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MD510 Series General-Purpose AC Drive

User Guide

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

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Preface

Introduction

The MD510 series AC drive is a general-purpose high-performance current vector AC drive designed to control and regulate the speed of three-phase high-speed permanent magnet motors and drive oil bearing, air bearing, and magnetic bearing of high-speed motors. It is suitable for a variety of automation production equipment in industries such as air separation for oxygen production, aquaculture, sewage treatment, and blower.

This guide describes installation and wiring of the drive, including preparations before installation, unpacking and transportation, mechanical installation, and electrical installation.

Revision History

Date	Version	Description
January 2021	A00	First release.

Access to the Guide

This guide is not delivered with the product. You can obtain the PDF version by the following methods:

- Do keyword search under Service and Support at *http://www.inovance.com*.
- Scan the QR code on the product with your smart phone.
- Scan the QR code below to install the app, where you can search for and download manuals.

Warranty Disclaimer

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is not caused by improper operation of the user. Maintenance will be charged after the warranty period expires.

Within the warranty period, maintenance fee will be charged for the following damage:

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by unintended use of the product

- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

The maintenance is charged according to the latest Price List of Inovance. If otherwise agreed upon, the terms and conditions in the agreement shall prevail.

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Product Models

The following table lists mapping between the product model and structure.

Table –1 Mapping between the product model and structure (three-phase 380 V to 480 V)

Drive Model	Structure
MD510-4T22	T5
MD510-4T30	T6
MD510-4T37	
MD510-4T45	T7
MD510-4T55	
MD510-4T75	T8
MD510-4T90	
MD510-4T110	
MD510-4T132	T9
MD510-4T160	

Fundamental Safety Instructions

Safety Precautions

- This chapter provides essential safety instructions for proper use of the equipment. Before operating the equipment, read through the guide and comprehend all the safety instructions. Failure to observe the safety precautions may result in serious injuries or death of personnel or device damage.
- "Danger", "Warning", and "Caution" items in this guide do not indicate all safety precautions that need to be followed; instead, they just supplement the safety precautions.
- Use this product in an environment that complies with the design specifications. Malfunction or component damage caused by improper usage is not covered by warranty.
- Inovance shall take no responsibility for any personal injuries or property damage caused by improper usage.

Safety Levels and Definitions



Indicates that failure to comply with the notice can result in death or severe personal injuries.



Indicates that failure to comply with the notice may result in death or severe personal injuries.



Indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage.

General Safety Instructions

- Drawings in the guide 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 guide are shown for illustration only and may be different from the product you purchased.
- Operators must take mechanical precautions to protect personal safety and wear protective equipment, such as anti-smashing shoes, safety clothing, safety glasses, protective gloves, and protective sleeves.

Unpacking



- Do not install the equipment if you find damage, rust, or signs of use on the equipment or accessories upon unpacking.
- Do not install the equipment if you find water seepage or missing or damaged components upon unpacking.
- Do not install the equipment if you find the packing list does not conform to the equipment you received.



- Check whether the packing is intact and whether there is damage, water seepage, dampness, and deformation before unpacking.
- Unpack the package by following the unpacking sequence. Do not strike the package violently.
- Check whether there is damage, rust, or injuries on the surface of the equipment and equipment accessories before unpacking.
- Check whether the package contents are consistent with the packing list before unpacking.

Storage and Transportation



- Large-scale or heavy equipment must be transported by qualified professionals using specialized hoisting equipment. Failure to comply may result in personal injury or equipment damage.
- Before hoisting the equipment, ensure the components such as the front cover and terminal block are secured firmly with screws. Loosely-connected components may fall off and result in personal injuries or equipment damage.
- Never stand or stay below the equipment when the equipment is being hoisted by the hoisting equipment.
- When hoisting the equipment with a steel rope, ensure the equipment is hoisted at a constant speed without suffering from vibration or shock. Do not turn the equipment over or let the equipment stay hanging in the air. Failure to comply may result in personal injuries or equipment damage.



- Handle the equipment with care during transportation and mind your steps to prevent personal 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 personal injuries.
- Store and transport the equipment based on the storage and transportation requirements. Failure to comply can result in equipment damage.
- Avoid storing or transporting the equipment in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing the product for more than 3 months. When the product needs to be stored for an extended period, take more strict protection and necessary inspection.
- Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
- Never transport the equipment with other equipment or materials that may harm or have negative impacts on this equipment.

Installation



- The equipment must be operated only by professionals with electrical knowledge. Non-professionals are not allowed.



- Read through the guide and safety instructions before installation.
- Do not install this equipment in places with strong electric or magnetic fields.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply can 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 a closed environment (such as a cabinet or casing), use a cooling device (such as a fan or air conditioner) to cool the environment down to the required temperature. Failure to comply may result in equipment over-temperature or a fire.
- Do not retrofit the equipment.
- Do not fiddle with the bolts used to fix equipment components or the bolts marked in red.
- When this product is installed in a cabinet or terminal equipment, protective measures such as a fireproof enclosure, electrical enclosure, or mechanical enclosure must be provided. The IP rating must meet IEC standards and local laws and regulations.
- Before installing equipments with strong electromagnetic interference, such as a transformer, install a shielding equipment for the equipment to prevent malfunction.
- Install the product on an incombustible object such as metal and do not contact or attach the product with combustible objects. Failure to comply will cause fires.



- Cover the top of the equipment with a piece of cloth or paper during installation. This is 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 on the top of the equipment to prevent over-temperature caused by poor ventilation due to blocked ventilation holes.
- Resonance may occur when the equipment operating at a constant speed executes variable speed operations. In this case, install the vibration-proof rubber under the motor frame or use the vibration suppression function to reduce resonance.

Wiring



- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Before wiring, cut off all the power supplies of the equipment, and wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. Measure the direct voltage of the main circuit and ensure that the voltage is within the safety range. Failure to comply will result in an electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with power ON. Failure to comply will result in an electric shock.
- Check that the equipment is grounded properly. Failure to comply can result in an electric shock.



- Do not connect the input power supply to the output end of the equipment. Failure to comply can result in equipment damage or even a fire.
- When connecting a drive to the motor, check that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor rotation.
- Cables used for wiring must meet cross sectional area and shielding requirements. The shield of the cable must be reliably grounded at one end.
- Fix the terminal screws with the tightening torque specified in the user guide. Improper tightening torque may overheat or damage the connecting part, resulting in a fire.
- After wiring is done, check 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.



- Follow the proper electrostatic discharge (ESD) procedure and wear an anti-static wrist strap to perform wiring. Failure to comply may result in damage to the equipment or to the internal circuit of the product.
- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment for grounding purpose. Failure to comply can result in equipment malfunction.

Power-on



- Before power-on, check that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Check that the power supply meets equipment requirements before power-on to prevent equipment damage or a fire.
- Do not open the cabinet door or protective cover of the product, contact any wiring terminal of the product, or remove any part of the product at power-on. Failure to comply will result in an electric shock.



- Perform a trial run after wiring and parameter setting to ensure the equipment operates safely. Failure to comply may result in personal injuries or equipment damage.
- Before power-on, check that the rated voltage of the equipment is consistent with that of the power supply. If the power supply voltage is used incorrectly, a fire accident may occur.
- Before power-on, check that no one is near the equipment, motor, or machine. Failure to comply may result in death or personal injuries.

Operation



- The equipment must be operated only by professionals. Failure to comply can result in death or personal injury.
- Do not touch any connecting terminals or disassemble any unit or component of the equipment during operation. Failure to comply can result in an electric shock.



- Do not touch the equipment casing, fan, or resistor with bare hands to feel the temperature. Failure to comply may result in personal injuries.
- Prevent metal or other objects from falling into the equipment during operation. Failure to comply may result in a fire or equipment damage.

Maintenance



- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Do not maintain the equipment with power on. Failure to comply can result in an electric shock.
- Before maintenance, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment 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 off. Failure to comply will 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



- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Do not repair the equipment with power on. Failure to comply can result in an electric shock.
- Before inspection and repair, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.



- Submit the repair request according to the 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 death, personal injury or equipment damage.
- When the equipment is faulty or damaged, the troubleshooting and repair work must be performed by professionals that follow the repair instructions, with repair records kept properly.
- Replace quick-wear parts of the equipment according to the replacement instructions.
- Do not use damaged equipment. Failure to comply may result in death, personal injury, or severe equipment damage.
- After the equipment is replaced, check the wiring and set parameters again.

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

Safety Labels

For safe equipment operation and maintenance, comply with the safety labels on the equipment. Do not damage or remove the safety labels. See the following table for descriptions of the safety labels.

Safety Label	Description
	• Read through the safety instructions before operating the equipment. Failure to comply may result in death, personal injuries, or equipment damage. • Do not touch the terminals or remove the cover with power ON or within 10 min after power-off. Failure to comply will result in an electric shock.

1 Product Information

1.1 Nameplate and Model

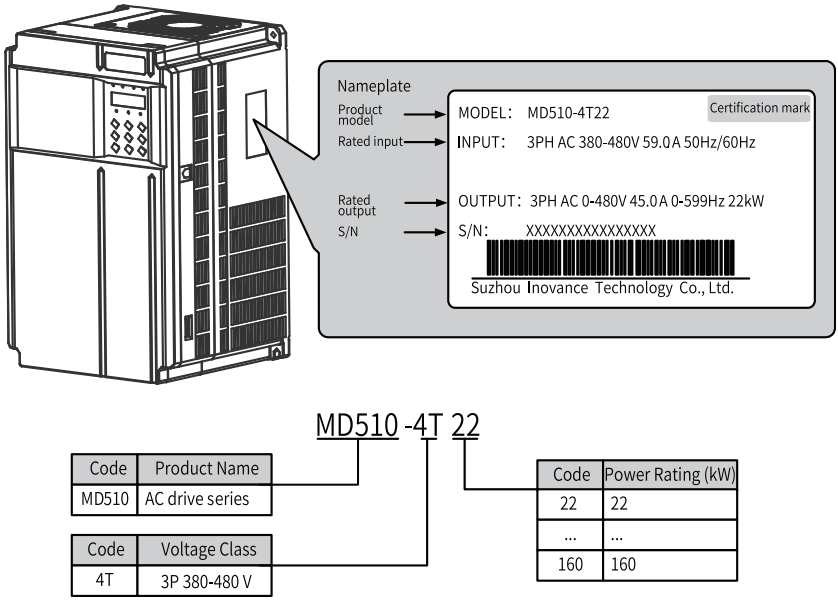


Figure 1-1 Nameplate and naming rules

1.2 System Connection

MD510When the AC drive is used to control high-speed permanent magnet synchronous motors, you must install a variety of electrical components on the input and output sides of the AC drive to ensure system safety and stability. The following figure shows the system composition.

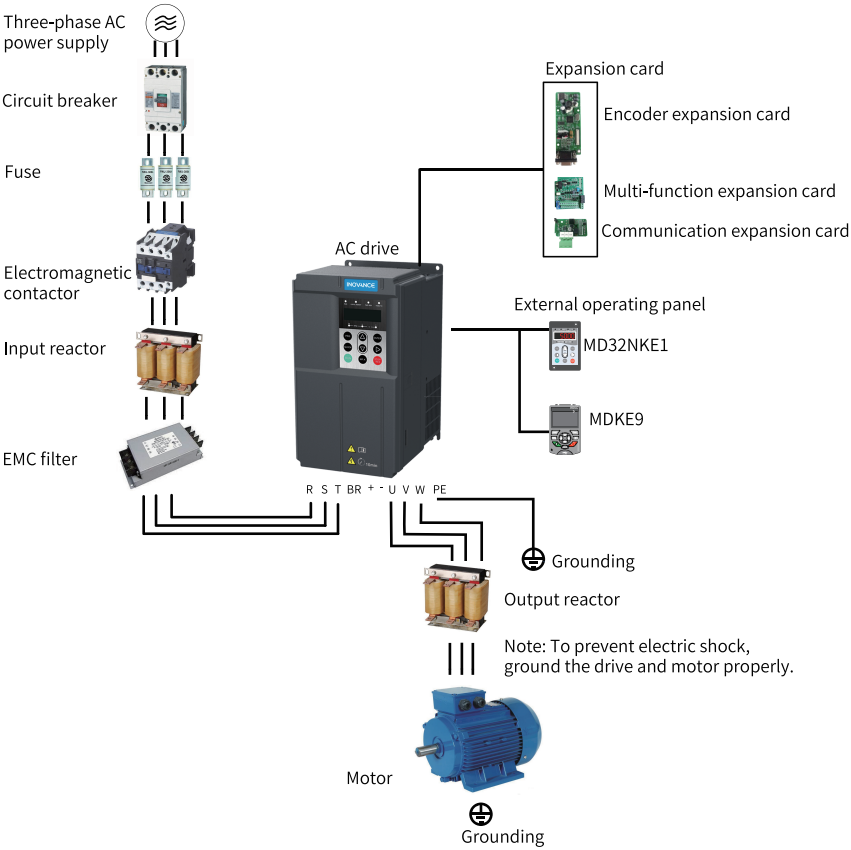


Figure 1-2 MD510System composition

Note

The preceding figure is only for your reference. For details on the peripheral component selection, see the section of "Peripheral Electrical Components".

Table 1–1 MD510Descriptions of peripheral electrical components for the AC drive

Name	Description
Circuit breaker	It is installed between the power supply and the AC drive input side. Circuit breaker for protection against short circuit: When overcurrent occurs on downstream devices, it cuts off the power supply to prevent incidents. Earth leakage circuit breaker (ELCB): The AC drive may generate high-frequency leakage current during running. To prevent electric shock or even a fire, install a proper ELCB based on actual applications.
Fuse	It protects downstream semiconductor components in case of short circuit.
Electromagnetic contactor	It is used to power on or off the AC drive. Do not use the contactor to power on or off the AC drive frequently (time interval ⩾ one hour) or use the contactor to directly start the AC drive.
AC input reactor	It provides the following functions: • Improves the power factor on the input side. • Eliminates harmonics on the input side and prevents other devices from being damaged due to voltage waveform distortion. • Eliminates input current unbalance caused by inter-phase unbalance.
EMC filter	It provides the following functions: • Reduces the conduction and radiation interference generated by the AC drive to external devices. • Decreases conduction interference flowing from the power supply to the AC drive and improves the anti-interference capacity of the AC drive.
Simple filter	It reduces the conduction and radiation interference generated by the AC drive to external devices.
Active front end (AFE) unit	An AFE is an optional unit used to feed the energy generated by the motor during braking back to the power grid. With the AFE installed, the braking unit and braking resistor are not required, which reduces heat emission. Inovance AFE units feature energy saving, low noise, low harmonics pollution, and high power factor.
Output reactor	Generally, the AC drive generates much high-order harmonics on the output side. When a motor is far away from the AC drive, much distributed capacitance exists in the circuit. Certain harmonics may cause resonance in the circuit, which brings the following adverse effects: 1. Degrades the motor insulation performance and damages the motor in the long run. 2. Generates large leakage current and causes frequent AC drive protection trips. The output reactor can protect motor insulation and reduce bearing current.
Magnetic ring and ferrite clamp	Installing the magnetic ring on the input side can suppress the noise in the input power supply system of the drive. When it is installed on the output side, it can reduce the interference generated by the drive to external devices and can reduce the bearing current.
Motor	Use a proper motor.
External operating panel	The external LED operating panel MD32NKE1 and the LCD operating panel MDKE9 are supported.

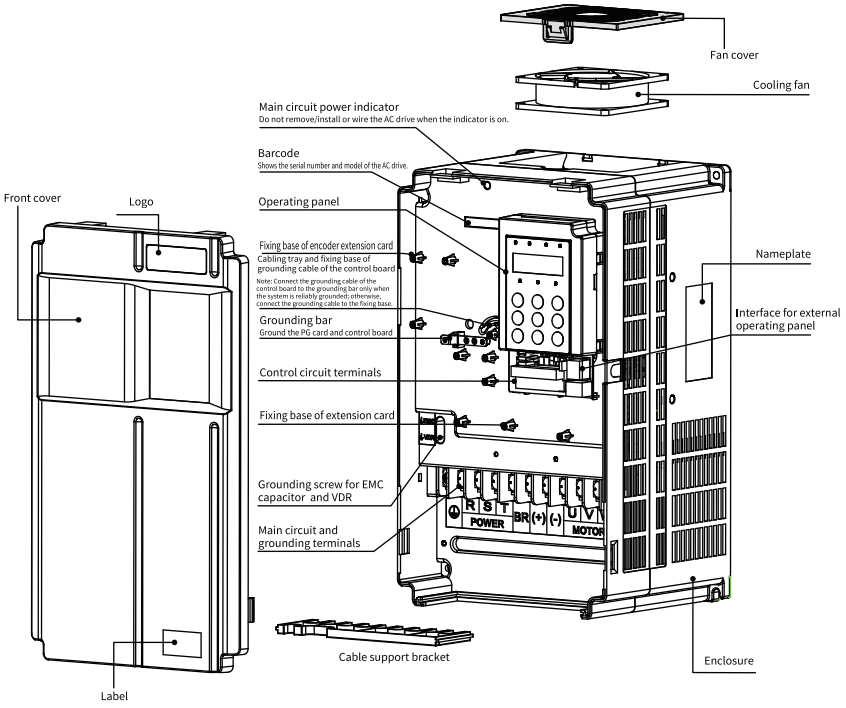
Note

No braking unit is delivered. If braking units are required, select the braking unit MDBUN. For details on how to install and use the MDBUN, see *MDBUN Series Braking Unit User Guide*.

1.3 Components

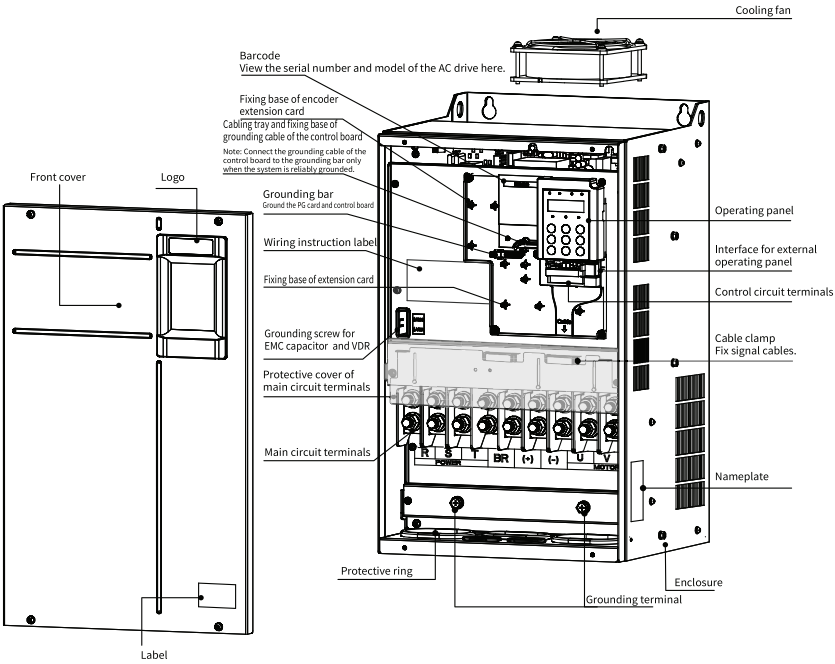
MD510The AC drive has either one of the following housings:

- Plastic structure for T5 to T6 models
- Sheet metal structure for T7 to T9 models



Label		Description
⚠	📖	Caution! Read the user guide before installation and operation.
⚠	10min	Danger! Do not remove the upper cover while the power is on or within 10 minutes after the power is turned off.

Figure 1-3 Components of T5 to T6 models



Label	Description
	Caution! Read the user guide before installation and operation.
10min	Danger! Do not remove the upper cover while the power is on or within 10 minutes after the power is turned off.

Figure 1-4 Components of T7 to T9 models

Note

The quantity and positions of cooling fans vary with AC drive models.

- T7 models have one cooling fan at the top.
- T8 models have two cooling fans at the top.
- The T9 models have two cooling fans at the bottom.

1.4 AC Drive Dimensions

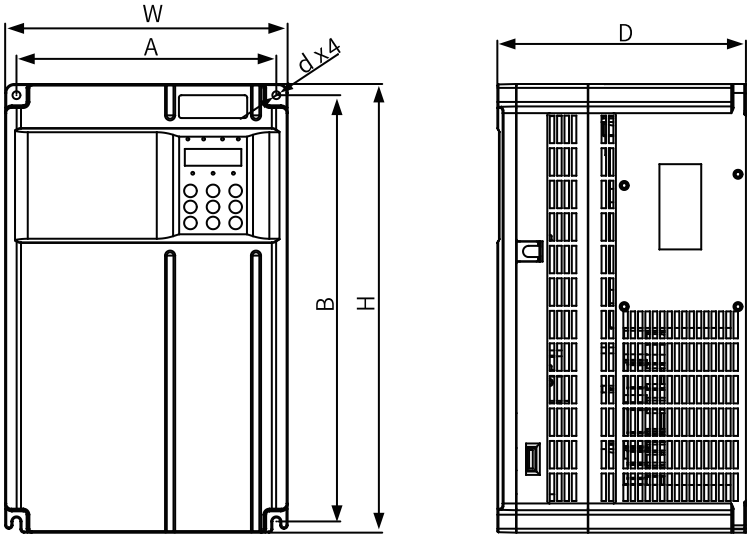


Figure 1-5 Outline dimensions and mounting dimensions of T5 to T6 models

Table 1–2 Outline dimensions and mounting dimensions of T5 to T6 models

Structure	Mounting Hole mm (in.)		Outline Dimension mm (in.)				Mounting Hole mm (in.)	Weight kg (lb)
	A	B	H	H1	W	D		
T5	195 (7.7)	335 (13.2)	350 (13.8)	-	210 (8.3)	192 (7.6)	Ø6 (0.2)	10.0 (22.0)
T6	230 (9.1)	380 (15.0)	400 (15.8)	-	250 (9.9)	220 (8.7)	Ø7 (0.3)	17.5 (38.6)

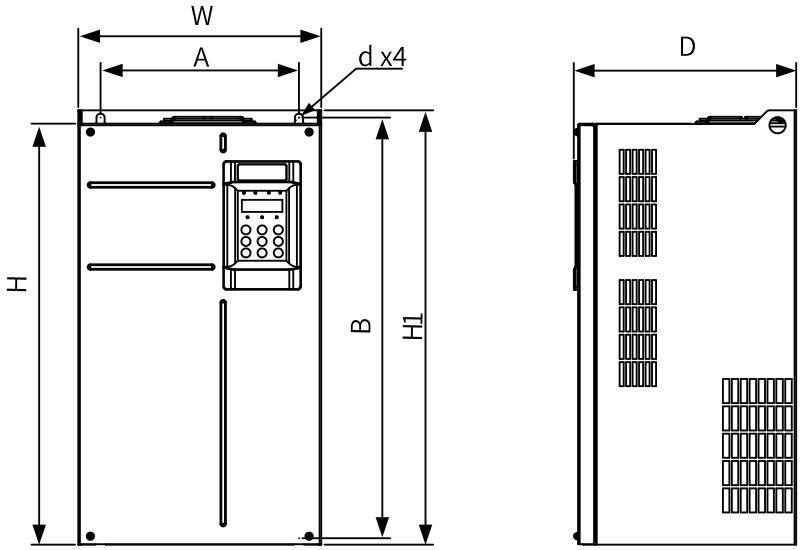


Figure 1-6 Outline dimensions and mounting dimensions of T7 to T9 models

Table 1–3 Outline dimensions and mounting dimensions of T7 to T9 models

Structure	Mounting Hole mm (in.)		Outline Dimension mm (in.)				Mounting Hole mm (in.)	Weight kg (lb)
	A	B	H	H1	W	D		
T7	245 (9.7)	523 (20.6)	525 (20.7)	542 (21.4)	300 (11.8)	275 (10.8)	Ø10 (0.4)	35 (77.2)
T8	270 (10.6)	560 (22.1)	554 (21.8)	580 (22.9)	338 (13.3)	315 (12.4)	Ø10 (0.4)	51.5 (113.5)
T9	320 (12.6)	890 (35.1)	874 (34.4)	915 (36.1)	400 (15.8)	320 (12.6)	Ø10 (0.4)	85 (187.4)

1.5 Electrical Specifications

Table 1–4 Electrical specifications (three-phase 380 V to 480 V)

Item	Specification									
Power (kW)	22	30	37	45	55	75	90	110	132	160
Structure	T5	T6		T7		T8			T9	

Item		Specification									
Output	Applicable motor capacity (kW)	22	30	37	45	55	75	90	110	132	160
	Rated output current (A)	45.0	60.0	75.0	91.0	112.0	150.0	176.0	210.0	253.0	304.0
	Output voltage	Three-phase 0 V to input voltage									
	Maximum output frequency	599 Hz (edited by parameter)									
	Carrier frequency	0.8 kHz to 12.0 kHz (adjusted automatically based on the load characteristics)									
	Overload capacity	60S at 110% of the rated current									
Input	Rated input current (A)	51.3	57.0	69.0	89.0	106.0	139.0	164.0	196.0	240.0	287.0
	Rated voltage and frequency	Three-phase 380 V to 480 V, 50/60 Hz									
	Allowable voltage fluctuation range	-15% to +10% (323 VAC to 528 VAC)									
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz									
	Capacity of power supply (kVA)	47	52	63	81	97	127	150	179	220	263
Heat dissipation design	Thermal design power (kW)	0.782	0.852	1.07	1.33	1.67	2.22	2.53	3.09	4.11	4.96
	Air exhaust volume (CFM)	57.4	118.5	118.5	122.2	122.2	218.6	287.2	354.2	547	627
Overvoltage class		OVCIII									
Pollution degree		PD2									
IP rating		IP20 (open type, applicable to IEC products)									

1.6 Technical Specifications

Item		Technical Specification
Basic functions	Input frequency resolution	Digital setting: 0.01 Hz Analog setting: maximum frequency x 0.05%
	Control mode	Sensorless vector control (SVC), feedback vector control (FVC), voltage/frequency (V/f) control, and PMVVC control
	Start torque	0.25 Hz/150% (SVC); 0 Hz/180% (FVC)
	Speed regulation range	1:200 (SVC); 1:1000 (FVC)
	Speed stability accuracy	±0.5% (SVC) ±0.02% (FVC)
	Torque control accuracy	FVC: ±3% SVC: ±5% (above 5 Hz)
	Torque boost	Automatic torque boost; manual torque boost: 0.1 % to 30.0%
	V/f curve	Four modes: straight-line V/f, multi-point V/f, complete V/f separation, and half V/f separation
	Acceleration/ deceleration curve	Straight-line or S-curve acceleration/deceleration Four groups of acceleration/deceleration time ranging from 0.0 to 6500.0s
	DC braking	Starting frequency of DC braking: 0.00 Hz to the maximum frequency DC braking time: 0.0s to 36.0s. Braking current: 0.0% to 100.0%
	Jog control	Frequency range: 0.00 Hz to 50.00 Hz Acceleration/deceleration time of jog: 0.0s to 6500.0s
	Simple PLC, multi-reference running	The AC drive supports up to 16 speeds by using the built-in PLC function or control terminals.
	Built-in PID	The PID function facilitates the implementation of the closed-loop process control system.
	Automatic voltage regulation (AVR)	When the mains voltage changes, the output voltage keeps constant automatically.
	Overvoltage/ Overcurrent stall control	This function limits the current and voltage automatically during operation to prevent frequent tripping caused by overvoltage/ overcurrent.
	Quick current limit	The function minimizes the occurrence of overcurrent to ensure normal operation of the AC drive.
	Torque limit and control	This function limits the torque during operation to avoid frequent tripping due to overcurrent and achieves torque control in vector control mode.

Item		Technical Specification
Customized functions	Power dip ride-through	Load regenerative energy compensates for voltage reduction during instantaneous power failure, allowing the AC drive to continue operating for a short time.
	Quick current limit	This function prevents frequent overcurrent faults.
	Virtual DI/DO	Five groups of virtual DIs/DOs are supported to implement simple logic control.
	Timing control	Time range: 0.0 minute to 6500.0 minutes
	Motor switchover	Two groups of motor parameters are supported, allowing switchover between two motors.
	Multiple field buses	Six field buses are supported, including Modbus, PROFIBUS DP, CANlink, CANopen, PROFINET, and EtherCAT.
	Multiple encoder types	Differential type, open-collector type, UVW type, and resolver type are supported.
	Powerful software	The software supports operations on drive parameters and the virtual oscilloscope function. You can monitor the internal state of the AC drive through the virtual oscilloscope.
Operation	Operation command source	Operating panel, control terminal, and serial communication port are available, which can be switched over in a variety of ways.
	Main frequency source	The drive supports 10 main frequency reference sources, including digital setting, analog voltage, analog current, pulse setting, and serial communication ports, which can be switched over in a variety of ways.
	Auxiliary frequency source	The drive supports 10 auxiliary frequency reference sources. The auxiliary frequency reference can be used together with the main frequency reference to implement fine adjustment and frequency superposition.
	Input terminal	Standard: Five DIs Three AIs. One supports only voltage input of -10 V to +10 V, and the other two support voltage input of -10 V to +10 V or current input of 0 mA to 20 mA. Expansion: Five DIs
	Output terminal	Standard: One DO Two relay output terminals Two AOs, supporting current output of 0 mA to 20 mA or voltage output of 0 V to 10 V Expansion: One DO One relay output terminal

Item		Technical Specification
Display and operating panel	LED display	The LED displays parameters.
	LCD display	Optional and two languages (Chinese or English) available
	Parameter copy	It allows quick parameter copy through the LCD operating panel (optional).
	Key locking and function selection	The function can be used to lock the keys partially or completely and limit the availability of some keys to prevent accidental operation.
Protection functions	Phase loss protection	Input/output phase loss protection
	Instantaneous overcurrent protection	The AC drive stops when the current exceeds 250% of the rated output current.
	Overvoltage protection	The AC drive stops when the DC voltage of the main circuit is above 820 V.
	Undervoltage protection	The AC drive stops when the DC voltage of the main circuit is lower than 350 V.
	Overtemperature protection	Protection is triggered when the inverter bridge gets overheated.
	Overload protection	The drive stops 60s after operating at 110% of the rated current.
	Overcurrent protection	The AC drive stops when the current exceeds 2.5 times the rated current.
	Short circuit protection	Output phase-to-phase short circuit protection and output phase-to-ground short circuit protection
Environment	Operating location	Indoors and free from direct sunlight, dusts, corrosive gases, combustible gases, oil mists, vapors, water drips, and salty elements
	Altitude	For altitude equal to or below 1000 m, derating is not required. For altitude ranging from 1000 m to 3000 m, derate 1% for every additional 100 m. For altitude above 3000 m, contact Inovance.
	Ambient temperature	–10°C to +50°C. For temperature ranging from 40°C to 50°C, derate 1.5% for every additional 1°C.
	Relative humidity	Less than 95% RH, non-condensing
	Vibration	Below 5.9 m/S^2 (0.6 g)
	Storage temperature	-20°C to +60°C

2 Installation and Wiring

2.1 Installation Site Inspection

2.1.1 Installation Environment

To maximum the product performance and ensure long-term use, install the drive in an environment meeting the following requirements.

Table 2–1 Environmental requirements

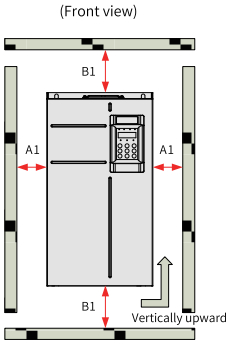
Environment	Condition
Installation location	Indoor
Grid overvoltage	OVC III
Temperature	Installation/Ambient temperature: –10°C to +50°C. When the temperature ranges from –10°C to +40°C, no derating is required. For temperature above 40°C, derate 1.5% for every additional 1°C. Storage/Transportation temperature: -20°C to +60°C. • For better reliability, use the AC drive in places without drastic temperature changes. • When installing the drive into an enclosed environment such as a control cabinet, use a cooling fan or air conditioner to keep the temperature of the inlet air below 50°C. Failure to comply will result in overheat or fire. • Install the AC drive on a flame-retardant surface, with sufficient clearance reserved for heat dissipation. • Take measures to prevent the AC drive from being frozen.
Humidity	< 95% RH, without condensation
Environment	Pollution degree 2 and below Install the drive in a place that meets the following requirements: • Free from direct sunlight, dust, corrosive gas, explosive and inflammable gas, oil mist, vapor, water drop, and salty element • Insusceptible to vibration (away from equipment that may generate strong vibration, such as a punch press) • Free from unwanted objects such as metallic dust, oil, and water that may enter the AC drive • Free from radioactive substances, combustible materials, harmful gases and liquids, and salt corrosion • Away from combustible materials such as wood

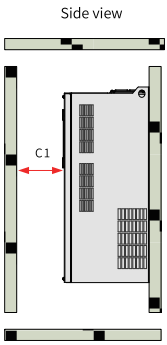
Environment	Condition
Altitude	• 1000 m and below: no derating. • > 1000 m: derate 1% for every additional 100 m Maximum altitude: 3000 m. If the altitude is above 3000 m, contact Inovance.
Vibration resistance	• For transportation in the package: compliant with class 2M3 in EN 60721-3-2 • For installation with the package removed: compliant with ISTA 1H

2.1.2 Installation Clearance

Reserve sufficient clearance according to the power rating of the AC drive.

- Installing one drive



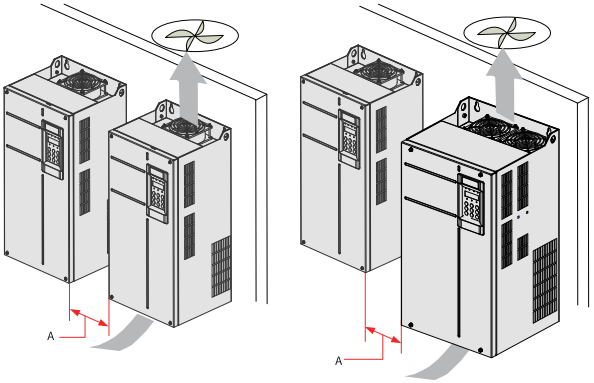


Installation clearance requirements

Power	Clearance (mm)		
22 kW	A1≥10	B1≥200	C1≥40
30 kW to 37 kW	A1≥50	B1≥200	C1≥40
45 kW to 160 kW	A1≥50	B1≥300	C1≥40

Figure 2-1 Clearance for installation of one drive

- Installing multiple drives side by side
  The AC drive dissipates heat from bottom to top. When multiple AC drives are required to work together, install them side by side. Keep their tops level with each other, especially for those of different sizes.



Installation clearance requirements

Power	Clearance (mm)
22 kW	A≥10
30 kW to 37 kW	A≥50
45 kW to 160 kW	A≥50

Figure 2-2 Installing multiple drives side by side

- Dual-row installation
  If one drive needs to be installed above another one, install an air guide plate, as shown in *"Figure 2–3 Dual-row installation" on page 27*. This can prevent the drive in the lower row from heating that in the upper row, causing overheat or overload faults.

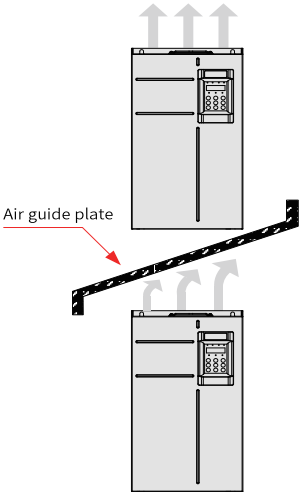


Figure 2-3 Dual-row installation

2.1.3 Installation Direction

MD510Install the AC drive vertically upwards, as shown in the following figure. Do not lie the AC drive on its back or side, or install it in the upside-down direction.

If the AC drive needs to be placed in an upright position, ensure the tilt angle of the place that holds the drive does not exceed 5°. Failure to comply may lead to rollover of the drive due to the heavy weight of the drive (close to 200 kg).

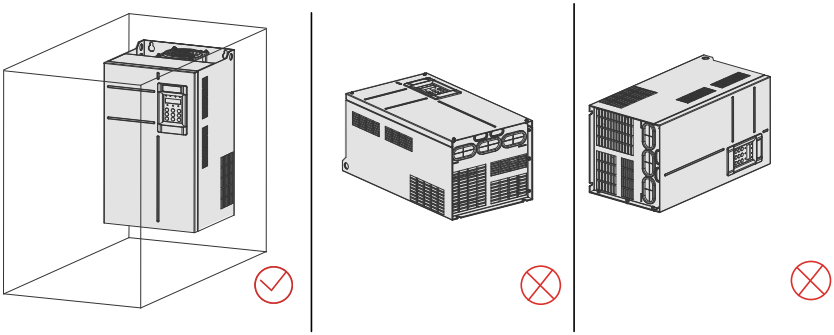


Figure 2-4 Installation direction

2.2 Mechanical Installation

2.2.1 Backplate Mounting

Fix the AC drive with all nuts. Do not fasten only the upper two nuts on the drive. Otherwise, the drive may fall off due to uneven force during long-time running.

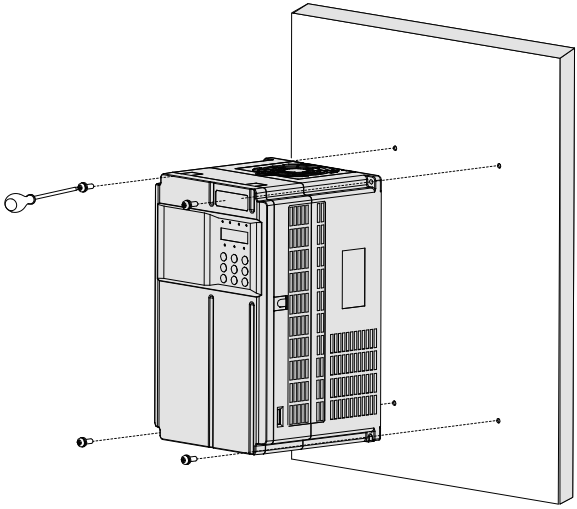


Figure 2-5 Backplate mounting of T5 and T6 models

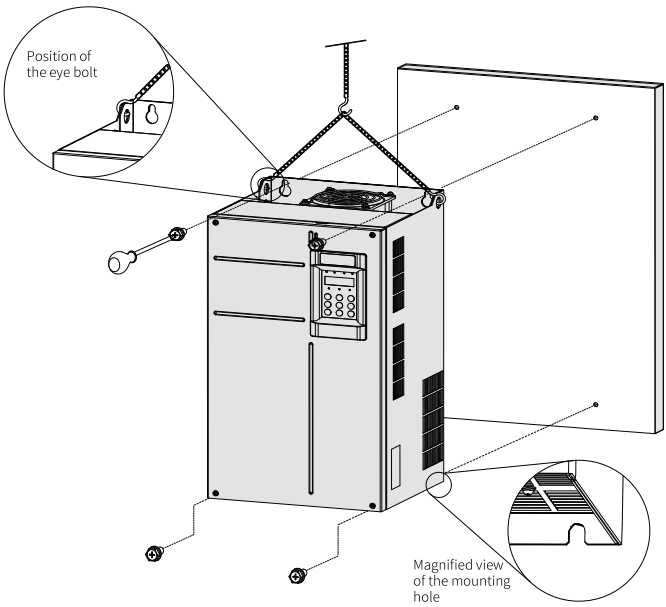
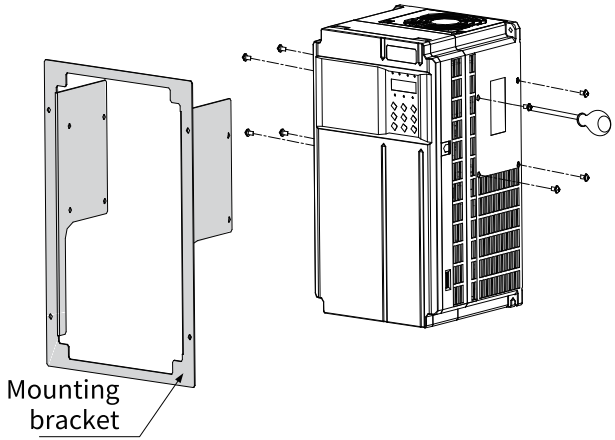


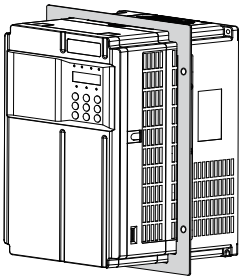
Figure 2-6 Backplate mounting of T7 and T9 models

2.2.2 Through-Hole Mounting

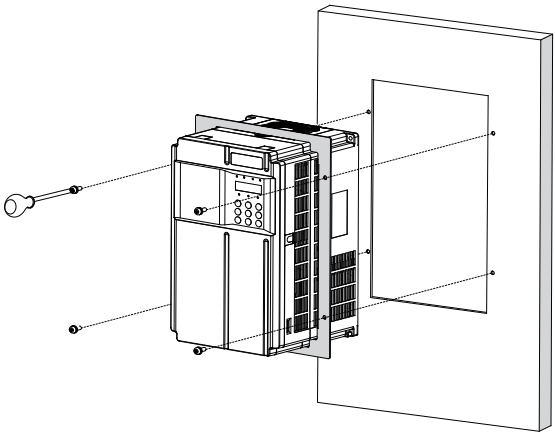
1. T5 to T6 models
   a. Install the AC drive through the mounting bracket, and then fix the screws at both sides of the bracket.



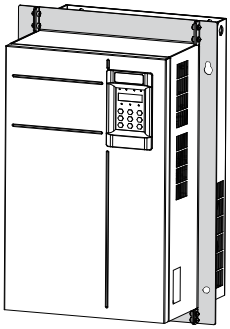
The following figure shows an AC drive with a bracket mounted.



b. Fix the AC drive with the bracket on the backplate of the control cabinet.

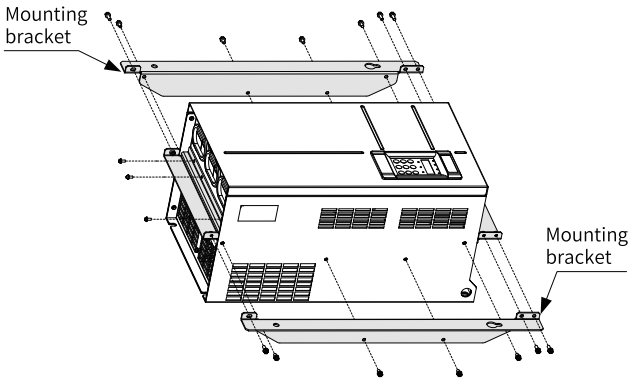


The following figure shows an AC drive with the bracket mounted in the cabinet.

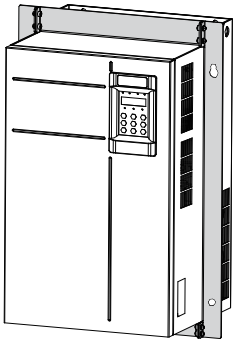


2. T7 to T9 models

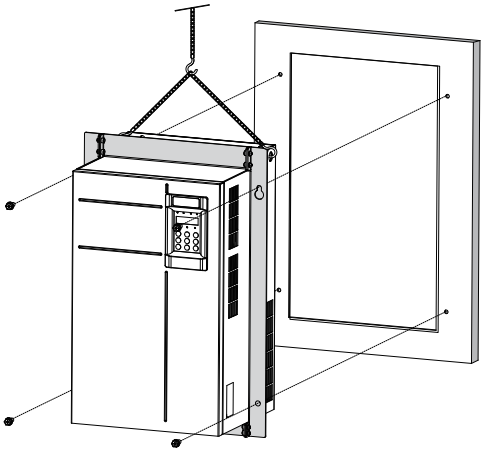
a. Fix the mounting brackets to both sides of the drive.



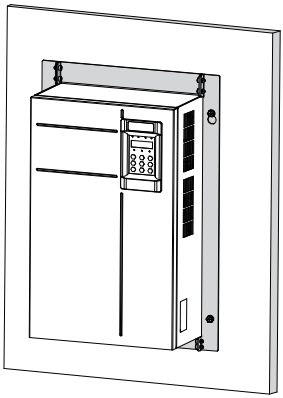
The following figure shows an AC drive with brackets mounted.



b. Fix the drive with brackets to the backplate of the control cabinet.



The following figure shows an AC drive with the bracket mounted in the cabinet.

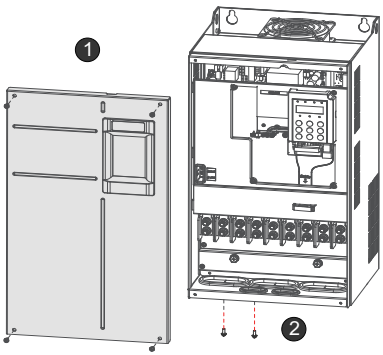
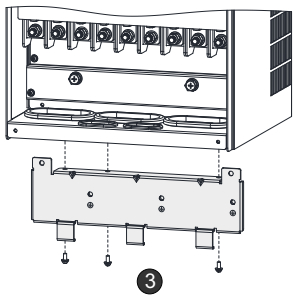


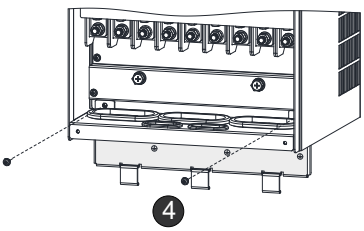
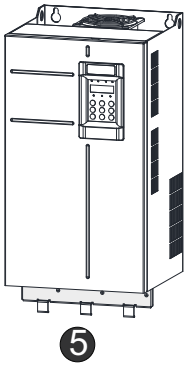
2.2.3 Installing the Grounding Bracket of the Cable Shield

The grounding bracket of cable shield is optional and can be purchased separately (applicable to T9 models and below).

Installation

Table 2–2 Procedure of installing the cable shield grounding bracket

No.	Step	Illustration
1	Remove the cover as shown in ①. Remove the two M4x12 SEMS screws on the air inlet plate, as shown in ②.	
2	Place the grounding bracket of the cable shield on the chassis, and fasten the bracket with three M4x12 SEMS screws at the three positions shown in ③.	

No.	Step	Illustration
3	Tighten two M4x12 SEMS screws at the two positions shown in ④.	
4	Install the cover.	

Wiring

Use shielded cables for motor output cables. Strip the cable to expose the shield, crimp the shield to the wire ferrule slot of the bracket with the wire ferrule, and crimp the lead wire of the shield to the PE terminal, as shown below. The grounding bracket of the cable shield is provided with wire ferrule slots. Cover the exposed shield with the insulation tape above the wire ferrule. The following figure shows the wiring.

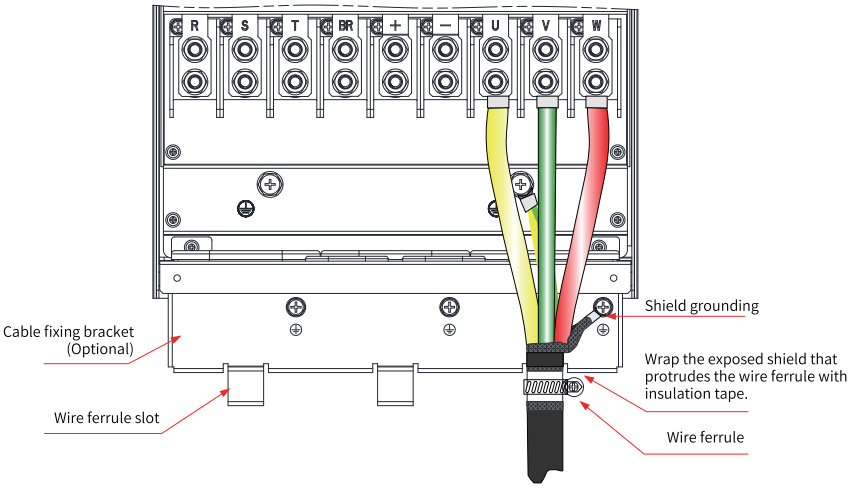


Figure 2-7 Wiring of the cable shield

2.3 Electrical Installation

2.3.1 Electrical Wiring Diagram

The following figure shows the typical electrical wiring.

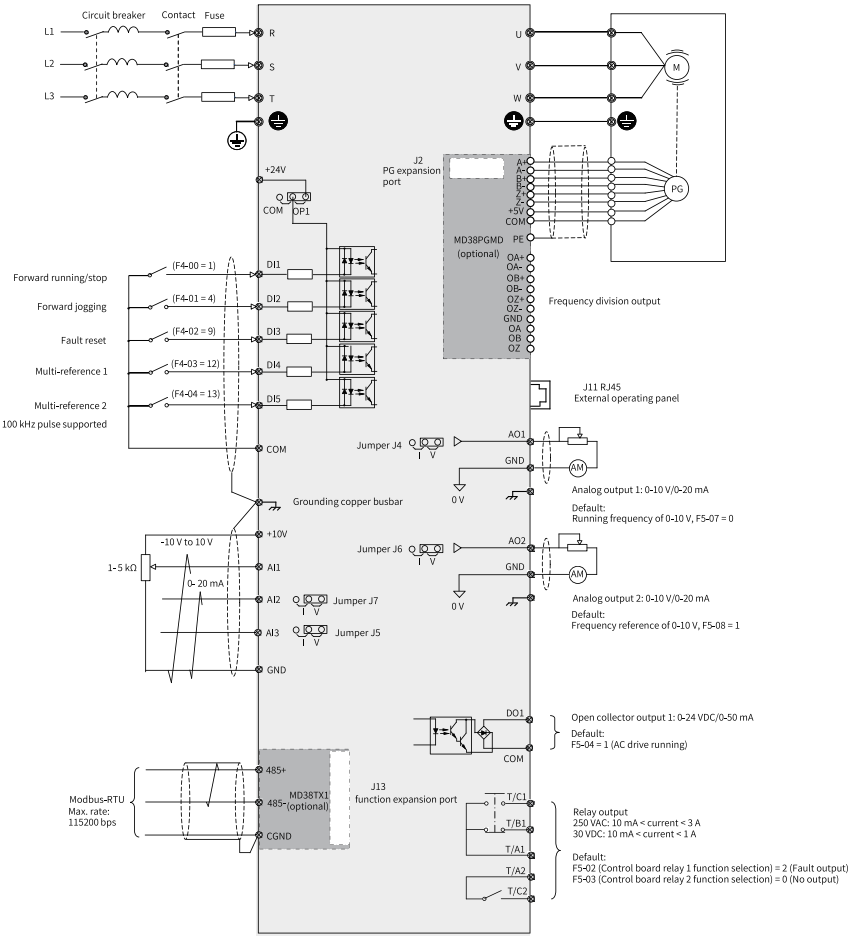


Figure 2-8 Standard electrical wiring

2.3.2 Descriptions of Main Circuit Terminals

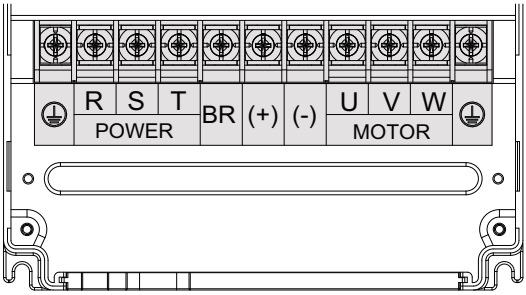


Figure 2-9 Layout of main circuit terminals for T5 to T6 models

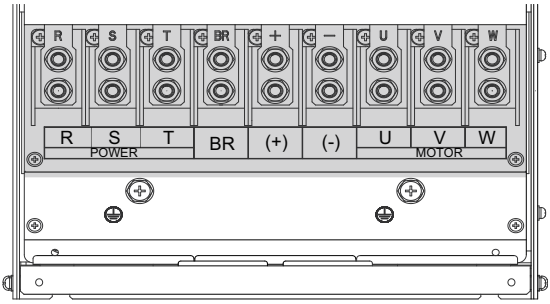


Figure 2-10 Layout of main circuit terminals for T7 to T8 models

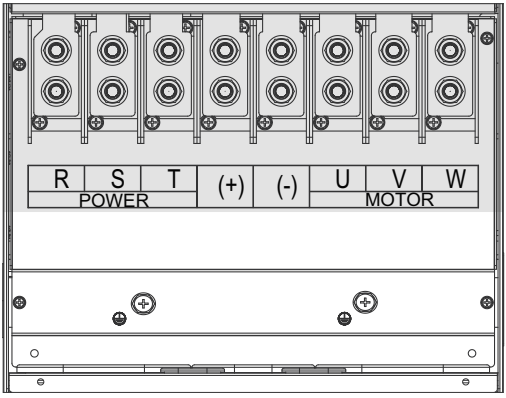


Figure 2-11 Layout of main circuit terminals for T9 models

Table 2–3 Descriptions of main circuit terminals

Terminal Identification	Terminal Name	Function
R, S, T	Three-phase power supply input terminals	The terminals are used to connect the three-phase AC power supply.
(+), (-)	Positive and negative terminals of the DC bus	Common DC busbar input; connected to the external braking unit of T9 models and above.
(+), BR	Braking resistor connection terminals	The terminals are used to connect to the braking resistor of T8 models and below.
U, V, W	Output terminals	The terminals are used to connect to a three-phase motor.
	Grounding terminal (PE)	It is used for protective grounding.

2.3.3 Dimensions and Cable Selection for Main Circuit Terminals

Dimensions of main circuit terminals

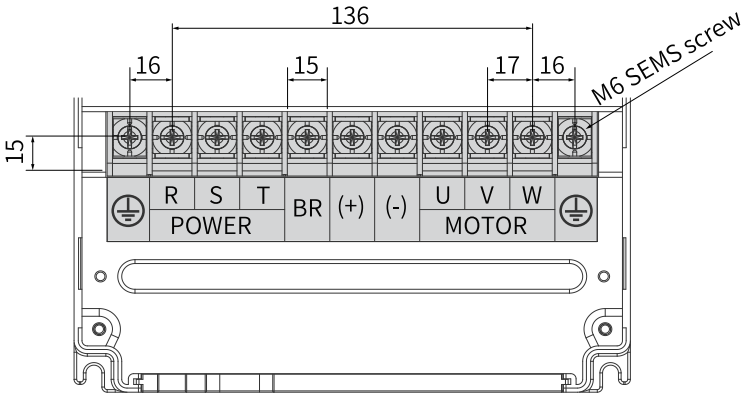


Figure 2-12 Dimensions of main circuit terminals for T5 models

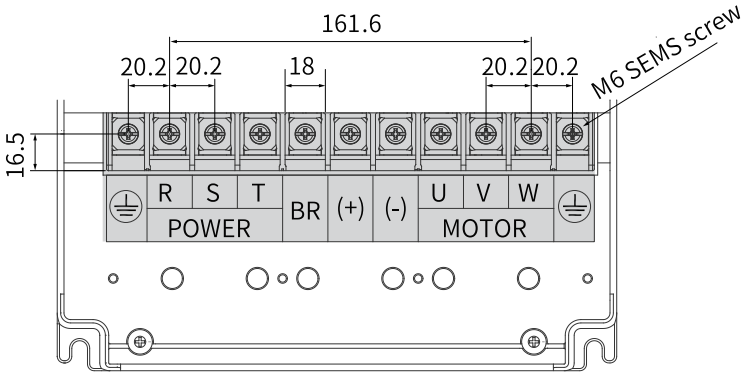


Figure 2-13 Dimensions of main circuit terminals for T6 models

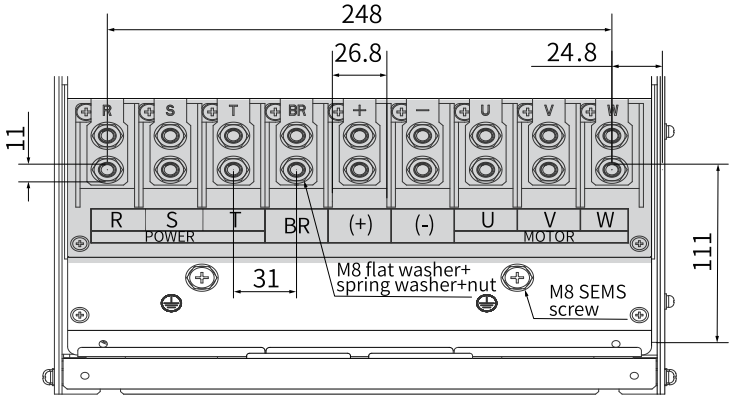


Figure 2-14 Dimensions of main circuit terminals for T7 models

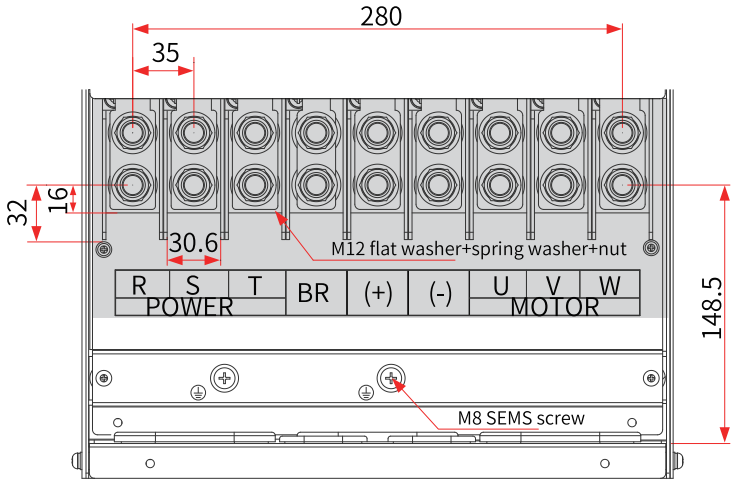


Figure 2-15 Dimensions of main circuit terminals for T8 models

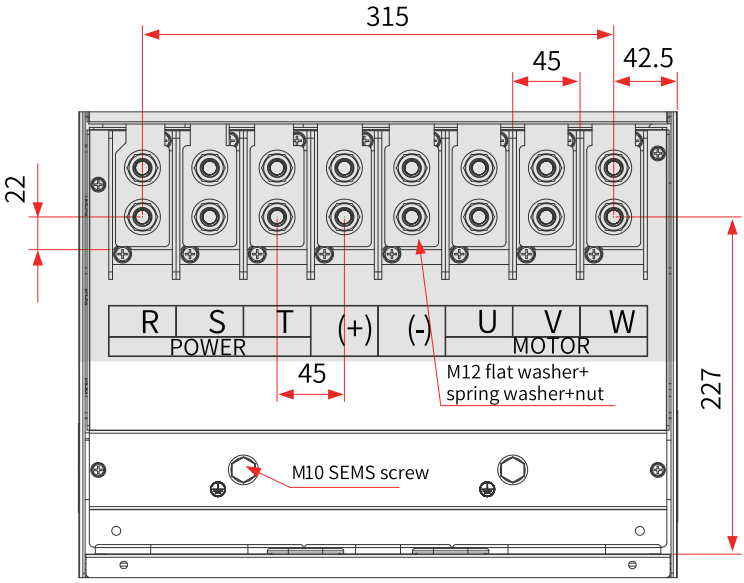


Figure 2-16 Dimensions of main circuit terminals for T9 models

Recommended cable

Table 2–4 Cable selection (three-phase 380 V to 480 V)

Structure	Drive Model	Rated Input Current A	R/S/T, U/V/W		Grounding Cable		Screw	Tightening Torque N·m (lb.in)
			Recommended Cable (mm^2)<1>	Recommended Cable Lug	Recommended Cable (mm^2)<1>	Recommended Cable Lug		
T5	MD510-4T22	51.3	3 x 16	GTNR16-6	16	GTNR16-6	M6	4.8 (45.2)
T6	MD510-4T30	57.0	3 x 16	GTNR16-6	16	GTNR16-6	M6	4.8 (45.2)
	MD510-4T37	69.0	3 x 25	GTNR25-6	16	GTNR16-6	M6	4.8 (45.2)
T7	MD510-4T45	89.0	3 x 35	GTNR35-8	16	GTNR16-8	M8	13.0 (115.2)
	MD510-4T55	106.0	3 x 50	GTNR50-8	25	GTNR25-8	M8	13.0 (115.2)
T8	MD510-4T75	139.0	3 x 70	GTNR70-12	35	GTNR35-12	M12	35.0 (310.1)
	MD510-4T90	164.0	3 x 95	GTNR95-12	50	GTNR50-12	M12	35.0 (310.1)
	MD510-4T110	196.0	3 x 120	GTNR120-12	70	GTNR70-12	M12	35.0 (310.1)
T9	MD510-4T132	240.0	3 x 150	BC150-12	95	BC95-12	M12	35.0 (310.1)
	MD510-4T160	287.0	3 x 185	BC185-12	95	BC95-12	M12	35.0 (310.1)

<1>: Chinese standards applicable; 3 x 10: one three-conductor cable; 2 x (3 x 95): two three-conductor cables; <2>: American standards applicable; 4: 4AWG; 1/0: 0AWG; 3/0: 000AWG; 4/0: 0000AWG

Recommended cable lug

The following table describes the appearances of the TNR, GTNR, and BC series cable lugs of Suzhou Yuanli.

Table 2–5 Appearance of cable lugs

Series	Appearance
GTNR series	
TNR series	
BC series	

The following table describes recommended lugs, namely, the TNR, GTNR, and BC series lugs of Suzhou Yuanli. The lugs with UL certifications are TLK and SQNBS series lugs of KST.

Table 2–6 Appearances, models, and dimensions of TNR series lugs (unit: mm)

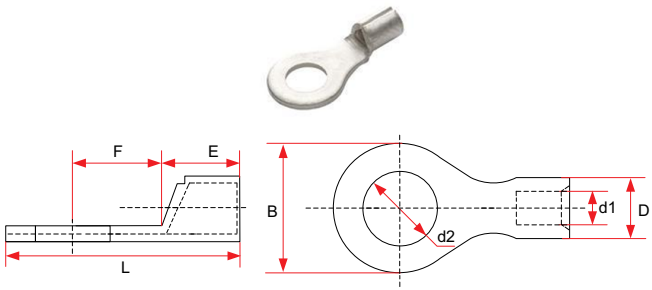
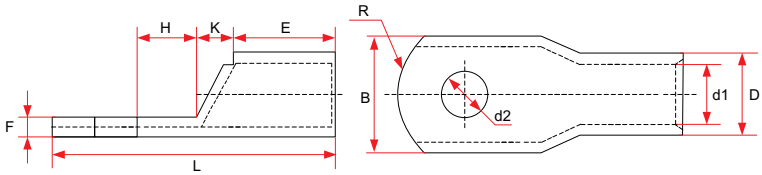
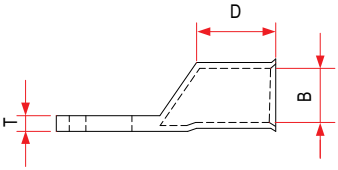
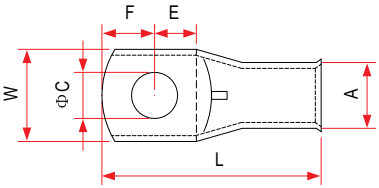
Model	Cable Specification		D	d1	E	F	B	d2	L	Current (A)	Crimping Tool
	AWG/ MCM	mm^2									
											
TNR0.75-4	22–16	0.25-1.0	2.8	1.3	4.5	6.6	8.0	4.3	15.0	10	RYO-8 AK-1M
TNR1.25-4	22–16	0.25-1.65	3.4	1.7	4.5	7.3	8	5.3	15.8	19	

Table 2–7 Appearances, models, and dimensions of GTNR series lugs (unit: mm)

Model	D	d1	E	H	K	B	d2	F	L	R	Crimping Tool
 											
GTNR1.5-5	4.0	2.2	5.0	5.0	2.0	8.0	5.3	1.0	16.0	5	
GTNR2.5-4	4.5	2.9	7.0	5.0	2.0	8.0	4.3	1.0	18.0	5	
GTNR2.5-5	4.5	2.9	7.0	6.0	2.0	8.0	5.3	1.0	20.0	7	
GTNR2.5-6	4.5	2.9	7.0	6.0	2.0	10.2	6.4	0.8	20.0	7	
GTNR4-5	5.2	3.6	7.0	6.0	2.0	10.0	5.3	1.0	20.0	7	RYO-8
GTNR4-6	5.2	3.6	7.0	6.0	2.0	10.0	6.4	1.0	20.0	7	YYT-8
GTNR6-5	6.0	4.2	9.0	6.0	3.0	10.0	5.3	1.2	23.0	7	RYO-14
GTNR6-6	6.0	4.2	9.0	7.5	3.0	10.0	6.4	1.2	26.0	7	
GTNR6-8	6.0	4.2	9.0	7.5	3.0	12.0	8.4	1.0	26.0	7	
GTNR10-6	7.0	5.0	9.0	8.0	3.5	12.4	6.4	1.3	26.5	7	
GTNR10-8	7.0	5.0	9.0	8.0	3.5	12.4	8.4	1.3	27.5	7	
GTNR16-6	7.8	5.8	12.0	8.0	4.0	12.4	6.4	1.3	31.0	7	
GTNR16-8	7.8	5.8	12.0	8.0	4.0	12.4	8.4	1.3	31.0	7	
GTNR25-6	9.5	7.5	12.0	8.0	4.5	14.0	6.4	2.0	32.0	10	
GTNR25-8	9.5	7.5	12.0	9.0	4.5	15.5	8.4	1.6	34.0	10	CT-38
GTNR25-10	9.5	7.5	12.0	10.5	4.5	17.5	10.5	1.4	37.0	10	CT-100
GTNR35-6	11.4	8.6	15.0	9.0	5.0	15.5	6.4	2.8	38.0	10	
GTNR35-8	11.4	8.6	15.0	9.0	5.0	15.5	8.4	2.8	38.0	10	
GTNR35-10	11.4	8.6	15.0	10.5	5.0	17.5	10.5	2.5	40.5	10	
GTNR50-8	12.6	9.6	16.0	11.0	6.0	18.0	8.4	2.8	43.5	10	
GTNR50-10	12.6	9.6	16.0	11.0	6.0	18.0	10.5	2.8	43.5	10	
GTNR70-8	15.0	12.0	18.0	13.0	7.0	21.0	8.4	2.8	50.0	14	
GTNR70-10	15.0	12.0	18.0	13.0	7.0	21.0	10.5	2.8	50.0	14	CT-100
GTNR70-12	15.0	12.0	18.0	13.0	7.0	21.0	13.0	2.8	50.0	14	
GTNR95-10	17.4	13.5	20.0	13.0	9.0	25.0	10.5	3.9	55.0	14	
GTNR95-12	17.4	13.5	20.0	13.0	9.0	25.0	13.0	3.9	55.0	14	

Model	D	d1	E	H	K	B	d2	F	L	R	Crimping Tool
GTNR120-12	19.8	15.0	22.0	14.0	10.0	28.0	13.0	4.7	60.0	16	RYC-150
GTNR120-16	19.8	15.0	22.0	16.0	10.0	28.0	17.0	4.7	64.0	16	
GTNR150-12	21.2	16.5	26.0	16.0	11.0	30.0	13.0	4.7	69.0	24	
GTNR150-16	21.2	16.5	26.0	16.0	11.0	30.0	17.0	4.7	69.0	24	
GTNR185-16	23.5	18.5	32.0	17.0	12.0	34.0	17.0	5.0	78.0	24	
GTNR240-16	26.5	21.5	38.0	20.0	14.0	38.0	17.0	5.5	92.0	24	
GTNR240-20	26.5	21.5	38.0	20.0	14.0	38.0	21.0	5.5	92.0	24	

Table 2–8 Appearance, models, and dimensions of BC series cable lugs (unit: mm)

Model	A	B	W	E	D	L	T	C	F
	  								
120-8	19.0	15.0	27.2	16.5	27.0	73.0	4.0	8.5	16.5
120-10								10.5	
120-12								12.8	
120-14								14.7	
120-16								16.7	
120-20				18.8				20.7	14.3
150-8	21.0	16.5	30.0	16.5	27.0	78.0	4.5	8.5	16.5
150-10								10.5	
150-12								12.8	
150-14								14.7	
150-16								16.7	
150-20				18.8				20.7	14.3

Model	A	B	W	E	D	L	T	C	F
185-10	23	18.5	33.5	16.5	30	82	4.5	10.5	16.5
185-12								12.8	
185-14								14.7	
185-16								16.7	
185-20				18.8				20.7	14.3
240-10	26	21	37.7	18.0	32.0	88.0	5.0	10.5	17.0
240-12								12.8	
240-14								14.7	
240-16								16.7	
240-20								20.7	
300-10	28.0	23.0	41.0	18.0	37.0	97.0	5.0	10.5	17.0
300-12								12.8	
300-14								14.7	
300-16								16.7	
300-20								20.7	

2.3.4 Descriptions of Control Circuit Terminals

"Figure 2–17 " on page 45 shows the layout of control circuit terminals.

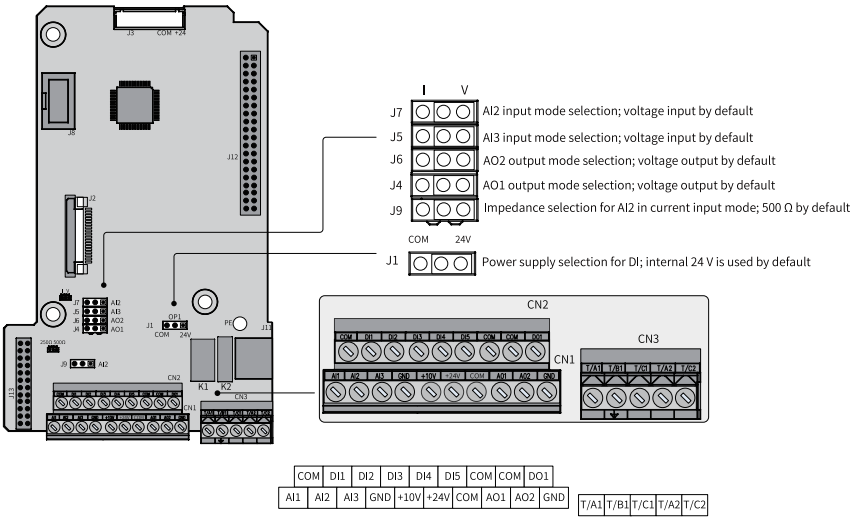


Figure 2-17 Layout of control circuit terminals

Table 2–9 Functions of control circuit terminals

Type	Terminal Mark	Terminal Name	Function Description
Power supply	+10V-GND	External +10 V power supply	The terminal is used to provide +10 V power supply to an external unit with the maximum output current 10 mA. Generally, it is used to power an external potentiometer with resistance ranging from 1 kΩ to 5 kΩ.
	+24V-COM	External +24 V power supply	The terminal is used to provide +24 V power supply to external devices. Generally, it is used to power the DIs/DOs and external sensor. Maximum output current: 200 mA
Analog input	AI1-GND	AI1	Input voltage range: -10 VDC to +10 VDC Input impedance: 22 kΩ
	AI2-GND	AI2	Input range: -10 VDC to +10 VDC/0 mA to 20 mA (determined by jumper J7 on the control board) Input impedance: 22 kΩ for voltage input, or 250 Ω or 500 Ω for current input (determined by jumper J9)
	AI3-GND	AI3	Input range: -10 VDC to +10 VDC/0 mA to 20 mA (determined by jumper J5 on the control board) Input impedance: 22 kΩ for voltage input or 500 Ω for current input AI3 supports inputs of PT100, PT1000, KTY-84-130, and PTC130 temperature sensors, which can be switched over by the F9-56.
Digital input	DI1- COM	DI1	Optocoupler isolation; input frequency: < 100 Hz; driven by internal or external power supply as determined by jumper J1 on the control board Input impedance: 1.39 kΩ Voltage range for valid level input: 9 V to 30 V DI5 can be used for high-speed pulse input. Maximum input frequency: 100 kHz Input impedance: 1.03 kΩ
	DI2-COM	DI2	
	DI3- COM	DI3	
	DI4- COM	DI4	
	DI5- COM	DI5	

Type	Terminal Mark	Terminal Name	Function Description
Analog output	AO1-GND	AO1	The terminal supports voltage output or current output, which is selected by jumper J4 on the control board. The maximum load resistance is 500 Ω. Output voltage range: 0 V to 10 V Output current range: 0 mA to 20mA
	AO2-GND	AO2	The terminal supports voltage output or current output, which is selected by jumper J6 on the control board. The maximum load resistance is 500 Ω. Output voltage range: 0 V to 10 V Output current range: 0 mA to 20mA
Digital output	DO1-COM	DO1	Optocoupler isolation; dual-polarity open collector output Output voltage range: 0 V to 24 V Output current range: 0 mA to 50mA The DO can be used for high-speed pulse output with the maximum frequency of 100 kHz by setting the F4-41.
Relay output	T/A1-T/B1	NC terminal	Driving capacity of the contact: 250 VAC, 3 A, COSØ = 0.4 30 VDC, 1 A
	T/A1-T/C1	NO terminal	
	T/A2-T/C2	NO terminal	
Auxiliary interfaces	J13	Function expansion card interface	It is the 28-conductor interface to connect the standard RS-485 communication card and other optional cards, such as the bus card.
	J2	PG card interface	It is used to connect to the resolver or differential encoder.
	J11	External operating panel interface	It is used to connect to the external operating panel.
Jumper	J1	Power supply mode for the DI	The internal 24 V power supply is used by default.
	J4	AO1 output mode selection	Voltage output (default) or current output available
	J6	AO2 output mode selection	Voltage output (default) or current output available
	J5	AI3 input mode selection	Voltage input (default) or current input available
	J7	AI2 input mode selection	Voltage input (default) or current input available
	J9	Input impedance selection for the AI2 in current input mode	250 Ω or 500 Ω

3 Commissioning and Trial Run

3.1 Operating Panel

Components

The LED operating panel is used for viewing the operating status, setting parameters, and viewing fault information. The following figure shows the operating panel.

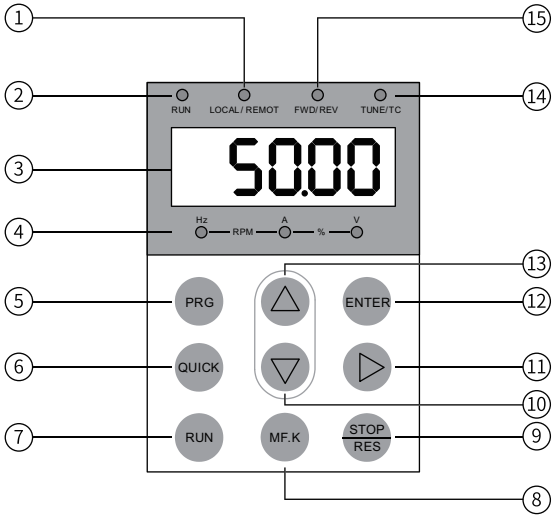


Figure 3-1 Components

Table 3–1 Description of the operating panel

No.	Name	No.	Name
1	Command source indicator	9	Stop/Reset key
2	RUN indicator	10	Decrement key
3	Data display area	11	Shift key
4	Unit indicator	12	OK key
5	Programming key	13	Increment key
6	Menu key	14	Tuning/Torque control/Fault indicator
7	RUN key	15	Forward/Reverse run indicator
8	Multi-function key	-	-

Key descriptions

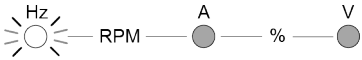
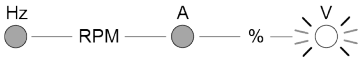
Table 3–2 Key descriptions

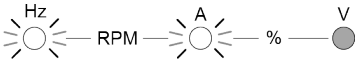
Key	Name	Function
PRG	Programming key	Return to the previous interface; Enter level 1 menu.
ENTER	OK key	Enter the next interface; Confirm the mode, parameter, and value.
△	Increment key	Increase the parameter number and setpoint.
▽	Decrement key	Decrease the parameter code and value.
▷	Shift key	Shift the displayed parameter to the left cyclically; Shift the modified bit of the parameter code or value to the left in cycle.
RUN	RUN key	In the operating panel control mode, press this key to start the drive.
STOP/RES	Stop/Reset key	Stop an operating drive or reset the fault/ alarm.
MF.K	Multi-function key	Switch functions according to the setting of F7-01.
QUICK	Menu key	Switch menu modes according to the setting of FP-03 (one menu mode by default).

Status indicator

 indicates ON.  indicates OFF.  indicates flashing.

Table 3–3 Descriptions of indicators

State		Description
RUN Operation indicator		OFF: Stop
		ON: Running
LOCAL/REMOT Command source indicator		OFF: Operating panel control
		ON: Terminal control
		Flashing: Communication control
FWD/REV Forward/Reverse run indicator		OFF: Forward run
		ON: Reverse run
TUNE/TC Tuning/Torque control/Fault indicator		OFF: Operating normally
		ON: Torque control mode
		Flashing once per second: Auto-tuning state
		Flashing four times per second: Faulty state
		Frequency unit: Hz
		Current unit: A
		Voltage unit: V

State	Description
	Speed unit: RPM
	Percentage: %

LED display

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

Table 3–4 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

3.2 Commissioning Flowchart

3.2.1 Basic Commissioning Flowchart

For details on different modes, see the related sections.

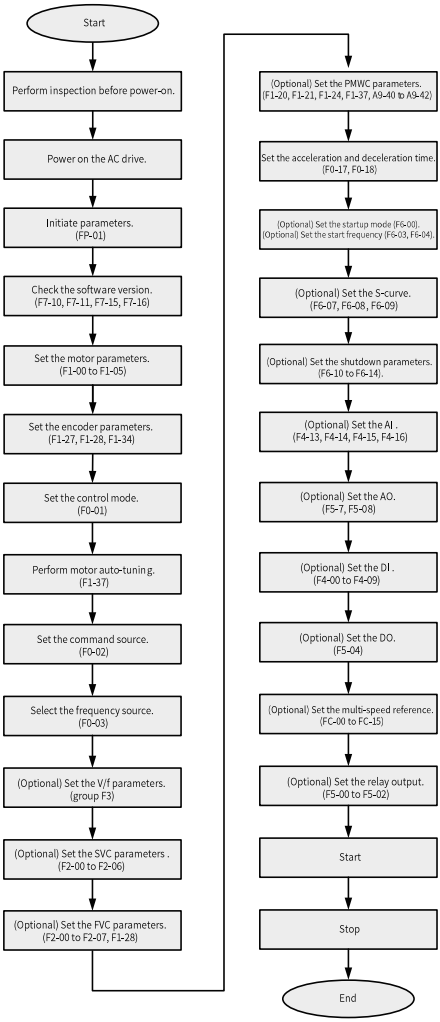


Figure 3-2 Basic commissioning flowchart

Table 3–5 Basic commissioning flowchart

No.	Step	Related Parameter
1	Check before power-on	/
2	Power-on	/
3	Parameter initialization	FP-01
4	View the software version.	F7-10, F7-11, F7–15, F7–16

No.	Step	Related Parameter
5	Set motor parameters.	F1-00 to F1-05 Note that you must set the motor type.
6	Set encoder parameters.	F1-27, F1-28, F1-34
7	Set the control mode.	F0-01
8	Perform motor parameter auto-tuning.	F1-37
10	Set the command source.	F0-02
11	Select the frequency source.	F0-03
12	(Optional) Set V/f parameters.	F3
13	(Optional) Set SVC parameters.	F2-00 to F2-06
14	(Optional) Set FVC parameters.	F2-00 to F2-07, F1-28
15	(Optional) Set PMVVC parameters.	F0-01, F1-00, F1-20, F1-21, F1-24, F1-37, and A9-40 to A9-42
16	Set acceleration/deceleration time.	F0-17, F0-18
17	(Optional) Set the startup mode.	F6-00
18	(Optional) Set the startup frequency.	F6-03, F6-04
19	(Optional) Set the S-curve.	F6-07, F6-08, F6-09
20	Set the stop parameters.	F6-10 to F6-14
21	(Optional) Set the AI.	F4-13, F4-14, F4-15, F4-16
22	(Optional) Set the AO.	F5-07, F5-08
23	(Optional) Set the DI.	F4-00 to F4-09
24	(Optional) Set the DO.	F5-04
25	(Optional) Set the multi-reference.	FC-00 to FC-15
26	(Optional) Set the relay output.	F5-00, F5-01, F5-02
27	Start	/
28	Stop	/

3.2.2 Commissioning Flowchart in V/f Control Mode

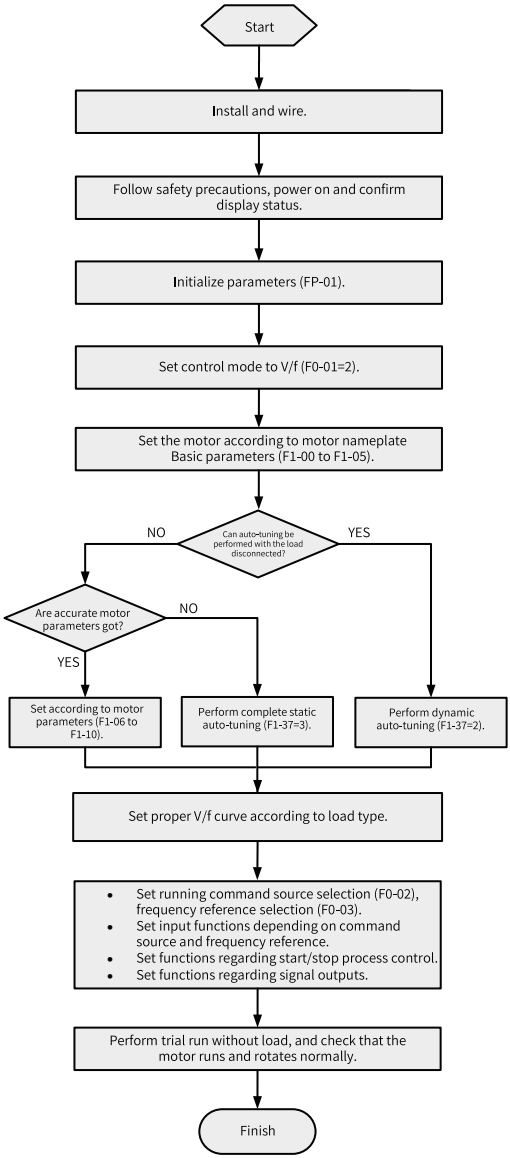


Figure 3-3 Commissioning flowchart in V/f control

3.2.3 Commissioning Flowchart in SVC/FVC Control Mode

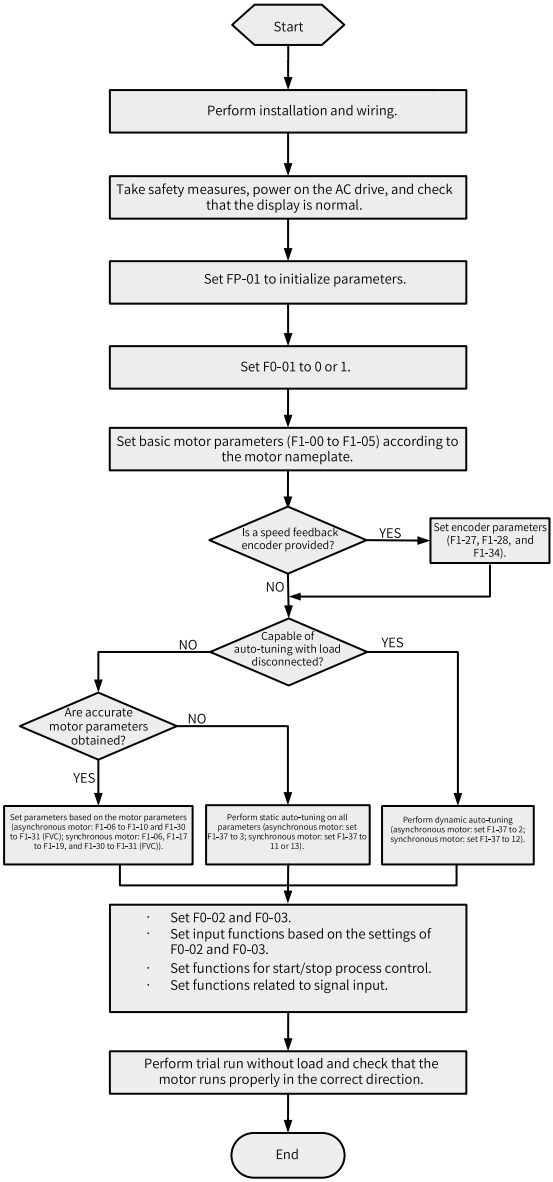


Figure 3-4 Commissioning flowchart in SVC/FVC control mode

3.2.4 Commissioning Flowchart in PMVVC Control Mode

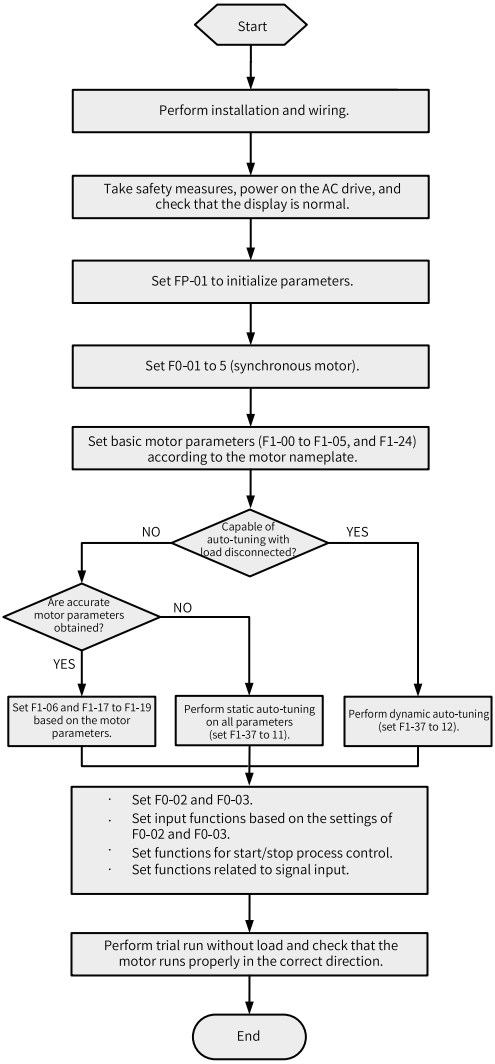


Figure 3-5 Commissioning flowchart in PMVVC control mode

4 Troubleshooting

4.1 Troubleshooting of Trial Run in Different Control Modes

- SVC mode (F0-01= 0, default)
  In this mode, the drive controls the motor speed and torque without an encoder for speed feedback. Auto-tuning on motor parameters is required to obtain the motor parameters.

Table 4–1 Troubleshooting in SVC mode

Problem	Solution
Overload or overcurrent during motor start	Set motor parameters F1-01 to F1-05 according to the motor nameplate. Perform auto-tuning (F1-37) on motor parameters. Perform dynamic complete auto-tuning if possible.
Slow torque/speed response and motor oscillation occur at a frequency below 5 Hz.	Increase the value of F2-00 (speed loop proportional gain) by the step value of 10 or decrease the value of F2-01 (speed loop integral time) by the step value of 0.05 to improve the torque/speed responsiveness. If oscillation occurs, decrease the value of F2-00 and increase the value of F2-01.
Slow torque/speed response and motor oscillation occur at a frequency above 5 Hz.	Increase the value of F2-03 (speed loop proportional gain) by the step value of 10 or decrease the value of F2-04 (speed loop integral time) by the step value of 0.05 to improve the torque/speed responsiveness. If oscillation occurs, decrease the value of F2-03 and increase the value of F2-04.
Low speed accuracy	If the speed deviation is too large when the motor runs with load, increase the value of F2-06 (vector control slip compensation gain) by the step value of 10%.
Obvious speed fluctuation	Increase the value of A9-05 (speed filter time) by the step value of 0.001s when motor speed fluctuates abnormally.
Excessive motor noise	Increase the value of F0-15 (carrier frequency) by the step value of 1.0 kHz. (Note that increasing the carrier frequency will lead to an increase in the motor leakage current.)
Insufficient motor torque or force	Check whether the torque upper limit is too low. If yes, increase the value of F2-10 (torque upper limit in speed control mode) in the speed control mode or the value of the torque reference in the torque control mode.

- FVC mode (F0-01 = 1)
  This mode is applicable to scenarios with an encoder for speed feedback. In this mode, you need to set the encoder pulses per revolution, encoder type, and encoder direction correctly and perform auto-tuning on motor parameters.

Table 4–2 Troubleshooting in FVC mode

Problem	Solution
Overload or overcurrent fault detected during startup	Set the encoder pulses per revolution, encoder type, and encoder direction correctly.
Overload or overcurrent is detected during motor running.	Set motor parameters F1-01 to F1-05 according to the motor nameplate. Perform auto-tuning (F1-37) on motor parameters. Perform dynamic complete auto-tuning if possible.
Slow torque/speed response and motor oscillation occur at a frequency below 5 Hz.	Increase the value of F2-00 (speed loop proportional gain) by the step value of 10 or decrease the value of F2-01 (speed loop integral time) by the step value of 0.05 to improve the torque/speed responsiveness. If oscillation occurs, decrease the value of F2-00 and F2-01.
Slow torque/speed response and motor oscillation occur at a frequency above 5 Hz.	Increase the value of F2-03 (speed loop proportional gain) by the step value of 10 or decrease the value of F2-04 (speed loop integral time) by the step value of 0.05 to improve the torque/speed responsiveness. If oscillation occurs, decrease the value of F2-03 and F2-04.
Obvious speed fluctuation	Increase the value of F2-07 (speed filter time) by the step value of 0.001s when motor speed fluctuates abnormally.
Excessive motor noise	Increase the value of F0-15 (carrier frequency) by the step value of 1.0 kHz. (Note that increasing the carrier frequency will lead to an increase in the motor leakage current.)
Insufficient motor torque or force	Check whether the torque upper limit is too low. If yes, increase the value of F2-10 (Torque upper limit in speed control mode) in the speed control mode or the value of the torque reference in the torque control mode.

- V/f control mode (F0-01 = 2)
  This mode applies to applications without an encoder for speed feedback. You only need to set the rated motor voltage and rated motor frequency correctly.

Table 4–3 Troubleshooting in V/f control mode

Problem	Solution
Motor oscillation during running	Decrease the value of F3-11 by the step value of 5. The minimum value is 5.
Overcurrent at startup with high power	Decrease the value of F3-01 by the step value of 0.5%.
Excessively high current during operation	Set F1-02 (rated motor voltage) and F1-04 (rated motor frequency) correctly. Decrease the value of F3-01 by the step value of 0.5%.
Excessive motor noise	Increase the value of F0-15 (carrier frequency) by the step value of 1.0 kHz. (Note that increasing the carrier frequency will lead to an increase in the motor leakage current.)

Problem	Solution
Overvoltage is detected when heavy load is suddenly removed or during deceleration.	Set F3-23 (overvoltage stall suppression) to 1 (Enable). Increase the value of F3-24/F3-25 (Frequency gain/Voltage gain for overvoltage stall suppression, 30 by default) by the step value of 10 gradually. The permissible maximum value is 100. Decrease the value of F3-22 (overvoltage stall suppression action voltage, default: 770 V) by the step value of 10 V. The permissible minimum value is 700 V.
Overcurrent is detected when heavy load is suddenly added or during acceleration.	Increase the value of F3-20 (overcurrent stall suppression gain, default: 20) by the step value of 10. The permissible maximum value is 100. Decrease the value of F3-18 (overcurrent stall suppression action current, default: 150%) by the step value of 10%. The permissible minimum value is 50%.

4.2 List of Faults

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

Table 4–4 Fault codes

Fault Name	Display	Possible Cause	Solution
Overcurrent during acceleration	E02.00	A grounding fault or short circuit exists in the output circuit of the AC drive.	Check the motor or contactor for short circuit.
		The control mode is FVC or SVC but parameter auto-tuning is not performed.	Set the motor parameters according to the motor nameplate and perform motor auto-tuning.
		The acceleration time is too short under abrupt acceleration conditions.	Increase the acceleration time (F0-17).
		The overcurrent stall suppression parameters are set improperly.	Ensure the overcurrent stall suppression (F3-19) is enabled. The value of F3-18 (overcurrent stall action current) is too large. Change it to a value between 120% and 160%. The value of F3-20 (overcurret stall suppression gain) is too low. Change it to a value between 20 and 40.
		The manual torque boost value or V/f curve is inappropriate.	Adjust the manual torque boost value or V/f curve.
		The motor is started while rotating.	Select the flying start mode or start the motor after it stops.
		The drive suffers external interference.	Check whether the current upon the fault reaches the overcurrent stall action current (F3-18) by viewing the fault log. If not, the fault is possibly caused by external interference. Find out the external interference source and rectify the fault. If no external interference source is found, the driver board or Hall device may be faulty. Contact the manufacturers to replace them.

Fault Name	Display	Possible Cause	Solution
Overcurrent during deceleration	E03.00	A grounding fault or short circuit exists in the output circuit of the AC drive.	Check whether the motor is short-circuited or disconnected.
		The control mode is FVC or SVC but parameter auto-tuning is not performed.	Set the motor parameters according to the motor nameplate and perform motor auto-tuning.
		The deceleration time is too short under abrupt deceleration condition.	Increase the deceleration time (F0-18).
		The overcurrent stall suppression parameters are set improperly.	Ensure the overcurrent stall suppression (F3-19) is enabled. The value of F3-18 (overcurrent stall action current) is too large. Change it to a value between 120% and 150%. The value of F3-20 (overcurret stall suppression gain) is too low. Change it to a value between 20 and 40.
		The braking unit or braking resistor is not installed.	Install the braking unit and braking resistor.
		The drive suffers external interference.	Check whether the current upon the fault reaches the overcurrent stall action current (F3-18) by viewing the fault log. If not, the fault is possibly caused by external interference. Find out the external interference source and rectify the fault. If no external interference source is found, the driver board or Hall device may be faulty. Contact the manufacturers to replace them.

Fault Name	Display	Possible Cause	Solution
Overcurrent during operation at constant speed	E04.00	A grounding fault or short circuit exists in the output circuit of the AC drive.	Check whether the motor is short-circuited or disconnected.
		The control mode is FVC or SVC but parameter auto-tuning is not performed.	Set the motor parameters according to the motor nameplate and perform motor auto-tuning.
		The overcurrent stall suppression parameters are set improperly.	Ensure the overcurrent stall suppression (F3-19) is enabled. The value of F3-18 (overcurrent stall action current) is too large. Change it to a value between 120% and 150%. The value of F3-20 (overcurret stall suppression gain) is too low. Change it to a value between 20 and 40.
		The power rating of the AC drive is too low.	In the stable operation state, if the operating current exceeds the rated current of the motor or the rated output current of the drive, select an AC drive with a higher power rating.
		The drive suffers external interference.	Check whether the current upon the fault reaches the overcurrent stall action current (F3-18) by viewing the fault log. If not, the fault is possibly caused by external interference. Find out the external interference source and rectify the fault. If no external interference source is found, the driver board or Hall device may be faulty. Contact the manufacturers to replace them.
Overvoltage during acceleration	E05.00	The input grid voltage is too large.	Adjust the voltage to a value within the normal range.
		External force drives the motor during acceleration.	Remove the external force or install a braking resistor. The maximum rise frequency during overvoltage stall suppression (F3-26) is too low. Adjust it to a value between 5 Hz and 15 Hz when external force is applied.
		The overvoltage suppression parameters are set improperly.	Ensure that the overvoltage stall suppression function (F3-23) is enabled. The value of F3-22 (overvoltage stall action voltage) is too large. Change it to a value between from 770 V and 700 V. The value of F3-24 (overvoltage stall suppression gain) is too small. Change it to a value between 30 and 50.
		The braking unit or braking resistor is not installed.	Install the braking unit and braking resistor.
		The acceleration time is too short.	Increase the acceleration time.

Fault Name	Display	Possible Cause	Solution
Overvoltage during deceleration	E06.00	The overvoltage suppression parameters are set improperly.	Ensure that the overvoltage stall suppression function (F3-23) is enabled. The value of F3-22 (overvoltage stall action voltage) is too large. Change it to a value between from 770 V and 700 V. The value of F3-24 (overvoltage stall suppression gain) is too small. Change it to a value between 30 and 50.
		External force drives the motor during deceleration.	Remove the external force or install a braking resistor. The maximum rise frequency during overvoltage stall suppression (F3-26) is too low. Adjust it to a value between 5 Hz and 15 Hz when external force is applied.
		The deceleration time is too short.	Increase the deceleration time.
		The braking unit or braking resistor is not installed.	Install the braking unit and braking resistor.
Overvoltage during operation at constant speed	E07.00	The overvoltage suppression parameters are set improperly.	Ensure that the overvoltage stall suppression function (F3-23) is enabled. The value of F3-22 (overvoltage stall action voltage) is too large. Change it to a value between from 770 V and 700 V. The value of F3-24 (overvoltage stall suppression gain) is too small. Change it to a value between from 30 and 50.
		External force drives the motor during running.	Remove the external force or install a braking resistor. The maximum rise frequency during overvoltage stall suppression (F3-26) is too low. Adjust it to a value between 5 Hz and 15 Hz when external force is applied.
Undervoltage	E09.00	Instantaneous power failure	Enable the power dip ride-through function (F9-59).
		The input voltage of the AC drive is beyond the specified range.	Adjust the voltage to a value within the normal range.
		The bus voltage is abnormal.	Contact Inovance for technical support.
		The power supply unit, the driver board of the drive unit, or the control board of the drive unit is faulty.	Contact Inovance for technical support.

Fault Name	Display	Possible Cause	Solution
Drive overload	E10.00	The load is too heavy or the motor is stalled.	Reduce the load and check the motor and machinery.
		The power rating of the AC drive is too low.	Replace the AC drive with one of a higher power rating.
		The control mode is FVC or SVC but parameter auto-tuning is not performed.	Set the motor parameters according to the motor nameplate and perform motor auto-tuning.
		The control mode is V/f control.	The torque boost (F3-01) is set to an excessively high value. Decrease the value of F3-01 by 1.0% every time or set it to 0 (automatic torque boost) to see whether the fault can be cleared.
		AC drive output phase loss	Check the output wiring of the AC drive.
Motor overload	E11.00	F9-01 (motor overload protection gain) is set incorrectly.	Set F9-01 (motor overload protection gain) properly. The motor overload time is prolonged if you increase the value of F9-01.
		The load is too heavy or the motor is stalled.	Reduce the load and check the motor and machinery.
Input phase loss	E12.00	Input phase loss exists.	Check whether the input R/S/T cables and three-phase input voltage are normal.
Output phase loss	E13.00	The motor is faulty.	Check whether open circuit occurs on the motor.
		The cable connecting the drive and the motor is faulty.	Eliminate the external fault.
		The three-phase outputs of the AC drive are unbalanced during motor running.	Check whether the motor three-phase winding is normal and eliminate the fault.
		The driver board or the IGBT module is faulty.	Contact Inovance for technical support.
Module overtemperature	E14.00	The ambient temperature is too high.	Lower down the ambient temperature.
		The air duct is blocked.	Clean the air duct.
		The fan is damaged.	Replace the fan.
		The thermistor is damaged.	Contact Inovance for technical support.
		The module is damaged.	Contact Inovance for technical support.
Peripheral device faulty	E15.01	An external fault signal is input through the multi-functional DI (NO).	Eliminate peripheral faults, ensure that restart is allowed under the mechanical condition (F8-18), and reset the operation.
	E15.02	An external fault signal is input through the multi-functional DI (NC).	Eliminate peripheral faults, ensure that restart is allowed under the mechanical condition (F8-18), and reset the operation.

Fault Name	Display	Possible Cause	Solution
Communication fault	E16.01	Modbus communication timeout	Check whether the RS485 communication cable is correctly connected. Check whether the settings of Fd-04 and the PLC communication cycle are proper.
	E16.11	CANopen communication timeout	Check whether the CAN communication cable is correctly connected. Check the settings of Fd-15 to Fd-17 and confirm interference.
	E16.12	The PDO mapping configured by CANopen is inconsistent with the actual communication mapping.	Check the PDO mapping in group AF.
	E16.21	CANlink heartbeat message timeout	Check whether the CAN communication cable is correctly connected. Check the settings of Fd-15 to Fd-17 and confirm interference.
	E16.22	CANlink station number conflict	Modify the repeated CAN station numbers by using Fd-13.
Contactor fault	E17.00	The driver board and power supply are faulty.	Replace the driver board or power supply board.
		The contactor is faulty.	Replace the contactor.
		The lightning protection board is abnormal.	Replace the lightning protection board.
Current sampling circuit damaged	E18.00	The current sampling circuit of the drive is abnormal.	Check whether the main circuit is powered on.
			Check whether the Hall sensor or current sampling circuit is damaged. If yes, contact Inovance for technical support.

Fault Name	Display	Possible Cause	Solution
Motor auto-tuning fault	E19.02	Auto-tuning of the magnetic pole position angle for the synchronous motor fails.	Check whether the motor is connected or output phase loss occurs.
	E19.06 E19.07 E19.08	Stator resistance auto-tuning fault	Ensure that the motor is connected. Check that the rated current of the motor (F1-03) is set according to the motor nameplate.
	E19.09 E19.10	Error in auto-tuning of the transient leakage inductance of the asynchronous motor	Check whether the motor is connected or output phase loss occurs. Check that the motor is connected properly.
	E19.11	The inertia auto-tuning is abnormal.	Check that the rated current of the motor (F1-03) is set according to the motor nameplate. Increase the value of F2-43 (inertia auto-tuning and dynamic speed reference).
	E19.20	Auto-tuning of the no-load zero position angle for the synchronous motor times out.	Check the Z feedback signal.
	E19.23	Auto-tuning of the magnetic pole position of the synchronous motor fails.	Check that the rated current of the motor (F1-03) is set according to the motor nameplate. Decrease the value of F2-29 (initial position angle detection current of synchronous motor).
	E19.24	Auto-tuning of the transient leakage inductance for the asynchronous motor fails.	Check whether the drive power rating is low, and replace with a drive with a proper power rating based on the motor power.

Fault Name	Display	Possible Cause	Solution
Encoder fault	E20.00	The encoder cable is disconnected.	Rectify the disconnection fault. The PG cable is wired improperly. Ensure the PG power supply cable is connected properly. Check that the actual encoder pulses per revolution matches the value of F1-27 (encoder pulses per revolution). AB signal cables are connected improperly.
	E20.01	The encoder is faulty.	
	E20.02	The wiring of the encoder is faulty.	
	E20.03	No-load auto-tuning of the encoder for the synchronous motor is faulty.	
	E20.04	No-load auto-tuning of the encoder for the synchronous motor is faulty.	
	E20.06	With-load auto-tuning of the encoder for the synchronous motor is faulty.	
	E20.07	No-load auto-tuning of the encoder for the synchronous motor is faulty.	
	E20.08	No-load auto-tuning of the encoder for the synchronous motor is faulty.	
	E20.09	Auto-tuning of the encoder for the synchronous motor is faulty.	Check the encoder signal Z and the wiring of the PG card.
	E20.10	The synchronous motor encoder is faulty.	
	E20.11	No-load auto-tuning of the encoder for the asynchronous motor in the FVC mode is faulty.	Check that the encoder is correctly connected. Check that the actual encoder pulses per revolution matches the value of F1-27 (encoder pulses per revolution).
	E20.12	Deviation between the encoder feedback speed and the speed estimated in SVC mode is too large.	Check whether the encoder is disconnected. Check whether motor parameters are set properly. Check whether motor auto-tuning is performed.
	E20.13	The hardware part of the resolver is disconnected.	Check the encoder wiring.
	E20.17	The wiring of the 23-bit encoder is faulty.	Check the encoder wiring.
EEPROM reading/ writing fault	E21.01	Read and write operations on the EEPROM are abnormal.	For parameters written to the EEPROM through communication, check the RAM addresses of the parameters. For the RAM address mapping of parameters, see section 6.2.4 "Parameter Address Rules". The EEPROM chip is damaged. Contact Inovance to replace the control board.
	E21.02		
	E21.03		
	E21.04		

Fault Name	Display	Possible Cause	Solution
Motor auto-tuning warning	E22.00	The stator resistance obtained through auto-tuning exceeds the allowed range.	The rated motor voltage and current are set incorrectly. Set F1-02 (rated motor voltage) and F1-03 (rated motor current) correctly according to the motor nameplate.
	E22.01	The rotor resistance of the asynchronous motor obtained from auto-tuning exceeds the allowed range.	Check that auto-tuning is performed after the motor is in the standstill state.
	E22.02	The auto-tuned no-load current and mutual inductance of the asynchronous motor exceed the allowed range. If this fault is reported, the AC drive calculates the mutual inductance and no-load current based on known motor parameters. The calculated values may be different from optimal values.	Set motor parameters in group F1 based on the motor nameplate. Before auto-tuning, check that the motor is not connected to any load.
	E22.03	The back EMF of the synchronous motor obtained through auto-tuning exceeds the allowed range.	Check that the rated motor voltage (F1-02) is set according to the motor nameplate. Before auto-tuning, check that the motor is not connected to any load.
	E22.04	The inertia auto-tuning is abnormal.	Check that the rated current of the motor (F1-03) is set according to the motor nameplate.
Short circuit to ground	E23.00	The motor is short circuited to ground.	Check the motor or motor cables for short circuit to ground.
Inter-phase short circuit on the motor	E24.00	Inter-phase short circuit occurs on the motor.	Check whether inter-phase short circuit occurs on the output UVW.
Cumulative operating time reached	E26.00	The cumulative running duration reaches the setpoint.	Clear the record by parameter initialization.
User-defined fault 1	E27.00	The signal of user-defined fault 1 is input through the multi-functional DI.	Reset the operation.
		The signal of user-defined fault 1 is input through the virtual I/O.	Reset the operation.
User-defined fault 2	E28.00	The signal of user-defined fault 2 is input through the multi-functional DI.	Reset the operation.
		The signal of user-defined fault 2 is input through the virtual I/O.	Reset the operation.
Cumulative power-on time reached	E29.00	The cumulative power-on time reaches the setpoint.	Clear the record by parameter initialization.
Load loss	E30.00	The operation current of the drive is lower than the value of F9-64.	Check whether the load is disconnected or ensure that F9-64 and F9-65 are set properly based on the actual conditions.

Fault Name	Display	Possible Cause	Solution
PID feedback loss during operation	E31.00	The PID feedback is lower than the setpoint of FA-26.	Check the PID feedback signal or set FA-26 properly.
Pulse-by-pulse current limit fault	E40.00	The load is too heavy or the motor is stalled.	Reduce the load and check the motor and machinery.
		The power rating of the AC drive is too low.	Replace the AC drive with one of a higher power rating.
Excessive speed deviation	E42.00	Encoder parameters are set improperly.	Set the encoder parameters correctly.
		Motor auto-tuning is not performed.	Perform motor auto-tuning.
		Speed deviation detection parameters F9-69 and F9-70 are set improperly.	Set speed deviation detection parameters F9-69 and F9-70 properly based on actual conditions.
Motor overspeed	E43.00	Encoder parameters are set improperly.	Set the encoder parameters correctly.
		Motor auto-tuning is not performed.	Perform motor auto-tuning.
		Motor overspeed detection parameters F9-67 and F9-68 are set improperly.	Set motor overspeed detection parameters F9-67 and F9-68 properly based on actual conditions.

5 Routine Maintenance

5.1 Routine Inspection Items

5.1.1 Routine Checklist

Components inside the drive can be affected by the ambient temperature, humidity, dust, and vibration, leading to potential faults and shorter service life. Therefore, routine maintenance on the device is required. The maintenance interval must be shortened when the drive is used in environments suffering from high ambient temperature, frequent startup and stop, violent fluctuation in the AC power supply and the load, strong vibration or shock, and intrusive and corrosive substances such as dust, metal dust, and hydrochloric acid.

Check the following items daily to ensure a proper operation of the device. It is recommended to make a copy of this checklist and sign the "Checked" column after each inspection.

Item	Content	Solution	Checked
Motor	Check for unusual vibration or noise.	• Check whether the mechanical connection is normal. • Check whether phase loss occurs on the motor. • Check whether fixing screws of the motor are tightened.	
Fan	Check whether the fan of the AC drive and motor operates normally.	• Check whether the fan of the AC drive operates properly. • Check whether the fan of the motor operates properly. • Check whether the ventilation duct is blocked. • Check whether the ambient temperature is within the allowable range.	
Installation environment	Check the cabinet and cable ducts.	• Check input and output cables of MD510for damaged insulation. • Check the mounting bracket for vibration. • Check whether copper bars and terminals become loose or get corroded.	
Load	Check whether the operating current of the drive exceeds the rated current of the drive and motor.	• Check for settings of motor parameters. • Check whether the motor is overloaded. • Check whether mechanical vibration is within the permissible range (< 0.6 g).	
Input voltage	Check whether the power supply voltage between the main circuit and control circuit is normal.	• Check whether the input voltage is within the permissible range. • Check whether a heavy load is being started around the drive.	

5.1.2 List of Regular Inspection Items

Check the items listed in the following table every one or two years. Determine the actual inspection cycle based on actual application and operating environment. Regular maintenance helps detect product function deterioration and damage.

Make a copy of the following checklist and sign the "Checked" column after each inspection.

Caution

Do not perform inspection or connection work with power on. Failure to do so may result in an electric shock. Cut off the power supplies of all equipment before wiring or repair. Wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. After waiting for the designated time, measure the DC voltage in the main circuit to ensure the DC voltage is within the safety voltage range. Failure to do so may result in an electric shock.

Item	Content	Solution	Checked
Controller	Check for wastes, dirt and dust on the surface of the AC drive.	• Check whether the controller cabinet is powered off. • Use a vacuum cleaner to suck up waste and dust to prevent direct contact with the components. • For stubborn surface dirt, wipe up the dirt with a piece of soft cloth immersed in alcohol.	
Cable	• Check power cables and connections for discoloration. • Check whether the insulation is aged or cracked.	• Replace the cracked cable. • Replace the aged or cracked terminal.	
Peripherals of the electromagnetic contactor	• Check whether the contactor closes tightly or generates unusual noise during closing. • Check whether short circuit, water seepage, swelling, or cracking occurs on any peripheral device.	Replace the abnormal components.	

Item	Content	Solution	Checked
Air duct	• Check whether the air duct and heatsink are blocked. • Check whether the fan is damaged.	• Clean the air duct. • Replace the fan.	
Control circuit	• Check whether control components are in poor contact. • Check whether terminal screws are loose. • Check whether the insulation of the control cable is cracked.	• Clean up the surface of control circuit cables and terminals. • Replace the damaged or corroded control cables.	

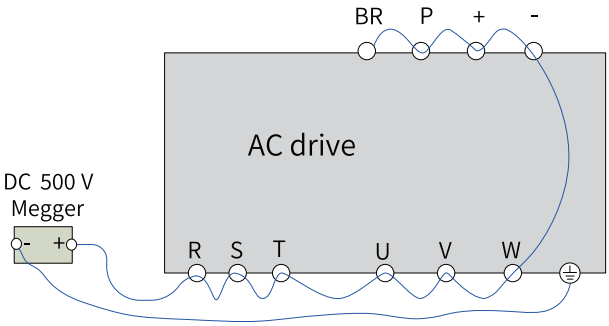
5.2 Main Circuit Insulation Test

Danger

The high voltage (> 500 V) test need not be performed again because it has been completed before delivery.

Remove the voltage dependent resistor screw before test and disconnect the voltage dependent resistor.

Before measuring insulation resistance with a megameter (500 VDC megameter recommended), disconnect the main circuit from the AC drive. Do not use the insulation resistance meter to test the insulation of the control circuit. See the following figure.



The measured insulation resistance must be greater than 5 MΩ.

Caution

Disconnect the optional grounding screw of VDR before performing a voltage resistance test. Otherwise, the test may fail.

5.3 Quick-Wear Parts Replacement

5.3.1 Service Life of Quick-Wear Parts

Quick-wear parts of the AC drive include the cooling fan and electrolytic capacitor. Their service life is related to the operating environment and maintenance status. Generally, the service life is as follows.

Name	Service Life [Note]
Fan	⩾ 5 years
Electrolytic capacitor	⩾ 5 years
Note: The service life indicates the time when the part is used in the following conditions. You can determine when to replace the part according to the actual operating time. Ambient temperature: 40°C Load rate: 80% Operating rate: 24 hours per day	

5.3.2 Replacing the Cooling Fan

Cooling fans

- Possible causes of damage: bearing wear or blade aging
- Criteria for determining the fan damage: cracks on the blade, unusual vibration noise upon start, and improper operation of fan blades
- Replacement of the fan: Press the snap-fit joint on the fan plastic cover and pull the fan outward. After replacing the fan, ensure the fan blows the air upwards.

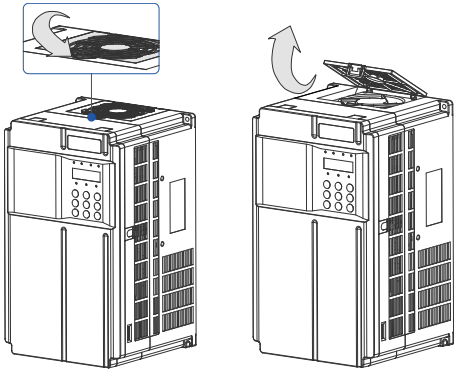
Table 5–1 Number of cooling fans

Structure	Fan
T5 to T7	1
T8 to T9	2

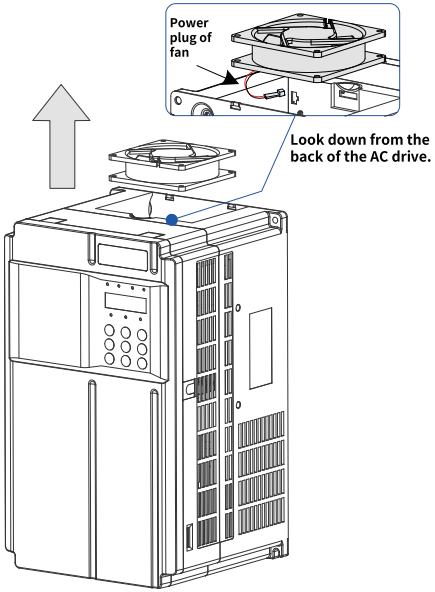
Removing and installing the fan of T5 to T6 models

Removing the fan

1. Press the snap-fit joint on the fan cover and remove the cover.



2. Pull the fan upwards and unplug the power cable connector from the socket.

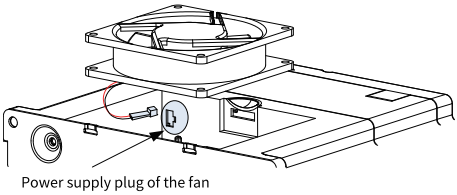


Installing the fan

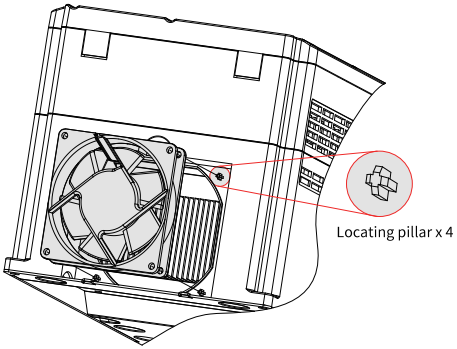
Note

Install the fan in the reverse order of removal and ensure the correct direction of the fan.

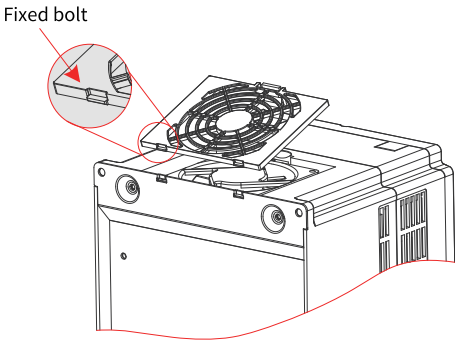
1. Plug the fan power cable connector to the socket.



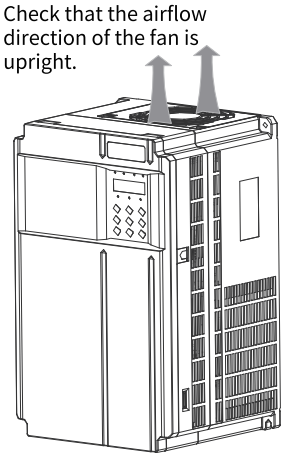
2. Install the fan into the drive, with the four fixing holes at the bottom of the fan aligned with the positioning pins.



3. Insert the two small snap-fit joints on the fan cover into the slot and then press down to fix the snap-fit joints.



4. After replacing the fan, ensure the fan blows the air upwards.



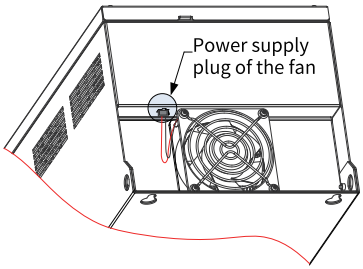
Removing and installing the fan of T7 to T9 models

Note

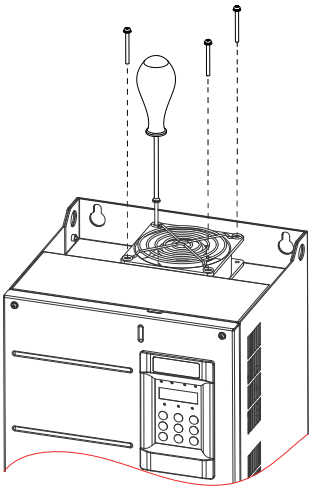
The number and location of cooling fans vary with product models, but the fans are removed and installed in the same way.

Removing the fan

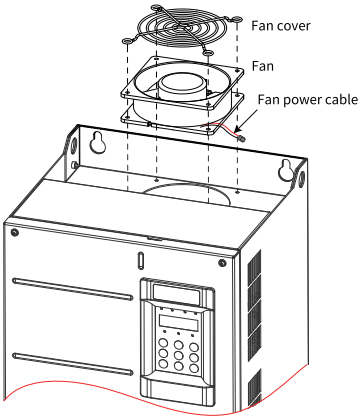
1. Unplug the fan power cable plug from the AC drive (top view)



2. Remove the four screws from the fan cover using a screwdriver.



3. Remove the fan and fan cover from the drive.

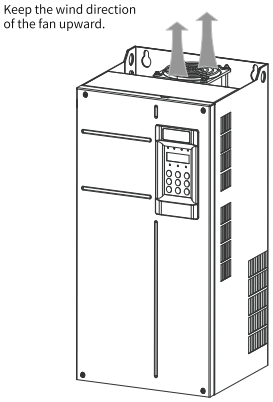


Installing the fan

1. Install the fan in the reverse order of removal and ensure the correct direction of the fan.

2. Align the fixing holes of the fan cover and the fan with those on the drive during installation.

3. After replacing the fan, ensure the fan blows the air upwards.



5.3.3 Replacing the Filter Electrolytic Capacitor

- Possible damage causes: input power supply in poor quality, high ambient temperature, frequent load jumping, and electrolytic aging
- Condition to determine whether the capacitor needs to be replaced: 1) Check whether there is liquid leakage. 2) Check whether the safety valve has protruded. 3) Measure the static capacitance and the insulation resistance.
- Replacement of the capacitor: As the filter capacitor involves the internal parts, do not replace the capacitor by yourself. Contact Inovance for replacement.

5.4 Storage and Repair

Storage

For storage of the AC drive, observe the following items:

- During storage, pack the equipment in the original packing box provided by Inovance.
- Do not expose the equipment to environments with moisture, high temperatures, or direct sunlight for a long time.
- The electrolytic capacitor will deteriorate after long-term storage. Therefore, switch on the AC drive once for at least 5 hours every 6 months. Increase the input voltage slowly to the rated value by using a voltage regulator. Contact Inovance for technical support if necessary.

Warranty

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is caused by proper operation of the user. You will be charged for any repair work after the warranty period expires.

Within the warranty period, maintenance fee will be charged for the following damage:

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

The maintenance is charged according to the latest Price List of Inovance. If otherwise agreed upon, the terms and conditions in the agreement shall prevail.

6 Options

6.1 List of Options

Optional peripherals include braking units, function expansion cards, and external operating panels. For use of each option, see its user guide. If any option is required, specify it in your order.

Table 6–1 Option list

Name		Option Model	Ordering Code	Supported AC Drive Model	Description
Expansion card	I/O expansion card 1	MD38IO1	01013098	All models	It provides five DIs, one relay output terminal, and one DO. Modbus and CANlink are supported.
	I/O expansion card 2	MD38IO2	01013103	All models	It provides three DIs.
	I/O expansion card 3	MD38IO3	01040051	All models	It provides three DIs, one RS-485 communication signal isolation input terminal, and one NO relay output terminal.
	RS-485 communication expansion card	MD38TX1	01013112	All models	Modbus communication expansion card with isolation
	CANlink communication expansion card	MD38CAN1	01013100	All models	CANlink communication expansion card
	CANopen communication expansion card	MD38CAN2	01013102	All models	CANopen communication expansion card
	PROFIBUS DP communication expansion card	MD38DP2	01013144	All models	PROFIBUS DP communication expansion card
	PROFINET communication expansion card	MD500-PN1	01040098	All models	PROFINET communication expansion card
	EtherCAT communication expansion card	MD500-ECAT	01040113	All models	EtherCAT communication expansion card

Name		Option Model	Ordering Code	Supported AC Drive Model	Description
Expansion card	Resolver interface card	MD38PG4	01013081	All models	It is applicable to the resolver with the excitation frequency of 10 kHz and with the DB9 interface To meet the MD38PG4 requirements, the excitation input DC resistance of the resolver must be greater than 17 Ω. Failure to comply will result in MD38PG4 malfunction. Select a resolver with a maximum of four pole pairs. Otherwise, the MD38PG4 card will be overloaded.
	MD38PGMD multi-function encoder card	MD38PGMD	01013147	All models	The card is an encoder interface card with the optional multiplied frequency division output function and supports 5 V or 15 V power supply. The card supports differential input, collector input, and push-pull input, as well as differential output and collector output; therefore, it can be used to connect to different encoders and supports A/B phase input of the host controller.
	23-bit PG card	ES510–PG-CT1	01320007	All models	Applicable to 23-bit encoders of Inovance; with a DB9 interface
Mounting accessory	Through-hole mounting bracket	MD500-AZJ-A1T5	01040001	T5	The bracket is used for through-hole mounting.
		MD500-AZJ-A1T6	01040002	T6	
		MD500-AZJ-A1T7	01040003	T7	
		MD500-AZJ-A1T8	01040004	T8	
		MD500-AZJ-A1T9	01040005	T9	
	Grounding bracket of cable shield	MD500-AZJ-A2T5	01040081	T5	The accessory is used for re-fixing the power cable and stable grounding of the shield in 360°.
		MD500-AZJ-A2T6	01040086	T6	
		MD500-AZJ-A2T7	01040087	T7	
		MD500-AZJ-A2T8	01040084	T8	
		MD500-AZJ-A2T9	01040089	T9	

Name		Option Model	Ordering Code	Supported AC Drive Model	Description
Cable	Main circuit cable	Lugs from Suzhou Yuanli are recommended. For details on cable lug selection, see section of dimensions of main circuit terminals and cable selection.			It is recommended that the input and output main circuit cables use symmetrical shielded cables. Compared with four-conductor cables, symmetrical shielded cables can reduce electromagnetic radiation in the whole transmission system. It is recommended that power cables also use symmetrical shielded cables.
	Control circuit cable	All control circuit cables must be shielded cables. Use a separate shielded cable for each type of analog signal. It is recommended that digital signal cables use shielded twisted pair (STP) cables.			
Operating panel	External LED operating panel	MD32NKE1	01013061	All models	External LED operating panel
	External LCD operating panel	MDKE9	01040037	All models	The external LCD operating panel supports parameter copying and English or Chinese display.
	Extension cable	MDCAB	01013008	All models	It is a standard eight-conductor, three-meter network cable that can be used to connect the MD32NKE1, MD32KC, and MDCP.
		MDCAB-1.5	15048471	All models	1.5-meter cable for the external operating panel

Note

For details on models and specifications of other peripheral electrical components, such as input reactors, EMC filters, output reactors, and fuses, see the section of "Peripheral electrical components".

6.2 Peripheral Electrical Components

6.2.1 Fuse, Contactor, and Circuit Breaker

Caution

To avoid electric shocks, do not power on the AC drive or operate peripherals immediately after a fuse burns or a circuit breaker trips. Instead, wait at least a period of time specified on the product warning label before further operations. Failure to comply will result in product damage, several injuries, or even death.

To comply with EN 61800-5-1 and UL61800-5-1 standards, install a fuse/circuit breaker on the input side of the drive to prevent accidents caused by short circuit in the internal circuit.

The following tables list recommended circuit breakers, fuses, and contactors.

Table 6–2 Selection of fuses, contactors, and circuit breakers (three phase 380-480 V)

Structure	Drive Model	Fuse Compliance with UL		Specification of Recommended Contactor	Specification of Recommended Circuit Breaker
		Rated Current (A)	Model	Rated Current (A)	Rated Current (A)
T5	MD510-4T22	100	FWH-100B	65	80
T6	MD510-4T30	100	FWH-100B	65	80
	MD510-4T37	125	FWH-125B	80	100
T7	MD510-4T45	150	FWH-150B	95	160
	MD510-4T55	200	FWH-200B	115	160
T8	MD510-4T75	250	FWH-250A	150	250
	MD510-4T90	275	FWH-275A	170	250
	MD510-4T110	325	FWH-325A	205	250
T9	MD510-4T132	400	FWH-400A	245	400
	MD510-4T160	500	FWH-500A	300	400

6.2.2 AC Input Reactor

An AC input reactor is optional and mainly used to reduce harmonics in the input current. Install an external reactor as needed in actual applications.

Model

Recommended AC input reactor manufacturers and models are listed in the following tables.

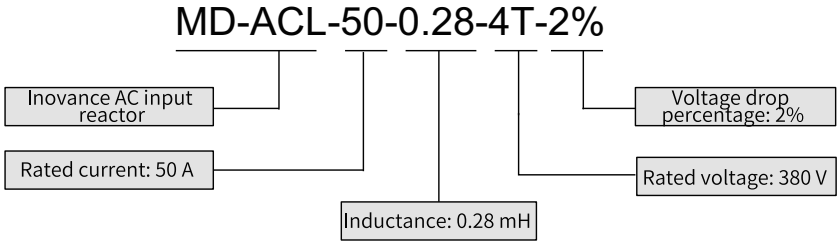


Figure 6-1 AC input reactor model

Table 6–3 Inovance AC input reactor model

Structure	Drive Model	Rated Power (kW)	Rated Current (A)	Reactor Model	Inductance (mH)	Loss (W)
T5	MD510-4T22	22	51.3	MD-ACL-60-0.24-4T	0.24	-
T6	MD510-4T30	30	57.0	MD-ACL-80-0.17-4T	0.17	-
	MD510-4T37	37	69.0	MD-ACL-90-0.16-4T	0.16	-
T7	MD510-4T45	45	89	MD-ACL-120-0.12-4T	0.12	-
	MD510-4T55	55	106	MD-ACL-150-0.095-4T	0.095	-
T8	MD510-4T75	75	139	MD-ACL-200-0.07-4T	0.07	-
	MD510-4T90	90	164	MD-ACL-250-0.056-4T	0.056	-
	MD510-4T110	110	196	MD-ACL-250-0.056-4T	0.056	-
T9	MD510-4T132	132	240	MD-ACL-330-0.042-4T	0.042	-
	MD510-4T160	160	287	MD-ACL-330-0.042-4T	0.042	-

Dimensions

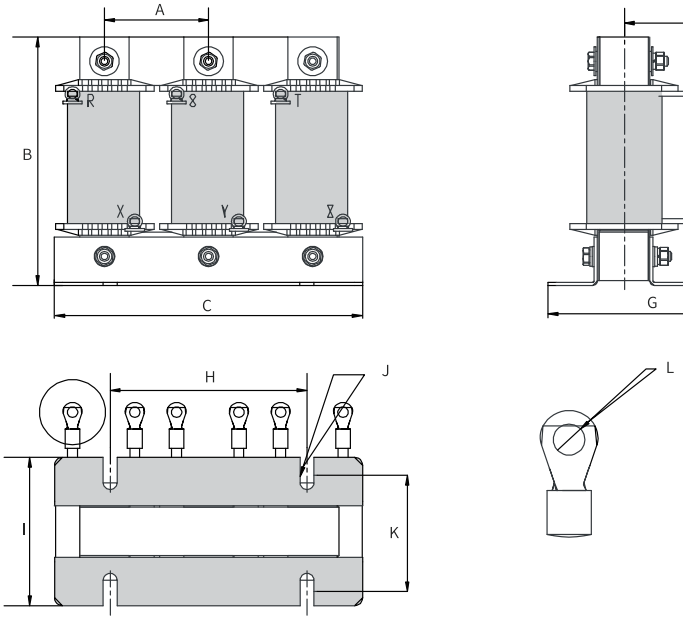


Figure 6-2 Dimensions of AC input reactors (50 A/0.28 mH, 60 A)

Table 6–4 Dimensions of AC input reactors (50 A/0.28 mH, 60 A) (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L
50	64	160	195	80±10	75±5	35±5	135	120±1	92±2	Φ8.5*20	72±2	Φ6.4
60	64	160	195	80±10	75±5	35±5	135	120±1	92±2	Φ8.5*20	72±2	Φ6.4

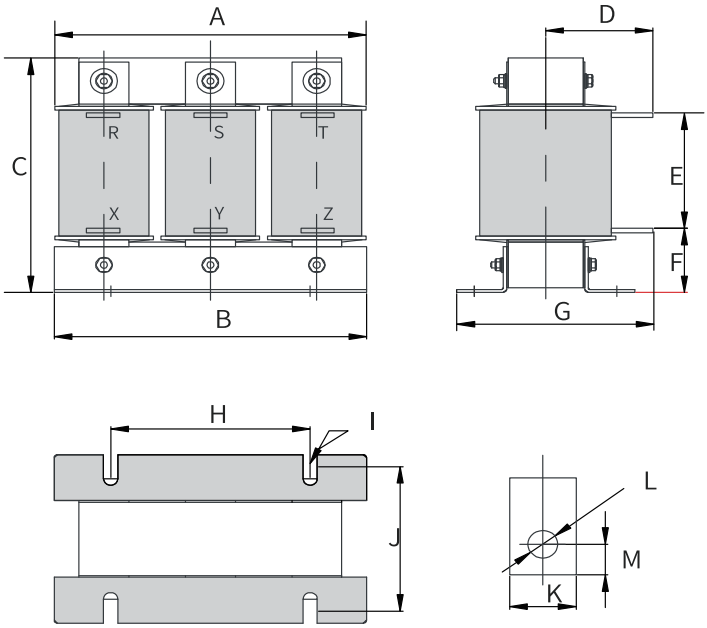


Figure 6-3 Dimensions of AC input reactors (90 A/120 A)

Table 6–5 Dimensions of AC input reactors (90 A/120 A) (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M
90	195	188±1	160	-	-	-	150	120±1	Φ8.5*20	72±2	-	-	-
120	195	188±1	160	78±10	79±5	40±5	135	120±1	Φ8.5*20	92±2	20	Φ9	10

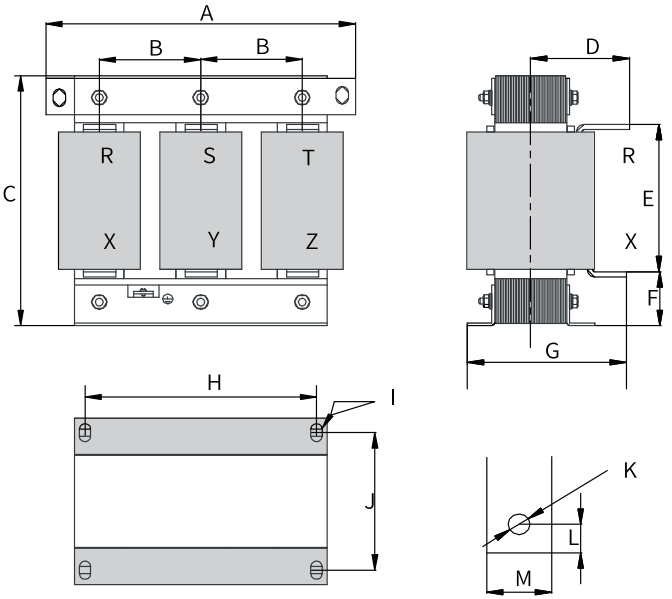


Figure 6-4 Dimensions of AC input reactors (150-330 A)

Table 6–6 Dimensions of AC input reactor (150-330 A) (unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M
150	250	81±5	230	92±10	145±5	38±5	155	182±1	Φ11*18	76±2	Φ11	13	25
200	250	81±5	230	102±10	145±5	40±5	175	182±1	Φ11*18	96±2	Φ11	13	25
250	250	81±5	260	102±10	160±5	50±5	175	182±1	Φ11*18	96±2	Φ11	13	25
330	290	95±5	275	107±10	160±5	60±5	180	214±1	Φ11*18	100±2	Φ12	15	30

Note

The dimensions of AC input reactors provided here are for reference only. Actual dimensions may vary with models.

6.2.3 EMC Filter

Overview

To comply with the radiated and conducted emission requirements of EN IEC 61800-3, install the EMC filter listed in the following table.

For 132 kW to 160 kW AC drives, built-in filters can meet requirements of EN 61800-3 C3. Therefore, external filters are not required.

Table 6–7 Standard EMC filter model and appearance

Filter Model		Appearance
Schaffner series	FN 3258 series	
	FN 3359 series	
Jianli series		

Models and dimensions (Schaffner filters)

Table 6–8 Selection of Schaffner filters (three-phase 380 V to 480 V)

Model	Rated Power (kW)	Rated Current (A)	Filter Model	Loss (W)
MD510-4T22	22	51.3	FN 3258-75-44	31.2
MD510-4T30	30	57.0	FN 3258-75-44	32.2
MD510-4T37	37	69.0	FN 3258-75-44	32.2
MD510-4T45	45	89	FN 3258-100-44	34.5
MD510-4T55	55	106	FN 3258-130-44	43.1

Model	Rated Power (kW)	Rated Current (A)	Filter Model	Loss (W)
MD510-4T75	75	139	FN 3258-180-44	58.3
MD510-4T90	90	164	FN 3258-180-44	58.3
MD510-4T110	110	196	FN 3359-250-28	49
MD510-4T132	132	240	FN 3359-250-28	49
MD510-4T160	160	287	FN 3359-320-99	19

The following figure shows the dimensions of FN 3258 series filters (7 A to 180 A).

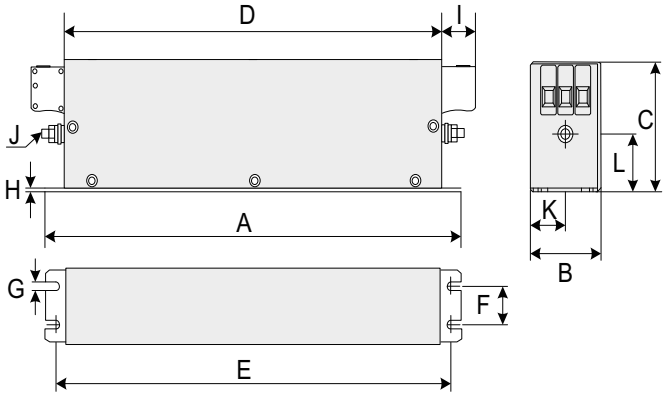


Figure 6-5 Dimensions of FN 3258 series filters (7 A to 180 A)

Table 6–9 Dimensions of FN 3258 series filters (7 A to 180 A, unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L
7	190	40	70	160	180	20	4.5	1	22	M5	20	29.5
16	250	45	70	220	235	25	5.4	1	22	M5	22.5	29.5
30	270	50	85	240	255	30	5.4	1	25	M5	25	39.5
42	310	50	85	280	295	30	5.4	1	25	M6	25	37.5
55	250	85	90	220	235	60	5.4	1	39	M6	42.5	26.5
75	270	80	135	240	255	60	6.5	1.5	39	M6	40	70.5
100	270	90	150	240	255	65	6.5	1.5	45	M10	45	64
130	270	90	150	240	255	65	6.5	1.5	45	M10	45	64
180	380	120	170	350	365	102	6.5	1.5	51	M10	60	47

The following figure shows the dimensions of FN 3359 series filters (150 A to 250 A).

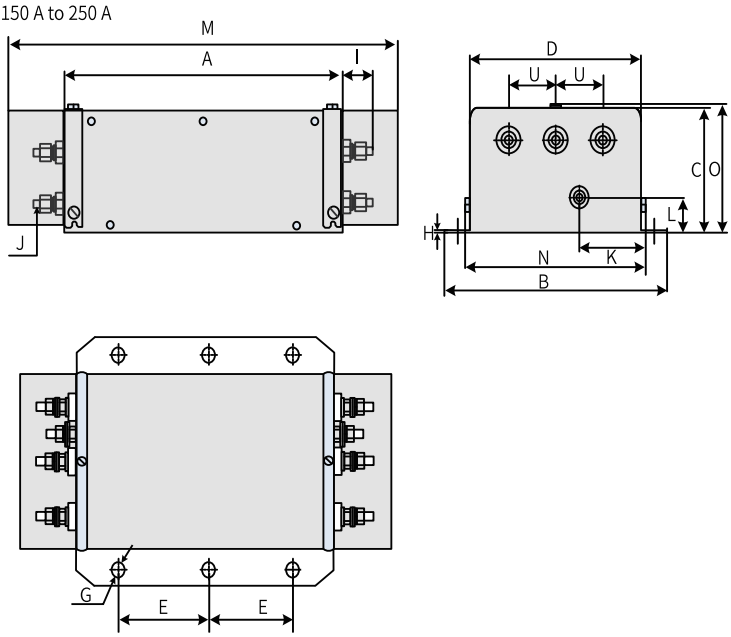


Figure 6-6 Dimensions of FN 3359 series filters (150 A to 250 A)

Table 6–10 Dimensions of FN 3359 series filters (150 A to 250 A, unit: mm)

Mark	Rated Current
	150 A to 250 A
A	300
B	230
C	125
D	180
E	120
F	205
G	ϕ12
H	2
I	33
J	M10
K	62.5
L	35
M	420
N	191
O	132
S	-
T	-

Mark	Rated Current
	150 A to 250 A
U	55
V	-
W	-
X	-
Y	-
Z	-

The following figure shows the dimensions of FN 3359 series filters (320 A to 2500 A).

320 A to 2500 A

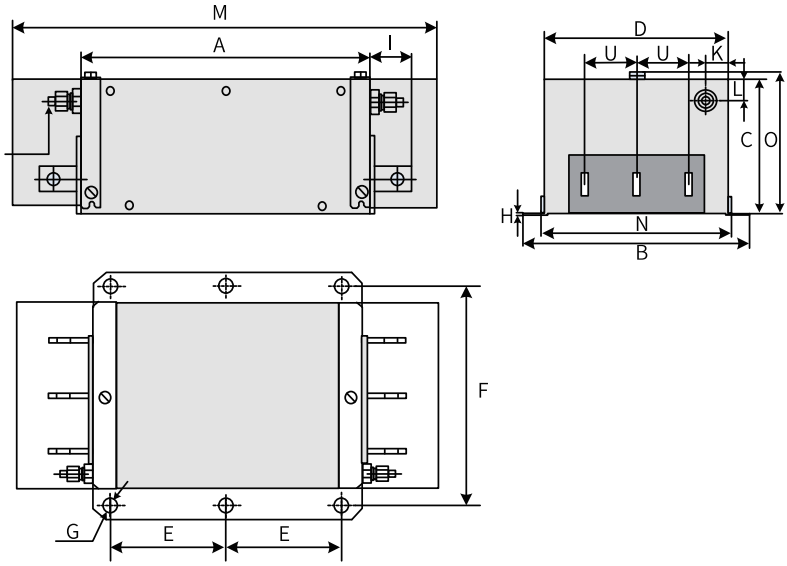


Figure 6-7 Dimensions of FN 3359 series filters (320 A to 2500 A)

The following figure shows the dimensions of the copper busbar.

320 A to 1000 A

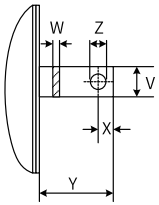


Figure 6-8 Dimensions of the copper busbar

Table 6–11 Dimensions of FN 3359 series filters (320 A to 2500 A, unit: mm)

Mark	Rated Current
	320 A to 2500 A
A	300
B	260
C	115
D	210
E	120
F	235
G	ϕ12
H	2
I	43
J	M12
K	20
L	20
M	440
N	221
O	122
S	-
T	-
U	60
V	25
W	6
X	15
Y	40
Z	ϕ10.5

Models and dimensions (Jianli filters)

Table 6–12 Selection of Jianli filters (three-phase 380 V to 480 V)

Drive Model	Rated Power (kW)	Rated Current (A)	Filter Model	Loss (W)
MD510-4T22	22	51.3	DL-65EBK5	27.4
MD510-4T30	30	57.0	DL-65EBK5	27.4
MD510-4T37	37	69.0	DL-80EBK5	32.6
MD510-4T45	45	89	DL-100EBK5	33
MD510-4T55	55	106	DL-130EBK5	37.5
MD510-4T75	75	139	DL-160EBK5	38.4
MD510-4T90	90	164	DL-200EBK5	34
MD510-4T110	110	196	DL-250EBK5	49
MD510-4T132	132	240	DL-300EBK3	49
MD510-4T160	160	287	DL-400EBK3	19

The following figure shows the dimensions of Jianli filters (50 A to 200 A).

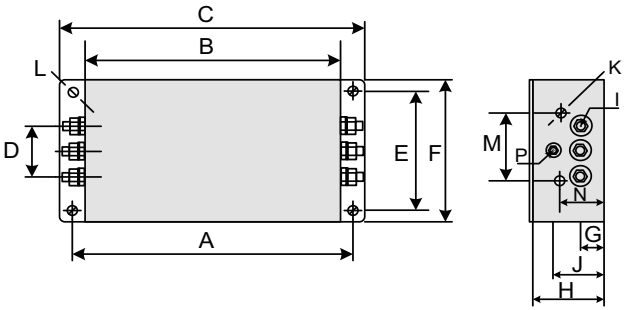


Figure 6-9 Dimensions of Jianli filters (50 A to 200 A)

Table 6–13 Dimensions of Jianli filters (50 A to 200 A, unit: mm)

Model	A	B	C	D	E	F	G	H	I	J	K	M	N	P	L
DL-25EBK5	243	224	265	58	70	102	25	92	M6	58	M4	74	49	M6	6.4 x 9.4
DL-35EBK5															
DL-50EBK5															
DL-65EBK5															
DL-80EBK5	354	323	388	66	155	188	30	92	M8	62	M4	86	56	M8	6.4 x 9.4
DL-100EBK5															
DL-130EBK5															
DL-160EBK5															
DL-200EBK5															

Dimensions of Jianli filters (250 A to 800 A)

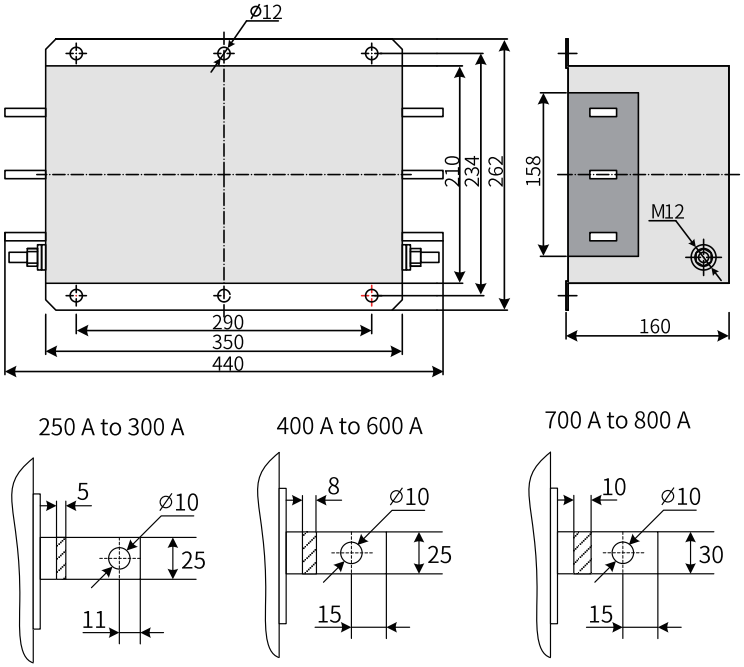


Figure 6-10 Dimensions of Jianli filters (250 A to 800 A, unit: mm)

6.2.4 Output Reactors

Models and dimensions (Inovance)

Models and dimensions of the recommended Inovance AC output reactors are as follows.

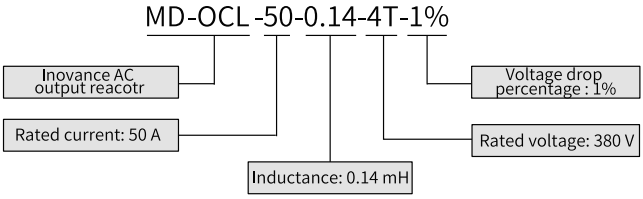


Figure 6-11 AC output reactor model

Table 6–14 Selection of Inovance AC output reactors (three-phase 380 V to 480 V)

Structure	AC Drive Model	Motor Capacity (kW)	Rated Current (A)	Reactor Model	Inductance (mH)	Loss (W)
T5	MD510-4T22	22	45	MD-OCL-60-0.12-4T-1%	0.12	-
T6	MD510-4T30	30	60	MD-OCL-80-0.087-4T-1%	0.087	-
	MD510-4T37	37	75	MD-OCL-90-0.078-4T-1%	0.078	-
T7	MD510-4T45	45	91	MD-OCL-120-0.058-4T-1%	0.058	-
	MD510-4T55	55	112	MD-OCL-150-0.047-4T-1%	0.047	-
T8	MD510-4T75	75	150	MD-OCL-200-0.035-4T-1%	0.035	-
	MD510-4T90	90	176	MD-OCL-250-0.028-4T-1%	0.028	-
	MD510-4T110	110	210	MD-OCL-250-0.028-4T-1%	0.028	-
T9	MD510-4T132	132	253	MD-OCL-330-0.021-4T-1%	0.021	-
	MD510-4T160	160	304	MD-OCL-330-0.021-4T-1%	0.021	-

Note: The recommended output reactor in the table is applicable only to scenarios with the output frequency of 50 Hz. For scenarios with higher output frequencies, consult the technical personnel.

Dimensions of AC output reactors

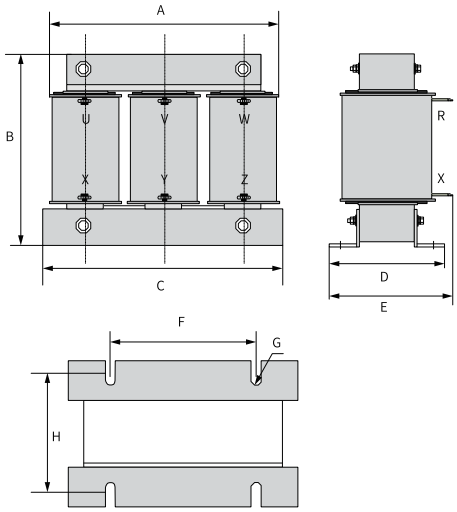


Figure 6-12 Dimensions of AC output reactors (60 A)

Table 6–15 Dimensions of AC output reactor (60 A, unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H
60	195	165	188±1	92±2	130	120±1	Φ8.5*20	72±2

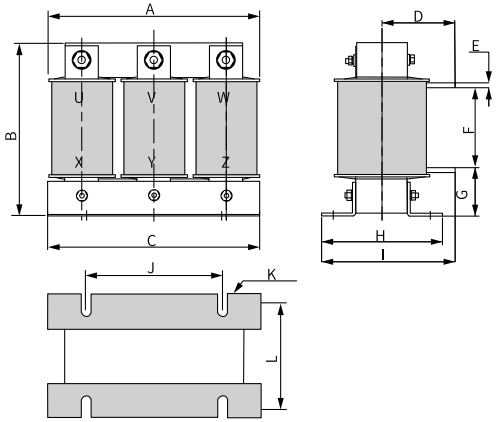


Figure 6-13 Dimensions of AC output reactors (80-120 A)

Table 6–16 Dimensions of AC output reactor (80-120 A, unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L
80	195	165	188±1	68±10	4	75±5	40±5	92±2	130	120±1	Φ8.5*20	72±2
90	195	165	188±1	68±10	4	75±5	40±5	92±2	130	120±1	Φ8.5*20	72±2
120	195	165	188±1	78±10	4	75±5	40±5	112±2	135	120±1	Φ8.5*20	72±2

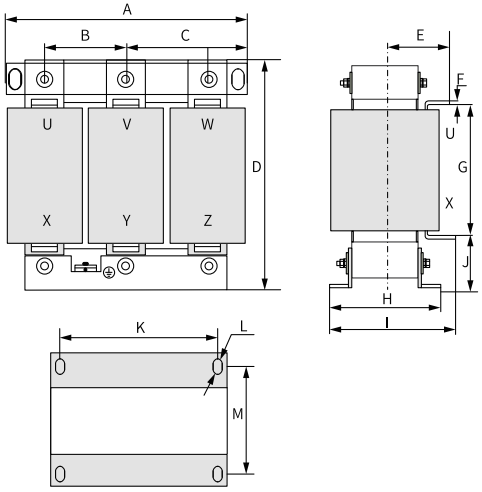


Figure 6-14 Dimensions of AC output reactors (150-250 A)

Table 6–17 Dimensions of AC output reactor (150-250 A, unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M
150	250	81±5	81±5	230	97±10	5	140±5	113±2	170	42±5	182±1	Φ11*18	87±2
200	250	81±5	81±5	230	102±10	5	140±5	123±2	175	42±5	182±1	Φ11*18	97±2
250	250	81±5	81±5	230	102±10	5	140±5	123±2	175	42±5	182±1	Φ11*18	97±2

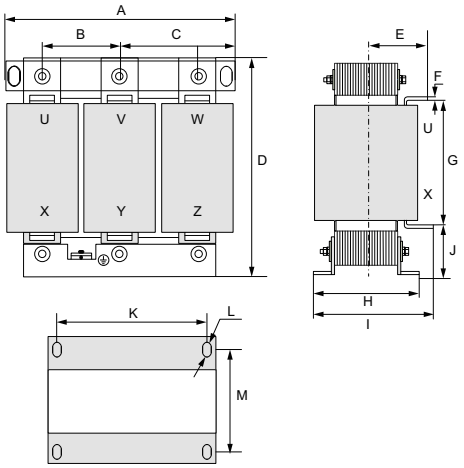


Figure 6-15 Dimensions of AC output reactors (330 A)

Table 6–18 Dimensions of AC output reactor (330 A, unit: mm)

Rated Current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M
330	290	95±5	95±5	250	110±10	5	155±5	132±2	190	45±5	214±1	Φ11*18	106±2

Models and dimensions (Schaffner)

Models and dimensions of the recommended Schaffner AC output reactors are as follows.

Table 6–19 Selection of output reactors (Schaffner)

Structure	Drive Model	Motor Capacity (kW)	Rated Current (A)	Reactor Model	Inductance (mH)	Loss (W)
T5	MD510-4T22	22	45	RWK 305-45-KL	0.131	60
T6	MD510-4T30	30	60	RWK 305-60-KL	0.098	65
	MD510-4T37	37	75	RWK 305-90-KL	0.065	75
T7	MD510-4T45	45	91	RWK 305-110-KL	0.053	90
	MD510-4T55	55	112	RWK 305-124-KS	0.047	110
T8	MD510-4T75	75	150	RWK 305-156-KS	0.038	120
	MD510-4T90	90	176	RWK 305-182-KS	0.032	140
	MD510-4T110	110	210	RWK 305-230-KS	0.026	180
T9	MD510-4T132	132	253	RWK 305-280-KS	0.021	220
	MD510-4T160	160	304	RWK 305-330-KS	0.018	240

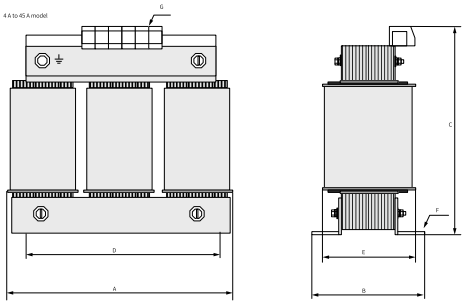


Figure 6-16 Dimensions of output reactors (45 A)

Table 6–20 Dimensions of output reactors (45 A, unit: mm)

Series	A	B	C	D	E	F	G
45 A	155	Max. 110	Max. 190	130	72	8 x 12	10 mm^2

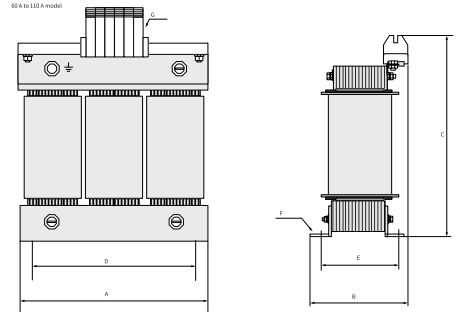


Figure 6-17 Dimensions of output reactors (60 A to 110 A)

Table 6–21 Dimensions of the output reactor (60 A to 110 A, unit: mm)

Series	A	B	C	D	E	F	G
60 A and 72 A	155	Max. 125	Max. 190	130	70	8 x 12	16 mm^2
90 A	190	Max. 115	Max. 225	170	57	8 x 12	35 mm^2
110 A	190	Max. 130	Max. 220	170	67	8 x 12	35 mm^2

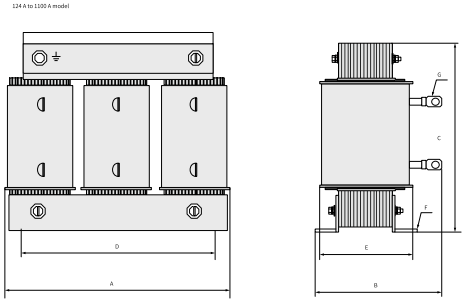


Figure 6-18 Dimensions of output reactors (124 A to 330 A)

Table 6–22 Dimensions of output reactors (124 A to 330 A, unit: mm)

Series	A	B	C	D	E	F	G
124 A	190	Max. 180	Max. 160	170	67	8 x 12	Ø8
143 A	190	Max. 180	Max. 160	170	77	8 x 12	Ø8
156 A and 170 A	190	Max. 180	Max. 160	170	77	8 x 12	Ø10
182 A	210	Max. 180	Max. 185	175	97	8 x 12	Ø10
230 A	240	220	-	190	119	11 x 15	Ø12
280 A	240	235	-	190	133	11 x 15	Ø12
330 A	240	240	-	190	135	11 x 15	Ø12

6.2.5 Simple Filter

The simple EMC filter effectively attenuates radio frequency noise from the power grid and running AC drive. In addition, for devices equipped with the earth leakage circuit breaker (ELCB), if the ELCB trips incorrectly, install a simple filter on the input side of the drive for suppression.

Ground the simple filter properly and use a cable shorter than 30 cm to connect the filter and the drive. The grounding terminal of the simple filter must be connected to the grounding terminal of the drive, and the grounding cable must be as short as possible (shorter than 30 cm).

Dimensions

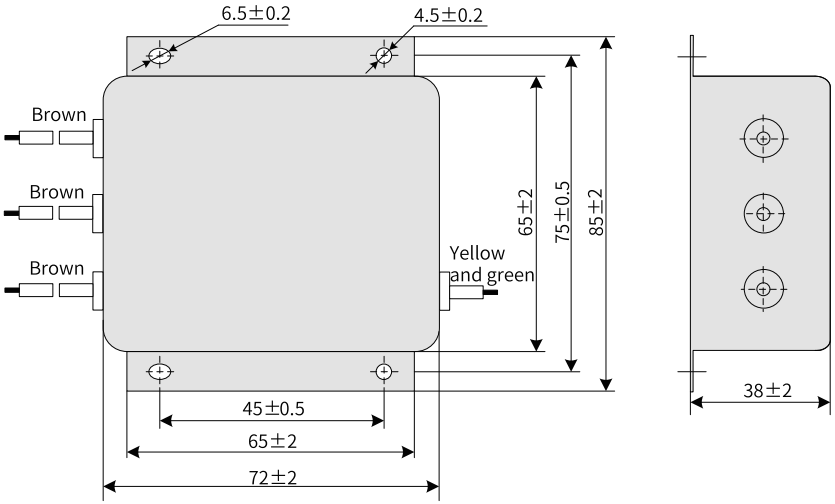


Figure 6-19 Dimensions of the simple filter

Table 6–23 Dimensions of the simple filter

Model	Code	Outline Dimension (Width × Depth x Height) (unit: mm)	Mounting Dimensions (Width x Depth) (mm)
Cxy-1-1	11025018	85 x 72 x 38	45 x 75

Mounting methods

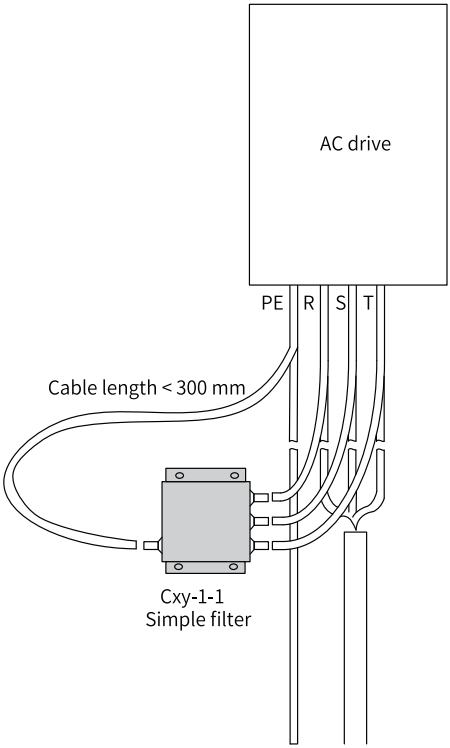
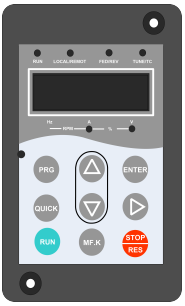


Figure 6-20 Simple filter installation

6.3 Operating Panel

Model	Description	Appearance
MD32NKE1	It is an external LED operating panel adaptable to the MD510 series. It can be operated in the same way as the AC drive's operating panel, facilitating commissioning. For dimensions, see *"Figure 6–21 " on page 104* .	
MDKE9	It is an LCD operating panel (optional) on which you can copy, modify, and download parameters. The LCD operating panel displays information in Chinese and English. It is easy to use. For dimensions, see *"Figure 6–22 " on page 104* .	

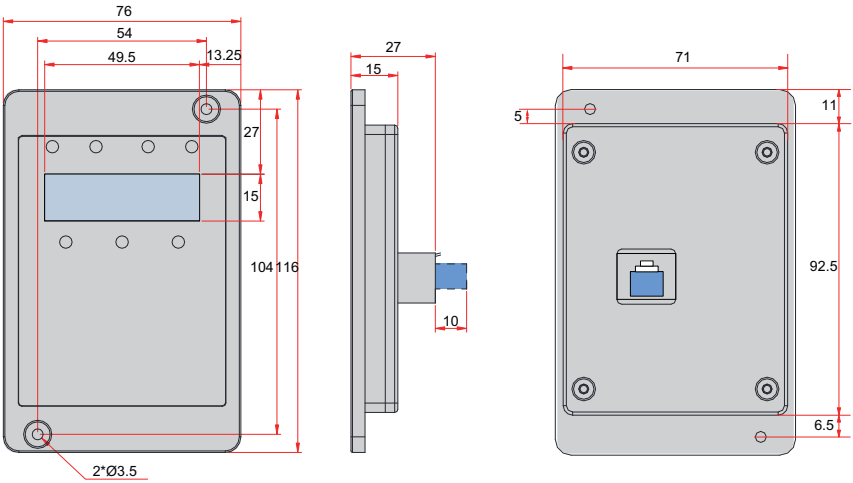


Figure 6-21 Dimensions (unit: mm) of the MD32NKE1

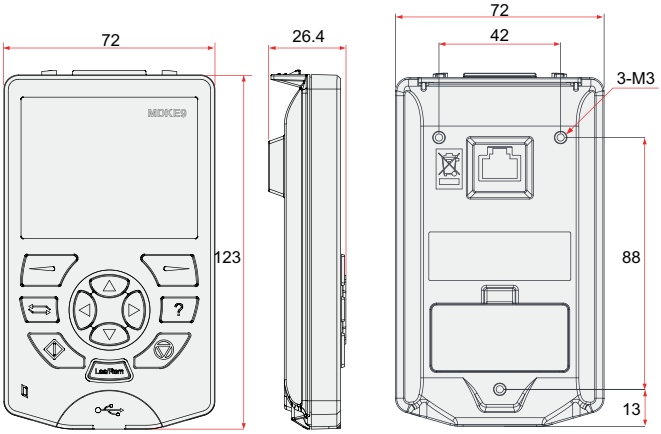


Figure 6-22 Dimensions (unit: mm) of the MDKE9

7 Communication

7.1 Parameter Communication Address

7.1.1 Introduction to Parameters

The AC drive supports the Modbus RTU protocol. The host controller allows users to control the AC drive, such as monitoring states, or viewing and changing parameters through the protocol. The communication data is classified into parameter data and non-parameter data. The non-parameter data includes operation commands, operation status, operation parameters, and alarm information.

Parameter data

Parameter Data	Group F (Read/Write)	F0, F1, F2, F3, F4, F5, F6, F7, F8, F9, FA, FB, FC, FD, FE, and FF
	Group A (Read/Write)	A0, A1, A2, A3, A4, A5, A6, A7, A8, A9, AA, AB, AC, AD, AE, and AF
	Group B (Read/Write)	B0, B1, B2, B6

The communication addresses of parameter data are defined as follows:

1. Reading parameter data through communication
   For groups F0 to FF and A0 to AF, the high-order 8 bits of the communication address indicate the group number and the low-order 8 bits indicate the parameter number.

   Example:

   The communication address of F0-16 is F010H, where F0H represents group F0 and 10H is the hexadecimal data format of serial number 16 in the group.

   The communication address of AC-08 is AC08, where ACH represents group AC and 08H is the hexadecimal data format of serial number 8 in the group.

2. Writing parameter data through communication
   For parameters in groups F0 to FF, the high-order 8 bits of the communication address are 00 to 0F or F0 to FF, depending on whether the parameter is written to the EEPROM. The low-order 8 bits indicate the parameter number in the group.

   Take writing F0-16 as an example.

   If F0-16 does not need to be written to the EEPROM, its communication address is 0010H.

   If F0-16 needs to be written to the EEPROM, its communication address is F010H.

For parameters in groups A0 to AF, the high-order 8 bits of the communication address are 40 to 4F or A0 to AF, depending on whether the parameter is written to the EEPROM. The low-order 8 bits indicate the parameter number in the group.

Take writing AC-08 as an example.

If AC-08 does not need to be written to the EEPROM, the communication address is 4C08H.

If AC-08 needs to be written to the EEPROM, the communication address is AC08H .

Non-parameter data

MD510Non-parameter Data	Status Data (Read-only)	Monitoring parameters in group U, AC drive fault description, and AC drive running status
	Control Parameters (Write-only)	Control commands, communication references, DO control, AO1 control, AO2 control, high-speed pulse (FMP) output control, and parameter initialization

1. Status data

Status data includes monitoring parameters in group U, AC drive fault description, and AC drive running status.

- Monitoring parameters in group U
  For group U0 to UF, the high-order 8 bits of the communication address is 70 to 7F, and the low-order 8 bits indicate the parameter number in the group. For example, the communication address of U0-11 is 700BH.
- AC drive fault description
  When the AC drive fault description is read via communication, the communication address is fixed to 8000H. The host controller can obtain the current fault code of the AC drive by reading the address. For the fault code description, see definitions of F9-14.
- AC drive running status
  When the running status of the AC drive is read through communication, the communication address is fixed to 3000H. The host controller can obtain the current running status of the AC drive by reading the address. The communication address is defined as follows.

Communication Address of AC Drive Running Status	Definition of Status Word
3000H	1: Forward run
	2: Reverse run
	3: Stop

2. Control parameters

Control parameters are divided into control commands, communication setpoint, DO control, AO1 control, AO2 control, and parameter initialization.

- Control command
  When F0-02 (command source) is set to 2 (communication control), the host controller can implement control such as start/stop of the AC drive by using the communication address. The control command is defined as follows.

Communication Address of AC Drive Running Status	Definition of Status Word
2000H	1: Forward run 2: Reverse run 3: Forward jogging 4: Reverse jogging 5: Coast to stop 6: Decelerate to stop 7: Reset upon fault

- Communication setpoint
  The communication setpoint applies when the frequency, torque, torque upper limit, V/f separation voltage, PID reference, and PID feedback of the AC drive are set through communication The communication address is 1000H. When the communication address is set through the host controller, the data range of the address is –10000 to 10000, corresponding to –100.00% to 100.00% of the reference.

- DO control
  When the DO is assigned with function 20, the host controller can control the DO of the AC drive through the communication address in the communication control mode. The communication address is defined as follows.

Communication Address for DO Control	Command
2001H	Bit 0: DO1 output control Bit 1: DO2 output control Bit 2: Relay1 output control Bit 3: Relay2 output control Bit 4: FMR output control

- AO1, AO2, and high-speed pulse output FMP control
  When AO1, AO2, and high-speed pulse output FMP terminal are assigned with function 12, the host controller can control the AO and FMP terminal through the communication address in the communication control mode. The communication address is defined as follows.

Output Control Communication Address		Command
AO1	2002H	0 to 7FFF represent 0% to 100%.
AO2	2003H	
FMP	2004H	

- Parameter initialization
  This function is required when you need to initialize parameters of the drive by using the host controller.

  If FP-00 (User password) is set to a non-zero value, the password needs to be verified through communication. After successful password verification, the host controller performs parameter initialization within 30s.

  The communication address of password verification through communication is 1F00H. Directly write the correct user password to this address to perform password verification. The communication address of parameter initialization through communication is 1F01H, as defined in the following table.

Communication Address for Parameter Initialization	Command
1F01H	0: Disable 1: Restore to default settings mode 1 2: Clear records 4: Back up current user parameters 501: Restore user backup parameters 503: Restore to default settings mode 2

7.1.2 Modbus Communication Protocol

Overview

MD510The AC drive provides RS485 communication interfaces and supports the Modbus RTU slave communication protocol. You can carry out centralized control by using a PC or PLC and set the running commands, modify or read parameters, and read the operating status and fault information of the AC drive through the communication protocol.

This protocol defines content and format of information transmitted during serial communication. The format includes master polling (or broadcasting) and master coding method, and the content includes parameters for the action, transmission data, and error check. The slave response uses the same structure including action confirmation, returned data, and error check. If an error occurs when the slave receives a message, or the slave cannot complete the action required by the master, the slave returns a fault message as a response to the master.

Application mode

The drive, acting as a communication slave, is connected to a a PC/PLC controlled network consisting of one master and multiple slaves and equipped with the RS485 bus.

Hardware interface

The RS485 expansion card MD38TX1 must be inserted into the AC drive.

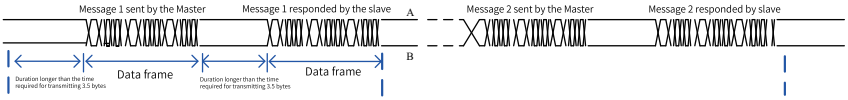
Topology

The system consists of a single master and multiple slaves. In the network, each communication device has a unique address. One of the devices (usually a PC host controller, a PLC, or an HMI) acts as the master to initiate communication and reads or writes parameters of the slave. Other devices act as slaves to respond to the query or operations from the master. At the same moment, only one device can transmit data and the other can only receive data.

The address range of the slaves is 1 to 247, and 0 is a broadcast address. A slave address must be unique in the network.

Communication transmission mode

The asynchronous serial and half-duplex transmission mode are used. During asynchronous serial communication, data is sent frame by frame in the form of packets. According to the Modbus RTU protocol, an interval that is longer than the transmission time of 3.5 bytes on the communication data line marks the start of a new communication frame.



MD510The built-in communication protocol of the AC drive is the Modbus RTU slave communication protocol, which allows the AC drive to respond to the query command from the master or execute the action according to query command from the master and respond with communication data.

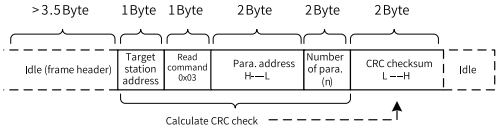
A master can be a PC, an industrial control device, or a PLC, etc. The master can separately communicate with a slave or issue broadcast information to all slaves. When the master sends a query command to a single slave, the slave needs to return a response frame. For a broadcast message sent by the master, the slaves do not need to return a response to the master.

7.1.3 Communication Data Frame Structure

The following figure shows the communication data format of the Modbus RTU protocol. The AC drive supports reading or writing only of word type parameters, and does not support reading or writing of bytes or bits. The read operation command is

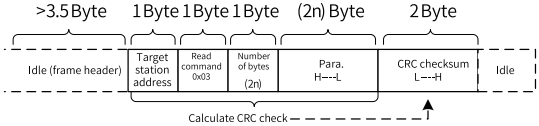
0x03, the write operation command is 0x06, and the multi-data write operation command is 0x10.

Frame of read command from the master

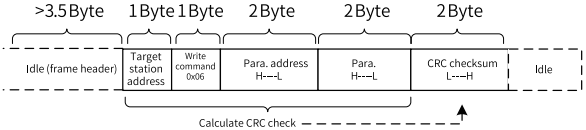


In theory, the host controller can read or write a maximum of 12 consecutive parameters. However, these parameters must be in the same group. Otherwise, a response error occurs.

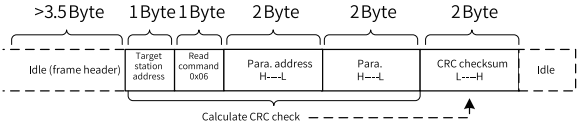
Frame of slave response to read command



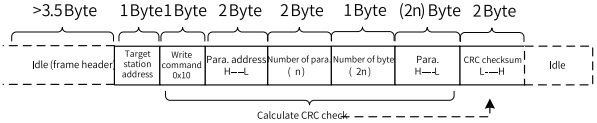
Frame of write command from the master



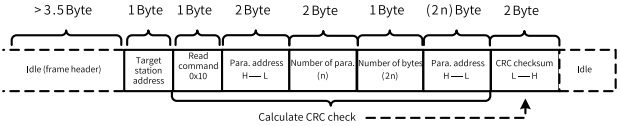
Frame of slave response to write command



Frame of multi-write command from the master



Frame of slave response to multi-write command

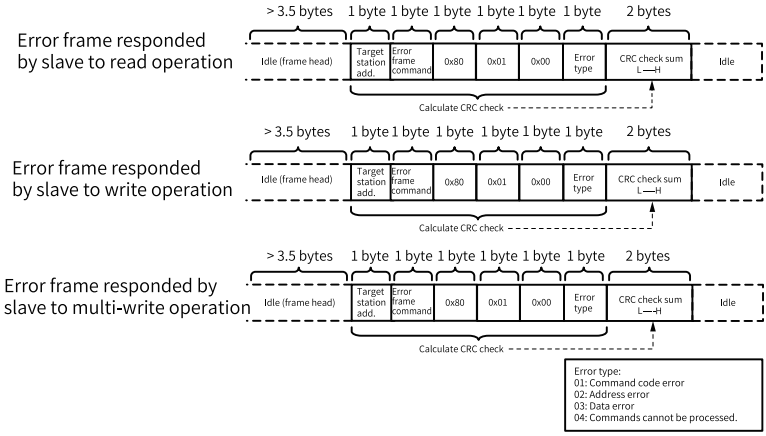


If the slave detects a communication frame error or reading/writing failure caused by other reasons, an error frame will be returned.

Note

No response is returned for CRC check error.

- When FD-05 is set to 0, the ones place indicates that Modbus is the non-standard protocol version.



- When FD-05 is set to 1, the ones place indicates that Modbus is the standard protocol version.

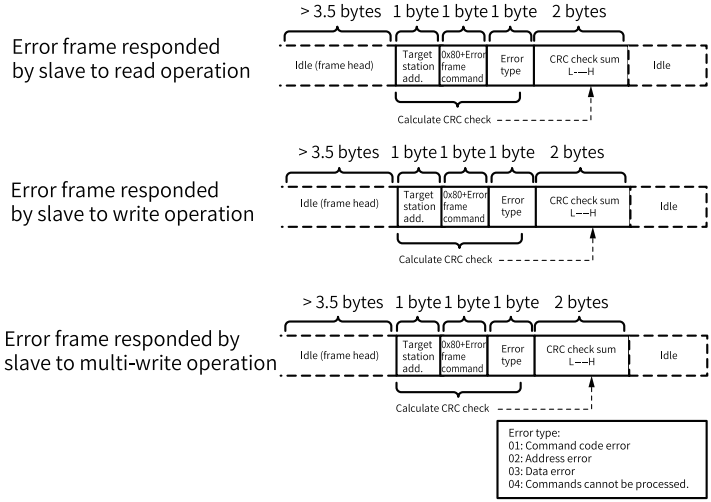


Table 7–1 Data frame fields

Frame Header (START)	Longer than the time for transmitting 3.5 bytes
Slave Address (ADR)	Communication address range: 1 to 247; 0: Broadcast address
Command Code (CMD)	03: Read a slave parameter; 06: Write a slave parameter; 10: Write multiple slave parameters
Parameter address (H)	AC drive internal parameter address in hexadecimal format; parameter type and non-parameter type (such as running status parameters and running commands). See the address definition for details. Low-order bytes follow high-order bytes during transmission.
Parameter address (L)	
Number of parameters (H)	Number of parameters read in this frame. 1 indicates that one parameter is read. Low-order bytes follow high-order bytes during transmission. Only one parameter can be modified at a time. When the command word is 06, these two fields are invalid.
Number of parameters (L)	
Number of data bytes	Data length, which is twice the number of parameters. When the command word is 03 or 06, the field is invalid.
Data (H)	Response data or data to be written. Low-order bytes follow high-order bytes during transmission.
Data (L)	
CRC low-order bits	Detection value: CRC16 check value. High-order bytes follow low-order bytes during transmission. For the calculation method, see the following descriptions of CRC.
CRC high-order bits	
END	Time required for transmitting 3.5 bytes

CRC check:

The cyclical redundancy check (CRC) adopts the RTU frame format. A Modbus message includes a CRC-based error check field. The CRC field checks content of the entire message. The CRC field is two bytes, containing a 16-bit binary value. It is added to the message after being calculated by the transmission device. The receiving device recalculates a CRC value in the message, and compares the calculated value with the CRC value in the received CRC field. If the two CRC values are different, transmission errors occur.

The CRC is first stored to 0xFFFF. Then a procedure is invoked to process the consecutive 8-bit byte in the message and the value in the register. Only the 8-bit data in each character is valid for the CRC. The start bit, stop bit and the parity bit do not apply to the CRC.

During CRC, each eight-bit byte is in exclusive or (XOR) with the content in the register. The result is shifted to the least significant bit (LSB), and 0 is filled in the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB is 1, the register then performs XOR with a preset value. If the LSB is 0, no XOR is performed. This process is repeated until eight shifts have been performed. After the

last (eighth) shift, the next eight-bit byte is in XOR with the register's current value, and the process repeats for eight more shifts as described above. The final value of the register is the CRC value after all the bytes in the message have been applied.

The CRC is added to a message from the low-order byte to the high-order byte. The CRC simple function is as follows:

```
unsigned int crc_chk_value (unsigned char *data_value,unsigned char length)
{
unsigned int crc_value=0xFFFF;
    int i;
    while (length–)
      {
          crc_value^=*data_value++;
           for (i=0;i<8;i++)
          {
                if (crc_value&0x0001)
                    {
                      crc_value= (crc_value>>1) ^0xa001;
                }
                else
                {
                      crc_value=crc_value>>1;
                }
          }
    }
return (crc_value);
 }
```

Definition of communication parameter addresses:

The parameters can be read and written (except those which cannot be changed because they are only for factory use or monitoring).

7.1.4 Parameter Address Expression Rules

The parameter group number and parameter identification number are used to express parameter addresses.

High-order bytes: F0 to FF (group F), A0 to AF (group A), 70 to 7F (group U)

Low-order bytes: 00 to FF

For example, to access F3-12, the communication address of F3-12 is expressed as 0xF30C.

Group FF: Parameters cannot be read or modified. Group U: Parameters are ready-only and cannot be modified.

Some parameters cannot be modified when the AC drive is running. Some parameters cannot be modified regardless of the status of the AC drive. When modifying a parameter, pay attention to the range, unit, and description of the parameter.

Group No.	Communication Address	Parameter Address in RAM that Is Modified via Communication
F0 to FE	0xF000 to 0xFEFF	0x0000 to 0x0EFF
A0 to AC	0xA000 to 0xACFF	0x4000 to 0x4CFF
U0	0x7000 to 0x70FF	-
B0 and B6	0xB000 to 0xB6FF	0x5000 to 0x56FF

Note

Frequent storing to the EEPROM reduces its service life. Therefore, in communication mode, users can change values of certain parameters in RAM without storing the settings. It takes about 15 ms to read and write a parameter per time. Frequent operations to the EEPROM may cause data interaction (read-write) failure.

For parameters in group F, if you want to change a parameter through communication without storing it to the EEPROM, change the high-order F of the parameter address to 0. For parameters in group A, if you want to change a parameter through communication without storing it to the EEPROM, change the high-order A of the parameter address to 4.

The parameter addresses are expressed as follows:

High-order bytes: 00 to 0F (group F), 40 to 4F (group A)

Low-order bytes: 00 to FF

Example:

If the parameter F3-12 is not stored to the EEPROM, the address is expressed as 030C. If the parameter A0-05 is not stored to the EEPROM, the address is expressed as 4005. The address indicates that it can be only written to the RAM. When the address is read from the RAM, it is invalid.

The following table lists some stop/running parameters.

Address	Description	Address	Description
1000H	*Communication setting value (decimal) (write-only) -10000 to 10000	1010H	PID settings
1001H	Operating frequency	1011H	PID feedback
1002H	Bus voltage	1012H	PLC stage
1003H	Output voltage	1013H	Pulse input frequency (unit: 0.01 kHz)
1004H	Output current	1014H	Feedback speed (unit: 0.1 Hz)
1005H	Output power	1015H	Remaining running time
1006H	Output torque	1016H	AI1 voltage before correction
1007H	Running speed	1017H	AI2 voltage before correction
1008H	DI input indication	1018H	AI3 voltage before correction
1009H	DO output indication	1019H	Linear speed
100AH	AI1 voltage	101AH	Current power-on time
100BH	AI2 voltage	101BH	Current operating time
100CH	AI3 voltage	101CH	Pulse input frequency (unit: 1 Hz)
100DH	Counting value input	101DH	Current communication setting value (read-only)
100EH	Length value input	101EH	Actual feedback speed
100FH	Load speed	101FH	Display of main frequency X
–	–	1020H	Display of auxiliary frequency Y

Note

The communication reference is a percentage of the maximum frequency (F0-10). +10000 and –10000 correspond to +100.00% and –100.00% respectively. For torque dimension data, this percentage is F2-10 or A2-48 (digital setting of torque upper limit of the first or second motor).

F0-03, F0-04, F0-11, F2-11, FA-00, FA-02, and A0-01 are set by H1000 through communication. However, only one parameter can be set through communication at a time. If all the above parameters need to set through communication, use the following method.

Take F0-03 and F0-11 as examples. If F0-03 is set to 9, the running frequency is controlled by H1000. Then F0-11 cannot be set to 5 and can be set to 0. In this case, you can modify the value of F0-12 through communication to achieve modification of F0-11 through communication.

Control command input to the drive (write-only)

Command Word Address	Command Function
2000H	0001: Forward run
	0002: Reverse run
	0003: Forward jogging
	0004: Reverse jogging
	0005: Coast to stop
	0006: Decelerate to stop
	0007: Reset upon fault

Reading the drive state (read-only)

Status Word Address	State Word Function
3000H	0001: Forward run
	0002: Reverse run
	0003: Stop

Password verification for parameter lock: If the actual password value is returned, password verification is passed. If password protection is not applied (FP-00 = 0), the returned value is 0000H.

Password Address	Password
1F00H	*****

DO control (write-only)

Command Address	Command
2001H	Bit 0: DO1 output control Bit 1: DO2 output control Bit 2: Relay1 output control Bit 3: Relay2 output control Bit 4: FMR output control Bit 5: VDO1 Bit 6: VDO2 Bit 7: VDO3 Bit 8: VDO4 Bit 9: VDO5

AO1 control (write-only)

Command Address	Command
2002H	0 to 7FFF represent 0% to 100%.

AO2 control (write-only)

Command Address	Command
2003H	0 to 7FFF represent 0% to 100%.

Pulse output control (write-only)

Command Address	Command
2004H	0 to 7FFF represent 0% to 100%.

AC drive fault description

AC Drive Fault Address	AC Drive Fault Information	
8000H	0000: Normal 0001: Reserved 0002: Overcurrent during acceleration 0003: Overcurrent during deceleration 0004: Overcurrent during operation at constant speed 0005: Overvoltage during acceleration 0006: Overvoltage during deceleration 0007: Overvoltage during operation at constant speed 0008: Pre-charge resistor overload 0009: Undervoltage 000A: AC drive overload 000B: Motor overload 000C: Input phase loss 000D: Output phase loss 000E: Module overtemperature 000F: External fault 0010: Communication fault 0011: Contactor fault 0012: Current detection fault 0013: Motor auto-tuning fault 0014: Encoder/PG card fault	0015: Parameter reading/writing operation fault 0016: AC drive hardware fault 0017: Motor short-circuited to ground 0018: Reserved 0019: Reserved 001A: Running time reach 001B: User-defined fault 1 001C: User-defined fault 2 001D: Power-on time reach 001E: Load loss 001F: PID feedback loss during running 0028: Fast current limit timeout 0029: Motor switchover fault during running 002A: Excessive speed deviation 002B: Motor overspeed 002D: Motor overtemperature 005A: Incorrect setting of encoder PPR 005B: Encoder not connected 005C: Initial position error 005E: Speed feedback error

7.1.5 Descriptions of Communication Parameters in Group FD

Parameter Fd-00 is used to set a data transmission rate between the host controller and the AC drive. Note that the baud rate of the host controller must be the same as that of the AC drive. Otherwise, communication will fail. A larger baud rate indicates faster communication speed.

Parameter Code	Parameter Name	Default	Value Range
Fd-00	Baud rate	5005	Ones: Modbus 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

Note that the data format of the host controller must be the same as that of the AC drive. Otherwise, communication can fail.

Parameter Code	Parameter Name	Default	Value Range
Fd-01	Data format	0	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>

When the local address is set to 0 (broadcast address), the AC drive communicates with the host controller in broadcast mode. The local address is unique (except the broadcast address), which is the basis for point-to-point communication between the host controller and the AC drive.

Parameter Code	Parameter Name	Default	Value Range
Fd-02	Local address	1	1–247 (0 is the broadcast address.)

Response delay defines the interval from when the AC drive finishes receiving data to when it sends data to the host controller. If the response delay is shorter than the system processing time, the system processing time will prevail. If the response delay is longer than the system processing time, the drive will not send data to the host controller unless the response delay elapses.

Parameter Code	Parameter Name	Default	Value Range
Fd-03	Response delay	2 ms	0 ms to 20 ms

When this parameter is set to 0.0s, the drive does not detect communication timeout.

When Fd-04 is set to a non-zero value, if the interval between two consecutive communication exceeds the value of Fd-04, Err16 (communication error) will be reported. Generally, set it to 0.0s. In a system with continuous communication, you can monitor the communication status by setting this parameter.

Parameter Code	Parameter Name	Default	Value Range
Fd-04	Communication timeout time	0.0s	0.0s (Invalid); 0.1s to 60.0s

8 List of Parameters

8.1 List of Basic Function Parameters

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F0-00	0xF000	G and P type display	1: G type (constant torque load)	1	-	Unchangeable
F0-01	0xF001	Motor 1 control mode	0: Sensorless vector control (SVC) 1: Feedback vector control (FVC) 2: Voltage/frequency (V/f) control 3: Reserved 4: Reserved 5: Speed open loop control for the synchronous motor (PMVVC)	0	-	At stop
F0-02	0xF002	Command source	0: LED operating panel/LCD operating panel/Software 1: Terminal 2: Communication	0	-	At stop
F0-03	0xF003	Main frequency X source	0: Digital setting (preset frequency F0-08 that can be changed by pressing UP/DOWN keys; non-retentive upon power failure) 1: Digital setting (preset frequency F0-08 that can be changed by pressing UP/DOWN key; retentive upon power failure) 2: AI1 3: AI2 4: AI3 5: Pulse reference (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication 10: Reserved	0	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F0-04	0xF004	Auxiliary frequency Y source	0: Digital setting (preset frequency F0-08 that can be changed by pressing UP/DOWN keys; non-retentive upon power failure) 1: Digital setting (preset frequency F0-08 that can be changed by pressing UP/DOWN key; retentive upon power failure) 2: AI1 3: AI2 4: AI3 5: Pulse reference (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication 10: Reserved	0	-	At stop
F0-05	0xF005	Base value of range of auxiliary frequency Y upon superposition	0: Relative to maximum frequency 1: Relative to main frequency X	0	-	Real time
F0-06	0xF006	Range of auxiliary frequency Y upon superposition	0% to 150%	100	%	Real-time
F0-07	0xF007	Frequency superposition selection	Ones: Frequency reference selection 0: Main frequency X 1: Main and auxiliary frequency operation result (based on tens place) 2: Switchover between the main frequency X and the auxiliary frequency Y 3: Switchover between the main frequency X and the main and auxiliary frequency operation result 4: Switchover between the auxiliary frequency Y and the main and auxiliary frequency operation result Tens: Main and auxiliary frequency operation 0: Main frequency + Auxiliary frequency 1: Main frequency – Auxiliary frequency 2: Max. (main frequency, auxiliary frequency) 3: Min. (main frequency, auxiliary frequency) 4: Main frequency x Auxiliary frequency	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F0-08	0xF008	Preset frequency	0.00 Hz to maximum frequency (F0-10)	50	Hz	Real time
F0-09	0xF009	Running direction	0: Same as the default direction 1: Reverse to the default direction	0	-	Real time
F0-10	0xF00A	Maximum frequency	5.00 Hz to 599.00 Hz	50	Hz	At stop
F0-11	0xF00B	Frequency upper limit source	0: F0-12 (Frequency upper limit) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication 6: Multi-reference	0	-	At stop
F0-12	0xF00C	Frequency upper limit	F0-14 (frequency lower limit) to F0-10 (maximum frequency)	50	Hz	Real time
F0-13	0xF00D	Frequency upper limit offset	0.00 Hz to maximum frequency (F0-10)	0	Hz	Real time
F0-14	0xF00E	Frequency lower limit	0.00 Hz to frequency upper limit (F0-12)	0	Hz	Real time
F0-15	0xF00F	Carrier frequency	0.8 kHz to 16.0 kHz	Model dependent	kHz	Real time
F0-16	0xF010	Carrier frequency change with temperature	0: No 1: Yes	1	-	Real time
F0-17	0xF011	Acceleration time 1	0.0s to 6500.0s	20	s	Real time
F0-18	0xF012	Deceleration time 1	0.0s to 6500.0s	20	s	Real time
F0-19	0xF013	Acceleration/ Deceleration time unit	0: 1s 1: 0.1s 2: 0.01s	1	-	At stop
F0-21	0xF015	Auxiliary frequency offset upon superposition	0.00 Hz to maximum frequency (F0-10)	0	Hz	Real time
F0-22	0xF016	Frequency reference resolution	1: 0.1 Hz 2: 0.01 Hz	2	-	At stop
F0-23	0xF017	Retention of digit-set frequency upon stop	0: Non-retentive 1: Retentive	0	-	Real time
F0-25	0xF019	Acceleration/ deceleration time base frequency	0: Maximum frequency (F0-10) 1: Frequency reference 2: 100 Hz	0	-	At stop
F0-26	0xF01A	Base of frequency adjusted by UP/ DOWN keys during running	0: Running frequency 1: Frequency reference	0	-	At stop
F0-27	0xF01B	Main frequency coefficient	0.00% to 100.00%	10	%	Real-time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F0-28	0xF01C	Auxiliary frequency coefficient	0.00% to 100.00%	10	%	Real-time
F1-00	0xF100	Motor type	0: Common asynchronous motor 1: Variable frequency asynchronous motor 2: Synchronous motor	0	-	At stop
F1-01	0xF101	Rated motor power	0.1 kW to 1000.0 kW	Model dependent	kW	At stop
F1-02	0xF102	Rated motor voltage	1 V to 2000 V	Model dependent	V	At stop
F1-03	0xF103	Rated motor current	0.1 A to 6553.5 A	Model dependent	A	At stop
F1-04	0xF104	Rated motor frequency	0.01 Hz to maximum frequency (F0-10)	Model dependent	Hz	At stop
F1-05	0xF105	Rated motor speed	1 RPM to 65535 RPM	Model dependent	RPM	At stop
F1-06	0xF106	Asynchronous/ Synchronous motor stator resistance	0.001 Ω to 65.535 Ω (AC drive power ≤ 55 KW) 0.0001 Ω to 6.5535 Ω (AC drive power > 55 KW)	Model dependent	Ω	At stop
F1-07	0xF107	Asynchronous motor rotor resistance	0.001 Ω to 65.535 Ω (AC drive power ≤ 55 KW) 0.0001 Ω to 6.5535 Ω (AC drive power > 55 KW)	Model dependent	Ω	At stop
F1-08	0xF108	Leakage inductive reactance of asynchronous motor	0.01 mH to 655.35 mH (AC drive power ≤ 55 KW) 0.001 mH to 65.535 mH (AC drive power > 55 KW)	Model dependent	mH	At stop
F1-09	0xF109	Mutual inductive reactance of asynchronous motor	0.1 mH to 6553.5 mH (AC drive power ≤ 55 KW) 0.01 mH to 655.35 mH (AC drive power > 55 KW)	Model dependent	mH	At stop
F1-10	0xF10A	No-load current of asynchronous motor	0.1 A to rated motor current (F0-03)	Model dependent	A	At stop
F1-11	0xF10B	Core saturation coefficient 1 of asynchronous motor	50.0% to 100.0%	86	%	Real-time
F1-12	0xF10C	Core saturation coefficient 2 of asynchronous motor	100.0% to 150.0%	130	%	Real-time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F1-13	0xF10D	Core saturation coefficient 3 of asynchronous motor	100.0% to 170.0%	140	%	Real-time
F1-14	0xF10E	Core saturation coefficient 4 of asynchronous motor	100.0% to 180.0%	150	%	Real-time
F1-17	0xF111	Axis D inductance of synchronous motor	0.01 mH to 655.35 mH (AC drive power ≤ 55 KW) 0.001 mH to 65.535 mH (AC drive power > 55 KW)	15.86	mH	At stop
F1-18	0xF112	Axis Q inductance of synchronous motor	0.01 mH to 655.35 mH (AC drive power ≤ 55 KW) 0.001 mH to 65.535 mH (AC drive power > 55 KW)	15.86	mH	At stop
F1-19	0xF113	Synchronous motor back EMF coefficient	0.0 V to 6553.5 V	Model dependent	V	At stop
F1-20	0xF114	Filter time constant (used in PMVVC)	0.003-65.535	Model dependent	-	Real time
F1-21	0xF115	Oscillation suppression gain (used in PMVVC)	0 to 65535	Model dependent	-	Real time
F1-23	0xF117	Friction torque percentage	0.00% to 100.00%	0	%	At stop
F1-24	0xF118	Number of motor pole pairs	0 to 65535	2	-	Real time
F1-26	0xF11A	Auto-tuning direction (inertia auto-tuning and synchronous motor)	0: Reverse run 1: Forward run	1	-	At stop
F1-27	0xF11B	Encoder PPR	1 to 20000	1024	-	At stop
F1-28	0xF11C	Encoder type	0: ABZ incremental encoder 1: 23-bit encoder 2: Resolver	0	-	At stop
F1-29	0xF11D	PG signal filter	0: Non-adaptive filter 1: Adaptive filter 2: Fixed interlock 3: Automatic interlock	1	-	At stop
F1-30	0xF11E	Encoder wiring flag	Ones: AB signal direction or rotational direction 0: Forward 1: Reverse Tens: Reserved	0	-	At stop
F1-31	0xF11F	Encoder zero position angle	0.0°to 359.9°	0	°	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F1-32	0xF120	Numerator of motor gear ratio	1–65535	1	-	At stop
F1-33	0xF121	Denominator of motor gear ratio	1–65535	1	-	At stop
F1-34	0xF122	Number of resolver pole pairs	1–32	1	-	At stop
F1-36	0xF124	PG disconnection detection	0 to 11	1	-	At stop
F1-37	0xF125	Auto-tuning selection	0: No auto-tuning 1: Static auto-tuning of asynchronous motor 2: Complete auto-tuning of asynchronous motor 3: With-load complete auto-tuning of asynchronous motor 4: Inertia auto-tuning of asynchronous motor (only in FVC mode) 11: Partial static auto-tuning of synchronous motor (excluding back EMF) 12: No-load complete dynamic auto-tuning of synchronous motor 13: Complete static auto-tuning of synchronous motor (excluding the encoder installation angle) 14: Inertia auto-tuning of synchronous motor (only in FVC mode)	0	-	At stop
F2-00	0xF200	Low-speed speed loop Kp	1–200	30	-	Real time
F2-01	0xF201	Low-speed speed loop Ti	0.001s to 10.000s	0.5	s	Real time
F2-02	0xF202	Switching frequency 1	0.00 Hz to F2-05	5	Hz	Real time
F2-03	0xF203	High-speed speed loop Kp	1–200	20	-	Real time
F2-04	0xF204	High-speed speed loop Ti	0.001s to 10.000s	1	s	Real time
F2-05	0xF205	Switching frequency 2	0.00 Hz to maximum frequency (F0-10)	10	Hz	Real time
F2-06	0xF206	VC slip compensation adjustment	50% to 200%	100	%	Real-time
F2-07	0xF207	Speed feedback filter time	0.000s to 0.1s	0.004	s	Real time
F2-08	0xF208	VC deceleration over-excitation gain	0 to 200	64	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F2-09	0xF209	Torque upper limit source in speed control mode (motoring)	0: Digital setting (F2-10) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication setting 6: Min. (AI1, AI2) 7: Max. (AI1, AI2)	0	-	Real time
F2-10	0xF20A	Digital setting of torque upper limit in speed control mode (motoring)	0.0% to 200.0%	150	%	Real-time
F2-11	0xF20B	Torque upper limit source in speed control mode (generating)	0: Digital setting (F2-10) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication setting 6: Min. (AI1, AI2) 7: Max. (AI1, AI2) 8: Digital setting (F2-12)	0	-	Real time
F2-12	0xF20C	Digital setting of torque upper limit in speed control (generating)	0.0% to 200.0%	150	%	Real-time
F2-13	0xF20D	Current loop Kp adjustment at low speed	0.1 to 10.0	1	-	Real time
F2-14	0xF20E	Current loop Ki adjustment at low speed	0.1 to 10.0	1	-	Real time
F2-15	0xF20F	Current loop Kp adjustment at high speed	0.1 to 10.0	1	-	Real time
F2-16	0xF210	Current loop Ki adjustment at high speed	0.1 to 10.0	1	-	Real time
F2-17	0xF211	Speed loop Kp upon zero speed lock	1–100	30	-	Real time
F2-18	0xF212	Speed loop Ki upon zero speed lock	0.001s to 10.000s	0.5	s	Real time
F2-19	0xF213	Inertia compensation gain	1–200	1	-	Real time
F2-20	0xF214	Speed loop switching frequency upon zero speed lock	0.00 Hz to F2-02	0.05	Hz	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F2-21	0xF215	Maximum output voltage coefficient	100 to 110	100	-	Real time
F2-22	0xF216	Output voltage filter time	0.000s to 0.01s	0	s	Real time
F2-23	0xF217	Zero speed lock	0: Disable 1: Enable	0	-	At stop
F2-24	0xF218	Vector overvoltage stall suppression Kp	0 to 1000	40	-	Real time
F2-25	0xF219	Acceleration compensation gain	0 to 200	0	-	Real time
F2-26	0xF21A	Acceleration compensation filter time	0 to 500	10	-	Real time
F2-27	0xF21B	Vector overvoltage stall suppression	0: Disable 1: Enable	1	-	Real time
F2-28	0xF21C	Cut-off frequency of torque reference filter	50 Hz to 1000 Hz	500	Hz	At stop
F2-29	0xF21D	Detected current at initial position angle of synchronous motor	50-180	80	-	Real time
F2-30	0xF21E	Auto-calculation of speed loop parameters	0: Disable 1: Enable	0	-	At stop
F2-31	0xF21F	Expected speed loop bandwidth at high speed	0 Hz to 3 Hz	0	Hz	At stop
F2-32	0xF220	Expected speed loop bandwidth at low speed	1 Hz to 10000 Hz	100	Hz	Real time
F2-33	0xF221	Expected speed loop bandwidth at zero speed	1 Hz to 10000 Hz	100	Hz	Real time
F2-34	0xF222	Expected speed loop damping ratio (unchanged generally)	0.1-65.000	1	-	Real time
F2-35	0xF223	System inertia (equivalent to the starting time)	0.001s to 50.000s	Model dependent	s	At stop
F2-36	0xF224	Single motor inertia ($kg \cdot m^2$)	0.001 $kg \cdot m^2$ to 50.000 $kg \cdot m^2$	Model dependent	$kg \cdot m^2$	At stop
F2-37	0xF225	Maximum frequency for inertia auto-tuning	20% to 100%	80	%	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F2-38	0xF226	Acceleration time for inertia auto-tuning	1.0s to 50.0s	10	s	At stop
F2-39	0xF227	Dynamic optimization test bandwidth 1 in speed loop control	1.0 Hz to 200.0 Hz	5	Hz	Unchangeable
F2-40	0xF228	Dynamic optimization test bandwidth 2 in speed loop control	1.0 Hz to 200.0 Hz	10	Hz	Unchangeable
F2-41	0xF229	Dynamic optimization test bandwidth 3 in speed loop control	1.0 Hz to 100.0 Hz	15	Hz	Unchangeable
F2-42	0xF22A	Dynamic optimization test bandwidth 4 in speed loop control	1.0 Hz to 200.0 Hz	20	Hz	Unchangeable
F2-43	0xF22B	Inertia auto-tuning and dynamic speed reference	0-100	30	-	At stop
F2-44	0xF22C	Rotor time constant check	0: Disable 1: Enable	0	-	Unchangeable
F2-45	0xF22D	Torque amplitude of rotor time constant check	10% to 100%	30	%	Unchangeable
F2-46	0xF22E	Number of rotor time constant check times	1-6	3	-	Unchangeable
F2-47	0xF22F	Inertia auto-tuning	0: Disable 1: Enable	0	-	At stop
F2-48	0xF230	Speed loop bandwidth reference in inertia auto-tuning	0.1 Hz to 100.0 Hz	10	Hz	At stop
F2-49	0xF231	Back EMF calculation	0: Disable 1: Enable	0	-	Unchangeable
F2-50	0xF232	Inertia auto-tuning mode	0: Acceleration/Deceleration mode 1: Triangular wave mode	0	-	At stop
F2-51	0xF233	Acceleration/ Deceleration coefficient of inertia auto-tuning	0.1-10.0	1	-	At stop
F2-52	0xF234	Decoupling control	0: Disable 1: Enable	0	-	At stop
F2-53	0xF235	Generating power limit	0: Disable 1: Enable	0	-	At stop
F2-54	0xF236	Generating power limit threshold	0.0% to 200.0%	20	%	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F2-55	0xF237	Flux closed-loop and torque linearity optimization in FVC mode	Ones: Flux closed loop in torque control mode 0: Disable 1: Enable Tens: Flux closed loop in speed control mode 0: Disable 1: Enable Hundreds: Torque upper limit and torque linearity optimization in speed control mode 0: Disable 1: Enable	10	-	At stop
F2-56	0xF238	Upper limit of AC drive output current	0.0% to 170.0%	150	%	At stop
F3-00	0xF300	V/f curve setting	0: Linear V/f curve 1: Multi-point V/f curve 2: Square V/f curve 3: 1.2-power V/f curve 4: 1.4-power V/f curve 6: 1.6-power V/f curve 8: 1.8-power V/f curve 10: V/f complete separation mode 11: V/f semi-separated mode	0	-	At stop
F3-01	0xF301	Torque boost	0.0% to 30.0%	0	%	Real-time
F3-02	0xF302	Cut-off frequency of torque boost	0.00 Hz to maximum frequency (F0-10)	50	Hz	At stop
F3-03	0xF303	Frequency 1 on multi-point V/f curve	0.00 Hz to F3-05	0	Hz	At stop
F3-04	0xF304	Voltage 1 on multi-point V/f curve	0.0% to 100.0%	0	%	At stop
F3-05	0xF305	Frequency 2 on multi-point V/f curve	F3-03 to F3-07	0	Hz	At stop
F3-06	0xF306	Voltage 2 on multi-point V/f curve	0.0% to 100.0%	0	%	At stop
F3-07	0xF307	Frequency 3 on multi-point V/f curve	F3-05 to F1-04	0	Hz	At stop
F3-08	0xF308	Voltage 3 on multi-point V/f curve	0.0% to 100.0%	0	%	At stop
F3-09	0xF309	V/f slip compensation gain	0.0% to 200.0%	0	%	Real-time
F3-10	0xF30A	V/f over-excitation gain	0-200	64	-	Real time
F3-11	0xF30B	V/f oscillation suppression gain	0-100	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F3-12	0xF30C	Oscillation suppression gain	0: Inactive 1: Reserved 2: Reserved 3: Active	3	-	At stop
F3-13	0xF30D	Voltage source for V/f separation	0: Digital setting (F3-14) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Multi-reference 6: Simple PLC 7: PID 8: Communication (1000H)	0	-	Real time
F3-14	0xF30E	Digital setting of voltage for V/f separation	0 V to F1-02	0	V	Real time
F3-15	0xF30F	Voltage acceleration time for V/f separation	0.0s to 1000.0s	0	s	Real time
F3-16	0xF310	Voltage deceleration time for V/f separation	0.0s to 1000.0s	0	s	Real time
F3-17	0xF311	Stop mode for V/f separation	0: The frequency and voltage decline to 0 independently. 1: The frequency declines to 0 after the voltage declines to 0.	0	-	At stop
F3-18	0xF312	Action current for V/f overcurrent stall	50% to 200%	150	%	At stop
F3-19	0xF313	V/f overcurrent stall suppression	0: Disable 1: Enable	1	-	At stop
F3-20	0xF314	V/f overcurrent stall suppression gain	0-100	20	-	Real time
F3-21	0xF315	Current compensation coefficient for V/f overcurrent stall action at multiplied rated frequency	50-200	50	-	At stop
F3-22	0xF316	Action voltage for V/f overvoltage stall suppression	200.0 V to 2000.0 V	770	V	At stop
F3-23	0xF317	V/f overvoltage stall suppression	0: Disable 1: Enable	1	-	At stop
F3-24	0xF318	Frequency gain for V/f overvoltage stall suppression	0-100	30	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F3-25	0xF319	Voltage gain for V/f overvoltage stall suppression	0-100	30	-	Real time
F3-26	0xF31A	Frequency rise threshold for overvoltage stall suppression	0-50	5	-	At stop
F3-27	0xF31B	Slip compensation time constant	0.1 Hz to 10.0 Hz	0.5	Hz	Real time
F3-28	0xF31C	V/f inertia coefficient	0.00-10.00	0.1	-	At stop
F3-29	0xF31D	Minimum motoring torque current	10-100	50	-	At stop
F3-30	0xF31E	Maximum generating torque current	10-100	20	-	At stop
F3-31	0xF31F	Automatic frequency rise Kp	0-100	50	-	Real time
F3-32	0xF320	Automatic frequency rise Ki	0-100	50	-	Real time
F3-33	0xF321	Online torque compensation gain	80 to 150	100	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F4-00	0xF400	DI1 function selection	0: No function 1: Forward run (FWD) 2: Reverse run (REV) 3: Three-wire operation control 4: Forward jog (FJOG) 5: Reverse jog (RJOG) 6: Function as the UP key 7: Function as the DOWN key 8: Coast to stop 9: Fault reset (RESET) 10: Operation pause 11: External fault NO input 12: Multi-reference terminal 1 13: Multi-reference terminal 2 14: Multi-reference terminal 3 15: Multi-reference terminal 4 16: Acceleration/Deceleration selection terminal 1 17: Acceleration/Deceleration selection terminal 2 18: Frequency source switchover 19: Clear information set by UP/DOWN keys on the operating panel or by terminals functioning as the UP/DOWN keys 20: Command switchover terminal 21: Acceleration/Deceleration inhibited 22: PID pause 23: PLC state reset 24: Wobble pause 25: Counter input (DI5) 26: Counter reset 27: Length counting input (DI5) 28: Length reset 29: Torque control inhibited 30: Pulse input 31: Reserved 32: Immediate DC braking 33: External fault NC input 34: Frequency modification enable 35: PID action direction reversal 36: External stop terminal 1 37: Control command switchover terminal 2 38: PID integral pause (to be continued)	1	-	At stop
F4-01	0xF401	DI2 function selection		4	-	At stop
F4-02	0xF402	DI3 function selection		9	-	At stop
F4-03	0xF403	DI4 function selection		12	-	At stop
F4-04	0xF404	DI5 function selection		13	-	At stop
F4-05	0xF405	DI6 function selection		0	-	At stop
F4-06	0xF406	DI7 function selection		0	-	At stop
F4-07	0xF407	DI8 function selection		0	-	At stop
F4-08	0xF408	DI9 function selection		0	-	At stop
F4-09	0xF409	DI10 function selection		0	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F4-00	0xF400	DI1 function selection	(continued) 39: Switchover between frequency source X and preset frequency 40: Switchover between frequency source Y and preset frequency 41: Motor terminal selection 42: Position lock enable 43: PID parameter switchover 44: User-defined fault 1 45: User-defined fault 2 46: Speed/Torque control switchover 47: Emergency stop 48: External stop terminal 2 49: Deceleration DC braking 50: Clear the current running time 51: Two-wire/Three-wire control switchover 52: Electromagnetic shorting 53: Thickness overlaying 54: Roll diameter reset 55: Initial roll diameter 1 56: Initial roll diameter 2 57: Pre-drive 58: Winding/Unwinding switchover 59: Roll diameter calculation disabled 60: Exit tension control 61: Terminal tension rise 62: Thickness selection 1 63: Thickness selection 2 90: Water cooling system fault 91: Low liquid level fault 92: Revolution count reset 93: Reserved	1	-	At stop
F4-01	0xF401	DI2 function selection		4	-	At stop
F4-02	0xF402	DI3 function selection		9	-	At stop
F4-03	0xF403	DI4 function selection		12	-	At stop
F4-04	0xF404	DI5 function selection		13	-	At stop
F4-05	0xF405	DI6 function selection		0	-	At stop
F4-06	0xF406	DI7 function selection		0	-	At stop
F4-07	0xF407	DI8 function selection		0	-	At stop
F4-08	0xF408	DI9 function selection		0	-	At stop
F4-09	0xF409	DI10 function selection		0	-	At stop
F4-10	0xF40A	DI filter time	0.000s to 1.000s	0.01	s	Real time
F4-11	0xF40B	Terminal command mode	0: Two-wire mode 1 1: Two-wire mode 2 2: Three-wire mode 1 3: Three-wire mode 2	0	-	At stop
F4-12	0xF40C	Step value of terminal functioning as UP/DOWN keys	0.001 Hz/s to 65.535 Hz/s	1	Hz/s	Real time
F4-13	0xF40D	Minimum input of AI curve 1	-10.00 V to F4-15	-10	V	Real time
F4-14	0xF40E	Percentage corresponding to minimum input of AI curve 1	-100.0% to 100.0%	-100	%	Real-time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F4-15	0xF40F	Maximum input of AI curve 1	F4-13 to 10.00 V	10	V	Real time
F4-16	0xF410	Percentage corresponding to maximum input of AI curve 1	-100.0% to 100.0%	100	%	Real-time
F4-17	0xF411	AI1 filter time	0.00s to 10.00s	0.1	s	Real time
F4-18	0xF412	Minimum input of AI curve 2	-10.00 V to F4-20	-10	V	Real time
F4-19	0xF413	Percentage corresponding to minimum input of AI curve 2	-100.0% to 100.0%	-100	%	Real-time
F4-20	0xF414	Maximum input of AI curve 2	F4-18 to 10.00 V	10	V	Real time
F4-21	0xF415	Percentage corresponding to maximum input of AI curve 2	-100.0% to 100.0%	100	%	Real-time
F4-22	0xF416	AI2 filter time	0.00s to 10.00s	0.1	s	Real time
F4-23	0xF417	Minimum input of AI curve 3	-10.00 V to F4-25	-10	V	Real time
F4-24	0xF418	Percentage corresponding to minimum input of AI curve 3	-100.0% to 100.0%	-100	%	Real-time
F4-25	0xF419	Maximum input of AI curve 3	F4-23 to 10.00 V	10	V	Real time
F4-26	0xF41A	Percentage corresponding to maximum input of AI curve 3	-100.0% to 100.0%	100	%	Real-time
F4-27	0xF41B	AI3 filter time	0.00s to 10.00s	0.1	s	Real time
F4-28	0xF41C	Pulse minimum input	0.00 kHz to F4-30	0	kHz	Real time
F4-29	0xF41D	Percentage corresponding to pulse minimum input	-100.0% to 100.0%	0	%	Real-time
F4-30	0xF41E	Pulse maximum input	F4-28 to 100.00 kHz	50	kHz	Real time
F4-31	0xF41F	Percentage corresponding to pulse maximum input	-100.0% to 100.0%	100	%	Real-time
F4-32	0xF420	Pulse filter time	0.00s to 10.00s	0.1	s	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F4-33	0xF421	AI curve selection	Ones: AI1 curve selection 1: Curve 1 (2 points, see F4-13 to F4-16) 2: Curve 2 (2 points, see F4-18 to F4-21) 3: Curve 3 (2 points, see F4-23 to F4-26) 4: Curve 4 (4 points, see A6-00 to A6-07) 5: Curve 5 (4 points, see A6-08 to A6-15) Tens: AI2 curve selection 1: Curve 1 (2 points, see F4-13 to F4-16) 2: Curve 2 (2 points, see F4-18 to F4-21) 3: Curve 3 (2 points, see F4-23 to F4-26) 4: Curve 4 (4 points, see A6-00 to A6-07) 5: Curve 5 (4 points, see A6-08 to A6-15) Hundreds: AI3 curve selection 1: Curve 1 (2 points, see F4-13 to F4-16) 2: Curve 2 (2 points, see F4-18 to F4-21) 3: Curve 3 (2 points, see F4-23 to F4-26) 4: Curve 4 (4 points, see A6-00 to A6-07) 5: Curve 5 (4 points, see A6-08 to A6-15)	321	-	Real time
F4-34	0xF422	Selection when AI value < minimum input value	Ones: AI1 0: Percentage corresponding to minimum input 1: 0.0% Tens: AI2 0: Percentage corresponding to minimum input 1: 0.0% Hundreds: AI3 0: Percentage corresponding to minimum input 1: 0.0%	0	-	Real time
F4-35	0xF423	DI1 delay time	0.0s to 3600.0s	0	s	Real time
F4-36	0xF424	DI2 delay time	0.0s to 3600.0s	0	s	Real time
F4-37	0xF425	DI3 delay time	0.0s to 3600.0s	0	s	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F4-38	0xF426	DI active status setting 1	Ones: DI1 active status selection 0: Active high 1: Active low Tens: DI2 active status selection 0: Active high 1: Active low Hundreds: DI3 active status selection 0: Active high 1: Active low Thousands: DI4 active status selection 0: Active high 1: Active low Ten thousands: DI5 active status selection 0: Active high 1: Active low	0	-	At stop
F4-39	0xF427	DI active status setting 2	Ones: DI6 active status selection 0: Active high 1: Active low Tens: DI7 active status selection 0: Active high 1: Active low Hundreds: DI8 active status selection 0: Active high 1: Active low Thousands: DI9 active status selection 0: Active high 1: Active low Ten thousands: DI10 active status selection 0: Active high 1: Active low	0	-	At stop
F4-42	0xF42A	AI input range selection	0: -10 V to +10 V 1: 0 V to 10 V	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F5-01	0xF501	Expansion card relay output function selection	0: No output 1: Drive in operation 2: Fault output (stop at fault) 3: Frequency level detection FDT1 output 4: Frequency reached 5: Operation at zero speed (no output at stop) 6: Motor overload alarm 7: Drive overload alarm 8: Set count value reached 9: Designated count value reached 10: Length reached 11: Simple PLC cycle completed 12: Cumulative operating time reached 13: Frequency limited 14: Torque limited 15: Ready to run 16: AI1 > AI2 17: Frequency upper limit reached 18: Frequency lower limit reached (operation-related) 19: Undervoltage output 20: Communication setting To be continued	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F5-01	0xF501	Expansion card relay output function selection	Continued 21: Reserved 22: Reserved 23: Operation at zero speed 2 (at stop) 24: Cumulative 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: AI1 input limit exceeded 32: Drive output load loss 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Output current limit exceeded 37: Frequency lower limit reached (output at stop) 38: Error (output upon fault or warning) 39: Current overtemperature pre-alarm 40: Present operating time reached 41: Fault output 2 42: Fault output 3	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F5-02	0xF502	Control board relay 1 function selection (T/A1-T/B1-T/C1)	0: No output 1: Drive in operation 2: Fault output (stop at fault) 3: Frequency level detection FDT1 output 4: Frequency reached 5: Operation at zero speed (no output at stop) 6: Motor overload alarm 7: Drive overload alarm 8: Set count value reached 9: Designated count value reached 10: Length reached 11: Simple PLC cycle completed 12: Cumulative operating time reached 13: Frequency limited 14: Torque limited 15: Ready to run 16: AI1 > AI2 17: Frequency upper limit reached 18: Frequency lower limit reached (operation-related) 19: Undervoltage output 20: Communication setting 21: Reserved 22: Reserved 23: Operation at zero speed 2 (at stop) 24: Cumulative 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 To be continued	2	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F5-02	0xF502	Control board relay 1 function selection (T/A1-T/B1-T/C1)	Continued 30: Timing reached 31: AI1 input limit exceeded 32: Drive output load loss 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Output current limit exceeded 37: Frequency lower limit reached (output at stop) 38: Error (output upon fault or warning) 39: Current overtemperature pre-alarm 40: Present operating time reached 41: Fault output 2 42: Fault output 3	2	-	Real time
F5-03	0xF503	Control board relay 2 function selection (T/A2-T/C2)	0: No output 1: Drive in operation 2: Fault output (stop at fault) 3: Frequency level detection FDT1 output 4: Frequency reached 5: Operation at zero speed (no output at stop) 6: Motor overload alarm 7: Drive overload alarm 8: Set count value reached 9: Designated count value reached 10: Length reached 11: Simple PLC cycle completed 12: Cumulative operating time reached 13: Frequency limited 14: Torque limited 15: Ready to run 16: AI1 > AI2 17: Frequency upper limit reached 18: Frequency lower limit reached (operation-related) 19: Undervoltage output 20: Communication setting To be continued	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F5-03	0xF503	Control board relay 2 function selection (T/A2-T/C2)	Continued 21: Reserved 22: Reserved 23: Operation at zero speed 2 (at stop) 24: Cumulative 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: AI1 input limit exceeded 32: Drive output load loss 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Output current limit exceeded 37: Frequency lower limit reached (output at stop) 38: Error (output upon fault or warning) 39: Current overtemperature pre-alarm 40: Present operating time reached 41: Fault output 2 42: Fault output 3	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F5-04	0xF504	DO1 output function selection	0: No output 1: Drive in operation 2: Fault output (stop at fault) 3: Frequency level detection FDT1 output 4: Frequency reached 5: Operation at zero speed (no output at stop) 6: Motor overload alarm 7: Drive overload alarm 8: Set count value reached 9: Designated count value reached 10: Length reached 11: Simple PLC cycle completed 12: Cumulative operating time reached 13: Frequency limited 14: Torque limited 15: Ready to run 16: AI1 > AI2 17: Frequency upper limit reached 18: Frequency lower limit reached (operation-related) 19: Undervoltage output 20: Communication setting 21: Reserved 22: Reserved 23: Operation at zero speed 2 (at stop) 24: Cumulative 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 To be continued	1	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F5-04	0xF504	DO1 output function selection	Continued 30: Timing reached 31: AI1 input limit exceeded 32: Drive output load loss 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Output current limit exceeded 37: Frequency lower limit reached (output at stop) 38: Error (output upon fault or warning) 39: Current overtemperature pre-alarm 40: Present operating time reached 41: Fault output 2 42: Fault output 3	1	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F5-05	0xF505	Output function selection of DO2 on expansion card	0: No output 1: Drive in operation 2: Fault output (stop at fault) 3: Frequency level detection FDT1 output 4: Frequency reached 5: Operation at zero speed (no output at stop) 6: Motor overload alarm 7: Drive overload alarm 8: Set count value reached 9: Designated count value reached 10: Length reached 11: Simple PLC cycle completed 12: Cumulative operating time reached 13: Frequency limited 14: Torque limited 15: Ready to run 16: AI1 > AI2 17: Frequency upper limit reached 18: Frequency lower limit reached (operation-related) 19: Undervoltage output 20: Communication setting 21: Reserved 22: Reserved 23: Operation at zero speed 2 (at stop) 24: Cumulative 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 To be continued	4	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F5-05	0xF505	Output function selection of DO2 on expansion card	Continued 30: Timing reached 31: AI1 input limit exceeded 32: Drive output load loss 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Output current limit exceeded 37: Frequency lower limit reached (output at stop) 38: Error (output upon fault or warning) 39: Current overtemperature pre-alarm 40: Present operating time reached 41: Fault output 2 42: Fault output 3	4	-	Real time
F5-07	0xF507	AO1 output function selection	0: Running frequency 1: Frequency reference 2: Output current 3: Output torque 4: Output power 5: Output voltage 6: Pulse input (100.0% corresponds to 100.0 kHz) 7: AI1 8: AI2 9: AI3 10: Length 11: Count value 12: Communication 13: Motor speed 14: Output current (100.0% corresponds to 1000.0 A) 15: Output voltage (100.0% corresponds to 1000.0 V) 16: Output torque (directional) 19: Taper output 20: Roll diameter output 21: Tension output	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F5-08	0xF508	AO2 output function selection	0: Running frequency 1: Frequency reference 2: Output current 3: Output torque 4: Output power 5: Output voltage 6: Pulse input (100.0% corresponds to 100.0 kHz) 7: AI1 8: AI2 9: AI3 10: Length 11: Count value 12: Communication 13: Motor speed 14: Output current (100.0% corresponds to 1000.0 A) 15: Output voltage (100.0% corresponds to 1000.0 V) 16: Output torque (directional) 19: Taper output 20: Roll diameter output 21: Tension output	1	-	Real time
F5-10	0xF50A	AO1 zero offset coefficient	-100.0% to 100.0%	0	%	Real-time
F5-11	0xF50B	AO1 gain	-10.00 to 10.00	1	-	Real time
F5-12	0xF50C	AO2 zero offset coefficient	-100.0% to 100.0%	0	%	Real-time
F5-13	0xF50D	AO2 gain	-10.00-10.00	1	-	Real time
F5-17	0xF511	Expansion card relay output delay	0.0s to 3600.0s	0	s	Real time
F5-18	0xF512	Control board relay 1 output delay	0.0s to 3600.0s	0	s	Real time
F5-19	0xF513	Control board relay 2 output delay	0.0s to 3600.0s	0	s	Real time
F5-20	0xF514	DO1 output delay	0.0s to 3600.0s	0	s	Real time
F5-21	0xF515	Expansion card DO2 output delay	0.0s to 3600.0s	0	s	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F5-22	0xF516	DO valid status selection	Ones: Expansion card relay 0: Positive logic 1: Negative logic Tens: Control board relay 1 0: Positive logic 1: Negative logic Hundreds: Control board relay 2 0: Positive logic 1: Negative logic Thousands: Control board DO1 0: Positive logic 1: Negative logic Ten thousands: Extension card DO2 0: Positive logic 1: Negative logic	0	-	Real time
F6-00	0xF600	Start mode	0: Direct start 1: Flying start 2: Vector pre-excitation start for asynchronous motor	0	-	Real time
F6-01	0xF601	Frequency for flying start mode	0: From stop frequency 1: From 50 Hz 2: From the maximum frequency 3: Reserved	0	-	At stop
F6-02	0xF602	Flying start speed	1 to 100	20	-	Real time
F6-03	0xF603	Startup frequency	0.00 Hz to 10.00 Hz	0	Hz	Real time
F6-04	0xF604	Startup frequency holding time	0.0s to 100.0s	0	s	At stop
F6-05	0xF605	DC braking current/ Pre-excitation current upon start	0% to 150%	0	%	At stop
F6-06	0xF606	DC braking/Pre-excitation time upon start	0.0s to 100.0s	0	s	At stop
F6-07	0xF607	Acceleration/ Deceleration mode	0: Linear acceleration/deceleration 1: S-curve acceleration/deceleration	0	-	At stop
F6-08	0xF608	Time proportion of S-curve start segment	0.0% to 70.0%	30	%	At stop
F6-09	0xF609	Time proportion of S-curve end segment	0.0% to 70.0%	30	%	At stop
F6-10	0xF60A	Stop mode	0: Decelerate to stop 1: Coast to stop	0	-	Real time
F6-11	0xF60B	Start frequency of DC braking for stop	0.00 Hz to maximum frequency (F0-10)	0	Hz	Real time
F6-12	0xF60C	Waiting time of DC braking for stop	0.0s to 100.0s	0	s	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F6-13	0xF60D	DC braking current for stop	0% to 150%	0	%	Real-time
F6-14	0xF60E	DC braking time for stop	0.0s to 100.0s	0	s	Real time
F6-15	0xF60F	Braking usage rate	0% to 100%	100	%	At stop
F6-16	0xF610	Closed-loop current Kp of flying start	0-1000	500	-	Real time
F6-17	0xF611	Closed-loop current Ki of torque tracking	0-1000	800	-	Real time
F6-18	0xF612	Current during flying start	30-200	100	-	Real time
F6-21	0xF615	Demagnetization time	0.00s to 10.00s	1	s	Real time
F6-22	0xF616	Start pre-torque setting	0.0% to 200.0%	0	%	Real-time
F6-26	0xF61A	Electromagnetic shorting current	0% to 200%	100	%	Real-time
F6-27	0xF61B	Electromagnetic shorting time upon startup	0.0s to 100.0s	0	s	At stop
F6-28	0xF61C	Electromagnetic shorting time upon stop	0.0s to 100.0s	0	s	At stop
F6-29	0xF61D	Electromagnetic shorting voltage margin	20.0 V to 100.0 V	20	V	At stop
F6-30	0xF61E	Flying start trial current of synchronous motor	50-500	100	-	At stop
F6-31	0xF61F	Minimum frequency for flying start of synchronous motor	0.0-100.0	0	-	At stop
F6-32	0xF620	Angle compensation for flying start of synchronous motor	0-360	0	-	At stop
F6-33	0xF621	Proportion of flying start for synchronous motor	0.1-10.0	1	-	At stop
F6-34	0xF622	Integral of flying start for synchronous motor	0.1-10.0	1	-	At stop
F6-35	0xF623	Maximum current limit for DC braking	80% to 135%	80	%	At stop
F6-36	0xF624	Speed loop feedforward	-200.0% to 200.0%	0	%	Real-time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F7-01	0xF701	MF.K key function	0: MF.K key disabled 1: Switchover between operating panel control and remote control (terminal or communication) 2: Switchover between forward and reverse run 3: Forward jog 4: Reverse jog	0	-	At stop
F7-02	0xF702	STOP/RES key function	0: STOP/RESET key enabled only in operating panel control mode 1: STOP/RESET key enabled in any control mode	0	-	Real time
F7-03	0xF703	Parameter 1 displayed on LED operating panel during operation	Bit 00: Running frequency (Hz) Bit 01: Frequency reference (Hz) Bit 02: Bus voltage (V) Bit 03: Output voltage (V) Bit 04: Output current (A) Bit 05: Output power (kW) Bit 06: Output torque (%) Bit 07: DI state Bit 08: DO state Bit 19: AI1 voltage (V) Bit 10: AI2 voltage (V) Bit 11: AI3 voltage (V) Bit 12: Count value Bit 13: Length value Bit 14: Load speed display Bit 15: PID reference	0x1F	-	Real time
F7-04	0xF704	Parameter 2 displayed on LED operating panel during operation	Bit 00: PID feedback Bit 01: PLC stage Bit 02: Pulse input frequency (kHz) Bit 03: Running frequency 2 (Hz) Bit 04: Remaining running time Bit 05: AI1 voltage before correction (V) Bit 06: AI2 voltage before correction (V) Bit 07: AI3 voltage before correction (V) Bit 08: Linear speed Bit 09: Current power-on time (h) Bit 10: Current running time (min.) Bit 11: Pulse input frequency (Hz) Bit 12: Communication setting Bit 13: Encoder feedback speed (Hz) Bit 14: Roll diameter (mm) Bit 15: Tension after taper (N)	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F7-05	0xF705	Parameter displayed on the LED operating panel upon stop	Bit 00: Frequency reference (Hz) Bit 01: Bus voltage (V) Bit 02: DI state Bit 03: DO state Bit 04: AI1 voltage (V) Bit 05: AI2 voltage (V) Bit 06: AI3 voltage (V) Bit 07: Count value Bit 08: Length value Bit 09: PLC stage Bit 10: Load speed display Bit 11: PID reference Bit 12: Pulse input frequency (kHz) Bit 13: Roll diameter (mm) Bit 14: Tension (N)	0x33	-	Real time
F7-06	0xF706	Load speed display coefficient	0.0000 to 6.5	1	-	Real time
F7-07	0xF707	Drive unit heatsink temperature	0°C to 999°C	0	°C	Unchangeable
F7-08	0xF708	Product No.	0-999	0	-	Unchangeable
F7-09	0xF709	Cumulative running time	0 h to 65535 h	0	h	Unchangeable
F7-10	0xF70A	Performance software version	-	0	-	Unchangeable
F7-11	0xF70B	Function software version	-	0	-	Unchangeable
F7-12	0xF70C	Number of decimal places for load speed display	0: 0 1: 1 2: 2 3: 3	1	-	Real time
F7-13	0xF70D	Cumulative power-on time	0 h to 65535 h	0	h	Unchangeable
F7-14	0xF70E	Cumulative power consumption	0° to 65535°	0	°	Unchangeable
F7-15	0xF70F	Temporary performance software version	-	0	-	Unchangeable
F7-16	0xF710	Temporary function software version	-	0	-	Unchangeable
F8-00	0xF800	Jog frequency	0.00 Hz to maximum frequency (F0-10)	2	Hz	Real time
F8-01	0xF801	Jog acceleration time	0.0s to 6500.0s	20	s	Real time
F8-02	0xF802	Jog deceleration time	0.0s to 6500.0s	20	s	Real time
F8-03	0xF803	Acceleration time 2	0.0s to 6500.0s	20	s	Real time
F8-04	0xF804	Deceleration time 2	0.0s to 6500.0s	20	s	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F8-05	0xF805	Acceleration time 3	0.0s to 6500.0s	20	s	Real time
F8-06	0xF806	Deceleration time 3	0.0s to 6500.0s	20	s	Real time
F8-07	0xF807	Acceleration time 4	0.0s to 6500.0s	20	s	Real time
F8-08	0xF808	Deceleration time 4	0.0s to 6500.0s	20	s	Real time
F8-09	0xF809	Jump frequency 1	0.00 Hz to maximum frequency (F0-10)	0	Hz	Real time
F8-10	0xF80A	Jump frequency 2	0.00 Hz to maximum frequency (F0-10)	0	Hz	Real time
F8-11	0xF80B	Jump frequency amplitude	0.00 Hz to 5.00 Hz	0	Hz	Real time
F8-12	0xF80C	Dead zone time of forward/reverse run switchover	0.0s to 3000.0s	0	s	Real time
F8-13	0xF80D	Reverse running control	0: Allowed 1: Prohibited	0	-	Real time
F8-14	0xF80E	Running mode when frequency < frequency lower limit	0: Run at frequency lower limit 1: Stop according to F6-10 2: Run at zero speed 3: Coast to stop	0	-	Real time
F8-15	0xF80F	Mechanical brake frequency	0.00 Hz to 10.00 Hz	0	Hz	Real time
F8-16	0xF810	Cumulative power-on time threshold	0 h to 65000 h	0	h	Real time
F8-17	0xF811	Cumulative running time threshold	0 h to 65000 h	0	h	Real time
F8-18	0xF812	Protection upon start	0: Disable 1: Enable	0	-	Real time
F8-19	0xF813	Frequency detection value (FDT1)	0.00 Hz to maximum frequency (F0-10)	50	Hz	Real time
F8-20	0xF814	Frequency detection hysteresis (FDT1)	0.0% to 100.0%	5	%	Real-time
F8-21	0xF815	Detection frequency amplitude	0.0% to 100.0%	0	%	Real-time
F8-22	0xF816	Jump frequency state during acceleration/deceleration	0: Invalid 1: Valid	0	-	Real time
F8-25	0xF819	Frequency for switchover between acceleration time 1 and acceleration time 2	0.00 Hz to maximum frequency (F0-10)	0	Hz	Real time
F8-26	0xF81A	Frequency for switchover between deceleration time 1 and deceleration time 2	0.00 Hz to maximum frequency (F0-10)	0	Hz	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F8-27	0xF81B	Jog with priority	0: Invalid 1: Valid	0	-	Real time
F8-28	0xF81C	Frequency detection value (FDT2)	0.00 Hz to maximum frequency (F0-10)	50	Hz	Real time
F8-29	0xF81D	Frequency detection hysteresis (FDT2)	0.0% to 100.0%	5	%	Real-time
F8-30	0xF81E	Detection frequency 1	0.00 Hz to maximum frequency (F0-10)	50	Hz	Real time
F8-31	0xF81F	Detection frequency amplitude 1	0.0% to 100.0%	0	%	Real-time
F8-32	0xF820	Detection frequency 2	0.00 Hz to maximum frequency (F0-10)	50	Hz	Real time
F8-33	0xF821	Detection frequency amplitude 2	0.0% to 100.0%	0	%	Real-time
F8-34	0xF822	Zero current detection level	0.0% to 300.0%	5	%	Real-time
F8-35	0xF823	Zero current detection delay	0.01s to 600.00s	0.1	s	Real time
F8-36	0xF824	Output current overlimit threshold	0.0% to 300.0%	200	%	Real-time
F8-37	0xF825	Software overcurrent detection delay	0.00s to 600.00s	0	s	Real time
F8-38	0xF826	Detection current 1	0.0% to 300.0%	100	%	Real-time
F8-39	0xF827	Detection current amplitude 1	0.0% to 300.0%	0	%	Real-time
F8-40	0xF828	Detection current 2	0.0% to 300.0%	100	%	Real-time
F8-41	0xF829	Detection current amplitude 2	0.0% to 300.0%	0	%	Real-time
F8-42	0xF82A	Timing function	0: Invalid 1: Valid	0	-	At stop
F8-43	0xF82B	Timing operation time setting source	0: F8-44 1: AI1 2: AI2 3: AI3	0	-	At stop
F8-44	0xF82C	Timing operation time	0.0 min. to 6500.0 min.	0	min	At stop
F8-45	0xF82D	Lower limit threshold of AI1 input voltage protection value	0.00 V to 11.00 V	3.1	V	Real time
F8-46	0xF82E	Upper limit threshold of AI1 input voltage protection value	0.00 V to 11.00 V	6.8	V	Real time
F8-47	0xF82F	Module temperature reach	0°C to 100°C	75	°C	Real-time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F8-48	0xF830	Cooling fan control	0: Working during drive running 1: Working continuously	0	-	Real time
F8-49	0xF831	Wakeup frequency	0.00 Hz to 599.00 Hz	0	Hz	Real time
F8-50	0xF832	Wakeup delay	0.0s to 6500.0s	0	s	Real time
F8-51	0xF833	Hibernation frequency	0.00 Hz to 599.00 Hz	0	Hz	Real time
F8-52	0xF834	Hibernation delay	0.0s to 6500.0s	0	s	Real time
F8-53	0xF835	Current running time reach	0.0 min. to 6500.0 min.	0	min	Real time
F8-54	0xF836	STO function	0: Disable 1: Enable	0	-	At stop
F8-55	0xF837	Deceleration time for emergency stop	0.0s to 6500.0s	0	s	Real time
F9-00	0xF900	AC drive overload suppression	0: Disable 1: Enable	0	-	Real time
F9-01	0xF901	Motor overload protection gain	0.2 to 10.00	1	-	Real time
F9-02	0xF902	Motor overload warning coefficient	50% to 100%	80	%	Real-time
F9-04	0xF904	Overvoltage threshold	350.0 V to 820.0 V	820	V	Real time
F9-06	0xF906	Output phase loss detection before start	0: Invalid 1: Valid	0	-	Real time
F9-07	0xF907	Detection of software short circuit to ground	0: Not detected 1: Detection before power-on 2: Detection before operation 3: Detection before power-on and operation	1	-	At stop
F9-08	0xF908	Start voltage for braking unit action	200.0 V to 2000.0 V	760	V	Real time
F9-09	0xF909	Number of automatic reset times upon fault	0-20	0	-	Real time
F9-10	0xF90A	DO action during automatic fault reset	0: Disable 1: Enable	0	-	Real time
F9-11	0xF90B	Time for automatic reset upon fault	0.1s to 100.0s	1	s	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F9-12	0xF90C	Input phase loss/ Contactor close protection	Ones: Input phase loss protection selection 0: Input phase loss detection inhibited 1: Input phase loss detected by software and hardware 2: Input phase loss detected by software 3: Input phase loss detected by hardware Tens: Pre-charge resistor contactor/ Fan fault protection 0: Disable 1: Enable	11	-	Real time
F9-13	0xF90D	Time for restart and reset upon fault	0.0s to 600.0s	10	s	Real time
F9-14	0xF90E	Type of the 1st fault	0-99	0	-	Unchangeable
F9-15	0xF90F	Type of the 2nd fault	0-99	0	-	Unchangeable
F9-16	0xF910	Type of the 3rd (latest) fault	0-99	0	-	Unchangeable
F9-17	0xF911	Frequency upon the 3rd (latest) fault	0 Hz to 65535 Hz	0	Hz	Unchangeable
F9-18	0xF912	Current upon the 3rd (latest) fault	0.0 A to 6553.5 A	0	A	Unchangeable
F9-19	0xF913	Bus voltage upon the 3rd (latest) fault	0.0 V to 6553.5 V	0	V	Unchangeable
F9-20	0xF914	Input terminal state upon the 3rd (latest) fault	0-9999	0	-	Unchangeable
F9-21	0xF915	Output terminal state upon the 3rd (latest) fault	0-9999	0	-	Unchangeable
F9-22	0xF916	AC drive state upon the 3rd (latest) fault	0-65535	0	-	Unchangeable
F9-23	0xF917	Power-on time upon the 3rd (latest) fault	0-65535	0	-	Unchangeable
F9-24	0xF918	Running time upon the 3rd (latest) fault	0.0-6553.5	0	-	Unchangeable
F9-25	0xF919	IGBT temperature upon the 3rd (latest) fault	0-999	0	-	Unchangeable
F9-26	0xF91A	Fault subcode of the 3rd (latest) fault	0-65535	0	-	Unchangeable
F9-27	0xF91B	Frequency upon the 2nd fault	0 Hz to 65535 Hz	0	Hz	Unchangeable

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F9-28	0xF91C	Current upon the 2nd fault	0.0 A to 6553.5 A	0	A	Unchangeable
F9-29	0xF91D	Bus voltage upon the 2nd fault	0.0 V to 6553.5 V	0	V	Unchangeable
F9-30	0xF91E	Input terminal state upon the 2nd fault	0-9999	0	-	Unchangeable
F9-31	0xF91F	Output terminal state upon the 2nd fault	0-9999	0	-	Unchangeable
F9-32	0xF920	AC drive state upon the 2nd fault	0-65535	0	-	Unchangeable
F9-33	0xF921	Power-on time upon the 2nd fault	0-65535	0	-	Unchangeable
F9-34	0xF922	Running time upon the 2nd fault	0.0-6553.5	0	-	Unchangeable
F9-35	0xF923	IGBT temperature upon the 2nd fault	0-999	0	-	Unchangeable
F9-36	0xF924	Fault subcode upon the 2nd fault	0-65535	0	-	Unchangeable
F9-37	0xF925	Frequency upon the 1st fault	0 Hz to 65535 Hz	0	Hz	Unchangeable
F9-38	0xF926	Current upon the 1st fault	0.0 A to 6553.5 A	0	A	Unchangeable
F9-39	0xF927	Bus voltage upon the 1st fault	0.0 V to 6553.5 V	0	V	Unchangeable
F9-40	0xF928	Input terminal state upon the 1st fault	0-9999	0	-	Unchangeable
F9-41	0xF929	Output terminal state upon the 1st fault	0-9999	0	-	Unchangeable
F9-42	0xF92A	AC drive state upon the 1st fault	0-65535	0	-	Unchangeable
F9-43	0xF92B	Power-on time upon the 1st fault	0-65535	0	-	Unchangeable
F9-44	0xF92C	Running time upon the 1st fault	0.0-6553.5	0	-	Unchangeable
F9-45	0xF92D	IGBT temperature upon the 1st fault	0-999	0	-	Unchangeable
F9-46	0xF92E	Fault subcode upon the 1st fault	0-65535	0	-	Unchangeable

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F9-47	0xF92F	Fault protection action selection 0	Ones: E02, E03, and E04 0: Coast to stop 2: Restart upon fault Tens: E05, E06, and E07 0: Coast to stop 2: Restart upon fault Hundreds: E08 0: Coast to stop Thousands: E09 0: Coast to stop 2: Restart upon fault Ten thousands: E10 0: Coast to stop 2: Restart upon fault	0	-	At stop
F9-48	0xF930	Fault protection action selection 1	Ones: E11 0: Coast to stop 1: Decelerate to stop 2: Restart upon fault 4: Warning 5: Canceled Tens: E12 0: Coast to stop 1: Decelerate to stop 2: Restart upon fault 4: Warning 5: Canceled Hundreds: E13 0: Coast to stop 1: Decelerate to stop 2: Restart upon fault 4: Warning 5: Canceled Thousands: E14 0: Coast to stop Ten thousands: E15 0: Coast to stop 1: Decelerate to stop 3: Electromagnetic shorting 4: Warning 5: Canceled	0	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F9-49	0xF931	Fault protection action selection 2	Ones: E16 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Tens: E17 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Hundreds: E18 0: Coast to stop Thousands: E19 0: Coast to stop 3: Electromagnetic shorting 4: Warning 5: Canceled Ten thousands: E20 0: Coast to stop 3: Electromagnetic shorting 4: Warning 5: Canceled	0	-	At stop
F9-50	0xF932	Fault protection action selection 3	Ones: Reserved 0: Coast to stop Tens: E63 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Hundreds: E23 0: Coast to stop 5: Canceled Thousands: E24 0: Coast to stop 5: Canceled Ten thousands: E25 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled	5040	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F9-51	0xF933	Fault protection action selection 4	Ones: E26 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Tens: E27 0: Coast to stop 1: Decelerate to stop 3: Electromagnetic shorting 4: Warning 5: Canceled Hundreds: E28 0: Coast to stop 1: Decelerate to stop 3: Electromagnetic shorting 4: Warning 5: Canceled Thousands: E29 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Ten thousands: E30 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled	51111	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F9-52	0xF934	Fault protection action selection 5	Ones: E31 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Tens: E40 0: Coast to stop 2: Restart upon fault Hundreds: Value of E41 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Thousands: E42 0: Coast to stop 1: Decelerate to stop 2: Restart upon fault 3: Electromagnetic shorting 4: Warning 5: Canceled Ten thousands: E43 0: Coast to stop 1: Decelerate to stop 3: Electromagnetic shorting 4: Warning 5: Canceled	101	-	At stop
F9-53	0xF935	Fault protection action selection 6	Ones: E45 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Tens: E60 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Hundreds: E61 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Thousands: E62 0: Coast to stop 5: Canceled Ten thousands: Reserved 5: Canceled	0	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
F9-54	0xF936	Frequency for continuing to run upon fault	0: Current running frequency 1: Frequency reference 2: Frequency upper limit 3: Frequency lower limit 4: Backup frequency upon error	1	-	Real time
F9-55	0xF937	Backup frequency reference upon error	0.0% to 100.0%	100	%	Real-time
F9-59	0xF93B	Selection of power dip ride-through action	0: Disabled 1: Decelerate 2: Decelerate to stop 3: Voltage dip suppression	0	-	At stop
F9-60	0xF93C	Voltage threshold for recovery from power dip ride-through	80% to 100%	85	%	Real-time
F9-61	0xF93D	Duration for judging voltage recovery from power dip ride-through	0.0s to 100.0s	0.5	s	Real time
F9-62	0xF93E	Voltage threshold for enabling power dip ride-through	60% to 100%	80	%	Real-time
F9-63	0xF93F	FVC flying start protection time	0-10000	0	-	At stop
F9-64	0xF940	Load loss detection level	0.0% to 100.0%	10	%	Real-time
F9-65	0xF941	Load loss detection time	0.0s to 60.0s	1	s	Real time
F9-66	0xF942	Voltage dip suppression time	0.0s to 600.0s	0	s	Unchangeable
F9-67	0xF943	Overspeed detection level	0.0% to 50.0%	5	%	Real-time
F9-68	0xF944	Overspeed detection time	0.0-60.0	1	-	Real time
F9-69	0xF945	Detection level for excessive speed deviation	0.0% to 50.0%	20	%	Real-time
F9-70	0xF946	Detection time for excessive speed deviation	0.0s to 60.0s	5	s	Real time
F9-71	0xF947	Power dip ride-through gain	0-100	40	-	Real time
F9-72	0xF948	Power dip ride-through integral	0-100	30	-	Real time
F9-73	0xF949	Deceleration time of power dip ride-through	0.0s to 300.0s	20	s	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
FA-00	0xFA00	PID reference source	0: PID digital setting (FA-01) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication setting (1000H) 6: Multi-reference	0	-	Real time
FA-01	0xFA01	PID digital setting	0.0% to 100.0%	50	%	Real-time
FA-02	0xFA02	PID feedback source	0: AI1 1: AI2 2: AI3 3: AI1 – AI2 4: Pulse reference (DI5) 5: Communication 6:AI1 + AI2 7: Max. (|AI1|, |AI2|) 8: Min. (|AI1|, |AI2|)	0	-	Real time
FA-03	0xFA03	PID action direction	0: Forward 1: Reverse	0	-	Real time
FA-04	0xFA04	PID reference and feedback range	0-65535	1000	-	Real time
FA-05	0xFA05	Proportional gain Kp1	0.0-1000.0	20	-	Real time
FA-06	0xFA06	Integral time Ti1	0.01s to 100.00s	2	s	Real time
FA-07	0xFA07	Differential time Td1	0.000s to 10.000s	0	s	Real time
FA-08	0xFA08	PID reverse cut-off frequency	0.00 Hz to maximum frequency (F0-10)	2	Hz	Real time
FA-09	0xFA09	PID deviation limit	0.0% to 100.0%	0	%	Real-time
FA-10	0xFA0A	PID differential limit	0.00% to 100.00%	0.1	%	Real-time
FA-11	0xFA0B	PID reference change time	0.00s to 650.00s	0	s	Real time
FA-12	0xFA0C	PID feedback filter time	0.00s to 60.00s	0	s	Real time
FA-13	0xFA0D	PID error gain	0.0% to 100.0%	100	%	Real-time
FA-14	0xFA0E	PID optimization parameter	0-100	0	-	Real time
FA-15	0xFA0F	Proportional gain Kp 2	0.0-1000.0	20	-	Real time
FA-16	0xFA10	Integral time Ti 2	0.01s to 100.00s	2	s	Real time
FA-17	0xFA11	Differential time Td 2	0.000s to 10.000s	0	s	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
FA-18	0xFA12	PID parameter switchover condition	0: No switchover 1: Switchover by DI 2: Automatic switchover based on deviation 3: Switchover based on running frequency 6: Automatic adjustment based on roll diameter 7: Automatic adjustment based on maximum roll diameter percentage	0	-	Real time
FA-19	0xFA13	PID parameter switchover deviation 1	0.0% to 100.0%	20	%	Real-time
FA-20	0xFA14	PID parameter switchover deviation 2	0.0% to 100.0%	80	%	Real-time
FA-21	0xFA15	PID initial value	0.0% to 100.0%	0	%	Real-time
FA-22	0xFA16	Active time of PID initial value	0.00s to 650.00s	0	s	Real time
FA-23	0xFA17	Maximum deviation between two PID outputs in forward direction	0.00% to 100.00%	1	%	Real-time
FA-24	0xFA18	Maximum deviation between two PID outputs in reverse direction	0.00% to 100.00%	1	%	Real-time
FA-25	0xFA19	PID integral	0: Invalid 1: Valid	0	-	Real time
FA-26	0xFA1A	Detection level of PID feedback loss	0.0% to 100.0%	0	%	Real-time
FA-27	0xFA1B	Detection time of PID feedback loss	0.0s to 20.0s	0	s	Real time
FB-00	0xFB00	Wobble setting mode	0: Relative to the central frequency 1: Relative to the maximum frequency	0	-	Real time
FB-01	0xFB01	Wobble amplitude	0.0% to 100.0%	0	%	Real-time
FB-02	0xFB02	Jump frequency amplitude	0.0% to 50.0%	0	%	Real-time
FB-03	0xFB03	Wobble cycle	0.1s to 3000.0s	10	s	Real time
FB-04	0xFB04	Triangular wave rising time of wobble frequency	0.1% to 100.0%	50	%	Real-time
FB-05	0xFB05	Length reference	0 m to 65535 m	1000	m	Real time
FB-06	0xFB06	Actual length	0 m to 65535 m	0	m	Real time
FB-07	0xFB07	Number of pulses per meter	0.1-6553.5	100	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
FB-08	0xFB08	Count value reference	1-65535	1000	-	Real time
FB-09	0xFB09	Designated count value	1-65535	1000	-	Real time
FB-10	0xFB0A	Reset mode of number of revolutions	0: Edge triggering 1: Level triggering	0	-	Real time
FB-11	0xFB0B	Reset signal of number of revolutions	0: Disable 1: Enable	0	-	Real time
FB-12	0xFB0C	Revolution count retention upon power failure	0: Disable 1: Enable	0	-	Real time
FB-13	0xFB0D	Revolution count reset	0-65535	0	-	Real time
FB-14	0xFB0E	Numerator of transmission ratio	1-65535	1	-	Real time
FB-15	0xFB0F	Denominator of transmission ratio	1-65535	1	-	Real time
FB-16	0xFB10	Number of actual running revolutions	0-65535	0	-	Unchangeable
FB-17	0xFB11	Number of running revolutions	0-65535	0	-	Unchangeable
FB-18	0xFB12	Running revolution accuracy	0: 1 revolution 1: 0.1 revolution	0	-	Real time
FB-19	0xFB13	Revolution count direction	0: Forward 1: Reverse	0	-	Real time
FC-00	0xFC00	Multi-reference 0	-100.0% to 100.0%	0	%	Real-time
FC-01	0xFC01	Multi-reference 1	-100.0% to 100.0%	0	%	Real-time
FC-02	0xFC02	Multi-reference 2	-100.0% to 100.0%	0	%	Real-time
FC-03	0xFC03	Multi-reference 3	-100.0% to 100.0%	0	%	Real-time
FC-04	0xFC04	Multi-reference 4	-100.0% to 100.0%	0	%	Real-time
FC-05	0xFC05	Multi-reference 5	-100.0% to 100.0%	0	%	Real-time
FC-06	0xFC06	Multi-reference 6	-100.0% to 100.0%	0	%	Real-time
FC-07	0xFC07	Multi-reference 7	-100.0% to 100.0%	0	%	Real-time
FC-08	0xFC08	Multi-reference 8	-100.0% to 100.0%	0	%	Real-time
FC-09	0xFC09	Multi-reference 9	-100.0% to 100.0%	0	%	Real-time
FC-10	0xFC0A	Multi-reference 10	-100.0% to 100.0%	0	%	Real-time
FC-11	0xFC0B	Multi-reference 11	-100.0% to 100.0%	0	%	Real-time
FC-12	0xFC0C	Multi-reference 12	-100.0% to 100.0%	0	%	Real-time
FC-13	0xFC0D	Multi-reference 13	-100.0% to 100.0%	0	%	Real-time
FC-14	0xFC0E	Multi-reference 14	-100.0% to 100.0%	0	%	Real-time
FC-15	0xFC0F	Multi-reference 15	-100.0% to 100.0%	0	%	Real-time
FC-16	0xFC10	Simple PLC running mode	0: Stop after running for one cycle 1: Keep final values after running for one cycle 2: Repeat after running for one cycle	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
FC-17	0xFC11	Simple PLC retention selection upon power failure	Ones: Retention selection upon power failure 0: Disable 1: Enable Tens: Retention selection upon stop 0: Disable 1: Enable	0	-	Real time
FC-18	0xFC12	Running time of multi-reference 0 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time
FC-19	0xFC13	Acceleration/ Deceleration time of multi-reference 0 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-20	0xFC14	Running time of multi-reference 1 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time
FC-21	0xFC15	Acceleration/ Deceleration time of multi-reference 1 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-22	0xFC16	Running time of multi-reference 2 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time
FC-23	0xFC17	Acceleration/ Deceleration time of multi-reference 2 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-24	0xFC18	Running time of multi-reference 3 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
FC-25	0xFC19	Acceleration/ Deceleration time of multi-reference 3 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-26	0xFC1A	Running time of multi-reference 4 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time
FC-27	0xFC1B	Acceleration/ Deceleration time of multi-reference 4 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-28	0xFC1C	Running time of multi-reference 5 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time
FC-29	0xFC1D	Acceleration/ Deceleration time of multi-reference 5 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-30	0xFC1E	Running time of multi-reference 6 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time
FC-31	0xFC1F	Acceleration/ Deceleration time of multi-reference 6 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-32	0xFC20	Running time of multi-reference 7 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
FC-33	0xFC21	Acceleration/ Deceleration time of multi-reference 7 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-34	0xFC22	Running time of multi-reference 8 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time
FC-35	0xFC23	Acceleration/ Deceleration time of multi-reference 8 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-36	0xFC24	Running time of multi-reference 9 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time
FC-37	0xFC25	Acceleration/ Deceleration time of multi-reference 9 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-38	0xFC26	Running time of multi-reference 10 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time
FC-39	0xFC27	Acceleration/ Deceleration time of multi-reference 10 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-40	0xFC28	Running time of multi-reference 11 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
FC-41	0xFC29	Acceleration/ Deceleration time of multi-reference 11 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-42	0xFC2A	Running time of multi-reference 12 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time
FC-43	0xFC2B	Acceleration/ Deceleration time of multi-reference 12 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-44	0xFC2C	Running time of multi-reference 13 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time
FC-45	0xFC2D	Acceleration/ Deceleration time of multi-reference 13 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-46	0xFC2E	Running time of multi-reference 14 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time
FC-47	0xFC2F	Acceleration/ Deceleration time of multi-reference 14 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-48	0xFC30	Running time of multi-reference 15 set by simple PLC	0.0s (h) to 6553.5s (h)	0	s (h)	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
FC-49	0xFC31	Acceleration/ Deceleration time of multi-reference 15 set by simple PLC	0: Group 1 acceleration/deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/deceleration time (F8-07 and F8-08)	0	-	Real time
FC-50	0xFC32	PLC operating time unit	0: s (second) 1: h (hour)	0	-	Real time
FC-51	0xFC33	Multi-reference 0 source	0: Multi-reference 0 (FC-00) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: PID 6: Preset frequency (F0-08 that can be changed by pressing UP/DOWN key)	0	-	Real time
FD-00	0xFD00	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	5	-	Real time
FD-01	0xFD01	Modbus data format	0: No check (8-N-2) 1: Even parity check (8-E-1) 2: Odd parity check (8-O-1) 3: No check (8-N-1)	0	-	Real time
FD-02	0xFD02	Local address	1 to 247	1	-	Real time
FD-03	0xFD03	Response delay	0 ms to 20 ms	2	ms	Real-time
FD-04	0xFD04	Modbus communication timeout time	0.0s to 60.0s	0	s	Real time
FD-06	0xFD06	Communication fault reset	0: Disable 1: Enable	1	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
FD-09	0xFD09	CANopen/CANlink communication state	Ones: CANopen 0: Stop 1: Initialized 2: Pre-running 8: Running Tens: CANlink 0: Stop 1: Initialized 2: Pre-running 8: Running Hundreds: Reserved	2	-	Unchangeable
FD-10	0xFD0A	CANopen/CANlink switchover	1: CANopen 2: CANlink	1	-	At stop
FD-12	0xFD0C	CAN baud rate	0: 20 kbps 1: 50 kbps 2: 100 kbps 3: 125 kbps 4: 250 kbps 5: 500 kbps 6: 1 Mbps	5	-	At stop
FD-13	0xFD0D	CAN station number	1-127	1	-	At stop
FD-14	0xFD0E	Number of CAN frames received per unit of time	0-65535	0	-	Unchangeable
FD-15	0xFD0F	Maximum number of error frames received by node	0-65535	0	-	Unchangeable
FD-16	0xFD10	Maximum number of error frames sent by node	0-65535	0	-	Unchangeable
FD-17	0xFD11	Number of bus disconnection times per unit of time	0-65535	0	-	Unchangeable
FD-19	0xFD13	CAN communication disconnection coefficient	1-15	3	-	At stop
FD-37	0xFD25	DHCP function	0: Disable 1: Enable	0	-	At stop
FD-38	0xFD26	Highest order byte of the IP address	0-255	0	-	At stop
FD-39	0xFD27	Second highest order byte of the IP address	0-255	0	-	At stop
FD-40	0xFD28	Third highest order byte of the IP address	0-255	0	-	At stop
FD-41	0xFD29	Lowest order byte of the IP address	0-255	0	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
FD-42	0xFD2A	Highest order byte of the subnet mask	0-255	0	-	At stop
FD-43	0xFD2B	Second highest order byte of the subnet mask	0-255	0	-	At stop
FD-44	0xFD2C	Third highest order byte of the subnet mask	0-255	0	-	At stop
FD-45	0xFD2D	Lowest order byte of the subnet mask	0-255	0	-	At stop
FD-46	0xFD2E	Highest order byte of the gateway IP address	0-255	0	-	At stop
FD-47	0xFD2F	Second highest order byte of the gateway IP address	0-255	0	-	At stop
FD-48	0xFD30	Third highest order byte of the gateway IP address	0-255	0	-	At stop
FD-49	0xFD31	Lowest order byte of the gateway IP address	0-255	0	-	At stop
FD-58	0xFD3A	Internet IP expansion card error code	0-255	0	-	Real time
FD-61	0xFD3D	High-order byte of MAC address	0-65535	0	-	At stop
FD-62	0xFD3E	Middle-order byte of MAC address	0-65535	0	-	At stop
FD-63	0xFD3F	Low-order byte of MAC address	0-65535	0	-	At stop
FD-94	0xFD5E	Modbus software version	0-65535	0	-	Unchangeable
FD-95	0xFD5F	CANlink software version	0-65535	0	-	Unchangeable
FD-96	0xFD60	CANopen software version	0-65535	0	-	Unchangeable
FE-00	0xFE00	User-defined parameter 0	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	7017	-	Real time
FE-01	0xFE01	User-defined parameter 1	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	7016	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
FE-02	0xFE02	User-defined parameter 2	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-03	0xFE03	User-defined parameter 3	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-04	0xFE04	User-defined parameter 4	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-05	0xFE05	User-defined parameter 5	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-06	0xFE06	User-defined parameter 6	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-07	0xFE07	User-defined parameter 7	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-08	0xFE08	User-defined parameter 8	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-09	0xFE09	User-defined parameter 9	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-10	0xFE0A	User-defined parameter 10	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
FE-11	0xFE0B	User-defined parameter 11	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-12	0xFE0C	User-defined parameter 12	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-13	0xFE0D	User-defined parameter 13	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-14	0xFE0E	User-defined parameter 14	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-15	0xFE0F	User-defined parameter 15	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-16	0xFE10	User-defined parameter 16	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-17	0xFE11	User-defined parameter 17	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-18	0xFE12	User-defined parameter 18	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-19	0xFE13	User-defined parameter 19	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
FE-20	0xFE14	User-defined parameter 20	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	6768	-	Real time
FE-21	0xFE15	User-defined parameter 21	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	6769	-	Real time
FE-22	0xFE16	User-defined parameter 22	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-23	0xFE17	User-defined parameter 23	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-24	0xFE18	User-defined parameter 24	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-25	0xFE19	User-defined parameter 25	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-26	0xFE1A	User-defined parameter 26	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-27	0xFE1B	User-defined parameter 27	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-28	0xFE1C	User-defined parameter 28	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
FE-29	0xFE1D	User-defined parameter 29	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-30	0xFE1E	User-defined parameter 30	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FE-31	0xFE1F	User-defined parameter 31	F0-00 to FP-xx A0-00 to Ax-xx B0-00 to Bx-xx U0-00 to U0-xx U3-00 to U3-xx	0	-	Real time
FP-00	0x1F00	User password	0 to 65535	0	-	Real time
FP-01	0x1F01	Parameter initialization	0: No operation 1: Restore to factory parameter mode 1 2: Clear records 4: Restore user backup parameters 501: Back up current user parameters 503: Restore to factory parameter mode 2	1	-	At stop
FP-02	0x1F02	Function parameter display	Ones: Group U 0: Hidden 1: Displayed Tens: Group A 0: Hidden 1: Displayed Hundreds: Group B 0: Hidden 1: Displayed Thousands: Reserved	111	-	Real time
FP-03	0x1F03	Individualized parameter display	Ones: User-defined parameter group 0: Hidden 1: Displayed Tens:User-modified parameter group 0: Hidden 1: Displayed	11	-	Real time
FP-04	0x1F04	Parameter modification function	0: Enable 1: Disable	0	-	Real time
A0-00	0xA000	Speed/Torque control mode	0: Speed control 1: Torque control	0	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A0-01	0xA001	Torque reference source	0: Digital setting (A0-03) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication setting (1000H) 6: Min. (AI1, AI2) 7: Max. (AI1, AI2)	0	-	At stop
A0-03	0xA003	Torque digital setting	-200.0% to 200.0%	100	%	Real-time
A0-04	0xA004	Torque filter time	0.000s to 5.000s	0	s	Real time
A0-05	0xA005	Digital setting of speed limit	-120.0% to 120.0%	0	%	Real-time
A0-06	0xA006	Frequency modulation coefficient in window mode	0.0-50.0	0	-	Real time
A0-07	0xA007	Torque acceleration time	0.00s to 650.00s	1	s	Real time
A0-08	0xA008	Torque deceleration time	0.00s to 650.00s	1	s	Real time
A0-09	0xA009	Speed limit reference source	0: A0-05 1: Frequency source	0	-	Real time
A0-10	0xA00A	Speed limit offset/ Window frequency	0.00 Hz to maximum frequency (F0-10)	5	Hz	Real time
A0-11	0xA00B	Active mode of speed limit offset	0: Bidirectional offset valid 1: Unidirectional offset valid 2: Window mode	1	-	At stop
A0-12	0xA00C	Frequency acceleration time	0.0s to 6500.0s	1	s	Real time
A0-13	0xA00D	Frequency deceleration time	0.0s to 6500.0s	1	s	Real time
A0-14	0xA00E	Torque mode switchover	0: No switchover 1: Switch to speed mode upon stop 2: Target torque changes to 0 upon stop	1	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A1-00	0xA100	VDI1 function selection	0: No function 1: Forward run (FWD) 2: Reverse run (REV) 3: Three-wire operation control 4: Forward jog (FJOG) 5: Reverse jog (RJOG) 6: Function as the UP key 7: Function as the DOWN key 8: Coast to stop 9: Fault reset (RESET) 10: Operation pause 11: External fault NO input 12: Multi-reference terminal 1 13: Multi-reference terminal 2 14: Multi-reference terminal 3 15: Multi-reference terminal 4 16: Acceleration/Deceleration selection terminal 1 17: Acceleration/Deceleration selection terminal 2 18: Frequency source switchover 19: Clear information set by UP/DOWN keys on the operating panel or by terminals functioning as the UP/ DOWN keys 20: Command switchover terminal 21: Acceleration/Deceleration inhibited 22: PID pause 23: PLC state reset 24: Wobble pause 25: Counter input (DI5) 26: Counter reset 27: Length counting input (DI5) 28: Length reset 29: Torque control inhibited 30: Pulse input 31: Reserved 32: Immediate DC braking 33: External fault NC input 34: Frequency modification enable 35: PID action direction reversal 36: External stop terminal 1 37: Control command switchover terminal 2 38: PID integral pause (to be continued)	0	-	At stop
A1-01	0xA101	VDI2 function selection		0	-	At stop
A1-02	0xA102	VDI3 function selection		0	-	At stop
A1-03	0xA103	VDI4 function selection		0	-	At stop
A1-04	0xA104	VDI5 function selection		0	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A1-00	0xA100	VDI1 function selection	(continued) 39: Switchover between frequency source X and preset frequency 40: Switchover between frequency source Y and preset frequency 41: Motor terminal selection 42: Position lock enable 43: PID parameter switchover 44: User-defined fault 1 45: User-defined fault 2 46: Speed/Torque control switchover 47: Emergency stop 48: External stop terminal 2 49: Deceleration DC braking 50: Clear the current running time 51: Two-wire/Three-wire control switchover 52: Electromagnetic shorting 53: Thickness overlaying 54: Roll diameter reset 55: Initial roll diameter 1 56: Initial roll diameter 2 57: Pre-drive 58: Winding/Unwinding switchover 59: Roll diameter calculation disabled 60: Exit tension control 61: Terminal tension rise 62: Thickness selection 1 63: Thickness selection 2 90: Water cooling system fault 91: Low liquid level fault 92: Revolution count reset 93: Reserved	0	-	At stop
A1-01	0xA101	VDI2 function selection		0	-	At stop
A1-02	0xA102	VDI3 function selection		0	-	At stop
A1-03	0xA103	VDI4 function selection		0	-	At stop
A1-04	0xA104	VDI5 function selection		0	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A1-05	0xA105	VDI state setting source	Ones: VDI1 0: Set by A1-06 1: DO state 2: DI state Tens: VDI2 0: Set by A1-06 1: DO state 2: DI state Hundreds: VDI3 0: Set by A1-06 1: DO state 2: DI state Thousands: VDI4 0: Set by A1-06 1: DO state 2: DI state Ten thousands: VDI5 0: Set by A1-06 1: DO state 2: DI state	0	-	At stop
A1-06	0xA106	VDI state setting	Ones: VDI1 0: Invalid 1: Valid Tens: VDI2 0: Invalid 1: Valid Hundreds: VDI3 0: Invalid 1: Valid Thousands: VDI4 0: Invalid 1: Valid Ten thousands: VDI5 0: Invalid 1: Valid	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A1-07	0xA107	AI1 function selection (used as DI)	0: No function 1: Forward run (FWD) 2: Reverse run (REV) 3: Three-wire operation control 4: Forward jog (FJOG) 5: Reverse jog (RJOG) 6: Function as the UP key 7: Function as the DOWN key 8: Coast to stop 9: Fault reset (RESET) 10: Operation pause 11: External fault NO input 12: Multi-reference terminal 1 13: Multi-reference terminal 2 14: Multi-reference terminal 3 15: Multi-reference terminal 4 16: Acceleration/Deceleration selection terminal 1 17: Acceleration/Deceleration selection terminal 2 18: Frequency source switchover 19: Clear information set by UP/DOWN keys on the operating panel or by terminals functioning as the UP/DOWN keys 20: Command switchover terminal 21: Acceleration/Deceleration inhibited 22: PID pause 23: PLC state reset 24: Wobble pause 25: Counter input (DI5) 26: Counter reset 27: Length counting input (DI5) 28: Length reset 29: Torque control inhibited 30: Pulse input 31: Reserved 32: Immediate DC braking 33: External fault NC input 34: Frequency modification enable 35: PID action direction reversal 36: External stop terminal 1 37: Control command switchover terminal 2 (to be continued)	0	-	At stop
A1-08	0xA108	AI2 function selection (used as DI)		0	-	At stop
A1-09	0xA109	AI3 function selection (used as DI)		0	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A1-07	0xA107	AI1 function selection (used as DI)	(continued) 38: PID integral pause 39: Switchover between frequency source X and preset frequency 40: Switchover between frequency source Y and preset frequency 41: Motor terminal selection 42: Position lock enable 43: PID parameter switchover 44: User-defined fault 1 45: User-defined fault 2 46: Speed/Torque control switchover 47: Emergency stop 48: External stop terminal 2 49: Deceleration DC braking 50: Clear the current running time 51: Two-wire/Three-wire control switchover 52: Electromagnetic shorting 53: Thickness overlaying 54: Roll diameter reset 55: Initial roll diameter 1 56: Initial roll diameter 2 57: Pre-drive 58: Winding/Unwinding switchover 59: Roll diameter calculation disabled 60: Exit tension control 61: Terminal tension rise 62: Thickness selection 1 63: Thickness selection 2 90: Water cooling system fault 91: Low liquid level fault 92: Revolution count reset 93: Reserved	0	-	At stop
A1-08	0xA108	AI2 function selection (used as DI)		0	-	At stop
A1-09	0xA109	AI3 function selection (used as DI)		0	-	At stop
A1-10	0xA10A	Active status of AI used as DI	Ones: AI1 0: Active high 1: Active low Tens: AI2 0: Active high 1: Active low Hundreds: AI3 0: Active high 1: Active low	0	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A1-11	0xA10B	VDO1 function selection	0: No output 1: Drive in operation 2: Fault output (stop at fault) 3: Frequency level detection FDT1 output 4: Frequency reached 5: Operation at zero speed (no output at stop) 6: Motor overload alarm 7: Drive overload alarm 8: Set count value reached 9: Designated count value reached 10: Length reached 11: Simple PLC cycle completed 12: Cumulative operating time reached 13: Frequency limited 14: Torque limited 15: Ready to run 16: AI1 > AI2 17: Frequency upper limit reached 18: Frequency lower limit reached (operation-related) 19: Undervoltage output 20: Communication setting 21: Reserved 22: Reserved 23: Operation at zero speed 2 (at stop) 24: Cumulative 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: AI1 input limit exceeded 32: Drive output load loss To be continued	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A1-11	0xA10B	VDO1 function selection	Continued 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Output current limit exceeded 37: Frequency lower limit reached (output at stop) 38: Error (output upon fault or warning) 39: Current overtemperature pre-alarm 40: Present operating time reached 41: Fault output 2 42: Fault output 3	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A1-12	0xA10C	VDO2 function selection	0: No output 1: Drive in operation 2: Fault output (stop at fault) 3: Frequency level detection FDT1 output 4: Frequency reached 5: Operation at zero speed (no output at stop) 6: Motor overload alarm 7: Drive overload alarm 8: Set count value reached 9: Designated count value reached 10: Length reached 11: Simple PLC cycle completed 12: Cumulative operating time reached 13: Frequency limited 14: Torque limited 15: Ready to run 16: AI1 > AI2 17: Frequency upper limit reached 18: Frequency lower limit reached (operation-related) 19: Undervoltage output 20: Communication setting 21: Reserved 22: Reserved 23: Operation at zero speed 2 (at stop) 24: Cumulative 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 To be continued	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A1-12	0xA10C	VDO2 function selection	Continued 30: Timing reached 31: AI1 input limit exceeded 32: Drive output load loss 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Output current limit exceeded 37: Frequency lower limit reached (output at stop) 38: Error (output upon fault or warning) 39: Current overtemperature pre-alarm 40: Present operating time reached 41: Fault output 2 42: Fault output 3	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A1-13	0xA10D	VDO3 function selection	0: No output 1: Drive in operation 2: Fault output (stop at fault) 3: Frequency level detection FDT1 output 4: Frequency reached 5: Operation at zero speed (no output at stop) 6: Motor overload alarm 7: Drive overload alarm 8: Set count value reached 9: Designated count value reached 10: Length reached 11: Simple PLC cycle completed 12: Cumulative operating time reached 13: Frequency limited 14: Torque limited 15: Ready to run 16: AI1 > AI2 17: Frequency upper limit reached 18: Frequency lower limit reached (operation-related) 19: Undervoltage output 20: Communication setting 21: Reserved 22: Reserved 23: Operation at zero speed 2 (at stop) 24: Cumulative 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 To be continued	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A1-13	0xA10D	VDO3 function selection	Continued 30: Timing reached 31: AI1 input limit exceeded 32: Drive output load loss 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Output current limit exceeded 37: Frequency lower limit reached (output at stop) 38: Error (output upon fault or warning) 39: Current overtemperature pre-alarm 40: Present operating time reached 41: Fault output 2 42: Fault output 3	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A1-14	0xA10E	VDO4 function selection	0: No output 1: Drive in operation 2: Fault output (stop at fault) 3: Frequency level detection FDT1 output 4: Frequency reached 5: Operation at zero speed (no output at stop) 6: Motor overload alarm 7: Drive overload alarm 8: Set count value reached 9: Designated count value reached 10: Length reached 11: Simple PLC cycle completed 12: Cumulative operating time reached 13: Frequency limited 14: Torque limited 15: Ready to run 16: AI1 > AI2 17: Frequency upper limit reached 18: Frequency lower limit reached (operation-related) 19: Undervoltage output 20: Communication setting 21: Reserved 22: Reserved 23: Operation at zero speed 2 (at stop) 24: Cumulative 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 To be continued	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A1-14	0xA10E	VDO4 function selection	Continued 30: Timing reached 31: AI1 input limit exceeded 32: Drive output load loss 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Output current limit exceeded 37: Frequency lower limit reached (output at stop) 38: Error (output upon fault or warning) 39: Current overtemperature pre-alarm 40: Present operating time reached 41: Fault output 2 42: Fault output 3	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A1-15	0xA10F	VDO5 function selection	0: No output 1: Drive in operation 2: Fault output (stop at fault) 3: Frequency level detection FDT1 output 4: Frequency reached 5: Operation at zero speed (no output at stop) 6: Motor overload alarm 7: Drive overload alarm 8: Set count value reached 9: Designated count value reached 10: Length reached 11: Simple PLC cycle completed 12: Cumulative operating time reached 13: Frequency limited 14: Torque limited 15: Ready to run 16: AI1 > AI2 17: Frequency upper limit reached 18: Frequency lower limit reached (operation-related) 19: Undervoltage output 20: Communication setting 21: Reserved 22: Reserved 23: Operation at zero speed 2 (at stop) 24: Cumulative 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 Continued	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A1-15	0xA10F	VDO5 function selection	To be continued 30: Timing reached 31: AI1 input limit exceeded 32: Drive output load loss 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Output current limit exceeded 37: Frequency lower limit reached (output at stop) 38: Error (output upon fault or warning) 39: Current overtemperature pre-alarm 40: Present operating time reached 41: Fault output 2 42: Fault output 3	0	-	Real time
A1-16	0xA110	VDO1 output delay	0.0s to 3600.0s	0	s	Real time
A1-17	0xA111	VDO2 output delay	0.0s to 3600.0s	0	s	Real time
A1-18	0xA112	VDO3 output delay	0.0s to 3600.0s	0	s	Real time
A1-19	0xA113	VDO4 output delay	0.0s to 3600.0s	0	s	Real time
A1-20	0xA114	VDO5 output delay	0.0s to 3600.0s	0	s	Real time
A1-21	0xA115	VDO valid status selection	Ones: VDO1 0: Positive logic 1: Negative logic Tens: VDO2 0: Positive logic 1: Negative logic Hundreds: VDO3 0: Positive logic 1: Negative logic Thousands: VDO4 0: Positive logic 1: Negative logic Ten thousands: VDO5 0: Positive logic 1: Negative logic	0	-	Real time
A5-00	0xA500	Frequency upper limit for DPWM switchover	0.00 Hz to maximum frequency (F0-10)	12	Hz	Real time
A5-01	0xA501	PWM modulation mode	0: Asynchronous modulation mode 1: Synchronous modulation mode 1 Synchronous modulation mode 2 Synchronous modulation mode 3	0	-	Real time
A5-02	0xA502	Dead-zone compensation mode	0: Disable 1: Enable	2	-	At stop
A5-03	0xA503	Random PWM depth	0-10	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A5-04	0xA504	Fast current limit	0: Disable 1: Enable	0	-	Real time
A5-05	0xA505	Sampling delay	1-13	5	-	Real time
A5-06	0xA506	Undervoltage threshold	150.0 V to 700.0 V	350	V	Real time
A5-07	0xA507	SVC optimization	0: No optimization 1: Optimization mode 1 2: Optimization mode 2	1	-	At stop
A5-12	0xA50C	Reserved	0-1	0	-	Unchangeable
A5-13	0xA50D	Reserved	100-20000	5310	-	Unchangeable
A5-14	0xA50E	Temperature correction	0-1	0	-	At stop
A5-16	0xA510	Displayed parameter address 1	0-100	0	-	Unchangeable
A5-17	0xA511	Displayed parameter address 2	0-100	1	-	Unchangeable
A5-18	0xA512	Displayed parameter address 3	0-100	2	-	Unchangeable
A5-19	0xA513	Displayed parameter address 4	0-100	3	-	Unchangeable
A5-21	0xA515	Low speed carrier frequency setting	0.0-16.0	0	-	Real time
A5-22	0xA516	Dead zone compensation auto-tuning	0: Disable 1: Enable	0	-	At stop
A6-00	0xA600	Minimum input of curve 4	-10.00 V to A6-02	0	V	Real time
A6-01	0xA601	Percentage corresponding to minimum input of curve 4	-100.0% to 100.0%	0	%	Real-time
A6-02	0xA602	Input of curve 4 inflection point 1	A6-00 to A6-04	3	V	Real time
A6-03	0xA603	Percentage corresponding to input of curve 4 inflection point 1	-100.0% to 100.0%	30	%	Real-time
A6-04	0xA604	Input of curve 4 inflection point 2	A6-02 to A6-06	6	V	Real time
A6-05	0xA605	Percentage corresponding to input of curve 4 inflection point 2	-100.0% to 100.0%	60	%	Real-time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A6-06	0xA606	Maximum input of curve 4	A6-06 to 10.00 V	10	V	Real time
A6-07	0xA607	Percentage corresponding to maximum input of curve 4	-100.0% to 100.0%	100	%	Real-time
A6-08	0xA608	Minimum input of curve 5	-10.00 V to A6-10	-10	V	Real time
A6-09	0xA609	Percentage corresponding to minimum input of curve 5	-100.0% to 100.0%	-100	%	Real-time
A6-10	0xA60A	Input of curve 5 inflection point 1	A6-08 to A6-12	-3	V	Real time
A6-11	0xA60B	Percentage corresponding to input of curve 5 inflection point 1	-100.0% to 100.0%	-30	%	Real-time
A6-12	0xA60C	Input of curve 5 inflection point 2	A6-10 to A6-14	3	V	Real time
A6-13	0xA60D	Percentage corresponding to input of curve 5 inflection point 2	-100.0% to 100.0%	30	%	Real-time
A6-14	0xA60E	Maximum input of curve 5	A6-12 to 10.00 V	10	V	Real time
A6-15	0xA60F	Percentage corresponding to maximum input of curve 5	-100.0% to 100.0%	100	%	Real-time
A6-16	0xA610	AI1 gain	-10.00 to 10.00	1	-	Real time
A6-17	0xA611	AI1 offset	-100.0% to 100.0%	0	%	Real-time
A6-18	0xA612	AI2 gain	-10.00 to 10.00	1	-	Real time
A6-19	0xA613	AI2 offset	-100.0% to 100.0%	0	%	Real-time
A6-20	0xA614	AI3 gain	-10.00 to 10.00	1	-	Real time
A6-21	0xA615	AI3 offset	-100.0% to 100.0%	0	%	Real-time
A6-24	0xA618	AI1 jump point	-100.0% to 100.0%	0	%	Real-time
A6-25	0xA619	AI1 jump amplitude	0.0% to 100.0%	0.1	%	Real-time
A6-26	0xA61A	AI2 jump point	-100.0% to 100.0%	0	%	Real-time
A6-27	0xA61B	AI2 jump amplitude	0.0% to 100.0%	0.1	%	Real-time
A6-28	0xA61C	AI3 jump point	-100.0% to 100.0%	0	%	Real-time
A6-29	0xA61D	AI3 jump amplitude	0.0% to 100.0%	0.1	%	Real-time
A9-00	0xA900	Online auto-tuning on rotor time constant of asynchronous motor	0: Disable 1: Enable	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A9-01	0xA901	Auto-tuning of rotor resistance gain for asynchronous motors in FVC mode	0 to 100	5	-	Real time
A9-02	0xA902	Auto-tuning of rotor resistance starting frequency of asynchronous motors in FVC mode	2 Hz to 100 Hz	7	Hz	Real time
A9-03	0xA903	Observed magnetic field coefficient of asynchronous motors in FVC mode	30 to 150	40	-	Real time
A9-04	0xA904	Maximum torque limit coefficient in the field-weakening range for asynchronous motors	30 to 150	80	-	Real time
A9-05	0xA905	Speed filter time of asynchronous motor in SVC mode	5 ms to 32 ms	15	ms	Real-time
A9-06	0xA906	Speed feedback handling in speed control of asynchronous motors in SVC mode	0: No operation 1: Minimum synchronization frequency limited based on load change 2: Fixed current output during low-speed running 3: Fixed current output during low-speed running	0	-	Real time
A9-07	0xA907	Magnetic field regulation bandwidth of asynchronous motor in SVC mode	0.0 to 8.0	2	-	Real time
A9-08	0xA908	Low-speed running current of asynchronous motor in SVC mode	30 to 170	100	-	Real time
A9-09	0xA909	Switchover frequency for fixed current output of asynchronous motor in SVC mode	2.0 Hz to 100.0 Hz	7	Hz	Real time
A9-10	0xA90A	Speed fluctuation suppression coefficient of asynchronous motor in SVC mode	0 to 6	3	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A9-11	0xA90B	Acceleration/ Deceleration time of asynchronous motor in SVC mode	0.1s to 3000.0s	50	s	Real time
A9-12	0xA90C	Quick auto-tuning of stator resistance before asynchronous motor start	0: Disable 1: Enable	0	-	Real time
A9-13	0xA90D	Quick auto-tuning of stator resistance coefficient 1 for asynchronous motor	0 to 65535	10	-	At stop
A9-14	0xA90E	Quick auto-tuning of stator resistance coefficient 2 for asynchronous motors	0 to 65535	10	-	At stop
A9-17	0xA911	Real-time angle of synchronous motor	0.0 to 359.9	0	-	Unchangeable
A9-18	0xA912	Initial position angle detection of synchronous motor	0: Detect every time upon operation 1: Not detected 2: Detect upon initial operation after power-on	0	-	Real time
A9-20	0xA914	Field weakening mode selection	0: Automatic mode 1: Synchronous motor adjustment mode 2: Synchronous motor hybrid mode 3: Disable	1	-	At stop
A9-21	0xA915	Field weakening gain of synchronous motor	0 to 50	5	-	Real time
A9-22	0xA916	Upper limit margin of synchronous motor output voltage	0% to 50%	5	%	Real-time
A9-23	0xA917	Maximum force adjustment gain of synchronous motor	20% to 300%	100	%	Real-time
A9-24	0xA918	Adjustment gain for calculated excitation current of synchronous motor	40% to 200%	100	%	Real-time
A9-25	0xA919	Integral gain for speed estimation of synchronous motor in SVC mode	5% to 1000%	30	%	Real-time
A9-26	0xA91A	Proportional gain for speed estimation of synchronous motor in SVC mode	5% to 300%	20	%	Real-time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A9-27	0xA91B	Estimated speed filter of synchronous motor in SVC mode	10 to 2000	100	-	Real time
A9-28	0xA91C	Minimum carrier frequency of synchronous motor in SVC mode	0.8 to 16.0	2	-	Real time
A9-29	0xA91D	Low-speed excitation current of synchronous motor in SVC mode	0% to 80%	30	%	Real-time
A9-30	0xA91E	Closed-loop current at low speed (used in VVC)	0% to 65535%	0	%	Real-time
A9-31	0xA91F	Oscillation suppression damping coefficient (used in VVC)	0% to 65535%	0	%	Real-time
A9-32	0xA920	Reserved parameter 8 for synchronous motor control	0 to 65535	0	-	Real time
A9-33	0xA921	Reserved parameter 9 for synchronous motor control	0 to 5	0	-	At stop
A9-34	0xA922	Reserved parameter 10 for synchronous motor control	0% to 65535%	0	%	Real-time
A9-35	0xA923	1st performance fault subcode	0 to 65535	0	-	Unchangeable
A9-36	0xA924	2nd performance fault subcode	0 to 65535	0	-	Unchangeable
A9-37	0xA925	3rd performance fault subcode	0 to 65535	0	-	Unchangeable
A9-40	0xA928	Closed-loop current selection at low speed (used in VVC)	0: Disable 1: Enable	0	-	At stop
A9-41	0xA929	Closed-loop current at low speed (used in VVC)	30% to 200%	50	%	At stop
A9-42	0xA92A	Oscillation suppression damping coefficient (used in VVC)	0% to 500%	100	%	Real-time
A9-43	0xA92B	Initial position compensation angle (used in VVC)	0 to 5	0	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A9-44	0xA92C	Initial position compensation angle of synchronous motor	0.0 to 360.0	0	-	Real time
A9-45	0xA92D	Synchronous motor low-speed handling	0: Disable 1: Enable	0	-	At stop
A9-46	0xA92E	Low-speed handling switchover frequency of synchronous motor	0.01 to F0-10 (Maximum frequency)	5	-	At stop
A9-47	0xA92F	Low-speed handling current of synchronous motor	10 to 200	100	-	At stop
A9-48	0xA930	Low-speed handling feedback suppression coefficient of synchronous motor	0 to 300	32	-	At stop
A9-49	0xA931	Synchronous motor energy-saving control	0: Disable 1: Enable	0	-	At stop
A9-50	0xA932	Maximum field weakening current limit margin	200 to 1000	1000	-	At stop
A9-51	0xA933	Advanced settings for parameter auto-tuning of asynchronous motor	Ones: Rotor resistance and leakage inductance DC offset selection 0: Standard offset 1: Large offset Tens: New rotor resistance and leakage inductance auto-tuning algorithm 0: Disable 1: Enable Hundreds: New mutual inductance static auto-tuning algorithm 0: Disable 1: Enable Thousands: Stator resistance auto-tuning selection 0: Current open loop 1: Current closed loop	111	-	At stop
A9-52	0xA934	Feedback torque selection (displayed in U0-06)	0: The motoring torque direction is positive and the generating torque direction is negative. 1: The torque direction that is the same as the forward speed direction is positive, and the torque direction that is the same as the reverse speed direction is negative.	1	-	Real time
A9-54	0xA936	Transistor voltage drop	0-10000	700	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
A9-55	0xA937	Dead zone time 0	0 to 10000	352	-	At stop
A9-56	0xA938	Dead zone time 1	0 to 10000	1052	-	At stop
A9-57	0xA939	Dead zone time 2	0 to 10000	1270	-	At stop
A9-58	0xA93A	Dead zone time 3	0 to 10000	1358	-	At stop
A9-59	0xA93B	Dead zone time 4	0 to 10000	1404	-	At stop
A9-60	0xA93C	Dead zone time 5	0 to 10000	1449	-	At stop
A9-61	0xA93D	Dead zone time 6	0 to 10000	1661	-	At stop
A9-62	0xA93E	Dead zone time 7	0 to 10000	1689	-	At stop
A9-63	0xA93F	Dead zone compensation current 0	0 to 10000	94	-	At stop
A9-64	0xA940	Dead zone compensation current 1	0 to 10000	376	-	At stop
A9-65	0xA941	Dead zone compensation current 2	0 to 10000	658	-	At stop
A9-66	0xA942	Dead zone compensation current 3	0 to 10000	940	-	At stop
A9-67	0xA943	Dead zone compensation current 4	0 to 10000	1222	-	At stop
A9-68	0xA944	Dead zone compensation current 5	0 to 10000	1504	-	At stop
A9-69	0xA945	Dead zone compensation current 6	0 to 10000	3478	-	At stop
A9-70	0xA946	Dead zone compensation current 7	0 to 10000	5452	-	At stop
AC-00	0xAC00	AI1 measured voltage 1	-10.000 V to 10.000 V	0	V	Real time
AC-01	0xAC01	AI1 displayed voltage 1	-10.000 V to 10.000 V	0	V	Real time
AC-02	0xAC02	AI1 measured voltage 2	-10.000 V to 10.000 V	0	V	Real time
AC-03	0xAC03	AI1 displayed voltage 2	-10.000 V to 10.000 V	0	V	Real time
AC-04	0xAC04	AI2 measured voltage 1	-10.000 V to 10.000 V	0	V	Real time
AC-05	0xAC05	AI2 displayed voltage 1	-10.000 V to 10.000 V	0	V	Real time
AC-06	0xAC06	AI2 measured voltage 2	-10.000 V to 10.000 V	0	V	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
AC-07	0xAC07	AI2 displayed voltage 2	-10.000 V to 10.000 V	0	V	Real time
AC-08	0xAC08	AI3 measured voltage 1	-10.000 V to 10.000 V	0	V	Real time
AC-09	0xAC09	AI3 displayed voltage 1	-10.000 V to 10.000 V	0	V	Real time
AC-10	0xAC0A	AI3 measured voltage 2	-10.000 V to 10.000 V	0	V	Real time
AC-11	0xAC0B	AI3 displayed voltage 2	-10.000 V to 10.000 V	0	V	Real time
AC-12	0xAC0C	AO1 measured voltage 1	-10.000 V to 10.000 V	0	V	Real time
AC-13	0xAC0D	AO1 target voltage 1	-10.000 V to 10.000 V	0	V	Real time
AC-14	0xAC0E	AO1 measured voltage 2	-10.000 V to 10.000 V	0	V	Real time
AC-15	0xAC0F	AO1 target voltage 2	-10.000 V to 10.000 V	0	V	Real time
AC-16	0xAC10	AO2 measured voltage 1	-10.000 V to 10.000 V	0	V	Real time
AC-17	0xAC11	AO2 target voltage 1	-10.000 V to 10.000 V	0	V	Real time
AC-18	0xAC12	AO2 measured voltage 2	-10.000 V to 10.000 V	0	V	Real time
AC-19	0xAC13	AO2 target voltage 2	-10.000 V to 10.000 V	0	V	Real time
AC-28	0xAC1C	AO1 measured current 1	0.000 mA to 20.000 mA	4	mA	Real time
AC-29	0xAC1D	AO1 target current 1	0.000 mA to 20.000 mA	4	mA	Real time
AC-30	0xAC1E	AO1 measured current 2	0.000 mA to 20.000 mA	16	mA	Real time
AC-31	0xAC1F	AO1 target current 2	0.000 mA to 20.000 mA	16	mA	Real time
AF-00	0xAF00	RPDO1-SubIndex0-H	0 to 65535	0	-	Real time
AF-01	0xAF01	RPDO1-SubIndex0-L	0 to 65535	0	-	Real time
AF-02	0xAF02	RPDO1-SubIndex1-H	0 to 65535	0	-	Real time
AF-03	0xAF03	RPDO1-SubIndex1-L	0 to 65535	0	-	Real time
AF-04	0xAF04	RPDO1-SubIndex2-H	0 to 65535	0	-	Real time
AF-05	0xAF05	RPDO1-SubIndex2-L	0 to 65535	0	-	Real time
AF-06	0xAF06	RPDO1-SubIndex3-H	0 to 65535	0	-	Real time
AF-07	0xAF07	RPDO1-SubIndex3-L	0 to 65535	0	-	Real time
AF-08	0xAF08	RPDO2-SubIndex0-H	0 to 65535	0	-	Real time
AF-09	0xAF09	RPDO2-SubIndex0-L	0 to 65535	0	-	Real time
AF-10	0xAF0A	RPDO2-SubIndex1-H	0 to 65535	0	-	Real time
AF-11	0xAF0B	RPDO2-SubIndex1-L	0 to 65535	0	-	Real time
AF-12	0xAF0C	RPDO2-SubIndex2-H	0 to 65535	0	-	Real time
AF-13	0xAF0D	RPDO2-SubIndex2-L	0 to 65535	0	-	Real time
AF-14	0xAF0E	RPDO2-SubIndex3-H	0 to 65535	0	-	Real time
AF-15	0xAF0F	RPDO2-SubIndex3-L	0 to 65535	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
AF-16	0xAF10	RPDO3-SubIndex0-H	0 to 65535	0	-	Real time
AF-17	0xAF11	RPDO3-SubIndex0-L	0 to 65535	0	-	Real time
AF-18	0xAF12	RPDO3-SubIndex1-H	0 to 65535	0	-	Real time
AF-19	0xAF13	RPDO3-SubIndex1-L	0 to 65535	0	-	Real time
AF-20	0xAF14	RPDO3-SubIndex2-H	0 to 65535	0	-	Real time
AF-21	0xAF15	RPDO3-SubIndex2-L	0 to 65535	0	-	Real time
AF-22	0xAF16	RPDO3-SubIndex3-H	0 to 65535	0	-	Real time
AF-23	0xAF17	RPDO3-SubIndex3-L	0 to 65535	0	-	Real time
AF-24	0xAF18	RPDO4-SubIndex0-H	0 to 65535	0	-	Real time
AF-25	0xAF19	RPDO4-SubIndex0-L	0 to 65535	0	-	Real time
AF-26	0xAF1A	RPDO4-SubIndex1-H	0 to 65535	0	-	Real time
AF-27	0xAF1B	RPDO4-SubIndex1-L	0 to 65535	0	-	Real time
AF-28	0xAF1C	RPDO4-SubIndex2-H	0 to 65535	0	-	Real time
AF-29	0xAF1D	RPDO4-SubIndex2-L	0 to 65535	0	-	Real time
AF-30	0xAF1E	RPDO4-SubIndex3-H	0 to 65535	0	-	Real time
AF-31	0xAF1F	RPDO4-SubIndex3-L	0 to 65535	0	-	Real time
AF-32	0xAF20	TPDO1-SubIndex0-H	0 to 65535	0	-	Real time
AF-33	0xAF21	TPDO1-SubIndex0-L	0 to 65535	0	-	Real time
AF-34	0xAF22	TPDO1-SubIndex1-H	0 to 65535	0	-	Real time
AF-35	0xAF23	TPDO1-SubIndex1-L	0 to 65535	0	-	Real time
AF-36	0xAF24	TPDO1-SubIndex2-H	0 to 65535	0	-	Real time
AF-37	0xAF25	TPDO1-SubIndex2-L	0 to 65535	0	-	Real time
AF-38	0xAF26	TPDO1-SubIndex3-H	0 to 65535	0	-	Real time
AF-39	0xAF27	TPDO1-SubIndex3-L	0 to 65535	0	-	Real time
AF-40	0xAF28	TPDO2-SubIndex0-H	0 to 65535	0	-	Real time
AF-41	0xAF29	TPDO2-SubIndex0-L	0 to 65535	0	-	Real time
AF-42	0xAF2A	TPDO2-SubIndex1-H	0 to 65535	0	-	Real time
AF-43	0xAF2B	TPDO2-SubIndex1-L	0 to 65535	0	-	Real time
AF-44	0xAF2C	TPDO2-SubIndex2-H	0 to 65535	0	-	Real time
AF-45	0xAF2D	TPDO2-SubIndex2-L	0 to 65535	0	-	Real time
AF-46	0xAF2E	TPDO2-SubIndex3-H	0 to 65535	0	-	Real time
AF-47	0xAF2F	TPDO2-SubIndex3-L	0 to 65535	0	-	Real time
AF-48	0xAF30	TPDO3-SubIndex0-H	0 to 65535	0	-	Real time
AF-49	0xAF31	TPDO3-SubIndex0-L	0 to 65535	0	-	Real time
AF-50	0xAF32	TPDO3-SubIndex1-H	0 to 65535	0	-	Real time
AF-51	0xAF33	TPDO3-SubIndex1-L	0 to 65535	0	-	Real time
AF-52	0xAF34	TPDO3-SubIndex2-H	0 to 65535	0	-	Real time
AF-53	0xAF35	TPDO3-SubIndex2-L	0 to 65535	0	-	Real time
AF-54	0xAF36	TPDO3-SubIndex3-H	0 to 65535	0	-	Real time
AF-55	0xAF37	TPDO3-SubIndex3-L	0 to 65535	0	-	Real time
AF-56	0xAF38	TPDO4-SubIndex0-H	0 to 65535	0	-	Real time
AF-57	0xAF39	TPDO4-SubIndex0-L	0 to 65535	0	-	Real time
AF-58	0xAF3A	TPDO4-SubIndex1-H	0 to 65535	0	-	Real time
AF-59	0xAF3B	TPDO4-SubIndex1-L	0 to 65535	0	-	Real time
AF-60	0xAF3C	TPDO4-SubIndex2-H	0 to 65535	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
AF-61	0xAF3D	TPDO4-SubIndex2-L	0 to 65535	0	-	Real time
AF-62	0xAF3E	TPDO4-SubIndex3-H	0 to 65535	0	-	Real time
AF-63	0xAF3F	TPDO4-SubIndex3-L	0 to 65535	0	-	Real time
AF-66	0xAF42	Number of valid RPDOs	0 to 65535	0	-	Unchangeable
AF-67	0xAF43	Number of valid TPDOs	0 to 65535	0	-	Unchangeable
B0-00	0xB000	Tension control mode	0: Disable 1: Open loop torque control 2: Closed loop speed control 3: Closed loop torque control 4: Constant linear speed control	0	-	At stop
B0-01	0xB001	Winding mode	0: Winding 1: Unwinding	0	-	Real time
B0-02	0xB002	Unwinding reverse tightening selection	0.0 m/min to 500.0 m/min	0	m/min	Real time
B0-03	0xB003	Mechanical transmission ratio	0.01 to 300.00	1	-	Real time
B0-04	0xB004	Linear speed input source	0: No input 1: AI1 2: AI2 3: AI3 4: Pulse input (DI5) 5: Communication(1000H)	0	-	At stop
B0-05	0xB005	Maximum linear speed	0.0 m/min to 6500.0 m/min	1000	m/min	Real time
B0-06	0xB006	Minimum linear speed for winding diameter calculation	0.0 m/min to 6500.0 m/min	20	m/min	Real time
B0-07	0xB007	Winding diameter calculation method	0: Calculated based on linear speed 1:Calculated based on cumulative thickness 2: AI1 3: AI2 4: AI3 5: Pulse input (DI5) 6: Communication 7: Specified by B0-14	0	-	At stop
B0-08	0xB008	Maximum roll diameter	0.1 millimeters to 6000.0 millimeters	500	mm	Real time
B0-09	0xB009	Empty roll diameter	0.1 millimeters to 6000.0 millimeters	100	mm	Real time
B0-10	0xB00A	Initial roll diameter source	0: B0-11 to B0-13 1: AI1 2: AI2 3: AI3 4: Communication (1000H)	0	-	At stop

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
B0-11	0xB00B	Initial roll diameter 1	0.1 millimeters to 6000.0 millimeters	100	mm	Real time
B0-12	0xB00C	Initial roll diameter 2	0.1 millimeters to 6000.0 millimeters	100	mm	Real time
B0-13	0xB00D	Initial roll diameter 3	0.1 millimeters to 6000.0 millimeters	100	mm	Real time
B0-14	0xB00E	Current roll diameter	0.1 millimeters to 6000.0 millimeters	100	mm	Real time
B0-15	0xB00F	Roll diameter filter time	0.00s to 10.00s	5	s	Real time
B0-16	0xB010	Roll diameter change rate	0.0 to 1000.0	0	-	Real time
B0-17	0xB011	Roll diameter change direction limit	0: Disable 1: Decrease disabled during winding, and increase disabled during unwinding	0	-	Real time
B0-18	0xB012	Roll diameter reset during running	0 to 1	0	-	Real time
B0-19	0xB013	Pre-drive speed gain	-100.0% to 200.0%	0	%	Real-time
B0-20	0xB014	Pre-drive torque limit source	0: Based on the value of F2-09 1: Based on tension control torque	1	-	At stop
B0-21	0xB015	Pre-drive torque correction	-100.0% to 100.0%	0	%	Real-time
B0-23	0xB017	Pre-drive acceleration time	0.0s to 6000.0s	20	s	Real time
B0-24	0xB018	Pre-drive deceleration time	0.0s to 6000.0s	20	s	Real time
B0-25	0xB019	Pre-drive roll diameter calculation	0: Disable 1: Enable	0	-	Real time
B0-26	0xB01A	Winding frequency limit	0.0% to 100.0%	50	%	Real-time
B0-27	0xB01B	Winding frequency limit offset	0.00 Hz to 100.00 Hz	5	Hz	Real time
B0-28	0xB01C	Winding frequency limit	0: Disable 1: Enable	0	-	Real time
B0-29	0xB01D	Pulses per revolution	1 to 60000	1	-	Real time
B0-30	0xB01E	Revolutions per layer	1 to 10000	1	-	Real time
B0-31	0xB01F	Material thickness reference source	0: Digital setting 1: AI1 2: AI2 3: AI3	0	-	At stop
B0-32	0xB020	Material thickness 0	0.01 millimeters to 100.00 millimeters	0.01	mm	Real time
B0-33	0xB021	Material thickness 1	0.01 millimeters to 100.00 millimeters	0.01	mm	Real time
B0-34	0xB022	Material thickness 2	0.01 millimeters to 100.00 millimeters	0.01	mm	Real time
B0-35	0xB023	Material thickness 3	0.01 millimeters to 100.00 millimeters	0.01	mm	Real time
B0-36	0xB024	Maximum thickness	0.01 millimeters to 100.00 millimeters	1	mm	Real time
B0-37	0xB025	Roll diameter not reset upon stop	0: Disable 1: Enable	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
B0-38	0xB026	Closed-loop tension torque mode selection	0: Torque calculated only through PID 1: Torque calculated through feedforward torque + PID	0	-	At stop
B0-40	0xB028	Minimum pre-drive torque limit	0.0% to 100.0%	0	%	Real-time
B0-41	0xB029	Constant linear speed source selection	0: AI1 1: AI2 2: AI3 3: Pulse reference (DI5) 4: Communication	0	-	At stop
B1-00	0xB100	Tension reference source	0: B0-01 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication (1000H)	0	-	At stop
B1-01	0xB101	Tension digital setting	0 N to 65000 N	50	N	Real time
B1-02	0xB102	Maximum tension	0 N to 65000 N	500	N	Real time
B1-03	0xB103	Zero-speed threshold	0.0% to 20.0%	0	%	Real-time
B1-04	0xB104	Zero-speed tension rise	0.0% to 100.0%	0	%	Real-time
B1-05	0xB105	Frequency acceleration time in torque control mode	0.0s to 6500.0s	0	s	Real time
B1-06	0xB106	Frequency deceleration time in torque control mode	0.0s to 6500.0s	0	s	Real time
B1-07	0xB107	Friction force compensation	0.0% to 50.0%	0	%	Real-time
B1-08	0xB108	Mechanical inertia compensation coefficient	0 $N \cdot m^2$ to 65535 $N \cdot m^2$	0	$N \cdot m^2$	Real time
B1-09	0xB109	Correction of acceleration inertia compensation	0.0% to 200.0%	100	%	Real-time
B1-10	0xB10A	Correction of deceleration inertia compensation	0.0% to 200.0%	100	%	Real-time
B1-11	0xB10B	Material density	0 kg/m^3 to 65535 kg/m^3	0	kg/m^3	Real time
B1-12	0xB10C	Material width	0 millimeters to 65535 millimeters	0	mm	Real time
B1-13	0xB10D	Inertia compensation exit delay	0 ms to 1000 ms	0	ms	Real-time
B1-14	0xB10E	Zero-speed compensation over-frequency	0.00 Hz to 20.00 Hz	2	Hz	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
B1-15	0xB10F	Open-loop torque reversal	0: Disable 1: Enable	0	-	Real time
B1-16	0xB110	Tension closed-loop torque limit	0.0% to 200.0%	100	%	Real-time
B1-17	0xB111	Friction force compensation correction coefficient	-50.0 to 50.0	0	-	Real time
B1-18	0xB112	Friction force compensation curve	0: Frequency 1: Linear speed 2: Multi-friction compensation curve 1 3: Multi-friction compensation curve 2	0	-	At stop
B1-19	0xB113	Multi-friction force compensation torque 1	0.0 to 50.0	0	-	Real time
B1-20	0xB114	Multi-friction force compensation torque 2	0.0 to 50.0	0	-	Real time
B1-21	0xB115	Multi-friction force compensation torque 3	0.0 to 50.0	0	-	Real time
B1-22	0xB116	Multi-friction force compensation torque 4	0.0 to 50.0	0	-	Real time
B1-23	0xB117	Multi-friction force compensation torque 5	0.0 to 50.0	0	-	Real time
B1-24	0xB118	Multi-friction force compensation torque 6	0.0 to 50.0	0	-	Real time
B1-25	0xB119	Multi-friction force compensation inflection point 1	0.00 Hz to maximum frequency (F0-10)	0	Hz	Real time
B1-26	0xB11A	Multi-friction force compensation inflection point 2	0.00 Hz to maximum frequency (F0-10)	0	Hz	Real time
B1-27	0xB11B	Multi-friction force compensation inflection point 3	0.00 Hz to maximum frequency (F0-10)	0	Hz	Real time
B1-28	0xB11C	Multi-friction force compensation inflection point 4	0.00 Hz to maximum frequency (F0-10)	0	Hz	Real time
B1-29	0xB11D	Multi-friction force compensation inflection point 5	0.00 Hz to maximum frequency (F0-10)	0	Hz	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
B1-30	0xB11E	Multi-friction force compensation inflection point 6	0.00 Hz to maximum frequency (F0-10)	0	Hz	Real time
B1-31	0xB11F	Tension establishment	0: Disable 1: Enable	0	-	At stop
B1-32	0xB120	Tension establishment dead zone	0.0% to 100.0%	2	%	Real-time
B1-33	0xB121	Tension establishment frequency	0.00 Hz to maximum frequency (F0-10)	0.1	Hz	Real time
B1-34	0xB122	Terminal torque boost proportion	0.0% to 500.0%	50	%	Real-time
B1-35	0xB123	Terminal torque boost cancellation time	0.0s to 50.0s	0	s	Real time
B1-37	0xB125	Initial roll diameter auto-tuning	0: Disable 1: Enable	0	-	At stop
B1-38	0xB126	Rod length	1 millimeter to 65535 millimeters	300	mm	At stop
B1-39	0xB127	Rod angle	0.1° to 360.0°	40	°	At stop
B2-00	0xB200	Taper curve	0: Curve taper 1: Multi-liner taper	0	-	At stop
B2-01	0xB201	Setting source of tension taper	0: B2-02 1: AI1 2: AI2 3: AI3 4: Communication (1000H)	0	-	At stop
B2-02	0xB202	Taper digital setting	0.0% to 100.0%	0	%	Real-time
B2-03	0xB203	Correction of tension taper compensation	0 millimeters to 10000 millimeters	0	mm	Real time
B2-05	0xB205	Setting source of external taper AO	0: B2-06 1: AI1 2: AI2 3: AI3 4: Communication (1000H)	0	-	At stop
B2-06	0xB206	External taper setting	0.0% to 100.0%	100	%	Real-time
B2-08	0xB208	Minimum roll diameter taper	0.0% to 100.0%	100	%	Real-time
B2-09	0xB209	Linear taper switchover point 1	B0-09 to B0-08	150	-	Real time
B2-10	0xB20A	Taper of switchover point 1	0.0% to 100.0%	100	%	Real-time
B2-11	0xB20B	Linear taper switchover point 2	B2-09 to B0-08	200	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
B2-12	0xB20C	Taper of switchover point 2	0.0% to 100.0%	90	%	Real-time
B2-13	0xB20D	Linear taper switchover point 3	B2-11 to B0-08	250	-	Real time
B2-14	0xB20E	Taper of switchover point 3	0.0% to 100.0%	80	%	Real-time
B2-15	0xB20F	Linear taper switchover point 4	B2-13 to B0-08	300	-	Real time
B2-16	0xB210	Taper of switchover point 4	0.0% to 100.0%	70	%	Real-time
B2-17	0xB211	Linear taper switchover point 5	B2-15 to B0-08	400	-	Real time
B2-18	0xB212	Taper of switchover point 5	0.0% to 100.0%	50	%	Real-time
B2-19	0xB213	Max. roll diameter taper	0.0 to 100.0	30	-	Real time
B6-00	0xB600	Source address 1	0 to 57362	0	-	Real time
B6-01	0xB601	Mapping address 1	0 to 20494	0	-	Real time
B6-02	0xB602	Writing gain 1	0.00 to 100.00	10	-	Real time
B6-03	0xB603	Reading gain 1	0.00 to 100.00	0.1	-	Real time
B6-04	0xB604	Source address 2	0 to 65535	0	-	Real time
B6-05	0xB605	Mapping address 2	0 to 65535	0	-	Real time
B6-06	0xB606	Writing gain 2	0.00 to 100.00	0	-	Real time
B6-07	0xB607	Reading gain 2	0.00 to 100.00	0	-	Real time
B6-08	0xB608	Source address 3	0 to 65535	0	-	Real time
B6-09	0xB609	Mapping address 3	0 to 65535	0	-	Real time
B6-10	0xB60A	Writing gain 3	0.00 to 100.00	0	-	Real time
B6-11	0xB60B	Reading gain 3	0.00 to 100.00	0	-	Real time
B6-12	0xB60C	Source address 4	0 to 65535	0	-	Real time
B6-13	0xB60D	Mapping address 4	0 to 65535	0	-	Real time
B6-14	0xB60E	Writing gain 4	0.00 to 100.00	0	-	Real time
B6-15	0xB60F	Reading gain 4	0.00 to 100.00	0	-	Real time
B6-16	0xB610	Source address 5	0 to 65535	0	-	Real time
B6-17	0xB611	Mapping address 5	0 to 65535	0	-	Real time
B6-18	0xB612	Writing gain 5	0.00 to 100.00	0	-	Real time
B6-19	0xB613	Reading gain 5	0.00 to 100.00	0	-	Real time
B6-20	0xB614	Source address 6	0 to 65535	0	-	Real time
B6-21	0xB615	Mapping address 6	0 to 65535	0	-	Real time
B6-22	0xB616	Writing gain 6	0.00 to 100.00	0	-	Real time
B6-23	0xB617	Reading gain 6	0.00 to 100.00	0	-	Real time
B6-24	0xB618	Source address 7	0 to 65535	0	-	Real time
B6-25	0xB619	Mapping address 7	0 to 65535	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
B6-26	0xB61A	Writing gain 7	0.00 to 100.00	0	-	Real time
B6-27	0xB61B	Reading gain 7	0.00 to 100.00	0	-	Real time
B6-28	0xB61C	Source address 8	0 to 65535	0	-	Real time
B6-29	0xB61D	Mapping address 8	0 to 65535	0	-	Real time
B6-30	0xB61E	Writing gain 8	0.00 to 100.00	0	-	Real time
B6-31	0xB61F	Reading gain 8	0.00 to 100.00	0	-	Real time
B6-32	0xB620	Source address 9	0 to 65535	0	-	Real time
B6-33	0xB621	Mapping address 9	0 to 65535	0	-	Real time
B6-34	0xB622	Writing gain 9	0.00 to 100.00	0	-	Real time
B6-35	0xB623	Reading gain 9	0.00 to 100.00	0	-	Real time
B6-36	0xB624	Source address 10	0 to 65535	0	-	Real time
B6-37	0xB625	Mapping address 10	0 to 65535	0	-	Real time
B6-38	0xB626	Writing gain 10	0.00 to 100.00	0	-	Real time
B6-39	0xB627	Reading gain 10	0.00 to 100.00	0	-	Real time
B6-40	0xB628	Source address 11	0 to 65535	0	-	Real time
B6-41	0xB629	Mapping address 11	0 to 65535	0	-	Real time
B6-42	0xB62A	Writing gain 11	0.00 to 100.00	0	-	Real time
B6-43	0xB62B	Reading gain 11	0.00 to 100.00	0	-	Real time
B6-44	0xB62C	Source address 12	0 to 65535	0	-	Real time
B6-45	0xB62D	Mapping address 12	0 to 65535	0	-	Real time
B6-46	0xB62E	Writing gain 12	0.00 to 100.00	0	-	Real time
B6-47	0xB62F	Reading gain 12	0.00 to 100.00	0	-	Real time
B6-48	0xB630	Source address 13	0 to 65535	0	-	Real time
B6-49	0xB631	Mapping address 13	0 to 65535	0	-	Real time
B6-50	0xB632	Writing gain 13	0.00 to 100.00	0	-	Real time
B6-51	0xB633	Reading gain 13	0.00 to 100.00	0	-	Real time
B6-52	0xB634	Source address 14	0 to 65535	0	-	Real time
B6-53	0xB635	Mapping address 14	0 to 65535	0	-	Real time
B6-54	0xB636	Writing gain 14	0.00 to 100.00	0	-	Real time
B6-55	0xB637	Reading gain 14	0.00 to 100.00	0	-	Real time
B6-56	0xB638	Source address 15	0 to 65535	0	-	Real time
B6-57	0xB639	Mapping address 15	0 to 65535	0	-	Real time
B6-58	0xB63A	Writing gain 15	0.00 to 100.00	0	-	Real time
B6-59	0xB63B	Reading gain 15	0.00 to 100.00	0	-	Real time
B6-60	0xB63C	Source address 16	0 to 65535	0	-	Real time
B6-61	0xB63D	Mapping address 16	0 to 65535	0	-	Real time
B6-62	0xB63E	Writing gain 16	0.00 to 100.00	0	-	Real time
B6-63	0xB63F	Reading gain 16	0.00 to 100.00	0	-	Real time
B6-64	0xB640	Source address 17	0 to 65535	0	-	Real time
B6-65	0xB641	Mapping address 17	0 to 65535	0	-	Real time
B6-66	0xB642	Writing gain 17	0.00 to 100.00	0	-	Real time

Parameter Code	Communication Address	Parameter Name	Value Range	Default	Unit	Change Mode
B6-67	0xB643	Reading gain 17	0.00 to 100.00	0	-	Real time
B6-68	0xB644	Source address 18	0 to 65535	0	-	Real time
B6-69	0xB645	Mapping address 18	0 to 65535	0	-	Real time
B6-70	0xB646	Writing gain 18	0.00 to 100.00	0	-	Real time
B6-71	0xB647	Reading gain 18	0.00 to 100.00	0	-	Real time
B6-72	0xB648	Source address 19	0 to 65535	0	-	Real time
B6-73	0xB649	Mapping address 19	0 to 65535	0	-	Real time
B6-74	0xB64A	Writing gain 19	0.00 to 100.00	0	-	Real time
B6-75	0xB64B	Reading gain 19	0.00 to 100.00	0	-	Real time
B6-76	0xB64C	Source address 20	0 to 65535	0	-	Real time
B6-77	0xB64D	Mapping address 20	0 to 65535	0	-	Real time
B6-78	0xB64E	Writing gain 20	0.00 to 100.00	0	-	Real time
B6-79	0xB64F	Reading gain 20	0.00 to 100.00	0	-	Real time
B6-80	0xB650	Source address 21	0 to 65535	0	-	Real time
B6-81	0xB651	Mapping address 21	0 to 65535	0	-	Real time
B6-82	0xB652	Writing gain 21	0.00 to 100.00	0	-	Real time
B6-83	0xB653	Reading gain 21	0.00 to 100.00	0	-	Real time
B6-84	0xB654	Source address 22	0 to 65535	0	-	Real time
B6-85	0xB655	Mapping address 22	0 to 65535	0	-	Real time
B6-86	0xB656	Writing gain 22	0.00 to 100.00	0	-	Real time
B6-87	0xB657	Reading gain 22	0.00 to 100.00	0	-	Real time
B6-88	0xB658	Source address 23	0 to 65535	0	-	Real time
B6-89	0xB659	Mapping address 23	0 to 65535	0	-	Real time
B6-90	0xB65A	Writing gain 23	0.00 to 100.00	0	-	Real time
B6-91	0xB65B	Reading gain 23	0.00 to 100.00	0	-	Real time
B6-92	0xB65C	Source address 24	0 to 65535	0	-	Real time
B6-93	0xB65D	Mapping address 24	0 to 65535	0	-	Real time
B6-94	0xB65E	Writing gain 24	0.00 to 100.00	0	-	Real time
B6-95	0xB65F	Reading gain 24	0.00 to 100.00	0	-	Real time
B6-96	0xB660	Source address 25	0 to 65535	0	-	Real time
B6-97	0xB661	Mapping address 25	0 to 65535	0	-	Real time
B6-98	0xB662	Writing gain 25	0.00 to 100.00	0	-	Real time
B6-99	0xB663	Reading gain 25	0.00 to 100.00	0	-	Real time

8.2 List of Monitoring Parameters

Parameter Code	Communication Address	Parameter Name	Unit	Change Mode
U0-00	0x7000	Operating frequency	Hz	Unchangeable
U0-01	0x7001	Frequency reference	Hz	Unchangeable
U0-02	0x7002	Bus voltage	V	Unchangeable
U0-03	0x7003	Output voltage	V	Unchangeable
U0-04	0x7004	Output current	A	Unchangeable
U0-05	0x7005	Output power	kW	Unchangeable
U0-06	0x7006	Output torque	%	Unchangeable
U0-07	0x7007	DI input state	-	Unchangeable
U0-08	0x7008	DO output state	-	Unchangeable
U0-09	0x7009	AI1 voltage	V	Unchangeable
U0-10	0x700A	AI2 voltage	V	Unchangeable
U0-11	0x700B	AI3 voltage	V	Unchangeable
U0-12	0x700C	Count value	-	Unchangeable
U0-13	0x700D	Length value	-	Unchangeable
U0-14	0x700E	Load speed display	Hz	Unchangeable
U0-15	0x700F	PID reference	%	Unchangeable
U0-16	0x7010	PID feedback	%	Unchangeable
U0-17	0x7011	PLC stage	-	Unchangeable
U0-18	0x7012	Pulse input frequency	kHz	Unchangeable
U0-19	0x7013	Feedback speed	Hz	Unchangeable
U0-20	0x7014	Remaining running time	min	Unchangeable
U0-21	0x7015	AI1 voltage before correction	V	Unchangeable
U0-22	0x7016	AI2 voltage before correction	V	Unchangeable
U0-23	0x7017	AI3 voltage before correction	V	Unchangeable
U0-24	0x7018	Linear speed	m/min	Unchangeable
U0-25	0x7019	Current power-on time	Min	Unchangeable
U0-26	0x701A	Current operating time	Min	Unchangeable
U0-27	0x701B	Pulse input frequency	Hz	Unchangeable
U0-28	0x701C	Communication setpoint	%	Unchangeable
U0-29	0x701D	Encoder feedback speed	Hz	Unchangeable
U0-30	0x701E	Display of main frequency X	Hz	Unchangeable
U0-31	0x701F	Display of auxiliary frequency Y	Hz	Unchangeable
U0-32	0x7020	Memory address view	-	Unchangeable
U0-33	0x7021	Synchronous motor rotor position	°	Unchangeable
U0-34	0x7022	Motor temperature	℃	Unchangeable
U0-35	0x7023	Target torque	%	Unchangeable
U0-36	0x7024	Resolver position	-	Unchangeable

Parameter Code	Communication Address	Parameter Name	Unit	Change Mode
U0-37	0x7025	Power factor angle	-	Unchangeable
U0-38	0x7026	ABZ position	-	Unchangeable
U0-39	0x7027	Target voltage for V/f separation	V	Unchangeable
U0-40	0x7028	Output voltage for V/f separation	V	Unchangeable
U0-41	0x7029	DI input state display	-	Unchangeable
U0-42	0x702A	DO output state display	-	Unchangeable
U0-43	0x702B	DI function state display	-	Unchangeable
U0-44	0x702C	DO function state display	-	Unchangeable
U0-45	0x702D	Fault subcode	-	Unchangeable
U0-46	0x702E	Drive unit temperature	℃	Unchangeable
U0-47	0x702F	PTC channel voltage before correction	V	Unchangeable
U0-48	0x7030	PTC channel voltage after correction	V	Unchangeable
U0-49	0x7031	Number of position lock deviation pulses	-	Unchangeable
U0-50	0x7032	Roll diameter	mm	Unchangeable
U0-51	0x7033	Tension (after taper)	N	Unchangeable
U0-58	0x703A	Z signal counter	-	Unchangeable
U0-59	0x703B	Frequency reference (%)	-	Unchangeable
U0-60	0x703C	Running frequency (%)	-	Unchangeable
U0-61	0x703D	AC drive state	-	Unchangeable
U0-62	0x703E	Current fault code	-	Unchangeable
U0-63	0x703F	Running frequency (after droop)	Hz	Unchangeable
U0-64	0x7040	Back EMF	V	Unchangeable
U0-65	0x7041	Stator resistance auto-tuning	-	Unchangeable
U0-66	0x7042	Model of communication expansion card	-	Unchangeable
U0-67	0x7043	Version of communication expansion card	-	Unchangeable
U0-68	0x7044	AC drive state read through DP card	-	Unchangeable
U0-69	0x7045	Frequency read through DP card (0.01 Hz)	Hz	Unchangeable
U0-70	0x7046	Speed read through DP card (RPM)	-	Unchangeable
U0-71	0x7047	Current read through communication card	-	Unchangeable
U0-72	0x7048	Communication card error state	-	Unchangeable
U0-73	0x7049	Target torque before filtering	%	Unchangeable
U0-74	0x704A	Target torque after filtering	%	Unchangeable
U0-75	0x704B	Torque reference after acceleration/ deceleration	%	Unchangeable
U0-76	0x704C	Torque upper limit in motoring state	%	Unchangeable
U0-77	0x704D	Torque upper limit in generating state	%	Unchangeable

Parameter Code	Communication Address	Parameter Name	Unit	Change Mode
U0-80	0x7050	EtherCAT slave name	-	Unchangeable
U0-81	0x7051	EtherCAT slave alias	-	Unchangeable
U0-82	0x7052	Transmission error code of EtherCAT ESM	-	Unchangeable
U0-83	0x7053	EtherCAT XML file version	-	Unchangeable
U0-84	0x7054	Number of lost EtherCAT synchronization frames	-	Unchangeable
U0-85	0x7055	Maximum number of error frames and invalid frames over EtherCAT port 0 per unit time	-	Unchangeable
U0-86	0x7056	Maximum number of error frames and invalid frames over EtherCAT port 1 per unit time	-	Unchangeable
U0-87	0x7057	Maximum number of error frames forwarded by EtherCAT port per unit time	-	Unchangeable
U0-88	0x7058	Maximum number of error frames processed by EtherCAT data frame processing unit per unit time	-	Unchangeable
U0-89	0x7059	Maximum number of lost links over the EtherCAT port per unit time	-	Unchangeable
U0-96	0x7060	Online monitored no-load current of asynchronous motor	A	Unchangeable
U0-97	0x7061	Online monitored mutual inductance of asynchronous motor	mH	Unchangeable
U1-00	0x7100	Linear speed	m/min	Unchangeable
U1-01	0x7101	Current roll diameter	mm	Unchangeable
U1-02	0x7102	Linear speed synchronization frequency	Hz	Unchangeable
U1-03	0x7103	PID output frequency	Hz	Unchangeable
U1-04	0x7104	Current tension reference	N	Unchangeable
U1-05	0x7105	Tension reference after taper	N	Unchangeable
U1-06	0x7106	Torque reference in tension control	%	Unchangeable
U1-07	0x7107	PID output torque	%	Unchangeable
U1-08	0x7108	Tension control mode	-	Unchangeable
U1-09	0x7109	Tension PID setting	%	Unchangeable
U1-10	0x710A	Tension PID feedback	%	Unchangeable
U1-11	0x710B	Tension PID proportional gain	-	Unchangeable
U1-12	0x710C	Tension PID integral time Ti	s	Unchangeable
U1-13	0x710D	Tension PID differential time Td	s	Unchangeable
U1-14	0x710E	Tension time	s	Unchangeable
U1-15	0x710F	Winding mode	-	Unchangeable

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