numbered 1 to 5 from right to left. The LEDs numbered 1 and 2 indicate the AC drive state. The LED numbered 3 indicates the current speed. The LED numbered 4 indicates the running direction. The LED numbered 5 indicates whether running is allowed. The following table lists meaning of each LED segment.

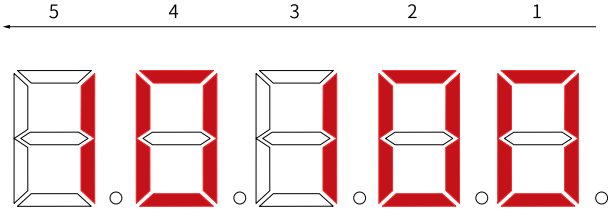


Figure 6-17 Logic information example

5		4		3		2	1
Terminal Running Permission		Direction Command		Multi-speed Setting		System State	
0	Running inhibited	0	No command	0	Speed 0	0	Standby
1	Running permitted	1	Up direction	1	Speed 1	1	RUN contactor control
-		2	Down direction	2	Speed 2	2	Brake release control
-	-	-	-	3	Speed 3	3	Startup zero-speed running
-	-	-	-	4	Speed 4	4	Normal curve running
-	-	-	-	5	Speed 5	5	Emergency running
-	-	-	-	6	Speed 6	6	Startup frequency processing
-	-	-	-	7	Speed 7	7	RUN contactor open
-	-	-	-	-	-	8	Direct travel ride control
-	-	-	-	-	-	9	Decelerate to stop

5		4		3		2	1
Terminal Running Permission		Direction Command		Multi-speed Setting		System State	
-	-	-	-	-	-	10	Stop zero-speed holding
-	-	-	-	-	-	11	Brake release control
-	-	-	-	-	-	12	Stop
-	-	-	-	-	-	13	Slip test running
-	-	-	-	-	-	14	Decelerate to stop at abnormality

Para.	Name	Value Range	Min. Unit	Default	Property
FU-02	Frequency reference	0.00 Hz to 99.00 Hz	0.01 Hz	0.00 Hz	●
FU-03	Feedback frequency	0.00 Hz to 99.00 Hz	0.01 Hz	0.00 Hz	●
FU-04	Bus voltage	0.0 V to 6500.0 V	0.1 V	0.0 V	●
FU-05	Output voltage	0 V to 65000 V	1 V	0 V	●
FU-06	Output current	0.00 A to 650.00 A	0.01 A	0.00 A	●
FU-07	Output torque	0.0% to 200.0%	0.10%	0.00%	●
FU-08	Torque current	0.00 A to 650.00 A	0.01 A	0.00 A	●
FU-09	Output power	–99.99 kW to +99.99 kW	0.01 kW	0.00 kW	●

These parameters indicate the current system performance state. The value of FU-09 (Output power) is a signed value.

Para.	Name	Value Range	Min. Unit	Default	Property
FU-10	Car load	0.0% to 100.0%	0.10%	0.00%	●

When the load cell pre-torque function is enabled, this parameter displays the car load measured by the load cell.

Para.	Name	Value Range	Min. Unit	Default	Property
FU-11	Car speed	0.000 m/s to 65.000 m/s	0.001 m/s	0.000 m/s	●

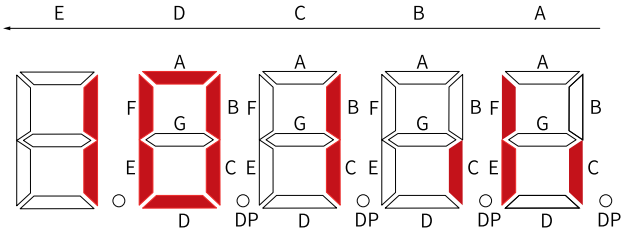
This parameter indicates the car running speed. The displayed value is correct only when F8-03 is set correctly.

Para.	Name	Value Range	Min. Unit	Default	Property
FU-12	Communication interference	0 to 65535	1	0	●

This parameter indicates the communication quality between the control board and the driver board. The display is 0 to 9. A larger value indicates more intensive communication interference and poorer communication quality.

Para.	Name	Value Range	Min. Unit	Default	Property
FU-13	Input function state 1	0 to 65535	1	0	●
FU-14	Input function state 2	0 to 65535	1	0	●
FU-15	Output function state 1	0 to 65535	1	0	●
FU-16	Output function state 2	0 to 65535	1	0	●

Figure 6-18 Input state example



As shown in *"Figure 6–18 " on page 142* , the LEDs are coded A to E from right to left. The LEDs coded E and D indicate the function code of the input/output terminal (for example, 10 indicates RUN contactor feedback). For the LED coded C, value 1 indicates active signal and value 0 indicates inactive signal. Each segment of the LEDs coded A and B indicates the state of a function. A total of 16 function states are indicated by the 16 LED segments. In the example illustrated by the figure, the LEDs coded C, D, and E indicate that the feedback signal of the RUN contactor is active, and the LEDs coded A and B indicate that the functions 10, 2, 4, and 5 are enabled.

FU-13 Input function state 1			
Function Code	Definition	Function Code	Definition
0	Reserved	8	Inspection signal
1	Forward running command	9	Emergency input
2	Reverse running command	10	RUN contactor feedback
3	Multi-speed terminal 1	11	Brake feedback
4	Multi-speed terminal 2	12	Load cell terminal 1
5	Multi-speed terminal 3	13	Load cell terminal 2
6	Fault reset command	14	Load cell terminal 3
7	Enable control signal	15	Load cell terminal 4
FU-14 Input function state 2			
Function Code	Definition	Function Code	Definition
16	External fault signal	24	Reserved
17	Motor overheat signal	25	Reserved
18	Up speed judgment	26	Reserved
19	Down speed judgment	27	Reserved
20	Multi-speed logic selection 1	28	Reserved
21	Multi-speed logic selection 2	29	Reserved
22	Direct travel ride command	30	Reserved
23	Reserved	31	Reserved
FU-15 Output function state 1			
Function Code	Definition	Function Code	Definition
0	Reserved	8	Bus undervoltage
1	Running	9	FDT1 output
2	Zero-speed running	10	FDT2 output
3	Zero-speed signal	11	Frequency reached
4	Fault signal	12	Overspeed output
5	RUN contactor output control	13	Overload pre-warning
6	Brake output control	14	Running time reached
7	Advance door opening signal	15	Ready for RUN
FU-16 Output function state 2			
Function Code	Definition	Function Code	Definition
16	Contact stuck output	24	Reserved
17	Re-leveling output	25	Reserved
18	Light-load running output	26	Reserved
19	Reserved	27	Reserved

FU-13 Input function state 1			
Function Code	Definition	Function Code	Definition
20	Reserved	28	Reserved
21	Reserved	29	Reserved
22	Reserved	30	Reserved
23	Reserved	31	Reserved

Para.	Name	Value Range	Min. Unit	Default	Property
FU-17	AI1 voltage	0.00 V to 20.00 V	0.01 V	0.00 V	●

This parameter indicates the AI1 voltage.

Para.	Name	Value Range	Min. Unit	Default	Property
FU-18	AI2 voltage	0.00 V to 20.00 V	0.01 V	0.00 V	●

This parameter indicates the AI2 voltage.

Para.	Name	Value Range	Min. Unit	Default	Property
FU-19	AO1 voltage	0.00 V to 20.00 V	0.01 V	0.00 V	●

This parameter indicates the AO1 voltage.

Para.	Name	Value Range	Min. Unit	Default	Property
FU-20	Number of startup rollback pulses	0 to 65535	1	0	●

When the no-load-cell function is enabled (F3-09 set to 5), this parameter is used to observe the car rollback at startup. For details, see the section "No-Load-Cell Commissioning".

Para.	Name	Value Range	Min. Unit	Default	Property
FU-21	PG card output pulses per second	0 to 65535	1	0	●

When the direct travel ride function is enabled, the PG card frequency-division signals are output to the corresponding terminal on the I/O extension board and then to the AC drive main control board. This parameter is used to view whether the PG card pulse signal is normal during running.

6.16 Group FF: Factory Parameters (Reserved)

6.17 Group FP: User Parameters

Para.	Name	Value Range	Min. Unit	Default	Property
FP-00	User password	0 to 65535 0: No password	1	0	☆

To enable password protection, set this parameter to any number except 0.

Setting this parameter to 00000 clears the password set before and disables the password protection function.

After a password is set and takes effect, you cannot view parameters without entering the password on the ME320LN^{new} AC drive.

Keep your password safe. If you forget your password, contact the manufacturer.

Para.	Name	Value Range	Min. Unit	Default	Property
FP-01	Parameter update	0: Disable 1: Restore default settings 2: Clear fault records	1	0	★

Para.	Name	Value Range	Min. Unit	Default	Property
FP-02	Display of user-defined parameters	0: Disable 1: Enable	1	0	★

When FP-02 is set to 1, parameters that are different from the default settings are displayed on the operating panel LED, facilitating setting and troubleshooting. When FP-02 is set to 0, all parameters are displayed.

7 Application and Commissioning

7.1 Multi-Speed as Speed Reference Source

As a common mode for the elevator application, multi-speed used as the speed reference source features strong anti-interference capability, high adaptability, and feasibility. Different from the traditional multi-speed mode that has the same acceleration/deceleration curve for different speeds, the multi-speed mode especially designed for the ME320LN^{new} series AC drive provides a different acceleration/deceleration curve for each speed based on the multi-speed control characteristics, making commissioning easier.

7.1.1 Wiring Diagram

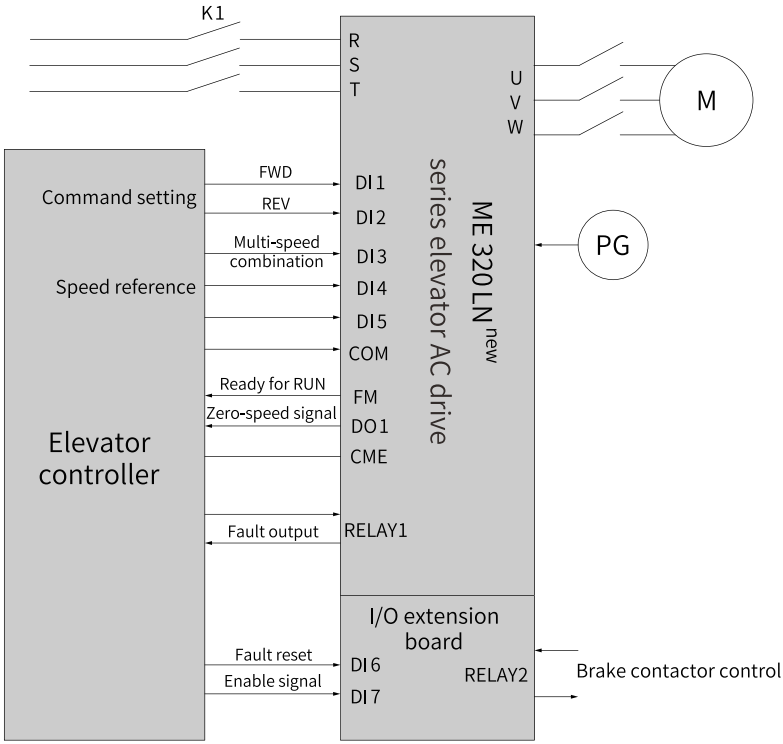


Figure 7-1 System wiring for the multi-speed control mode

Note

- *"Figure 7–1 " on page 146* The input and output terminals except RELAY2 have default settings at delivery. Change the settings only when required.
- It is recommended that RELAY2 be used as the brake control output and connected to the brake control circuit of the system.

7.1.2 Parameter Setting

This section describes parameter setting in the elevator commissioning procedure that is divided into three parts: motor auto-tuning, inspection running, and normal speed running.

Motor Auto-Tuning

- Asynchronous motor auto-tuning (static and dynamic)

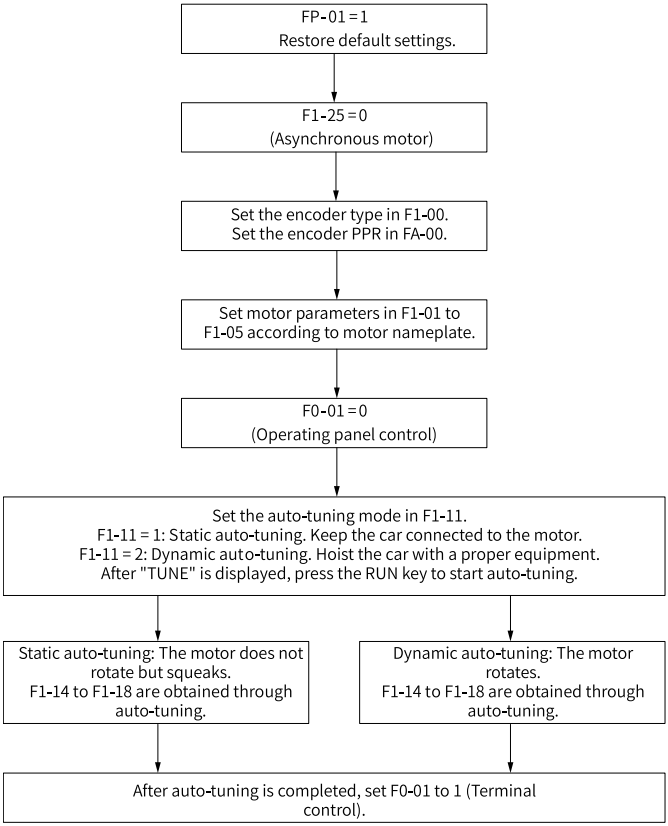


Figure 7-2 Asynchronous motor auto-tuning flowchart

Note

If the control mode is SVC or V/f control, the encoder type and encoder pulses per revolution need not be set. However, the FVC mode is recommended for the elevator application.

- Synchronous motor no-load auto-tuning

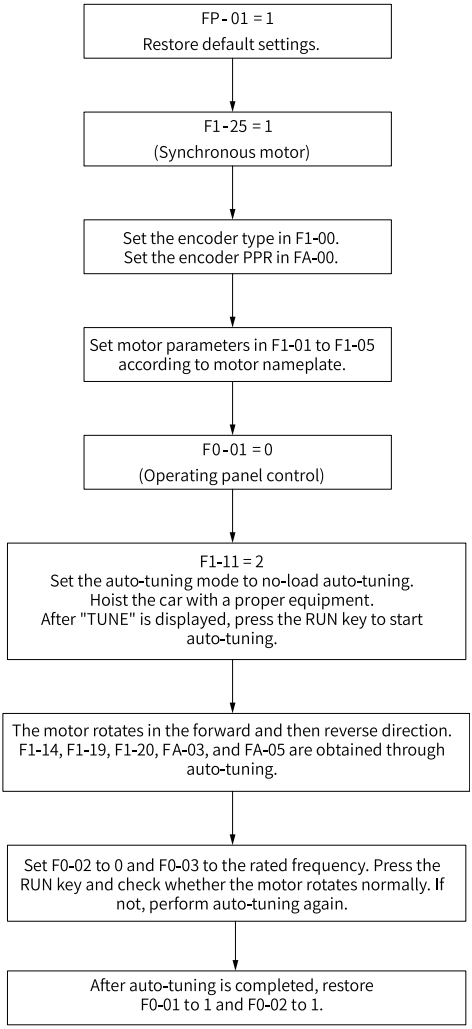


Figure 7-3 Synchronous motor no-load auto-tuning flowchart

Note

Perform auto-tuning multiple times until the error of FA-03 is no more than 5 degrees and the value of FA-05 remains unchanged, and then perform trial run.

- Synchronous motor with-load auto-tuning

To facilitate auto-tuning of synchronous motors, the ME320LN^{new} series AC drive provides an encoder angle auto-tuning method with the car connected, so that you do not need to remove the elevator steel rope. The procedure is as follows.

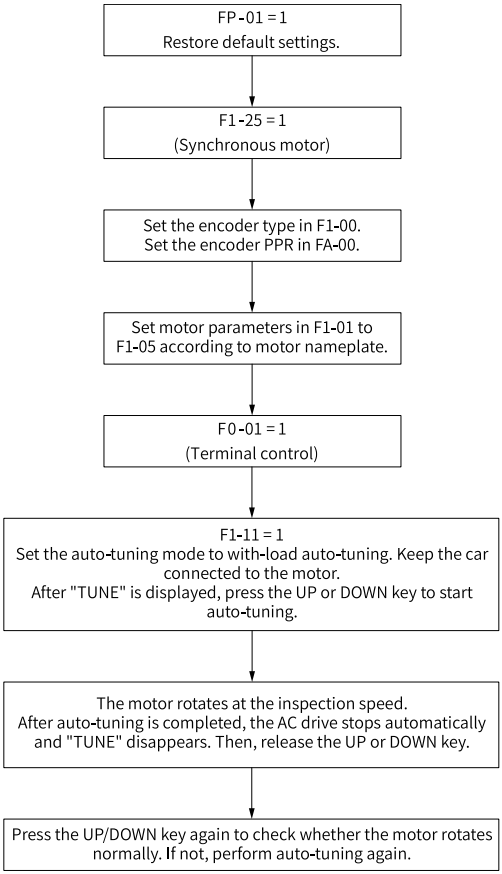


Figure 7-4 Synchronous motor with-load auto-tuning flowchart

Note

- The AC drive takes 2s to store obtained data after auto-tuning is completed, and does not respond to any input command at this moment.
- Note that the with-load auto-tuning mode can be performed only by professionals and only when there is no person inside the shaft; otherwise, danger may occur.
- After auto-tuning starts, the no-load-cell pre-torque compensation function is disabled (bit1 of F6-23 is 0) to prevent abnormality.
- If auto-tuning fails, exchange any two of UVW power cables of the AC drive, and perform auto-tuning again.

Inspection Running

After auto-tuning is completed, the AC drive enters the inspection running stage. Before the AC drive enters this stage, set the following parameters:

1. Inspection speed selection (F6-16)
2. Speeds for multi-speed running (F6-00 to F6-07)
3. Acceleration/Deceleration running curves (F6-08 to F6-15)
4. Acceleration/Deceleration time (F7-00 to F7-15)

Note:

- If speed 2 is used as the inspection speed, set F6-16 to 2.
- Then, set the frequency reference corresponding to speed 2 in F6-02. The AC drive outputs this frequency during inspection running.
- Then, set the acceleration/deceleration curve of speed 2 in F6-10, which is running curve 1 by default.
- If you need to modify the acceleration/deceleration time of the running curve 1, set parameters F7-00 to F7-03 again.

Note

If the terminal functions of the AC drive are different from the default settings, check and set parameters in groups F4 and F5 correctly before inspection running.

Normal Speed Running

Before the elevator enters the normal speed commissioning stage, perform the following operations to ensure riding comfort:

1. Check that the encoder wiring and cable connection (U, V, and W phases) between the AC drive and motor are correct and the phase sequence is not changed after motor auto-tuning.
2. Set the target running frequency for each speed.

3. Set acceleration/deceleration curve for each speed.
4. Set acceleration/deceleration time, start segment, and end segment for each curve to guarantee the riding comfort.
5. Adjust parameters in groups F2 and F3 to improve the riding comfort during running, start, and stop.

Application

Assume that the speed reference combinations of the AC drive are as follows:

- Inspection: Speed 2, frequency reference 10 Hz, and running curve 4
- Creeping: Speed 3, frequency reference 3 Hz, and running curve 3
- Normal speed: Speed 7, frequency reference 48 Hz, and running curve 1

The parameter setting is as follows:

Stage	Para.	Name	Setpoint	Remarks
Inspection	F6-16	Inspection speed selection	2	-
	F6-02	Speed 2	10	-
	F6-10	Running curve of speed 2	4	Running curve 4 is defined by F7-12 to F7-15.
Creeping	F6-03	Speed 3	3	-
	F6-11	Running curve of speed 3	3	Running curve 3 is defined by F7-08 to F7-11.
High speed	F6-07	Speed 7	48	-
	F6-15	Running curve of speed 7	1	Running curve 1 is defined by F7-00 to F7-03.

Note

This example lists only speed-related parameters. Other parameters to be set during multi-speed commissioning are not described here.

7.2 AI as Speed Reference Source

Using AI as the speed reference source is also a common mode in the ME320LN^{new} series AC drive, in which the speed reference and RUN command are set through AI terminals.

7.2.1 Wiring Diagram

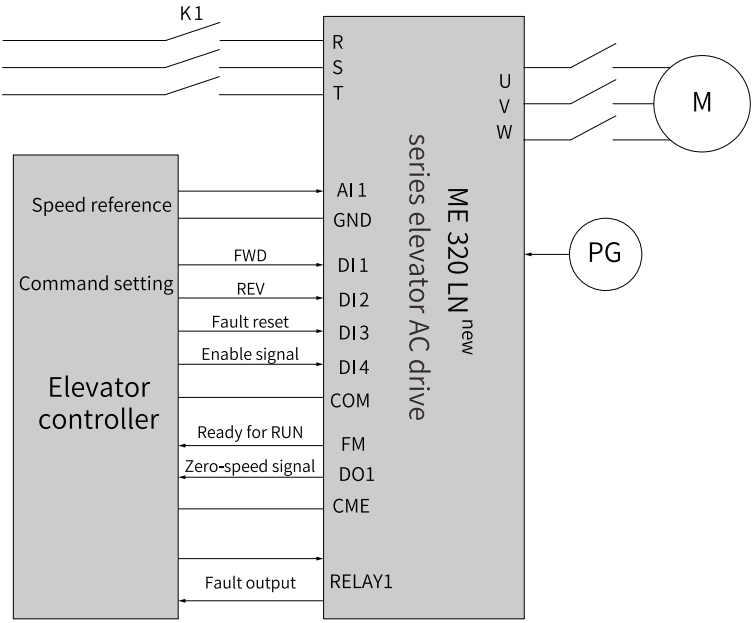


Figure 7-5 System wiring for AI terminal control mode

7.2.2 Parameter Setting

In AI speed control mode, the motor auto-tuning method is the same as that in multi-speed control mode. Perform motor auto-tuning according to the auto-tuning method in multi-speed control mode.

When AI is used as the speed reference source, the AC drive executes commands sent by the controller, as shown in the preceding figure. The AI signal is assumed as 0 V to 10 V input. The following table lists the parameter setting:

Type	Para.	Name	Setpoint
Analog function parameters	F0-02	Speed reference source selection	2
	F6-19	Corresponding percentage of analog minimum input	0
	F6-21	Corresponding percentage of analog maximum input	100
	F6-18	Analog minimum input	0
	F6-20	Analog maximum input	10
	F8-22	Analog input filter time	0.1
Motor encoder parameters	Groups F1 and FA	Obtained through motor auto-tuning. See synchronous and asynchronous motor auto-tuning in multi-speed control mode.	
Speed loop parameter in vector control mode	Group F2	Adjusted based on actual running characteristics.	
Input terminal definition parameters (group F4)	F4-03	DI3 function selection	7
	F4-04	DI4 function selection	6

7.3 Inspection Running

In the ME320LN^{new} series AC drive, the inspection running mode can be implemented through multi-speed control based on the elevator inspection running characteristics. The following section describes the control process and the running curve briefly.

Enable the ME320LN^{new} series AC drive to enter the inspection mode in the following two ways:

- Activate the inspection signal of the AC drive input terminal. After this signal becomes active, if F6-16 is a non-zero value, the AC drive runs at the speed selected by F6-16.
- Set F6-16 to a non-zero value and make the selected speed equal to the value of F6-16. For example, if F6-16 is set to 1 and state combinations if multi-speed DI terminals correspond to speed 1, the AC drive enters the inspection mode even no inspection signal is input by the input terminal.

The slip test and angle-free auto-tuning functions of the semi-automatic mode can be used only in the inspection mode. Make the AC drive enter the inspection mode before the system starts up.

7.3.1 Wiring Diagram

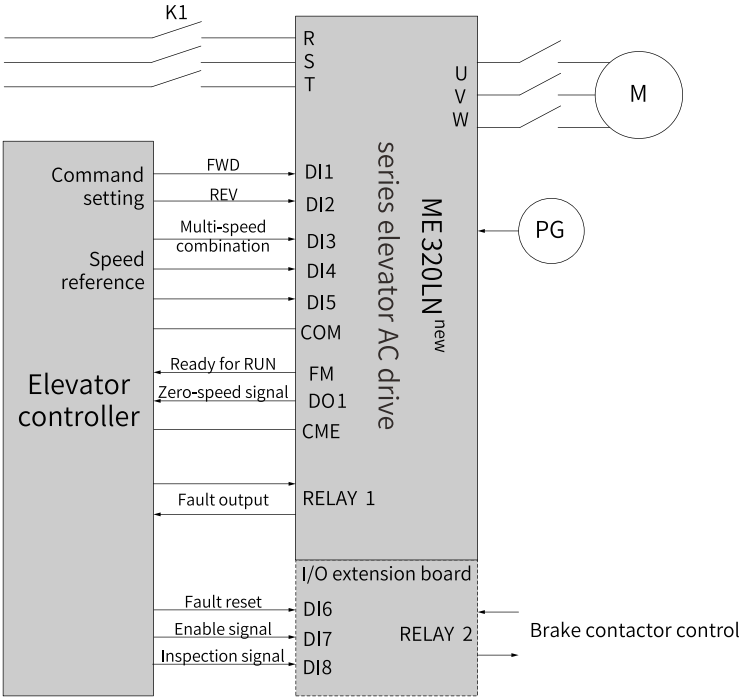


Figure 7-6 System wiring of inspection running (using DI8 for inspection signal input)

7.3.2 Parameter Setting and Running Curve

The running time sequence of the inspection mode is different from that of the normal speed mode in the aspect of stop process. For example, if F6-16 is set to 2, when there is a FWD (REV) command and the inspection signal of the input terminal is active, the ME320LN^{new} AC drive runs at the target frequency of speed 2, and the acceleration time is determined according to the curve corresponding to speed 2. In the stop process, if the inspection signal is canceled first, the AC drive decelerates to 0 according to the deceleration time of speed 2 until the FWD or REV command is canceled. As shown in *"Figure 7–7 " on page 156* , the deceleration can be set to a small value (such as 1s) to achieve quick stop.

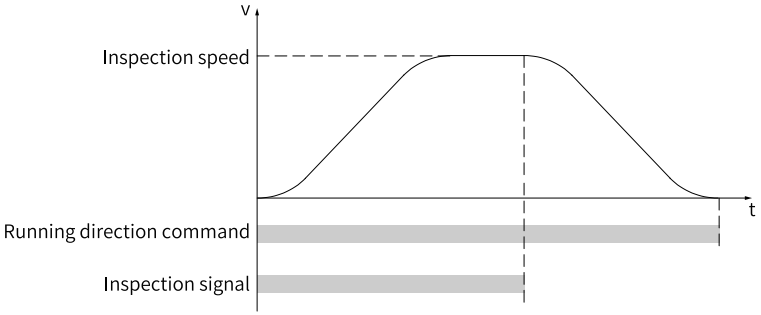


Figure 7-7 Stop process time sequence of inspection signal

If the FWD or REV command is canceled directly during inspection running, the AC drive stops output immediately, as shown in *"Figure 7–8 " on page 156* .

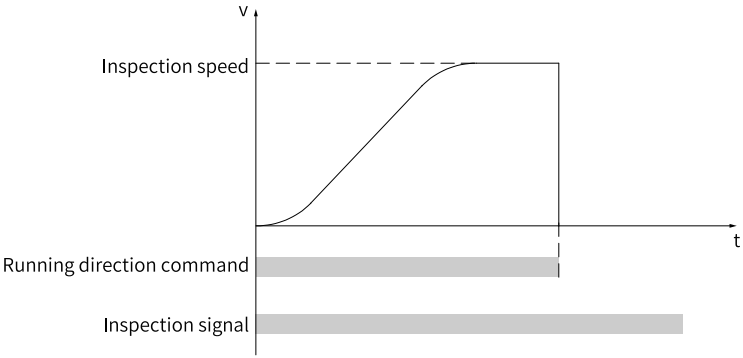


Figure 7-8 Stop process time sequence when the RUN command is canceled

Assume that for speed 2, inspection frequency 10 Hz and the curve 4 are used for inspection running. The following table lists the parameters to be set.

Para.	Name	Setpoint	Default	Remarks
F6-05	Speed 2	10.00 Hz	0.00 Hz	The rated motor frequency is 50.00 Hz.
F6-13	Acceleration/ Deceleration time of speed 2	4	1	-
F6-16	Inspection speed selection	2	0	Speed 2 is selected.

Para.	Name	Setpoint	Default	Remarks
F7-12	Acceleration time 4	2.0s	20.0s	-
F7-13	Deceleration time 4	1.0s	20.0s	Set it to the minimum value to ensure that the speed is reduced to a very small value before the brake is applied.

7.4 Emergency Evacuation at Power Failure

Passengers may be trapped in the car if power failure suddenly happens during the user of the elevator.

The ME320LN^{new} series AC drive provides two standby power supply modes to prevent this problem: UPS and 48 V battery power supply.

48 V battery power supply: The AC drive main circuit is powered by a 48 V battery, and other working power of the elevator is supplied by the UPS or the inverter power of more than 220 V. In this mode, the motor runs with the electrical energy of the battery and the working power supply can be very small.

UPS: The main circuit and working power of the AC drive are both supplied by the UPS.

The following describes the two modes respectively.

7.4.1 Emergency Evacuation Modes at Power Failure

System Wiring

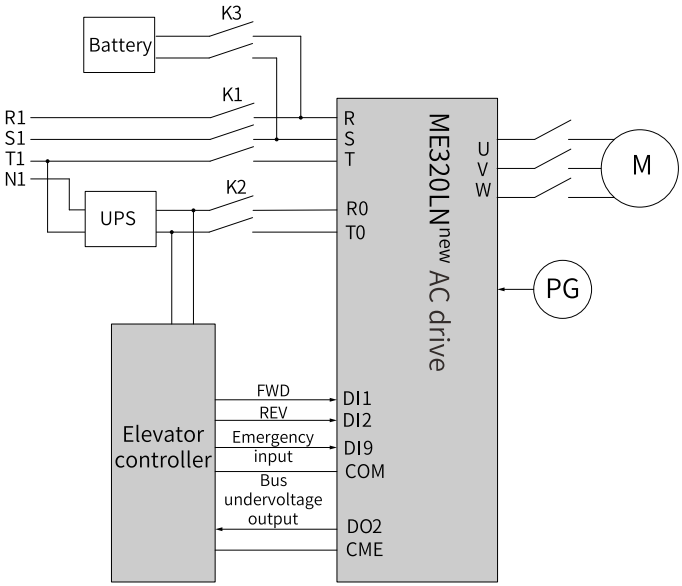


Figure 7-9 Wiring of battery power supply for emergency evacuation

Note

When this mode is used, the AC drive must be added with the UPS power interfaces R0 and T0.

Running Time Sequence

When the AC drive runs in the multi-speed mode, wire the system according to the preceding figure, with DO2 as the bus undervoltage output port. Use speed 2 as the emergency evacuation speed. The following table lists the parameters to be set in this mode.

Para.	Name	Setpoint	Default	Remarks
F4-09	DI9 function selection	9	0	Emergency input
F5-01	DO2 function selection	8	0	Bus undervoltage
F6-02	Speed 2	2.00 Hz	0.00 Hz	The rated motor frequency is 50.00 Hz.
F6-10	Running curve of speed 2	3	1	-

Para.	Name	Setpoint	Default	Remarks
F6-17	Emergency evacuation selection at power failure	2	0	48 V battery power supply
F7-08	Acceleration time 3	30.0s	4.0s	Increasing the acceleration time can prevent too large inrush current.

"Figure 7–10 " on page 159 takes the up direction as an example to show the time sequence.

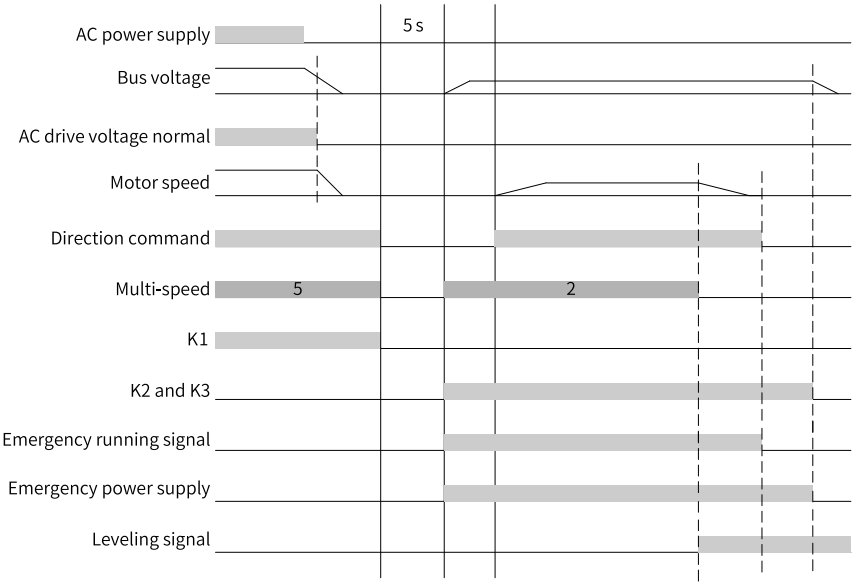


Figure 7-10 Time sequence of emergency evacuation

The AC drive receives the emergency running signal from the elevator controller through the DI terminal. Based on this signal, the AC drive determines whether to enter the emergency evacuation state. Contactors K1, K2, and K3 are controlled by the elevator controller.

Precautions

- Set the running speed and acceleration/deceleration time in this mode properly based on the elevator conditions. The recommended acceleration/deceleration time is larger than 10s. Set the battery running speed according to the following formula: Running frequency < (48 V - 5 V) x Rated motor frequency/(1.414 x Rated motor voltage)
- The battery supplies 48 V DC voltage to the main circuit, and the auxiliary power supply such as UPS supplies the working power.

- It is recommended that the steady output current of the battery be larger than the no-load current of the traction machine.
- The ME320LN^{new} series AC drive determines whether it is emergency running based on the signal input to the relevant DI terminal. The running speed is given through multi-speed setting, and the acceleration/deceleration time selected for this speed is used, but it is linear rather than running curve.
- The AC drive does not detect the DC bus voltage in the battery power supply mode. Before the brake is released, ensure that the 48 V voltage has been input to the main circuit of the AC drive.
- In the battery power supply mode, the ME320LN^{new} series AC drive monitors the running speed. If the speed exceeds F6-28 (Upper limit of emergency evacuation speed at power failure), the AC drive reports the fault Err32 and performs protection.
- During emergency running, the direction of drive load is not allowed. The external controller must select the running direction of balanced load or braking load. The ME320LN^{new} series AC drive provides the light-load running signal, and determines whether to output this signal according to the load conditions. The external controller determines the emergency running direction based on this signal.
- During emergency evacuation at power failure, pay attention to the time sequence of the contactor connected to the AC drive main power supply and the connector connected to the UPS. They must not be closed at the same time; otherwise, the UPS and battery will be damaged.

7.4.2 UPS

System Wiring

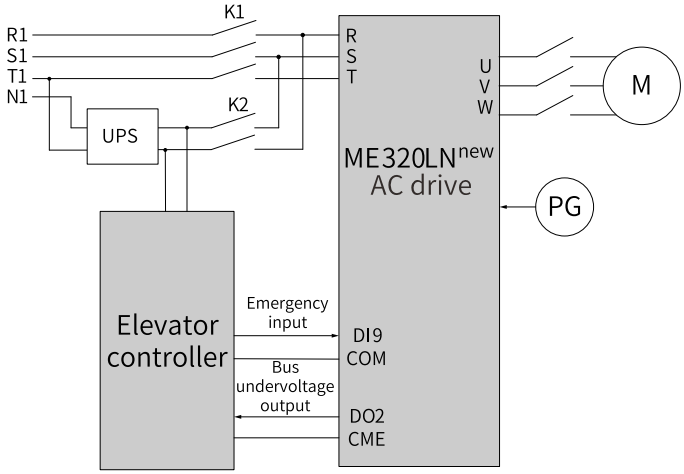


Figure 7-11 Wiring of UPS power supply for emergency evacuation

Running Time Sequence

When UPS is used for power supply for emergency evacuation in multi-speed control, add the following wiring according to *"Figure 7–11 " on page 160*:

- Wiring to terminals respectively with "Emergency input" and "Bus undervoltage output" signals
- Wiring between the UPS and the AC drive in the stop state

Assume that speed 2 is used as the emergency evacuation speed. The following table lists the parameters to be set.

Para.	Name	Setpoint	Default	Remarks
F4-09	DI9 function selection	9	0	Emergency input
F5-01	DO2 function selection	8	0	Bus undervoltage
F6-02	Speed 2	2.00 Hz	0.00 Hz	The rated motor frequency is 50.00 Hz.
F6-10	Running curve of speed 2	3	1	-
F6-17	Emergency evacuation selection at power failure	1	0	UPS
F7-08	Acceleration time 3	30.0s	4.0s	Increasing the acceleration time can prevent too large inrush current.

The running time sequence of UPS is the same as that of the 48 V battery power supply.

The AC drive receives the UPS emergency running signal from the elevator controller through the DI terminal. Based on this signal, the AC drive determines whether to enter the emergency evacuation state. Contactors K1 and K2 are controlled by the elevator controller.

7.5 Analog Load Cell Commissioning

This section describes the analog load cell commissioning method of the ME320LN^{new} series AC drive, on the prerequisite that FWD and REV commands respectively indicate up and down directions of the elevator.

7.5.1 Parameter Setting

1. Assume that AI1 is used as the pre-torque input channel, F3-09 is set to 2, and F3-10 is the elevator balance coefficient.
2. View the AI1 sampling value (FU-17) displayed on the operating panel when the car has no load and input the value to F3-18. Then, input the AI1 sampling value (FU-17) when the car has full load to F3-19. These two parameters can also be obtained by load cell auto-tuning.

3. Adjust F3-11 appropriately, with 0.6 recommended.

7.5.2 Commissioning When Balance Coefficient Incorrect

Sometimes no-load compensation is correct, but the compensation effect becomes poor when the car load increases. This is caused by incorrect elevator balance coefficient.

If the balance coefficient is unknown, calculate the balance coefficient (F3-10) and gain (F3-11) according to the no-load and full-load compensation tests to make the compensation effect consistent.

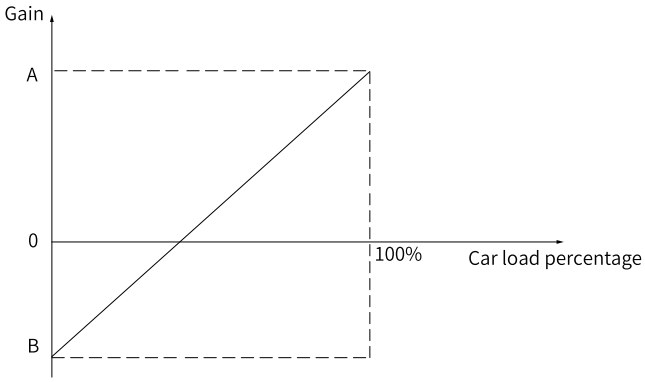


Figure 7-12 Compensation curve

As shown in *"Figure 7–12 " on page 162* , set F3-10 to 50%. Perform car no-load auto-tuning. Run the elevator in the up and down directions. Adjust F3-11 to ensure that there is no rollback or over torque compensation at the instantaneous moment of brake release both in the up and down directions. Record F3-11 as B. Put full load in the car and perform car full-load auto-tuning. Run the elevator in the up and down directions. Adjust F3-11. When the compensation is proper, record F3-11 as A.

As shown in *"Figure 7–12 " on page 162* , the oblique line is the correct compensation curve of the elevator. The cross point between this line and the horizontal axis is the balance compensation point, that is, balance coefficient. Calculate the balance coefficient according to the following formula: F3-10 = 100 x B/(A + B) F3-11 = (A + B)/2

For example, if B is 0.7 and A is 0.4, then F3-10 is 36.4% and F3-11 is 0.55.

7.5.3 Commissioning When Running Direction Incorrect

If the FWD command instructs down direction and the REV command instructs up direction, which is opposite to the prerequisites, compensation causes bad consequence on the system. In this case, record the sampling values F3-18 and F3-19 at car non-load and full-load and the balance coefficient F3-10.

Assume that F3-18 is X, F3-19 is Y, and F3-10 is Z. Then, set F3-19 to X, F3-18 to Y, and F3-10 to 100 - Z.

7.6 No-Load-Cell Commissioning

7.6.1 Parameter Setting

Para.	Description	Value Range
F1-00	Encoder type	0
F3-09	Weighing mode	5
F3-04	Holding time of zero-speed torque current upon brake release	> 0.5s

7.6.2 Commissioning Instructions

- Increase FD-05 (Position lock current coefficient) gradually to a value that ensures rollback is small enough and the motor does not jitter after the brake is released.
- View FU-20 during commissioning to check rollback. Minimize the rollback.
- If the motor oscillates obviously when FD-07 (Position lock speed loop Ti) is smaller than 1.00, increase FD-05.
- The default setting of FD-06 (Position lock speed loop Kp) is proper. Do not change it to a very large value because this may cause motor oscillation.

7.7 Commissioning of Direct Travel Ride

The ME320LN^{new} series AC drive provides the direct travel ride function, which eliminates creeping of the elevator at arrival and improves the elevator running efficiency. The function requires that:

- The elevator controller outputs a direct travel ride signal to the AC drive.
- This signal is sent when the car arrives at the position with a fixed distance to the leveling position, and keeps active until the AC drive stops.

7.7.1 Wiring Diagram

Figure *"Figure 7–13 " on page 164* gives a wiring example, in which the elevator uses the sin-cos encoder and I/O expansion card for open collector output in the direct travel ride solution.

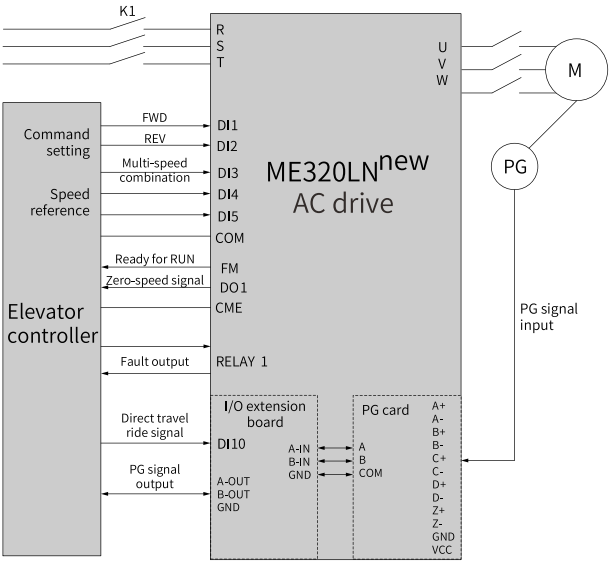


Figure 7-13 Wiring of the direct travel ride function

Note

- The PG card pulse input terminal on the I/O extension board of the AC drive receives the frequency-division output signal from the PG card. This terminal can be connected only to the PG card with open collector output. Select the correct PG card model according to descriptions of PG card in chapter "Mechanical and Electrical Installation".
- The elevator controller obtains the PG card frequency-division signal from the PG card pulse output terminal on the I/O extension board of the AC drive. There are two pulse output terminals of the PG card on the I/O extension board of the AC drive. One is open collector output, and the other is differential output. Select the correct terminal according to the input type of the controller.

7.7.2 Parameter Setting

Besides the motor and encoder parameters, parameters in the following table also need to be set correctly (with *"Figure 7–13 " on page 164* as an example):

Para.	Name	Setpoint	Default	Remarks
F4-10	DI10 function selection	22	0	Direct travel ride command signal (NO)
F7-17	Set distance of direct travel ride	100.0 mm	0.0 mm	Distance from the car to the leveling position when the direct travel ride command is active (set based on the actual conditions)
F8-03	Rated elevator speed	1.600 m/s	1.600 m/s	Rated elevator speed
FA-06	PG frequency-division coefficient ratio	1	1	Set according to the PG card frequency-division ratio

7.7.3 Time Sequence

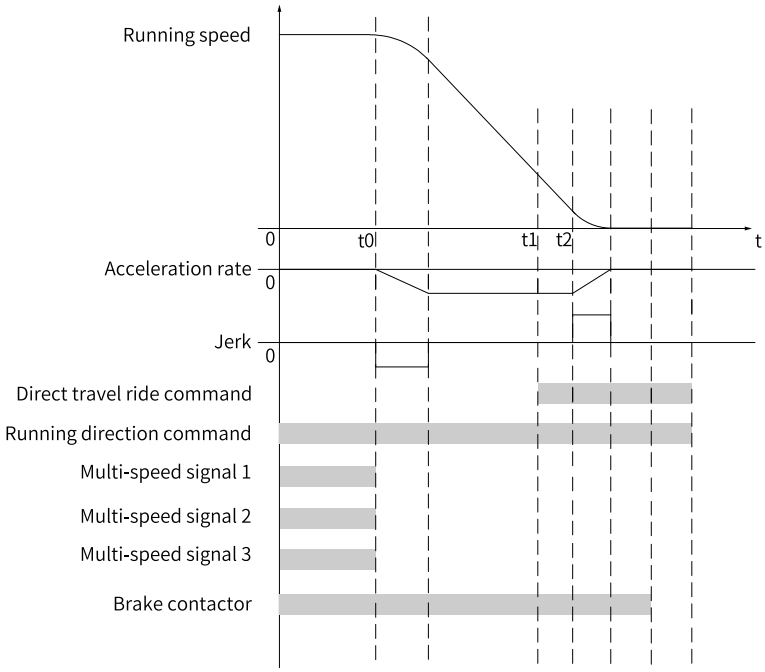


Figure 7-14 Time sequence of direct travel ride

Note

- At the speed switchover point, the elevator controller cancels all the multi-speed signals, making the target speed of the AC drive be 0.
- When the car runs to the position with a specified distance to the leveling zone, the elevator controller issues the direct travel ride command.
- When the AC drive reaches zero speed, the brake is released.
- After the brake is released completely, the direction command and direct travel ride command are canceled. The direct travel ride command can also be canceled before next deceleration.

7.7.4 Commissioning Description

After setting the parameters and performing all wiring, register a call and perform trial run. After the car arrives, check the value of F7-18.

- If F7-18 is 0, the AC drive does not use the direct travel ride function at stop. There are two reasons:
  - The AC drive does not receive the direct travel ride command. To solve this problem, check wiring of the direct travel ride command signal and function selection of the corresponding DI terminal of the AC drive. If the direct travel ride command is active, the corresponding LED segment in FU-14 is ON.
  - The end time segment of the AC drive deceleration is too long, that is, the time from t2 to zero-speed in *"Figure 7–13 " on page 164* is too long. In this case, even if the AC drive receives the direct travel ride command, it cannot execute the command because it has entered the deceleration stage and the stop distance cannot be adjusted. To solve this problem, reduce the end time segment of the AC drive deceleration. For example, if speed 4 is used for the normal speed running and F6-12 (Running curve of speed 4) is set to 1, then decrease the value of F7-02 (Time proportion of running curve 1 start segment).
- If F7-18 is not 0, the AC drive uses the direct travel ride function. Adjust F7-17 based on the actual leveling conditions. Increase F7-17 at under-leveling and decrease F7-17 at over-leveling.
  When F7-17 is increased or decreased to a certain value, F7-18 will not change along with F7-17. It indicates that F7-17 reaches its upper or lower limit. This is because that the deceleration distance can be adjusted only within a certain range when the direct travel ride command is received.
  - If F7-17 reaches the upper limit, increase the deceleration time. For example, if speed 4 is used for the normal speed running and F6-12 (Running curve of speed 4) is set to 1, then increase the value of F7-01 (Deceleration time 1). This

increases the deceleration distance. The speed switchover point needs to be adjusted accordingly.

- If F7-17 reaches the lower limit, reduce the end time segment of AC drive deceleration. For example, if speed 4 is used for the normal speed running and F6-12 (Running curve of speed 4) is set to 1, then decrease the value of F7-02 (Time proportion of running curve 1 start segment). Note that a very small value of F7-02 may affect the riding comfort.

- The deviation between the leveling error at light-load running and that at heavy-load running is very large. For example, the leveling error at heavy-load running is within 2 mm, while that at light-load running is larger than 5 mm. To solve this problem, decrease the speed loop integral time in F2-01 and F2-04 to improve the speed loop control accuracy and reduce the error.

7.8 Calculating Speed Switchover Point

The deceleration distance can be adjusted only within a certain range when the direct travel ride command is received. Therefore, the speed switchover point (t0 in *"Figure 7–13 " on page 164*) at which the system starts to decelerate must be accurate.

The distance from t0 to AC drive stop is calculated according to the following formula:

$$L=V\times Tdec\times\left(\frac{2+Kf-Ks}{4}\right)+\frac{V}{12}\times\frac{Ks^2-Kf^2}{2-Ks-Kf}$$

$$Tdec=\frac{V\times Tdec}{Vmax}$$

In the formula: V is the car speed (m/s) before speed switchover. Vmax is the car speed (m/s) at the maximum frequency output by the AC drive (F0-05). Tdec is the set deceleration time (s). Ks is the time proportion of the running curve start segment (%). Kf is the time proportion of the running curve end segment (%).

For example, speed 4 is used for normal speed running, and both F6-04 (Speed 4) and the maximum frequency are equal to the rated frequency. F6-12 (Running curve of speed 4) is set to 1 and F7-01 (Deceleration time 1) is set to 4s. The time proportions of running curve 1 start and end segments are both set to 20.0%. F8-03 (Rated elevator speed) is set to 1 m/s.

Then, based on the formula, the calculation results are: Vmax = 1 m/s, V = 1 m/s, Tdec = 4s, Ks = 0.2, Kf = 0.2. Then, L is calculated as 2 m. The elevator controller performs speed switchover and starts to decelerate at the position 2 m from the leveling position.

8 Troubleshooting

8.1 List of Faults

The ME320LN^{new} series elevator AC drive has over 50 pieces of alarm messages and protection functions. If a fault occurs, the AC drive stops output, enables the contact of the fault relay to act, and displays the fault code on the operating panel. Before asking Inovance engineers for help, you can perform self-check according to instructions in this section, analyze the fault causes, and find solutions. If the fault persists, contact your agent or Inovance.

Note

Faults Err33, Err16, and Err17 can be reset only after next power-on.

Fault Code	Fault Name	Subcode	Possible Cause	Solution	Remarks
Err02/ Err03/ Err04	Output overcurrent	1	The main circuit output is grounded or short circuited, or the motor insulation is degraded.	• Check whether the motor wiring is correct or the grounding wire is connected incorrectly. • Check whether the shorting stator contactor causes short circuit on the AC drive output side. • Check whether the motor cable surface is damaged. • Check whether the driver board is abnormal.	-
			Motor parameters are not auto-tuning or the motor parameter setting is incorrect.	• Set motor parameters according to the motor nameplate correctly and perform motor auto-tuning again. • The current loop PI setting is incorrect. Reduce the value of F2-06.	-
			The encoder signal is incorrect.	• Check whether FA-00 is set correctly. • Check whether the encoder signal suffers interference, whether the encoder cable is routed in a separate duct, whether the cable is too long, and whether the shield is grounded at one end. • Check whether the encoder is installed reliably, and whether the rotating shaft is connected to the motor shaft reliably by checking whether the encoder is stable during normal speed running. • Check whether the encoder wiring is correct and reliable. For asynchronous motors, run them in the SVC mode and compare the current to check whether the encoder works properly.	-

Fault Code	Fault Name	Subcode	Possible Cause	Solution	Remarks
Err02/ Err03/ Err04	Output overcurrent	1	The motor phase sequence is incorrect.	Adjust the UVW sequence of the motor or set FF-10 to adjust the output phase sequence.	-
			The acceleration time is too short.	Reduce the value of F3-02.	-
			The braking resistor is short-circuited.	Check whether the braking resistor and braking unit are wired properly, without short circuit.	-
			The power hardware is abnormal.	If overcurrent is reported upon power-on when the brake is not applied in the V/f mode, the drive hardware is abnormal.	-
		2	Same as subcode 1	Same as subcode 1	-
		11			
		12			
		15	Overcurrent is detected during motor inter-phase short circuit detection.	Check for short circuit among three phases.	-
Err05/ Err06/ Err07	Bus overvoltage	1	The bus voltage is too high in the running state.	• The braking circuit resistance is too large in the regenerative running state. • The bus voltage is large because FF-08 is set to a large value. • The bus voltage hardware coefficient does not match the software in the regenerative state, and an error easily occurs in the 380 V and 220 V models. • Check whether the input power supply is matching. • The deceleration time is too short.	-
Err09	Input undervoltage	1	FF-08 is set to a too small value.	Restore FF-08 to 100.0%.	
			An instantaneous power failure occurs in the input power supply.	Check the grid input circuit.	-
			The input voltage is too low.	Check the grid.	
			The AC drive power rating does not match the motor power rating.	Replace with an AC drive of larger power rating.	
			The drive control board fails.	Replace the drive hardware.	

Fault Code	Fault Name	Subcode	Possible Cause	Solution	Remarks
Err10	AC drive overload	1	The mechanical resistance is too large.	• Check whether the brake is released, or whether the brake power supply is normal by checking whether rollback occurs during electric brake release. • Check whether the guide shoes are too tight.	Overload curve: Assume that the overload current upper limit is 180% of the rated AC current. Calculate the overload time at different current. Modify the overload time by proportion when the maximum current is not equal to 180% of the rated current.
			The balance coefficient is inappropriate.	Check the balance coefficient.	
			Check whether the encoder feedback signal is normal.	• Check whether the feedback signal and parameter setting (FA-00) of the encoder are correct. • For synchronous motors, check whether the initial angle of the encoder is correct.	
			The motor auto-tuning results are inaccurate.	Check whether the motor parameter settings are correct and perform auto-tuning again. If this error is reported during slip test, enable the slip function in F3-24.	
			The phase sequence of the motor cables is inversed.	Adjust the UVW phase sequence.	
			The AC drive power rating is too low.	Check whether the current exceeds the rated AC drive current when the elevator with no load runs at a stable speed. Replace with an AC drive of a larger power.	
Err11	Motor overload	1	-	See Err10-001.	-
Err12	Input phase loss	1	• The RST input phases of the grid are not symmetric or input phase loss occurs. • RST incoming terminals are loose.	• Set bit1 of FJ-18 to 1. • Check whether the incoming RST terminals of the grid has phase loss. • The three phases of the input grid are heavily unbalanced. • The driver board is abnormal.	-
Err13	Output phase loss	2	The main circuit output cables are loose.	Check whether motor cables are connected securely.	-
		The three-phase output current reached the maximum current.	The motor is damaged.	Check whether the motor is internally abnormal.	-

Fault Code	Fault Name	Subcode	Possible Cause	Solution	Remarks
Err14	Module overheat	Carrier frequency	FF-02 is set incorrectly.	• FF-02 is set incorrectly. • The fan fails.	-
			The air filter is blocked.	Clean the air filter. Check whether the installation clearance of the controller meets the requirements.	-
			The ambient temperature is too high.	Reduce the ambient temperature.	-
			The main board does not match the drive software.	Replace with a matching main board or driver board.	-
			The AC drive power rating is too low.	Replace with an AC drive of larger power rating.	-
Err15	Braking unit fault	1	The braking resistor is short-circuited.	Check whether the braking resistor and braking unit are wired properly, without short circuit.	-
		2	The braking transistor is short-circuited.	• The input power supply is poor. • The braking transistor is short-circuited. • The voltage sampling ripple is large.	Check the bus voltage fluctuation at stop to check whether the braking transistor is normal.
Err16	Current control fault	1	The exciting current control is abnormal.	• The motor parameter setting is incorrect. • Output phase loss occurs. • The RUN contactor is not closed • The brake circuit is abnormal. • The input voltage is too low.	-
		2	The torque current control is abnormal.		-
		3	The torque upper limit is reached and the speed is very low.		-
Err17	Encoder interference during auto-tuning	2	The Z signal position during motor auto-tuning is abnormal.	• Encoder interference exists. • Correct the CD zero drift.	-
		3	The auto-tuning base signal of the UVW encoder is abnormal.	• Encoder interference exists. • The encoder is disconnected.	-
Err18	Current detection fault	1	The hardware is abnormal or suffers from interference.	Replace the drive hardware.	-
		2			
		3	The driver board is damaged.	Replace the driver board.	-

Fault Code	Fault Name	Subcode	Possible Cause	Solution	Remarks
Err19	Motor auto-tuning fault	1	Stator resistance auto-tuning is abnormal.	• The RUN contactor is not closed • Output phase loss occurs. • Check whether F1-03 (Rated motor current) is set correctly. • The driver board is abnormal.	-
		5	Output open circuit exists during magnetic pole position auto-tuning.	Check whether output UVW cables have open circuit during running.	-
			The motor power is far smaller (such as 40%) than the AC drive power.	Replace with an AC drive of a smaller power rating.	-
		6	See subcode 5.	See subcode 5.	-
		8	The motor type set in F1-25 does not match the encoder type set in F1-00.	• The motor type setting is incorrect. • The encoder type setting is incorrect.	-
Err19	Motor auto-tuning fault	9	The encoder CD signal is not stable.	• The motor rotates. • Encoder interference exists.	-
		10	Parameter setting is incorrect.	The encoder phase sequence is incorrect.	-
		12	The encoder initial angle is obtained because the angle-free auto-tuning function and mode are enabled in bit0 and bit1 of F2-12.	In the angle-free auto-tuning mode, rotate the motor by at least three turns and then power off and then on the motor.	-
		13	Initial magnetic pole position auto-tuning of synchronous motor rotor failed.	Check whether parameters in group F1 are set correctly.	-
		14	The encoder type setting is incorrect.	In static auto-tuning, set F1-00 to 0 or 3.	-
		15	The encoder CD signal is incorrect.	Check whether the encoder type set in F1-00 is SIN/COS encoder.	-
		19		Replace the encoder.	-

Fault Code	Fault Name	Subcode	Possible Cause	Solution	Remarks
Err20	Speed feedback error	1	In no-load auto-tuning, the AB pulse remains unchanged.	• The motor does not rotate during auto-tuning. • The brake is not released or the current is insufficient. • The AB signal suffers from interference. • The AB cables are wired incorrectly. For example, AZ cables are wired.	-
		3	A/B phase sequence of encoder is reversed.	• The phase sequence is reversed. • The motor does not rotate during auto-tuning. The brake is not released or the current is insufficient. • The AB signal suffers from interference. • The encoder PPR is set incorrectly. • Modify FF-10.	-
		4	The Z signal is lost during auto-tuning.	• The Z signal is not connected. • Encoder interference exists. • The encoder is not connected. • The motor does not rotate.	-
Err20	Speed feedback error	5	The CD signal is disconnected in the stop state.	• Check the encoder type and ensure that the CD signal of the SIN/COS encoder is supported. • Check whether the CD signal cable is wired correctly. • For the 1313 encoder, the CD signal is output by the AO terminal of the PG card. Check whether the CD signal is correct. • For magnetic ring encoders, the SIN/COS encoder does not support the CD signal. In this case, set F0-00 to 5.	-
		7	The UVW encoder is disconnected.	• Check the encoder type setting. • Check whether the PG card is correct • Check cable connections.	-
		9	Runaway protection is enabled.	• FD-05, FD-06, and FD-07 are set incorrectly. Set FD-05 to F2-06 value divided by 10. • The phase sequence of the power cable is reversed or the speed is reversed. • The encoder PPR is incorrect. • The rated motor speed is incorrect. • Encoder interference exists. • The brake is released at an incorrect time.	-

Fault Code	Fault Name	Subcode	Possible Cause	Solution	Remarks
Err20	Speed feedback error	10	The output torque upper limit is reached but the motor does not rotate.	• The output torque upper limit is too small. • The load is too heavy. • Check whether the brake is fully released. • Select an AC drive of an appropriate power rating. • The bus voltage is too low or the motor back EMF is too large.	-
		11	The AB/CD zero drift of the SIN/COS encoder is too large.	• Check the PG card, system, and motor grounding. • For the 1313 encoder, check whether the CD signal obtained is correct. • Replace the PG card and perform the test again.	-
		12	The output torque upper limit is reached but the motor does not rotate.	• Whether the brake is fully released. • Perform magnetic pole angle auto-tuning multiple times and check whether the values obtained are consistent. • Check the wiring of the encoder.	-
Err20	Speed feedback error	13	The AB signal is lost during running.	• Check whether the brake is released. • Check whether the encoder feedback signal is updated.	-
		14	The Z signal is lost during running.	• Check the encoder grounding and eliminate interference. • For the 1313 encoder, check whether the Z signal exists.	-
		19	The encoder AB signal is lost during running.	Check the wiring of the encoder.	-
		20	An error occurred while perform speed test during with-load auto-tuning.	• The encoder feedback pulse is not updated. • The motor does not rotate.	-
		21	The CD signal is abnormal during with-load auto-tuning.	• Check the CD signal wiring. • The encoder PPR is set incorrectly. • For the 1313 encoder, check whether the CD signal exists.	-
		55	The encoder CD signal or Z signal is incorrect.	• The Z signal is heavily interfered with. • For the 1313 encoder, check the relationship between the CD signal and the Z signal.	-

Fault Code	Fault Name	Subcode	Possible Cause	Solution	Remarks
Err21	Parameter setting error	2	The maximum frequency is smaller than the rated motor frequency.	Check whether the value of F0-06 is larger than that of F1-04.	-
		3	The encoder type setting is incorrect.	The SIN/COS encoder, absolute encoder, or ABZ encoder is set to UVW encoder. Check whether the encoder type set in F1-00 matches the type of the encoder in use.	-
		4			-
		5	An inspection error occurs.	Contact the elevator manufacturer after-sales department.	-
		6	An inspection error occurs.	Contact the elevator manufacturer after-sales department.	
			The main board elevator lock function is enabled.		-
		7	The main board does not match the driver board software but FF-07 is set.	Set FF-07 correctly.	-
		8			
Err23	Short circuit fault	1	• The output UVW is short-circuited to ground. • The AC drive output is short-circuited to ground.	• Check whether output UVW is short-circuited to ground. • Check whether the AC drive output is short-circuited to ground.	-
		2		• Check whether output UVW is short-circuited to ground. • Check whether the outputs of the AC drive three phases are the same or short-circuited to ground.	-
		3			
		4			
		5	The output UVW is short-circuited to ground.	Check whether output UVW is short-circuited to ground.	-
		6			
Err24	Initial magnetic pole position detection error	-	-	-	-
Err25	Data storage error	101	An error occurred while storing data to the main control board.	Contact Inovance or our agent.	-
		102			-
Err32	Emergency running overspeed	101	The speed during running with battery power supply exceeds the value of F6-28.	• Check whether the battery voltage is normal. • Check for loose cable connection. • Check whether F6-28 is set to a too small value.	

Fault Code	Fault Name	Subcode	Possible Cause	Solution	Remarks
Err33	Overspeed	101	The AC running speed remains larger than FC-09 for more than the time set in FC-10.	• Check whether the motor power is proper. • Check whether the elevator load is too heavy. • Check whether the rotary encoder signals are correct. • Check whether FC-09 and FC-10 are set to a too small value.	-
Err34	Excessive speed deviation	101	The deviation between the AC drive feedback frequency and the frequency reference remains larger than FC-12 for more than the time set in FC-13.	• Check whether the motor power is proper. • Check whether the elevator load is too heavy. • Check whether the rotary encoder signals are correct. • Check whether FC-12 and FC-13 are set to a too small value.	-
Err36	RUN contactor feedback error	101	The RUN contactor has no output, but the RUN contactor feedback is active.	• Check whether the contactor feedback contact action is normal. • Check whether the feedback contact signal NC/NO type is set correctly.	-
		102	The RUN contactor has output, but the RUN contactor feedback is inactive.		
Err37	Brake contactor feedback error	101	The RUN contactor has no output, but the RUN contactor feedback is active.	• Check whether the brake contactor is closed properly. • Check whether the NO/NC feature of the brake contactor feedback point is correct. • Check whether the brake contactor feedback circuit is connected properly.	-
		102	The RUN contactor has output, but the RUN contactor feedback is inactive.		
Err38	Contact stuck	101	The feedback signal of the RUN contactor remains active for 2.5s.	• Check cable connections. • Check the brake and RUN contactors.	-
		102	The feedback signal of the brake contactor remains active for 2.5s.		
Err39	Motor overheat	101	The motor overheat relay input remains active for a certain period.	• Check whether the signal feature (NO/NC) settings of motor parameters are correct. • Check whether the thermal protection relay socket is normal. • Check whether the motor is used properly or damaged. • Improve the cooling conditions of the motor.	-
		102	The AI2 voltage is greater than the value of F6-24 for a certain period.		-

Fault Code	Fault Name	Subcode	Possible Cause	Solution	Remarks
Err40	Pulse-by-pulse current limit fault	1	-	-	-
Err55	DSP communication protection	101	The cable connection between the driver board and control board is abnormal.	Check the cable connection between the driver board and the logic board.	-
		102			
Err74	STO fault	1	The hardware STO card is abnormal.	Check whether the STO card is matching. If not, replace the hardware STO card.	-
		2	The safety circuit is disconnected.	Check the safety circuit.	-
Err79	Encryption fault	1	The 3000+ encryption underlying authentication failed.	The driver board is not compatible with the main board.	-

8.2 Faults and Troubleshooting

The following faults may occur during the use of the AC drive. Troubleshoot the faults according to the solutions described in the following table.

- The display does not work upon power-on.
  - Check with a multimeter whether the AC drive input power supply is consistent with the rated AC drive voltage. If not, eliminate the power supply problems.
  - Check whether the three-phase rectifier bridge is normal. If the rectifier bridge is damaged, contact the agent or Inovance for technical support.
  - Check whether the CHARGE indicator is on. If the indicator is off, the fault may occur on the rectifier bridge or pre-charge resistor. If the indicator is on, the fault may occur on the switched-mode power supply. Contact the agent or Inovance for technical support.
- The power supply air switch trips after power-on.
  - Check whether the power supply is grounded or short-circuited. If yes, eliminate the problems.
  - Check whether the rectifier bridge is damaged. If yes, contact the agent or Inovance for technical support.
- The motor does not rotate when the AC drive is running.
  - Check whether there is balanced three-phase output from the U, V, W cables. If yes, the cause is the motor cabling problem, motor damage, or locked-rotor due to mechanical reasons. Eliminate the problems.
  - If there is output but the three-phase output is unbalanced, the cause is damage of the driver board of output module of the AC drive. Contact the agent or Inovance for technical support.

- If there is no output voltage, the cause is damage of the drive board of output module. Contact the agent or Inovance for technical support.

- The AC drive display is normal after power-on, but the power air switch trips during running.
  - Check whether inter-phase short circuit occurs in the output module. If yes, contact the agent or Inovance for technical support.
  - Check whether motor lead wire is short-circuited or grounded. If yes, eliminate the problems.
  - If trip occurs sometimes and the distance between the motor and the AC drive is far, install an AC output reactor.

9 Routine Maintenance

9.1 Routine Maintenance Checklist

The influence of the ambient temperature, humidity, dust, and vibration will cause aging of components inside the AC drive, which may result in potential faults or shorten the service life of the AC drive. Therefore, it is necessary to carry out routine and periodic maintenance.



There is still high voltage on the filter capacitor after power-off. Wait until the CHARGE indicator goes off, test with a multimeter that the bus voltage is lower than 36 V, and then maintain or repair the AC drive.

9.1.1 Routine Inspection Checklist

The user is responsible for operating the device in accordance with the technical regulations recognized by the country or region and with other applicable regional regulations. The following table lists some check items. Tick the checked items.

☑	No.	Routine Inspection Checklist
☐	1	Check whether the motor generates abnormal noise during running.
☐	2	Check whether strong vibration occurs during motor running.
☐	3	Check whether the installation environment of the AC drive changes.
☐	4	Check whether the AC drive cooling fan works properly.
☐	5	Check whether the AC drive is overheated.

9.1.2 Routine Cleaning Checklist

The user is responsible for operating the device in accordance with the technical regulations recognized by the country or region and with other applicable regional regulations. The following table lists some check items. Tick the checked items.

☑	No.	Routine Cleaning Checklist
☐	1	Always keep the AC drive clean.
☐	2	Remove the dust from the surface of the AC drive, to prevent the dust from entering the AC drive, especially metal powders.
☐	3	Clear the oil stains on the cooling fan of the AC drive.

9.2 Periodic Inspection Checklist

Perform periodic inspection for items that are difficult to access during routine maintenance and operation.

The user is responsible for operating the device in accordance with the technical regulations recognized by the country or region and with other applicable regional regulations. The following table lists some check items. Tick the checked items.

☑	No.	Periodic Inspection Checklist
☐	1	Check and clean the air filter periodically.
☐	2	Check whether the screws are loose.
☐	3	Check whether the AC drive is corroded.
☐	4	Check whether the terminals are pulled or scraped.
☐	5	Test the main circuit insulation.



Before measuring insulation resistance with a megger (500 VDC megger recommended), disconnect the main circuit from the AC drive. Do not use the insulation resistance meter to test the insulation of the control circuit. The high voltage test need not be performed again because it has been completed before delivery.

9.3 Part Replacement

Quick-wear parts of the AC drive include the cooling fan and filter electrolytic capacitor. Their service life is related to the operating environment and maintenance. The standard service life of the two components is listed in the following table.

Component Name	Service Life (Year)	Possible Damage Cause	Signs of Damage
Fan	2 to 3	Bearing worn and blade aging	Check whether there is crack on the fan blade and whether there is abnormal vibration noise at startup.
Electrolytic capacitor	4 to 5	Poor input power supply, high ambient temperature, frequent load jumping, and electrolyte aging.	Check for liquid leakage, protruded safety valve, electrostatic capacitance decrease, and insulation resistance decrease.

9.4 Storage

For temporary and long-term storage of the AC drive, pay attention to the following aspects:

- Store the AC drive with the original packing carton of Inovance.
- Long-term storage degrades the electrolytic capacitor. Thus, the AC drive must be energized once every 2 years, each time lasting at least 5 hours. The input voltage must be increased slowly to the rated value with the regulator.

10 Appendix A EMC

10.1 CE Certification

The CE mark on the ME320LN^{new} series AC drive declares that the AC drive complies with the European low voltage directive (LVD) and EMC directive.



Figure 10-1 CE mark

The ME320LN^{new} series AC drive meets the requirements of the following directives and standards:

Directive	Directive Name	Standard
EMC directive	2004/18/EC	EN 61800-3: 2004+A1: 2012 EN 12015: 2004 EN 12016: 2004+A1: 2008
LVD directive	2006/95/EC	EN 61800-5-1

Note

The AC drive complies with the requirements of EMC standards on the condition of correct installation and use by following the instructions in Appendix A.

10.2 Definition of Terms

Electromagnetic compatibility (EMC) describes the ability of electronic and electrical devices or systems to work properly in the electromagnetic environment and not to generate electromagnetic interference that influences other local devices or systems. In other words, EMC includes two aspects: The electromagnetic interference generated by a device or system must be restricted within a certain limit; the device or system must have sufficient immunity to the electromagnetic interference in the environment.

- First environment: Environment that includes domestic premises. It also includes establishments directly connected without intermediate transformers to a low-voltage power supply network which supplies buildings used for domestic purposes.

- Second environment: Environment that includes all establishments other than those directly connected to a low-voltage power supply network which supplies buildings used for domestic purposes.

- Category C1 AC drive: Power Drive System (PDS) of rated voltage less than 1000 V, intended for use in the first environment.
- Category C2 AC drive: PDS of rated voltage less than 1000 V, which is neither a plug-in device nor a movable device and, when used in the first environment, is intended to be installed and commissioned only by a professional.
- Category C3 AC drive: PDS of rated voltage less than 1000 V, intended for use in the second environment and not intended for use in the first environment.
- Category C4 AC drive: PDS of rated voltage equal to or above 1000 V, or rated current equal to or above 400 A, or intended for use in complex systems in the second environment.

10.3 Introduction to EMC Standard

10.3.1EMC Standards

The ME320LN^{new} series AC drive complies with Category C2 of EN 61800-3: 2004 and is applicable to both the first environment and the second environment.

10.3.2Installation Environment EMC Requirements

The manufacturer of the system installed with the AC drive is responsible for compliance of the system with the European EMC directive and standard EN 61800-3: 2004 Category C2, C3, or C4 according to the system application environment.

Machines and devices used in combination with this AC drive must also be CE certified and marked. The manufacturer who integrates the AC drive with the CE mark into other devices has the responsibility of ensuring compliance with European directives and verifying that conditions meet requirements of EN 61800-3: 2004 Category C2.

Note

If applied in the first environment, the AC drive may generate radio interference. Besides the CE compliance described in this chapter, users must take measures to avoid such interference, if necessary.

10.3.3Conditions for Compliance with the EMC Directive

An external EMC filter is required for the AC drive. Recommended filter (option) models are listed in *"Table 10–1 " on page 185*. The cable connecting the filter and AFE should be as short as possible, no more than 30 cm. The filter and AFE must be installed on the same sheet metal, and the AFE grounding terminal and the filter grounding point must be in good contact with the sheet metal.

Select the motor and controller cables based on the cable selection description.

Install and wire the AC drive according to the cable wiring and grounding methods.

Connect an AC reactor to suppress current harmonics. For recommended AC reactor models, see *"Table 10–2 " on page 186*.

10.3.4 Selection of Peripheral EMC Devices

10.3.4.1 Installation of EMC Input Filter on Power Input Side

An EMC input filter installed between the AC drive and the power supply can not only restrict the interference of electromagnetic noise in the surrounding environment on the AC drive, but also prevent the interference from the AC drive on the surrounding devices. The ME320LN^{new} series AC drive meets the requirements of Category C2 only with a filter installed on the power input side. The installation precautions are as follows:

- Strictly comply with the ratings when using the filter. The filter is category I electric apparatus, and therefore, the metal housing ground of the filter should be in good contact with the metal ground of the installation cabinet in a large area, and requires good conductive continuity. Otherwise, it will result in electric shock or poor EMC effect.
- The filter should be installed as closely as possible to the power input side of the AC drive.
- The following table lists the recommended manufacturers and models of EMC filters for ME320LN^{new} series AC drives. Select a proper one based on actual requirements.

Table 10–1 Recommended EMC filter manufacturers and models

AC Drive Model	Power Capacity (kVA)	Rated Input Current (A)	AC Input Filter Model (Changzhou Jianli)	AC Input Filter Model (SCHAFFNER)
ME320LN-4002-SA	4	6.5	DL-10EBK5	FN 3258-7-44
ME320LN-4003-SA	5.9	10.5	DL-16EBK5	FN3258-16-33
ME320LN-4005-SA	8.9	14.8	DL-16EBK5	FN3258-16-33
ME320LN-4007-SA	11	20.5	DL-25EBK5	FN3258-30-33
ME320LN-4011-SA	17	29	DL-35EBK5	FN3258-30-33

AC Drive Model	Power Capacity (kVA)	Rated Input Current (A)	AC Input Filter Model (Changzhou Jianli)	AC Input Filter Model (SCHAFFNER)
ME320LN-4015-SA	21	36	DL-50EBK5	FN3258-42-33
ME320LN-4018-SA	24	41	DL-50EBK5	FN3258-42-33
ME320LN-4022-SA	30	49.5	DL-50EBK5	FN3258-55-34
ME320LN-4030-SA	40	62	DL-65EBK5	FN3258-75-34
ME320LN-4037-SA	57	77	DL-80EBK5	FN3258-100-35
ME320LN-4045-SA	69	93	DL-100EBK5	FN3258-100-35
ME320LN-4090-SA	134	180	DL-200EBK5	FN3258-180-40

10.3.4.2 Installation of AC Input Reactor on the Power Input Side

The AC input reactor is an option used to suppress the harmonics in the input current. In applications where harmonics need to be suppressed, install an external AC input reactor. The following table lists the recommended manufacturers and models of AC input reactors.

Table 10–2 Recommended manufacturers and models of AC input reactors

AC Drive Model	Power Capacity (kVA)	Rated Input Current (A)	AC Input Reactor Model (Inovance)
ME320LN-4002-SA	4	6.5	MD-ACL-7-3.5-4T-4%
ME320LN-4003-SA	5.9	10.5	MD-ACL-10-2.8-4T-4%
ME320LN-4005-SA	8.9	14.8	MD-ACL-15-1.9-4T-4%
ME320LN-4007-SA	11	20.5	MD-ACL-20-1.4-4T-4%
ME320LN-4011-SA	17	29	MD-ACL-30-0.93-4T-4%
ME320LN-4015-SA	21	36	MD-ACL-40-0.7-4T-4%
ME320LN-4018-SA	24	41	MD-ACL-50-0.56-4T-4%
ME320LN-4022-SA	30	49.5	MD-ACL-50-0.56-4T-4%
ME320LN-4030-SA	40	62	MD-ACL-60-0.24-4T-2%
ME320LN-4037-SA	57	77	MD-ACL-90-0.16-4T-2%
ME320LN-4045F-SA	69	93	MD-ACL-120-0.12-4T-2%
ME320LN-4090F-SA	134	180	MD-ACL-250-0.056-4T-2%

10.4 Shielded Cable

10.4.1Requirements for Shielded Cable

The shielded cable must be used to meet the EMC requirements of CE marking. Shielded cables are classified into three-conductor cables and four-conductor cables.

If conductivity of the cable shield is not sufficient, add an independent PE cable, or use a four-conductor cable, of which one phase conductor is PE cable. Shielded cables are shown in *"Figure 10–2 " on page 187*:

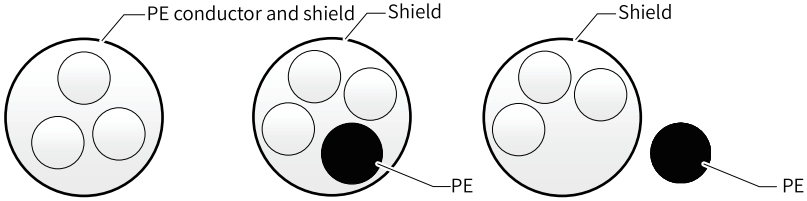


Figure 10-2 Cross-sectional view of shielded cables

The motor cable and PE shielded conducting wire (twisted shielded) should be as short as possible to reduce electromagnetic radiation and external stray current and capacitive current of the cable.

To suppress emission and conduction of the radio frequency interference effectively, the shield of the shielded cable is made of coaxial copper braid. Ensure that the braided density is greater than 90% to enhance the shielding performance and conductivity. Braided density requirements are shown in *"Figure 10–3 " on page 187*:

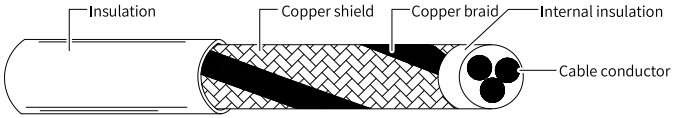


Figure 10-3 Braided density of the shield

It is recommended that all control cables be shielded. The grounding area of the shielded cable should be as large as possible. A recommended method is to fix the shield on a metal plate using the metal cable clamp for good contact, as shown in *"Figure 10–4 " on page 187*.

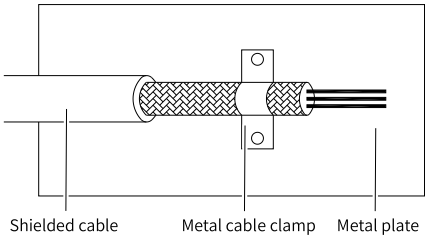


Figure 10-4 Fixing the shield using the metal cable clamp

"Figure 10–5 " on page 188 shows the grounding method of the shielded cable.

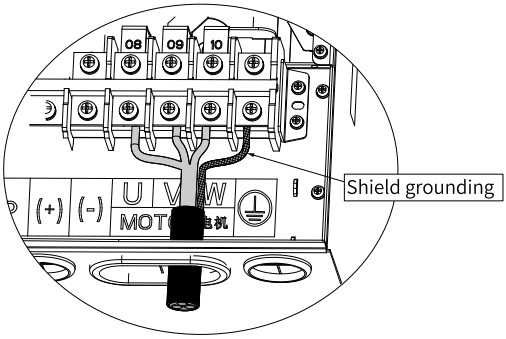


Figure 10-5 Grounding of the shielded cable

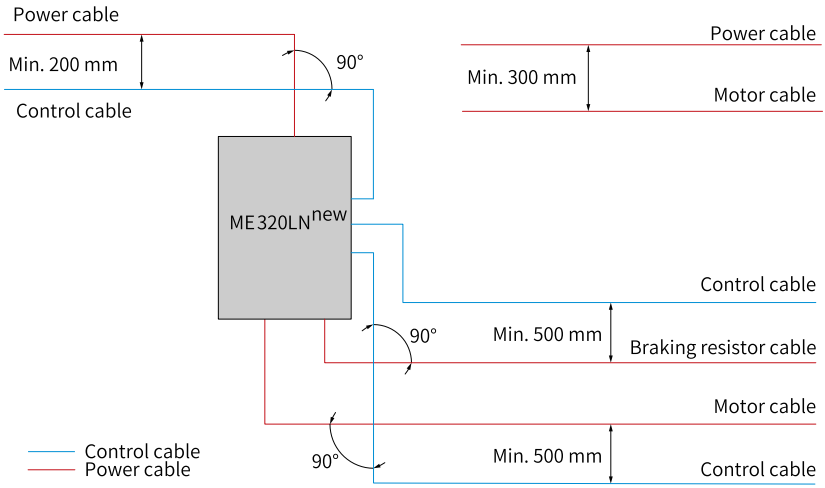
10.4.2Installation Precautions for Shielded Cables

- Symmetrical shielded cable is recommended. The four-conductor shielded cable can also be used as an input cable.
- The motor cable and PE shielded conducting wire (twisted shielded) should be as short as possible to reduce electromagnetic radiation and external stray current and capacitive current of the cable. If the motor cable is over 100 meters long, an output filter or a reactor is required.
- It is recommended that all control cables be shielded.
- The output power cable of the AC drive should use shielded cable, and the shield must be reliably grounded. For lead cables in exposure to interference, shielded twisted-pair control cables should be used and the shield must be reliably grounded.

10.4.3Cable Routing Requirements

- Motor cables must be routed away from other cables at an interval of more than 0.5 m. The several AC drives can be laid in parallel.
- To avoid electromagnetic interference caused by rapid change of output voltage of the AC drive, motor cables and other cables must not be laid side by side for a long distance. It is recommended that motor cables, power input cables, and control cables be laid in different ducts. Cable ducts must be in good connection and well grounded.
- If the control cable must run across the power cable, make sure they are arranged at an angle of close to 90°. Other cables must not run across the AC drive.
- The power input and output cables of the AC drive and weak-current signal cables (such as control cables) should be laid vertically (if possible) rather than in parallel.
- Cable ducts must be in good connection and well grounded. Aluminum ducts can be used to improve electric potential.

- Connect the filter and AC drive to the control cabinet properly. Protect all connections with spray coating and ensure good contact of conductive metal.
- The motor must be connected to the system (machines or devices) properly. Protect all connections with spray coating and ensure good contact of conductive metal.



10.5 Solutions to EMC Interference

The AC drive generates very strong interference. Although EMC measures are taken, interference may still exist due to improper wiring or grounding during use. When the AC drive interferes with other devices, adopt the following solutions.

Interference Type	Solution
ELCB tripping	• Connect the motor housing to the PE of the AC drive. • Connect the PE of the AC drive to the PE of the grid. • Add a safety capacitor to the power input cable. • Add magnetic rings to the input drive cable.
AC drive interference during operation	• Connect the motor housing to the PE of the AC drive. • Connect the PE of the AC drive to the PE of the grid. • Add a safety capacitor to the power input cable and wind the cable with magnetic rings. • Add a safety capacitor to the interfered signal port or wind the signal cable with magnetic rings. • Connect the devices to the common ground.

Interference Type	Solution
Communication interference	• Connect the motor housing to the PE of the AC drive. • Connect the PE of the AC drive to the PE of the grid. • Add a safety capacitor to the power input cable and wind the cable with magnetic rings. • Add a termination resistor between the communication cable source and the load side. • Add a common ground cable besides the communication cable. • Use a shielded cable as the communication cable and connect the cable shield to the common ground.
I/O interference	• Enlarge the capacitance at low-speed DI. A maximum of 0.1 uF capacitance is recommended. • Enlarge the capacitance at AI. A maximum of 0.22 uF is recommended.

Copyright © Shenzhen Inovance Technology Co., Ltd.

19010493B00

Shenzhen Inovance Technology Co., Ltd.

www.inovance.com

Add.: Inovance Headquarters Tower, High-tech Industrial Park, Guanlan Street, Longhua New District, Shenzhen
Tel: (0755) 2979 9595 Fax: (0755) 2961 9897

Suzhou Inovance Technology Co., Ltd.

www.inovance.com

Add.: No. 16 Youxiang Road, Yuexi Town, Wuzhong District, Suzhou 215104, P.R. China
Tel: (0512) 6637 6666 Fax: (0512) 6285 6720