LAEG®

Advanced User Guide

LD320 AC Drive

High Performance

Open and Closed Loop

Preface

Thank you for purchasing the LD320 series AC drive developed by HeFei Jianghuai LAEG Electric Co.,Ltd.

The LD320 series AC drive is a general-purpose high-performance current vector control AC drive. It increases the user programmable function, background monitoring software and communication bus function, and supports multi-kind PG cards. It is used to drive various automation production equipment involving textile, paper-making, wiredrawing, machine tool, packing, food, fan and pump.

This manual describes the correct use of the LD320 series AC drive, including selection, parameter setting, commissioning, maintenance & inspection. Read and understand the manual before use and forward the manual to the end user.

Notes
• The drawings in the manual are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions. • The drawings in the manual are shown for description only and may not match the product you purchased. • The instructions are subject to change, without notice, due to product upgrade, specification modification as well as efforts to increase the accuracy and convenience of the manual. • Contact our agents or customer service center if you have problems during the use. • • **TEL:0564-3365453**

Chapter 1 Safety Information and Precautions

In this manual, the notices are graded based on the degree of danger:

-  **DANGER** indicates that failure to comply with the notice will result in severe personal injury or even death.
-  **WARNING** indicates that failure to comply with the notice will result in personal injury or property damage.

Read this manual carefully so that you have a thorough understanding. Installation, commissioning or maintenance may be performed in conjunction with this chapter. Inovance will assume no liability or responsibility for any injury or loss caused by improper operation.

1.1 Safety Information

Use Stage	Safety Grade	Precautions
Before installation	 **DANGER**	• Do not install the equipment if you find water seepage, component missing or damage upon unpacking. • Do not install the equipment if the packing list does not conform to the product you received.
	 **WARNING**	• Handle the equipment with care during transportation to prevent damage to the equipment. • Do not use the equipment if any component is damaged or missing. Failure to comply will result in personal injury. • Do not touch the components with your hands. Failure to comply will result in static electricity damage.
During installation	 **DANGER**	• Install the equipment on incombustible objects such as metal, and keep it away from combustible materials. Failure to comply may result in a fire. • Do not loosen the fixed screws of the components, especially the screws with red mark.
	 **WARNING**	• Do not drop wire end or screw into the AC drive. Failure to comply will result in damage to the AC drive. • Install the AC drive in places free of vibration and direct sunlight. • When two AC drives are laid in the same cabinet, arrange the

		installation positions properly to ensure the cooling effect.

Use Stage	Safety Grade	Precautions
At wiring	 **DANGER**	• Wiring must be performed only by qualified personnel under instructions described in this manual. Failure to comply may result in unexpected accidents. • A circuit breaker must be used to isolate the power supply and the AC drive. Failure to comply may result in a fire. • Ensure that the power supply is cut off before wiring. Failure to comply may result in electric shock. • Tie the AC drive to ground properly by standard. Failure to comply may result in electric shock.
	 **WARNING**	• Never connect the power cables to the output terminals (U, V, W) of the AC drive. Pay attention to the marks of the wiring terminals and ensure correct wiring. Failure to comply will result in damage to the AC drive. • Never connect the braking resistor between the DC bus terminals (+) and (-). Failure to comply may result in a fire. • Use wire sizes recommended in the manual. Failure to comply may result in accidents. • Use a shielded cable for the encoder, and ensure that the shielding layer is reliably grounded.
Before power-on	 **DANGER**	• Check that the following requirements are met: – The voltage class of the power supply is consistent with the rated voltage class of the AC drive. – The input terminals (R, S, T) and output terminals (U, V, W) are properly connected. – No short-circuit exists in the peripheral circuit. – The wiring is secured. Failure to comply will result in damage to the AC drive • Do not perform the voltage resistance test on any part of the AC drive because such test has been done in the factory. Failure to comply will result in accidents.

	 **WARNING**	• Cover the AC drive properly before power-on to prevent electric shock. • All peripheral devices must be connected properly under the instructions described in this manual. Failure to comply will result in accidents
Use Stage	Safety Grade	Precautions
After power-on	 **DANGER**	• Do not open the AC drive's cover after power-on. Failure to comply may result in electric shock. • Do not touch any I/O terminal of the AC drive. Failure to comply may result in electric shock.
	 **WARNING**	• Do not touch the rotating part of the motor during the motor auto-tuning or running. Failure to comply will result in accidents. • Do not change the default settings of the AC drive. Failure to comply will result in damage to the AC drive.
During operation	 **DANGER**	• Do not touch the fan or the discharging resistor to check the temperature. Failure to comply will result in personal burnt. • Signal detection must be performed only by qualified personnel during operation. Failure to comply will result in personal injury or damage to the AC drive.
	 **WARNING**	• Avoid objects falling into the AC drive when it is running. Failure to comply will result in damage to the AC drive. • Do not start/stop the AC drive by turning the contactor ON/OFF. Failure to comply will result in damage to the AC drive.

During maintenance	 **DANGER**	• Repair or maintenance of the AC drive may be performed only by qualified personnel. Failure to comply will result in personal injury or damage to the AC drive. • Do not repair or maintain the AC drive at power-on. Failure to comply will result in electric shock. • Repair or maintain the AC drive only ten minutes after the AC drive is powered off. This allows for the residual voltage in the capacitor to discharge to a safe value. Failure to comply will result in personal injury. • Ensure that the AC drive is disconnected from all power supplies before starting repair or maintenance on the AC drive. • Set and check the parameters again after the AC drive is replaced. • All the pluggable components must be plugged or removed only after power-off. • The rotating motor generally feeds back power to the AC drive. As a result, the AC drive is still charged even if the motor stops, and the power supply is cut off. Thus ensure that the AC drive is disconnected from the motor before starting repair or maintenance on the AC drive.

1.2 General Precautions

1) Requirement on residual current device (RCD)

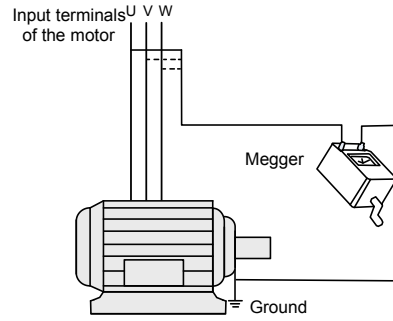
The AC drive generates high leakage current during running, which flows through the protective earthing (PE) conductor. Thus install a type-B RCD at primary side of the power supply. When selecting the RCD, you should consider the transient and steadystate leakage current to ground that may be generated at startup and during running of the AC drive. You can select a specialized RCD with the function of suppressing high harmonics or a general-purpose RCD with relatively large residual current.

2) High leakage current warning

The AC drive generates high leakage current during running, which flows through the PE conductor. Earth connection must be done before connection of power supply. Earthing shall comply with local regulations and related IEC standards.

3) Motor insulation test

Perform the insulation test when the motor is used for the first time, or when it is reused after being stored for a long time, or in a regular check-up, in order to prevent the poor insulation of motor windings from damaging the AC drive. The motor must be disconnected from the AC drive during the insulation test. A 500-V mega-Ohm meter is recommended for the test. The insulation resistance must not be less than 5 MΩ.



4) Thermal protection of motor

If the rated capacity of the motor selected does not match that of the AC drive, especially when the AC drive's rated power is greater than the motor's, adjust the motor protection parameters on the operation panel of the AC drive or install a thermal relay in the motor circuit for protection.

5) Running at over 50 Hz

The AC drive provides frequency output of 0 to 3200 Hz (Up to 300 Hz is supported if the AC drive runs in CLVC and SFVC mode). If the AC drive is required to run at over 50 Hz, consider the capacity of the machine.

6) Vibration of mechanical device

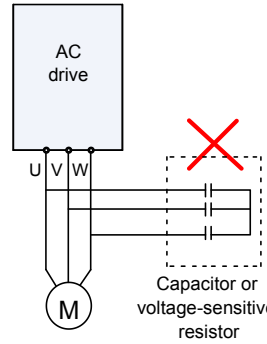
The AC drive may encounter the mechanical resonance point at some output frequencies, which can be avoided by setting the skip frequency.

7) Motor heat and noise

The output of the AC drive is pulse width modulation (PWM) wave with certain harmonic frequencies, and therefore, the motor temperature, noise, and vibration are slightly greater than those when the AC drive runs at power frequency (50 Hz).

8) Voltage-sensitive device or capacitor on output side of the AC drive

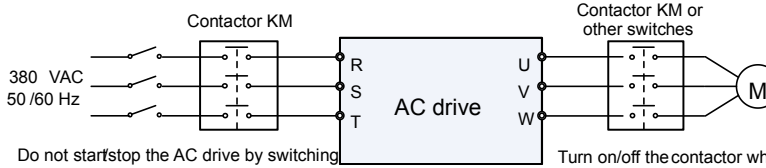
Do not install the capacitor for improving power factor or lightning protection voltagesensitive resistor on the output side of the AC drive because the output of the AC drive is PWM wave. Otherwise, the AC drive may suffer transient overcurrent or even be damaged.



9) Contactor at the I/O terminal of the 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 the contactor on or off. If the AC drive has to be operated by the contactor, ensure that the time interval between switching is at least one hour since frequent charge and discharge will shorten the service life of the capacitor inside the AC drive.

When a contactor is installed between the output side of the AC drive and the motor, do not turn off the contactor when the AC drive is active. Otherwise, modules inside the AC drive may be damaged.



Do not start/stop the AC drive by switching the contactor on /off. If the AC drive has to be operated by the contactor , ensure that the time interval between switching is at least one hour . Otherwise, modules inside the AC drive may be damaged .

Turn on/off the contactor when the AC drive has no output . be operated by the contactor . AC drive may be damaged .

10) When external voltage is out of rated voltage range

The AC drive must not be used outside the allowable voltage range specified in this manual. Otherwise, the AC drive's components may be damaged. If required, use a corresponding voltage step-up or step-down device.

11) Prohibition of three-phase input changed into two-phase input

Do not change the three-phase input of the AC drive into two-phase input. Otherwise, a fault will result or the AC drive will be damaged.

12) Surge suppressor

The AC drive has a built-in voltage dependent resistor (VDR) for suppressing the surge voltage generated when the inductive loads (electromagnetic contactor,

electromagnetic relay, solenoid valve, electromagnetic coil and electromagnetic brake) around the AC drive are switched on or off. If the inductive loads generate a very high surge voltage, use a surge suppressor for the inductive load or also use a diode.

Note

Do not connect the surge suppressor on the output side of the AC.

13) Altitude and de-rating

In places where the altitude is above 1000 m and the cooling effect reduces due to thin air, it is necessary to de-rate the AC drive. Contact Inovance for technical support.

14) Some special usages

If wiring that is not described in this manual such as common DC bus is applied, contact the agent or Inovance for technical support.

15) Disposal

The electrolytic capacitors on the main circuits and PCB may explode when they are burnt. Poisonous gas is generated when the plastic parts are burnt. Treat them as ordinary industrial waste.

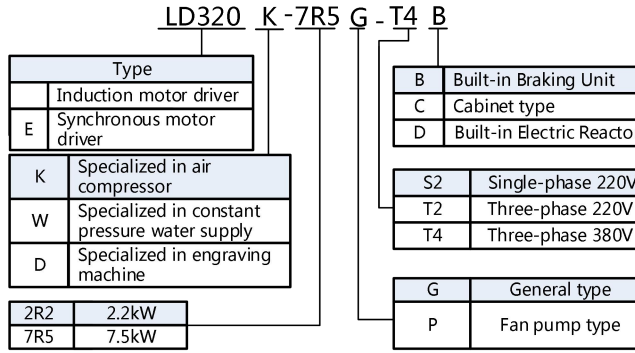
16) Adaptable Motor

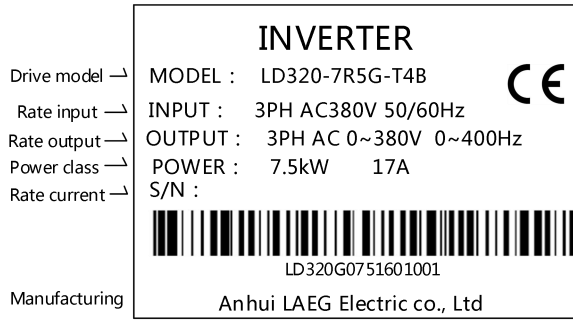
- The standard adaptable motor is adaptable four-pole squirrel-cage asynchronous induction motor or PMSM. For other types of motor, select a proper AC drive according to the rated motor current.
- The cooling fan and rotor shaft of non-variable-frequency motor are coaxial, which results in reduced cooling effect when the rotational speed declines. If variable speed is required, add a more powerful fan or replace it with variable-frequency motor in applications where the motor overheats easily.
- The standard parameters of the adaptable motor have been configured inside the AC drive. It is still necessary to perform motor auto-tuning or modify the default values based on actual conditions. Otherwise, the running result and protection performance will be affected.
- The AC drive may alarm or even be damaged when short-circuit exists on cables or inside the motor. Therefore, perform insulation short-circuit test when the motor and cables are newly installed or during routine maintenance. During the test, make sure that the AC drive is disconnected from the tested parts.

Chapter 2 Product Information

2.1 Designation Rules and Nameplate of the LD320

Figure 2-1 Designation rules and nameplate of the LD320



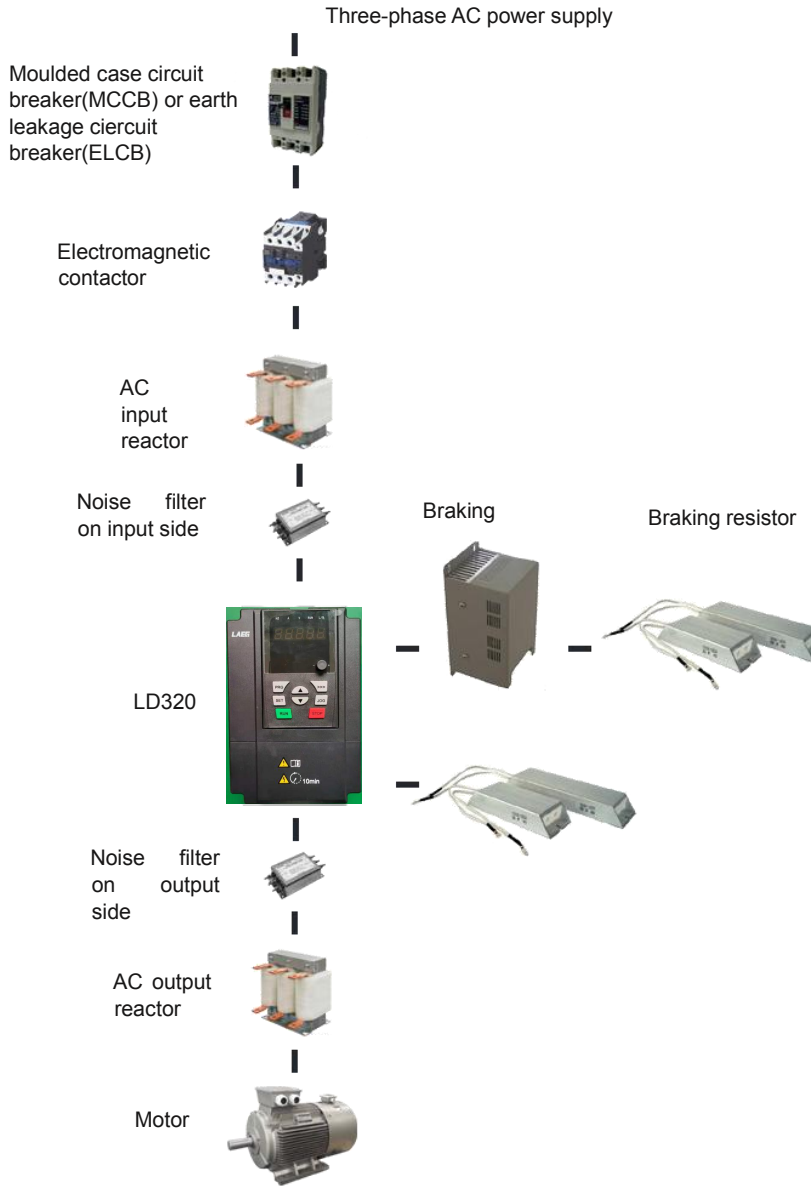


2.2 Peripheral Electrical Devices and System Configuration

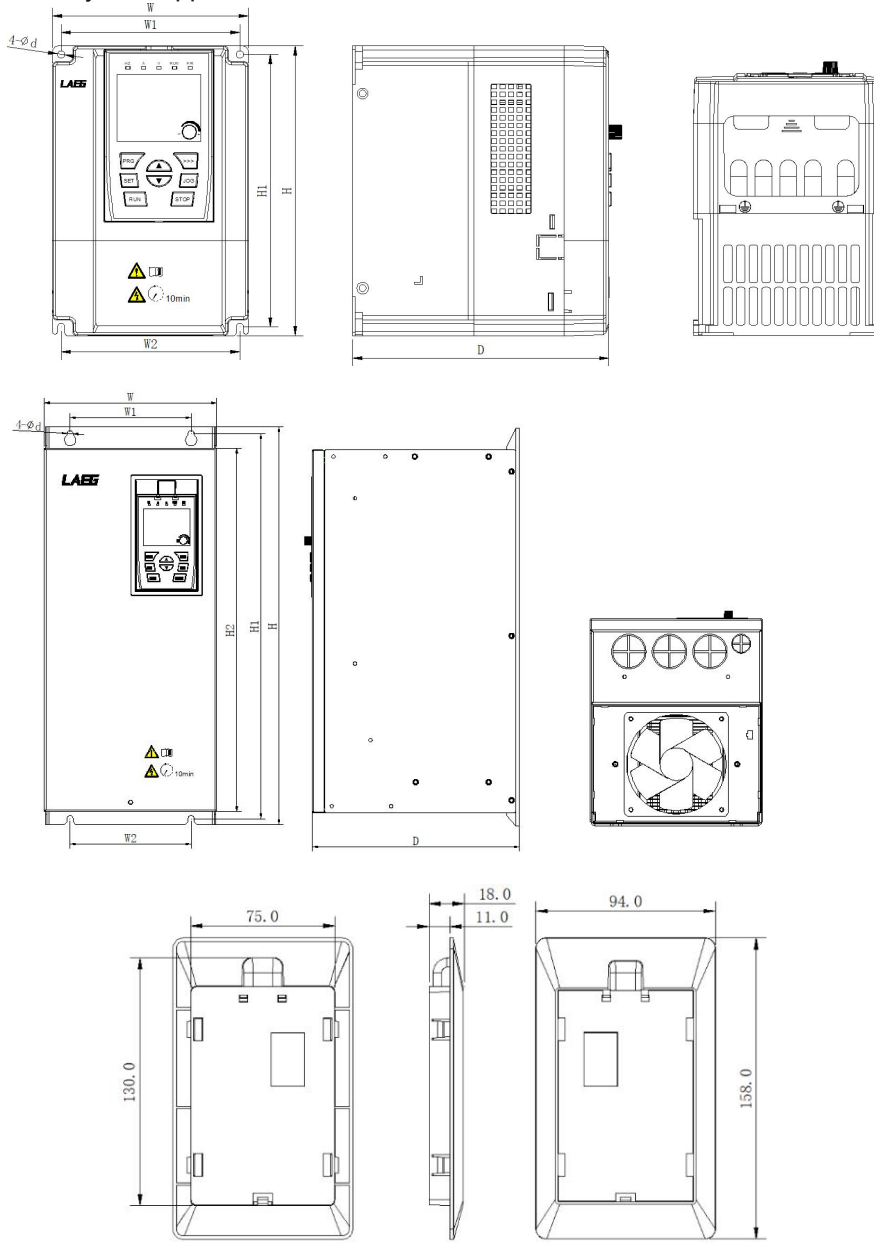
When the LD320 is used to control the synchronous or asynchronous motor, forming a control system, it is necessary to install various electrical devices on the input and output sides of the AC drive to ensure the system safety and stability.

In addition, several optional extension cards are available for the LD320 to implement various functions. The system configuration of three-phase 220 V/380 V/480 V voltage class, 3.7 kW and above is shown in the following figure.

Figure 2-2 System configuration of three-phase 220 V/380 V/480 V voltage class, 3.7 kW and above


Three-phase AC power supply
Moulded case circuit breaker(MCCB) or earth leakage ciercuit breaker(ELCB)
Electromagnetic contactor
AC input reactor
Noise filter on input side
Braking
Braking resistor
LD320
Noise filter on output side
AC output reactor
Motor

2.3 Physical Appearance and Overall Dimensions of the LD320



Model	Overall Dimensions (mm)			Mounting Hole (mm)				Mounting Hole Diameter (mm)	Shell Types
	H	W	D	H1	H2	W1	W2	d	
■Three-phase 220 V，50/60Hz									
LD320-0R4G-S2B	185	126	165	175	—	115	—	4.7	plastic housing
LD320-0R7G-S2B									
LD320-1R5G-S2B									
LD320-2R2G-S2B									
Three-phase 380 V，50/60Hz									
LD320-0R7G-T4B	185	126	165	175	—	115	—	4.7	
LD320-1R5G-T4B									
LD320-2R2G-T4B									
LD320-4R0G-T4B									
LD320-5R5G-T4B	256	146	179	243	—	131	—	6	
LD320-7R5G-T4B									
LD320-011G-T4B									
LD320-015G-T4B	320	170	205	303	—	151	—	6	
LD320-018G-T4									
LD320-022G-T4									
LD320-030G-T4	460	200	240	445	420	140	—	7	sheet metal housing
LD320-037G-T4									
LD320-045G-T4	560	238	321	545	520	175	—	7	
LD320-55G-T4									
LD320-75G-T4									
LD320-90G-T4	640	271	352	615	580	200	—	10	
LD320-110G-T4									
LD320-132G-T4	740	350	407	720	678	220	—	10	
LD320-160G-T4									
LD320-185G-T4	940	360	480	910	850	200	—	14	
LD320-220G-T4									
LD320-250G-T4	1140	370	545	1110	1055	200	—	14	
LD320-280G-T4									
LD320-315G-T4	1250	400	545	1213	1138	240	—	20	
LD320-400G-T4									

2.4 Installation Environment Requirements

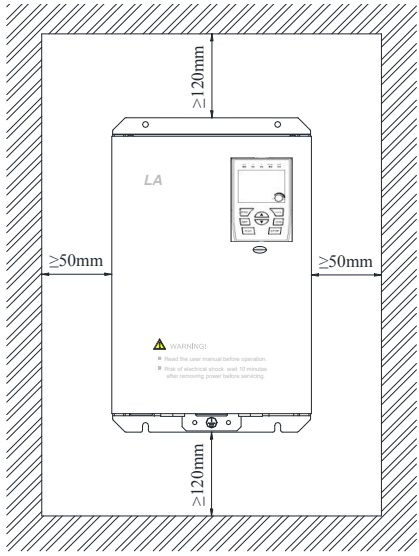
Item	Requirements
Ambient temperature	-10°C to +50°C
Heat dissipation	Install the AC drive on the surface of an incombustible object, and ensure that there is sufficient space around for heat dissipation. Install the AC drive vertically on the support using screws.
Mounting location	Free from direct sunlight, high humidity and condensation
	Free from corrosive, explosive and combustible gas
	Free from oil dirt, dust and metal powder
Vibration	Less than 0.6 g Far away from the punching machine or the like
Protective enclosure	The LD320 series AC drives of plastic housing are the whole unit built-in products operated through remote control and need to be installed in the final system.The final system must have the required fireproof cover, electrical protective cover and mechanical protective cover, and satisfy the regional laws & regulations and related IEC requirements.

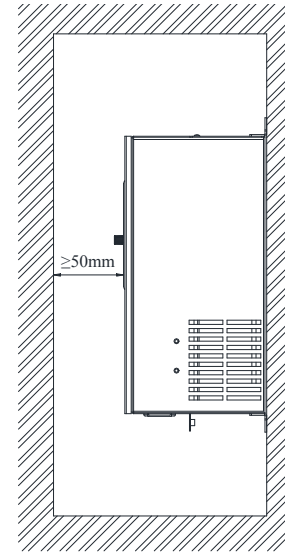
2.5 Installation Clearance Requirements

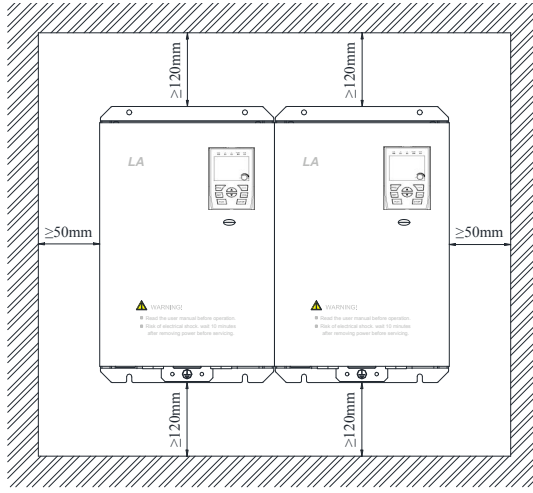
The clearance that needs to be reserved varies with the power class of the LD320, as shown in the following figure.

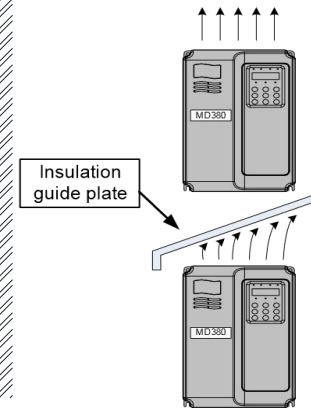
The LD320 series AC drive dissipates heat from the bottom to the top. When multiple AC drives are required to work together, install them side by side.

For application installing multiple AC drives, if one row of AC drives need to be installed above another row, install an insulation guide plate to prevent AC drives in the lower row from heating those in the upper row and causing faults.


≥120mm
≥50mm
≥50mm
≥120mm


≥50mm


≥120mm
≥120mm
≥50mm
≥50mm
≥120mm
≥120mm


Insulation guide plate
MD380
MD380

Chapter 3 Electrical Installation

3.1 Description of Main Circuit Terminals

■ Description of Main Circuit Terminals of Single-phase AC drive

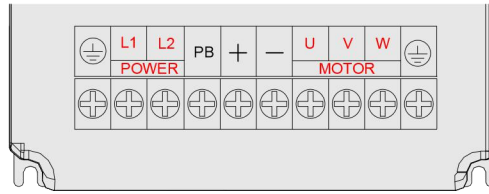


Table 3-1 Description of main circuit terminals of single-phase AC drive

Terminal	Name	Description
L1, L2	Single-phase power supply input terminals	Connect to the single-phase 220 VAC power supply.
(+), (-)	Positive and negative terminals of DC bus	Common DC bus input point.
(+), PB	Connecting terminals of braking resistor	Connect to a braking resistor.
U, V, W	AC drive output terminals	Connect to a three-phase motor.
⏚	Grounding terminal	Must be grounded.

■ Description of Main Circuit Terminals of Three-phase AC drive

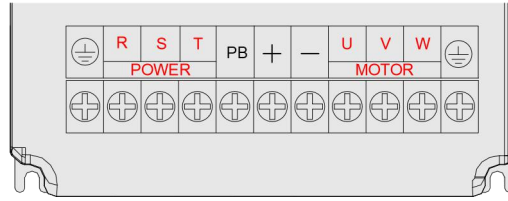


Table 3-2 Description of main circuit terminals of three-phase AC drive

Terminal	Name	Description
R, S, T	Three-phase power supply input terminals	Connect to the three-phase AC power supply

(+), (-)	Positive and negative terminals of DC bus	Common DC bus input point Connect the external braking unit to the AC drive of 18.5 kW and above (220 V) and 37 kW and above (other voltage classes).
(+), PB	Connecting terminals of braking resistor	Connect to the braking resistor for the AC drive of 15 kW and below (220 V) and 30 kW and below (other voltage classes).
P, (+)	Connecting terminals of external reactor	Connect to an external reactor.
U, V, W	AC drive output terminals	Connect to a three-phase motor.
⏚	Grounding terminal	Must be grounded.

3.2 Wiring of AC Drive Main Circuit

Table 3-3 Wiring of the AC drive main circuit

■ Precautions on the Wiring

1) Power input terminals L1, L2 or R, S, T

   – The cable connection on the input side of the AC drive has no phase sequence requirement.
   – The specification and installation method of external power cables must comply with the local safety regulations and related IEC standards.
   – Use copper conductors of a proper size as power cables according to the recommended values in section 8.3.

2) DC bus terminals (+), (-)

   – Terminals (+) and (-) of DC bus have residual voltage after the AC drive is switched off. After indicator CHARGE goes off, wait at least 10 minutes before touching the equipment Otherwise, you may get electric shock.
   – connecting external braking components for the AC drive of 18.5 kW and above (220 V) and 37 kW and above (other voltage classes), do not reverse poles (+) and (-). Otherwise, it may damage the AC drive and even cause a fire.
   – The cable length of the braking unit shall be no longer than 10 m. Use twisted pair wire or pair wires for parallel connection.
   – Do not connect the braking resistor directly to the DC bus. Otherwise, it may damage the AC drive and even cause fire.

3) Braking resistor connecting terminals (+), PB

   – The connecting terminals of the braking resistor are effective only for the AC configured with the built-in braking unit.
   – The cable length of the braking resistor shall be less than 5 m. Otherwise, it may damage the AC drive.

4) External reactor connecting terminals P, (+)

For the AC drive of 37 kW and above (220 V) and 75 kW and above (other voltage classes), remove the jumper bar across terminals P and (+) and install the reactor between the two terminals.

5) AC drive output terminals U, V, W

- The specification and installation method of external power cables must comply with the local safety regulations and related IEC standards.
- Use copper conductors of a proper size as power cables according to the recommended values in section 8.3.
- The capacitor or surge absorber cannot be connected to the output side of the AC drive. Otherwise, it may cause frequent AC drive fault or even damage the AC drive.
- If the motor cable is too long, electrical resonance will be generated due to the impact of distributed capacitance. This will damage the motor insulation or generate higher leakage current, causing the AC drive to trip in overcurrent protection. If the motor cable is greater than 100 m long, an AC output reactor must be installed close to the AC drive.

6) Terminal ⏚ PE

- This terminal must be reliably connected to the main earthing conductor. Otherwise, it may cause electric shock, mal-function or even damage to the AC drive.
- Do not connect the earthing terminal to the neutral conductor of the power supply.
- The impedance of the PE conductor must be able to withstand the large shortcircuit current that may arise when a fault occurs.
- Select the size of the PE conductor according to the following table:

Cross-sectional Area of a Phase Conductor (S)	Min. Cross-sectional Area of Protective Conductor (Sp)
$S \leq 16\ mm^2$	S
$16\ mm^2 < S \leq 35\ mm^2$	$16\ mm^2$
$35\ mm^2 < S$	S/2

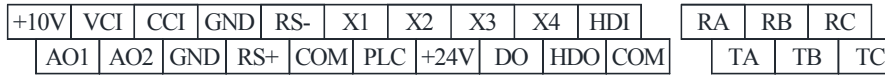
- You must use a yellow/green cable as the PE conductor.

7) Requirements on upstream protection device

- Install upstream protection device on the input power circuit. The protection device must provide the protections on overcurrent, short-circuit and electrical solation.
- When selecting the protective device, you should consider the current capacity of the power cable, system overload capacity and short-circuit capacity of the upstream power distribution of the equipment. Generally, make selection according to the recommended values in section 8.4.

3.3 Description of Control Circuit Terminals

■ Terminal Arrangement of Control Circuit



■ Description of Control Circuit Terminals

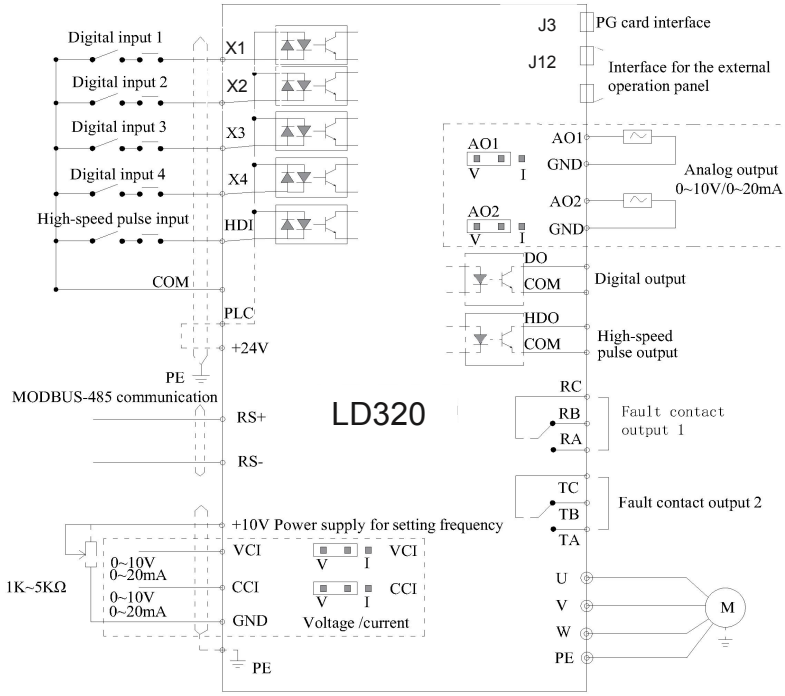
Table 3-3 Description of control circuit terminals

Type	Terminal	Name	Function Description
Power supply	+10V-GND	External +10 V power supply	Provide +10 V power supply to external unit. Generally, it provides power supply to external potentiometer with resistance range of 1–5 kΩ. Maximum output current: 10 mA
	+24V-COM	External +24 V power supplyApplying to Overvoltage Category II circuit	Provide +24 V power supply to external unit. Generally, it provides power supply to DI/DO terminals and external sensors. Maximum output current: 200 mA
	PLC	Input terminal of external power supply	Connect to +24 V by default. When X1-HDI need to be driven by external signal, OP needs to be connected to external power supply and be disconnected from +24 V.
Analog input	VCI-GND	Analog input 1	Input range: 0–10 VDC/4–20 mA, decided by jumper VCI,CCI on the control board Impedance: 22 kΩ (voltage input), 500 Ω (current input)
	CCI-GND	Analog input 2	
Digital input	X1- OP	Digital input 1	Optical coupling isolation, compatible with dual polarity input Impedance: 2.4 kΩ Voltage range for level input: 9–30 V
	X2- OP	Digital input 2	
	X3- OP	Digital input 3	
	X4- OP	Digital input 4	
	HDI- OP	High-speed pulse input	Besides features of X1–X4, it can be used for high-speed pulse input. Maximum input frequency: 100 kHz

Analog output	AO1-GND	Analog output 1	Voltage or current output is decided by jumper AO1. Output voltage range: 0–10 V Output current range: 0–20 mA
	AO2-GND	Analog output 2	Voltage or current output is decided by jumper AO2. Output voltage range: 0–10 V Output current range: 0–20 mA
Digital output	DO-COM	Digital output 1	Optical coupling isolation, dual polarity open collector output Output voltage range: 0–24 V Output current range: 0–50 mA Note that CME and COM are internally insulated, but they are shorted by jumper externally. In this case DO is driven by +24 V by default. If you want to drive DO1 by external power supply, remove the jumper.
	HDO- COM	High-speed pulse output	It is limited by P5-00 (HDO terminal output mode selection). As high-speed pulse output, the maximum frequency hits 100 kHz. As open-collector output, its specification is the same as that of DO
Relay output	TC-TB	NC terminal	Contact driving capacity: 250 VAC, 3 A, COSø = 0.4 30 VDC, 1 A Applying to Overvoltage Category II circuit
	TA-TC	NO terminal	
	RC-RB	NC terminal	
	RA-RC	NO terminal	

3.4 Wiring of AC Drive Control Circuit

Figure 3-1 Wiring mode of the AC drive control circuit

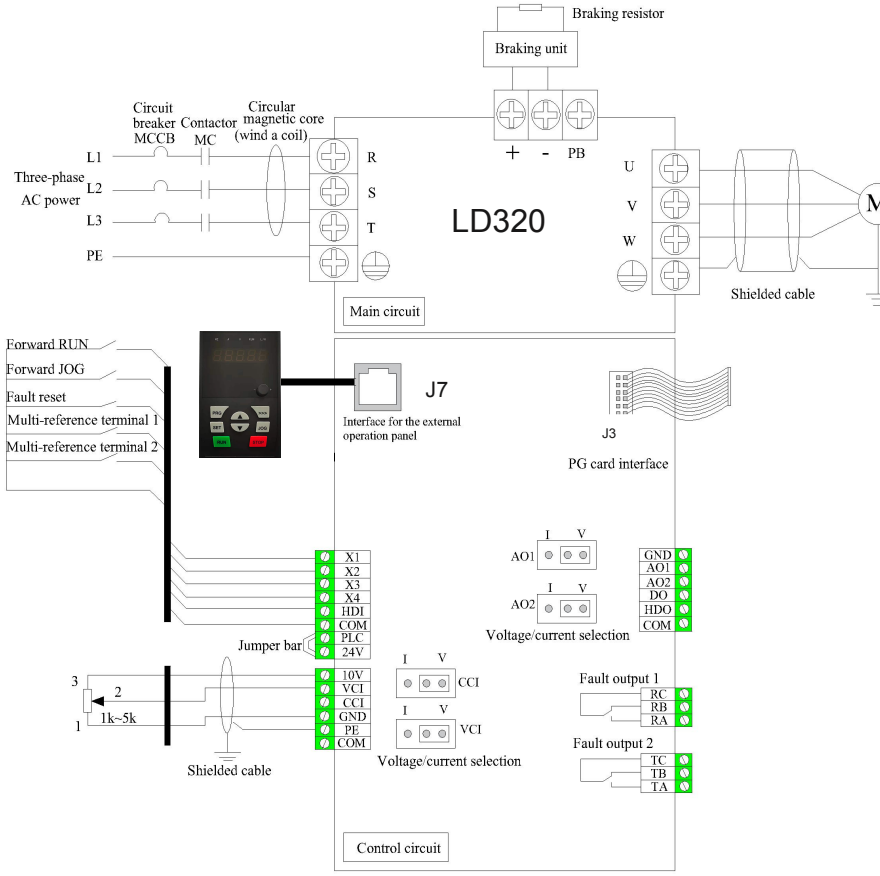


Note

- All LD320 series AC drives have the same wiring mode. The figure here shows the wiring of single-phase 220 VAC drive. ◎ indicates main circuit terminal, while ○ indicates control circuit terminal.
- When the external operation panel is connected, the display of the operation panel on the LD320 goes off.

3.5 Electric Wiring of the LD320

Figure 3-2 Electric Wiring of the LD320

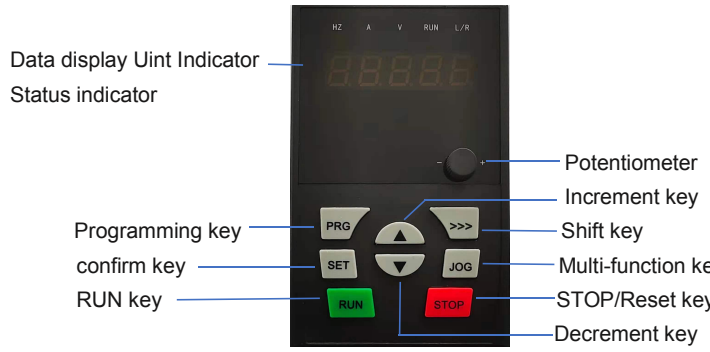


Chapter 4 Operation and Display

4.1 Operation Panel

You can modify the parameters, monitor the working status and start or stop the LD320 by operating the operation panel, as shown in the following figure.

Figure 4-1 Diagram of the operation panel



4.2 Description of Indicators

- RUN

  ON indicates that the AC drive is in the running state, and OFF indicates that the AC drive is in the stop state.

- L/R

  It indicates whether the AC drive is operated by means of operation panel, terminals or communication.

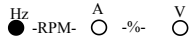
L/R：OFF	Operation panel control
L/R：ON	Terminal control
L/R：Blinking	Communication control

- F/R

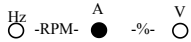
  ON indicates reverse rotation, and OFF indicates forward rotation.

- Unit Indicators

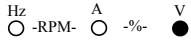
  ● means that the indicator is ON, and ○ means that the indicator is OFF.



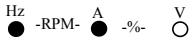
Hz: unit of frequency



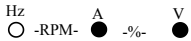
A: unit of current



V: unit of voltage



RPM: unit of rotational speed



%: percentage

4.3 Description of Keys on the Operation Panel

Table 4-1 Description of keys on the operation panel

Key	Name	Function
	Programming	Enter or exit Level I menu.
	Confirm	Enter the menu interfaces level by level, and confirm the parameter setting.
	Increment	Increase data or function code.
	Decrement	Decrease data or function code.
	Shift	Select the displayed parameters in turn in the stop or running state, and select the digit to be modified when modifying parameters.
	RUN	Start the AC drive in the operation panel control mode.
	Stop/Reset	Stop the AC drive when it is in the running state and perform the reset operation when it is in the fault state. The functions of this key are restricted in P7-02.
	Rotary knob	Operating knob to change the inverter output frequency, the function determined by P0-03
	Multi-function	Perform function switchover (such as quick switchover of command source or direction) according to the setting of P7-01.

Chapter 5 Function Code Table

Group P and Group C are standard function parameters. Group U includes the monitoring function parameters.

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

"☆": The parameter can be modified when the AC drive is in either stop or running state.

"★": The parameter cannot be modified when the AC drive is in the running state.

"●": The parameter is the actually measured value and cannot be modified.

"*": The parameter is factory parameter and can be set only by the manufacturer.

5.1 Standard Function Parameters

Function Code	Parameter Name	Setting Range	Default	Property
Group P0: Standard Function Parameters				
P0-00	G/P type display	1: G type (constant torque load) 2: P type (variable torque load e.g. fan and pump)	Model dependent	●
P0-01	Motor 1 control mode	0: Sensorless flux vector control (SFVC) 1: Closed-loop vector control (CLVC) 2: Voltage/Frequency (V/F) control	0	★
P0-02	Command source selection	0: Operation panel control (LED off) 1: Terminal control (LED on) 2: Communication control (LED blinking)	0	☆
P0-03	Main frequency source X selection	0: Digital setting (non-retentive at power failure) 1: Rotary knob setting 2: VCI 3: CCI 4: Digital setting (retentive at power failure)	0	★

Function Code	Parameter Name	Setting Range	Default	Property
P0-03	Main frequency source X selection	5: Pulse setting (HDI) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication setting	0	★
P0-04	Auxiliary frequency source Y selection	The same as P0-03 (Main frequency source X selection)	0	★
P0-05	Range of auxiliary frequency Y for X and Y operation	0: Relative to maximum frequency 1: Relative to main frequency X	0	☆
P0-06	Range of auxiliary frequency Y for X and Y operation	0%–150%	100%	☆
P0-07	Frequency source selection	Unit's digit (Frequency source selection) 0: Main frequency source X 1: X and Y operation (operation relationship determined by ten's digit) 2: Switchover between X and Y 3: Switchover between X and "X and Y operation" 4: Switchover between Y and "X and Y operation" Ten's digit (X and Y operation relationship) 0: X+Y 1: X-Y 2: Maximum 3: Minimum	00	☆
P0-08	Preset frequency	0.00 to maximum frequency (valid when frequency source is digital setting)	50.00 Hz	☆
P0-09	Rotation direction	0: Same direction 1: Reverse direction	0	☆
P0-10	Maximum frequency	50.00–320.00 Hz	50.00 Hz	★
P0-11	Source of frequency upper limit	0: Set by P0-12 1: VCI 2: CCI 3: Rotary knob setting	0	★

		4: Pulse setting (HDI) 5: Communication setting		

Function Code	Parameter Name	Setting Range	Default	Property
P0-12	Frequency upper limit	Frequency lower limit (P0-14) to maximum frequency (P0-10)	50.00 Hz	☆
P0-13	Frequency upper limit offset	0.00 Hz to maximum frequency (P0-10)	0.00 Hz	☆
P0-14	Frequency lower limit	0.00 Hz to frequency upper limit (P0-12)	0.00 Hz	☆
P0-15	Carrier frequency	0.5–16.0 kHz	Model dependent	☆
P0-16	Carrier frequency adjustment with temperature	0: No 1: Yes	1	☆
P0-17	Acceleration time 1	0.00–650.00s (P0-19 = 2) 0.0–6500.0s (P0-19 = 1) 0–65000s (P0-19 = 0)	Model dependent	☆
P0-18	Deceleration time 1	0.00–650.00s (P0-19 = 2) 0.0–6500.0s (P0-19 = 1) 0–65000s (P0-19 = 0)	Model dependent	☆
P0-19	Acceleration/Deceleration time unit	0:1s 1: 0.1s 2: 0.01s	1	★
P0-21	Frequency offset of auxiliary frequency source for X and Y operation	0.00 Hz to maximum frequency (P0-10)	0.00 Hz	☆
P0-22	Frequency reference resolution	1: 0.1 Hz 2: 0.01 Hz	2	★
P0-23	Retentive of digital setting frequency upon power failure	0: Not retentive 1: Retentive	0	☆
P0-25	Acceleration/Deceleration time base frequency	0: Maximum frequency (P0-10) 1: Set frequency 2: 100 Hz	0	★

P0-26	Base frequency for UP/ DOWN modification during running	0: Running frequency 1: Set frequency	0	★

Function Code	Parameter Name	Setting Range	Default	Property
P0-27	Binding command source to frequency source	Unit's digit (Binding operation panel command to frequency source) 0: No binding 1: Frequency source by digital setting 2: VCI 3: CCI 4: Rotary knob setting 5: Pulse setting (HDI) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication setting Ten's digit (Binding terminal command to frequency source) 0–9, same as unit's digit Hundred's digit (Binding communication command to frequency source) 0–9, same as unit's digit	000	☆
Group P1: Motor Parameters				
P1-00	Motor type selection	0: Common asynchronous motor 1: Variable frequency asynchronous motor 2: Permanent magnetic synchronous motor	Model dependent	★
P1-01	Rated motor power	0.1–1000.0 kW	Model dependent	★
P1-02	Rated motor voltage	1–2000 V	Model dependent	★
P1-03	Rated motor current	0.01–6553.5 A (AC drive power < 55 kW) 0.1–6553.5 A (AC drive power > 55 kW)	Model dependent	★

P1-04	Rated motor frequency	0.01 Hz to maximum frequency	Model dependent	★
P1-05	Rated motor rotational speed	1–65535 RPM	Model dependent	★

Function Code	Parameter Name	Setting Range	Default	Property
P1-06	Stator resistance (asynchronous motor)	0.001–65.535 Ω (AC drive power ≤ 55 kW) 0.0001–6.5535 Ω (AC drive power > 55 kW)	Model dependent	★
P1-07	Rotor resistance (asynchronous motor)	0.001–65.535 Ω (AC drive power ≤ 55 kW) 0.0001–6.5535 Ω (AC drive power > 55 kW)	Model dependent	★
P1-08	Leakage inductive reactance (asynchronous motor)	0.01–655.35 mH (AC drive power ≤ 55 kW) 0.001–65.535 mH (AC drive power > 55 kW)	Model dependent	★
P1-09	Mutual inductive reactance (asynchronous motor)	0.1–6553.5 mH (AC drive power ≤ 55 kW) 0.01–-655.35 mH (AC drive power > 55 kW)	Model dependent	★
P1-10	No-load current (asynchronous motor)	0.01 to P1-03 (AC drive power ≤ 55 kW) 0.1 to P1-03 (AC drive power > 55 kW)	Model dependent	★
P1-37	Auto-tuning selection	0: No auto-tuning 1: Asynchronous motor static auto-tuning 2: Asynchronous motor complete auto-tuning 11: Synchronous motor with-load auto-tuning 12: Synchronous motor no-load auto-tuning	0	★
Group P2: Vector Control Parameters				
P2-00	Speed loop proportional gain 1	0–100	20	☆
P2-01	Speed loop integral time 1	0.01–10.00s	0.50s	☆

Function Code	Parameter Name	Setting Range	Default	Property
P2-02	Switchover frequency 1	0.00 to P2-05	5.00 Hz	☆
P2-03	Speed loop proportional gain 2	0–100	20	☆
P2-04	Speed loop integral time 2	0.01–10.00s	1.00s	☆
P2-05	Switchover frequency 2	P2-02 to maximum output frequency	10.00 Hz	☆
P2-06	Vector control slip gain	50%–200%	100%	☆
P2-07	Time constant of speed loop filter	0.000–0.100s	0.050s	☆
P2-08	Vector control overexcitation gain	0–200	64	☆
P2-09	Torque upper limit source in speed control mode	0: P2-10 1: VCI 2: CCI 3: Rotary knob setting 4: Pulse setting (HDI) 5: Communication setting	0	☆
P2-10	Digital setting of torque upper limit in speed control mode	0.0%–200.0%	150.0%	☆
P2-13	Excitation adjustment proportional gain	0–20000	3000	☆
P2-14	Excitation adjustment integral gain	0–20000	500	☆
P2-15	Torque adjustment proportional gain	0–20000	3000	☆
P2-16	Torque adjustment integral gain	0–20000	500	☆
P2-17	Speed loop integral property	Unit's digit: integral separation 0: Disabled 1: Enabled	0	☆
P2-18	Field weakening mode of synchronous motor	0: No field weakening 1: Direct calculation 2: Automatic adjustment	1	☆
P2-19	Field weakening depth of synchronous motor	1 ~ 50	50	☆
P2-20	Maximum field weakening current	100%~110%	50%	☆

P2-21	Field weakening automatic adjustment gain	50%~200%	100%	☆
P2-22	Field weakening integral multiple	0, 1	0	☆

Function Code	Parameter Name	Setting Range	Default	Property
Group P3: V/F Control Parameters				
P3-00	V/F curve setting	0: Linear V/F 1: Multi-point V/F 2: Square V/F 3: 1.2-power V/F 4: 1.4-power V/F 6: 1.6-power V/F 8: 1.8-power V/F 9: Reserved 10: V/F complete separation 11: V/F half separation	0	★
P3-01	Torque boost	0.0% (fixed torque boost) 0.1%–30.0%	Model dependent	☆
P3-02	Cut-off frequency of torque boost	0.00 Hz to maximum output frequency	50.00 Hz	★
P3-03	Multi-point V/F frequency 1 (F1)	0.00 Hz to P3-05	0.00 Hz	★
P3-04	Multi-point V/F voltage 1 (V1)	0.0%–100.0%	0.0%	★
P3-05	Multi-point V/F frequency 2 (F2)	P3-03 to P3-07	0.00 Hz	★
P3-06	Multi-point V/F voltage 2 (V2)	0.0%–100.0%	0.0%	★
P3-07	Multi-point V/F frequency 3 (F3)	P3-05 to rated motor frequency (P1-04) Note: The rated frequencies of motors 2, 3, and 4 are respectively set in A2-04, A3-04, and A4-04.	0.00 Hz	★
P3-08	Multi-point V/F voltage 3 (V3)	0.0%–100.0%	0.0%	★

P3-09	V/F slip compensation gain	0%–200.0%	0.0%	☆
P3-10	V/F over-excitation gain	0–200	64	☆
P3-11	V/F oscillation suppression gain	0–100	Model dependent	☆

Function Code	Parameter Name	Setting Range	Default	Property
P3-13	Voltage source for V/F separation	0: Digital setting (P3-14) 1: VCI 2: CCI 3: Rotary knob setting 4: Pulse setting (HDI) 5: Multi-reference 6: Simple PLC 7: PID 8: Communication setting 100.0% corresponds to the rated motor voltage (P1-02, A4-02, A502, A6-02).	0	☆
P3-14	Voltage digital setting for V/F separation	0 V to rated motor voltage	0 V	☆
P3-15	Voltage rise time of V/F separation	0.0–1000.0s It indicates the time for the voltage rising from 0 V to rated motor voltage.	0.0s	☆
P3-16	Voltage decline time of V/F separation	0.0–1000.0s It indicates the time for the voltage to decline from rated motor voltage to 0 V.	0.0s	☆
P3-17	Stop mode selection upon V/F separation	0: Frequency and voltage declining to 0 independently 1: Frequency declining after voltage declines to 0	0	☆

Group P4: Input Terminals

P4-00	X1 function selection	0: No function 1: Forward RUN (FWD) 2: Reverse RUN (REV) 3: Three-line control 4: Forward JOG (FJOG) 5: Reverse JOG (RJOG) 6: Terminal UP 7: Terminal DOWN 8: Coast to stop 9: Fault reset (RESET) 10: RUN pause 11: Normally open (NO) input of external fault 12: Multi-reference terminal 1 13: Multi-reference terminal 2 14: Multi-reference terminal 3 15: Multi-reference terminal 4 16: Terminal 1 for acceleration/ deceleration time selection 17: Terminal 2 for acceleration/ deceleration time selection 18: Frequency source switchover 19: UP and DOWN setting clear (terminal, operation panel) 20: Command source switchover terminal 1 21: Acceleration/Deceleration prohibited 22: PID pause 23: PLC status reset 24: Swing pause 25: Counter input 26: Counter reset 27: Length count input 28: Length reset 29: Torque control prohibited 30: Pulse input (enabled only for DI5) 31:Reserved 32: Immediate DC braking 33: Normally closed (NC) input of external fault 34: Frequency modification	1	★
P4-01	X2 function selection		4	★
P4-02	X3 function selection		9	★
P4-03	X4 function selection		12	★
P4-04	HDI function selection		13	★

		forbidden 35: Reverse PID action direction 36: External STOP terminal 1 37: Command source switchover terminal 2 38: PID integral pause 39: Switchover between main frequency source X and preset frequency 40: Switchover between auxiliary frequency source Y and preset frequency 41: Motor selection terminal 1 42: Motor selection terminal 2 43: PID parameter switchover 44: User-defined fault 1 45: User-defined fault 2 46: Speed control/Torque control switchover 47: Emergency stop 48: External STOP terminal 2 49: Deceleration DC braking 50: Clear the current running time 51: Switchover between two-line mode and three-line mode 52–59: Reserved		
P4-10	DI filter time	0.000–1.000s	0.010s	☆
P4-11	Terminal command mode	0: Two-line mode 1 1: Two-line mode 2 2: Three-line mode 1 3: Three-line mode 2	0	★
P4-12	Terminal UP/DOWN rate	0.01–65.535 Hz/s	1.00 Hz/s	☆
P4-13	CI curve 1 minimum input	0.00 V to P4-15	0.00 V	☆
P4-14	Corresponding setting of CI curve 1 minimum input	-100.00%–100.0%	0.0%	☆
P4-15	CI curve 1 maximum input	P4-13 to 10.00 V	10.00 V	☆
P4-16	Corresponding setting of CI curve 1 maximum input	-100.00%–100.0%	100.0%	☆
P4-17	VC filter time	0.00–10.00s	0.10s	☆

P4-18	VCI curve 2 minimum input	0.00 V to P4-20	0.00 V	☆
P4-19	Corresponding setting of CI curve 2 minimum input	-100.00%–100.0%	0.0%	☆
P4-20	CI curve 2 maximum input	P4-18 to 10.00 V	10.00 V	☆
Function Code	Parameter Name	Setting Range	Default	Property
P4-21	Corresponding setting of CI curve 2 maximum input	-100.00%–100.0%	100.0%	☆
P4-22	CCI filter time	0.00–10.00s	0.10s	☆
P4-23	CI curve 3 minimum input	0.00 V to P4-25	-10.00 V	☆
P4-24	Corresponding setting of CI curve 3 minimum input	-100.00%–100.0%	0.0%	☆
P4-25	CI curve 3 maximum input	P4-23 to 10.00 V	10.00 V	☆
P4-26	Corresponding setting of CI curve 3 maximum input	-100.00%–100.0%	100.0%	☆
P4-28	Pulse minimum input	0.00 kHz to P4-30	0.00 kHz	☆
P4-29	Corresponding setting of pulse minimum input	-100.00%–100.0%	0.0%	☆
P4-30	Pulse maximum input	P4-28 to 50.00 kHz	50.00 kHz	☆
P4-31	Corresponding setting of pulse maximum input	-100.00%–100.0%	100.0%	☆
P4-32	Pulse filter time	0.00–10.00s	0.10s	☆
P4-33	CI curve selection	Unit's digit (VCI curve selection) Curve 1 (2 points, see P4-13 to P4-16) Curve 2 (2 points, see P4-18 to P4-21) Curve 3 (2 points, see P4-23 to P4-26) Curve 4 (4 points, see C6-00 to C6-07) Curve 5 (4 points, see C6-08 to C6-15) Ten's digit (CCI curve selection) Curve 1 to curve 5 (same as VCI)	21	☆

Function Code	Parameter Name	Setting Range	Default	Property
P4-34	Setting for CI less than minimum input	Unit's digit (Setting for VCI less than minimum input) 0: Minimum value 1: 0.0% Ten's digit (Setting for CCI less than minimum input) 0, 1 (same as VCI)	000	☆
P4-35	DI1 delay time	0.0–3600.0s	0.0s	★
P4-36	DI2 delay time	0.0–3600.0s	0.0s	★
P4-37	DI3 delay time	0.0–3600.0s	0.0s	★
P4-38	X valid mode selection 1	Unit's digit (X1 valid mode) 0: High level valid 1: Low level valid Ten's digit (X2 valid mode) 0, 1 (same as X1) Hundred's digit (X3 valid mode) 0, 1 (same as X1) Thousand's digit (X4 valid mode) 0, 1 (same as X1) Ten thousand's digit (HDI valid mode) 0, 1 (same as X1)	00000	★
P4-40	AI2 input signal selection	0: Voltage signal 1: Current signal	0	★
Group P5: Output Terminals				
P5-00	HDO terminal output mode	0: Pulse output (FMP) 1: Switch signal output (FMR)	0	☆

Function Code	Parameter Name	Setting Range	Default	Property
P5-01	FMR function (opencollector output terminal)	0: No output 1: AC drive running	0	☆
P5-02	Relay function 1 (R/A-R/B-R/C)	2: Fault output (stop) 3: Frequency-level detection FDT1 output 4: Frequency reached 5: Zero-speed running (no output at stop) 6: Motor overload pre-warning 7: AC drive overload pre-warning 8: Set count value reached 9: Designated count value reached 10: Length reached 11: PLC cycle complete 12: Accumulative running time reached 13: Frequency limited 14: Torque limited	2	☆
P5-04	DO function selection (open-collector output terminal)	15: Ready for RUN 16: VCI larger than CCI 17: Frequency upper limit reached	1	☆
P5-05	Relay function 2 (T/A-T/B-T/C)	18: Frequency lower limit reached (no output at stop) 19: Undervoltage state output 20: Communication setting 21: Reserved 22: Reserved 23: Zero-speed running 2 (having output at stop) 24: Accumulative power-on time reached 25: Frequency level detection FDT2 output 26: Frequency 1 reached 27: Frequency 2 reached 28: Current 1 reached 29: Current 2 reached 30: Timing reached 31: VCI input limit exceeded	0	☆

		32: Load becoming 0 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Software current limit exceeded 37: Frequency lower limit reached (having output at stop) 38: Alarm output 39: Motor overheat warning 40: Current running time reached 41: Fault output (There is no output if it is the coast to stop fault and undervoltage occurs.)		

Function Code	Parameter Name	Setting Range	Default	Property
P5-06	FMP function selection	0: Running frequency 1: Set frequency 2: Output current 3: Output torque (absolute value) 4: Output power 5: Output voltage 6: Pulse input 7: VCI 8: CCI 9: Rotary knob setting 10: Length 11: Count value 12: Communication setting 13: Motor rotational speed 14: Output current 15: Output voltage 16: Output torque (actual value)	0	☆
P5-07	AO1 function selection		0	☆
P5-08	AO2 function selection		1	☆
P5-09	Maximum FMP output frequency	0.01–100.00 kHz	50.00 kHz	☆
P5-10	AO1 offset coefficient	-100.0%–100.0%	0.0%	☆
P5-11	AO1 gain	-10.00–10.00	1.00	☆
P5-12	AO2 offset coefficient	-100.0%–100.0%	0.00%	☆

Function Code	Parameter Name	Setting Range	Default	Property
P5-13	AO2 gain	-10.00–10.00	1.00	☆
P5-17	FMR output delay time	0.0–3600.0s	0.0s	☆
P5-18	Relay 1 output delay time	0.0–3600.0s	0.0s	☆
P5-20	DO output delay time	0.0–3600.0s	0.0s	☆
P5-21	Relay 2 output delay time	0.0–3600.0s	0.0s	☆
P5-22	DO valid mode selection	Unit's digit (FMR valid mode) 0: Positive logic 1: Negative logic Ten's digit (Relay 1 valid mode) 0, 1 (same as FMR) Thousand's digit (DO valid mode) 0, 1 (same as FMR) Ten thousand's digit (Relay 2 valid mode) 0, 1 (same as FMR)	00000	☆
P5-23	AO1 output signal selection	0: Voltage signal 1: Current signal	0	★
Group P6: Start/Stop Control				
P6-00	Start mode	0: Direct start 1: Rotational speed tracking restart 2: Pre-excited start (asynchronous motor)	0	☆
P6-01	Rotational speed tracking mode	0: From frequency at stop 1: From zero speed 2: From maximum frequency	0	★
P6-02	Rotational speed tracking speed	1–100	20	☆
P6-03	Startup frequency	0.00–10.00 Hz	0.00 Hz	☆
P6-04	Startup frequency holding time	0.0–100.0s	0.0s	★

Function Code	Parameter Name	Setting Range	Default	Property
P6-05	Startup DC braking current/ Pre-excited current	0%–100%	0%	★
P6-06	Startup DC braking time/ Pre-excited time	0.0–100.0s	0.0s	★
P6-07	Acceleration/Deceleration mode	0: Linear acceleration/ deceleration 1: S-curve acceleration/ deceleration A 2: S-curve acceleration/ deceleration B	0	★
P6-08	Time proportion of S-curve start segment	0.0% to (100.0% – P6-09)	30.0%	★
P6-09	Time proportion of S-curve end segment	0.0% to (100.0% – P6-08)	30.0%	★
P6-10	Stop mode	0: Decelerate to stop 1: Coast to stop	0	☆
P6-11	Initial frequency of stop DC braking	0.00 Hz to maximum frequency	0.00 Hz	☆
P6-12	Waiting time of stop DC braking	0.0–36.0s	0.0s	☆
P6-13	Stop DC braking current	0%–100%	0%	☆
P6-14	Stop DC braking time	0.0–36.0s	0.0s	☆
P6-15	Brake use ratio	0%–100%	100%	☆
Group P7: Operation Panel and Display				
P7-01	QUICK Key function selection	0: QUICK key disabled 1: Switchover between operation panel control and remote command control (terminal or communication) 2: Switchover between forward rotation and reverse rotation 3: Forward JOG 4: Reverse JOG	2	★
P7-02	STOP/RES key function	0: STOP/RES key enabled only in operation panel control 1: STOP/RES key enabled in any operation mode	1	☆

Function Code	Parameter Name	Setting Range	Default	Property
P7-03	LED display running parameters 1	0000–FFFF Bit00: Running frequency 1 (Hz) Bit01: Set frequency (Hz) Bit02: Bus voltage (V) Bit03: Output voltage (V) Bit04: Output current (A) Bit05: Output power (kW) Bit06: Output torque (%) Bit07: DI input status Bit08: DO output status Bit09: VCI voltage (V) Bit10: CCI voltage (V) Bit12: Count value Bit13: Length value Bit14: Load speed display Bit15: PID setting	1F	☆
P7-05	LED display stop parameters	0000–FFFF Bit00: Set frequency (Hz) Bit01: Bus voltage (V) Bit02: DI input status Bit03: DO output status Bit04: VCI voltage (V) Bit05: CCI voltage (V) Bit07: Count value Bit08: Length value Bit09: PLC stage Bit10: Load speed Bit11: PID setting Bit12: Pulse setting frequency (kHz)	33	☆

Function Code	Parameter Name	Setting Range	Default	Property
P7-06	Load speed display coefficient	0.0001–6.5000	1.0000	☆
P7-07	Heatsink temperature of inverter module	0.0–100.0°C	-	●
P7-08	Temporary software version	-	-	●
P7-09	Accumulative running time	0–65535 h	-	●
P7-10	Product number	-	-	●
P7-11	Software version	-	-	●
P7-12	Number of decimal places for load speed display	0: 0 decimal place 1: 1 decimal place 2: 2 decimal places 3: 3 decimal places	1	☆
P7-13	Accumulative power-on time	0–65535 h	-	●
P7-14	Accumulative power consumption	0–65535 kWh	-	●
Group P8: Auxiliary Functions				
P8-00	JOG running frequency	0.00 Hz to maximum frequency	2.00 Hz	☆
P8-01	JOG acceleration time	0.0–6500.0s	20.0s	☆
P8-02	JOG deceleration time	0.0–6500.0s	20.0s	☆
P8-03	Acceleration time 2	0.0–6500.0s	Model dependent	☆
P8-04	Deceleration time 2	0.0–6500.0s	Model dependent	☆
P8-05	Acceleration time 3	0.0–6500.0s	Model dependent	☆
P8-06	Deceleration time 3	0.0–6500.0s	Model dependent	☆
P8-07	Acceleration time 4	0.0–500.0s	Model dependent	☆
P8-08	Deceleration time 4	0.0–6500.0s	Model dependent	☆
P8-09	Jump frequency 1	0.00 Hz to maximum frequency	Model dependent	☆
P8-10	Jump frequency 2	0.00 Hz to maximum frequency	0.00 Hz	☆

Function Code	Parameter Name	Setting Range	Default	Property
P8-11	Frequency jump amplitude	0.00 Hz to maximum frequency	0.00 Hz	☆
P8-12	Forward/Reverse rotation dead-zone time	0.0–3000.0s	0.0s	☆
P8-13	Reverse control	0: Enabled 1: Disabled	0	☆
P8-14	Running mode when set frequency lower than frequency lower limit	0: Run at frequency lower limit 1: Stop 2: Run at zero speed	0	☆
P8-15	Droop control	0.00–10.00 Hz	0.00 Hz	☆
P8-16	Accumulative power-on time threshold	0–65000 h	0 h	☆
P8-17	Accumulative running time threshold	0–65000 h	0 h	☆
P8-18	Startup protection	0: No 1: Yes	0	☆
P8-19	Frequency detection value (FDT1)	0.00 Hz to maximum frequency	50.00 Hz	☆
P8-20	Frequency detection hysteresis (FDT hysteresis 1)	0.0%–100.0% (FDT1 level)	5.0%	☆
P8-21	Detection range of frequency reached	0.00–100% (maximum frequency)	0.0%	☆
P8-22	Jump frequency during acceleration/deceleration	0: Disabled1: Enabled	0	☆
P8-25	Frequency switchover point between acceleration time 1 and acceleration time 2	0.00 Hz to maximum frequency	0.00 Hz	☆
P8-26	Frequency switchover point between deceleration time 1 and deceleration time 2	0.00 to maximum frequency	0.00 Hz	☆
P8-27	Terminal JOG preferred	0: Disabled1: Enabled	0	☆
P8-28	Frequency detection value (FDT2)	0.00 to maximum frequency	50.00 Hz	☆
P8-29	Frequency detection hysteresis (FDT hysteresis 2)	0.0%–100.0% (FDT2 level)	5.0%	☆

Function Code	Parameter Name	Setting Range	Default	Property
P8-30	Any frequency reaching detection value 1	0.00 Hz to maximum frequency	50.00 Hz	☆
P8-31	Any frequency reaching detection amplitude 1	0.0%–100.0% (maximum frequency)	0.0%	☆
P8-32	Any frequency reaching detection value 2	0.00 Hz to maximum frequency	50.00 Hz	☆
P8-33	Any frequency reaching detection amplitude 2	0.0%–100.0% (maximum frequency)	0.0%	☆
P8-34	Zero current detection level	0.0%–300.0% (rated motor current)	5.0%	☆
P8-35	Zero current detection delay time	0.00–600.00s	0.10s	☆
P8-36	Output overcurrent threshold	0.0% (no detection) 0.1%–300.0% (rated motor current)	200.0%	☆
P8-37	Output overcurrent detection delay time	0.00–600.00s	0.00s	☆
P8-38	Any current reaching 1	0.0%–300.0% (rated motor current)	100.0%	☆
P8-39	Any current reaching 1 amplitude	0.0%–300.0% (rated motor current)	0.0%	☆
P8-40	Any current reaching 2	0.0%–300.0% (rated motor current)	100.0%	☆
P8-41	Any current reaching 2 amplitude	0.0%–300.0% (rated motor current)	0.0%	☆
P8-42	Timing function	0: Disabled 1: Enabled	0	☆
P8-43	Timing duration source	0: P8-44 1: VCI 2: CCI 3: Rotary knob setting (100% of analog input corresponds to the value of P8-44)	0	☆
P8-44	Timing duration	0.0–6500.0 min	0.0 min	☆
P8-45	VCI input voltage lower limit	0.00 V to P8-46	3.10 V	☆
P8-46	VCI input voltage upper limit	P8-45 to 10.00 V	6.80 V	☆

Function Code	Parameter Name	Setting Range	Default	Property
P8-47	Module temperature threshold	0–100°C	75°C	☆
P8-48	Cooling fan control	0: Fan working during running 1: Fan working continuously	0	☆
P8-49	Wakeup frequency	Dormant frequency (P8-51) to maximum frequency (P0-10)	0.00 Hz	☆
P8-50	Wakeup delay time	0.0–6500.0s	0.0s	☆
P8-51	Dormant frequency	0.00 Hz to wakeup frequency (P8-49)	0.00 Hz	☆
P8-52	Dormant delay time	0.0–6500.0s	0.0s	☆
P8-53	Current running time reached	0.0–6500.0 min	0.0 min	☆
P8-54	Output power correction coefficient	0.00%–200 .0%	100.0%	☆
Group P9: Fault and Protection				
P9-00	Motor overload protection selection	0: Disabled 1: Enabled	1	☆
P9-01	Motor overload protection gain	0.20–10.00	1.00	☆
P9-02	Motor overload warning coefficient	50%–100%	80%	☆
P9-03	Overvoltage stall gain	0 (no stall overvoltage)–100	30	☆
P9-04	Overvoltage stall protective voltage	120%–150%	130%	☆
P9-05	Overcurrent stall gain	0–100	20	☆
P9-06	Overcurrent stall protective current	100%–200%	150%	☆
P9-07	Short-circuit to ground upon power-on	0: Disabled 1: Enabled	1	☆
P9-09	Fault auto reset times	0–20	0	☆
P9-10	DO action during fault auto reset	0: Not act 1: Act	0	☆

Function Code	Parameter Name	Setting Range	Default	Property
P9-11	Time interval of fault auto reset	0.1s–100.0s	1.0s	☆
P9-12	Input phase loss protection/ contactor energizing protection selection	Unit's digit: Input phase loss protection Ten's digit: Contactor energizing protection 0: Disabled 1: Enabled	00	☆
P9-13	Output phase loss protection selection	0: Disabled 1: Enabled	1	☆
P9-14	1st fault type	0: No fault 1: Reserved 2: Overcurrent during acceleration 3: Overcurrent during deceleration 4: Overcurrent at constant speed 5: Overvoltage during acceleration 6: Overvoltage during deceleration 7: Overvoltage at constant speed 8: Buffer resistance overload 9: Undervoltage 10: AC drive overload 11: Motor overload 12:Power input phase loss 13: Power output phase loss 14: Module overheat 15: External equipment fault 16: Communication fault 17: Contactor fault 18: Current detection fault 19: Motor auto-tuning fault 20: Encoder/PG card fault 21: EEPROM read-write fault 22: AC drive hardware fault 23: Short circuit to ground 24: Reserved 25: Reserved 26: Accumulative running time	-	●

		reached 27: User-defined fault 1 28: User-defined fault 2 29: Accumulative power-on time reached 30: Load becoming 0 31: PID feedback lost during running 40: With-wave current limit fault 41: Motor switchover fault during running 42: Too large speed deviation 43: Motor over-speed 45: Motor overheat 51: Initial position fault		
P9-15	2nd fault type		-	●
P9-16	3rd (latest) fault type		-	●

Function Code	Parameter Name	Setting Range	Default	Property
P9-17	Frequency upon 3rd fault	-	-	●
P9-18	Current upon 3rd fault	-	-	●
P9-19	Bus voltage upon 3rd fault	-	-	●
P9-20	DI status upon 3rd fault	-	-	●
P9-21	Output terminal status upon 3rd fault	-	-	●
P9-22	AC drive status upon 3rd fault	-	-	●
P9-23	Power-on time upon 3rd fault	-	-	●
P9-24	Running time upon 3rd fault	-	-	●
P9-27	Frequency upon 2nd fault	-	-	●
P9-28	Current upon 2nd fault	-	-	●
P9-29	Bus voltage upon 2nd fault	-	-	●
P9-30	DI status upon 2nd fault	-	-	●
P9-31	Output terminal status upon 2nd fault	-	-	●
P9-32	Frequency upon 2nd fault	-	-	●
P9-33	Current upon 2nd fault	-	-	●
P9-34	Bus voltage upon 2nd fault	-	-	●
P9-37	DI status upon 1st fault	-	-	●
P9-38	Output terminal status upon 1st fault	-	-	●
P9-39	Frequency upon 1st fault	-	-	●
P9-40	Current upon 1st fault	-	-	●
P9-41	Bus voltage upon 3rd fault	-	-	●
P9-42	DI status upon 1st fault	-	-	●
P9-43	Output terminal status upon 1st fault	-	-	●
P9-44	Frequency upon 1st fault	-	-	●

Function Code	Parameter Name	Setting Range	Default	Property
P9-47	Fault protection action selection 1	Unit's digit (Motor overload, E-11) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Ten's digit (Power input phase loss, E-12) Same as unit's digit Hundred's digit (Power output phase loss, E-13) Same as unit's digit Thousand's digit (External equipment fault, E-15) Same as unit's digit Ten thousand's digit (Communication fault, E-16) Same as unit's digit	00000	☆
P9-48	Fault protection action selection 2	Unit's digit (Encoder fault, E-20) 0: Coast to stop 1: Switch over to V/F control, stop according to the stop mode 2: Switch over to V/F control, continue to run Ten's digit (EEPROM read-write fault, E-21) 0: Coast to stop 1: Stop according to the stop mode	00000	☆
P9-48	Fault protection action selection 2	Hundred's digit: reserved Thousand's digit (Motor overheat, E-25) Same as unit's digit in P9-47 Ten thousand's digit (Accumulative running time reached) Same as unit's digit in P9-47	00000	☆

Function Code	Parameter Name	Setting Range	Default	Property
P9-49	Fault protection action selection 3	Unit's digit (User-defined fault 1, E-27) Same as unit's digit in P9-47 Ten's digit (User-defined fault 2, E-28) Same as unit's digit in P9-47 Hundred's digit (Accumulative power-on time reached, E-29) Same as unit's digit in P9-47 Thousand's digit (Load becoming 0, E-30) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run at 7% of rated motor frequency and resume to the set frequency if the load recovers Ten thousand's digit (PID feedback lost during running, E-31) Same as unit's digit in P9-47	00000	☆
P9-50	Fault protection action selection 4	Unit's digit (Too large speed deviation, E-42) Same as unit's digit in P9-47 Ten's digit (Motor over-speed, E-43) Same as unit's digit in P9-47 Hundred's digit (Initial position fault, E-51) Same as unit's digit in P9-47 Thousand's digit (Speed feedback fault, E-52) Same as unit's digit in P9-47 Ten thousand's digit: Reserved	00000	☆
P9-54	Frequency selection for continuing to run upon fault	0: Current running frequency 1: Set frequency 2: Frequency upper limit 3: Frequency lower limit 4: Backup frequency upon abnormality	0	☆

Function Code	Parameter Name	Setting Range	Default	Property
P9-55	Backup frequency upon abnormality	0.0%–100.0% (maximum frequency)	100.0%	☆
P9-56	Type of motor temperature sensor	0: No temperature sensor 1: PT100 2: PT1000	1	☆
P9-57	Motor overheat protection threshold	0–200°C	110°C	☆
P9-58	Motor overheat warning threshold	0–200°C	90°C	☆
P9-59	Action selection at instantaneous power failure	0: Invalid 1: Decelerate 2: Decelerate to stop	0	☆
P9-60	Action pause judging voltage at instantaneous power failure	80.0%–100.0%	85.0%	☆
P9-61	Voltage rally judging time at instantaneous power failure	0.00–100.00s	0.50s	☆
P9-62	Action judging voltage at instantaneous power failure	60.0%–100.0% (standard bus voltage)	80.0%	☆
P9-63	Protection upon load becoming 0	0: Disabled 1: Enabled	0	☆
P9-64	Detection level of load becoming 0	0.0%–100.0% (rated motor current)	10.0%	☆
P9-65	Detection time of load becoming 0	0.0–60.0s	1.0s	☆
P9-67	Over-speed detection value	0.0%–50.0% (maximum frequency)	20.0%	☆
P9-68	Over-speed detection time	0.0–60.0s	1.0s	☆
P9-69	Detection value of too large speed deviation	0.0%–50.0% (maximum frequency)	20.0%	☆
P9-70	Detection time of too large speed deviation	0.0–60.0s	5.0s	☆

Function Code	Parameter Name	Setting Range	Default	Property
Group PA: Process Control PID Function				
PA-00	PID setting source	0: PA-01 1: VCI 2: CCI 3: Rotary knob setting 4: Pulse setting (DI5) 5: Communication setting 6: Multi-reference	0	☆
PA-01	PID digital setting	0.0%–100.0%	50.0%	☆
PA-02	PID feedback source	0: VCI 1: CCI 2: Rotary knob setting 3: VCI – CCI 4: Pulse setting (HDI) 5: Communication setting 6: VCI + CCI 7: MAX (|VCI|, |CCI|) 8: MIN (|VCI|, |CCI|)	0	☆
PA-03	PID action direction	0: Forward action 1: Reverse action	0	☆
PA-04	PID setting feedback range	0–65535	1000	☆
PA-05	Proportional gain Kp1	0.0–100.0	20.0	☆
PA-06	Integral time Ti1	0.01–10.00s	2.00s	☆
PA-07	Differential time Td1	0.00–10.000	0.000s	☆
PA-08	Cut-off frequency of PID reverse rotation	0.00 to maximum frequency	0 Hz	☆
PA-09	PID deviation limit	0.0%–100.0%	0.0%	☆
PA-10	PID differential limit	0.00%–100.00%	0.10%	☆
PA-11	PID setting change time	0.00–650.00s	0.00s	☆
PA-12	PID feedback filter time	0.00–60.00s	0.00s	☆
PA-13	PID output filter time	0.00–60.00s	0.00s	☆
PA-14	Reserved	-	-	☆

Function Code	Parameter Name	Setting Range	Default	Property
PA-15	Proportional gain Kp2	0.0–100.0	20.0	☆
PA-16	Integral time Ti2	0.01–10.00s	2.00s	☆
PA-17	Differential time Td2	0.000–10.000s	0.000s	☆
PA-18	PID parameter switchover condition	0: No switchover 1: Switchover via DI 2: Automatic switchover based on deviation	0	☆
PA-19	PID parameter switchover deviation 1	0.0% to PA-20	20.0%	☆
PA-20	PID parameter switchover deviation 2	PA-19 to 100.0%	80.0%	☆
PA-21	PID initial value	0.0%–100.0%	0.0%	☆
PA-22	PID initial value holding time	0.00–650.00s	0.00s	☆
PA-23	Maximum deviation between two PID outputs in forward direction	0.00%–100.00%	1.00%	☆
PA-24	Maximum deviation between two PID outputs in reverse direction	0.00%–100.00%	1.00%	☆
PA-25	PID integral property	Unit's digit (Integral separated) 0: Invalid 1: Valid Ten's digit (Whether to stop integral operation when the output reaches the limit) 0: Continue integral operation 1: Stop integral operation	00	☆
PA-26	Detection value of PID feedback loss	0.0%: Not judging feedback loss 0.1%–100.0%	0.0%	☆
PA-27	Detection time of PID feedback loss	0.0–20.0s	0.0s	☆
PA-28	PID operation at stop	0: No PID operation at stop 1: PID operation at stop	0	☆

Function Code	Parameter Name	Setting Range	Default	Property
Group PB: Swing Frequency, Fixed Length and Count				
PB-00	Swing frequency setting mode	0: Relative to the central frequency 1: Relative to the maximum frequency	0	☆
PB-01	Swing frequency amplitude	0.0%–100.0%	0.0%	☆
PB-02	Jump frequency amplitude	0.0%–50.0%	0.0%	☆
PB-03	Swing frequency cycle	0.0–3000.0s	10.0s	☆
PB-04	Triangular wave rising time coefficient	0.0%–100.0%	50.0%	☆
PB-05	Set length	0–65535 m	1000 m	☆
PB-06	Actual length	0–65535 m	0 m	☆
PB-07	Number of pulses per meter	0.1–6553.5	100.0	☆
PB-08	Set count value	1–65535	1000	☆
PB-09	Designated count value	1–65535	1000	☆
Group PC: Multi-Reference and Simple PLC Function				
PC-00	Reference 0	-100.0%–100.0%	0.0%	☆
PC-01	Reference 1	-100.0%–100.0%	0.0%	☆
PC-02	Reference 2	-100.0%–100.0%	0.0%	☆
PC-03	Reference 3	-100.0%–100.0%	0.0%	☆
PC-04	Reference 4	-100.0%–100.0%	0.0%	☆
PC-05	Reference 5	-100.0%–100.0%	0.0%	☆
PC-06	Reference 6	-100.0%–100.0%	0.0%	☆
PC-07	Reference 7	-100.0%–100.0%	0.0%	☆
PC-08	Reference 8	-100.0%–100.0%	0.0%	☆
PC-09	Reference 9	-100.0%–100.0%	0.0%	☆
PC-10	Reference 10	-100.0%–100.0%	0.0%	☆
PC-11	Reference 11	-100.0%–100.0%	0.0%	☆
PC-12	Reference 12	-100.0%–100.0%	0.0%	☆

Function Code	Parameter Name	Setting Range	Default	Property
PC-13	Reference 13	-100.0%–100.0%	0.0%	☆
PC-14	Reference 14	-100.0%–100.0%	0.0%	☆
PC-15	Reference 15	-100.0%–100.0%	0.0%	☆
PC-16	Simple PLC running mode	0: Stop after the AC drive runs one cycle 1: Keep final values after the AC drive runs one cycle 2: Repeat after the AC drive runs one cycle	0	☆
PC-17	Simple PLC retentive selection	Unit's digit (Retentive upon power failure) 0: No 1: Yes Ten's digit (Retentive upon stop) 0: No 1: Yes	00	☆
PC-18	Running time of simple PLC reference 0	0.0–6553.5s (h)	0.0s (h)	☆
PC-19	Acceleration/deceleration time of simple PLC reference 0	0–3	0	☆
PC-20	Running time of simple PLC reference 1	0.0–6553.5s (h)	0.0s (h)	☆
PC-21	Acceleration/deceleration time of simple PLC reference 1	0–3	0	☆
PC-22	Running time of simple PLC reference 2	0.0–6553.5s (h)	0.0s (h)	☆
PC-23	Acceleration/deceleration time of simple PLC reference 2	0–3	0	☆
PC-24	Running time of simple PLC reference 3	0.0–6553.5s (h)	0.0s (h)	☆
PC-25	Acceleration/deceleration time of simple PLC reference 3	0–3	0	☆
PC-26	Running time of simple PLC reference 4	0.0–6553.5s (h)	0.0s (h)	☆

Function Code	Parameter Name	Setting Range	Default	Property
PC-27	Acceleration/deceleration time of simple PLC reference 4	0–3	0	☆
PC-28	Running time of simple PLC reference 5	0.0–6553.5s (h)	0.0s (h)	☆
PC-29	Acceleration/deceleration time of simple PLC reference 5	0–3	0	☆
PC-30	Running time of simple PLC reference 6	0.0–6553.5s (h)	0.0s (h)	☆
PC-31	Acceleration/deceleration time of simple PLC reference 6	0–3	0	☆
PC-32	Running time of simple PLC reference 7	0.0–6553.5s (h)	0.0s (h)	☆
PC-33	Acceleration/deceleration time of simple PLC reference 7	0–3	0	☆
PC-34	Running time of simple PLC reference 8	0.0–6553.5s (h)	0.0s (h)	☆
PC-35	Acceleration/deceleration time of simple PLC reference 8	0–3	0	☆
PC-36	Running time of simple PLC reference 9	0.0–6553.5s (h)	0.0s (h)	☆
PC-37	Acceleration/deceleration time of simple PLC reference 9	0–3	0	☆
PC-38	Running time of simple PLC reference 10	0.0–6553.5s (h)	0.0s (h)	☆
PC-39	Acceleration/deceleration time of simple PLC reference 10	0–3	0	☆
PC-40	Running time of simple PLC reference 11	0.0–6553.5s (h)	0.0s (h)	☆
PC-41	Acceleration/deceleration time of simple PLC reference 11	0–3	0	☆
PC-42	Running time of simple PLC reference 12	0.0–6553.5s (h)	0.0s (h)	☆
PC-43	Acceleration/deceleration time of simple PLC reference 12	0–3	0	☆

Function Code	Parameter Name	Setting Range	Default	Property
PC-44	Running time of simple PLC reference 13	0.0–6553.5s (h)	0.0s (h)	☆
PC-45	Acceleration/deceleration time of simple PLC reference 13	0–3	0	☆
PC-46	Running time of simple PLC reference 14	0.0–6553.5s (h)	0.0s (h)	☆
PC-47	Acceleration/deceleration time of simple PLC reference 14	0–3	0	☆
PC-48	Running time of simple PLC reference 15	0.0–6553.5s (h)	0.0s (h)	☆
PC-49	Acceleration/deceleration time of simple PLC reference 15	0–3	0	☆
PC-50	Time unit of simple PLC running	0: s (second)1:h (hour)	0	☆
PC-51	Reference 0 source	0: Set by FC-00 1: VCI 2: CCI 3: Rotary knob setting 4: Pulse setting 5: PID 6: Set by preset frequency (P0-08), modified via terminal UP/DOWN	0	☆

Function Code	Parameter Name	Setting Range	Default	Property
Group PD: Communication Parameters				
PD-00	Baud rate	0: 300 BPs 1: 600 BPs 2: 1200 BPs 3: 2400 BPs 4: 4800 BPs 5: 9600 BPs 6: 19200 BPs 7: 38400 BPs 8: 57600 BPs 9: 115200 BPs	5005	☆
PD-01	Data format	0: No check, data format <8,N,2> 1: Even parity check, data format <8,E,1> 2: Odd Parity check, data format <8,O,1> 3: No check, data format <8,N,1> Valid for Modbus	0	☆
PD-02	Local address	0: Broadcast address 1–247	1	☆
PD-03	Response delay	0–20 ms Valid for Modbus	2 ms	☆
PD-04	Communication timeout	0.0s (invalid) 0.1–60.0s	0.0s	☆
PD-05	Modbus protocol selection and PROFIBUS-DP data format	0: Non-standard Modbus protocol 1: Standard Modbus protocol	30	☆
PD-06	Communication reading current resolution	0: 0.01A 1: 0.1A	0	☆

Function Code	Parameter Name	Setting Range	Default	Property
Group PE: User-defined Parameters				
PE-00	User-defined function code 0	P0-00 to PP-xx	P0-10	☆
PE-01	User-defined function code 1		P0-02	☆
PE-02	User-defined function code 2		P0-03	☆
PE-03	User-defined function code 3		P0-07	☆
PE-04	User-defined function code 4		P0-08	☆
PE-05	User-defined function code 5		P0-17	☆
PE-06	User-defined function code 6		P0-18	☆
PE-07	User-defined function code 7		P3-00	☆
PE-08	User-defined function code 8		P3-01	☆
PE-09	User-defined function code 9		P4-00	☆
PE-10	User-defined function code 10		P4-01	☆
PE-11	User-defined function code 11		P4-02	☆
PE-12	User-defined function code 12		P5-04	☆
PE-13	User-defined function code 13		P5-07	☆
PE-14	User-defined function code 14		P6-00	☆
PE-15	User-defined function code 15		P6-10	☆
PE-16	User-defined function code 16		P0-00	☆
PE-17	User-defined function code 17		P0-00	☆
PE-18	User-defined function code 18		P0-00	☆
PE-19	User-defined function code 19		P0-00	☆
PE-20	User-defined function code 20		P0-00	☆
PE-21	User-defined function code 21		P0-00	☆
PE-22	User-defined function code 22		P0-00	☆
PE-23	User-defined function code 23		P0-00	☆
PE-24	User-defined function code 24		P0-00	☆
PE-25	User-defined function code 25		P0-00	☆
PE-26	User-defined function code 26		P0-00	☆
PE-27	User-defined function code 27		P0-00	☆
PE-28	User-defined function code 28		P0-00	☆
PE-29	User-defined function code 29		P0-00	☆

Function Code	Parameter Name	Setting Range	Default	Property
Group PP: Function Code Management				
PP-00	User password	0–65535	0	☆
PP-01	Restore default settings	0: No operation 01: Restore factory settings except motor parameters 02: Clear records 04: Restore user backup parameters 501: Back up current user parameters	0	★
PP-02	AC drive parameter display property	Unit's digit (Group U display selection) 0: Not display 1: Display Ten's digit (Group A display selection) 0: Not display 1: Display	11	★

Chapter 6 Maintenance and Troubleshooting

6.1 Routine Repair and Maintenance of the LD320

6.1.1 Routine Maintenance

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

Routine maintenance involves checking:

- Whether the motor sounds abnormally during running
- Whether the motor vibrates excessively during running
- Whether the installation environment of the AC drive changes.
- Whether the AC drive's cooling fan works normally
- Whether the AC drive overheats

Routine cleaning involves:

- Keep the AC drive clean all the time.
- Remove the dust, especially metal powder on the surface of the AC drive, to prevent the dust from entering the AC drive.
- Clear the oil stain on the cooling fan of the AC drive.

6.1.2 Periodic Inspection

Perform periodic inspection in places where inspection is difficult.

Periodic inspection involves:

Check and clean the air duct periodically.

Check whether the screws become loose.

Check whether the AC drive is corroded.

Check whether the wiring terminals show signs of arcing;

Main circuit insulation test

Prompt

Before measuring the insulating resistance with megameter (500 VDC megameter recommended), disconnect the main circuit from the AC drive. Do not use the insulating 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.

6.1.3 Replacement of Vulnerable Components

The vulnerable components of the AC drive are cooling fan and filter electrolytic capacitor. Their service life is related to the operating environment and maintenance status. Generally, the service life is shown as follows:

Component	Service Life	Possible Damage Reason	Judging Criteria
Fan	2 to 3 years	• Bearing worn • Blade aging	• Whether there is crack on the blade • Whether there is abnormal vibration noise upon startup
Electrolytic capacitor	4 to 5 years	• Input power supply in poor quality • High ambient temperature • Frequent load jumping • Electrolytic aging	• Whether there is liquid leakage. • Whether the safe valve has projected. • Measure the static capacitance. • Measure the insulating resistance.

6.1.4 Storage of the AC Drive

For storage of the AC drive, pay attention to the following two aspects:

1) Pack the AC drive with the original packing box provided by Inovance.

2) 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.

6.2 Warranty Agreement

1) Free warranty only applies to the AC drive itself.

2) Inovance will provide 18-month warranty (starting from the leave-factory date as indicated on the barcode) for the failure or damage under normal use conditions. If the equipment has been used for over 18 months, reasonable repair expenses will be charged.

3) Reasonable repair expenses will be charged for the damages due to the following causes:

   - Improper operation without following the instructions
   - Fire, flood or abnormal voltage.
   - Using the AC drive for non-recommended function

4) The maintenance fee is charged according to Inovance's uniform standard. If there is an agreement, the agreement prevails.

6.3 Faults and Solutions

The LD320 provides a total of 24 pieces of fault information and protective functions. After a fault occurs, the AC drive implements the protection function, and displays the fault code on the operation panel (if the operation panel is available).

Before contacting Inovance for technical support, you can first determine the fault type, analyze the causes, and perform troubleshooting according to the following tables. If the fault cannot be rectified, contact the agent or Inovance.

E-22 is the AC drive hardware overcurrent or overvoltage signal. In most situations, hardware overvoltage fault causes E-22.

Figure 6-1 Solutions to the faults of the LD320

Fault Name	Display	Possible Causes	Solutions
Inverter unit protection	E-01	1: The output circuit is grounded or short circuited. 2: The connecting cable of the motor is too long. 3: The module overheats. 4: The internal connections become loose. 5:The main control board is faulty. 6: The drive board is faulty. 7: The inverter module is faulty.	1: Eliminate external faults. 2: Install a reactor or an output filter. 3: Check the air filter and the cooling fan. 4: Connect all cables properly. 5: Contact the agent or Inovance.
Overcurrent during acceleration	E-02	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The acceleration time is too short. 4: Manual torque boost or V/F curve is not appropriate. 5: The voltage is too low. 6: The startup operation is performed on the rotating motor. 7: A sudden load is added during acceleration. 8: The AC drive model is of too small power class.	1: Eliminate external faults. 2: Perform the motor autotuning. 3: Increase the acceleration time. 4: Adjust the manual torque boost or V/F curve. 5: Adjust the voltage to normal range. 6: Select rotational speed tracking restart or start the motor after it stops. 7: Remove the added load. 8: Select an AC drive of higher power class.
Overcurrent during deceleration	E-03	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The deceleration time is too short. 4: The voltage is too low. 5: A sudden load is added during deceleration. 6: The braking unit and braking resistor are not installed.	1: Eliminate external faults. 2: Perform the motor autotuning. 3: Increase the deceleration time. 4: Adjust the voltage to normal range. 5: Remove the added load. 6: Install the braking unit and braking resistor.

Overcurrent at constant speed	E-04	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The voltage is too low. 4: A sudden load is added during operation. 5: The AC drive model is of too small power class.	1: Eliminate external faults. 2: Perform the motor autotuning. 3: Adjust the voltage to normal range. 4: Remove the added load. 5: Select an AC drive of higher power class.
Overvoltage during acceleration	E-05	1: The input voltage is too high. 2: An external force drives the motor during acceleration. 3: The acceleration time is too short. 4: The braking unit and braking resistor are not installed.	1: Adjust the voltage to normal range. 2: Cancel the external force or install a braking resistor. 3: Increase the acceleration time. 4: Install the braking unit and braking resistor.
Overvoltage during deceleration	E-06	1: The input voltage is too high. 2: An external force drives the motor during deceleration. 3: The deceleration time is too short. 4: The braking unit and braking resistor are not installed.	1: Adjust the voltage to normal range. 2: Cancel the external force or install the braking resistor. 3: Increase the deceleration time. 4: Install the braking unit and braking resistor.
Overvoltage at constant speed	E-07	1: The input voltage is too high. 2: An external force drives the motor during deceleration.	1: Adjust the voltage to normal range. 2: Cancel the external force or install the braking resistor.
Control power supply fault	E-08	The input voltage is not within the allowable range.	Adjust the input voltage to the allowable range.
Undervoltage	E-09	1: Instantaneous power failure occurs on the input power supply. 2: The AC drive's input voltage is not within the allowable range. 3: The bus voltage is abnormal. 4: The rectifier bridge and buffer resistor are faulty. 5: The drive board is faulty. 6: The main control board is faulty.	1: Reset the fault. 2: Adjust the voltage to normal range. 3: Contact the agent or Inovance.

AC drive overload	E-10	1: The load is too heavy or lockedrotor occurs on the motor. 2: The AC drive model is of too small power class.	1: Reduce the load and check the motor and mechanical condition. 2: Select an AC drive of higher power class.

Motor overload	E-11	1: P9-01 is set improperly. 2: The load is too heavy or lockedrotor occurs on the motor. 3: The AC drive model is of too small power class.	1: Set P9-01 correctly. 2: Reduce the load and check the motor and the mechanical condition. 3: Select an AC drive of higher power class.
Power input phase loss	E-12	1: The three-phase power input is abnormal. 2: The drive board is faulty. 3: The lightening board is faulty. 4: The main control board is faulty.	1: Eliminate external faults. 2: Contact the agent or Inovance.
Power output phase loss	E-13	1: The cable connecting the AC drive and the motor is faulty. 2: The AC drive's three-phase outputs are unbalanced when the motor is running. 3: The drive board is faulty. 4: The module is faulty.	1: Eliminate external faults. 2: Check whether the motor three-phase winding is normal. 3: Contact the agent or Inovance.
Module overheat	E-14	1: The ambient temperature is too high. 2: The air filter is blocked. 3: The fan is damaged. 4: The thermally sensitive resistor of the module is damaged. 5: The inverter module is damaged.	1: Lower the ambient temperature. 2: Clean the air filter. 3: Replace the damaged fan. 4: Replace the damaged thermally sensitive resistor. 5: Replace the inverter module.
External equipment fault	E-15	1: External fault signal is input via DI. 2: External fault signal is input via virtual I/O.	Reset the operation.
Communication fault	E-16	1: The host computer is in abnormal state. 2: The communication cable is faulty. 3:P0-28 is set improperly. 4: The communication parameters in group FD are set improperly.	1: Check the cabling of host computer. 2: Check the communication cabling. 3: Set P0-28 correctly. 4: Set the communication parameters properly.

Contactor fault	E-17	1: The drive board and power supply are faulty. 2: The contactor is faulty.	1: Replace the faulty drive board or power supply board. 2: Replace the faulty contactor.

Current detection fault	E-18	1: The HALL device is faulty. 2: The drive board is faulty.	1: Replace the faulty HALL device. 2: Replace the faulty drive board.
Motor auto-tuning fault	E-19	1: The motor parameters are not set according to the nameplate. 2: The motor auto-tuning times out.	1: Set the motor parameters according to the nameplate properly. 2: Check the cable connecting the AC drive and the motor.
Encoder fault	E-20	1: The encoder type is incorrect. 2: The cable connection of the encoder is incorrect. 3: The encoder is damaged. 4: The PG card is faulty.	1: Set the encoder type correctly based on the actual situation. 2: Eliminate external faults. 3: Replace the damaged encoder. 4: Replace the faulty PG card.
EEPROM read-write fault	E-21	The EEPROM chip is damaged.	Replace the main control board.
AC drive hardware fault	E-22	1: Overvoltage exists. 2: Overcurrent exists.	1: Handle based on overvoltage. 2: Handle based on overcurrent.
Short circuit to ground	E-23	The motor is short circuited to the ground.	Replace the cable or motor.
Accumulative running time reached	E-26	The accumulative running time reaches the setting value.	Clear the record through the parameter initialization function.
User-defined fault 1	E-27	1: The user-defined fault 1 signal is input via DI. 2: User-defined fault 1 signal is input via virtual I/O.	Reset the operation.
User-defined fault 2	E-28	1: The user-defined fault 2 signal is input via DI. 2: The user-defined fault 2 signal is input via virtual I/O.	Reset the operation.

Accumulative power-on time reached	E-29	The accumulative power-on time reaches the setting value.	Clear the record through the parameter initialization function.
Load becoming 0	E-30	The AC drive running current is lower than P9-64.	Check that the load is disconnected or the setting of P9-64 and P9-65 is correct.
PID feedback lost during running	E-31	The PID feedback is lower than the setting of PA-26.	Check the PID feedback signal or set PA-26 to a proper value.
Pulse-by-pulse current limit fault	E-40	1: The load is too heavy or lockedrotor occurs on the motor. 2: The AC drive model is of too small power class.	1: Reduce the load and check the motor and mechanical condition. 2: Select an AC drive of higher power class.
Motor switchover fault during running	E-41	Change the selection of the motor via terminal during running of the AC drive.	Perform motor switchover after the AC drive stops.
Too large speed deviation	E-42	1: The encoder parameters are set incorrectly. 2: The motor auto-tuning is not performed. 3: P9-69 and P9-70 are set incorrectly.	1: Set the encoder parameters properly. 2: Perform the motor autotuning. 3: Set P9-69 and P9-70 correctly based on the actual situation.
Motor over-speed	E-43	1: The encoder parameters are set incorrectly. 2: The motor auto-tuning is not performed.3: P9-69 and P9-70 are set incorrectly.	1: Set the encoder parameters properly. 2: Perform the motor autotuning. 3: Set P9-69 and P9-70 correctly based on the actual situation.
Motor overheat	E-45	1: The cabling of the temperature sensor becomes loose. 2: The motor temperature is too high.	1: Check the temperature sensor cabling and eliminate the cabling fault. 2: Lower the carrier frequency or adopt other heat radiation measures.
Initial position fault	E-51	The motor parameters are not set based on the actual situation.	Check that the motor parameters are set correctly and whether the setting of rated current is too small.

6.4 Common Faults and Solutions

You may come across the following faults during the use of the AC drive. Refer to the following table for simple fault analysis.

Table 9-2 Troubleshooting to common faults of the AC drive

SN	Fault	Possible Causes	Solutions
1	There is no display at power-on.	1: There is no power supply to the AC drive or the power input to the AC drive is too low. 2: The power supply of the switch on the drive board of the AC drive is faulty. 3: The rectifier bridge is damaged. 4: The control board or the operation panel is faulty. 5: The cable connecting the control board and the drive board and the operation panel breaks.	1: Check the power supply. 2: Check the bus voltage. 3: Re-connect the 8-core and 28-core cables. 4: Contact the agent or Inovance for technical support.
2	“HC” is displayed at power-on.	1: The cable between the drive board and the control board is in poor contact. 2: Related components on the control board are damaged. 3: The motor or the motor cable is short circuited to the ground. 4: The HALL device is faulty. 5: The power input to the AC drive is too low.	1: Re-connect the 8-core and 28-core cables. 2: Contact the agent or Inovance for technical support.
3	“E-23” is displayed at power-on.	1: The motor or the motor output cable is short-circuited to the ground. 2: The AC drive is damaged.	1: Measure the insulation of the motor and the output cable with a megger. 2: Contact the agent or Inovance for technical support.
4	The AC drive display is normal upon poweron. But “HC” is displayed after running and stops immediately.	1:The cooling fan is damaged or locked-rotor occurs. 2: The external control terminal cable is short circuited.	1: Replace the damaged fan. 2: Eliminate external fault.
5	E-14 (module overheat) fault is reported frequently.	1: The setting of carrier frequency is too high. 2: The cooling fan is damaged, or the air filter is blocked. 3: Components inside the AC drive are damaged (thermal coupler or others).	1: Reduce the carrier frequency (P0-15). 2: Replace the fan and clean the air filter. 3: Contact the agent or Inovance for technical support.

SN	Fault	Possible Causes	Solutions
6	The motor does not rotate after the AC drive runs.	1: Check the motor and the motor cables. 2: The AC drive parameters are set improperly (motor parameters). 3: The cable between the drive board and the control board is in poor contact. 4: The drive board is faulty.	1: Ensure the cable between the AC drive and the motor is normal. 2: Replace the motor or clear mechanical faults. 3: Check and re-set motor parameters.
7	The DI terminals are disabled.	1: The parameters are set incorrectly. 2: The external signal is incorrect. 3: The jumper bar across OP and +24 V becomes loose. 4: The control board is faulty.	1: Check and reset the parameters in group P4. 2: Re-connect the external signal cables. 3: Re-confirm the jumper bar across OP and +24 V. 4: Contact the agent or Inovance for technical support.
8	The motor speed is always low in CLVC mode.	1: The encoder is faulty. 2: The encoder cable is connected incorrectly or in poor contact. 3: The PG card is faulty. 4: The drive board is faulty.	1: Replace the encoder and ensure the cabling is proper. 2: Replace the PG card. 3: Contact the agent or Inovance for technical support.
9	The AC drive reports overcurrent and overvoltage frequently.	1: The motor parameters are set improperly. 2: The acceleration/deceleration time is improper. 3: The load fluctuates.	1: Re-set motor parameters or re-perform the motor autotuning. 2: Set proper acceleration/ deceleration time. 3: Contact the agent or Inovance for technical support.
10	E-17 is reported upon power-on or running.	The soft startup contactor is not picked up.	1: Check whether the contactor cable is loose. 2: Check whether the contactor is faulty. 3: Check whether 24 V power supply of the contactor is faulty. 4: Contact the agent or Inovance for technical support.
11	8.8.8.8.8 is displayed upon power-on.	Related component on the control board is damaged.	Replace the control board.

LAEG Warranty Agreement

1. The warranty period of the product is 18 months (refer to the barcode on the equipment). During the warranty period, if the product fails or is damaged under the condition of normal use by following the instructions, Inovance will be responsible for free maintenance.
2. Within the warranty period, maintenance will be charged for the damages caused by the following reasons:

   a. Improper use or repair/modification without prior permission

   b. Fire, flood, abnormal voltage, other disasters and secondary disaster

   c. Hardware damage caused by dropping or transportation after procurementd. Improper operation

   e. Trouble out of the equipment (for example, external device)
3. If there is any failure or damage to the product, please correctly fill out the Product Warranty Card in detail.
4. The maintenance fee is charged according to the latest Maintenance Price List of Inovance.
5. The Product Warranty Card is not re-issued. Please keep the card and present it to the maintenance personnel when asking for maintenance.
6. If there is any problem during the service, contact Inovance's agent or Inovance directly.
7. This agreement shall be interpreted by HeFei Jianghuai LAEG Electric Co.,Ltd

LAEG Product Warranty Card

Customer information	Add. of unit:	
	Name of unit: P.C.:	Contact person:
		Tel.:
Product information	Product model:	
	Body barcode (Attach here):	
	Name of agent:	
Failure information	(Maintenance time and content): Maintenance personnel:	

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