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MD580 Series Low-Voltage High-Performance Engineering AC Drive

Function Guide

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

Data code 19011709B02

Preface

Introduction

MD580 series AC drive is a low-voltage high-performance engineering AC drive, which supports control of both three-phase AC permanent magnet synchronous motors and asynchronous motors. Adopting the high-performance vector control technology, the MD580 series features high torque output at a low speed, excellent dynamic characteristics, superior overload capabilities, and stable performance. It provides rich and powerful combined functions, such as user programmable, software monitoring, and communication bus functions, and supports multiple encoder types.

This guide describes the function application, fault parameters, and parameters of the AC drive.

The guide applies to the following software versions: ARM function software version (A2-08) 0.12 or later, ARM function software sub-version (A2-09) 0.02 or later, DSP performance software version (A2-10) 2.06 or later, and DSP function software version (A2-12) 0.15 or later.

More documents

Document Name	Data Code	Description
MD580 Series Low-Voltage High-Performance Engineering AC Drive Hardware Guide	19011706 (400 V) 19012181 (690 V)	This guide describes the system composition, technical specifications, components, dimensions, options (including installation accessories, cables, and peripheral electrical components), expansion cards, certifications, and standards.
MD580 Series Low-Voltage High-Performance Engineering AC Drive Safety Installation Guide.	19012111 (400 V) 19012183 (690 V)	This guide describes the installation and wiring of the drive, including pre-installation preparations, unpacking and transportation,mechanical installation, and electrical installation.
MD580 Series Low-Voltage High-Performance Engineering AC Drive Maintenance Guide	19011705	This guide describes the routine maintenance and component replacement.
MD580 Series Low-Voltage High-Performance Engineering AC Drive Communication Guide	19011708	This guide describes the composition, size, installation, electrical connection, and parameter configuration of the communication expansion card.
MD580 Series Low-Voltage High-Performance Engineering AC Drive Function Guide	19011709	This guide describes function applications, fault codes, and parameters.
MD580 Series Low-voltage High-performance Engineering AC Drive Commissioning Guide	19012184	This guide describes the parameters, troubleshooting, operating panel, commissioning software, commissioning flowchart, and commissioning procedure.

Revision History

Date	Version	Description
October 2023	B02	**Modified the following sections:** • *" Preface" on page 1* • *"4.16.4 AI" on page 195*
August 2023	B01	• Added 3.4.2 Encoder Configuration. • Added descriptions in 3.6.1 Starting Equipment by Local Control and Default Terminal. • Updated 4.11.4.1 Brake Force Test. • Added 4.11.5 Brake Failure Protection. • Updated the torque control diagram in 4.12.2 Torque Control. • Updated the communication module list in 4.15.4 Communication Expansion Module. • Added 4.16.8 Expansion I/O Module. • Updated the encoder parameter, disconnection detection, pulse count, and encoder angle simulation in 4.19 Encoder Speed Measurement. • Added 4.21.3 Energy Conservation Statistics. • Added 4.23 Positioning Control. • Added 4.24 Position Reference. • Updated 5.1 Parameter Categories. • Updated 5.2 Parameter List. • Updated 7.6 Fault List.
December 2022	B00	• Added the contents of acceleration torque compensation, AI monitoring, RS flip-flop (A to D), D flip-flop (A to D), voltage dip resistance, and fan running control. • Optimized the description of function parameters and fault parameters. • Updated the "Asynchronous Motor Field Weakening Control", "Vdc Control in Vector Control Mode", and "Vdc Control in V/f Control" sections. • Optimized the architecture and details. ***Note*** The functions of acceleration torque compensation, AI monitoring, asynchronous motor field weakening control, Vdc control in vector control, and Vdc control in VF control are available to A2-08 [ARM functional software version number]: 0.09 and later software versions.
March 2022	A00	First release

Access to the Guide

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

- Visit http://www.inovance.com, go to Support > Download, search by keyword, and then download the PDF file.
- 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

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

For details, see the Product Warranty Card.

Table of Contents

Fundamental Safety Instructions

Safety Precautions

- This chapter presents essential safety instructions for a proper use of the equipment. Before using this product, read the user guide thoroughly and correctly understand the related safety precautions. Failure to comply with the safety instructions may result in death, severe personal injuries, or equipment damage.
- "CAUTION", "WARNING", and "DANGER" items in the guide only indicate some of the precautions that need to be followed; they just supplement the safety precautions.
- Use this equipment according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
- Inovance shall take no responsibility for any personal injuries or property damage caused by improper use.

Safety Levels and Definitions

Indicates that failure to comply with the notice will 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.
- Users 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 injuries or equipment damage.
- Before hoisting the equipment, ensure the equipment components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in 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 will 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 equipment for more than three months. Long-term storage requires stricter protection and necessary inspections.
- 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 will 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 the equipment is installed in a cabinet or final assembly, a fireproof enclosure providing both electrical and mechanical protections 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 equipment onto an incombustible object such as a metal. Keep the equipment away from combustible objects. Failure to comply will result in a fire.

- 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. After waiting for the designated time, measure the DC voltage in the main circuit to ensure the DC voltage is within the safe voltage 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 electric shock.

WARNING

- 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.

CAUTION

- 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 will result in equipment malfunction.

Power-on

DANGER

- 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.
- After power-on, do not open the cabinet door or protective cover of the equipment, touch any terminal, or disassemble any unit or component of the equipment. Failure to comply will result in an electric shock.

WARNING

- 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. Failure to comply may result in a fire.
- 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

DANGER

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

WARNING

- 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 will 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 will 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 injuries 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 injuries, or severe equipment damage. • After the equipment is replaced, check the wiring and set parameters again.
Disposal
 • Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, personal injuries, or even death. • Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

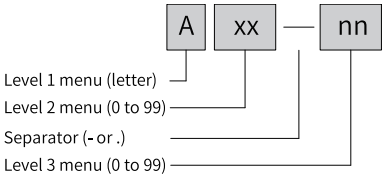
Safety label

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

MD580 parameters are displayed in the three-level menu structure, as shown in the following figure.



Note

- The separators "-" and "." used in parameter menus represent the same meaning. For example, A0-00 is the same as A0.00. This guide uses A0-00, whereas the LED panel may display A0.00.
- Level-1 menus can contain the following letters: A, b, C, d, E, F, H, L, n, o, P, and U. The letters are case sensitive for the purpose of display on the LED panel.

- Parameter reference values are set by users.
- Parameter output values are the parameter numerical values read by drives.

For most parameters, the output values are equal to the reference values. However, for reference source parameters, the reference indicates that the value of parameter A is sourced from parameter B, that is, the output value of parameter A is equal to the output value of parameter B.

In this guide, a "parameter number" indicates the parameter reference, whereas a "[parameter number]" indicates the parameter output value. For example:

- U19-32 = 10%
- C0-00 = 2932
- [C0-00] = 10%

C0-00 indicates the main speed source for speed control of channel 1, which is sourced from the value of the U19-32 connector parameter. When U19-32 is 10%, the actual output value [C0-00] is 10%.

For the reference source parameter C0-00, reference 2932 only indicates that the reference is sourced from the value of the U19-32 connector parameter. We focus more on the main reference output for speed control of channel 1 and use the [C0-00] parameter to indicate the actual output value of the parameter, that is, 10%.

2 Introduction to Commissioning Tools

The MD580 series products support both the operating panel and InoDriveStudio for parameter setting and commissioning. Commissioning steps and parameters related to the operating panel are basically the same as that related to InoDriveStudio. This chapter describes how to use the operating panel and InoDriveStudio for commissioning.

2.1 MDKE-10 Operating Panel

MDKE-10 is the LED operating panel configured for MD580 series products. It provides the status and data display, parameter setting, fault information prompt, and USB connection functions. MDKE-10 is installed on the product body by default. It can be removed and connected as an external device as required to facilitate commissioning.

2.1.1 Keys and Display

2.1.1.1 Operating Panel Description

The following figure shows different functional areas of the MDKE-10 LED operating panel.

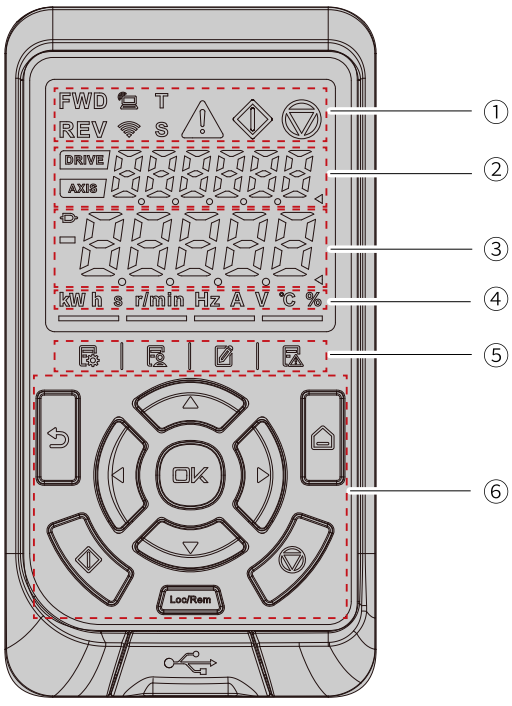


Figure 2-1 MDKE-10 LED operating panel

Table 2–1 Operating panel description

No.	Name	Description
①	Status display area	-
②	Multi-function display area	• Key test and auto-tuning • Fault and system status monitoring • Station number, jog, and STO status

No.	Name	Description
③	Parameter display area	-
④	Unit display area	-
⑤	Menu	Parameter menu, shortcut menu, differential parameter menu, and historical fault menu
⑥	Key area	-

Table 2–2 Description of the keys

Key	Name	Description
	Back key	Press this key to return to the upper-level menu or switch between the menu bar and status parameter interface. Press and hold this key to enter or exit the keypad parameter menu.
	Menu key	Press this key to switch between different menus. Press and hold this key to switch between the data display area and status display area.
	RUN key	In the local control mode, press this key to start the device.
	Stop/Fault reset key	In the local control mode, press this key to stop the device. When the device is faulty, press this key to reset the device.
	Local/Remote switchover key	Press this key to switch between the MDKE-10 (local mode) and remote mode.
	Increment key	Press this key to increase the value of a parameter or increase the target speed reference in the local control mode.
	Decrement key	Press this key to decrease the value of a parameter or decrease the target speed reference in the local control mode.
	Left shift key	Data display area: Press this key to move the cursor leftwards when selecting a parameter or setting a parameter. Status display area: Press this key to switch the screen leftwards.
	Right shift key	Data display area: Press this key to move the cursor rightwards when selecting a parameter or setting a parameter. Status display area: Press this key to switch the screen rightwards.
	OK key	Press this key to enter the lower-level screen or confirm the parameter or value.

2.1.1.2 Homepage View

This part describes different areas including the status indicators, status display area, unit indicators, menu indicators, and data display area.

Status indicators

Table 2–3 Status indicators

Indicator Status		Description
FWD REV	FWD REV	FWD steady on: The current target speed is positive. REV steady on: The current target speed is negative. FWD and REV both off: The current target speed is 0.
	Remote mode	Off: The local mode is active, that is, the system is controlled through the MDKE-10 operating panel. Steady on: The remote mode is active, that is, the system is controlled through the terminal I/O or the bus.
T	Torque control mode (T)	T steady on: The system is in the torque control mode.
S	Speed control mode (S)	S steady on: The system is in the speed control mode.
	Alarm state	Steady off: No fault occurs. Steady on: The device is faulty. Blinking: An alarm is generated.
	Running state	Steady off: The device is stopped. Steady on: The device is running.
	Stop state	Steady off: The device is running. Steady on: The device is stopped.
DRIVE	DRIVE indicator steady on	Displayed in the secondary display area is a drive number.
	DRIVE indicator steady off	Displayed in the secondary display area is not a drive number.
AXIS	AXIS indicator steady on	Displayed in the secondary display area is an axis number.
	AXIS indicator steady off	Displayed in the secondary display area is not an axis number.
	Connector indicator steady on	Displayed in the main display area is a connector variable.
	Connector indicator steady off	Displayed in the main display area is not a connector variable.
	Minus sign indicator steady on	The value displayed in the main display area is negative.
	Minus sign indicator steady off	The value displayed in the main display area is positive.
	Operation cursor 1 steady on	The main display area is active.
	Operation cursor 2 steady on	The secondary display area is active.
kW h s r/min Hz A V ℃ %	One of the unit indicators steady on	The value displayed in the main display area is in the unit that is on.

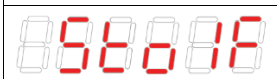
Indicator Status		Description
	Indicator 1 steady on	The main display area shows the parameter menu.
	Indicator 2 steady on	The main display area shows the shortcut setting menu.
	Indicator 3 steady on	The main display area shows the differential parameter menu.
	Indicator 4 steady on	The main display area shows the fault history menu.

Status display area

On the MDKE-10 operating panel, the data display area and status display area each has a triangle cursor on the right. The cursor indicates which operation area is active. The data display area is active by default. The status display area can show the following four screens.

1. Display of operation status (default screen). The following table lists supported running statuses.

Table 2–4 Running status display

Display	Name	Scenario	Meaning
	reset Initializing	System initializing upon power-on	The system is being initialized upon power-on, after which the system will switch to another state.
	nr (no ready) Not ready	OFF2, OFF3, STO, or fault state activated	The device is not runnable.
	ry (ready) Ready	OFF2, OFF3, STO, and fault state not activated; system waiting for operating command OFF1	The device is runnable and is waiting for the operating command.
	rn (run) Running	Operating command provided in the ry state	The device is in the normal running state.
	JoG Jogging	After the jog command takes effect	The device is in the jogging state.
	busy Parameter restoring or downloading	After restoring factory defaults or the parameter download command is confirmed	The device parameters are being restored to factory defaults or being downloaded. Device connection fails.
	tune Auto-tuning	After auto-tuning is selected	The device is in auto-tuning.
	STO STO1 and STO2 activated together	STO1 and STO2 input circuits disconnected	The device is in the STO activation state.
	STO1F STO1 input activation	STO1 input circuit, such as wiring and power supply, disconnected abnormally	The device is in the STO fault activation state. STO1 input is activated, but STO2 input is normal.

Display	Name	Scenario	Meaning
	STO2F STO2 input activation	STO2 input circuit, such as wiring and power supply, disconnected abnormally	The device is in the STO fault activation state. STO2 input is activated, but STO1 input is normal.
	STOF STO fault activation	Power supply fault, BUFFER fault, detection photocoupler fault, or FLASH or RAM fault	The device is in the STO fault activation state.

2. Display of device ID. The device ID corresponds to the communication address indicated by parameter A10-03. The station number range is 1 to 64. When the current device ID is displayed, the DRIVE indicator is steady on. For example, when the device ID is 2, the last two digits in the status display area is 02. In this case, the display is as follows.

Figure 2-2 Diagram of device ID display

3. Display of the current motor data set. The motor data set is indicated by parameter A0-24 (current motor data set). Values 0 to 3 of this parameter represent motor data sets 1 to 4, respectively. For example, when motor data set 1 is active, the display in the status display area is as follows.

Figure 2-3 Diagram of motor data set display

4. Display of fault code. This screen is displayed only upon abnormal system status. When the device encounters a fault, limit, or warning, this screen is displayed in the status display area. Users can switch the screens by pressing the left and right keys. If no switchover command is run within 5s, the fault code screen is automatically displayed. In case of multiple fault warnings, users can switch the status display area to the fault code screen and view each fault code by pressing the UP or DOWN key. A maximum of six faults, six limits, and six warnings can be viewed. After a fault is reset, the status display area is automatically switched to the original display screen. For example, when fault 15-1, limit 15-2, or warning 63-1 occurs, the following screens are displayed.

Figure 2-4 Display of fault

Figure 2-5 Display of limit

Figure 2-6 Display of warning

Unit indicators

Status Indicator	Unit
kW	Power unit: kilowatts
h	Time unit: hours
s	Time unit: seconds
RPM	Speed unit: revolutions per minute
Hz	Frequency unit: hertzs
A	Current unit: amperes
V	Voltage unit: volts
°C	Temperature unit: degrees Celsius
%	Percentage

Menu indicators

Menu indicators are used to indicate the current menu types. The MDKE-10 operating panel provides four types of menus and one current status parameter screen. The status parameter screen is displayed by default, regardless of menu types. To switch between the status parameter screen and the current level-1 menu bar, press the return key. The four indicators and their corresponding icons represent different menu types. When an indicator is on, the system is under the menu represented by the indicator. The following table lists the relationships between menu types and indicators.

Table 2–5 Menu indicators

Menu Icon	Menu Name	Indicator Display Status
	Parameter menu	
	Shortcut setting menu	
	Differential parameter menu (reserved function)	
	Fault history menu (reserved function)	

Data display area

1. Status parameter screen

   This screen is displayed by default after power-on. It shows some necessary device running information. To view different parameters, press the left and right shift keys. Parameters displayed in the stop state are different from those in the running state. In addition, parameters displayed in the

stop state blink, whereas parameters displayed during running are steady on. Table 1-6 lists the parameters displayed in the stop and running states, respectively. To enable or disable default display of a parameter, set through A10-30 or A10-32.

Table 2–6 Parameters displayed on the status parameter screen

No.	Parameter Displayed During Stop	Default Display	Parameter Displayed During Running	Default Display
①	Current state machine	Yes	Motor frequency reference	Yes
②	Target frequency	Yes	Actual motor frequency	Yes
③	Target speed	Yes	Motor speed reference	No
④	Bus voltage	Yes	Actual motor speed	No
⑤	Module temperature	Yes	Reserved	No
⑥	AI1 input proportion	No	RFG frequency reference	No
⑦	AI2 input proportion	No	RFG speed reference	No
⑧	Reserved	No	Bus voltage	Yes
⑨	Reserved	No	Output voltage	Yes
⑩	Reserved	No	Output current	Yes
⑪	Reserved	No	Output torque	No
⑫	Reserved	No	Output power	No
⑬	Reserved	No	Module temperature	No
⑭	Reserved	No	Current state machine	Yes
⑮	Reserved	No	AI1 input proportion	No
⑯	Reserved	No	AI2 input proportion	No

2. Parameter menu

The MDKE-10 parameter menus are divided into three levels:

- Level-1 menu: Parameter group
- Level-2 menu: Parameter value
- Level-3 menu: Digit of parameter value

In each menu, the bit under operation blinks. To increase or decrease a numerical value, press the up or down key. To switch bits under operation, press the left or right shift key. For example, to change the value of parameter b0-00 to 1, follow the operation procedure below.

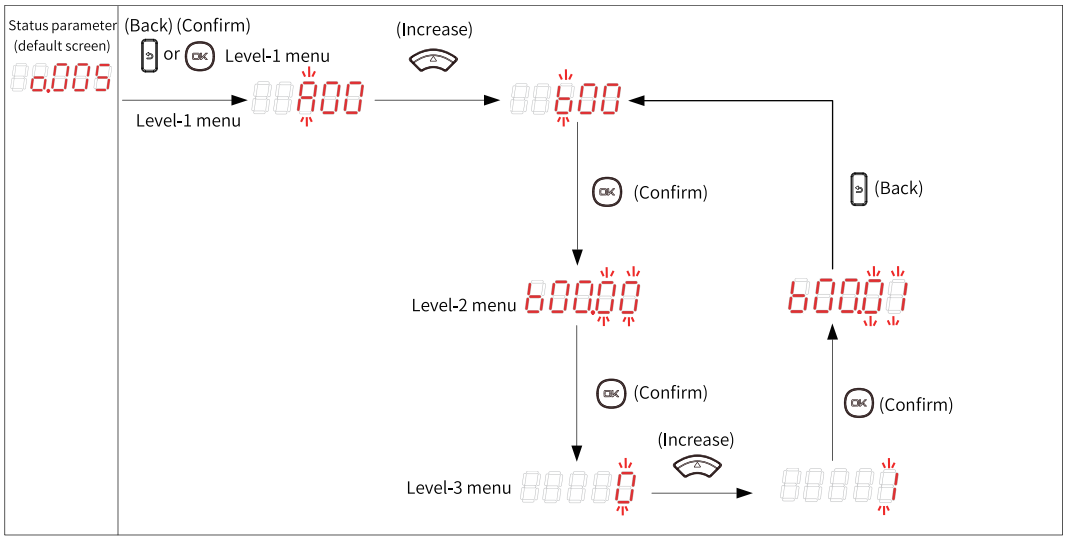


Figure 2-7 Procedure of operating a level-3 menu

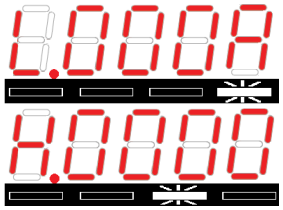
Note

1. To return to a level-2 menu from a level-3 menu, you can press the OK or Return key. The difference between the two keys is that:
   1. Pressing the OK key saves the current parameter setting and returns to the level-2 menu, where the next parameter is automatically displayed.
   2. Pressing the Return key returns to the level-2 menu corresponding to the current parameter, without saving the current parameter modification.
3. On a level-3 menu, if no bit of a parameter value blinks, the parameter is not editable. The possible reasons are as follows:
   1. The parameter is unmodifiable in nature, such as a measured running parameter and product type.
   2. The parameter can only be modified after the motor stops.

The following table lists examples of displayed parameters of different types.

Table 2–7 Parameter display examples

Para.	Numerical Value Display	Data Type and Value Meaning	Remarks
-		Current state machine S5: Ready to switch on	-
A02-41		Time October 11	-
U5-40		Hexadecimal single word 0x000E	-

Para.	Numerical Value Display	Data Type and Value Meaning	Remarks
U19-18		Hexadecimal double word Data: 0x0000000A Low word: 0x000A High word: 0x0000	Double word (DWord) data is divided into two screens. The menu indicators indicate which screen is displayed. When the rightmost indicator blinks, the first screen (low word) is displayed, and the user can move the screen leftward to view the second screen. When the second rightmost indicator blinks, the second screen (high word) is displayed, and the user can move the screen rightward to view the first screen.
A4-00		Decimal place 12.0	The MD580 series products support display of up to four decimal places. In case of more than four decimal places, the number is rounded up to four decimal places.
L9-02		Negative number -100.0	The minus sign is displayed immediately ahead of the data.
L10-11		Connector parameter U0-00	When the source of the current parameter value can be set to a connector, the icon on the left of the data display area is on. In this case, 1000 indicates connector U0-00.

3. Shortcut setting menu

The shortcut setting menu facilitates quick setting of common parameters. The following table lists the parameters contained on the shortcut setting menu.

Table 2–8 Parameters on the shortcut setting menu

No.	Para.	Para. Name	Value Range
①	A8-02	Parameter access level	0: Monitoring parameters 1: Basic parameters 2: Expert parameters 3: Maintenance parameters
②	A8-03	Factory password	0 to 65535
③	A10-03	Operating panel/Repeater communication address	1 to 64
④	A10-04	Operating panel/Repeater communication speed	0: 115200 bps 1: 1 Mbps 2: 2 Mbps 3: 4 Mbps

No.	Para.	Para. Name	Value Range
⑤	A8-00	Parameter operation mode	0: No operation 1: Restore some parameters to factory defaults 2: Restore all parameters to factory defaults 3: Clear fault records
⑥	A8-01	Parameter operation confirmation	0: Cancel 1: Confirm

4. Relationships between characters displayed on the LED and actual data

Table 2–9 Relationships between characters displayed on the LED and actual data

LED Display	Actual Data	LED Display	Actual Data	LED Display	Actual Data	LED Display	Actual Data
	1		9		G		r
	2		0		H		t
	3		A		J		y
	4		b		L		Upper hyphen
	5/S		C		n		Middle hyphen
	6		d		o		Lower hyphen
	7		E		P		Point
	8		F		U	-	-

2.1.1.3 Operating Panel Setting

Parameters related to the operating panel function can be set as needed, as described in the following table.

Table 2–10 Operating panel parameter list

Para.	Name	Description
A10-00	Operating panel control	Specifies whether to allow switchover to operating panel local control mode.
A10-01	Speed reference source in operating panel control mode	Specifies the speed setting source in operating panel local control mode.
A10-03	Operating panel/Repeater communication address	-

Para.	Name	Description
A10-04	Operating panel/Repeater communication speed	-
A10-05	Operating panel disconnection detection	Specifies whether to detect disconnection.
A10-06	Operating panel disconnection detection time	Specifies the time limit over which a fault is reported when disconnection is detected during operation.
A10-07	Fault reset always enabled in operating panel control	Specifies whether fault reset is always available regardless of whether the local mode is used.
A10-10	Operating panel UP/DOWN output reset source	Resets the operating panel UP/DOWN frequency reference to 0 Hz.
A10-15	Max. operating panel UP/DOWN output	The default value +100% corresponds to +100% of the rated motor frequency.
A10-16	Min. operating panel UP/DOWN output	The default value -100% corresponds to -100% of the rated motor frequency.
A10-30	Parameter selection 1 on LED operating panel home screen during operation	Selects parameters to be displayed on the status parameter screen of the operating panel during operation.
A10-32	Parameter selection 1 on LED operating panel home screen during stop	Selects parameters to be displayed on the status parameter screen of the operating panel during stop.

The operating panel can be set using the operating panel menu. You can press and hold the Back key to enter or exit the menu to set or view the following parameters.

- Switch to another connected device. When devices are cascaded, you can change the value of PF-00 to switch to another device to operate on it. PF-00 specifies the communication address of the device, and the parameter number of the device is set by A10-03.
- Adjust the brightness. You can adjust the brightness through parameter PF-04. The value range of this parameter is 1 to 16, ascending in brightness.
- View the operating panel version. You can view the current version using parameters PF-34 and PF-35.

2.1.1.4 Driving the Motor

Procedure:

1. Inspection before power-on. Perform installation and wiring inspection according to the installation guide. For detailed inspection, see the *MD580 Series Low-voltage High-performance Engineering AC Drive Hardware Guide*.
2. Power-on. Turn on the power supply of the AC drive, and the MDKE-10 operating panel is started, indicating that the power-on is successful.
3. Restoring parameters to factory defaults. After successful power-on, set parameter A8-00 to 2 (restore all parameters to factory defaults) and the A8-01 parameter to 1 (confirm). Now "Busy" is displayed in the status display area, indicating that the device is restoring parameters.
4. Confirming the system status. Check the status bar. If "ry" is displayed, the AC drive is normal and is waiting for the RUN command. Otherwise, pinpoint relevant causes such as fault, STO activation, OFF2/OFF3 activation, and other common causes.
5. Set the parameters shown in the following table according to the motor nameplate.

Table 2–11 Setting rated motor parameters

Para.	Para. Name	Value Range	Remarks
d0-00	Motor type	0: Induction motor 1: Permanent magnet synchronous motor	-
d0-01	Rated motor power	0.1 kW to 6553.5 kW	-
d0-02	Rated motor voltage	1 V to 1500 V	Line voltage
d0-03	Rated motor current	0.1 A to 6553.5 A	Line current
d0-04	Rated motor frequency	0.1 Hz to 600.0 Hz	-
d0-05	Rated motor speed	1 RPM to 36000 RPM	-

6. Enabling local control. Press Loc/Rem to enable the local control mode. When the status indicator becomes steady off, the operating panel local control mode takes effect.
7. Auto-tuning. Set parameter b5-00 (auto-tuning mode), as shown below:

Table 2–12 Motor auto-tuning parameter setting

Para.	Para. Name	Value Range	Remarks
b5-00	Auto-tuning mode	0: No operation 1: Asynchronous motor static auto-tuning 2: Asynchronous motor no-load complete auto-tuning 4: Asynchronous motor inertia auto-tuning (SVC or FVC) 11: Synchronous motor with-load auto-tuning in FVC mode 12: Synchronous motor no-load auto-tuning 13: Synchronous motor static auto-tuning 14: Synchronous motor inertia auto-tuning	Set the parameter based on the motor type and whether the motor can rotate during auto-tuning.

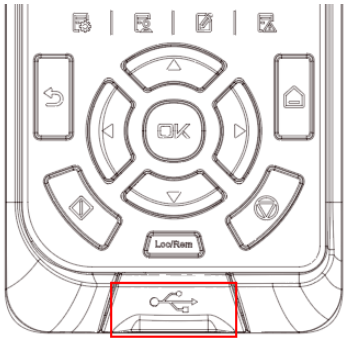
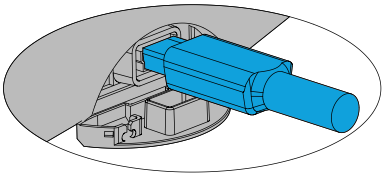
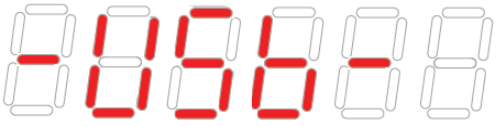
After b5-00 is set, the status bar displays "tUnE". In this case, press the RUN key to start motor auto-tuning. The operation status indicator becomes steady ON. Wait until the operation status indicator becomes steady OFF and the stop state indicator becomes steady ON, indicating completion of the motor auto-tuning. If no fault is displayed in the status bar, auto-tuning succeeds.

8. Setting the running frequency. Switch to the status parameter display screen in the data display area and find the stop parameter "Target frequency". The value is 0.00 Hz. Press and hold the UP key . Now the FWD indicator in the running direction indicator FWD REV is steady ON. Increase the value to 50.00 Hz.

9. Running. Press the  key, and the device starts to run and the motor starts to rotate. Now the status bar displays "rn" and the operation status indicator  is steady ON. On the status parameter screen in the data display area, the actual motor frequency displayed gradually increases to 50.00 Hz.
10. Speed governing. Increase or decrease the target frequency reference using the UP  or DOWN  key. To facilitate your operation, the target frequency is first displayed when you long press the UP or DOWN key. The actual frequency is then displayed after you release the key.
11. Stop. Set parameter E1-27 (OFF1 stop mode) to a stop mode. The default is "decelerate to stop". After you press  , the operation frequency of the AC drive gradually decreases to 0 Hz until the AC drive stops. Finally, the status indicator  becomes steady OFF and the stop status indicator  becomes steady ON, indicating that the AC drive has stopped.

2.1.2 Repeater-to-PC Connection

The type-C USB terminal on the bottom of the MDKE-10 operating panel is used to connect to a PC. Use a cable not longer than 3 m for the connection. Communication between the MDKE-10 and the PC is implemented using the USB 2.0 communication protocol.

1. Open the USB terminal cover.	
2. Connect the USB terminal to the PC using a cable with a ferrite magnetic ring.	
3. After connection, the MDKE-10 automatically enters the USB relay mode. In the status display area on the panel, "USb" is displayed, indicating the repeater mode. In this case, InoDriveStudio can be used for commissioning.	

2.2 SOP-20-880

The SOP-20-880 smart operating panel features LCD display and a wide power supply range and is applicable to single-drive/multi-drive systems. The operating panel provides functions such as parameter setting, status monitoring, parameter copy, fault analysis and locating, program download, USB relay, and mass storage.

2.2.1 Keys and Display

2.2.1.1 Keys

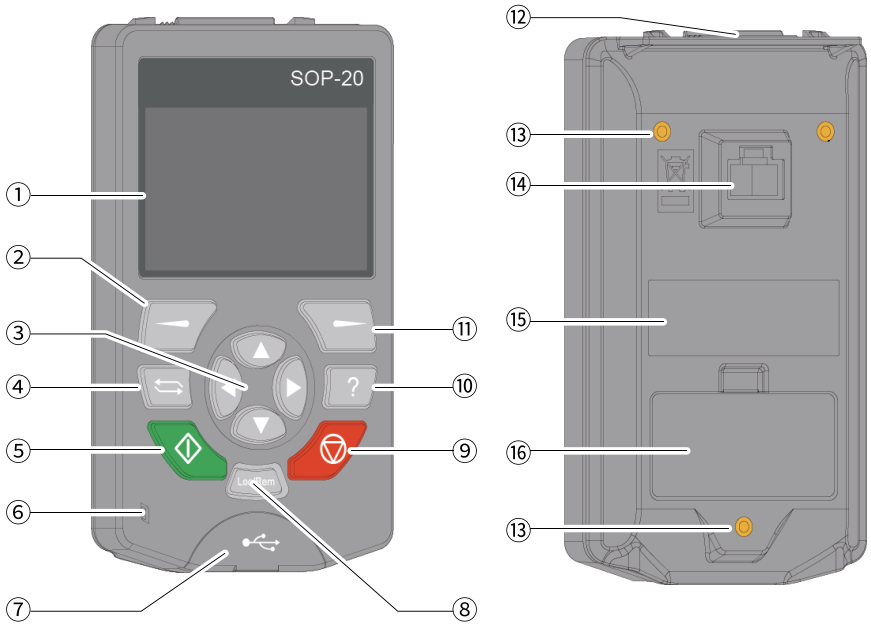


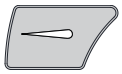
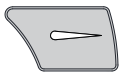
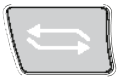
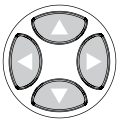
Figure 2-8 Diagram of SOP-20-880 appearance and keys

Table 2–13 SOP-20-880 components

No.	Name
①	Display
②	Left soft key
③	Arrow keys
④	Switchover key
⑤	Run key
⑥	Status Indicator
⑦	USB connection terminal
⑧	Loc/Rem switchover key
⑨	Stop key/Reset key
⑩	Help key
⑪	Right soft key
⑫	Snap-fit joint
⑬	Fastening screw
⑭	RJ45 port

No.	Name
⑮	Product nameplate
⑯	Battery cover

Table 2–14 Shortcut key functions

Key	Name	Description
	Left soft key	Used to exit or cancel. This key is located on the left below the display. It corresponds to different functions in different situations. On the home page, pressing this key enters the device selection page.
	Right soft key	Used to select or confirm. This key is located on the right below the display. It corresponds to different functions in different situations. On the home page, pressing this key enters the menu page.
	Switchover key	Used to quickly enter the device selection page. On some pages where operations cannot be interrupted, the quick device switchover function is disabled and this key is disabled.
	Help key	Used to open a help page. Content on the help page is contextual. That is, content on the help page depends on the menu or view displayed previously.
	Run key	Used to start the device in the local control mode.
	Stop key/Reset key	Used to stop the device in the local control mode. When the device is faulty, the stop key is used to reset the device.
	Loc/Rem switchover key	Used to switch between the local SOP-20-880 and the remote connection.
	Arrow keys	The up and down arrow keys are used to select options in a menu or list, scroll up or down a text page, and adjust a value (such as setting time, inputting a password, and changing a parameter value). The left and right arrow keys are used to move the cursor left and right.

2.2.1.2 Homepage View

SOP-20-880 has a monochrome LCD display with a resolution of 240×160 pixel and white backlight.

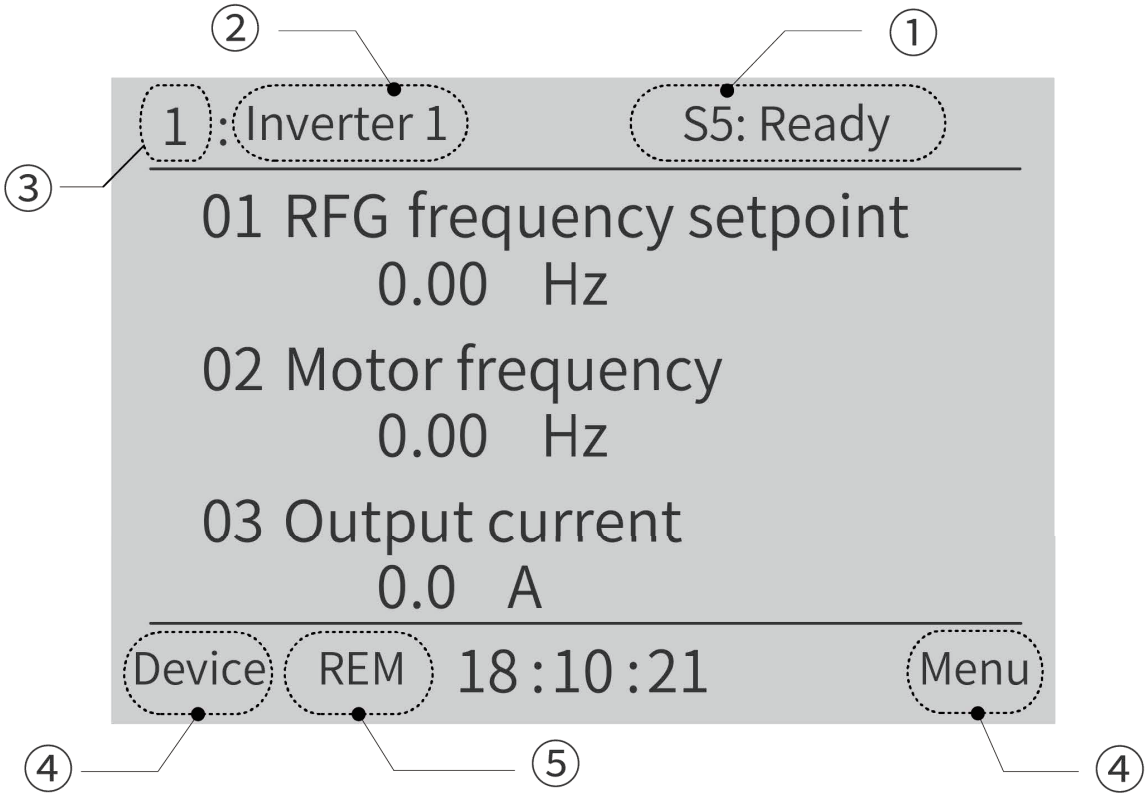


Figure 2-9 Homepage view

Table 2–15 Homepage view description

No.	Value	Description
①	Device status and fault information	Shows the running status of the current device. When the device fails, fault information appears and blinks and the running status is not displayed.
②	Controlled device name	Shows the name of the device that is being controlled by SOP-20-880.
③	Controlled device ID	Shows the device ID of the device that is being controlled by SOP-20-880.
④	Function key	Device: Display the device list. Menu: Display the menu list. Select: Select specified items. OK: Confirm the prompt content on a menu. Back: Return to the previous menu.
⑤	Loc/Rem switchover key	Local: Local control by SOP-20-880 is enabled. Rem: Remote control by using I/O or the bus is enabled. Blank: This function is unavailable on the device.

2.2.1.3 Status Indicator

The status indicator on the SOP-20-880 is used to indicate whether a fault or alarm exists.

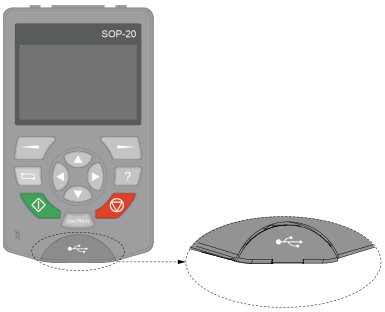
Table 2–16 Description of status indicators

Indicator	Illustration	Description
Steady green		The AC drive is running properly.
Blinking green		Data is being transferred between the SOP-20-880 and PC via USB.
Steady red		Communication between the SOP-20-880 and the AC drive is normal, but the AC drive is faulty.
Blinking red		Communication between the SOP-20-880 and the AC drive is interrupted.

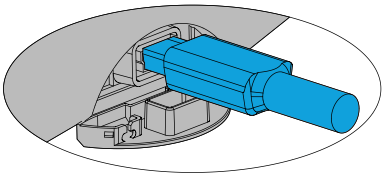
2.2.2 Repeater-to-PC Connection

The Type-B Mini USB terminal on the bottom of the SOP-20-880 is used to connect to a PC. Use a cable not longer than 3 m for the connection. Communication between the SOP-20-880 and the PC is implemented using the USB 2.0 communication protocol.

1. Open the USB terminal cover.

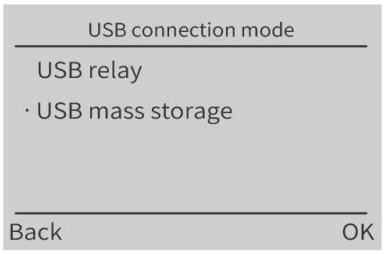


2. Connect the USB terminal to the PC using a cable with a ferrite magnetic ring.



3. After the SOP-20-880 is connected to the PC through the USB cable, the USB relay mode and the USB mass storage mode are displayed for selection.

- In the USB relay mode, the SOP-20-880 serves as a repeater for communication between the device and the PC. To use InoDriveStudio for commissioning, select the USB relay mode.
- In the USB mass storage mode, the SOP-20-880 serves as a memory.



Note

For details about how to use the SOP-20-880, see the *SOP-20-880 Smart Operating Panel Guide*.

2.3 Introduction to InoDriveStudio

InoDriveStudio (IDS for short) is independently developed by Inovance and Inovance fully owns the intellectual property rights to it. InoDriveStudio is high-performance commissioning software for engineering drives, and can be used for commissioning, fault diagnosis, and operation status monitoring on drives.

InoDriveStudio only supports the Windows platform, including but not limited to the following operating systems: Windows XP Professional, Windows Server 2003, Windows Vista, Windows 7, Windows 8, and Windows 10.

2.3.1 Main Screen

Double-click IDS to access the software. The following screen is displayed.

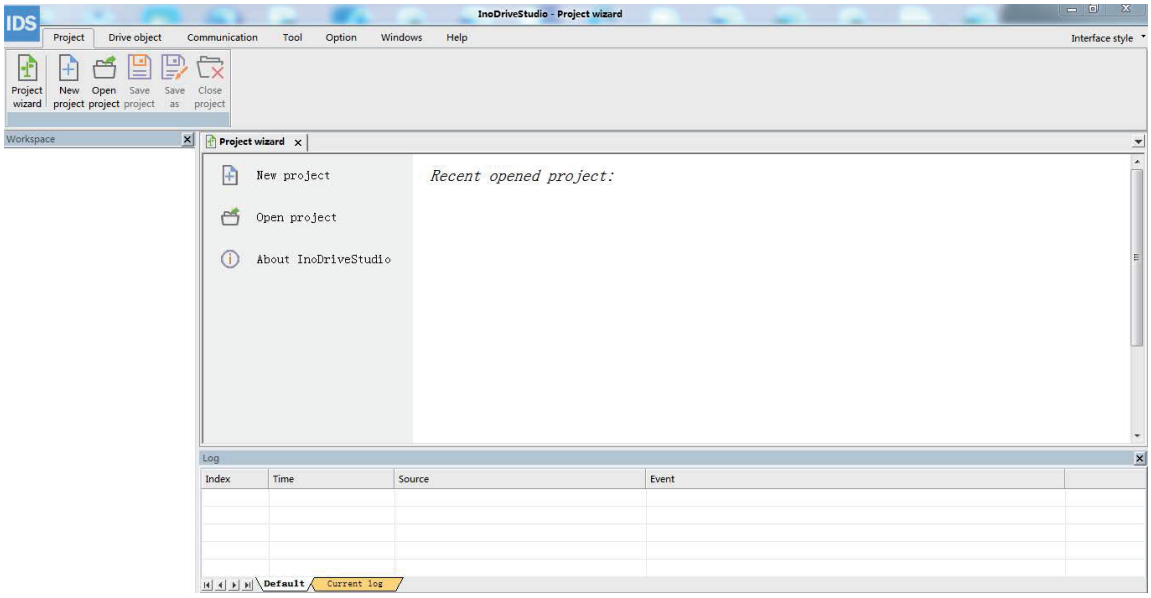


Figure 2-10 Start screen

No.	Name	Description
①	Title block	Displays information such as the window title or opened files.
②	Menu bar	Displays function modules by category.
③	Work area	Displays relevant navigation information such as the current projects.
④	Window area	Displays details of an item specified in the work area.
⑤	Multi-functional area	Displays the log window, monitoring window, control panel window, and fault alarm window.
⑥	Status bar	Displays the current project status.

2.3.2 Creating a Project

1. Choose "Project > New project" to create an online project, and a dialog box will appear, as shown in the following figure.

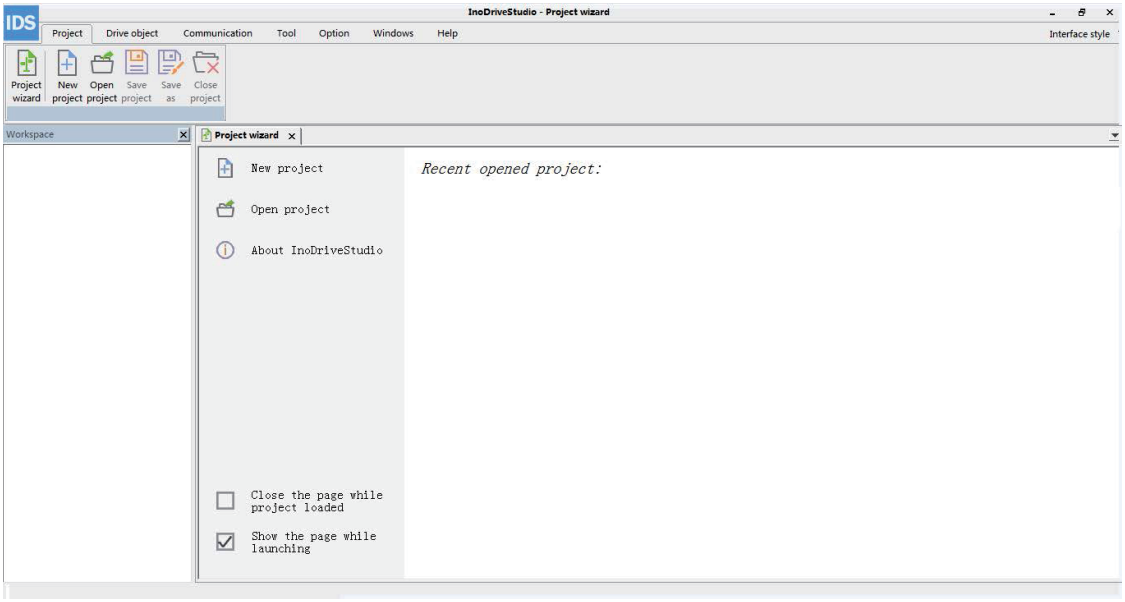


Figure 2-11 Home page for creating a project

No.	Name	Description
①	New project	Click this button to open the dialog box for creating projects as required.
②	Open project	Click this button to open the dialog box for selecting a project file to open.
③	About InoDriveStudio	Click this button to view information relevant to the current InoDriveStudio system version.
④	Help	Click this button to view the help document.
⑤	Close the page while project loaded	If this item is selected, the project wizard will automatically close after the project is loaded. If this item is not selected, the project wizard will not close.
⑥	Show the page while launching	If this item is selected, the project wizard will automatically appear after the software is started. If this item is not selected, you can choose "Project > Project wizard" to access the wizard.
⑦	Recent opened project	Click this option to view eight recently opened projects, which are listed in descending chronological order. You can double-click a file name to open the corresponding project. Hover the cursor over a file name, the file background color will change to light blue and  will appear. If you click the icon, the file will be excluded from the list of latest projects, but will not be deleted.

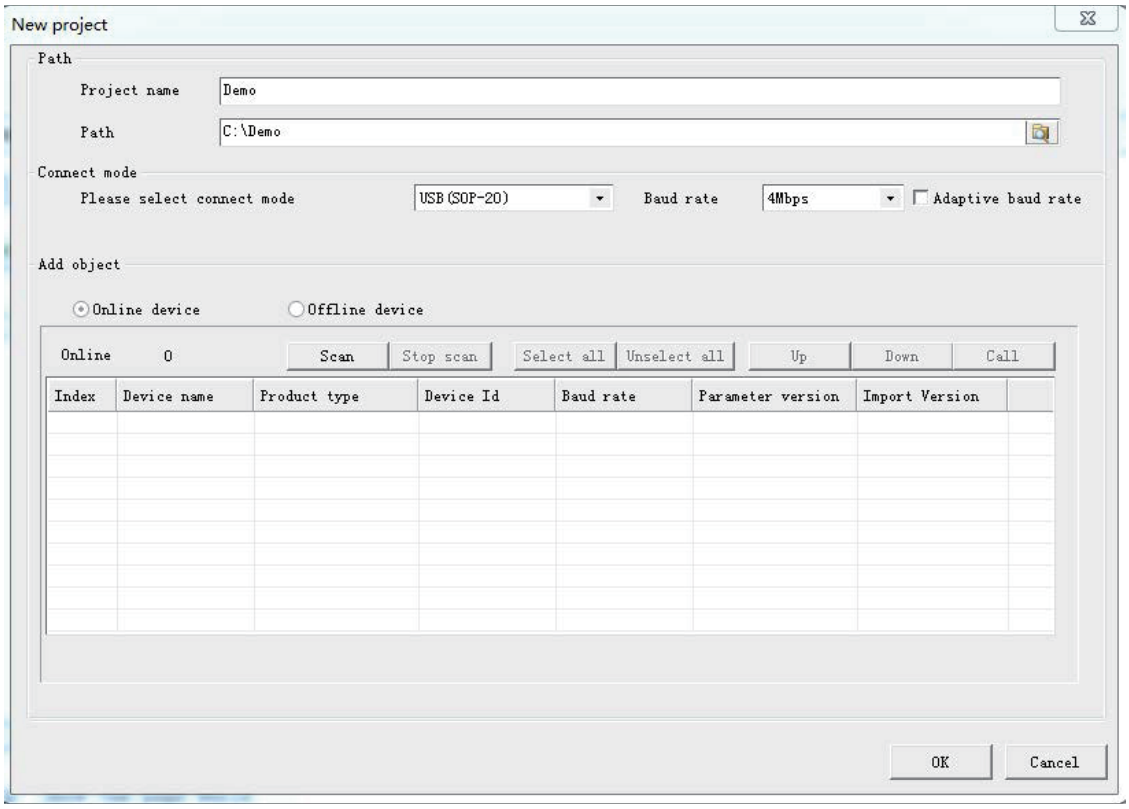


Figure 2-12 New project

No.	Name	Description
①	Project name	Specify a name for the project to be created.
②	Path	Specify a path on the computer for storing the project to be created.
③	Connect mode	Specify a communication mode and relevant parameters for the project to be created. The USB, TCP/IP, and gateway communication modes are supported. You can also change the connection method through "Communication Settings" under the "Communication" menu bar. The project will be connected to the device in the set connection mode.
④	Online device	Specify an online object to be added to the project to be created. Online objects can be scanned and displayed.
⑤	Offline device	Specify an offline object to be added to the project to be created. Offline objects can be confirmed based on information such as product types and versions.
⑥	Adaptive baud rate	In the USB communication mode, specify whether to scan the drive controller in the adaptive baud rate mode. If this item is selected, objects on all the supported baud rates will be scanned. If this item is not selected, only the drive objects on the specified baud rate will be scanned.

Note

- When multiple devices are cascaded, ensure that the communication address of each device is unique and that the baud rate is the same for all the devices. Set the communication address through A10-03 and set the baud rate through A10-04.
- When multiple devices are cascaded, ensure that each device name is unique. Otherwise, project creation fails.

2. Click "Scan".

In the USB connection mode:

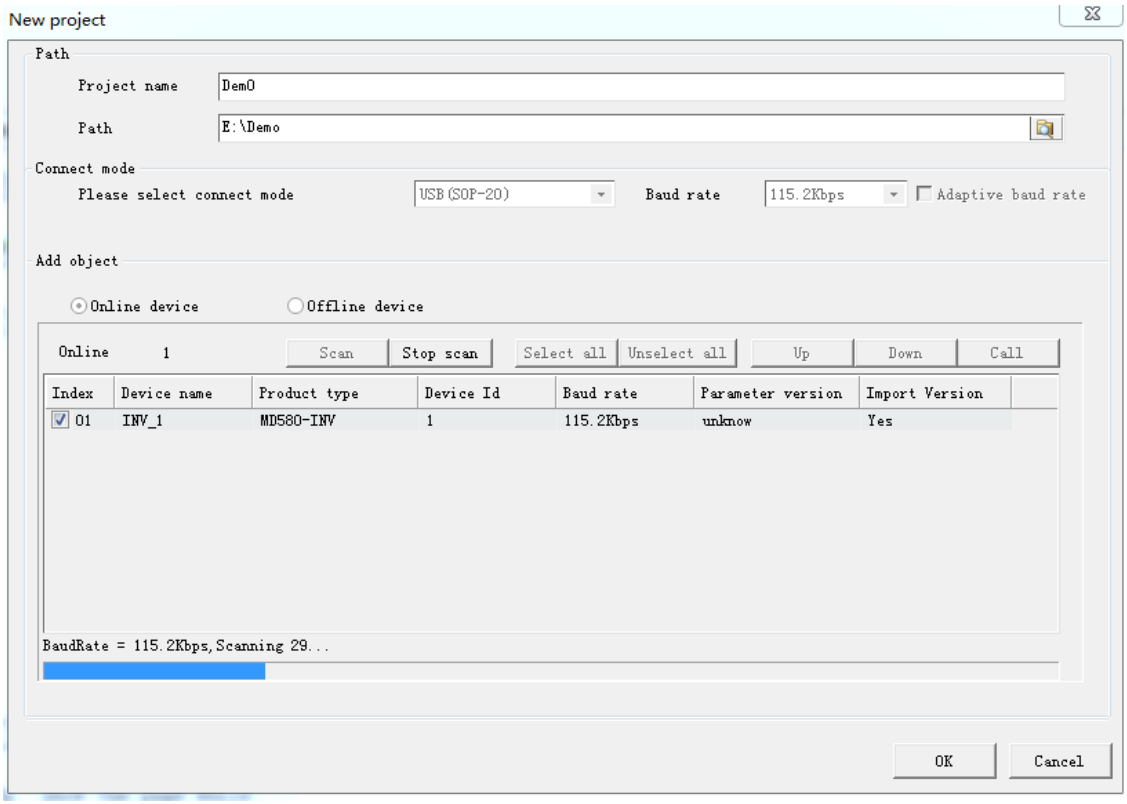


Figure 2-13 Starting scanning in the USB connection mode

3. Click "OK". The new project is created, as shown in the following figure. Then, relevant settings and commissioning operations can be performed.

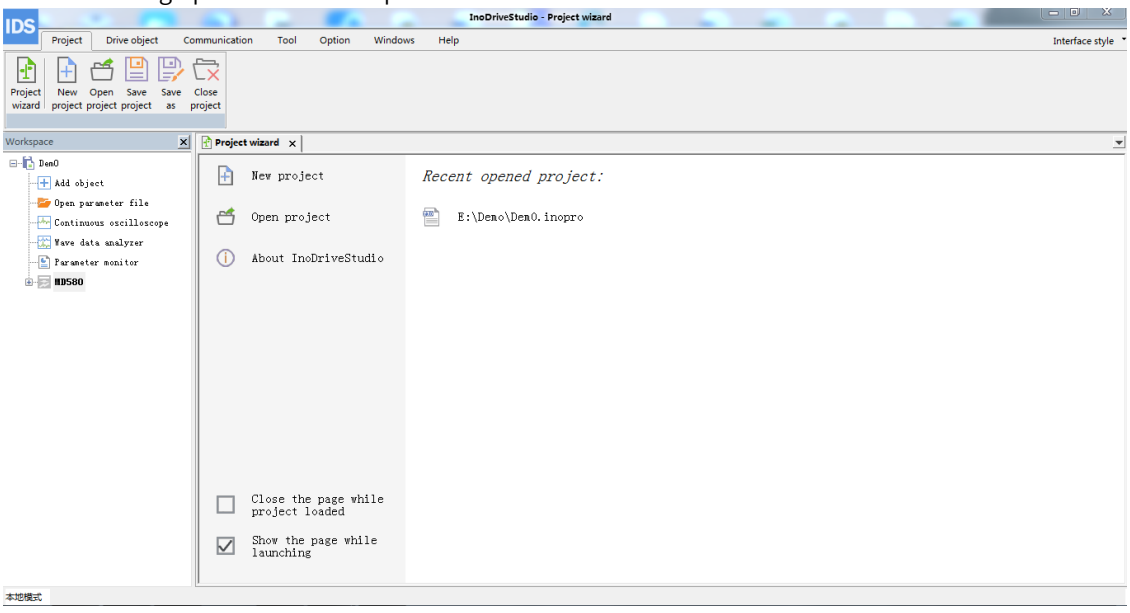


Figure 2-14 Main screen

2.3.3 Basic Functions

2.3.3.1 Viewing and Modifying Parameters

Parameter viewing and modification are basic functions of the InoDriveStudio commissioning software. After connecting the device, choose "MD580 > Parameter table > Parameter list" in the work area on the home screen. The parameter list of the current device is displayed. The following figure shows the details.

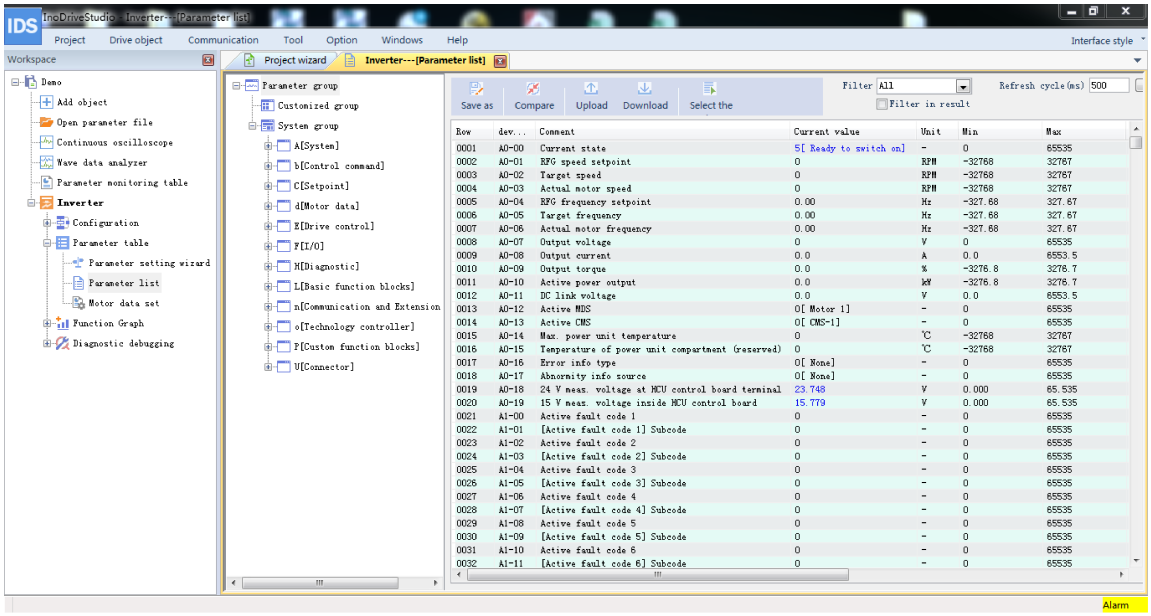


Figure 2-15 Parameter list

- Parameter groups are in the left part, while information about each parameter group is in the right part in the parameter list.
- The parameter information columns include the parameter name, current value, default value, unit, modification mode, and communication address.
- After parameters are modified, they are downloaded to the device.
- When the current value of a parameter differs from the default value, the current value is blue.
- When the new value of a parameter exceeds the parameter value range, the new value does not take effect.
- If a parameter supposed to be modified only at stop is modified during device running, the modification does not take effect.
- Some parameter description information can be input in the "Filter" drop-down list for fuzzy matching of parameters on the current screen. For example, click "System group" for all parameters and select "Torque" from the "Filter" drop-down list. All parameters containing "torque" will be displayed.

2.3.3.2 Operating the Control Panel

The control panel of InoDriveStudio can be used to start/stop devices and reset devices upon faults. Choose "MD580 > Diagnostic debugging > Debug > Control panel" to access the control panel, as shown in the following figure.

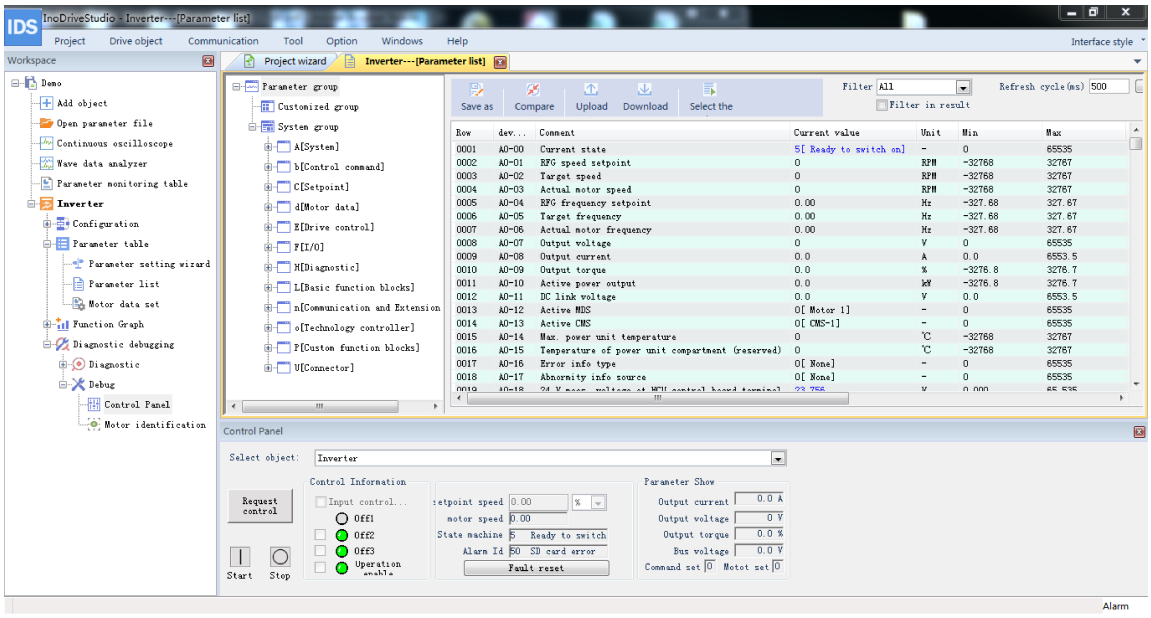


Figure 2-16 Accessing the control panel

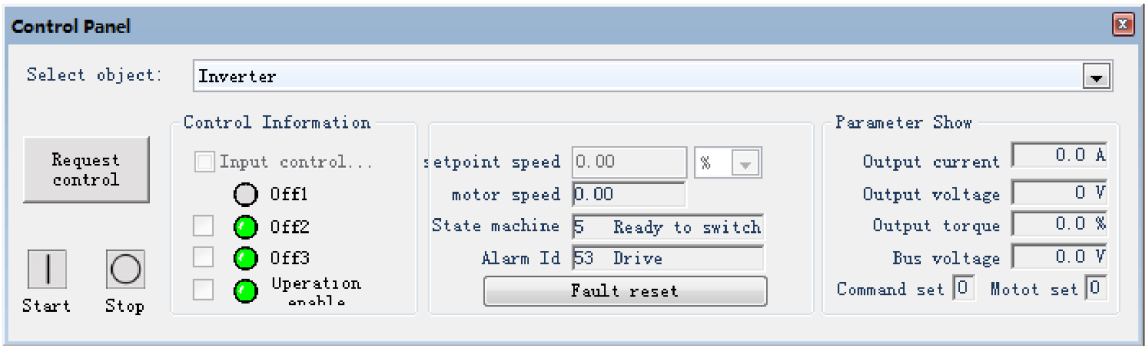


Figure 2-17 Control panel

- The control panel can be used to control start/stop of the device and monitor the device status.
- To control the device through the control panel, click "Request control" to obtain the device control permission.
- Then, click the "Start" or "Stop" buttons to start or stop the device.
- If "Input control bit" is selected, you can click "Off1", "Off2", "Off3", or "Operation enable" for switchover of control words to start or stop the device.
- For reset upon fault, click the "Fault reset" button.
- Pressing the space key for three consecutive times can trigger the OFF2 stop command.
- After an AC drive is started through the control panel, if the communication between the drive and InoDriveStudio is disconnected, fault 52-1 will be reported.

2.3.3.3 Viewing Faults and Alarms

The following two ways are available for viewing faults using InoDriveStudio.

(1) Viewing current faults

Method 1: Choose "MD580 > Diagnostic debugging > Diagnostic > Fault alarm table" to access the list of current faults and alarms, as shown in the following figure.

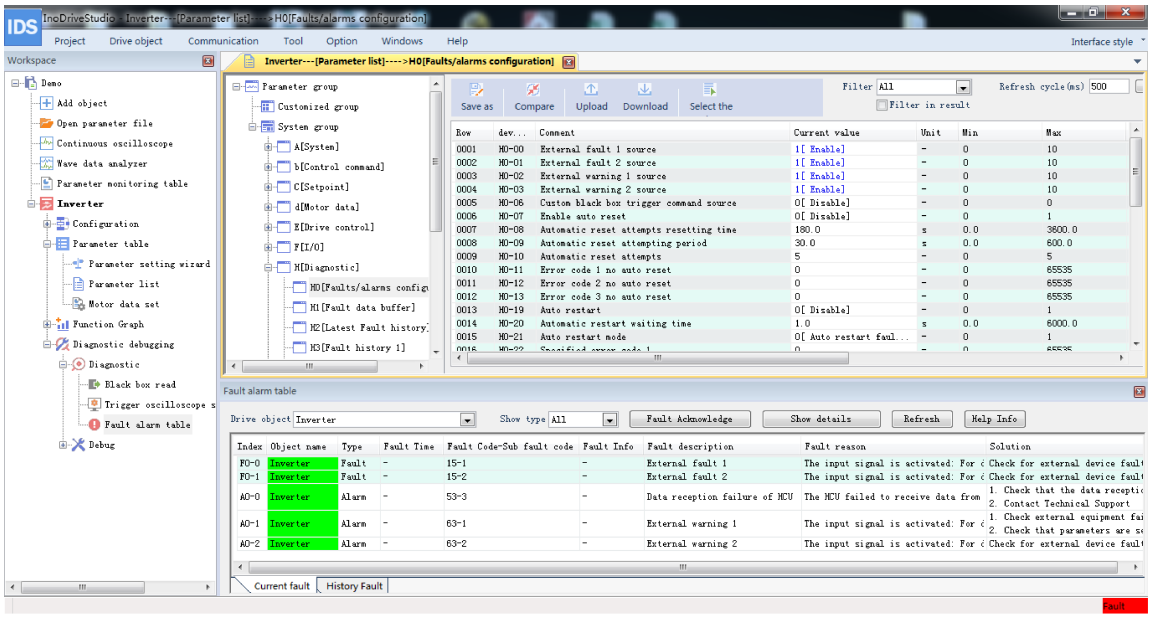


Figure 2-18 List of current faults and alarms

Method 2: Access parameters of group A1 to check current faults and alarms, as shown in the following figure.

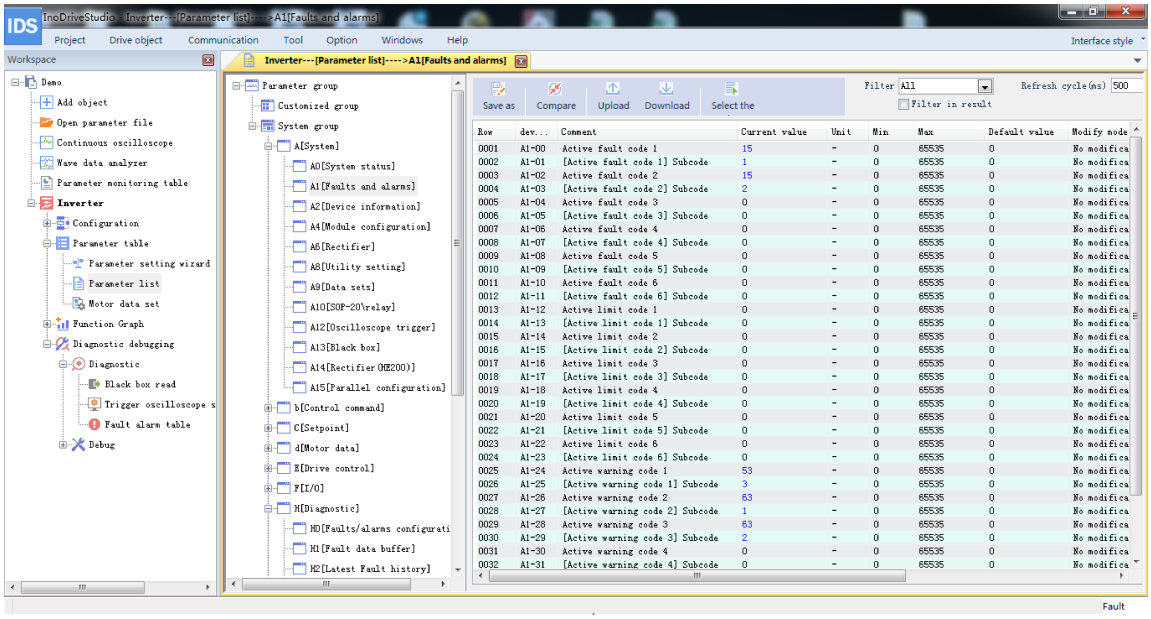


Figure 2-19 Viewing current faults through parameters of group A1

(2) Viewing previous faults

Method 1: Choose "MD580 > Diagnostic debugging > Diagnostic > Fault alarm table". On the page that appears, click the "History Fault" tab to access the list of previous faults and alarms, as shown in the following figure.

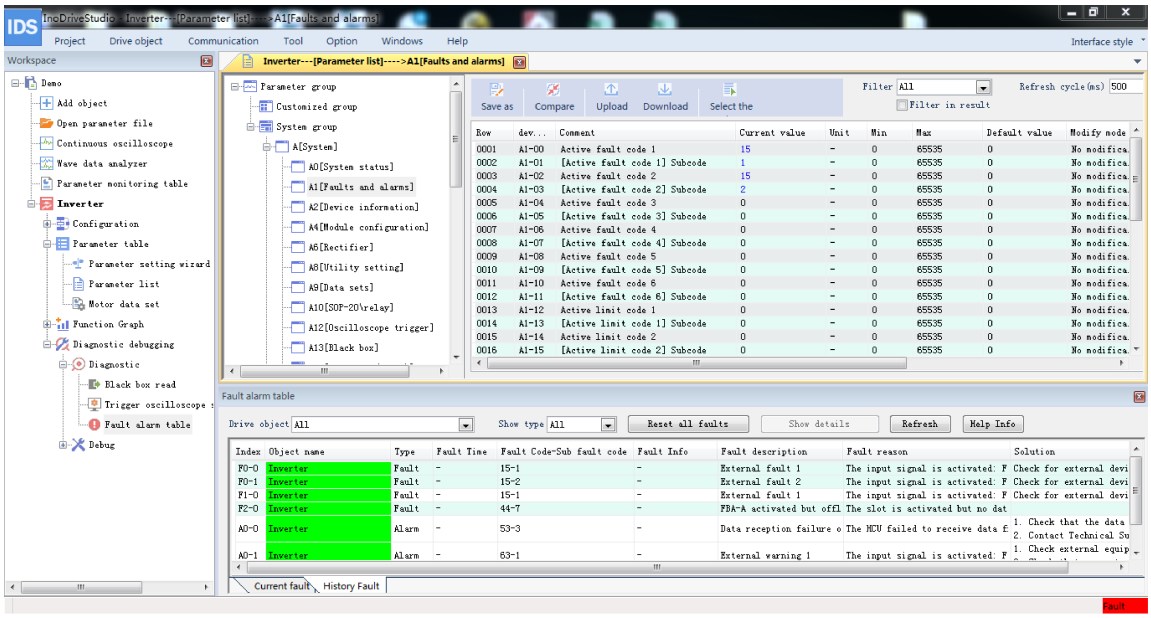


Figure 2-20 List of previous faults and alarms

Method 2: Access parameters of groups H2 to H7 to check previous faults and alarms, as shown in the following figure.

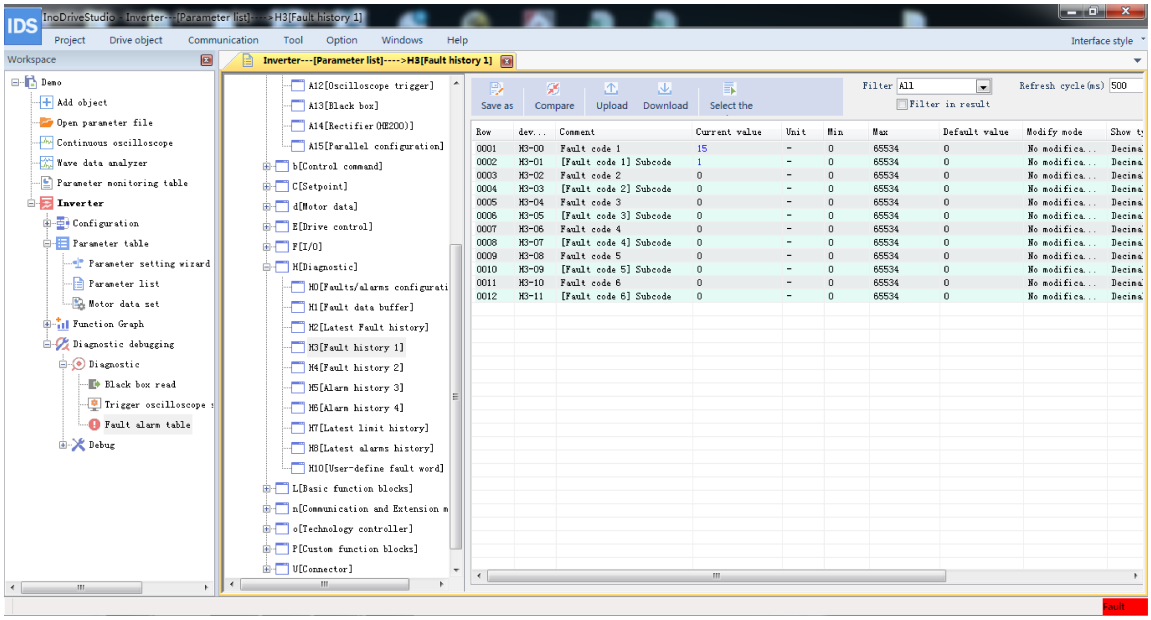


Figure 2-21 Viewing previous faults through parameters of groups H2 to H7

2.3.3.4 Comparing Parameters

InoDriveStudio provides the function of comparing parameters. Users can access the comparison function page in two ways:

- In the menu bar, choose "Drive object" > "Compare".
- Click the "Compare" button above the parameter list.

The following figure illustrates the two ways of entering the comparison function page.

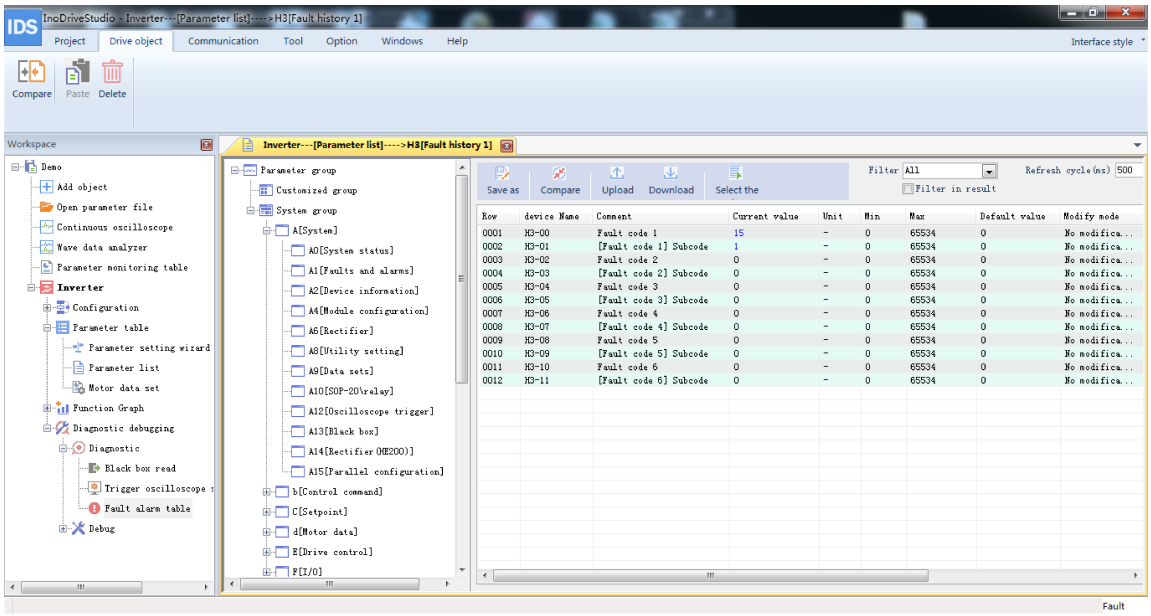


Figure 2-22 Buttons for entering the comparison function page

On the comparison function page, users can compare two offline parameter files or the current values and factory defaults of the drive unit parameters. The comparison result can be set to contain inconsistent parameters only, consistent parameters only, or all parameters, as shown in the following figure.

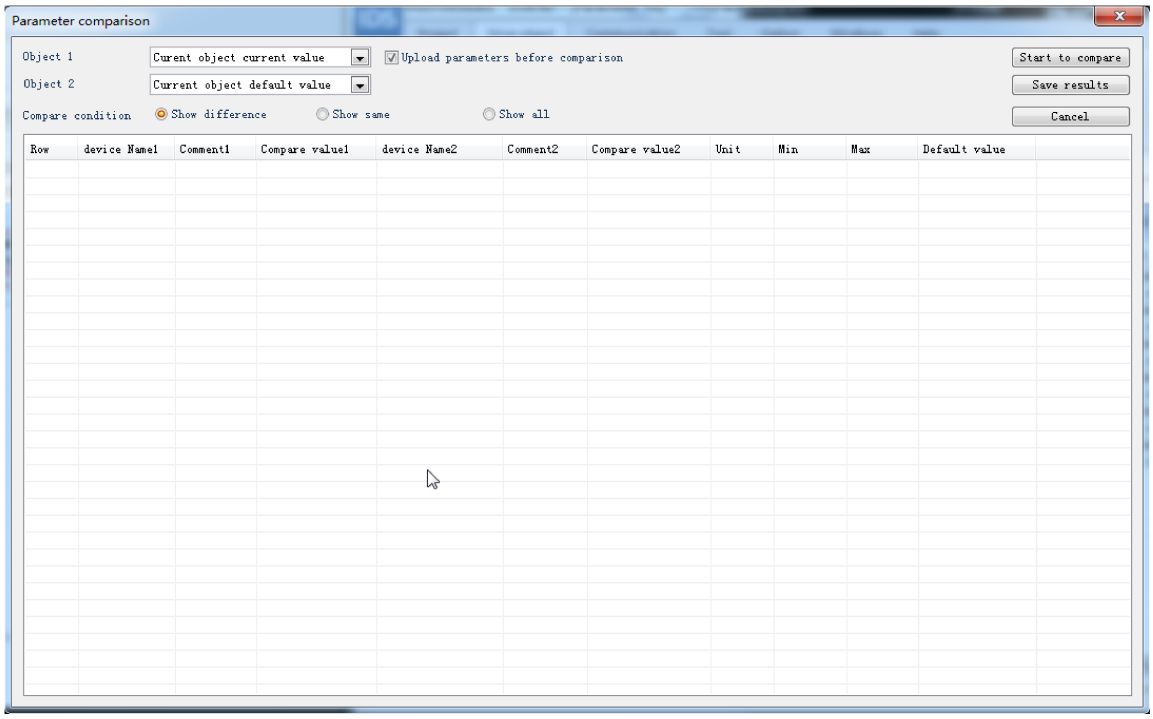
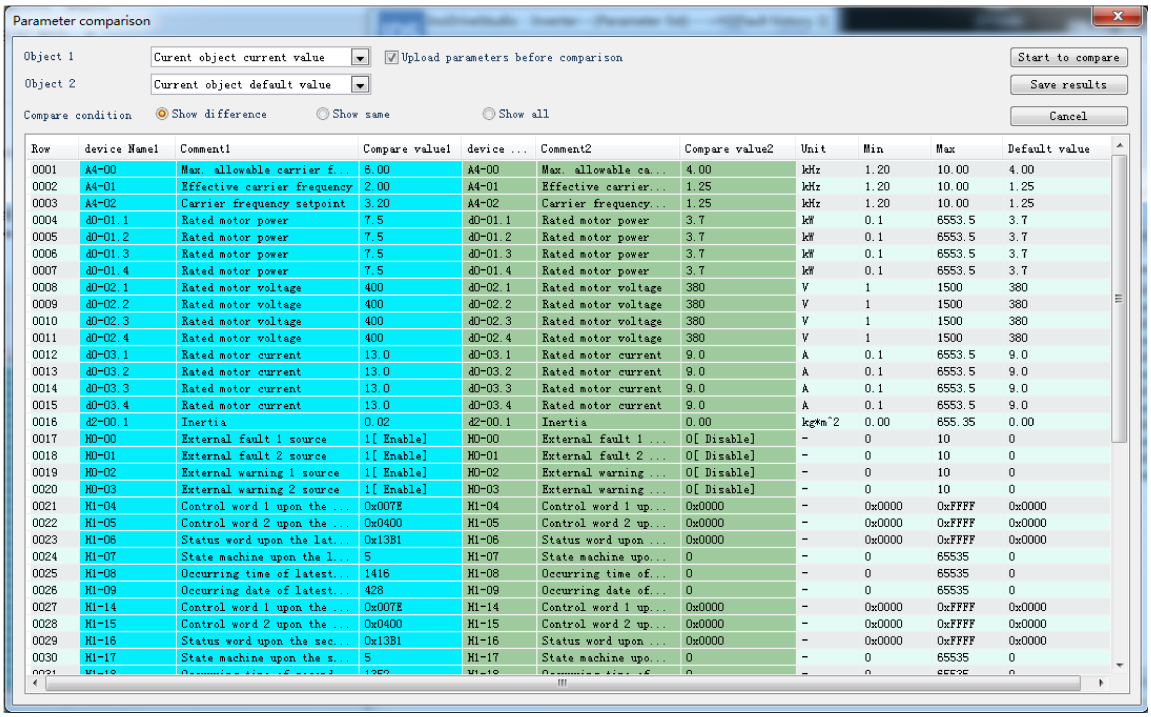


Figure 2-23 Comparison function page



Row	device Name1	Comment1	Compare value1	device ...	Comment2	Compare value2	Unit	Min	Max	Default value
0001	A4-00	Max. allowable carrier f...	6.00	A4-00	Max. allowable ca...	4.00	kHz	1.20	10.00	4.00
0002	A4-01	Effective carrier frequency	2.00	A4-01	Effective carrier...	1.25	kHz	1.20	10.00	1.25
0003	A4-02	Carrier frequency setpoint	3.20	A4-02	Carrier frequency...	1.25	kHz	1.20	10.00	1.25
0004	d0-01.1	Rated motor power	7.5	d0-01.1	Rated motor power	3.7	kW	0.1	6553.5	3.7
0005	d0-01.2	Rated motor power	7.5	d0-01.2	Rated motor power	3.7	kW	0.1	6553.5	3.7
0006	d0-01.3	Rated motor power	7.5	d0-01.3	Rated motor power	3.7	kW	0.1	6553.5	3.7
0007	d0-01.4	Rated motor power	7.5	d0-01.4	Rated motor power	3.7	kW	0.1	6553.5	3.7
0008	d0-02.1	Rated motor voltage	400	d0-02.1	Rated motor voltage	380	V	1	1500	380
0009	d0-02.2	Rated motor voltage	400	d0-02.2	Rated motor voltage	380	V	1	1500	380
0010	d0-02.3	Rated motor voltage	400	d0-02.3	Rated motor voltage	380	V	1	1500	380
0011	d0-02.4	Rated motor voltage	400	d0-02.4	Rated motor voltage	380	V	1	1500	380
0012	d0-03.1	Rated motor current	13.0	d0-03.1	Rated motor current	9.0	A	0.1	6553.5	9.0
0013	d0-03.2	Rated motor current	13.0	d0-03.2	Rated motor current	9.0	A	0.1	6553.5	9.0
0014	d0-03.3	Rated motor current	13.0	d0-03.3	Rated motor current	9.0	A	0.1	6553.5	9.0
0015	d0-03.4	Rated motor current	13.0	d0-03.4	Rated motor current	9.0	A	0.1	6553.5	9.0
0016	d2-00.1	Inertia	0.02	d2-00.1	Inertia	0.00	kg*m^2	0.00	655.35	0.00
0017	H0-00	External fault 1 source	1[Enable]	H0-00	External fault 1 ...	0[Disable]	-	0	10	0
0018	H0-01	External fault 2 source	1[Enable]	H0-01	External fault 2 ...	0[Disable]	-	0	10	0
0019	H0-02	External warning 1 source	1[Enable]	H0-02	External warning ...	0[Disable]	-	0	10	0
0020	H0-03	External warning 2 source	1[Enable]	H0-03	External warning ...	0[Disable]	-	0	10	0
0021	H1-04	Control word 1 upon the ...	0x007E	H1-04	Control word 1 up...	0x0000	-	0x0000	0xFFFF	0x0000
0022	H1-05	Control word 2 upon the ...	0x0400	H1-05	Control word 2 up...	0x0000	-	0x0000	0xFFFF	0x0000
0023	H1-06	Status word upon the lat...	0x13B1	H1-06	Status word upon ...	0x0000	-	0x0000	0xFFFF	0x0000
0024	H1-07	State machine upon the l...	5	H1-07	State machine upo...	0	-	0	65535	0
0025	H1-08	Occurring time of latest...	1416	H1-08	Occurring time of...	0	-	0	65535	0
0026	H1-09	Occurring date of latest...	428	H1-09	Occurring date of...	0	-	0	65535	0
0027	H1-14	Control word 1 upon the ...	0x007E	H1-14	Control word 1 up...	0x0000	-	0x0000	0xFFFF	0x0000
0028	H1-15	Control word 2 upon the ...	0x0400	H1-15	Control word 2 up...	0x0000	-	0x0000	0xFFFF	0x0000
0029	H1-16	Status word upon the sec...	0x13B1	H1-16	Status word upon ...	0x0000	-	0x0000	0xFFFF	0x0000
0030	H1-17	State machine upon the s...	5	H1-17	State machine upo...	0	-	0	65535	0

Figure 2-24 Example results of comparison between current values and factory defaults

2.3.3.5 Backing Up and Downloading Parameters

When using the InoDriveStudio commissioning software, you can click "Upload" on the parameter list page to back up MD580 parameters to the computer or "Save as" to back up selected parameter groups. To restore parameter files in the computer to an MD580 series device, click "Download".

- Steps of backing up parameters using the "upload" function
  Choose "Parameter list". On the page that appears, click "Upload". In the dialog box that appears, set "File name", set "Save as type" to "Parameter file(*.inoprm)", and click "Save". Wait until the file is uploaded.

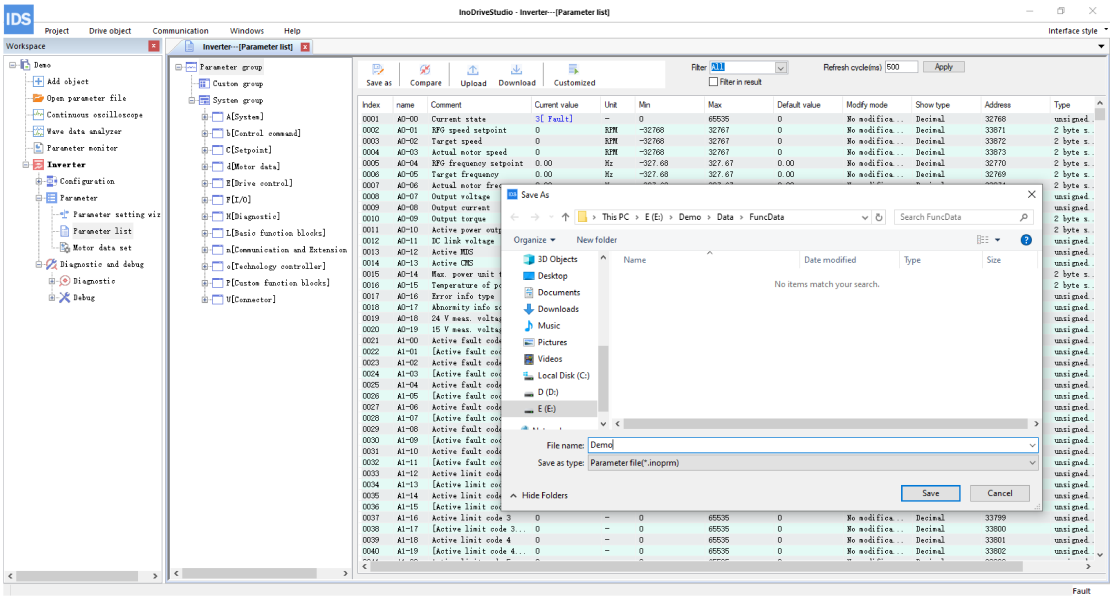


Figure 2-25 Backing up parameters by clicking the "Upload" button

- Steps of backing up parameters using the "save as" function
  Choose "Parameter list". On the page that appears, select the parameter group to be backed up and click "Save as". In the dialog box that appears, set "File name", set "Save as type" to "Parameter file (*.inoprm)", select "Upload parameters before save", and click "Save". Wait until the file is uploaded.

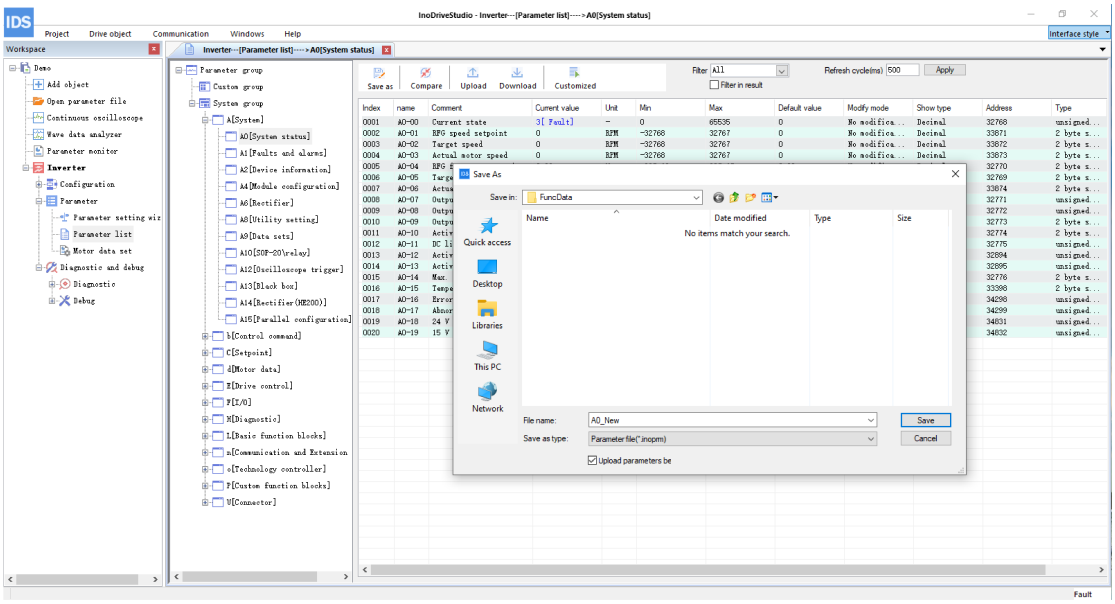


Figure 2-26 Backing up parameters by clicking the "Save as" button

Note

- If the "Upload" button is used for parameter copy, all parameters are backed up.
- To back up specified parameters, see section "User-defined Parameter Groups".
- When using the "Save as" button to back up parameters, set the file type to "*.inoprm" and select the option of "Upload parameters before save".

- Steps of downloading parameters
  Choose "Parameter list". On the page that appears, click "Download". In the dialog box that appears, select the file to be downloaded, select a download mode (at the bottom of the dialog box), and click "Open". Wait until the file is downloaded.

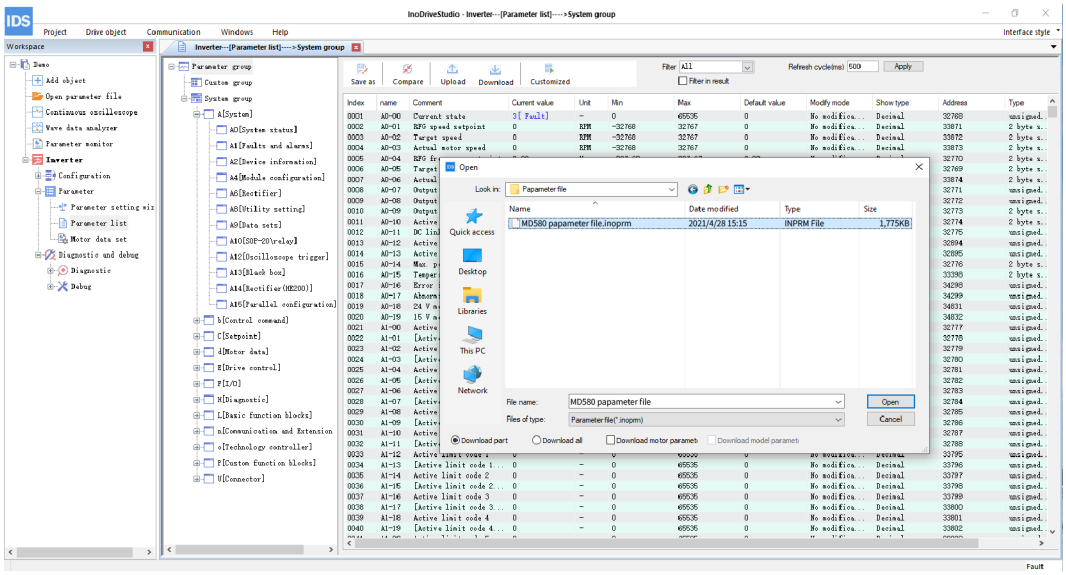


Figure 2-27 Downloading parameters

Download part/Download all: By default, all the parameters, excluding motor parameters (parameters of group d) and model-related parameters, are downloaded. The SOP-20-880 communication rate (A10-04) and communication address (A10-03) are not downloaded. To download motor parameters, select "Download motor parameters". The "Download part" and "Download all" modes do not support model parameter downloading.
Parameters can be downloaded in the following modes:

- Download part: By default, all the parameters, excluding motor parameters (parameters of group d) and model-related parameters, are downloaded. The communication rate (A10-04) and communication address (A10-03) are not downloaded. To download motor parameters, select "Download motor parameters". This mode is applicable to most parameter restoration and backup scenarios.
- Download all: By default, all the parameters, excluding motor parameters (parameters of group d) and model-related parameters, are downloaded. If the communication rate (A10-04) and communication address (A10-03) differ from the current parameter settings, a prompt asking for modification is displayed. Exert caution when modifying parameters to prevent communication failure caused by duplicate station numbers. To download all parameters, select "Download motor parameters" and "Download model parameters".

Caution Exert caution about downloading model parameters. Non-specialists shall not download model parameters.

2.3.3.6 User-defined Parameter Groups

InoDriveStudio allows users to select parameters and combine them into user-defined parameter groups as needed. Such parameter groups can be saved into parameter files or user-defined parameter group configuration files.

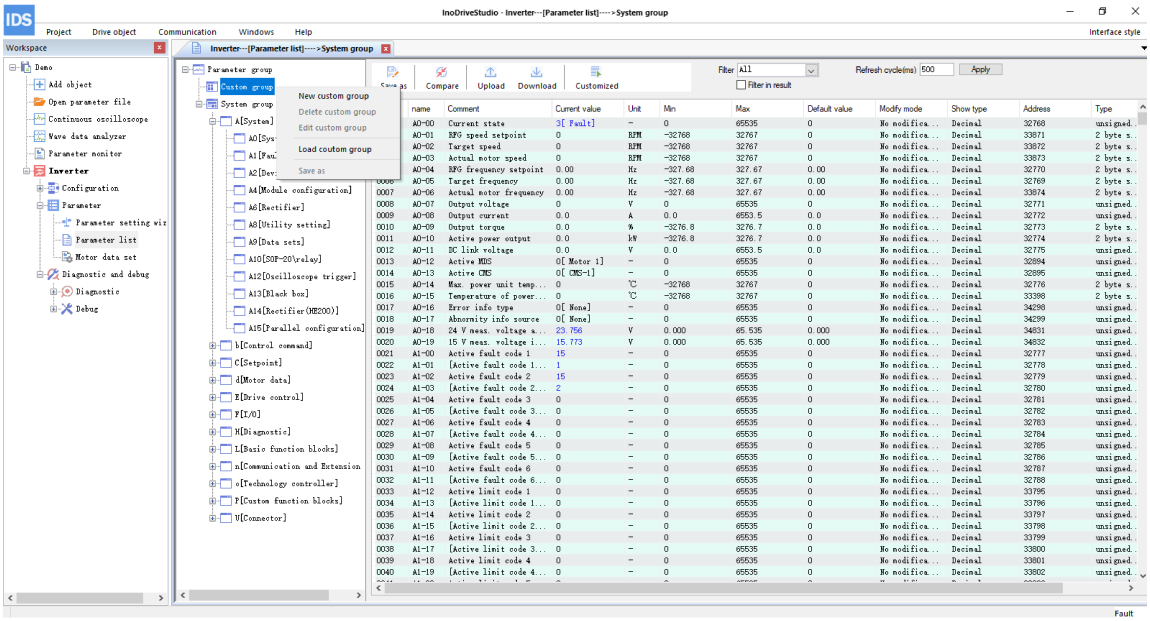


Figure 2-28 Entering a user-defined parameter group

Defining a parameter group

Choose "Parameter list". Right-click "Custom group" and choose "New custom group" or "Load custom group". In the dialog box that appears, set a user-defined group name, click "Add" or "Delete" to add or delete target parameters, and click "OK". The user-defined parameter group is generated.

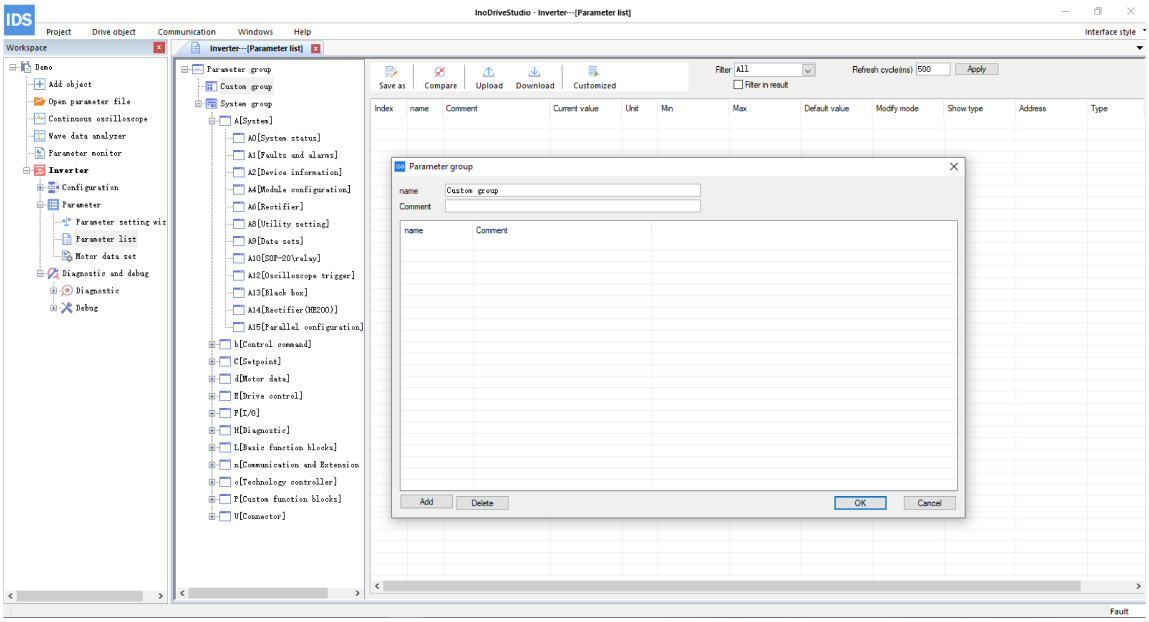


Figure 2-29 Page of a user-defined parameter group

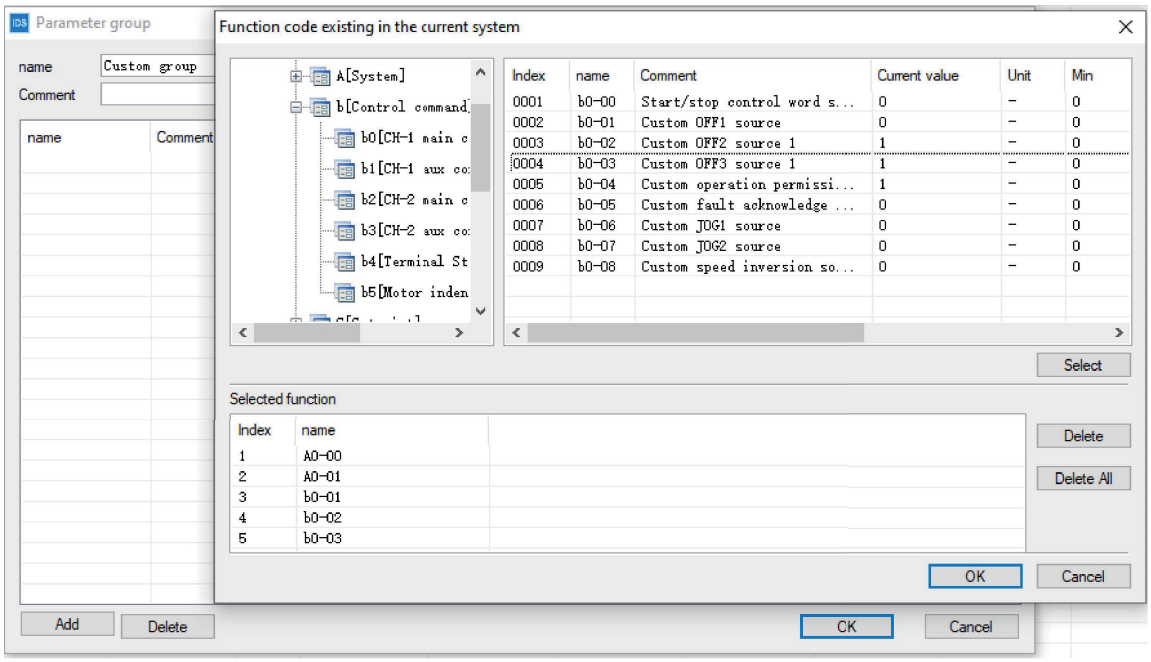


Figure 2-30 Parameters in a user-defined parameter group

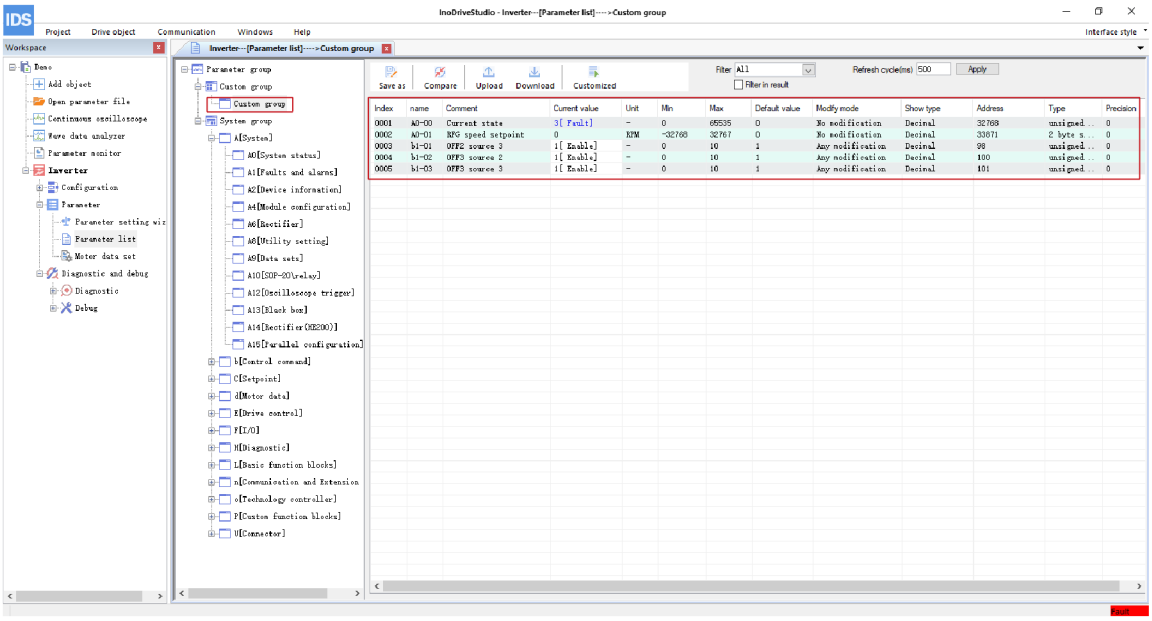


Figure 2-31 New file of a user-defined parameter group

Right-click on the created user-defined parameter group and choose "New custom group", "Delete custom group", "Edit custom group", "Load custom group", or "Save as" as needed.

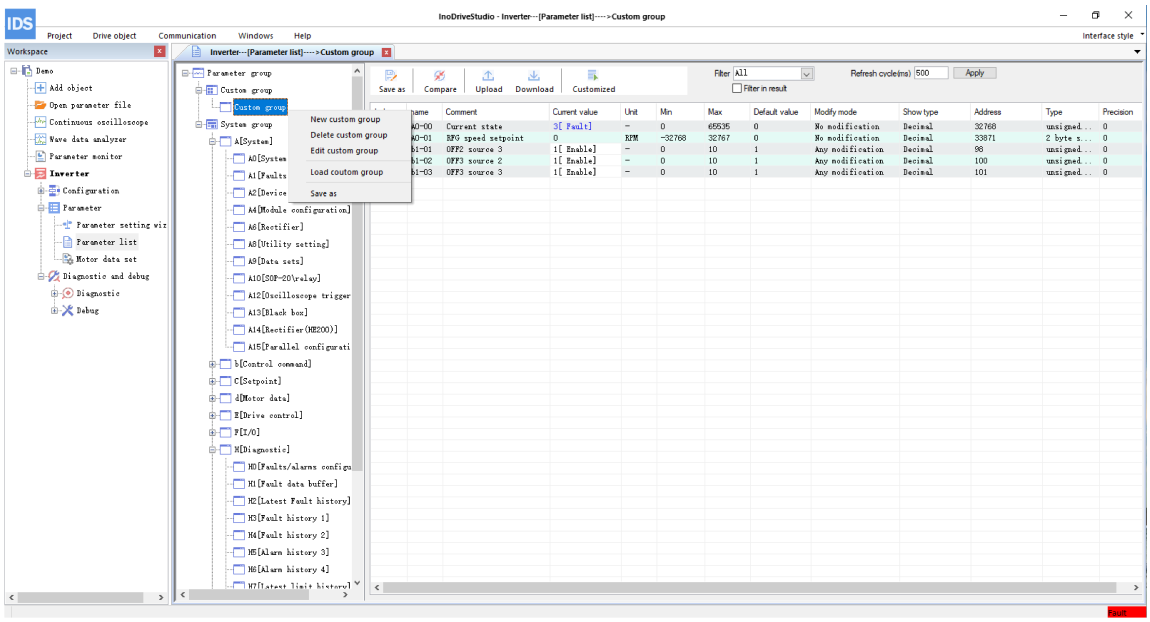


Figure 2-32 Operations on a user-defined parameter group

User-defined parameters can be saved as files of different formats:

- Parameter file (*.inoprm): The saved file supports parameter download, contains parameter values, and can be downloaded to other devices.
- Parameter group file (*.inogrp): The saved file is a parameter group configuration file that can be loaded to a user-defined group. It only contains user-defined parameter group information.
- CSV file (*.csv): Parameters are saved into a CSV file, which can be directly opened.

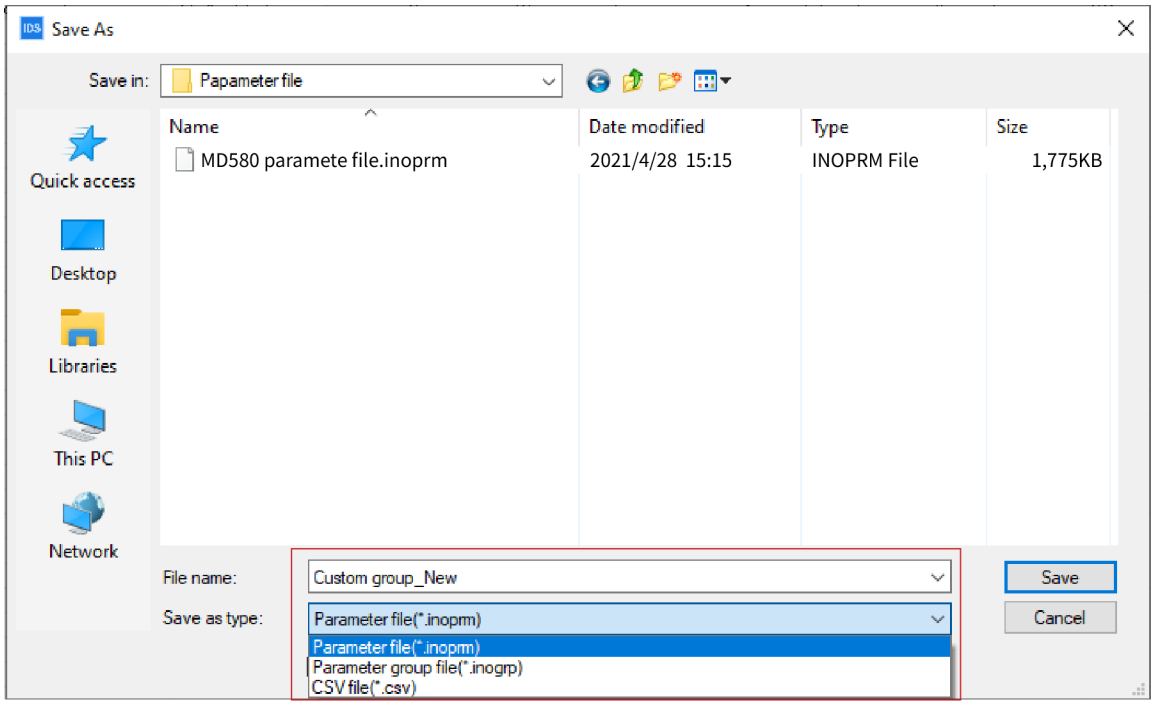


Figure 2-33 Defining a parameter group

2.3.4 Waveform Recording and Analysis

2.3.4.1 Overview of Waveform Recording and Analysis

Analysis of real-time data curves is the most important for commissioning. InoDriveStudio provides two means for online real-time recording and conditional triggering recording of data curves, and offline view of waveforms.

2.3.4.2 Continuous Oscilloscope

Field commissioning often requires monitoring the device operation status in real time. The continuous oscilloscope of InoDriveStudio can monitor and record device data or status in real time. Click "Continuous oscilloscope" under "Workspace" to access the "Continuous oscilloscope" window. This window mainly consists of the channel selection, waveform display, waveform configuration, and toolbar parts, as shown below:

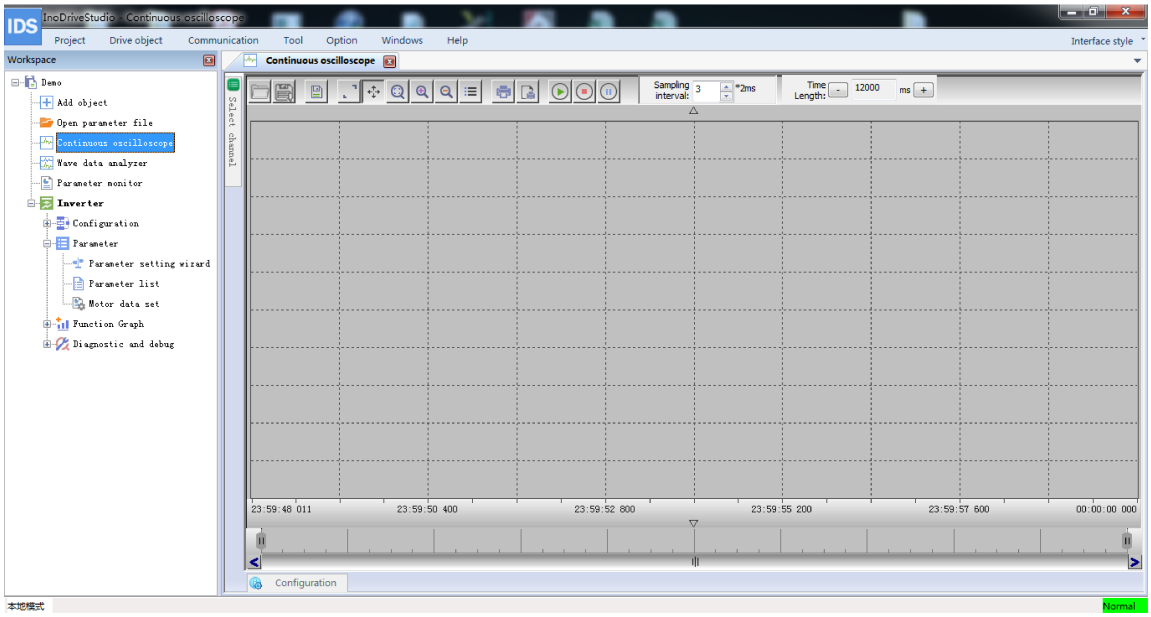


Figure 2-34 Way to access the continuous oscilloscope window

You can open only one continuous oscilloscope window for each project. In the continuous oscilloscope window, you can record and analyze waveforms of all devices in the current project. In this window, the part marked as ① is used for selecting channels, the part marked as ② is used for displaying the waveform, the part marked as ③ is used for configuring waveforms, and the part marked as ④ is the toolbar, where you can perform operations such as start, stop, pause, and zooming. In ③, input the same value in the field "Group" to display connectors with the same physical quantity meaning to the same coordinate system. Select the Stop icon in ④, click "Channel Parameter", and then select a channel. Then, you can delete the selected channel, as shown in *"Figure 2–36" on page 54* .

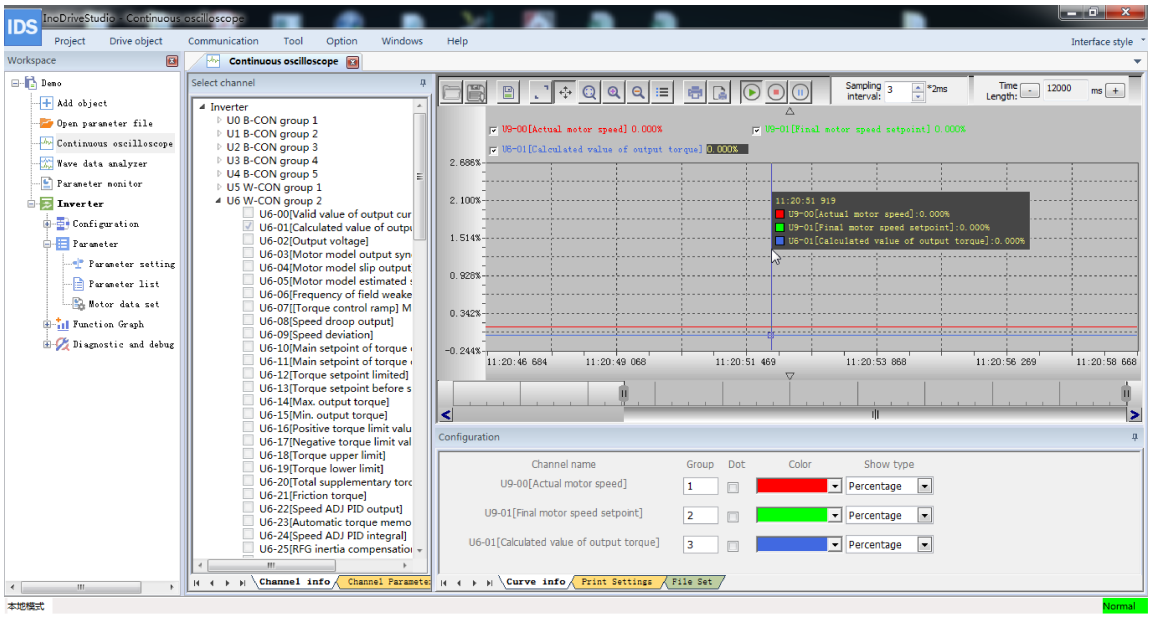


Figure 2-35 Continuous oscilloscope window

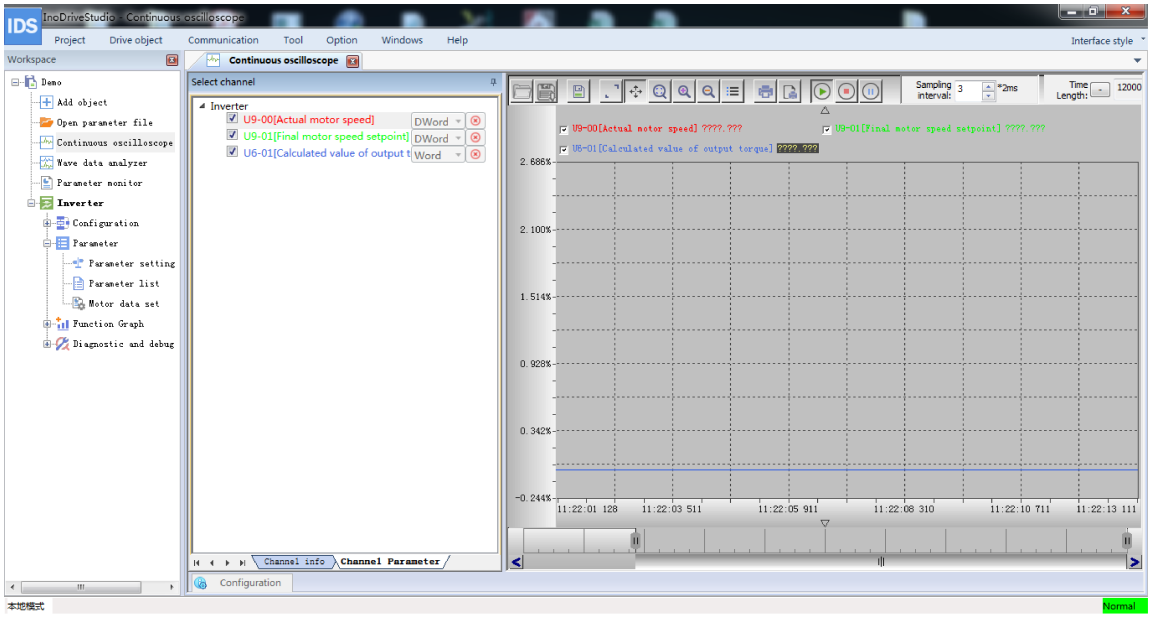


Figure 2-36 Deleting a continuous oscilloscope channel

In the "Select channel" section, select the data channel you want to monitor. All parameters in group U can be used as the data source for the recorded curve, among which:

- Parameters U5 to U8 and U15 to U18 use one record channel for recording each data entry.
- Parameters U9 and U19 use one record channel for recording each data entry by default. To obtain waveforms of higher accuracy, you can modify single word to double word in the configuration to occupy two record channels.
- Parameters U0 to U4 and U10 to U14 are used to record digital waveforms. Up to 8 digital waveforms of a device can be recorded. All digital waveforms of a device occupy only one record data.

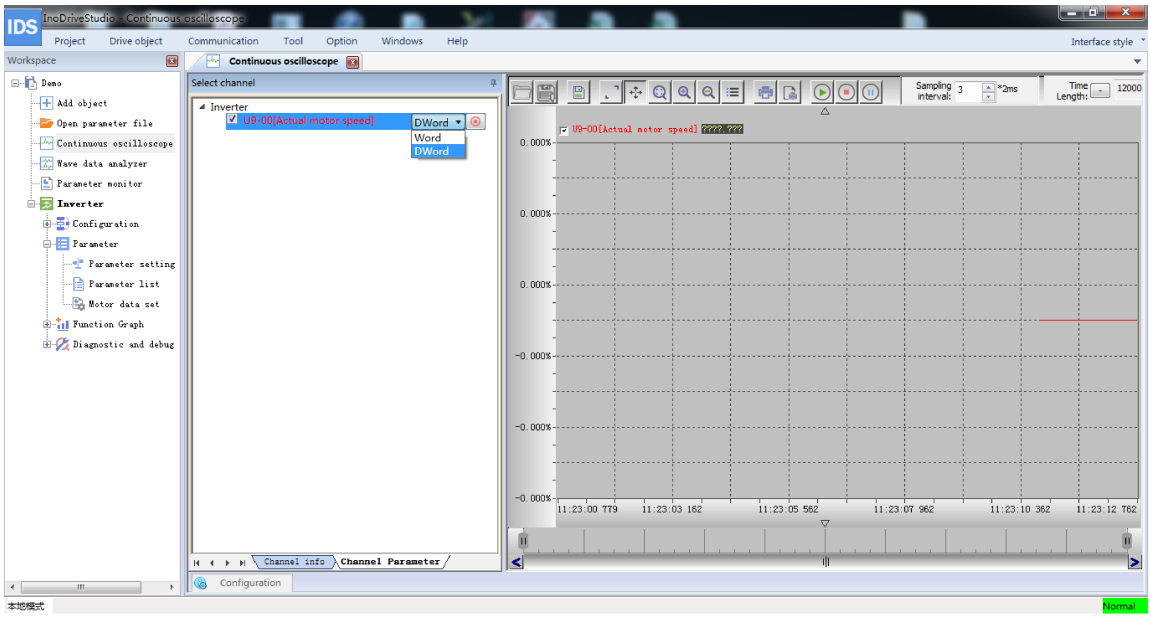


Figure 2-37 Connector single-word and double-word display

The channel number limit is related to the communication baud rate and sampling interval. Their relationship is shown in the following figure.

Baud Rate	Sampling Interval	Maximum Number of Channels	Sampling Interval	Maximum Number of Channels	Sampling Interval	Maximum Number of Channels
115200 bps	2 ms	4	4 ms	7	> 4 ms	8
1 Mbps	2 ms	8	4 ms	8	> 4 ms	8
2 Mbps	2 ms	8	4 ms	8	> 4 ms	8
4 Mbps	2 ms	8	4 ms	8	> 4 ms	8

For how to configure the waveform and use the toolbar, see the help document delivered with the InoDriveStudio software.

Key operation method:

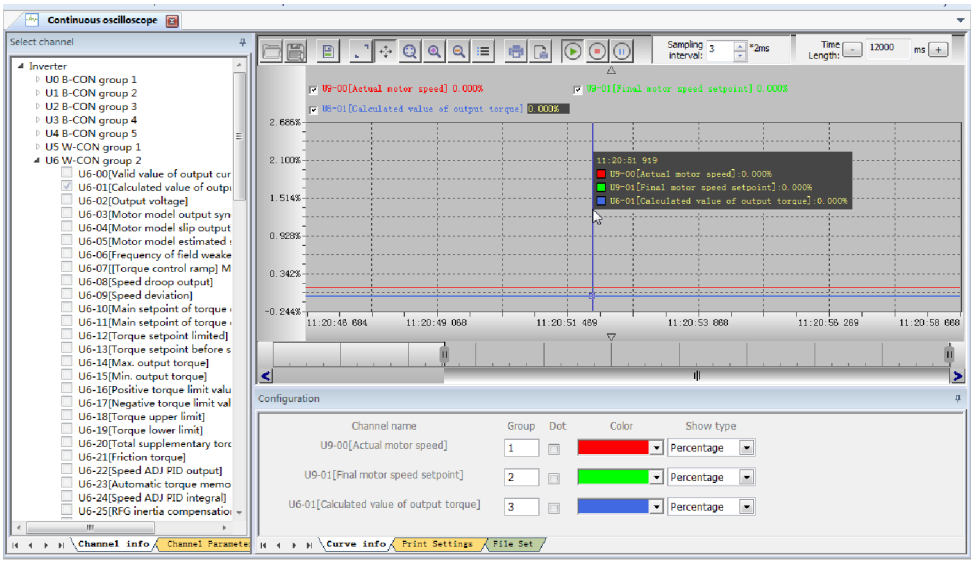


Figure 2-38 Continuous oscilloscope window

In part ① in the lower-left corner of the page, switch the tab to "Channel info", and then select a device, and configure the oscilloscope channel. Switch the tab to "Channel Parameter". The available channels and the configured oscilloscope channel are displayed. You can also select the record accuracy for the 32-bit connector. You can select double word to improve the record accuracy, but then two oscilloscope channels are occupied for each data entry recorded.

The following table lists functions of buttons in the toolbar in part ②:

Button	Description
	Saves the waveform. Waveforms generated during running of the continuous oscilloscope are automatically saved to the project directory. When the number of waveform files exceeds the limit, the earlier waveforms are automatically deleted. It is recommended to back up important waveforms to another directory manually.
	Automatically zooms in or out the vertical coordinate. After this button is clicked, the vertical coordinates of all curves are zoomed in or out according to the current display range to ensure that all curve points are within the current display range.
	Moves the curve. After this button is clicked, you can drag and drop the current curve by using the left mouse button.
	Zoom in an area. After this button is clicked, you can use the mouse to frame an area, and the area will be zoomed in and displayed on the current screen. Only when the vertical coordinate range of the current curve changes will the time axes of all curves change synchronously. You can zoom in or out a horizontal or vertical coordinate separately.
	Zooms in or out the coordinate. You can click this button to zoom in or out the curve to the next level. Only when the vertical coordinate range of the current curve changes will the time axes of all curves change synchronously.
	Shows or hides the verniers. You can use two verniers to measure the curve data.

On the "Curve info" tab page in part ③, modify the color of each curve and then select "Dot". Each sampling point on the curve is bolded. When the group numbers of two curves are the same, these two curves share the same vertical coordinate and are zoomed in and out synchronously.

You can modify the display type for some signals in part ④. For example, you can choose to display the speed per-unit value in percentage, frequency, or speed unit.

Table 2–17 Common shortcut keys

Shortcut Key	Description
Right mouse button	Click to automatically zoom in or out the vertical and vertical coordinates of all curves.
Mouse scroll wheel	Zoom in or out curves. In the waveform area, both the horizontal and vertical coordinates are zoomed in or out. In the coordinate area, only the coordinate under operation is zoomed in or out. Only when the vertical coordinate range of the current curve changes will the time axes of all curves change synchronously.
Ctrl+Mouse scroll wheel	Move the curves. In the waveform area, both the horizontal and vertical coordinates are moved. In the coordinate area, only the coordinate under operation is moved. Only when the vertical coordinate range of the current curve changes will the time axes of all curves change synchronously.
↑ or ↓	Move the current curve up or down.

Shortcut Key	Description
Alt	Force to apply the operation to all curves. For example, Alt+↑ or Alt+↓ is used to move all curves up or down.
Shift	Force an operation to zooming. For example, Shift+↑ or Shift+↓ is used to zoom in or out the vertical coordinate of the current curve.
Ctrl	Force an operation to moving. For example, Ctrl+mouse scroll wheel is used to move a curve.

2.3.4.3 Black Box Function

MD580 series AC drives are provided with the black box function. The black box is enabled automatically upon power-on. The function can be triggered either upon occurrence of a fault or by user-defined conditions. A record is generated once the function is triggered.

- Fault-based triggering: When the drive unit state changes from the no-fault to the fault state, a black box record is automatically generated.
- User-defined triggering: You can set A13-03 to define a black box triggering condition. When the set condition is met, a black box record is generated.

When a fault occurs, the MD580 controller collects data generated within 0.9s before and 0.1s after the fault. The data includes 8 ADC interruption internal data entries, 4 data entries at 0.5 ms interval, 48 internal data entries at 2 ms interval, 16 user-defined data entries at 2 ms interval, and 5 data entries at 16 ms interval. The black box also records the fault triggering time and condition. The collected data is automatically saved to the controller FLASH. Data of up to 80 faults can be stored. Data of a fault occurring later will automatically overwrite that of the earliest fault.

MD580 series AC drives support two groups of user-defined triggering conditions that can be used separately or in logic combination. The following figure shows parameters related to user-defined triggering conditions.

A13-03	User defined trigger condition configuration mode	0[The user-defined trigger conditions are invalid]
A13-04	User defined trigger condition 1 Mode	0[Analog comparison]
A13-05	User defined trigger condition 1 analog comparison method	0[Greater than >]
A13-06	User defined trigger condition 1 analog source	0[Disable]
A13-07	User defined trigger condition 1 analog comparison value	0[Disable]
A13-08	User defined trigger condition 1 digital trigger method	0[Rising edge 0 -> 1]
A13-09	User defined trigger condition 1 digital source	0[Disable]
A13-10	User defined trigger condition 1 state machine comparison method	0[Greater than >]
A13-11	User defined trigger condition 1 state machine comparison value	0[Disable]
A13-12	User defined trigger condition 2 mode	0[Analog comparison]
A13-13	User defined trigger condition 2 analog comparison method	0[Greater than >]
A13-14	User defined trigger condition 2 analog source	0[Disable]
A13-15	User defined trigger condition 2 analog comparison value	0[Disable]
A13-16	User defined trigger condition 2 digital trigger method	0[Rising edge 0 -> 1]
A13-17	User defined trigger condition 2 digital source	0[Disable]
A13-18	Custom trigger condition 2 State machine comparison method	0[Greater than >]
A13-19	Custom trigger condition 2 state machine comparison value	0[Disable]

Figure 2-39 Parameters of user-defined triggering conditions

Table 2–18 Relationship of user-defined triggering condition combination

Para.	Value	Combination Relationship
A13-03 User-defined triggering condition configuration mode	0	Disable all user-defined triggering conditions
	1	Enable only user-defined triggering condition 1
	2	Enable only user-defined triggering condition 2
	3	Two triggering conditions in logic AND relationship
	4	Two triggering conditions in logic OR relationship
	5	Two triggering conditions in logic XOR relationship

Each user-defined triggering condition can be set to three modes: analog comparison triggering, digital triggering, and state machine triggering.

- The analog comparison triggering mode supports the following five comparison modes.

Table 2–19 Analog comparison triggering

User-defined Condition	Comparison Value 1	Comparison Value 2	Comparison Mode	Description
User-defined condition 1	A13-06	A13-07	A13-05 = 0	Valid when comparison value 1 is greater than comparison 2
			A13-05 = 1	Valid when comparison value 1 is less than comparison 2
			A13-05 = 2	Valid when comparison value 1 is equal to comparison 2
			A13-05 = 3	Valid when comparison value 1 is greater than or equal to comparison 2
			A13-05 = 4	Valid when comparison value 1 is less than or equal to comparison 2
User-defined condition 2	A13-14	A13-15	A13-13 = 0	Valid when comparison value 1 is greater than comparison 2
			A13-13 = 1	Valid when comparison value 1 is less than comparison 2
			A13-13 = 2	Valid when comparison value 1 is equal to comparison 2
			A13-13 = 3	Valid when comparison value 1 is greater than or equal to comparison 2
			A13-13 = 4	Valid when comparison value 1 is less than or equal to comparison 2

- The digital triggering mode supports the following five configurations.

Table 2–20 Digital triggering

User-defined Condition	Comparison Value 1	Comparison Mode	Description
User-defined condition 1	A13-09	A13-08 = 0	Valid when the input signal changes on the rising edge
		A13-08 = 1	Valid when the input signal changes on the falling edge
		A13-08 = 2	Valid when the input signal changes on an edge
		A13-08 = 3	Valid when the input signal logic is 1
		A13-08 = 4	Valid when the input signal logic is 0
User-defined condition 2	A13-17	A13-16 = 0	Valid when the input signal changes on the rising edge
		A13-16 = 1	Valid when the input signal changes on the falling edge
		A13-16 = 2	Valid when the input signal changes on an edge
		A13-16 = 3	Valid when the input signal logic is 1
		A13-16 = 4	Valid when the input signal logic is 0

- The state machine triggering mode supports the following five configurations.

Table 2–21 State machine triggering

User-defined Condition	Comparison Value 1	Comparison Mode	Description
User-defined condition 1	A13-11	A13-10 = 0	The current state machine is greater than the state machine comparison value.
		A13-10 = 1	The current state machine is less than the state machine comparison value.
		A13-10 = 2	The current state machine is equal to the state machine comparison value.
		A13-10 = 3	The current state machine is greater than or equal to the state machine comparison value.
		A13-10 = 4	The current state machine is less than or equal to the state machine comparison value.
User-defined condition 2	A13-19	A13-18 = 0	The current state machine is greater than the state machine comparison value.
		A13-18 = 1	The current state machine is less than the state machine comparison value.
		A13-18 = 2	The current state machine is equal to the state machine comparison value.
		A13-18 = 3	The current state machine is greater than or equal to the state machine comparison value.
		A13-18 = 4	The current state machine is less than or equal to the state machine comparison value.

The following describes how to view the waveform in the black box record.

(1) Choose MD580 > Diagnostic and debug > Diagnostic > Black box. On the black box page displayed, click "Refresh". The faults occurred on the device and their occurrence time are displayed.

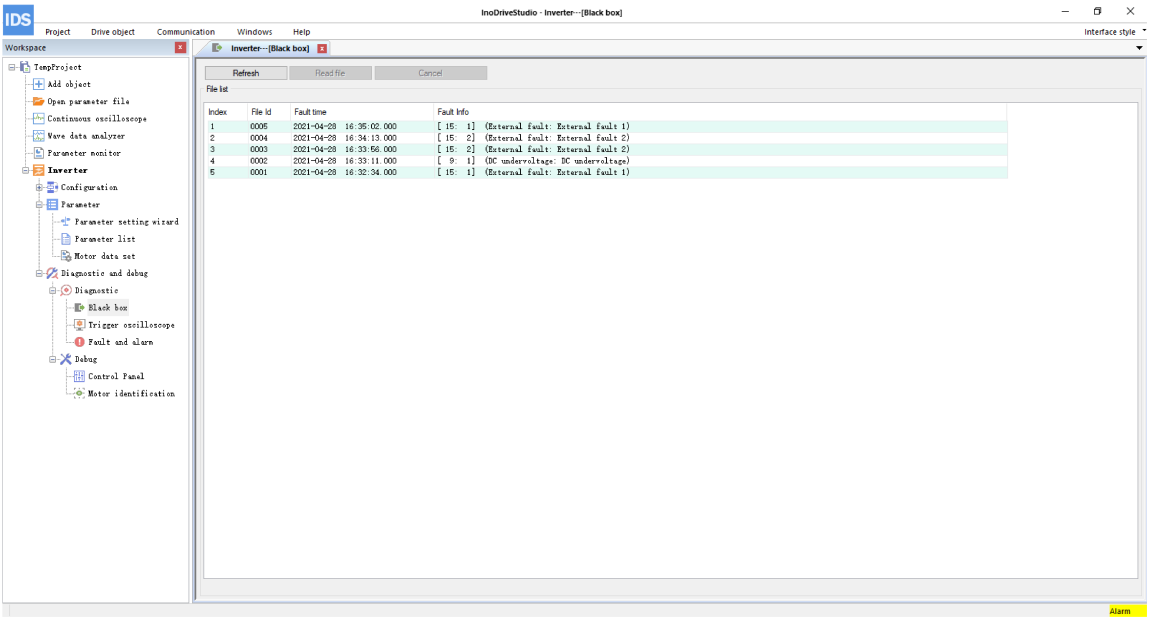


Figure 2-40 Black box opening page

(2) Select a fault, such as the 73rd fault, click "Read file", name the file, and then click "Save" to save the file.

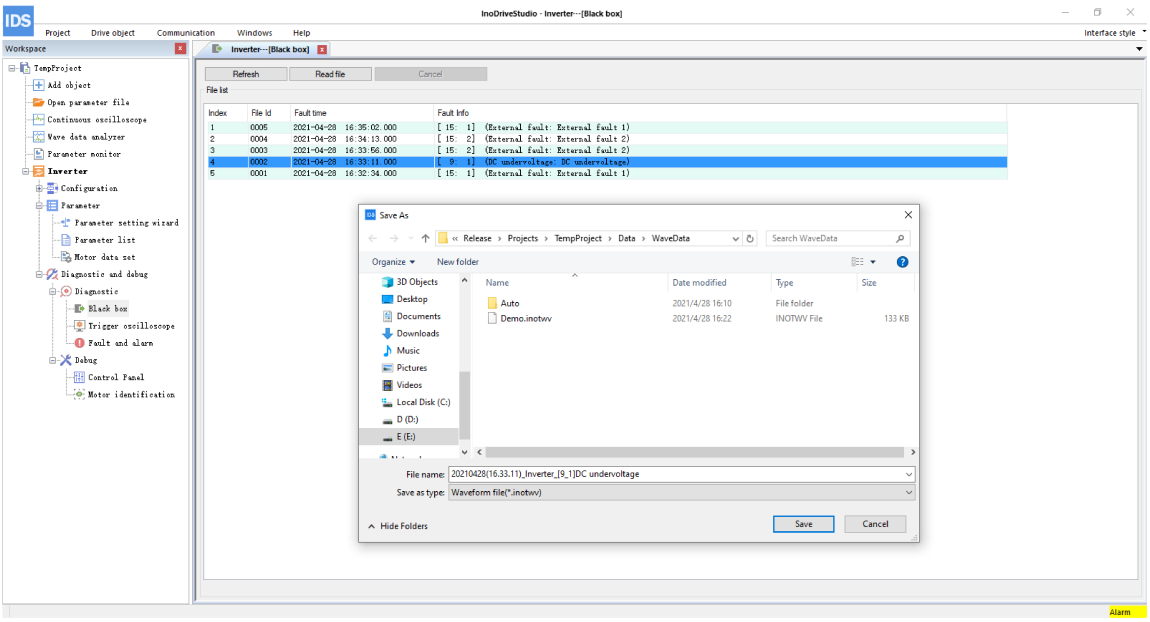


Figure 2-41 Black box saving page

(3) After the file is saved, InoDriveStudio automatically displays the saved waveform. You can select the channel you want to view and the corresponding waveform is displayed.

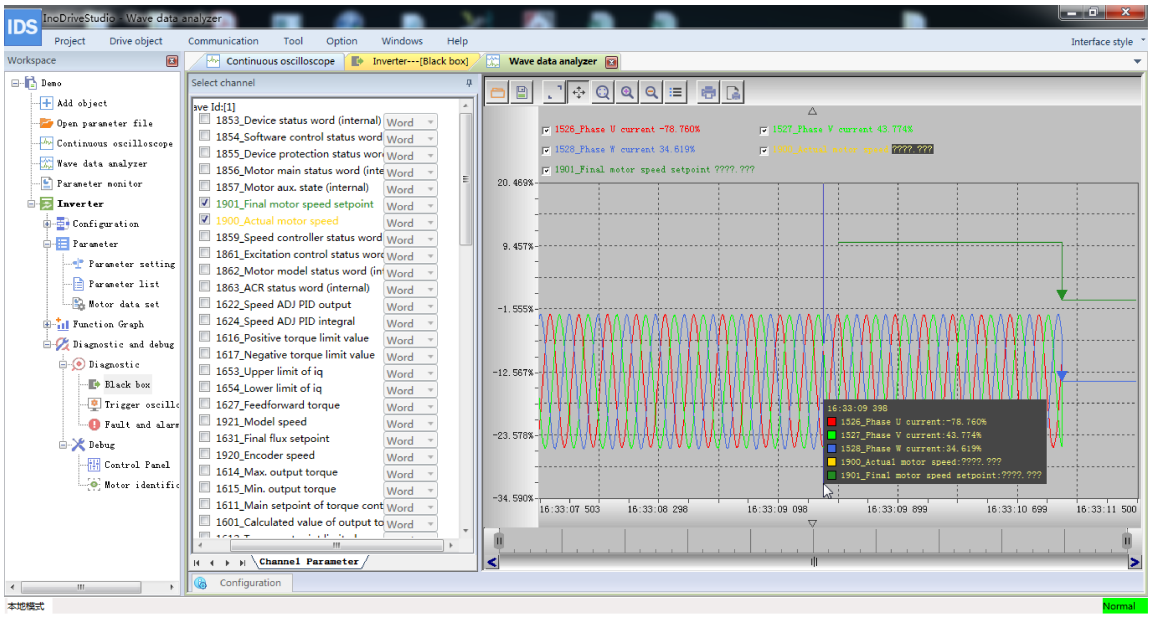
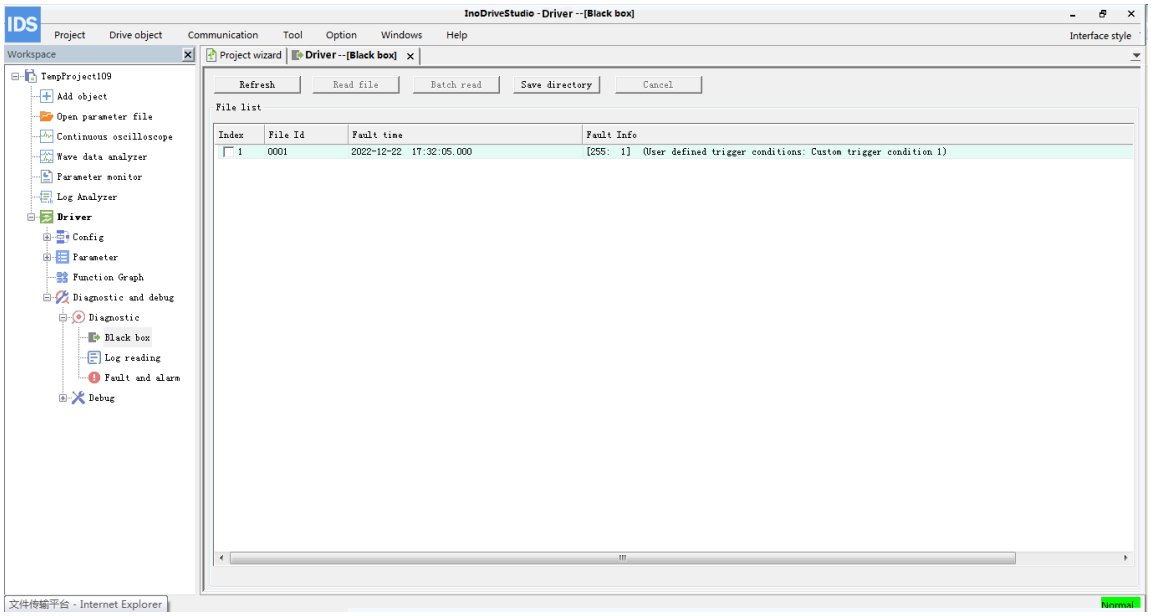


Figure 2-42 Black box opened waveform

To record waveforms based on other conditions, you can use parameters A13-03 to A13-19 to customize the triggering conditions. You can configure two triggering conditions. A black box record is generated when either condition is met or when the logic AND, OR, or XOR is met.

When the configured condition is met, access the black box page and refresh the fault list. Information recorded at the triggering time point is displayed.



MD580 series AC drives allow you to reset the black box function in either of the following two ways:

- Clear the black box records. Set A13-01 and A13-02 to 1. Then, all black box records are cleared.
- Restore black box configuration parameters.

Note

During restoration of some or all parameters to factory defaults triggered by A8-00, the black box configuration parameters will be restored.

During restoration of black box configuration parameters triggered by A13-01 (set to 2), the black box fault trigger mode (H1-79) will not be restored.

3 Quick Commissioning Guide

This chapter describes the basic commissioning steps of MD580 series products, including power-on, trial run, and commissioning of the drive unit. The following figure shows the system commissioning process.

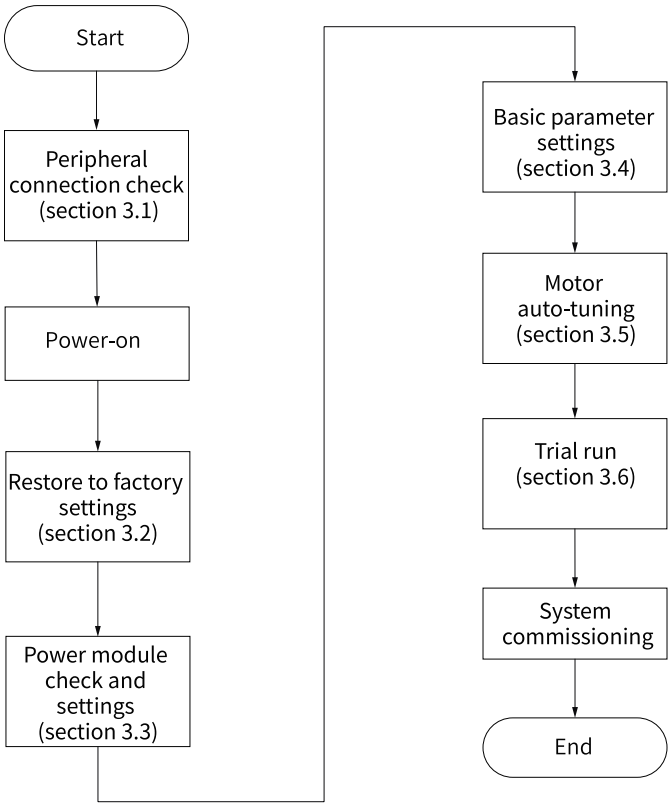


Figure 3-1 Flowchart of commissioning for initial power-on

Note

The preceding flowchart of commissioning upon system power-on includes basic steps of using the MD580 series products. Before using the products, read relevant sections carefully and follow the commissioning steps.

3.1 Checking Peripheral Connection

Before powering on and commissioning the control system, ensure that the preparation for power-on has been completed, and check each item in the table.

Table 3–1 Checklist before running

No.	Action	Applicable	Completed
1	The power input of the main circuit must be correctly connected according to terminal (R, S, and T) labels.	☐	☐
2	The connection phase sequence of the main circuit output terminals (U, V, and W) matches that of the motor cables (U, V, and W).	☐	☐

No.	Action	Applicable	Completed
3	The power input terminals (R, S, and T) and output terminals (U, V, and W) of the main circuit must not be connected inversely, especially that the power input cable must not be connected to the output side.	☐	☐
4	The AC drive and motor must be grounded reliably.	☐	☐
5	The encoder cable must be correctly connected, and the shield must be properly handled.	☐	☐
6	The power input of the auxiliary circuit must be correctly connected according to terminal (L1, L2, L3, and N) labels.	☐	☐
7	The communication cable must be correctly connected.	☐	☐
8	External ports such as I/O must be correctly connected.	☐	☐

Note

For details about encoder connection and shield handling, see each encoder module user guide.

3.2 Restoring Factory Defaults

After initial power-on of the control circuit, restore factory defaults first. Restore factory defaults in the following two steps:

1. Set A8-00 to 2 (restore all parameters to factory defaults).
2. Set A8-01 to 1 to confirm the restoration.

After the operations, the state machine A0-00 enters the S20 parameter restoration state machine and then exits the state machine after restoration ends.

Note

For details about restoring factory defaults, see *"4.1.1.1 Overview of Restoring Factory Defaults" on page 85*.

3.3 Checking and Setting the Power Module

3.3.1 Checking Device Information

The following table lists the parameters used checking device information.

Para.	Name	Description
A2-00	Product type	Current device type 0: MD580
A2-01	Module rated power	Rated power of the module
A2-02	Module rated voltage	Rated voltage of the module
A2-03	Module rated current	Rated current of the module
A2-04	Overload reference current	Overload reference current in the current overload mode

Para.	Name	Description
A2-07	Software type	0: Standard software 1: Customized software 2: Temporary software
A2-08	ARM function software version	-
A2-09	ARM function software child version	-
A2-10	DSP performance software version	-
A2-12	DSP function software version	-

Note

If the power module information such as the rated power, rated voltage, and rated current is inconsistent with that on the module nameplate, contact the service personnel for technical support.

3.3.2 Setting Load Modes

Set the A4-28 parameter to select appropriate load characteristics. The load characteristics curve is used to protect the power module against overload. It prevents load temperature rise due to continuous overload, ensuring long-term stable running of the power component.

The load mode must match the hardware selection design.

The load mode for AC drives is light overload by default. If short-term overload is needed, select the heavy load mode to improve the short-term maximum output current of the power module. Typically, in the heavy load mode, the load runs for at least 240s at heavy load current, and then runs for at most 60s at 1.5 times the heavy load current.

For applications with long-term stable load, select the light load mode to make full use of the output capability of the power module.

For details about load modes, see relevant sections in the *MD580 Series Low-voltage High-performance Engineering AC Drive Hardware Guide*.

3.4 Setting Basic Parameters

3.4.1 Setting Basic Motor Parameters

Set motor parameters according to the S1 duty ratings indicated on the motor nameplate.

No.	Para.	Name	Setting
1	d0-00	Motor type	Select a motor type.
2	d0-01	Rated motor power	Set the rated motor power.
3	d0-02	Rated motor voltage	Set the rated motor voltage.
4	d0-03	Rated motor current	Set the rated motor current. For a drive motor group, calculate the sum of output current all the motors in the group.
5	d0-04	Rated motor frequency	Set the rated motor frequency, which must match the rated motor voltage.

No.	Para.	Name	Setting
6	d0-05	Rated motor speed	Set the rated motor speed. The speed of an asynchronous motor is the rotor speed rather than the synchronous speed.
7	d0-06	Max. motor speed	Set the maximum speed of the motor. Set this parameter to a percentage of the rated motor synchronous speed. The maximum speed is affected by the E2-10 to E2-13 parameter reference.
8	d0-07	Min. motor speed	Set the minimum speed of the motor. For motors that cannot run at a low speed, set this parameter. For other motors, ignore this parameter.
9	d0-08	Max. motor current	Set the maximum current of the motor. Set this parameter to a percentage of the rated motor current.
10	d0-09	Number of motor pole pairs	The number of motor pole pairs is automatically calculated by the drive unit module.
11	d0-10	Motor power factor	Set this parameter according to the motor nameplate.
12	d0-16	Motor brake control	0: Disable 1: Enable. Set this parameter as required.

3.4.2 Encoder Configuration

The AC drive supports two encoder detection modules, which can be configured by parameters in group n5. You can select the supported encoder for speed feedback according to the following parameter.

Parameter Code	Parameter Name	Description
d0-21	Speed feedback encoder	Use encoder 1 or encoder 2 for speed feedback. Note that the selected encoder must be enabled for normal use
n5-00	Encoder 1 enable	It is used to enable encoder detection module 1.
n6-00	Encoder 2 enable	It is used to enable encoder detection module 2.

Four encoder types are supported: incremental (ABZ) encoders, resolver encoders, sin-cos encoders, and SSI encoders. The following table describes the parameters to be set. For details about how to set parameters, see *" Encoder Speed Measurement" on page 215*.

Item	Parameter Code	Parameter Name	Description
1	n5-02/n6-02	Encoder type	It is used to set the encoder type. • 0: Normal ABZ encoder • 2: Resolver • 4: Sin-cos encoder (MD580-PG-AR1) • 5: SSI encoder (MD580-PG-AR1) • 6: ABZ encoder (MD580-PG-AU1) • 7: SSI encoder (MD580-PG-AU1)
2	n5-03/n6-03	Input A/B phase sequence	It is used to set the input A/B phase sequence, corresponding to the incremental encoder. If the detection speed is inverse to the actual speed, modify this parameter.
3	n5-07/n6-07	Encoder resolution (number of pulses/ revolutions)	It is used to set the pulses per revolution of the incremental encoder or the wave number of the sin-cos encoder according to the encoder nameplate.

Item	Parameter Code	Parameter Name	Description
4	n5-13/n6-13	Number of resolver pole pairs	It is used to set the number of pole pairs for the resolver encoder. Set the parameter according to the actual encoder nameplate.
5	n5-50/n6-50	Clock frequency of SSI encoder	Set the parameter according to the parameter of the connected SSI encoder.
6	n5-51/n6-51	SSI encoder output coding type	Set the parameter according to the parameter of the connected SSI encoder.
7	n5-52/n6-52	SSI encoder verification mode	Set the parameter according to the parameter of the connected SSI encoder.
8	n5-53/n6-53	Number of SSI encoder status bits	Set the parameter according to the parameter of the connected SSI encoder.
9	n5-54/n6-54	Number of SSI encoder single-turn bits	Set the parameter according to the parameter of the connected SSI encoder.
10	n5-55/n6-55	Number of SSI encoder multi-turn bits	Set the parameter according to the parameter of the connected SSI encoder.

3.4.3 Basic Control Parameters

3.4.3.1 Selecting Motor Control Modes

Para.	Name	Description	Application Scenario
E0-00	Control mode	0: SVC SVC	Speed open loop control
		1: FVC FVC	Feedback vector control. An encoder must be installed for a motor, and MD580 series products support the ABZ encoder and resolver. This mode is applicable to high-accuracy speed control and torque control.
		2: V/f Speed open loop control	This mode is applicable to scenarios with moderate requirements on load control performance or scenarios where one AC drive needs to drive multiple motors, such as fans and pumps.

3.4.3.2 Selecting Motor Control Modes

Para.	Name	Description
E0-01	Control mode	0: Speed control
		1: Torque control

Note

- In the V/f control mode, only speed control is supported, whereas settings of torque control are inactive.
- If the torque control mode is used during normal operation, for motor parameter auto-tuning upon initial commissioning, set the control mode to speed control. After motor parameter auto-tuning is completed, change the control mode back to torque control.

3.4.4 Automatic Calculation of Motor Parameters

The AC drive supports automatic calculation of motor parameters. Before commissioning, set the AC drive to calculate motor parameters, and adjust relevant auto-tuning motor parameters to the experience values converted according to motor parameters.

Steps of calculating motor specifications:

1. Set b5-02 to 1 to select motor parameter calculation.
2. Set b5-03 to 1 to confirm b5-02 motor parameter calculation.
3. After automatic calculation of motor parameters is completed, the following parameters are updated.

Table 3–2 Asynchronous motor

Para.	Name
d1-00	Asynchronous motor stator resistance
d1-01	Asynchronous motor rotor resistance
d1-02	Asynchronous motor leakage inductance
d1-03	Asynchronous motor mutual inductance
d1-04	Asynchronous motor no-load current
d1-13	Time constant of asynchronous magnetic field rotor
E1-03	Pre-excitation time
E1-15	Demagnetization time (DC braking delay at stop)
E7-07	Timeout interval of flying start in SVC control mode

Table 3–3 Permanent magnet synchronous motor

Para.	Name
d1-20	Synchronous motor stator resistance
d1-21	Synchronous motor D-axis inductance
d1-22	Synchronous motor Q-axis inductance
d1-23	Synchronous motor back EMF voltage

3.5 Motor Auto-tuning

3.5.1 Self-Test and Auto-Tuning

Before self-test and auto-tuning of a motor, check the following items:

1. Check for construction around the motor.
2. Check for obstacles that affect shaft rotation around the motor shaft.
3. Check whether the motor brake is closed. If yes, release the brake.
4. Check whether the motor fan works properly.
5. Check whether the device (if any) connected to the motor meets the running conditions, for example, whether the device needs lubrication.

Self-test and auto-tuning can be performed only after the brake closing instruction is provided. Sources for the brake closing instruction upon auto-tuning and the start/stop instruction upon normal

running are the same. In general, self-test and auto-tuning can be started and stopped by local control mode.

This section takes the MDKE-10 operating panel for commissioning as an example. The commissioning flow by using the SOP-20-880 or InoDriveStudio is basically the same. The InoDriveStudio provides the control panel and commissioning wizard, making commissioning easier.

Before using the MDKE-10 for control, make sure that MDKE-10 has the local control permission. When the control permission is being obtained, the status indicator  is off. Press the Loc/Rem key to switch between local and remote control.

3.5.2 Motor Parameter Auto-tuning

Motor auto-tuning is the process by which the AC drive obtains the parameters of the controlled motor.

Motor auto-tuning modes include:

- Static auto-tuning: This mode is applicable to asynchronous motors and permanent magnet synchronous electrical motors. The motor does not rotate during static auto-tuning. Basic motor parameters are obtained in this mode. Select this mode only when the motor has load and cannot rotate. Parameters such as mutual inductance, no-load current, mutual inductance characteristic curve, and inertia speed loop cannot be obtained in this mode. Accuracy of motor parameters obtained in this mode is slightly lower than that in the no-load complete auto-tuning mode. When the asynchronous motor is in the SVC mode, set b5-00 to 2 or 3 to perform auto-tuning.
- No-load complete auto-tuning: This mode is applicable to asynchronous motors and permanent magnet synchronous electrical motors. The motor rotates during auto-tuning. Therefore, prevent the motor from causing any physical injury or device damage during this process. This mode is applicable to scenarios where the motor has no load and can rotate. The most accurate motor parameters are obtained in this mode.
- With-load auto-tuning: Select this mode to obtain accurate motor parameters in scenarios where the motor cannot be disconnected from its load. In this case, confirm that the motor and connected load are allowed to rotate, the travel clearance is enough and can avoid physical injury and device damage.
- Inertia auto-turning: This mode is applicable to scenarios where the motor can rotate and only the inertia parameters need to be auto-tuned. In this case, confirm that the motor and connected load are allowed to rotate, the travel clearance is enough and can avoid physical injury and device damage.

In the ready-to-switch-on state, set auto-tuning as follows:

1. Check that the operating panel has the local control permission.
2. Check that the AC drive is free of faults and in the S5 ready-to-switch-on state.
3. Set b5-00 (auto-tuning mode): For motors that can rotate without load, set b5-00 to 12 (no-load auto-tuning) to obtain accurate motor parameters. After b5-00 is set, the AC drive enters the S18 ready-for-auto-tuning state.
4. After receiving the RUN command, the AC drive enters the S19 auto-tuning state to auto-tune parameters and outputs current. The motor first remains stationary and then rotates. When the auto-tuning process is complete, the motor comes to a standstill. The AC drive enters the S4 switch-

on-blocking state. When the RUN command is canceled, the AC drive enters the S5 ready-to-switch-on state.

The following figure shows the state machine changes during auto-tuning.

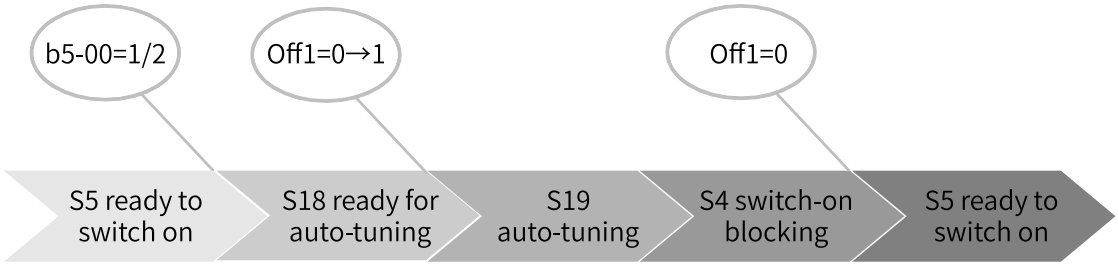


Figure 3-2 State machine changes during motor parameter auto-tuning

After auto-tuning, the obtained motor parameters are automatically saved to corresponding parameters. The obtained parameters vary with the auto-tuning mode, as shown in the following table.

Table 3–4 Parameters auto-tuned for asynchronous motor

Para.	Name	b5-00 = 1 (Asynchronous Motor Static Auto-tuning)	b5-00 = 2 (Asynchronous Motor No-load Complete Auto-tuning)	b5-00 = 4 (Asynchronous Motor Inertia Auto-tuning (SVC or FVC))
d1-00	Motor stator resistance	√	√	-
d1-01	Asynchronous motor rotor resistance	√	√	-
d1-02	Asynchronous motor leakage inductance	√	√	-
d1-03	Asynchronous motor mutual inductance	-	√	-
d1-04	Asynchronous motor no-load current	-	√	-
d1-06	Mutual inductance coefficient 1 for asynchronous magnetic field saturation	-	√	-
d1-08	Mutual inductance coefficient 2 for asynchronous magnetic field saturation	-	√	-
d1-10	Mutual inductance coefficient 3 for asynchronous magnetic field saturation	-	√	-
d1-12	Mutual inductance coefficient 4 for asynchronous magnetic field saturation	-	√	-

Para.	Name	b5-00 = 1 (Asynchronous Motor Static Auto-tuning)	b5-00 = 2 (Asynchronous Motor No-load Complete Auto-tuning)	b5-00 = 4 (Asynchronous Motor Inertia Auto-tuning (SVC or FVC))
d1-13	Time constant of asynchronous magnetic field rotor	√	√	-
A3-19	UV two-phase current deviation correction coefficient	√	√	-
n5-03	Input AB phase sequence	-	√	-
d2-00	Inertia	-	√	√
d2-05	Electromechanical time constant	-	√	√
E1-03	Pre-excitation time	√	√	-
E1-15	Demagnetization time (DC braking delay at stop)	√	√	-
E7-07	Timeout interval of flying start in SVC control mode	√	√	-

When b5-00 is set to 2, the motor will rotate at a high speed. Set this parameter to 2 only when the mechanical safety is ensured. Besides, keep the load torque close to no load as much as possible when the motor rotates at a constant speed. Lower load means more accurate auto-tuning results. Heavy load may cause drive overload or overcurrent.

Table 3–5 Parameters auto-tuned for synchronous motor

Para.	Name	b5-00 = 11 (Synchronous Motor With-load Auto-tuning in FVC Mode)	b5-00 = 12 (Synchronous Motor No-load Auto-tuning)	b5-00 = 13 (Synchronous Motor Static Auto-tuning)	b5-00 = 14 (Synchronous Motor Inertia Auto-tuning)
d1-22	Synchronous motor stator resistance	√	√	√	-
d1-24	Synchronous motor D-axis inductance	√	√	√	√
d1-25	Synchronous motor Q-axis inductance	√	√	√	√
d1-26	Synchronous motor back EMF coefficient	-	√	-	-
A3-19	UV two-phase current deviation correction coefficient	√	√	√	-
n5-03 [1]	Input AB phase sequence	√	√	-	-

Para.	Name	b5-00 = 11 (Synchronous Motor With-load Auto-tuning in FVC Mode)	b5-00 = 12 (Synchronous Motor No-load Auto-tuning)	b5-00 = 13 (Synchronous Motor Static Auto-tuning)	b5-00 = 14 (Synchronous Motor Inertia Auto-tuning)
n5-12 [1]	Encoder installation position angle	√	√	-	-
d2-00	Inertia	-	√	-	√
d2-05	Electromechanical time constant	-	√	-	√

When b5-00 is set to 2, the motor will rotate at a high speed. Set this parameter to 2 only when the mechanical safety is ensured. Besides, keep the load torque close to no load as much as possible when the motor rotates at a constant speed. Lower load means more accurate auto-tuning results. Heavy load may cause drive overload or overcurrent.

Note

[1] In FVC control mode, correctly set and auto-tune the installation position angle of the encoder before operation. If no-load complete auto-tuning (b5-00 = 12) cannot be performed because the load cannot be disengaged, set b5-00 to 11 to select synchronous motor with-load auto-tuning.

3.6 Trial Run

3.6.1 Starting Equipment by Local Control and Default Terminal

For initial trial run, it is recommended to start equipment through local control by using the InoDriveStudio control panel, MDKE-10 common LED operating panel, or SOP-20-880 smart operating panel. For details, see relevant sections in chapter 1. The V/f control mode and speed control mode are adopted. Default configurations of the speed reference and RFG are used. Before trial operation, check parameters listed in the following table.

Table 3–6 Parameters for starting equipment through local control by using InoDriveStudio or operating panels

Parameter Code	Parameter Name	Default	Description
A9-00	Command channel selection	0	Selection command channel 1.
A9-02	Reference channel selection	0	Select reference channel 1.
A9-04	Motor data group selection 0 source	0	Select the first group of motor parameters.
A9-05	Motor data group selection 1 source	0	
E0-00	Control mode	2	V/f control mode
E0-01	Control method	0	Speed control
E1-00	Start mode	0	Direct start
E1-27	OFF1 stop mode	1	Decelerate to stop
E3-00	V/f mode selection	0	V/f curve

Parameter Code	Parameter Name	Default	Description
E3-01	V/f curve selection	0	Linear V/f
C8-04	RFG selection 1	0	Select RFG 1 acceleration/ deceleration time.
C8-05	RFG selection 2	0	
C8-08	RFG 1 acceleration time	20	The RFG 1 acceleration time is 20s.
C8-09	RFG 1 deceleration time	20	The RFG 1 deceleration time is 20s.

When using the default terminal to start or stop the drive, check the following parameters in addition to the previous parameters.

Table 3–7 Parameters for start/stop by the default terminal

Parameter Code	Parameter Name	Value	Description
b0-00	Start/Stop control word source	0	Select the terminal start/ stop module.
b4-02	Terminal start/stop module A/B selection	0	Module A
b4-03	Mode of terminal start/ stop module A	1	Select the IN1 start mode.
b4-05	Input 1 of terminal start/ stop module A	U0-02 (1002)	Select DI1 as the command source.
C0-00	Source of main speed in speed control mode	U19-02 (2902)	Select multi-reference 1 as the speed reference.
C6-11	Multi-reference 1	Speed reference	-

When the DI1 state changes from 0 to 1 (rising edge), the drive starts and the motor accelerates from the static state to the speed set by C6-11. For more information about the terminal start/stop module, see *"4.9.1 Overview of Terminal Start/Stop Modules" on page 135*.

Note

During operation, if the motor runs in the opposite direction to the set direction, you can change the value of d0-15 (motor phase sequence) to change the motor rotation direction without changing the cable sequence.

3.6.2 Starting Equipment Using Fieldbus

To start equipment using fieldbus communication, specify a data exchange protocol to use with the host controller system, and set parameters according to the protocol. The following parameter descriptions take the fieldbus adapter A configured as the PROFIBUS DP bus to start equipment as an example.

Protocol for data exchange between MD580 and the host controller

ID	Definition	Description
PZD1	Control word	For details, see the control word definition table.
PZD2	Speed reference	The speed ramp is determined by PLC. 4096 indicates the 100% rated motor frequency.

Table 3–8 Control word definition table

Bit	Description
Bit0	0: Stop 1: Start upon switch-on at 0→1 rising edge
Bit1	0: Coast to stop 1: Necessary running conditions
Bit2	0: Quick stop 1: Necessary running conditions
Bit3	0: Blocking output 1: Operation enable
Bit4	0: Ramp output disable 1: Ramp output enable
Bit5	0: Ramp pause enable 1: Ramp pause disable
Bit6	0: Ramp reference 0 enable 1: Ramp reference 0 disable
Bit7	0: Disable 1: 0→1 fault reset enable
Bit8 to bit9	Reserved
Bit10	0: PZD data disable 1: PZD data enable
Bit11 to bit15	Reserved

Description of data sent by MD580 to the host controller system:

ID	Definition	Description
PZD1	Status word 1	For details, see the status word definition table.
PZD2	DC bus voltage	For base value calibration, see section 6.9 "Communication Module". One decimal place: 1000 indicates that the voltage is 100.0 V.

Table 3–9 Status word definition table

Bit	Description
Bit0	0: Not ready to switch on 1: Ready to switch on
Bit1	0: Not ready to run 1: Ready to run
Bit2	0: Not running 1: Running
Bit3	0: Fault not activated 1: Fault activated
Bit4 to bit6	Reserved
Bit7	0: No alarm 1: Alarm activated
Bit8 to bit15	Reserved

Parameter settings

- Fieldbus adapter PROFIBUS DP configuration:

Para.	Name	Reference	Reference Description
n2-00	Bus type for fieldbus adapter	7	Set the bus type for fieldbus adapter A to PROFIBUS DP.
n2-01	Communication disconnection detection delay	1.00	The communication fault is reported 1s after communication becomes disconnected.
n2-02	Communication mode for fieldbus adapter	0 [Standard mode]	Exceptions and faults of the fieldbus adapter communication card are detected by default.
n2-03	Detection setting for continuous CRC check errors in communication	0	The fieldbus adapter receives data without CRC.
n2-04	Process data output 1	U6-20 (1620)	Use the B2W function module A to configure status words.
n2-05	Process data output 2	U5-05 (1505)	U5-05 indicates the DC bus voltage (100 ms filter).
n2-20	Communication base value for process data output 1	0	The base value conversion is not required.
n2-21	Communication base value for process data output 2	0	The base value conversion is not required.
n2-36	Communication base value for process data input 1	0	The base value conversion is not required.
n2-37	Communication base value for process data input 2	0	The base value conversion is not required.
n16-00	Extension slot	1	The PROFIBUS DP communication module is at extension slot 1_1.
n16-02	Extension card ID	45	Set the PROFIBUS DP address to 45.
n16-10	DP data check bit	0	Set the PROFIBUS DP data check bit to PZD1.bit10, indicating that the communication data is valid only when bit10 in PZD1 received by MD580 is 1.

- PZD1 control word configuration:

Para.	Name	Reference	Reference Description
b0-00	Start/Stop control word source	1	User-defined setting (b0 group setting)
b0-01	User-defined OFF1 source	U0-48 (1048)	Select the fieldbus adapter A.PZD1.0 as the OFF1 command source.
b0-02	User-defined OFF2 source 1	U0-49 (1049)	Select the fieldbus adapter A.PZD1.1 as the OFF2 command source.
b0-03	User-defined OFF3 source 1	U0-50 (1050)	Select the fieldbus adapter A.PZD1.2 as the OFF3 command source.
b0-04	User-defined running permission source	U0-51 (1051)	Select the fieldbus adapter A.PZD1.3 as the run enable command source.
b0-05	User-defined fault reset source 1	U0-55 (1055)	Select the fieldbus adapter A.PZD1.7 as the fault reset command source.
b1-06	RFG prohibition source	U0-52 (1052)	Select the fieldbus adapter A.PZD1.4 as the command source for enabling ramp output.

Para.	Name	Reference	Reference Description
b1-07	RFG pause source	U0-53 (1053)	Select the fieldbus adapter A.PZD1.5 as the ramp pause command source.
b1-08	Source of setting RFG reference to 0	U0-54 (1054)	Select the fieldbus adapter A.PZD1.6 as the command source for ramp reference 0.
n16-10	DP data check bit	0 or 12	Select the fieldbus adapter A.PZD1.10 as the command source for DP data check bits.

- Speed reference settings:

Para.	Name	Reference	Reference Description
A9-00	Command channel selection	0	Select command channel 1.
A9-02	Reference channel selection	0	Select reference channel 1.
C0-00	Main speed control reference	U15-19 (2519)	Select the fieldbus adapter A.PZD2 as the speed reference source.

- Output of B2W function 1 for status words:

Para.	Name	Reference	Reference Description
L10-10	B2W module A enable	1	Enable
L10-11	B2W module A - bit00	U1-12 (1112)	Ready to switch on
L10-12	B2W module A - bit01	U1-13 (1113)	Ready to run
L10-13	B2W module A - bit02	U1-14 (1114)	Running
L10-14	B2W module A - bit03	U1-15 (1115)	Fault activation
L10-15	B2W module A - bit04	0	-
L10-16	B2W module A - bit05	0	-
L10-17	B2W module A - bit06	0	-
L10-18	B2W module A - bit07	U1-19 (1119)	Alarm/Active limit
L10-19	B2W module A - bit08	0	-
L10-20	B2W module A - bit09	0	-
L10-21	B2W module A - bit10	0	-
L10-22	B2W module A - bit11	0	-
L10-23	B2W module A - bit12	0	-
L10-24	B2W module A - bit13	0	-
L10-25	B2W module A - bit14	0	-
L10-26	B2W module A - bit15	0	-
L10-88	Positive and negative logic selection for B2W module A	0x0000	Set bit0 to bit15 of B2W module A, without inverting for the input.

3.6.3 Starting Equipment Using Digital Input and Analog Input

Digital input can be used as the command sources for starting and stopping equipment. Analog input can be used as the speed reference to start equipment. For example, DI1 is used as the start command, DI2 as the quick stop command, DI3 as the fault reset command, and AI1 as the speed reference. Set the parameters listed in *"Table 3–10 Example of parameter setting" on page 79* based on *"Table 3–7" on page 75*.

Table 3–10 Example of parameter setting

Para.	Name	Reference	Reference Description
b0-00	Start/Stop control word source	1	User-defined reference
b0-01	User-defined OFF1 source 1	U0-02 (1002)	Select DI1 as the OFF1 command source.
b0-03	User-defined OFF3 source 1	U0-03 (1003)	Select DI2 as the OFF3 command source.
b0-04	User-defined running permission source	1	Running permission
b0-05	User-defined fault reset source 1	U0-04 (1004)	Select DI3 as the command source for reset upon fault.
C0-00	Main speed control reference	U5-20 (1520)	Select AI1 as the speed reference source.

3.6.4 Control Using Modbus (Mailbox Data)

3.6.4.1 Special Address Control

Modbus directly reads and writes parameters based on the communication address and does not generate any process data. However, b0-01 or b2-01 of the custom OFF1 source cannot be set to 1 to directly start the communication. You must select connector data. Besides, the communication efficiency is greatly improved when Modbus controls applications using continuous addresses.

To facilitate Modbus communication ON/OFF and setting, the AC drive provides the following addresses for direct reading and writing, and the data is updated to the specific connector to be read by the specified source parameters.

Note The special address control mode supports both the Modbus fieldbus adapter communication module mode and the onboard Modbus RTU mode.

Comm. Addr.	Write to Para.	Name	Description
24984	U15-08	Modbus communication reference 1	The value is directly written through Modbus communication.
24985	U15-09	Modbus communication reference 2	The value is directly written through Modbus communication.
24986	U15-10	Modbus communication reference 3	The value is directly written through Modbus communication.
24987	U15-11	Modbus communication reference 4	The value is directly written through Modbus communication.
24988	U15-12	Modbus communication reference 5	The value is directly written through Modbus communication.

Comm. Addr.	Write to Para.	Name	Description
24989	U15-13	Modbus communication reference 6	The value is directly written through Modbus communication.
24990	U15-14	Modbus communication reference 7	The value is directly written through Modbus communication.
24991	U15-15	Modbus communication reference 8	The value is directly written through Modbus communication.
24992	U15-16	Modbus communication reference 9	The value is directly written through Modbus communication.
24993	U15-17	Modbus communication reference 10	The value is directly written through Modbus communication.

Comm. Addr.	Write to Para.	Name	Description
-	U10-12	Bit00 of Modbus communication reference 1	1. The 16 bits of the Modbus communication reference 1. 2. The Modbus communication reference 1 is automatically written to 16-bit data. The addresses of such bits cannot be written separately.
-	U10-13	Bit01 of Modbus communication reference 1	
-	U10-14	Bit02 of Modbus communication reference 1	
-	U10-15	Bit03 of Modbus communication reference 1	
-	U10-16	Bit04 of Modbus communication reference 1	
-	U10-17	Bit05 of Modbus communication reference 1	
-	U10-18	Bit06 of Modbus communication reference 1	
-	U10-19	Bit07 of Modbus communication reference 1	
-	U10-20	Bit08 of Modbus communication reference 1	
-	U10-21	Bit09 of Modbus communication reference 1	
-	U10-22	Bit10 of Modbus communication reference 1	
-	U10-23	Bit11 of Modbus communication reference 1	
-	U10-24	Bit12 of Modbus communication reference 1	
-	U10-25	Bit13 of Modbus communication reference 1	
-	U10-26	Bit14 of Modbus communication reference 1	
-	U10-27	Bit15 of Modbus communication reference 1	

Parameter settings when a fieldbus adapter is used:

Para.	Name	Reference	Reference Description
n2-00	Bus type for fieldbus adapter	1	The fieldbus adapter A is of the Modbus RTU type.
n10-00	Extension slot	1	The Modbus RTU module is inserted in the extension slot 1-1.
n10-04	Modbus local address	4	The address of the Modbus RTU module is 4.
b0-00	Start/Stop control word source	1	Custom setting (set by parameters in group b0)
b0-01	Custom OFF1 source	U10-12 (2012)	Bit0 of the Modbus communication reference 1 is used as the OFF1 source.
C0-00	Main speed control reference	U15-09 (2509)	The Modbus communication reference 2 is used as the speed reference source.

Parameter settings when on-board Modbus RTU is used:

Para.	Name	Reference	Reference Description
n1-00	Modbus enable	1	On-board Modbus RTU enabling
n1-02	Modbus local address	4	The address of the on-board Modbus RTU is set to 4.
b0-00	Start/Stop control word source	1	Custom setting (set by parameters in group b0)
b0-01	Custom OFF1 source	U10-12 (2012)	Bit0 of the Modbus communication reference 1 is used as the OFF1 source.
C0-00	Main speed control reference	U15-09 (2509)	The Modbus communication reference 2 is used as the speed reference source.

After setting, you can write 0 to the communication address 24984 (U15-08) through Modbus to stop the motor and write 1 to run the motor. You can write data to address 24985 (U15-09) to use the data as the main reference for speed control. In this case, 4096 corresponds to +100% of the rated motor frequency and –4096 corresponds to –100% of the rated motor frequency.

3.6.4.2 Continuous Address Control

A drive provides only a limited number of special communication addresses. Therefore, Modbus RTU and Modbus TCP support the write operation on process data n2-68 to n2-83 (n3-68 to n3-83). Then, the process data is converted using communication base values n2-36 to n2-51 (n3-36 to n3-51) and finally updated to the corresponding connectors U15-18 to U5-33 (U15-34 to U15-49).

Note The continuous address control mode supports only the Modbus fieldbus adapter communication module mode but not the onboard Modbus RTU mode.

Fieldbus adapter A

Comm. Addr.	Written Parameter	Name	Description
17423	n2-68	Display of process data input 1	Written through Modbus communication, converted using base value n2-36, and updated to connector U15-18
17424	n2-69	Display of process data input 2	Written through Modbus communication, converted using base value n2-37, and updated to connector U15-19
17425	n2-70	Display of process data input 3	Written through Modbus communication, converted using base value n2-38, and updated to connector U15-20
17426	n2-71	Display of process data input 4	Written through Modbus communication, converted using base value n2-39, and updated to connector U15-21
17427	n2-72	Display of process data input 5	Written through Modbus communication, converted using base value n2-40, and updated to connector U15-22
17428	n2-73	Display of process data input 6	Written through Modbus communication, converted using base value n2-41, and updated to connector U15-23
17429	n2-74	Display of process data input 7	Written through Modbus communication, converted using base value n2-42, and updated to connector U15-24
17430	n2-75	Display of process data input 8	Written through Modbus communication, converted using base value n2-43, and updated to connector U15-25
17431	n2-76	Display of process data input 9	Written through Modbus communication, converted using base value n2-44, and updated to connector U15-26
17432	n2-77	Display of process data input 10	Written through Modbus communication, converted using base value n2-45, and updated to connector U15-27
17433	n2-78	Display of process data input 11	Written through Modbus communication, converted using base value n2-46, and updated to connector U15-28
17434	n2-79	Display of process data input 12	Written through Modbus communication, converted using base value n2-47, and updated to connector U15-29
17435	n2-80	Display of process data input 13	Written through Modbus communication, converted using base value n2-48, and updated to connector U15-30
17436	n2-81	Display of process data input 14	Written through Modbus communication, converted using base value n2-49, and updated to connector U15-31
17437	n2-82	Display of process data input 15	Written through Modbus communication, converted using base value n2-50, and updated to connector U15-32
17438	n2-83	Display of process data input 16	Written through Modbus communication, converted using base value n2-51, and updated to connector U15-33

Fieldbus adapter B

Comm. Addr.	Written Parameter	Name	Description
17471	n3-68	Display of process data input 1	Written through Modbus communication, converted using base value n3-36, and updated to connector U15-34
17472	n3-69	Display of process data input 2	Written through Modbus communication, converted using base value n3-37, and updated to connector U15-35
17473	n3-70	Display of process data input 3	Written through Modbus communication, converted using base value n3-38, and updated to connector U15-36
17474	n3-71	Display of process data input 4	Written through Modbus communication, converted using base value n3-39, and updated to connector U15-37
17475	n3-72	Display of process data input 5	Written through Modbus communication, converted using base value n3-40, and updated to connector U15-38

Comm. Addr.	Written Parameter	Name	Description
17476	n3-73	Display of process data input 6	Written through Modbus communication, converted using base value n3-41, and updated to connector U15-39
17477	n3-74	Display of process data input 7	Written through Modbus communication, converted using base value n3-42, and updated to connector U15-40
17478	n3-75	Display of process data input 8	Written through Modbus communication, converted using base value n3-43, and updated to connector U15-41
17479	n3-76	Display of process data input 9	Written through Modbus communication, converted using base value n3-44, and updated to connector U15-42
17480	n3-77	Display of process data input 10	Written through Modbus communication, converted using base value n3-45, and updated to connector U15-43
17481	n3-78	Display of process data input 11	Written through Modbus communication, converted using base value n3-46, and updated to connector U15-44
17482	n3-79	Display of process data input 12	Written through Modbus communication, converted using base value n3-47, and updated to connector U15-45
17483	n3-80	Display of process data input 13	Written through Modbus communication, converted using base value n3-48, and updated to connector U15-46
17484	n3-81	Display of process data input 14	Written through Modbus communication, converted using base value n3-49, and updated to connector U15-47
17485	n3-82	Display of process data input 15	Written through Modbus communication, converted using base value n3-50, and updated to connector U15-48
17486	n3-83	Display of process data input 16	Written through Modbus communication, converted using base value n3-51, and updated to connector U15-49

For device start/stop, reset commands, and reference settings using continuous address control over Modbus communications, see *"3.6.2 Starting Equipment Using Fieldbus" on page 75*.

4 Function Modules

4.1 Backing up and Restoring Parameters

4.1.1 Restoring Parameters to Default Settings

4.1.1.1 Overview of Restoring Factory Defaults

Parameters in group A8 (environment setting) are used to restore parameters to factory defaults as needed. For this purpose, select an operation through A8-00 and set A8-01 to confirm.

4.1.1.2 Restoring All Parameters to Factory Defaults

Set the following parameters in sequence:

1. Set A8-00 to 2 (restore all parameters to factory defaults).
2. Set A8-01 to 1 to confirm the operation specified in A8-00.
3. All parameters (including parameters of group d) are restored to factory defaults (parameters such as motor power and current are restored to the values corresponding to the model).

Note

Parameters related to the power module, such as A4-02 (carrier frequency reference) will be restored to the default values of the model rather than the factory defaults. Record parameters in groups H2 to H7 will not be restored. The device name cannot be restored.

4.1.1.3 Restoring Specified Parameters to Factory Defaults (Motor Parameters Not Restored)

Set the following parameters in sequence:

1. Set A8-00 to 1 (restore specified parameters to factory defaults). In this case, motor parameters in group d will remain unchanged.
2. Set A8-01 to 1 to confirm the operation specified in A8-00.
3. Parameters are restored to factory defaults, excluding parameters in group d.

Note

Parameters related to the power module, such as A4-02 (carrier frequency reference) will be restored to the default values of the model rather than the factory defaults. Record parameters in groups H2 to H7 will not be restored. The device name cannot be restored.

4.1.1.4 Clearing Fault Records

Set the following parameters in sequence:

1. Set A8-00 to 3 (clear fault records).
2. Set A8-01 to 1 to confirm the operation specified in A8-00.
3. Parameters in groups H2 to H7 are cleared, and other parameters are not affected.

4.1.1.5 Clearing Time Statistics Information

Set the following parameters in sequence:

1. Set A8-11 to select a time record to be cleared. The options are as follows:

- 1: Clear the current running duration
- 2: Clear the current mains power-on duration
- 3: Clear the accumulative running duration
- 4: Clear the accumulative mains power-on duration
- 5: Clear the current control power-on duration
- 6: Clear all time records

2. Set A8-12 to 1 to confirm the operation specified in A8-11.
3. The selected time records A2-48 to A2-53 will be cleared.

4.1.2 Backing up Parameters Using Internal Memory

To save all the parameter values to the internal memory or restore parameter backup in the internal memory to the controller, use parameters in group A8 (environment setting). Specifically, set A8-05 to the operation as needed and set A8-06 to confirm the operation.

Backing up current parameters to the internal memory

Set the following parameters in sequence:

1. Set A8-05 to 1 to back up all controller parameters to the internal memory.
2. Set A8-06 to 1 to confirm the operation specified in A8-05.

Only one backup parameter file is allowed. The backup record will be overwritten by the next backup.

After successful backup, status 56 "Parameter backup completed" will be read from the A8-07 parameter.

Restoring parameters from the internal memory

Set the following parameters in sequence:

1. Set A8-05 to 2 to restore all controller parameters from the backup file in the internal memory.
2. Set A8-06 to 1 to confirm the operation specified in A8-05.

After successful backup, status 57 "Parameter restoration completed" will be read from the A8-07 parameter. If the backup fails, no backup parameter file is in the internal memory and status 51 "Parameter file does not exist" is prompted.

Note

When the internal memory contains a backup parameter file, the status value of A8-07 is 1 (backup parameter file exists). Otherwise, the status value is 0 (backup parameter file does not exist).

Verifying parameters

Set the following parameters in sequence:

1. Set A8-05 to 3 to select parameter verification.
2. Set A8-06 to 1 to confirm the operation specified in A8-05.

The program verifies the backup parameters in the internal memory and the current parameters in the controller. If they are consistent, status 58 "Parameters are consistent" can be read from the A8-07 parameter. Otherwise, status 59 "Parameters are inconsistent" can be read, indicating that the backup parameters in the internal memory are different from the current parameters in the controller.

Clearing backup parameters from the internal memory

Set the following parameters in sequence:

1. Set A8-05 to 4 to clear backup parameters from the internal memory.
2. Set A8-06 to 1 to confirm the operation specified in A8-05.

The program deletes the backup parameter file from the internal memory. After successful deletion, status 60 "Backup parameters are deleted" can be read from the A8-07 parameter, without impact on any parameters.

4.1.3 Backing up Parameters with SOP-20-880

4.1.3.1 Overview of Backing up Parameters Using SOP-20-880

On the SOP-20-880, select the target device and log in to the system. Then, enter 07 Operations > 01 Copy parameter to back up or restore parameters.

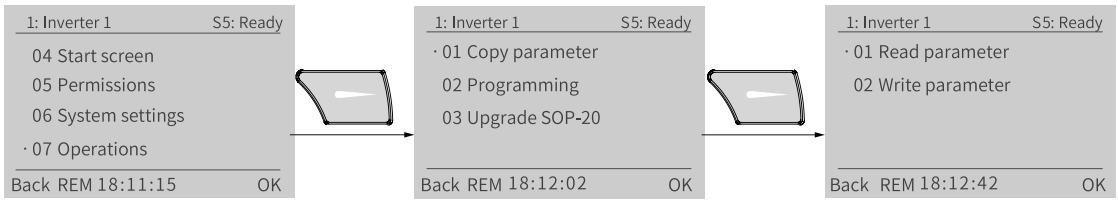


Figure 4-1 Entering the "Copy parameter" screen after login to the system

4.1.3.2 Saving Parameters to an SOP-20-880 File

- When the parameter read operation is selected, all parameters of the device will be read and saved to a file on the SD card of SOP-20-880.
- After selecting the parameter read operation, set the user-defined part (five characters) of the parameter file name. Press the leftward and rightward keys to move the characters to be set, and press the upward and downward keys to set the character values. The value range is 0 to 9 and A to Z. The file is in the format of "Device name-User-defined name of five characters.ipv".
  Example: Drive 1-12ABC.ipv

  Meaning: The device is drive 1, and the user-defined name is 12ABC.

  After the file name is set, press  to read the parameters. After the parameters are read, a prompt indicating successful parameter copy is displayed on the screen. If the operation fails, the failure reason is displayed on the screen.

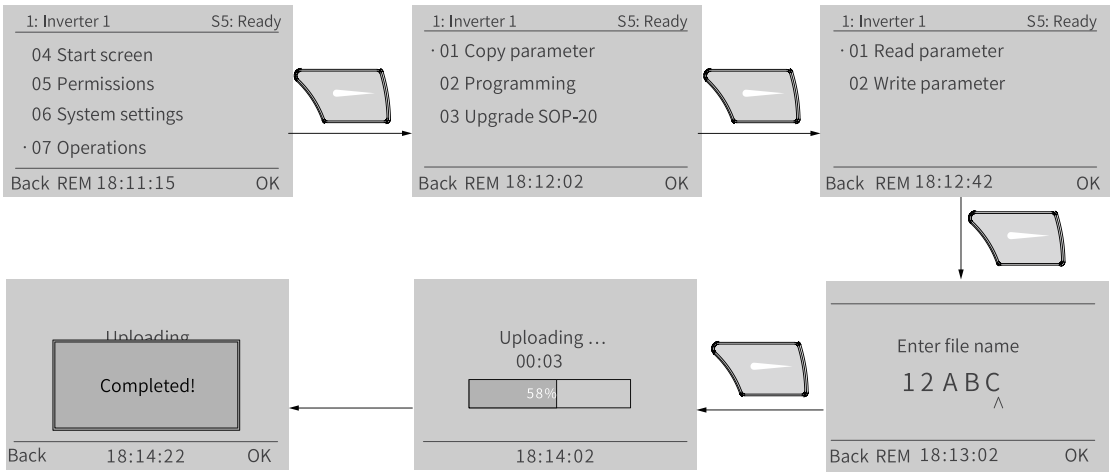


Figure 4-2 Parameter reading example

4.1.3.3 Restoring Parameters from an SOP-20-880 File

- To download parameters saved in an SOP-20-880 file to the drive, choose "Write parameter".
- Then, select a parameter file in the SD card, and select "Complete" to restore all parameters in the drive to those in the file.

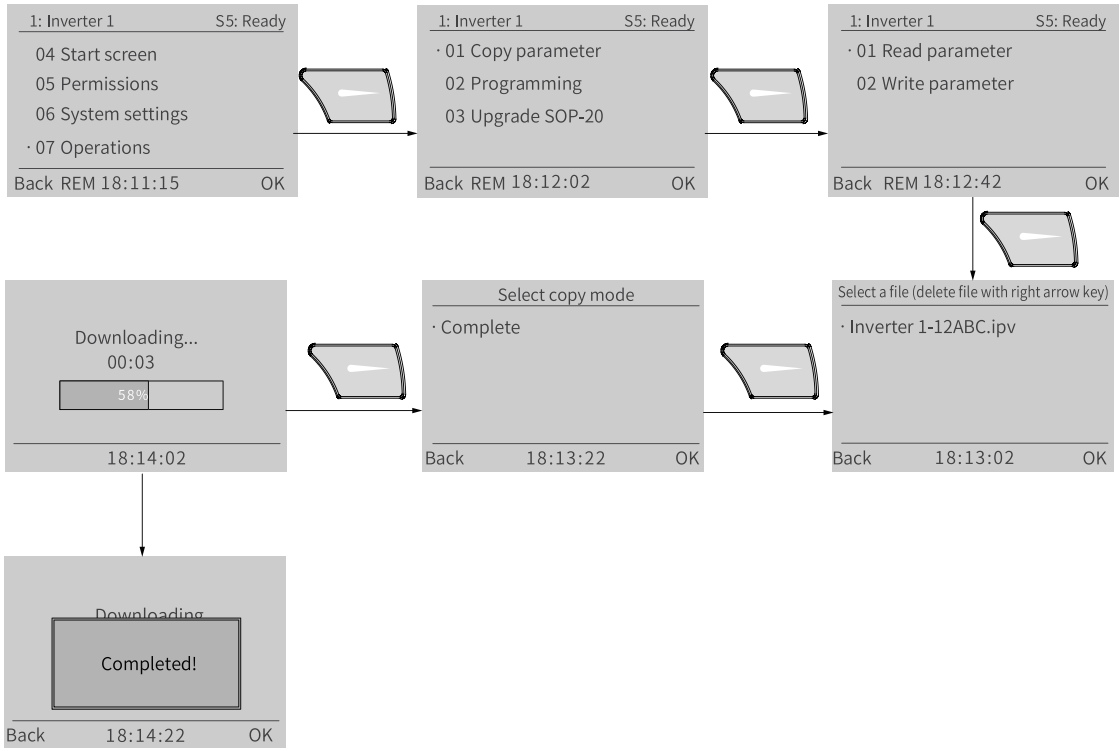


Figure 4-3 Example of writing parameters

Note

Files saved and read by using the parameter copy function are stored in the SD card of SOP-20-880. Before using the parameter copy function, ensure that the SD card of SOP-20-880 is properly installed.

4.2 Drive Object Configuration Information

4.2.1 Station ID and Baud Rate

When the MDKE-10, SOP-20-880, or InoDriveStudio is connected to a drive, set the correct station ID and communication rate. When multiple drives are cascaded to the same network, use the MDKE-10, SOP-20-880, or InoDriveStudio to set the station ID and communication rate separately for each drive, and ensure the same communication rate and unique station ID for each device on the same network.

- Method 1: Connect the MDKE-10 to the drive, and set A10-03 and A10-04 to the correct communication rate and station ID.
- Method 2: Connect the SOP-20-880 to the drive, choose "Menu > 01 Parameter settings > A system > A10 operating panel/repeater communication", select A10-03 operating panel/repeater communication address or A10-04 operating panel/repeater communication rate, and set the correct communication rate and station ID.
- Method 3: When creating a project on the InoDriveStudio, scan the device, and change the device baud rate and ID, as shown in the following figure.

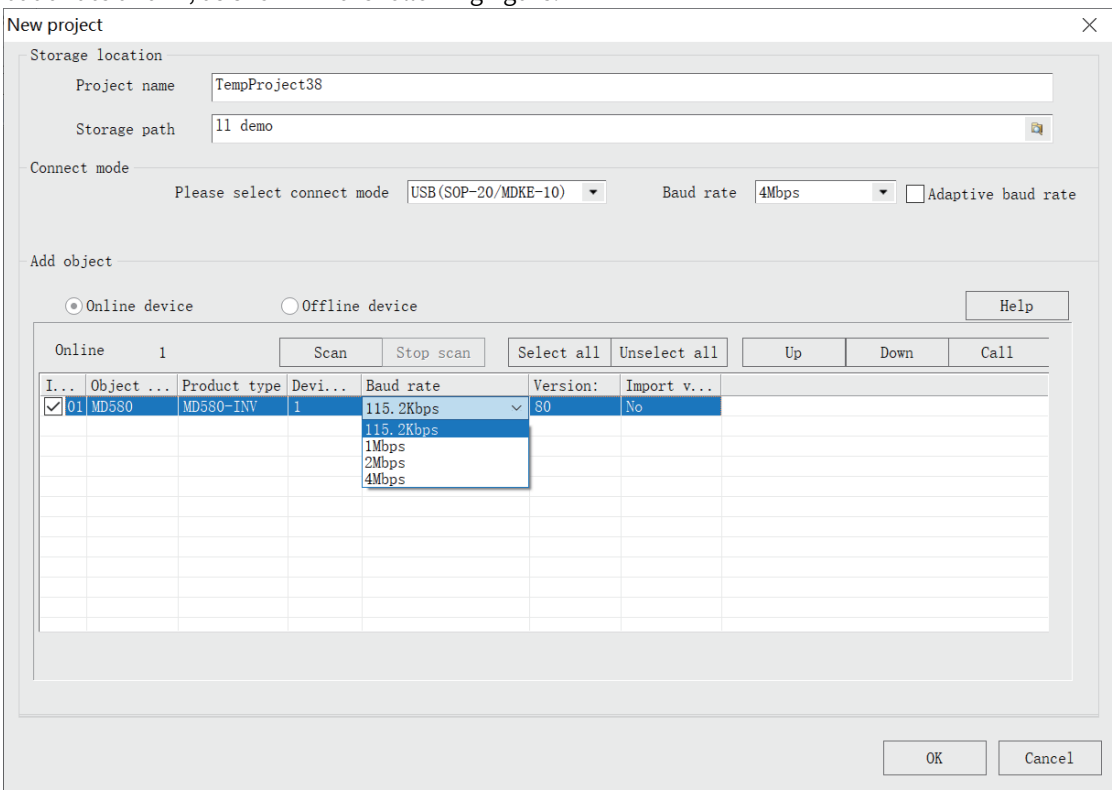


Figure 4-4 Changing the station ID and baud rate

- Method 4: Connect the InoDriveStudio to the device and then change the station ID (A10-03) and baud rate (A10-04) in the parameter list.

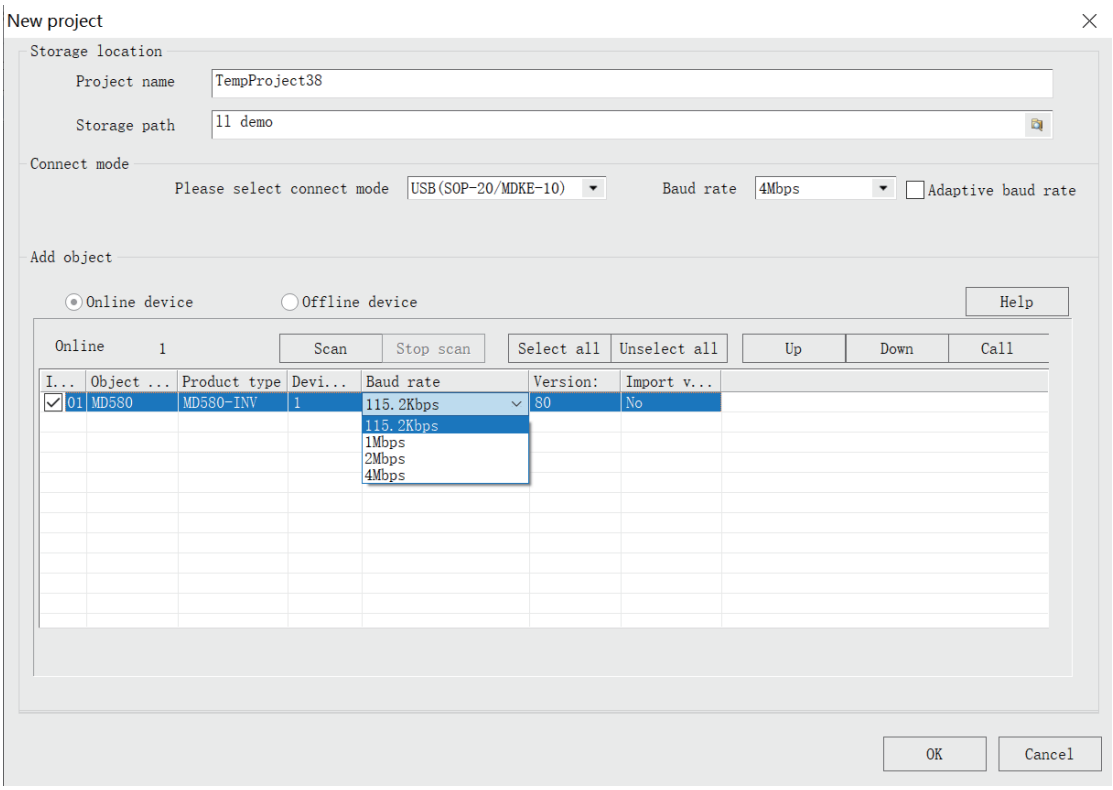


Figure 4-5 Changing the station ID and baud rate in the parameter list

- Method 5: Access the drive object configuration interface of the InoDriveStudio and change the station ID and baud rate.

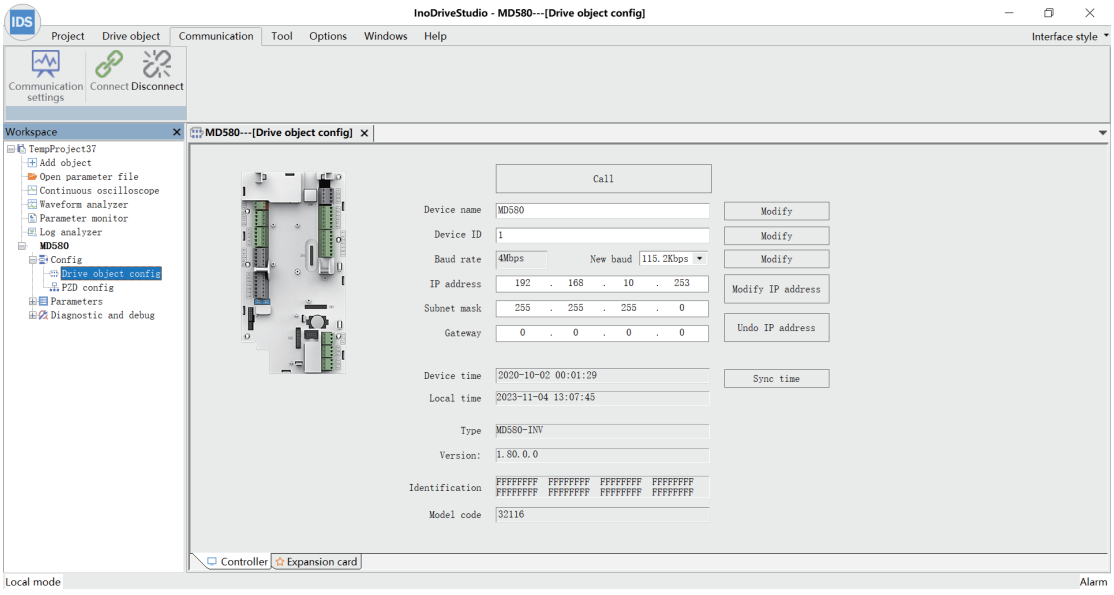


Figure 4-6 Changing the station ID and baud rate on the configuration interface

4.2.2 System Time

4.2.2.1 Overview of System Time

The built-in RTC clock chip of the controller supports recording of the system date and time. You can view and change the system date and time using MDKE-10, SOP-20-880, or InoDriveStudio.

4.2.2.2 Viewing and Changing System Time Using MDKE-10

- You can view the system date and time using parameters A2-40 to A2-43.
- You can set parameters A2-60 to A2-65 to change the system date and time, and set A2-66 to 1 to confirm and apply the change. After successful setting, the system time and date indicated by A2-40 to A2-43 are updated.

4.2.2.3 Viewing and Changing System Time Using SOP-20-880

- Method 1: Choose "Menu > 06 System Settings > 04 Date/Time > 02 Device Object Time". On the interface that appears, view and change the current system date and time.
- Method 2: Choose "Menu > 06 System Settings > 04 Date/Time > 03 Sync Time". On the interface that appears, synchronize the SOP-20-880 time to the controller.
- Method 3: Set parameters A2-60 to A2-65 to change the system date and time. Then, set A2-66 to 1 to confirm and apply the system time settings. After successful setting, the system time and date indicated by A2-40 to A2-43 are updated.

4.2.2.4 Viewing and Changing System Time Using InoDriveStudio

- Method 1: Open the InoDriveStudio, choose "Config > Drive object config" to view the system time (object time) and the PC time (local time), and click "Sync time" to synchronize the PC time to the controller.

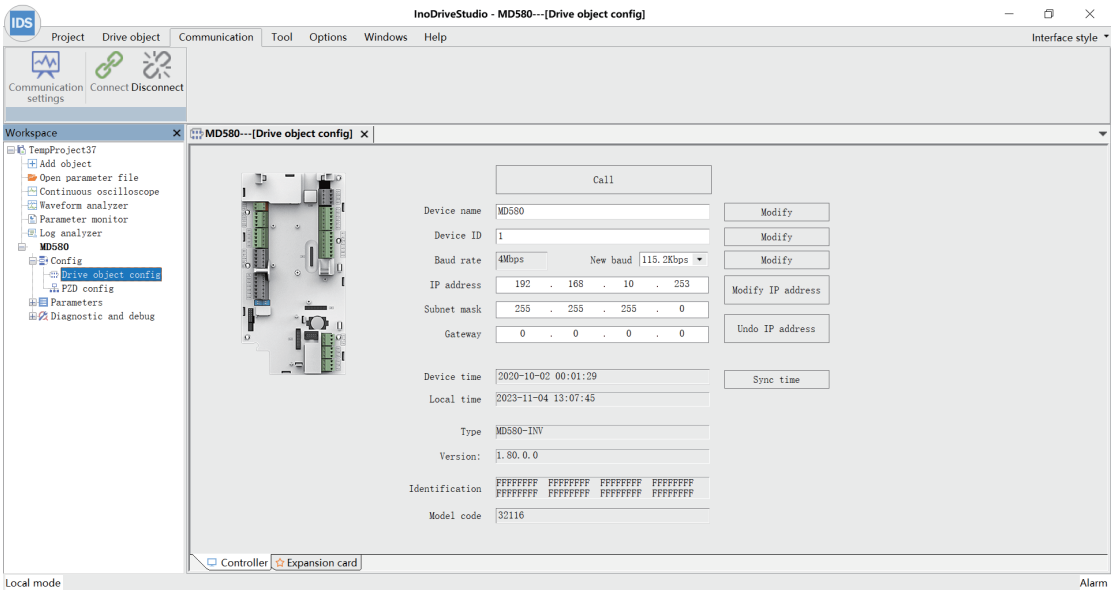


Figure 4-7 InoDriveStudio system time

- Method 2: Set parameters A2-60 to A2-65 to change the system date and time. Then, set A2-66 to 1 to confirm and apply the system time settings. After successful settings, the system time and date indicated by A2-40 to A2-43 are updated.

4.2.2.5 Viewing System Time Using Parameters

Access the A2 group parameter list and view the system date and time parameters.

Para.	Name
A2-40	Current system year
A2-41	Current system date
A2-42	Current system hour and minute
A2-43	Current system second

4.2.3 Device Name

The drive allows users to define the device name. A user-defined device name is retained at power failure. During restoration of some parameters to factory defaults (A8-00 = 1), the device name is not reset. During restoration of all parameters to factory defaults (A8-00 = 2), the device name is reset to factory default. The drive supports three methods of viewing and changing device names.

- Method 1: When creating a project on InoDriveStudio, after a device is scanned, change the device name, as shown in the following figure.

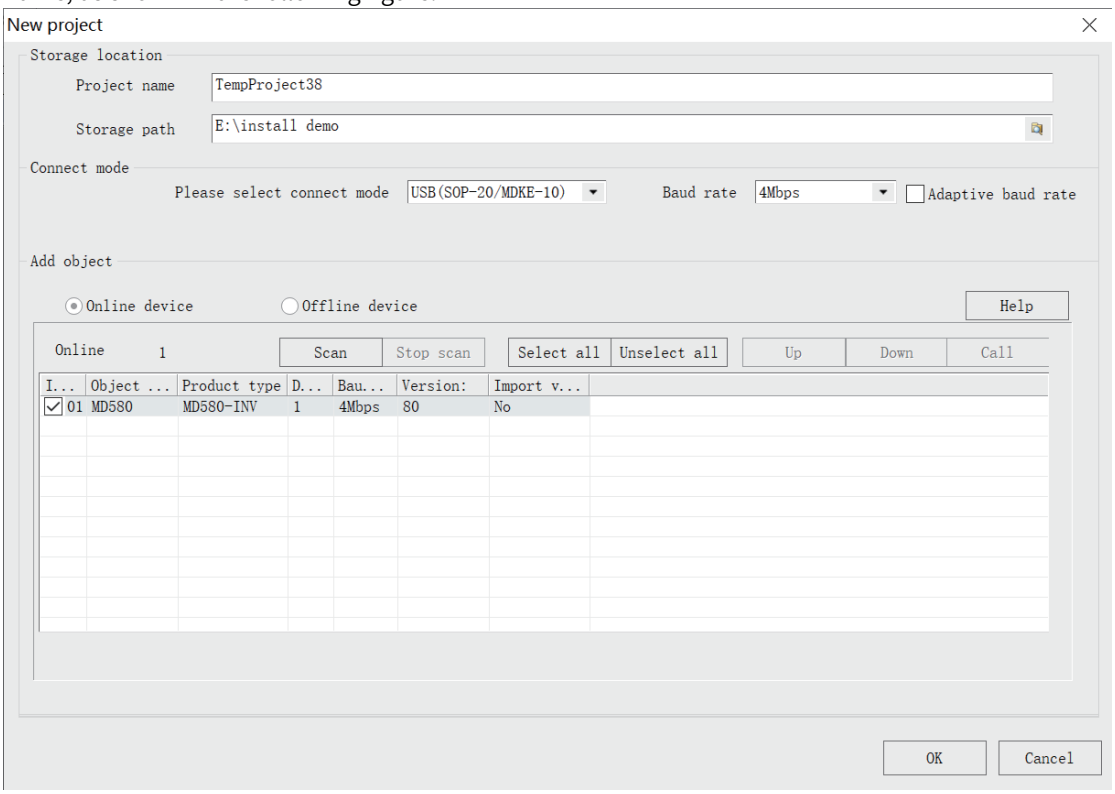


Figure 4-8 Directly changing the device name on InoDriveStudio

- Method 2: In the work area of InoDriveStudio, right-click the device and choose "Rename" to change the device name.

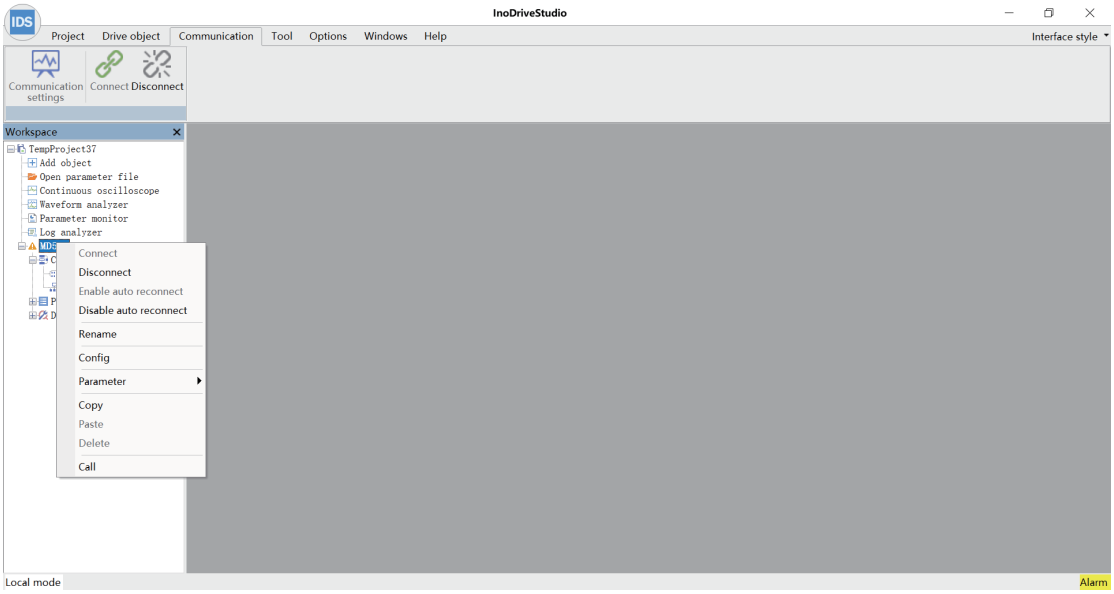


Figure 4-9 Changing the device name by right-clicking the device

- Method 3: In InoDriveStudio, choose "Config > Drive object config". On the "MD580–[Drive object config]" tab, change the device name, as shown in the following figure.

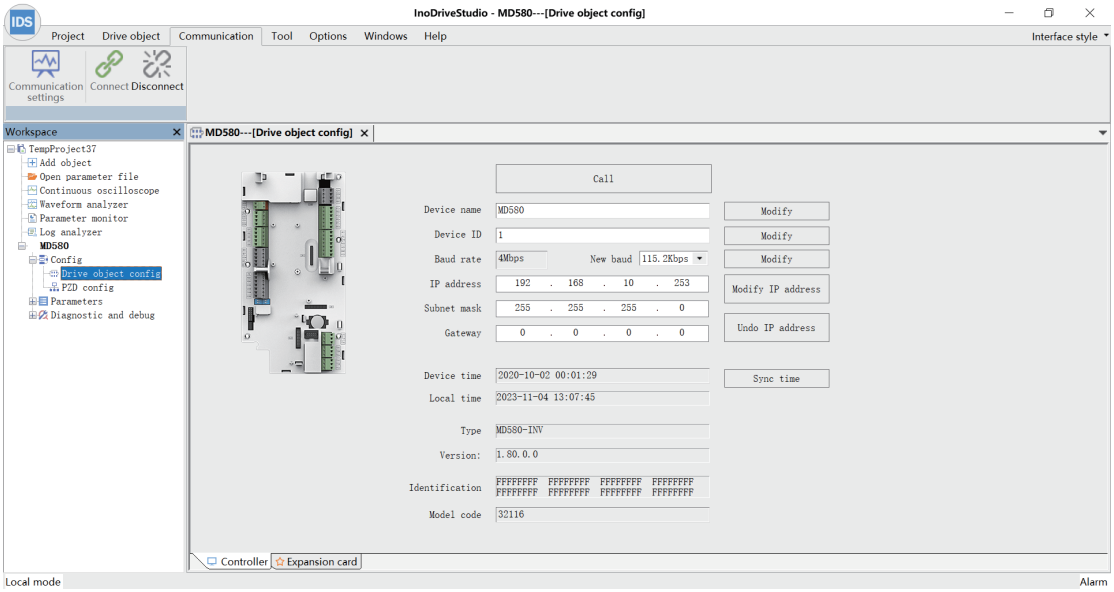


Figure 4-10 Changing the device name on InoDriveStudio

Note

When multiple devices are cascaded by InoDriveStudio on the same monitoring network, ensure that each device name is unique.

4.3 Per-unit Value System

4.3.1 Overview of the Per-unit Value System

In general circuit calculation, the units of current, voltage, power, and impedance are expressed as A, V, W, and Ω, respectively. This method of expressing physical quantities in actual named units is called the named unit system.

When the named unit system is used for calculation, even parameters for motors of the same type are completely different due to difference in capacities, causing inconvenience in parameter calculation. On that account, the per-unit value system is typically used in engineering to simplify calculation and facilitate analysis on physical status changes.

The per-unit value is a common way to mark numerical values in engineering calculation. It indicates the relative value of each physical quantity and parameter. A per-unit value is relative to a base value. For the same named value, per-unit values vary with base values. The conversion between per-unit values and named values is as follows:

Per-unit value = Named value/Base value

In motor control systems, the rated value of the motor is typically used as the base value of the per-unit system. For example, assume that the rated motor current is 100 A and the no-load current is 40 A. When the rated motor current 100 A is used as the base value, the per-unit value of the motor no-load current 40 A is 40%.

4.3.2 Per-unit Value Selection

To facilitate motor control, set rated parameters of the motor to per-unit values for the detection and control volume in the AC drive system.

Name	Base Value
AC voltage	The base value is the RMS value (d0-02) of the motor line voltage. This parameter can be viewed through d3-02.
AC current	The base value is the RMS value (based on d0-03) of the motor current. This parameter can be viewed through d3-03. If the rated current of the AC drive under a heavy load is greater than 4 times the rated motor current, use 1/4 of the rated current of the AC drive under a heavy load as the base value.
Motor speed	The base value is the motor synchronous speed (calculated based on d0-04, rather than the rotor speed). This parameter can be viewed through d3-02.
Output frequency	The base value is the rated motor frequency (based on d0-04). This parameter can be viewed through d3-03.
Motor torque	The base value is the rated motor torque, which is automatically calculated based on the basic parameters input by users and does not need manual setting.
Motor power	The base value is the rated motor power (based on d0-01). This parameter can be viewed through d3-05.

4.3.3 Per-unit Value Formats

In the control module system, parameter values are integers expressed in the 16-bit and 32-bit formats with different accuracy. The following definitions apply in expression of per-unit values.

- When the per-unit value is expressed in the 16-bit format, 4096 (hexadecimal 0x1000) indicates 100%, with the accuracy being 0.0244%, and the value range is –799.9% to +799.9%. Typically, this format is used for the per-unit value of current, voltage, and torque.
- When the per-unit value is expressed in the 32-bit format, hexadecimal 0x1000 0000 indicates 100%, with higher accuracy, and the value range is –799.99% to +799.99%. Typically, this format is used for the per-unit value of motor speed.

The 16-bit and 32-bit numerical values can be automatically converted to each other in the system. A 32-bit value can be used as a 16-bit value when its low-order 16 bits are removed. A 16-bit value can be used as a 32-bit value when 16 zeros are added to its low bits.

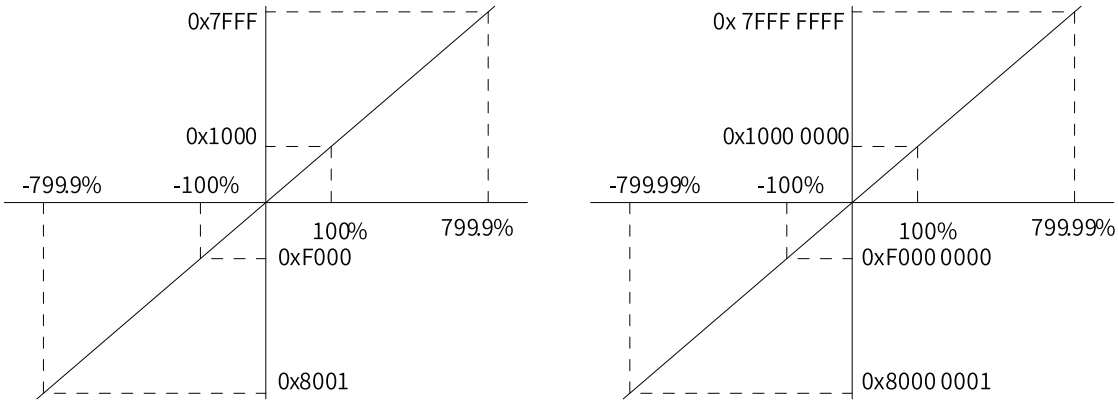


Figure 4-11 Per-unit value expressed in the 16-bit and 32-bit numerical value formats

4.3.4 Per-unit Value Range

In the control module, the ranges of both the 16-bit and 32-bit per-unit values are –799.9% to +799.9%. However, 32-bit values have more valid digits, indicating numerical values with higher precision. The following table lists the data error of 16-bit and 32-bit per-unit values when they are both 123.45%.

Value Mode	Stored Numerical Value	Per-unit Value	Absolute Error	Relative Error
16-bit per-unit value	5056	123.4375%	-0.0125%	0.010126%
32-bit per-unit value	331383570	123.44999984%	-0.00000016%	< 0.0001%

4.4 Parameter Interconnection System

4.4.1 Overview of the Parameter Interconnection System

To set a parameter, first find the parameter corresponding to the function, and then set the parameter to select a reference source. Example:

- To implement the user-defined OFF1 command (start/stop command) by using DI1 input, set b0-01 to U0-02. In this case, the U0-02 parameter stores the input status of DI1 and is known as a connector parameter (for details, see *"4.4.2 Connector Parameters" on page 96*). The b0-01 parameter is used to select the function source and is known as a reference source parameter. The input source of a reference source parameter can be set to any connector parameter.

Example:

- A9-00 = U0-04: U0-04 stores the input status of DI3, while A9-00 controls channel selection. The setting indicates that DI3 is used for the control channel switchover. When DI3 is inactive, control channel 1 is enabled. When DI3 is active, control channel 2 is enabled.
- C0-00 = U15-19: U15-19 stores numerical values of process data PZD2 received by fieldbus adapter A, while C0-00 specifies the main speed reference source of reference channel 1. The setting indicates that the main speed reference of reference channel 1 is sourced from process data PZD2 received by fieldbus adapter A.

4.4.2 Connector Parameters

Parameters in group U are read-only, which only stores the calculation data of each module during the AC drive running process. These parameters are connector parameters, which can be viewed by users or read or used by other parameters.

Connector parameters can be divided into two categories based on signal types:

- Bit connector: stores logical signals, including DI input, DO output, a bit of a communication word, a big of a control word and a status word, and status information of a hardware board card or a fault. It is in parameter groups U0 to U4 and U10 to U14.
- Word connector: stores numerical values, including AC drive control calculation variables such as the speed, voltage, current, and torque, as well as the hardware detection analog signal such as the received communication data or AI/AO. It is in parameter groups U5 to U9 and U15 to U19. U5 to U8 and U15 to U18 are single-word connectors, and U9 and U19 are double-word connectors.

Note: When continuous oscilloscope, triggering oscilloscope, and black box data recording functions of the InoDriveStudio are used, connector parameters are also required. Only connector parameters are available for continuous oscilloscope and black box recording.

4.4.3 Reference Source Parameters

Parameters used to read connector parameters are reference source parameters, which are divided into two categories according to connector types.

- Bit reference source parameter: Set a parameter number for a bit connector and read the value of the bit connector as the reference source parameter output.
- Word reference source parameter: Set a parameter number for a word connector and read the value of the word connector as the reference source parameter output.

All parameters can be set by using numbers only. When setting reference sources, use 1000 to 1999 to indicate the connectors U0-00 and U9-99 and 2000 to 2999 to indicate connectors U10-00 to U19-99.

One connector parameter can be read by multiple reference source parameters. However, one reference source parameter can read only one connector parameter each time.

4.5 Command Channel and Local Control

4.5.1 Local and Remote

"Local" and "Remote" in this guide are defined in terms of drives. Controlling device start/stop using control channels is defined as remote control. Obtaining control permission by MDKE-10, SOP-20-880, or InoDriveStudio is called local control.

Some cabinet manufacturers may add start/stop buttons and potentiometers on drive cabinet doors to implement operations with the cabinet doors, and define such control as local control and the PLC control as remote control. This is different from the concept in this guide. In this guide, operations with cabinet doors, PLC control, or other host controller control are all remote control for drives. They only differ in control channels. Use a DI to connect the local/remote control button on the cabinet door to the drive, and set the DI to the source for the control channel indicated by A9-00.

In some production fields, the operation box next to the drive is defined as local control, while PLC is defined as centralized control or remote control. They also differ only in control channels. Configure the I/O signals of the operation box and the PLC communication protocol into two control channels, and set A9-00 for switchover, implementing separate control.

4.5.2 Local and Remote Control

4.5.2.1 Overview of Local and Remote Control

Controlling the start-stop of the drive through a control channel is called remote control, which is the most commonly used mode. The way of using MDKE-10, SOP-20-880, or InoDriveStudio to start or stop a drive during commissioning is called local control. Local control mainly applies to commissioning and maintenance. When local control is enabled, the start/stop control word of control channel reference and the reference for the reference channel are inactive.

- The local control of InoDriveStudio has the highest commissioning priority. Once InoDriveStudio local control is enabled, the command channel and the SOP-20-880 control are disabled. The switchover between local control and remote control is allowed only in the stop state.
- The local/remote control status is indicated by U1-58. The value 0 indicates that local control is activated and the command channel is inactivated. The value 1 indicates that remote control is activated, that is, the command channel is activated.
- Command channel switchover is implemented by the A9-00 parameter, and the status is indicated by U1-26. The value 0 indicates that command channel 1 is active. The value 1 indicates that command channel 2 is active.
- Reference channel switchover is implemented by the A9-02 parameter, and the status is indicated by U1-33. The value 0 indicates that reference channel 1 is active. The value 1 indicates that reference channel 2 is active.

The following table lists the actually activated control sources and the connector states.

A9-00	A9-02	MDKE or SOP Local/ Remote	IDS Local/ Remote	U1-58	U1-26	Actual Control Source
0	0	0	0	1	0	Control channel 1 Reference channel 1
0	1	0	0	1	0	Control channel 1 Reference channel 2
0	X	1	0	0	0	MDKE-10 or SOP-20-880
0	X	0	1	0	0	InoDriveStudio
0	X	1	1	0	0	InoDriveStudio
1	0	0	0	1	1	Control channel 2 Reference channel 1
1	1	0	0	1	1	Control channel 2 Reference channel 2
1	X	1	0	0	1	MDKE-10 or SOP-20-880
1	X	0	1	0	1	InoDriveStudio
1	X	1	1	0	1	InoDriveStudio

4.5.2.2 Starting Local Control via the Operating Panel

An operating panel may be an MDKE-10 or SOP-20-880 model. When the MDKE-10 remote indicator  is off, local control is enabled. When the indicator is on, remote control is enabled. The SOP-20-880 operating panel directly shows text to indicate local or remote control.

After the operating panel and the control module are properly connected, pressing "Loc/Rem" on the operating panel can switch the control permission. The switchover is effective only when the AC drive is stopped. After the operating panel obtains the local control permission, the start/stop control in control channels and the reference in reference channels becomes inactive. Users need to press "Loc/Rem" on the operating panel again to restore the control channel function.

To prevent the operating panel from obtaining the local control permission, set the A10-00 parameter to disable the control permission of the operating panel. After the permission is disabled, "Loc/Rem" on the operating panel is inactive.

After the operating panel obtains the local control permission, the start/stop command source can only be the keys of the operating panel, but the speed reference source can be set through the A10-01 parameter.

When A10-01 is set to 0, the speed reference is controlled by the up and down keys on the operating panel. The increase and decrease commands correspond to the up and down keys on the operating panel.

When A10-01 is set to 1, the speed reference is still sourced from that of the current reference channel.

In local control, press "RUN" and "STOP" for the start and stop operations.

Note

When the drive unit is running, the Loc/Rem key is disabled and cannot be used to switch control permissions.

4.5.3 Control Channel and Reference Channel

The drive has two command channels, which are also called channels. Each channel contains one control channel and one reference channel, which are independent from each other.

- The control channel implements the reference of the AC drive control instruction for the AC drive start/stop and other relevant control. Groups b0 and b1 are for control reference of channel 1, while groups b2 and b3 are for control reference of channel 2. The control reference mainly includes the start/stop control word reference and other control word reference.
- The reference channel is used to set the motor speed and torque demand value to change the running status of the motor. Groups C0 to C2 correspond to the reference of channel 1, while groups C3 to C5 correspond to the reference of channel 2.

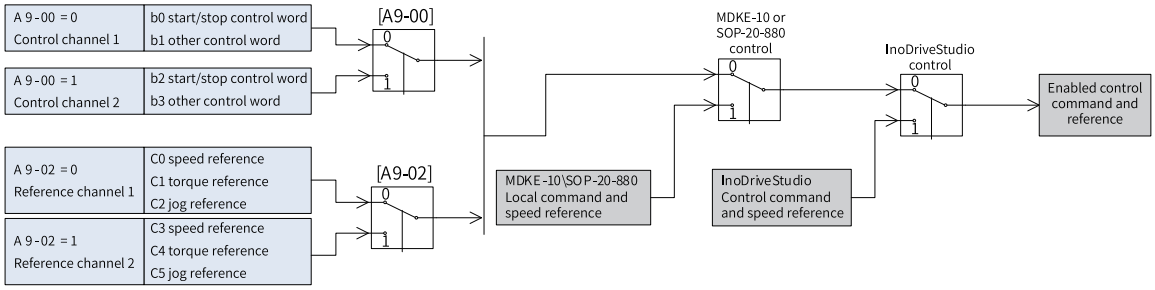


Figure 4-12 Channel command dataflow diagram

In remote control, set the control channel parameters for start/stop command word reference and the speed and torque setting.

Set A9-00 to the current active control channel. When control channel 1 is selected, parameters in groups b0 and b1 are activated. When control channel 2 is selected, parameters in groups b2 and b3 are activated. Other parameters in group b are always activated.

Set A9-02 to the current active reference channel. When reference channel 1 is selected, parameters in groups C0, C1, and C2 are activated. When reference channel 2 is selected, parameters in groups C3, C4, and C5 are activated. Other parameters in group C are always activated.

Table 4–1 Control channel

A9-00	b0-00	b0-01 to b0-10	Group b1	b2-00	b2-01 to b2-10	Group b3	Group b4
0: [Control channel 1]	0: [Terminal start/stop module]	-	Enable	-	-	-	Enable
-	1: [User-defined reference]	Enable	Enable	-	-	-	-
1: [Control channel 2]	-	-	-	0: [Terminal start/stop module]	-	Enable	Enable
-	-	-	-	1: [User-defined reference]	Enable	Enable	-

Table 4–2 Reference channels

A9-02	Group C0	Group C1	Group C2	Group C3	Group C4	Group C5
0: [Reference channel 1]	Enable	Enable	Enable	-	-	-
1: [Reference channel 2]	-	-	-	Enable	Enable	Enable

4.5.4 Control Channel Switchover

The switchover between local control and remote control is allowed only in the stop state.

The switchover between the two remote control channels is allowed in any state. After switchover, if the OFF1 command is 0, the device stops. If the OFF1 command is 1, the device remains in the status before the switchover. The following table lists the drive unit statuses after the control channel switchover.

Status Before Switchover	OFF1 Before Switchover	OFF1 After Switchover	Status After Switchover
Switch-on blocking	1	0	Ready to switch on
Switch-on blocking	1	1	Switch-on blocking
Ready to switch on	0	0	Ready to switch on
Ready to switch on	0	1	Switch-on blocking
Run	1	0	Ready to switch on
Run	1	1	Run

Note

- If the state machine is in the ready-to-switch-on state (OFF1 = 0) before the control channel switchover, and OFF1 becomes 1 after the switchover, the state machine enters the switch-on-blocking state. In this case, the state machine can return to the ready-to-switch-on state only after OFF1 is reset to 0.
- When the same DI signal is configured for A9-00 command channel selection and start/stop control commands, the DI signal is active and the state machine enters the switch-on-blocking state (S4).
- The control channel switchover helps to implement the control permission switchover of two different control GNDs. For example, after the operation box channel DI on the field is started, devices can be switched to centralized control on the PLC, or the devices in centralized control on the PLC can be switched to the operation box on the field for manual operation.
- In the switch-on-blocking state, the OFF1 start command is not accepted. The machine can be started only in the ready-to-switch-on state. For details about each status of the state machine, see *"4.7.9 State Machine" on page 125*.

4.6 Motor Data Set

4.6.1 Switching Motor Data Sets

The control module can store up to four different motor data sets (MDS's). Each MDS contains motor parameters (group d) and corresponding motor control parameters (group E).

The A9-04 and A9-05 parameters can be set to switch between active MDS's. MDS's can be switched over only in the stop state. MDS switchover during running is inactive.

Para.	Name	Description
A9-04 (bit0)	MDS 0 source	bit1 bit0: 00: Motor parameters of group 1 01: Motor parameters of group 2 10: Motor parameters of group 3 11: Motor parameters of group 4
A9-05 (bit1)	MDS 1 source	
U5-69	Current MDS	0: MDS 1 1: MDS 2 2: MDS 3 3: MDS 4

Group d and group E contain the parameter values of active MDS's. Parameters of different MDS's have different communication addresses.

The communication addresses of parameters with the same functions in the four MDS's are sorted in ascending order. Communication addresses in the guide correspond to motor parameters of group 1, which need to be manually calculated for other groups. The following description takes the rated motor current as an example.

Para.	Name	Current Range (A)	Change Level	Default	Comm. Addr.
d0-03	Rated motor current	0.1 to 6553.5	At stop	9.0	1512

According to the table:

- The communication address of the rated motor current parameter of motor 1 is 1512.

Based on motor 1, the communication addresses of parameters of motors 2, 3, and 4 can be derived, are as follows:

- The communication address of the rated motor current parameter of motor 2 is 1513.
- The communication address of the rated motor current parameter of motor 3 is 1514.
- The communication address of the rated motor current parameter of motor 4 is 1515.

Note

- The MDS function allows an AC drive to run with different motors or a motor to run in different control modes.
- After MDS switchover, ensure that the motor control parameters match the motor parameters.
- If a drive unit drives different motors, perform parameter auto-tuning on every motor during commissioning.

4.6.2 Viewing Multiple Motor Data Sets

4.6.2.1 Viewing and Setting Motor Parameters Using MDKE-10 or SOP-20-880

When using MDKE-10 or SOP-20-880 to view different motor data, set the A9-04 and A9-05 parameters to switch between the activated motor data sets (MDS's). After the switchover, the activated motor parameters can be viewed in groups d and E.

4.6.2.2 Quick View Using InoDriveStudio

To view activated motor parameters using InoDriveStudio, follow the same way as that of using the MDKE-10 or SOP-20-880, or choose "Inverter > Parameter table > Motor data set" to view all motor parameters.

As shown in the following figure, the list contains all parameters related to motor switchover. When users select different motors from the "Select data set" drop-down list, parameters displayed in the list are switched to those corresponding to the selected motor.

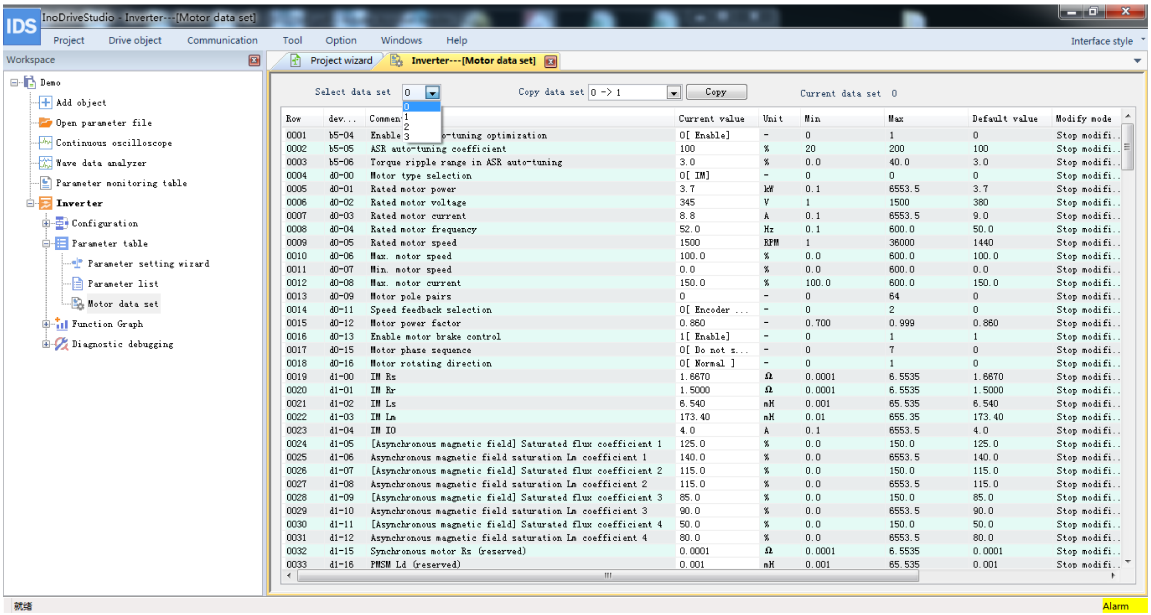


Figure 4-13 Quickly viewing motor parameters

4.6.3 Motor Data Set and Motor Control Data Set

The motor data set (group d) and the motor control data set (group E) each have four groups of communication addresses, which are switched based on the settings of A9-04 and A9-05. In actual use, group d and group E both can be considered as motor data sets.

Group d differs from group E in restoration to factory defaults. Specifically, when A8-00 is set to 1, parameters of group d are not restored while parameters of group E are restored.

4.6.4 Copying a Motor Data Set

To set two identical sets of motor parameters, either of the following two methods can be used.

Method 1: Start InoDriveStudio, choose "MD580 > Parameter table > Motor data set". On the "Inverter—[Motor data set]" page, select a required copy mode from the "Copy data set" drop-down list, and click "Copy", as shown in the following figure.

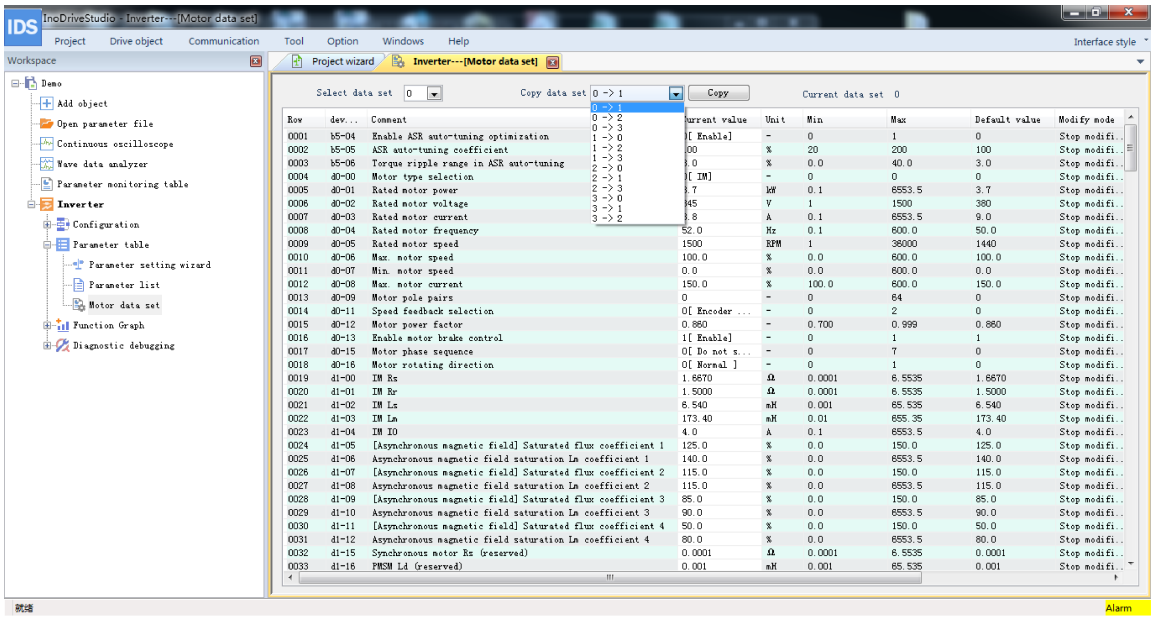


Figure 4-14 Copying a motor data set

Note

In the "Copy data set" drop-down list, digits 0 to 3 correspond to motor data sets 1 to 4, respectively.

Method 2: Use the MDKE-10, SOP-20-880, or InoDriveStudio commissioning software to modify the A8-20 and A8-21 parameters.

Para.	Name	Description
A8-20	MDS copy mode	0: No operation 1: MDS 1 > MDS 2 2: MDS 1 > MDS 3 3: MDS 1 > MDS 4 4: MDS 2 > MDS 1 5: MDS 2 > MDS 3 6: MDS 2 > MDS 4 7: MDS 3 > MDS 1 8: MDS 3 > MDS 2 9: MDS 3 > MDS 4 10: MDS 4 > MDS 1 11: MDS 4 > MDS 2 12: MDS 4 > MDS 3
A8-21	MDS copy confirmation	0: Cancel 1: Confirm

4.7 Control Channel and Start/Stop Command

4.7.1 Start and Run

4.7.1.1 Overview of Start and Run

The drive involves two commands related to motor start/stop control. The commands can be set by using start/stop control words.

4.7.1.2 OFF1 Command

When OFF1 is set to 0, the OFF2 and OFF3 commands are inactive, and no fault occurs, the system enters the ready-to-switch-on state (S5). In this case, if the OFF1 value is changed from 0 to 1, the start command is delivered, and the system enters the pre-charge state (S6). When the DC bus voltage is detected to be normal, the system enters the ready to run state (S7) and waits for the running permission command. After the running permission command is active, the system enters detection before operation (S9). If detection before operation is not selected in group E8, the S9 state is skipped. According to different start modes indicated by E1-00, the system enters pre-excitation (S10), flying start (S11), or DC braking start (S15), and then enters the running status (S12).

If OFF1 is set to 0, the stop command is delivered. Then, the system exits the running status (S12) and enters OFF1 stopped state (S13). When the motor zero-speed conditions are met, the system enters the ready-to-switch-on state (S5).

4.7.1.3 Running Permission Command

The running permission command only controls IGBT triggering, which must be judged after OFF1 command is run to close the brake. If running permission is inactive, IGBT will not be triggered and will be in the ready to run state (S7) even if the OFF1 command is run to close the brake. Wait until the running permission signal is active before triggering IGBT to control motor running.

Keep the running permission command at a high level to directly run the OFF1 command to control running and stop.

Both the OFF1 and running permission commands are start/stop control words, which are affected by the switchover of command channels indicated by A9-00. For details, see *"4.5.3 Control Channel and Reference Channel" on page 99*.

Table 4–3 Start and running permission command sources

Command Channel	Command Word Source	OFF1 Command Source	Running Permission Command Source
[A9-00] = 0	[b0-00] = 0	Terminal start/stop module	Always active
	[b0-00] = 1	b0-01	b0-04
	MDKE-10 control	MDKE-10 local control	Always active
	SOP control	SOP-20-880 local control	Always active
	IDS control	InoDriveStudio control panel	InoDriveStudio control panel
[A9-00] = 1	[b2-00] = 0	Terminal start/stop module	Always active
	[b2-00] = 1	b2-01	b2-04
	MDKE-10 control	MDKE-10 local control	Always active
	SOP control	SOP-20-880 local control	Always active
	IDS control	InoDriveStudio control panel	InoDriveStudio control panel

4.7.2 Emergency Stop Command

Drives can be stopped at emergency in two ways:

- OFF2 emergency stop: The IGBT output is blocked unconditionally when receiving the command.
- OFF3 quick stop: Reduce the speed to zero according to the E1-29 and C8-37 to C8-39 settings when receiving the command, and then block the IGBT output.

The emergency stop command is enabled at low level. When the corresponding parameter is set to 0, the device stops at emergency. For more information about OFF3 stop, see *"4.7.4.2 Stop Modes by Different Stop Commands" on page 107*.

The OFF2 and OFF3 commands have multiple sources. The current active parameters vary with the settings of control channels. Take OFF2 as an example. The following table lists the active parameters of the OFF2 command. The principle for OFF3 is similar.

Table 4–4 OFF2 command sources

Command Channel	Command Word Source	OFF2 Command Source							
		b0-02	b1-00	b0-00	b2-02	b3-00	b3-01	SOP	IDS
[A9-00] = 0	[b0-00] = 0	X	Enable	Enable	X	X	X	X	X
	[b0-00] = 1	Enable	Enable	Enable	X	X	X	X	X
	MDKE-10 control	X	Enable	Enable	X	X	X	X	X
	SOP control	X	Enable	Enable	X	X	X	X	X
	IDS control	X	Enable	Enable	X	X	X	X	Enable
[A9-00] = 1	[b2-00] = 0	X	X	X	X	Enable	Enable	X	X
	[b2-00] = 1	X	X	X	Enable	Enable	Enable	X	X
	MDKE-10 control	X	X	X	X	Enable	Enable	X	X
	SOP control	X	X	X	X	Enable	Enable	X	X
	IDS control	X	X	X	X	Enable	Enable	X	Enable

Note

"X" in the table indicates that the corresponding command source is disabled.

4.7.3 Start Mode

4.7.3.1 Overview of Start Modes

Motors can be started in three start modes. The start modes are set through E1-00 and affected by the setting of b1-09 and b3-09 (source of forced flying start).

4.7.3.2 Direct Start (Pre-excitation Start)

When the OFF1 start command is received in V/f control mode, the motor speed reference becomes the RFG output reference.

Before startup in the SVC or FVC mode, an asynchronous motor needs to enter the pre-excitation state to build a rotor magnetic field for better control on motor output torque. After motor auto-tuning, the initial value of the excitation time will be set based on the rotor time constant.

To quickly build a magnetic field for the motor, the AC drive excites the motor with a large current based on the drive and motor capability. Then, the AC drive reduces the exciting current to the no-load current. When the time indicated by E1-03 elapses, the AC drive exits the pre-excitation state and starts to run.

Para.	Name	Description
E1-03	Pre-excitation time	If the time is too short, the established motor magnetic flux may be insufficient.
E1-15	Demagnetization time	When the asynchronous motor is running at a non-zero speed (feedback speed indicated by [E1-21]), the IGBT is blocked. Wait for at least the duration indicated by E1-15 before restart.

Note

The preceding parameters are disabled for synchronous motors.

4.7.3.3 Flying Start

To restart the motor when it is running at a high speed, select the flying start mode. If E1-00 is not set to flying start, you can use b1-09 or b3-09 to enable forced flying start for once.

For details about flying start, see *"4.14 Flying Start" on page 183*.

Note

- If L1-00 is set to "without brake", when b1-09 or b3-09 (forced flying start) is enabled or E1-00 is set to 1 (flying start), flying start is enabled.
- If L1-00 is set to "with brake", when b1-09 or b3-09 (forced flying start) is enabled or E1-00 is set to 1 (flying start), the actually enabled start mode is direct start.

4.7.3.4 DC Braking Start

In the mode of DC braking at stop, before the asynchronous motor starts, direct current passes through the motor to apply a braking force on the motor, ensuring that the motor is at the zero speed.

Para.	Name	Description
E1-08	DC braking current at startup	Current passing through the motor during DC braking, which corresponds to 100% of the rated motor current.
E1-09	DC braking time at startup	Duration of the DC braking stage. Long-term braking can ensure that the asynchronous motor is at the zero speed but may cause much motor heating.

The preceding parameters are disabled for synchronous motors.

4.7.4 Stop Mode

4.7.4.1 Overview of Stop Modes

Stop commands are the command sources triggering stop, including OFF1, OFF2, OFF3, run enable commands, and faults.

Stop modes specify the actions upon corresponding stop commands, including coast to stop, stop at maximum capability, OFF3 decelerate-to-stop, and OFF1 decelerate-to-stop.

For drives, each stop command corresponds to at least one stop mode, which can be configured by parameter settings. By default, stop modes are consistent with stop commands.

4.7.4.2 Stop Modes by Different Stop Commands

- Stop modes corresponding to the OFF1 stop command:

Control mode	E1-27 OFF1 Stop Mode	E1-32 Stop Mode in Torque Control	Stop Mode
Speed control	0: Coast to stop	X	Coast to stop
	1: Decelerate to stop	X	OFF1 decelerate-to-stop
	2: Stop at maximum capability	X	Stop at maximum capability
Torque control	X	0: Coast to stop forcibly	Coast to stop
	0: Coast to stop	1: Switch to speed control mode and then stop	Coast to stop
	1: Decelerate to stop		OFF1 decelerate-to-stop
	2: Stop at maximum capability		Stop at maximum capability
	0: Coast to stop	2: Hold the torque control until blocking at zero speed	Coast to stop
	1: Decelerate to stop		Hold the torque control until the actual motor speed is smaller than the zero speed threshold for the set delay time and then the motor coasts to stop.

Note

In torque control mode, the stop mode of the OFF1 stop command is relevant to E1-32.

- Stop modes corresponding to the OFF3 stop command:

Control mode	E1-28 OFF3 Stop Mode	E1-32 Stop Mode in Torque Control	Stop Mode
Speed control	0: Quick stop	X	OFF3 decelerate-to-stop
	1: Stop at maximum capability	X	Stop at maximum capability
Torque control	X	0: Coast to stop forcibly	Coast to stop
	0: Quick stop	1: Switch to speed control mode and then stop	OFF3 decelerate-to-stop
	1: Stop at maximum capability		Stop at maximum capability
	0: Quick stop	2: Hold the torque control until blocking at zero speed	Hold the torque control until the actual motor speed is smaller than the zero speed threshold for the set delay time and then the motor coasts to stop.

Note In torque control mode, the stop mode of the OFF3 stop command is relevant to E1-32.

- Stop modes corresponding to the run enable command:

Control mode	E1-31 Stop mode during running	E1-27 OFF1 Stop Mode	E1-29 OFF3 Stop Mode	E1-32 Stop Mode in Torque Control	Stop Mode
Speed control	0: Stop at OFF1	0: Coast to stop	X	X	Coast to stop
		1: Decelerate to stop	X	X	OFF1 decelerate-to-stop
		2: Stop at maximum capability	X	X	Stop at maximum capability
	1: Stop at OFF2	X	X	X	Coast to stop
	2: Stop at OFF3	X	0: Quick stop	X	OFF3 decelerate-to-stop
		X	1: Stop at maximum capability	X	Stop at maximum capability
Torque control	0: Stop at OFF1	X	X	0: Coast to stop forcibly	Coast to stop
		0: Coast to stop	X	1: Switch to speed control mode and then stop	Coast to stop
		1: Decelerate to stop	X		OFF1 decelerate-to-stop
		2: Stop at maximum capability	X		Stop at maximum capability
		0: Coast to stop	X	2: Hold the torque control until blocking at zero speed	Coast to stop
		1: Decelerate to stop	X	X	Hold the torque control until the actual motor speed is smaller than the zero speed threshold for the set delay time and then the motor coasts to stop.
		2: Stop at maximum capability	X		
	1: Stop at OFF2	X	X		Coast to stop
	2: Stop at OFF3	X	X	0: Coast to stop forcibly	Coast to stop
		X	0: Quick stop	1: Switch to speed control mode and then stop	OFF3 decelerate-to-stop
		X	1: Stop at maximum capability		Stop at maximum capability
		X	0: Quick stop	2: Hold the torque control until blocking at zero speed	Hold the torque control until the actual motor speed is smaller than the zero speed threshold for the set delay time and then the motor coasts to stop.

Note In torque control mode, the stop mode of the run enable command is relevant to E1-32.

- The stop mode in OFF2, fault, and V/f separation modes is fixed to coast to stop.

4.7.4.3 Actions in Different Stop Modes

- Coast to stop
  When a motor coasts to stop, the IGBT output is directly blocked and the motor rotates freely due to inertia and stops due to friction. For large-inertia devices, this process takes quite a long time. Most faults and OFF2 emergency stop can trigger the coast-to-stop mode.

  In V/f separation, the coast-to-stop mode is used on all occasions.

- OFF1: Decelerate to stop
  The OFF1 decelerate to stop mode is typically activated by the OFF1 command at a low level. After it is activated, the speed reference of the motor is forced to be 0. The motor decelerates to 0 within the RFG deceleration time. Pulses are blocked or DC braking at stop is started when the speed approaches 0. For details about zero speed determination and DC braking at stop, see *"4.7.5.1 Zero Speed Determination" on page 110*.

  The OFF1 stop mode can be set through OFF3 of the E1-27 parameter. The default value is 1, which indicates that the motor decelerates to stop, that is, OFF1 decelerate to stop mode is activated.

  In the SVC mode, due to the large fluctuation of zero speed, if stop is not allowed, appropriately increase E1-21 (zero speed judgment threshold of motor).

- OFF3: Decelerate to stop
  After OFF3 decelerate to stop mode is activated, the speed reference of the motor is forced to be 0. The motor decelerates to 0 within the OFF3 stop duration specified by C8-37 to C8-39. The IGBT is blocked when the motor reaches zero speed.

- Stop at maximum capability
  After the stop at maximum capability mode is activated, the speed reference of the motor is forced to be 0. The motor decelerates to 0 based on the maximum output capability. During deceleration, the motor torque or current may reach the limit.

  The motor may stop at the maximum capability during OFF1 stop or OFF3 stop process. No arc time is included when the motor stops at the maximum capability.

4.7.5 Zero Speed Determination and DC Braking at Stop

4.7.5.1 Zero Speed Determination

Except for the coast-to-stop mode, all the other three stop modes need the motor speed to be reduced to zero speed before IGBT output blocking. Zero speed determination involves two conditions: motor zero speed and zero speed reference. When either is met, it is considered that the zero speed conditions are met.

Determination of motor zero speed involves two parameters. When the absolute value of the actual motor speed is less than or equal to [E1-21] and the duration exceeds [E1-22], the zero speed conditions are met.

Determination of zero speed reference involves three parameters. E1-25 is set to enable zero speed determination (disabled by default). When the absolute value of the speed reference after supplementation is less than or equal to [E1-23] and the duration exceeds [E1-24], the zero speed conditions are met.

However, note that:

- If E1-22 is too small, the IGBT will be blocked before the motor speed reaches the zero speed, which extends the duration between motor stop and the completely static state. Enlarging the time indicated by E1-22 can ensure that the IGBT is blocked after the motor is in the completely static state.
- If E1-21 is too small, the stop conditions may fail to be met due to the speed detection error, causing constant output near the zero speed.
- If E1-21 is too large, the motor may coast to stop before a standstill.
- If brake control is enabled, the IGBT is blocked only after the brake is closed when the zero speed conditions are met.

Therefore, set the zero speed determination conditions properly based on the actual running requirements, and increase E1-22 to ensure that the motor is in the completely static state.

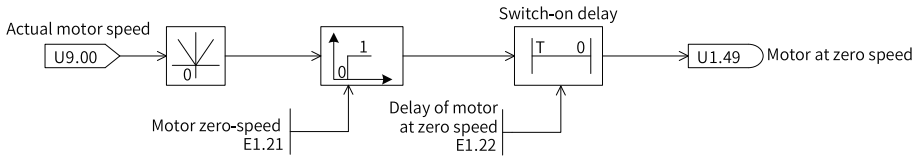


Figure 4-15 Motor zero speed determination conditions

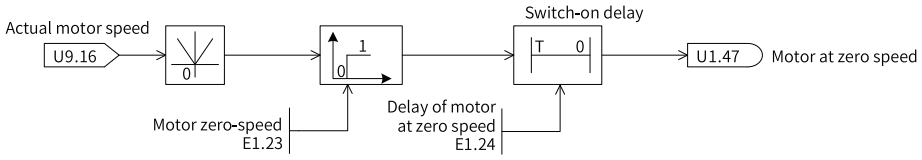


Figure 4-16 Zero speed reference determination conditions

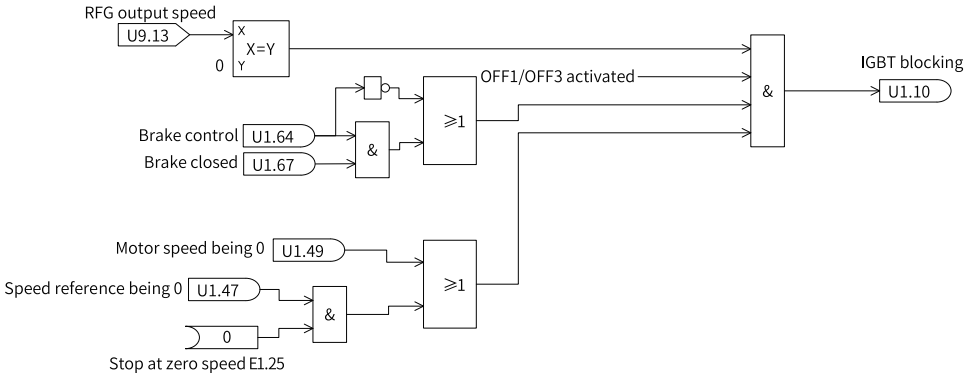


Figure 4-17 IGBT blocking determination conditions

4.7.5.2 DC Braking at Stop

Two stop modes are derived from OFF1 (decelerate to stop). One is conventional stop (set [E1-11] to 0 or [E1-14] to 0.00s), in which the IGBT output is blocked after the zero speed condition is met. The other ([E1-11] is set to 01 and [E1-14] is greater than 0) is to activate DC braking at stop.

DC braking at stop is triggered in OFF1 decelerate-to-stop-mode when the speed reference and the actual speed of the asynchronous motor are less than the value of E1-12.

If the [E1-15] demagnetization time is not 0 and [E1-12] is greater than or equal to E1-21, the system blocks the IGBT and waits for demagnetization. Otherwise, the motor directly enters the DC braking state.

The DC braking current indicated by E1-13 is generated during DC braking and lasts for a duration indicated by E1-14 to ensure that the motor is completely stopped. Then, the IGBT is blocked.

Para.	Name	Setting Description
E1-11	DC braking at stop	Switch of DC braking at stop: 0: Disable 1: Enable
E1-12	Starting speed of DC braking at stop	DC braking starts only when the actual speed and RFG speed reference are lower than the speed indicated by this parameter in OFF1 decelerate-to-stop mode. If DC braking is started at a high speed, the braking torque may be reduced.
E1-13	DC braking current at stop	The output current for DC braking at stop. 100% corresponds to the rated motor current.
E1-14	DC braking time at stop	E1-14 = 0: Disable DC braking at stop and stop the motor according to zero speed determination.
		E1-14 ≠ 0: Enable DC braking at stop and determine the braking duration.
E1-15	Demagnetization time (DC braking delay at stop)	Wait for motor demagnetization before starting DC braking. During demagnetization, the motor rotates freely. When it is set to 0, skip this step and directly start DC braking at stop.
E1-21	Threshold of motor zero speed determination	When the actual motor speed is lower than the speed indicated by this parameter, it enters the motor zero speed determination condition.

Note

DC braking takes effect only for asynchronous motors in the OFF1 decelerate-to-stop mode.

4.7.6 Start/Stop Control Word

4.7.6.1 Overview of Start/Stop Control Words

Start/stop control words are equipotential commands controlling the running, stop, and fault reset of the drive. Drive control is performed to process start/stop control words according to the priority in the following function diagram.

Function diagram of start/stop control words

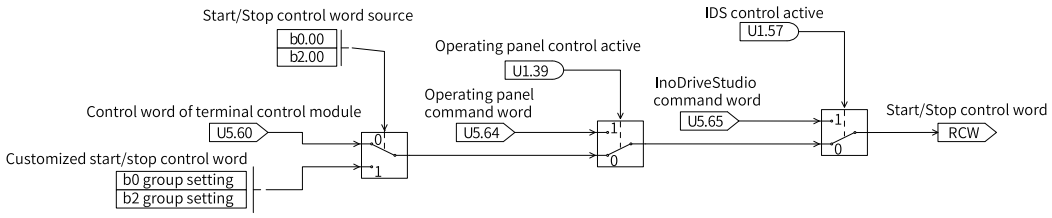


Figure 4-18 Function diagram of start/stop control words

As shown in the figure, InoDriveStudio has the top priority, followed by MDKE-10 and SOP-20-880. When InoDriveStudio local control is enabled, other control sources are ignored.

Only when local control is not enabled, a control channel is activated based on A9.00. The control channel has two sources, and the corresponding configuration is activated based on settings of b0.00 and b2.00. No matter whether local control is enabled or not, the function of fault reset of SOP-20-880 and InoDriveStudio is enabled.

4.7.6.2 U8-11 Terminal Start/Stop Control

For details about configurations of U8-11 terminal start/stop control, see *"4.9.1 Overview of Terminal Start/Stop Modules" on page 135*.

U 5 .60 Control word of terminal control module

bits	Description
00	↑ = Run 0 = OFF 1
01	0 = OFF 2 Active 1 = OFF 2 Inactive
02	0 = OFF 3 Active 1 = OFF 3 Inactive
03	0 = Running prohibition 1 = Running permission
04	1 = Reset command
05	1 = Jog 1
06	1 = Jog 2
07	1 = Speed reference inverted 0 = No action
Rsv	Reserved

Figure 4-19 U8-11 terminal start/stop control

4.7.6.3 User-defined Start/Stop Parameter Settings

This section takes control channel 1 as an example. The following table lists the user-defined start/stop parameter settings of channel 1.

Para.	Name	Setting	Command Source
b0-01	User-defined OFF1 source	Command source output: 0: Normal stop 0→1: Start	0: Inactive Other: B connector
b0-02	User-defined OFF2 source 1	Command source output: 0: Active, IGBT blocking, coast to stop 1: Inactive	0: Inactive Other: B connector
b0-03	User-defined OFF3 source 1	Command source output: 0: Enable 1: Disable	

For example:

b0-00 = 3: User-defined (set in group b0).

b0-01 = 2: Select DI1 as the command source of OFF1. When DI1 changes from 0 to 1, the equipment is started.

b0-02 = 3: Select DI2 as the command source of OFF2. When DI2 becomes 0 (low level), the equipment coasts to stop.

b0-03 = 4: Select DI3 as the command source of OFF3. When DI3 becomes 0 (low level), the equipment quickly stops.

4.7.6.4 Running Permission and Fault Reset

Only when the running permission signal function is enabled, can IGBT trigger pulses be sent and the equipment output current. If the drive is started but the running permission is disabled, IGBT cannot be triggered. The following table lists the parameters of running permission and fault reset.

Table 4–5 Parameters of running permission and fault reset

Para.	Name	Setting	Command Source
b0-04/b2-04	User-defined running permission source	Command source output: 0: Disable 1: Enable	0: Disable 1: Enable Other: B connector
b0-05/b2-05	User-defined fault reset source 1	Command source output: 0: Disable 0→1: Fault reset	0: Disable 1: Enable Other: B connector

4.7.6.5 Jog, Ramp Function Generator, and Speed Regulator Enable Parameter Setting

For a detailed explanation of the ramp function generator and speed regulator function blocks, see *"4.10.1 Overview of the Ramp Function Generator" on page 139* and *"4.12.6 Speed Controller" on page 162*. The relevant parameter settings of the control channel are as follows:

Table 4–6 Jog, ramp function generator, and speed regulator enable parameter setting

Para.	Name	Setting	Command Source
b0-06/b2-06	User-defined jog 1 source	Command source output: 0: Disable 1: Enable	0: Disable Other: B connector
b0-07/b2-07	User-defined jog 2 source	Command source output: 0: Disable 1: Enable	
b0-08/b2-08	User-defined speed inversion source	Command source output: 0: Disable 1: Enable	0: Disable 1: Enable Other: B connector
b1-06/b3-06	RFG prohibition source	Command source output: 0: RFG prohibition is active and RFG output is forced to 0 1: RFG outputs normally	
b1-07/b3-07	RFG pause source	Command source output: 0: RFG pause is active and RFG maintains current output value 1: RFG runs normally	
b1-08/b3-08	Source of setting RFG reference to 0	Command source output: 0: RFG input is forced to 0 1: RFG gets input normally	
b1-11/b3-11	Speed regulator enable source	Command source output: 0: Disable 1: Enable	

4.7.7 Control Word

4.7.7.1 Overview of Control Words

A control word is a set of various control commands in the system, which is derived from the control channel parameter setting.

4.7.7.2 Internal Control Word 1

Control word 1 can be viewed by using parameter U5-40. The following table lists bits of control word 1 and their corresponding parameters.

Bit	Name	Para.	Value	Description
0	Run/Stop (OFF1)	b0-01<1> b2-01<1>	0	Stop: The AC drive stops according to the OFF1 stop mode defined by E1-27 and enters the S5 ready-to-switch-on state.
			1	Running: At the rising edge, the AC drive's state changes from "Ready to switch on" to "Pre-charge" and then to "Ready to run". You can select normal running or auto-tuning after running by setting the corresponding parameter (b5-00).
1	Coast to stop (OFF2)	b0-02<2> b1-00/b1-01<2> b2-02<2> b3-00/b3-01<2>	0	Pulse is inhibited and the AC drive enters the S4 switch-on-blocking state.
			1	Normal
2	Quick stop (OFF3)	b0-03<2> b1-02/b1-03<2> b2-03<2> b3-02/b3-03<2>	0	The motor decelerates to 0 RPM according to the OFF3 stop mode defined in E1-16. Then, the pulse is inhibited and the AC drive enters the S4 switch-on-blocking state.
			1	Normal
3	Running permission	b0-04<3> b2-04<3>	0	In the OFF1 active state, the motor enters the S7 ready-to-run state according to the stop mode defined in E1-17 and the pulse is inhibited.
			1	In the S7 ready-to-run state, the AC drive must receive the running permission signal before entering the normal running state.
4	Ramp output disabled	b1-06 b3-06	0	The output of the ramp function generator is forcibly set to 0.
			1	Normal
5	Ramp output retained	b1-07 b3-07	0	The last output of the ramp function generator is retained.
			1	Normal
6	Ramp output being zero	b1-08 b3-08	0	The setpoint of the ramp function generator is forcibly set to 0 and the output decelerates to 0 according to the set time.
			1	Normal
7	Fault reset	b0-05<4> b1-04/b1-05<4> b2-05<4> b3-04/b3-05<4>	0	Disable
			0→1	If the current fault disappears, the state machine changes from the S3 faulty state to the S4 switch-on-blocking state during running. When OFF1 is set to 0, the state machine enters the S5 ready-to-switch-on state.
8	Jog 1 (JOG1)	b0-06 b2-06 b4-13	0	Disable
			1	1. The state changes from ready-to-switch-on to jog and the setpoint of C5-00 (JOG1) is used as the speed reference. 2. The state can be changed to jog during running and the current speed is the setpoint of C5-00 (JOG1).

Bit	Name	Para.	Value	Description
9	Jog 2 (JOG2)	b0-07 b2-07 b4-14	0	Disable
			1	1. The state changes from ready-to-switch-on to jog and the setpoint of C5-00 (JOG2) is used as the speed reference. 2. The state can be changed to jog during running and the current speed is the setpoint of C5-01 (JOG2).
10	Reserved	/	0	/
			1	/
11	Speed reference inverted	b0-08<5> b2-08<5>	0	Use the speed reference.
			1	The speed reference is inverted and then used as the setpoint of the ramp function generator.
12	Start signal	/	0	The OFF1/jog command is invalid.
			1	The OFF1/jog command is valid.
13	Start signal after processing	/	0	The start signal is invalid after being processed by the wake-up signal.
			1	The start signal is valid after being processed by the wake-up signal.
14	Fault reset retaining	/	0	The fault reset signal of bit7 is invalid.
			1	After the fault reset signal of bit7 is activated, the bit setting keeps valid for at least 10 ms.
15	Reserved	/	0	/
			1	/

Note

- <1>: OFF1 commands may be sourced from the terminal start/stop module, fieldbus adapter, or user-defined group reference. b0-01 and b2-01 are active only when b0-00 and b2-00 are set to the user-defined reference. For details, see *"4.7.1.1 Overview of Start and Run" on page 104*.
- <2>: OFF2 and OFF3 commands can be set in the start/stop control words (b0-00 and b2-00) and other control words (b1-00 and b3-00). Settings in other control words (b1-00 and b3-00) are always active and not effected by the sources of start/stop control words (b0-00 and b2-00). For details, see *"4.7.2 Emergency Stop Command" on page 105*.
- <3>: b0-04 and b2-04 are active only when b0-00 and b2-00 are set to the user-defined start/stop control words. When b0-00 and b2-00 are set to the terminal start/stop module, the running permission signals are determined by the running permission sources in the current terminal start/stop module.
- <4>: For details about reset upon fault, see *"7.1.3 Fault Reset Modes" on page 606*.
- <5>: b0-08 and b2-08 are active only when b0-00 and b2-00 are set to the user-defined reference. When b0-00 and b2-00 are set to the terminal start/stop module, the speed reference inversion is determined by the configuration and input of the terminal start/stop module.

4.7.7.3 Internal Control Word 2

Control word 2 can be viewed by using parameter U8-08. The following table lists bits of control word 2 and their corresponding parameters.

Bit	Name	Para.	Value	Description
0	STO1 input	/	0	Activated. The IGBT is blocked, and the AC drive enters switch-on blocking (S4).
			1	Normal
1	STO2 input	/	0	Activated. The IGBT is blocked, and the AC drive enters switch-on blocking (S4).
			1	Normal
2 and 3	Motor selection	A9-04	0 to 3	A maximum of four groups of MDS's and control parameters (groups d and E) can be saved.
		A9-05		Values 0 to 3 correspond to activation of MDS 1 to MDS4. The activated motor data is displayed in motor parameters (group d) and motor control (group E) parameters.
4 to 7	Multi-reference data selection	C6-03	0 to 15	The values correspond to C6-03 to C6-06.
		to C6-06		Values 0 to 15 correspond to output of multi-reference values 0 to 15. For details, see section 4.2.3.
8	Command channel selection	A9-00	0	Command channel 1 is activated, and b0/b1 is selected as the command source.
			1	Command channel 2 is activated, and b2/b3 is selected as the command source.
9	Flying start	b1-09	0	E1-00 indicates whether to enable flying start.
		b3-09	1	Flying start is forced to be used.
10	Speed regulator enable	b1-11	0	The speed regulator output is forced to be 0, and the motor can rotate freely.
		b3-11	1	The speed regulator works properly to ensure the closed-loop speed.
11	Reserved	/	-	-
12	Forced torque control	b1-10	0	E0-01 indicates the control mode.
		b3-10	1	The vector control is forced to work in torque control mode.
13 and 14	Reserved	/	-	-
15	DC braking at startup	E1-00	0	Disable
		E1-08		
		E1-09	1	Enable

4.7.7.4 Internal Control Word 3

Control word 3 can be viewed by using parameter U5-42. The following table lists bits of control word 3 and their corresponding parameters.

Bit	Name	Para.	Value	Description
0	DC braking at stop	E1-11	0	Disable
		E1-14	1	Enable
1	Pre-excitation	E1-03	0	Disable
			1	Enable
2	Speed loop freezing	E4-17	0	Disable
			1	Enable
3	Speed loop force	E4-18	0	Disable
			1	Enable

Bit	Name	Para.	Value	Description
4	Brake control	d0-16	0	Disable
		L1-00	1	Enable
5 to 7	Reserved	-	0	-
			1	-
8	Reference channel	A9-02	0	Activate command channel 1 and select c0/c1/c2 as the reference source.
			1	Activate command channel 2 and select c3/c4/c5 as the reference source.
9 to 10	Reserved	/	-	-
11	RFG ramp change permission	C8-48	0	Disable
			1	Enable
12..15	Reserved	/	-	-

4.7.7.5 Internal Control Word 4

Control word 4 can be viewed by using parameter U5-43. The following table lists bits of control word 4 and their corresponding parameters.

Bit	Name	Para.	Value	Description
0 to 15	Reserved	-	0	-
			1	

4.7.8 Status word

4.7.8.1 Overview of Status Words

A state word is a set of bit codes for the running states of the drive. Check the status word to determine the system status.

4.7.8.2 Internal Status Word 1

Status word 1 can be viewed by using connector U5-44. Status word 1 indicates the major running status of the system. The following table lists bits of status word 1 and their corresponding bit connectors and meanings.

Bit	Name	Connector	Value	Description
0	Ready to switch on	U1-12	0	The AC drive is faulty or external conditions are not met (see switch-on blocking).
			1	Ready to switch on. The value is 1 regardless of whether there is a run (OFF1) command or not.
1	Ready to run	U1-13	0	There is no run command.
			1	A run command is received and the bus voltage is rising. The value is 1 regardless of whether there is a running permission command or not.

Bit	Name	Connector	Value	Description
2	Run	U1-14	0	There is no running permission signal.
			1	The value is 1 upon normal operation, including jogging.
3	Fault activation	U1-15	0	There is no fault.
			1	A fault is activated.
4	OFF2	U1-16	0	OFF2 is enabled and coast to stop is activated.
			1	OFF2 is disabled and coast to stop is not activated.
5	OFF3	U1-17	0	OFF2 is enabled and quick stop is activated.
			1	OFF2 is disabled and quick stop is not activated.
6	Switch-on blocking (switch-on prohibited)	U1-18	0	Normal
			1	External conditions are not met (OFF2/ OFF3 active) or faults occur.
7	Alarm/Active limit	U1-19	0	Normal
			1	An alarm or a limit is active.
8	Deviation between motor speed and speed reference	U1-20	0	The actual speed deviates from the speed reference.
			1	The actual speed follows the speed reference.
9	IDS control disable	U1-21	0	IDS local control is enabled, and the control channel or operating panel local control is enabled.
			1	IDS local control is disabled, and the control channel or operating panel local control is enabled.
10	Speed comparison reached	U1-22	0	The actual speed is lower than the comparison value.
			1	The actual speed is higher than the comparison value.
11	Current/Torque limit reached	U1-23	0	The torque or current does not reach the limit.
			1	The torque or current reaches the limit.
12	Forward speed	U1-24	0	The motor speed is negative.
			1	The motor speed is positive.
13	Reverse speed	U1-25	0	The motor speed is positive.
			1	The motor speed is negative.
14	Current control channel	U1-26	0	Control channel 1 is enabled, and [A9-00] is 0.
			1	Control channel 2 is enabled, and [A9-00] is 1.
15	IGBT operation	U1-27	0	IGBT is blocked.
			1	IGBT is triggered.

Status words indicate the working status of MD580. The following figure shows how the status bits change with control words.

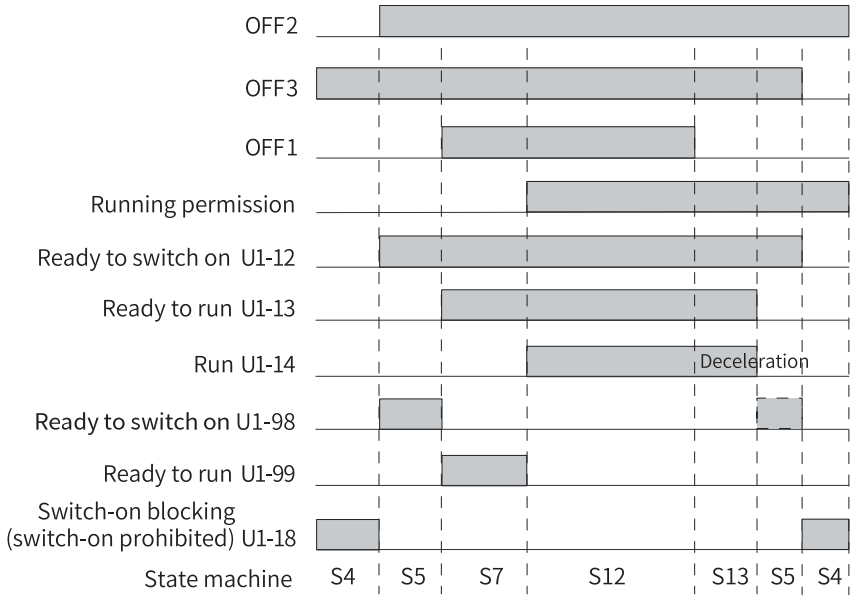


Figure 4-20 Status bit sequence diagram

4.7.8.3 Internal Status Word 2

Status word 2 can be viewed by using parameter U5-45. Status word 2 indicates the auxiliary status of the system.

Bit	Name	Connector	Value	Description
0	RFG enable	U1-28	0	The ramp function generator is disabled, and the output is 0.
			1	The ramp function generator works properly.
1	RFG running	U1-29	0	The ramp function generator stops working, and the supplementary speed is inactive (for example, during the stop process).
			1	The ramp function generator is working.
2	Stopped upon fault	U1-30	0	Disable
			1	Stopped upon fault
3	Normal operation	U1-31	0	The motor is not running or jogging.
			1	Motor operation is started by the run (OFF1) command.
4	Jogging	U1-32	0	The motor is not running or jogging.
			1	Motor operation is started by the jog command.
5	Current reference channel	U1-33	0	Reference channel 1 is activated, and [A9-02] is 0.
			1	Reference channel 2 is activated, and [A9-02] is 1.
6	Motor auto-tuning	U1-34	0	Auto-tuning is not ongoing.
			1	Motor parameter auto-tuning is ongoing.
7	There is an active limit.	U1-35	0	There is no active limit.
			1	There is an active limit.

Bit	Name	Connector	Value	Description
8	There is an alarm.	U1-36	0	There is no alarm.
			1	There is an alarm.
9	MDS selection bit0	U1-37	0	Inactive when [A9-04] is 0
			1	Active when [A9-04] is 1
10	MDS selection bit1	U1-38	0	Inactive when [A9-05] is 0
			1	Active when [A9-05] is 1
11	Operating panel control enable	U1-39	0	Local control by the operating panel is not activated.
			1	Local control by the operating panel is activated by the Local/Rem key on the operating panel. The AC drive is controlled by the operating panel instead of the control channel.
12	There is no fault.	U1-40	0	There is a fault.
			1	There is no fault.
13	Alarm and active limit	U1-41	0	There is an alarm or active limit.
			1	There is no alarm and no active limit.
14	Active limit	U1-42	0	There is an active limit.
			1	There is no active limit.
15	Alarm	U1-43	0	There is an alarm.
			1	There is no alarm.

4.7.8.4 Internal Status Word 3

Status word 3 can be viewed by using parameter U5-46. Status word 3 indicates the auxiliary status of the system.

Bit	Name	Connector	Value	Description
0	In self-test	U1-44	0	Disable
			1	The system is in self-test.
1	Decelerate to stop	U1-45	0	Disable
			1	The system is decelerating to stop.
2	Quick stop	U1-46	0	Disable
			1	The system is stopping quickly.
3	Speed reference being 0	U1-47	0	The speed reference is not 0.
			1	Speed reference being 0
4	Motor overspeed	U1-48	0	Disable
			1	The motor speed exceeds the speed limit.
5	Motor at zero speed	U1-49	0	The motor is not at zero speed.
			1	The motor is at zero speed.
6	Actual speed reaching target	U1-50	0	The motor speed has not reached the set target speed.
			1	The motor speed is in the range of the set target speed.
7	Excessive speed deviation of motor	U1-51	0	The motor speed follows the speed reference.
			1	The motor speed does not follow the speed reference.

Bit	Name	Connector	Value	Description
8	Stopping at maximum capability	U1-52	0	Disable
			1	The system is stopping at the maximum capability.
9	Fan start/stop command	U1-53	0	The fan is not running.
			1	The fan is running.
10	DC bus voltage normal	U1-54	0	The DC bus voltage is lower than the undervoltage threshold.
			1	The DC bus voltage is higher than the undervoltage threshold.
11	STO activation	U1-55	0	The STO1 and STO2 input signals are normal.
			1	The STO1 and STO2 input signals are disconnected.
12	STO non-activation	U1-56	0	The STO1 and STO2 input signals are disconnected.
			1	The STO1 and STO2 input signals are normal.
13	IDS control enable	U1-57	0	IDS control is disabled, while the control channel or operating panel control is enabled.
			1	IDS control is enabled, while the control channel and operating panel control are disabled.
14	Local control disable	U1-58	0	IDS control or operating panel control is enabled, while the control channel is disabled.
			1	IDS control and operating panel control are disabled, while the control channel is enabled.
15	Local control enable	U1-59	0	IDS control and operating panel control are disabled, while the control channel is enabled.
			1	IDS control or operating panel control is enabled, while the control channel is disabled.

4.7.8.5 Internal Status Word 4

Status word 4 can be viewed by using parameter U5-47. Status word 4 indicates the auxiliary status of the system.

Bit	Name	Connector	Value	Description
0	Speed control enable	U1-60	0	The system is in a mode other than the speed control mode.
			1	The system is in the speed control mode.
1	Torque control enable	U1-61	0	The system is in a mode other than the torque control mode.
			1	The system is in the torque control mode.

Bit	Name	Connector	Value	Description
2	Position control enable (reserved)	U1-62	0	-
			1	-
3	Brake open command	U1-63	0	Disable
			1	Enable
4	Brake control	U1-64	0	Disable
			1	Enable
5	Reserved	U1-65	0	-
			1	-
6	Brake opened	U1-66	0	The brake is not completely opened.
			1	The brake is completely opened.
7	Brake closed	U1-67	0	The brake is not completely closed.
			1	The brake is completely closed.
8	Establishing starting torque	U1-68	0	The brake function is disabled or does not work, or the brake open command has taken effect or the system is not in vector control.
			1	The brake function is enabled. After receiving the operating command, the system is establishing the starting torque before the brake open command takes effect.
9	Establishing starting speed	U1-69	0	The brake function is disabled or does not work, or the brake open command has taken effect.
			1	The brake function is enabled. After receiving the operating command, the system is establishing the starting speed before the brake open command takes effect.
10	Memory torque enable	U1-70	0	The brake function is disabled or the system is not in vector control.
			1	The brake function is enabled. In vector control, the torque is retained when the brake is closed.
11	Started (closing ON)	U1-71	0	The system is in the state of initialization, fault, switch-on blocking, ready to switch on, ready for auto-tuning, restoring factory defaults, or parameter downloading.
			1	The system is in a normal state and receives the start command.
12	DC braking	U1-72	0	The system is not in the DC braking startup or DC braking stop state.
			1	The system is in the DC braking startup or DC braking stop state.
13	Flying start	U1-73	0	The system is not in the flying start state.
			1	The system is in the flying start state.

Bit	Name	Connector	Value	Description
14	Pre-exciting	U1-74	0	The system is not in the pre-excitation state.
			1	The system is in the pre-excitation state.
15	OFF3 activation	U1-75	0	Inactive. The OFF3 command is 1 (normal).
			1	Active. The OFF3 command is 0 (activated).

4.7.9 State Machine

The following table describes different states of the state machine.

State	Name	Description
S1	System initialization	The program is initialized and waits for the establishment of the control voltage. When the condition is met, the state machine enters S4.
S2	Detection upon power-on (reserved)	-
S3	Faulty	The state machine enters S3 when a fault occurs in any state. After the fault is reset, the state machine enters S4.
S4	Switch-on blocking	The state machine enters S5 when no OFF2, OFF3, STO, or OFF1 signal is received. Otherwise, the state machine waits for the corresponding command in this state.
S5	Ready to switch on	The state machine waits for the Run (OFF1) command and enters S6 at the rising edge of the command. The state machine enters S6 when the jog command is valid. The state machine enters S18 when the value of b5-00 is greater than 0.
S6	Pre-charge	The state machine waits for the establishment of the DC bus voltage and then enters S7. When A6-00 is 0 and the bus voltage is not normal within 3s, the 9-3 pre-charge timeout fault is reported and the state machine enters this state. When A6-00 is 1 and the bus voltage is still not normal after the starting time defined in A6-01 expires or A6-02 is invalid, the 9-3 pre-charge timeout fault is reported and the state machine enters this state.
S7	Ready to run	The state machine enters this state after receiving the running permission signal.
S8	Waiting for demagnetization	When the pulse is inhibited for the first time, if the actual motor speed is greater than the zero speed threshold, the state machine has to wait until the interval is greater than the demagnetization time defined in E1-15. If the inhibition duration is longer than the demagnetization time, the state machine enters S9.
S9	Detection before running	The state machine detects the selected item. If no detection item before running is selected, the state machine skips this state. The state machine enters S10, S11 or S15, depending on the startup mode.

State	Name	Description
S10	Pre-excitation	The state machine creates a magnetic field for the asynchronous motor and then enters S12.
S11	Flying start	The state machine searches for the current motor speed and then enters S12.
S12	Run	The state machine runs normally and can accept speed or torque references. The state machine enters S13 after receiving a "decelerate to stop" command. The state machine enters S14 after receiving a "quick stop" command. The state machine enters S27 after receiving a "stop at maximum capability" command. The state machine enters S4 when the OFF2 or STO signal is activated. When a fault is activated, the state machine enters S3, S13, S14, or S27, depending on the fault action or remains in S12.
S13	Decelerate to stop	The state machine decelerates to 0 RPM according to the deceleration time of the ramp function generator, inhibits the pulse, and then enters S5. When a fault is triggered, the state machine responds to the fault and enters S3.
S14	Quick stop	The state machine decelerates to 0 RPM according to the quick stop time, inhibits the pulse, and then enters S4. For response to the action of fault activation, the state machine enters S3.
S15	DC braking at startup	The state machine applies a DC current to the asynchronous motor before startup to ensure that the motor brakes to zero speed. The state machine enters S12 after the braking time is reached.
S16	Ready for self-test (reserved)	-
S17	Self-test (reserved)	-
S18	Ready for auto-tuning	The state machine enters S19 at the rising edge of the RUN (OFF1) command.
S19	Auto-tuning	The state machine auto-tunes the motor parameters and then enters S4.
S20	Parameter restoration	The state machine restores the motor parameters to defaults and then enters S4.
S21	Parameter download	The state machine downloads the motor parameters in batch in background and then enters S4.
S22	Jogging	The state machine enters S12 when the jog command is canceled.
S25	DC braking at stop	The state machine supplies a DC current to the asynchronous motor to force the motor to stop and then enters S4 after a certain period of time.
S26	Waiting for DC braking at stop	When the motor decelerates to a value smaller than the threshold for a period of time, the state machine enters S25.
S27	Stop at maximum capability	The state machine decelerates to 0 RPM according to the maximum capacity, inhibits the pulse, and then enters S5. For response to the action of fault activation, the state machine enters S3.

State diagram

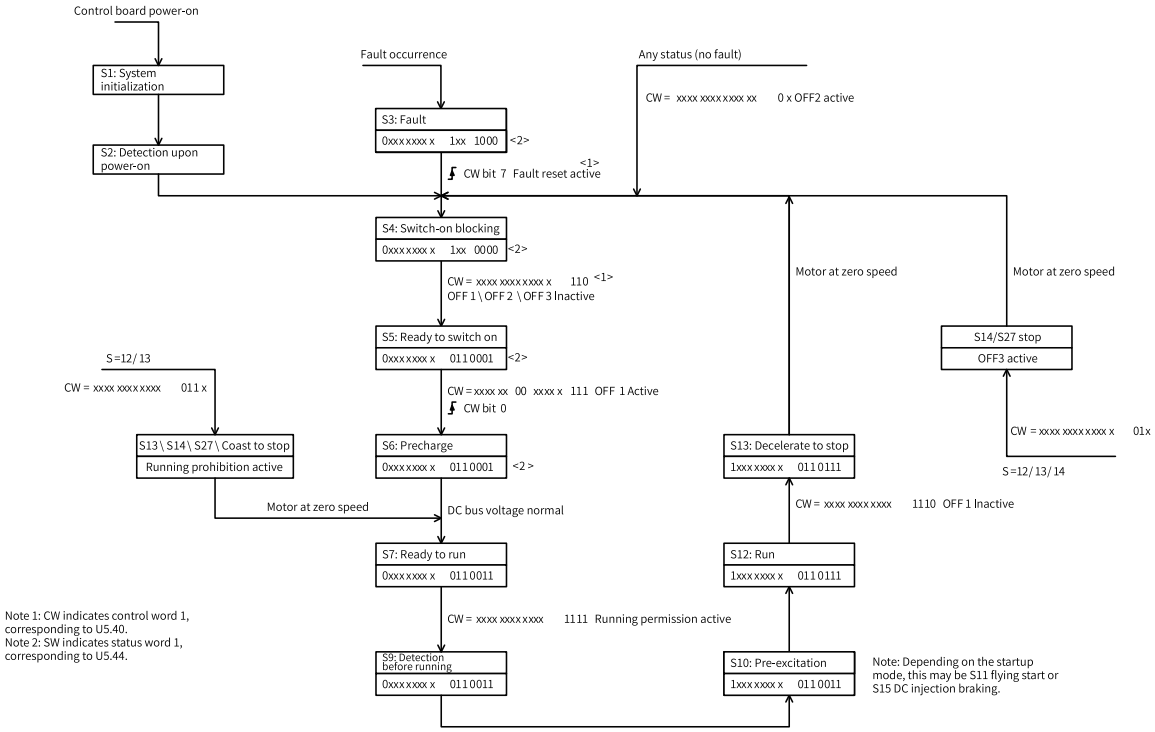


Figure 4-21 State conversion diagram of the state machine

4.8 Reference Channel

4.8.1 Speed Reference

Speed reference can be given through two channels: the primary reference channel and the secondary reference channel, as shown in the following figure.

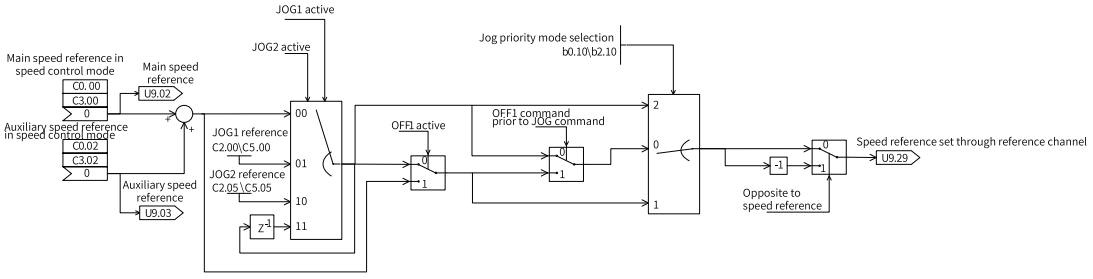


Figure 4-22 Speed reference function implementation flowchart 1

Jog priority mode	Description
0	The priority of OFF1 is the same as that of jog. The one used first prevails.
1	The priority of OFF1 is higher than that of jog
2	The priority of jog is higher than that of OFF1.

The primary reference and secondary reference are added as the input of the ramp function generator. After the acceleration/deceleration time, the actual speed reference is generated.

Sometimes, a speed regulation reference that is enabled directly without acceleration/deceleration time is required for the process. The function implementation flowchart H328 provides a supplementary speed reference, which is enabled only during running. It is added to the RFG output speed when it is being enabled. The additional speed is enabled only in FVC and SVC control modes.

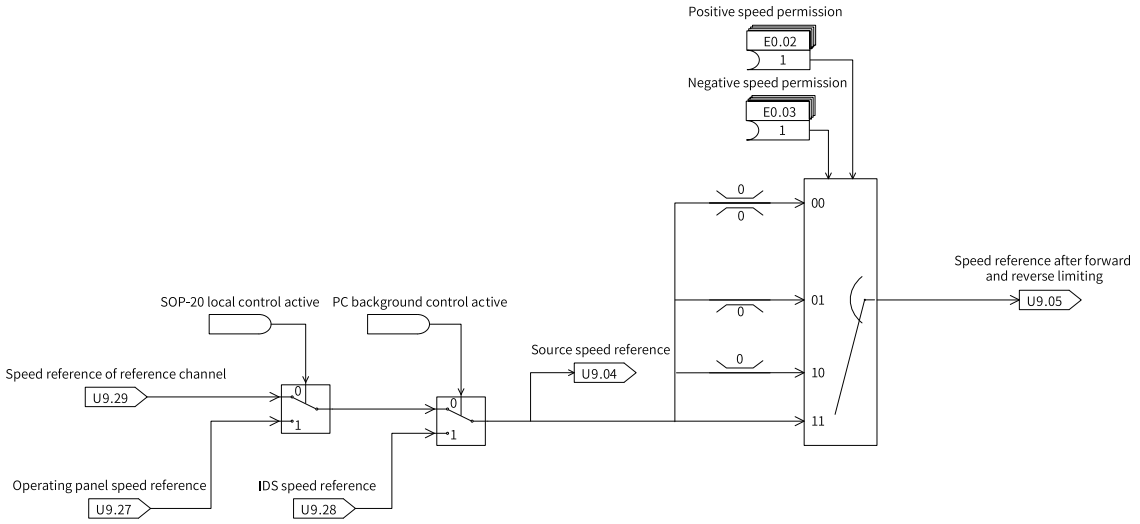


Figure 4-23 Speed reference function implementation flowchart 2

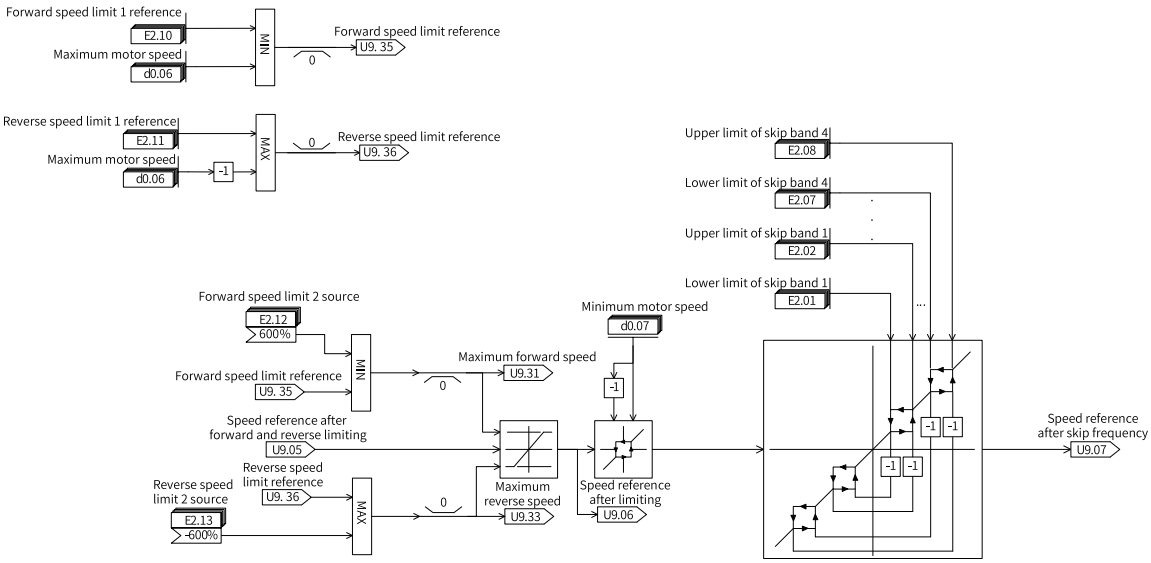


Figure 4-24 Speed reference function implementation flowchart 3

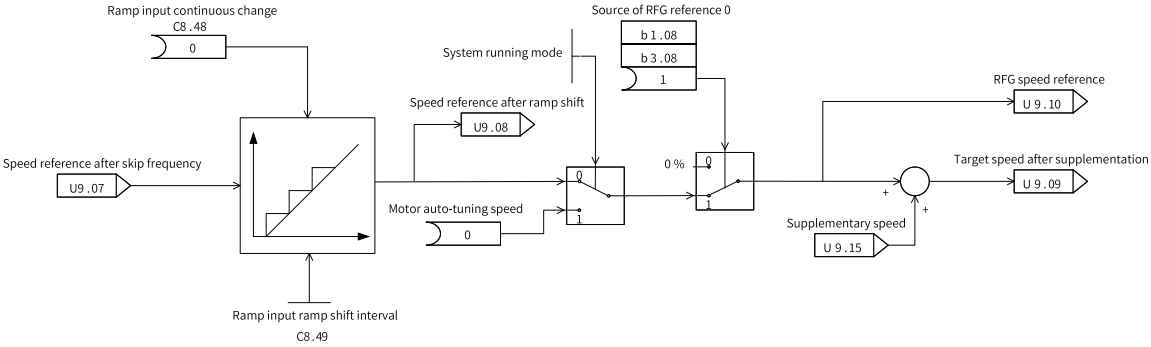


Figure 4-25 Speed reference function implementation flowchart 4

The primary reference and secondary reference are added as the input of the ramp function generator. After the acceleration/deceleration time, the actual speed reference is generated.

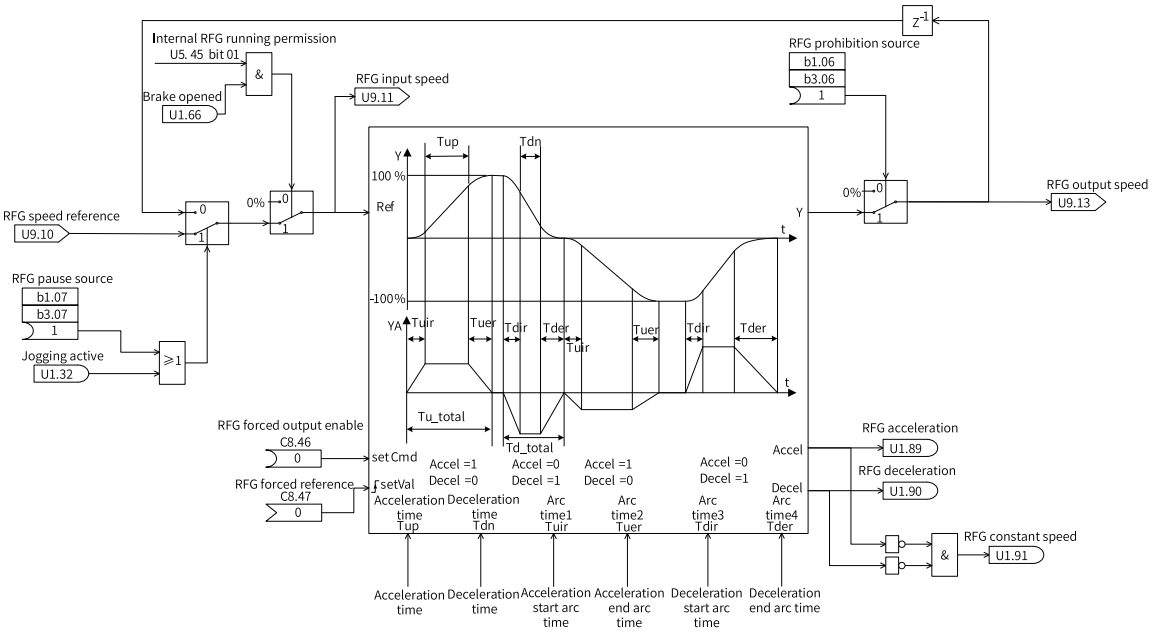


Figure 4-26 RFG processing function implementation flowchart

Sometimes, a speed regulation reference that is enabled directly without acceleration/deceleration time is required for the process. The system provides a supplementary speed reference, which is enabled only during running. It is added to the RFG output speed when it is being enabled.

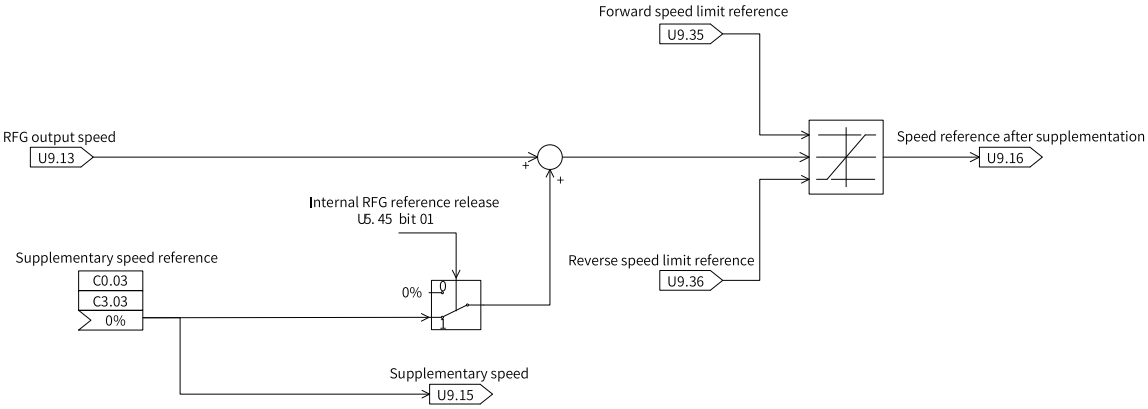


Figure 4-27 Supplementary speed reference function implementation flowchart

Speed references can be sourced from the analog, communication, and multi-reference values. Take reference channel 1 as an example. The following table lists the parameters of channel 1.

Para.	Name	Reference
C0-00	Source of main speed in speed control	0: Digital setting Other: K connector
C0-01	Digital setting of main speed in speed control	–600.0% to +600.0%
C0-02	Source of auxiliary speed in speed control	0: 0 Other: K connector

Para.	Name	Reference
C0-03	Source of supplementary speed in speed control	0: 0 Other: K connector
C2-00	JOG1 speed source	0: Digital setting Other: K connector
C2-01	Digital setting of JOG1 speed	–600.0% to +600.0%
C2-05	JOG2 speed source	0: Digital setting Other: K connector
C2-06	Digital setting of JOG2 speed	–600.0% to +600.0%

The speed reference is in percentage format. Its base value (100%) is determined based on the per-unit speed base value (d3-00).

4.8.2 Torque Reference

The following figure shows the torque reference. When torque control is enabled, the main torque reference undergoes a series of processing, including limiting, filtering, and ramp acceleration and deceleration time process, and superimposition of supplementary torque reference, to produce the actual running torque reference.

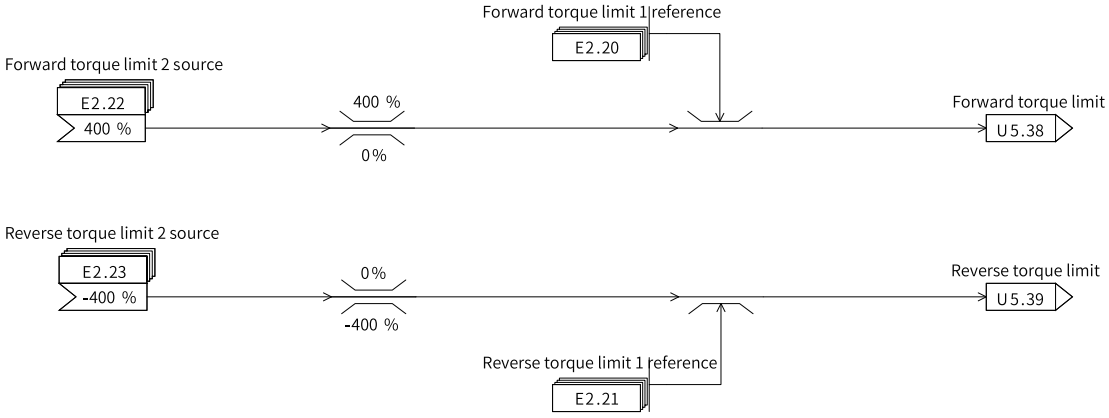


Figure 4-28 Forward and reverse torque limits

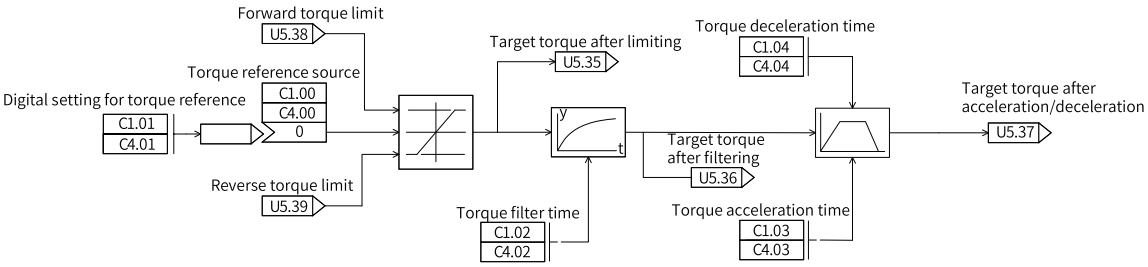


Figure 4-29 Torque command channel in torque control

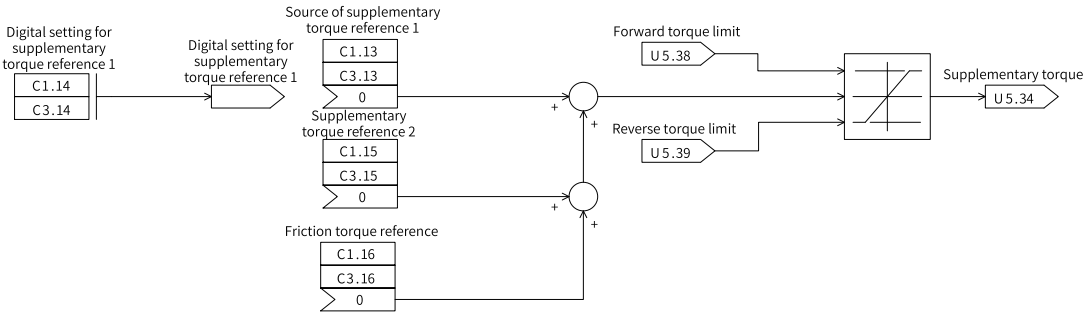


Figure 4-30 Supplementary torque command channel

Two channels are available for torque reference. The following table describes the parameters of channel 1.

Para.	Name	Reference
C1-00	Torque reference selection in torque control	0: Digital setting Other: K connector
C1.01	Digital setting of torque reference	–400.0% to 400.0%
C1.02	Torque filter time	0 ms to 10000 ms
C1.03<1>	Torque acceleration time	0.000s to 60.000s
C1.04<2>	Torque deceleration time	0.000s to 60.000s
C1.13	Source of supplementary torque reference 1	0: Digital setting Other: K connector
C1.14	Digital setting of supplementary torque reference 1	–400.0% to 400.0%
C1.15	Supplementary torque reference 2	0: 0 Other: K connector
C1.16	Friction torque reference	0: 0 Other: K connector
C1-10	RFG feedforward torque coefficient	0: 0% 1: 100% Other: K connector
C1-11<2>	Torque ramp acceleration time	0.000s to 60.000s
C1-12<3>	Torque ramp deceleration time	0.000s to 60.000s
E2-20	Forward torque limit 1 reference	0.0% to 400.0%
E2-21	Reverse torque limit 1 reference	–400.0% to 0.0%
E2-22	Forward torque limit 2 source	0: 400% Other: K connector
E2-23	Reverse torque limit 2 source	0: -400% Other: K connector

Note

- <1>: Acceleration time: Time for the motor torque to increase from 0 to the rated torque.
- <2>: Deceleration time: Time for the motor torque to decrease from the rated torque to 0.

4.8.3 Multi-speed Reference

When multi-reference is enabled, multi-reference values 1 to 16 (U19-02 to U19-17) can be directly used as the reference. If multi-reference values 13 to 16 are used, the accuracy is higher. Alternatively, the multi-reference selection output (U9-01) can be used as the reference. In this case, C6-03 to C6-06 determine the actually enabled multi-reference values. The following table lists the parameter settings.

Para.	Name	Reference
C6-03 to C6-06	Multi-reference selection bit0/bit1/ bit2/bit3	0: 0 1: 1 Other: B connector
C6-07	Source of multi-reference value 1	0: C6-11 parameter setting Other: K connector
C6-08	Source of multi-reference value 2	0: C6-12 parameter setting Other: K connector
C6-09	Source of multi-reference value 3	0: C6-13 parameter setting Other: K connector
C6-10	Source of multi-reference value 4	0: C6-14 parameter setting Other: K connector
C6-11 to C6-22	Multi-reference values 1 to 12	–600.0% to +600.0%
C6-23 to C6-26	Multi-reference values 13 to 16	–300.00% to 300.00%

0000 (binary) to 1111 (binary) corresponding to C6-03 to C6-06 also corresponds to multi-reference values 1 to 16 in sequence, which can be viewed in C6-00 and C6-01.

Multi-reference values 1 to 4 can be sourced from the connector or indicated by C6-11 to C6-14.

Multi-reference Value	[C6-06] Bit3	[C6-05] Bit2	[C6-04] Bit1	[C6-03] Bit0	Enabled Multi-Reference Value of U19-01	Connector Parameter Corresponding to Multi-Reference Value
Multi-reference value 1	0	0	0	0	[C6-07]/C6-11	U19-02
Multi-reference value 2	0	0	0	1	[C6-08]/C6-12	U19-03
Multi-reference value 3	0	0	1	0	[C6-09]/C6-13	U19-04
Multi-reference value 4	0	0	1	1	[C6-10]/C6-14	U19-05
Multi-reference value 5	0	1	0	0	C6-15	U19-06
Multi-reference value 6	0	1	0	1	C6-16	U19-07

Multi-reference Value	[C6-06] Bit3	[C6-05] Bit2	[C6-04] Bit1	[C6-03] Bit0	Enabled Multi-Reference Value of U19-01	Connector Parameter Corresponding to Multi-Reference Value
Multi-reference value 7	0	1	1	0	C6-17	U19-08
Multi-reference value 8	0	1	1	1	C6-18	U19-09
Multi-reference value 9	1	0	0	0	C6-19	U19-10
Multi-reference value 10	1	0	0	1	C6-20	U19-11
Multi-reference value 11	1	0	1	0	C6-21	U19-12
Multi-reference value 12	1	0	1	1	C6-22	U19-13
Multi-reference value 13	1	1	0	0	C6-23	U19-14
Multi-reference value 14	1	1	0	1	C6-24	U19-15
Multi-reference value 15	1	1	1	0	C6-25	U19-16
Multi-reference value 16	1	1	1	1	C6-26	U19-17

Bit0 to bit3 of U0-32 to U0-33 multi-reference values are indicated by bit0/bit1/bit2/bit3 of C6-03 to C6-06 in sequence.

Multi-reference Selection	Connector Parameter Corresponding to Multi-Reference Selection
Multi-reference value bit0 C6-03	U0-32
Multi-reference value bit1 C6-04	U0-33
Multi-reference value bit2 C6-05	U0-34
Multi-reference value bit3 C6-06	U0-35

4.8.4 Motor-driven Potentiometer

The function diagram of the motor-driven potentiometer is as follows.

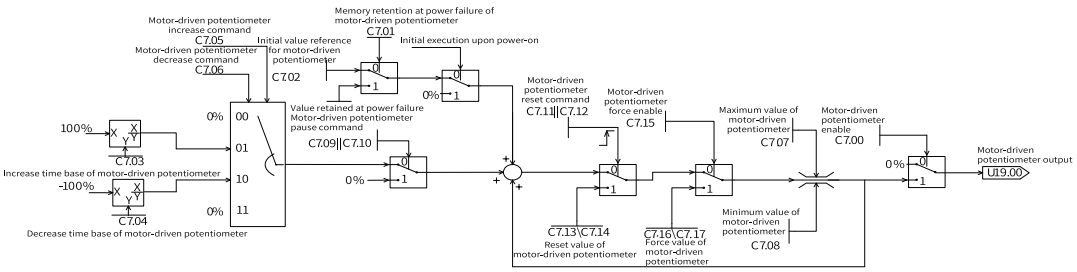


Figure 4-31 Function diagram of motor-driven potentiometer

The following table lists the function parameters of the motor-driven potentiometer.

Para.	Name	Description	Reference
C7-00	Motor-driven potentiometer	Function disabling and enabling for the motor-driven potentiometer	0: Disable 1: Enable
C7-01	Memory retention at power failure of motor-driven potentiometer	Restoration of the output value to the current value upon power failure and power-on when the function is enabled. Otherwise, the value is restored to the initial value of C7.02.	0: Disable 1: Enable
C7-02	Initial value of motor-driven potentiometer	Initial value of the motor-driven potentiometer output when the motor-driven potentiometer is not retentive at power failure.	–600.0% to +600.0%
C7-03	Increase time base of motor-driven potentiometer	Output value increase rate, in 100%/t.	0.00s to 600.00s
C7-04	Decrease time base of motor-driven potentiometer	Output value decrease rate, in 100%/t.	0.00s to 600.00s
C7-05	Source of motor-driven potentiometer increase command	Output value increases by the rate indicated by C7.03 when the command is valid.	0: Disable 1: Enable Other: B connector
C7-06	Source of motor-driven potentiometer decrease command	Output value decreases by the rate indicated by C7.04 when the command is valid.	0: Disable 1: Enable Other: B connector
C7-07	Maximum value of motor-driven potentiometer output	Maximum output value.	–600.0% to +600.0%
C7-08	Minimum value of motor-driven potentiometer output	Minimum output value.	–600.0% to +600.0%
C7-09	Source 1 of motor-driven potentiometer pause command	Output value is retained when the command is valid.	0: Disable 1: Enable Other: B connector

Para.	Name	Description	Reference
C7-10	Source 2 of motor-driven potentiometer pause command	Output value is retained when the command is valid.	0: Disable 1: Enable Other: B connector
C7-11	Source 1 of motor-driven potentiometer reset command	Triggering of equivalence between the current output value and the reset value indicated by C7.13 after activation when the rising edge is valid.	0: Disable 1: Enable Other: B connector
C7-12	Source 2 of motor-driven potentiometer reset command	Triggering of equivalence between the current output value and the reset value indicated by C7.13 after activation when the rising edge is valid.	0: Disable 1: Enable Other: B connector
C7-13	Source of motor-driven potentiometer reset value	Source of the reset value.	0: Digital setting Other: K connector
C7-14	Reset value of motor-driven potentiometer	Digital reset value when C7-13 is set to 0.	–600.0% to +600.0%
C7-15	Source of motor-driven potentiometer force command	Motor-driven potentiometer output value as the force value of C7-16 when the parameter is set to 1.	0: Disable 1: Enable Other: B connector
C7-16	Source of motor-driven potentiometer force value	Source of the force value.	0: Digital setting Other: K connector
C7-17	Force value of motor-driven potentiometer	Digital force value when C7-16 is set to 0.	–600.0% to +600.0%

4.9 Start/Stop by Terminal

4.9.1 Overview of Terminal Start/Stop Modules

Six different templates are provided to control motor running and stop and a maximum of three terminals are required for cooperation. The three terminals are separately defined as IN1, IN2, and IN3.

Two groups of terminal start/stop modes can be configured for the terminal start/stop module. This parameter can be set to enable terminal start/stop module A or B. When module A is enabled, b4-03 to b4-011 are enabled. When module B is enabled, b4-13 to b4-21 are enabled. The following table lists the input terminal parameters of the terminal start/stop module.

[b4-02] Terminal Start/Stop Command 1/2 Selection	IN1 Enabled Parameter	IN2 Enabled Parameter	IN3 Enabled Parameter
[0]: Terminal start/stop command 1	b4-05	b4-06	b4-07
[1]: Terminal start/stop command 2	b4-15	b4-16	b4-17

Confirm the terminal connection first. Ensure that the set parameters match the terminal connection. For example, when terminal start/stop module A is enabled, b4-05 corresponds to terminal DI1 (unless otherwise specified, DI1 corresponds to b4-05, DI2 corresponds to b4-06, and DI3 corresponds to b4-07); when terminal start/stop module B is enabled, set b4-15 to b4-17 in sequence.

The following table lists the parameters indicating six terminal start/stop modes (suffix P indicates that the command is active at the rising edge).

Para.	Name	Value Range	Default	Unit	User Setting	Remarks
b4-03/b4-13	Terminal start/stop mode	0: Disable 1: IN1 start 2: IN1 start, IN2 direction 3: IN1 start in forward direction, IN2 start in reverse direction 4: IN1P start, IN2 stop 5: IN1P start, IN2 stop, IN3 direction 6: IN1 start in forward direction, IN2 start in reverse direction, IN3 stop	The factory defaults for b4-03 and b4-13 are 0.	-	-	-

The following table lists the relationships between the input and start/stop command OFF1 and reference direction DIR.

Terminal Start/ Stop Mode	IN1 Input	IN2 Input	IN3 Input	Start Command OFF1	Reference Direction DIR
0: Disable	X	X	X	0: Stop	0: Forward
1: IN1 start	0→1	X	X	1: Run	0: Forward
	0	X	X	0: Stop	0: Forward
2: IN1 start, IN2 direction	0	N	X	0: Stop	N = IN2
	0→11	N	X	1: Run	N = IN2
3: IN1 start in forward direction, IN2 start in reverse direction	0	0	X	0: Stop	Depending on the running direction before stop
	0→1	0	X	1: Run	0: Forward
	0	0→1	X	1: Run	1: Reverse
	1	1	X	0: Stop	Depending on the running direction before stop

Terminal Start/ Stop Mode	IN1 Input	IN2 Input	IN3 Input	Start Command OFF1	Reference Direction DIR
4: IN1P start, IN2 stop	X	0	X	0: Stop	0: Forward
	0→1	1	X	1: Run	0: Forward
5: IN1P start, IN2 stop, IN3 direction	X	0	N	0: Stop	N = IN3
	0→1	1	N	1: Run	N = IN3
6: IN1 start in forward direction, IN2 start in reverse direction, IN3 stop	X	X	0	0: Stop	Depending on the running direction before stop
	0→1	0	1	1: Run	0: Forward
	0	0→1	1	1: Run	1: Reverse

Note

1 indicates high level. 0 indicates low level. N indicates 0 or 1, namely, a certain state. X indicates that the bit does not affect the output.

For example, for multi-functional input terminals DI1, DI2, and DI3 used as external terminals, their functions are selected through b4-05 to b4-07 and b4-10 to b4-12.

4.9.2 Terminal Start/Stop Mode 1

It is the most commonly used single-wire mode. Terminal DI1 determines the start/stop of a motor.

K1	Operating command
Close	Run
Open	Stop

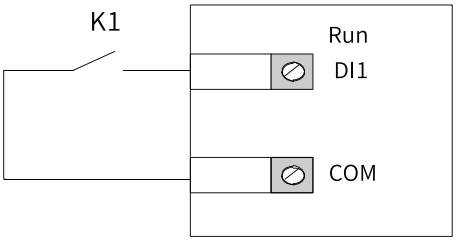


Figure 4-32 Terminal Start/Stop Mode 1

As shown in the preceding figure, one terminal DI1 is used for terminal start/stop mode 1. The DI1 rising edge triggers the operating command. When DI1 is set to 0, the device is stopped.

4.9.3 Terminal Start/Stop Mode 2

In this mode, the DI1 terminal functions as the operation enable terminal, and the DI2 terminal determines the running direction.

K1	K2	Operating command
Close	Open	Forward
Close	Close	Reverse
Open	Open	Stop
Open	Close	Stop

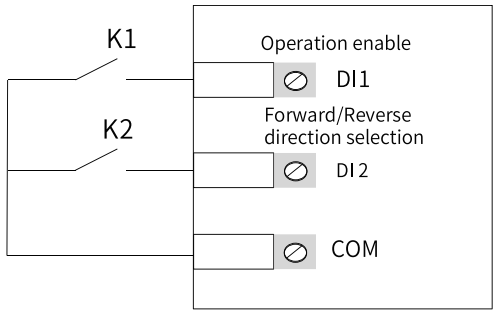


Figure 4-33 Terminal start/stop mode 2

As shown in the preceding figure, two terminals, DI1 and DI2, are used for start/stop and direction control in terminal start/stop mode 2. The start/stop logic of DI1 control in this mode is the same as that in mode 1, but the speed reference is inverted when DI2 is 1.

4.9.4 Terminal Start/Stop Mode 3

K1	K2	Operating command
Close	Open	Forward
Open	Close	Reverse
Close	Close	Stop
Open	Open	Stop

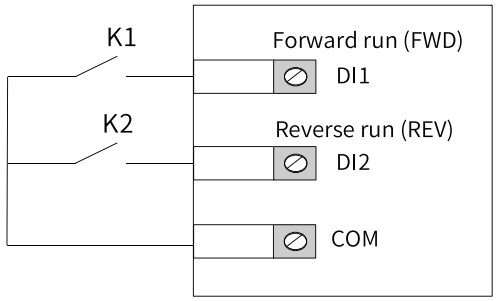


Figure 4-34 Terminal start/stop mode 3

As shown in the preceding figure, two terminals, DI1 and DI2, are used for start/stop and direction control in terminal start/stop mode 3. The DI1 rising edge triggers the operating command and directly uses the speed reference. The DI2 rising edge also triggers the operating command but the speed reference is inverted. When both DI1 and DI2 are set to 0 or 1, the device stops.

4.9.5 Terminal Start/Stop Mode 4

SW1	K	Operating command
X	Open	Stop
Open→Close	Close	Run

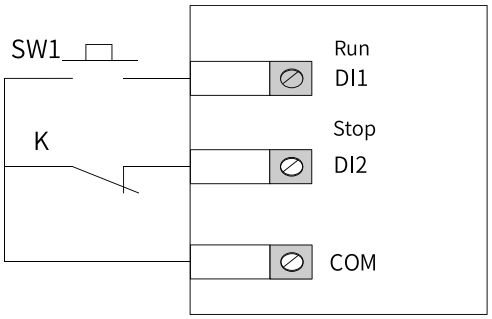


Figure 4-35 Terminal start/stop mode 4

As shown in the preceding figure, two terminals are used for terminal start/stop mode 4, with one controlling start while the other controlling stop. DI2 is set to 1 and the DI1 rising edge triggers the operating command. When DI2 is set to 0, the device is stopped.

4.9.6 Terminal Start/Stop Mode 5

SW1	K1	K2	Operating command
X	Open	X	Stop
Open→Close	Close	Open	Forward
Open→Close	Close	Close	Reverse

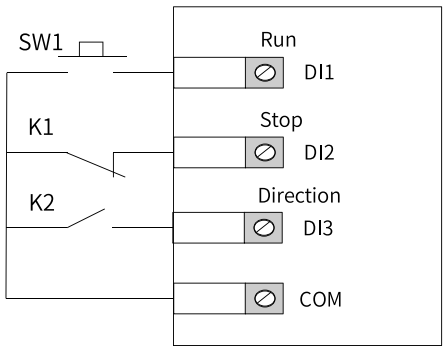


Figure 4-36 Terminal start/stop mode 5

As shown in the preceding figure, three terminals are used for start/stop and direction control. The start/stop logic of DI1 and DI2 control in this mode is the same as that in mode 4, but the speed reference is inverted when DI3 is 1.

4.9.7 Terminal start/stop mode 6

SW1	SW2	K	Operating command
X	X	Open	Stop
Open→Close	Open	Close	Forward
Open	Open→Close	Close	Reverse

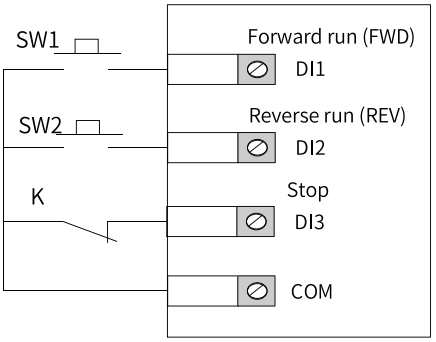


Figure 4-37 Terminal start/stop mode 6

As shown in the preceding figures, three terminals are used to control the start and direction in terminal start/stop mode 6. When DI3 is set to 1, DI1 and DI2 start logic is the same as that of mode 3. However, a running device can stop only when DI3 is set to 0, which is irrelevant to DI1 and DI2 statuses.

4.10 Ramp Function Generator

4.10.1 Overview of the Ramp Function Generator

Parameters in group C8 are used to set the characteristics of the ramp function generator (RFG).

4.10.2 Acceleration/Deceleration Time Setting and Selection

The ramp function generator is used to control the motor acceleration/deceleration time. Four groups of acceleration/deceleration time can be set and switched over by using external commands. When the arc time is set to 0, linear acceleration/deceleration is followed.

- Acceleration time: indicates the time for a motor to accelerate from 0 to the speed indicated by d3-00 (per-unit speed base value).
- Deceleration time: indicates the time for a motor to decelerate from the speed indicated by d3-00 (per-unit speed base value) to 0.
- Acceleration start arc time: indicates the time for the acceleration rate to change from 0 to the maximum acceleration rate (determined by the acceleration/deceleration time) when a motor starts to accelerate (or decelerate) from a steady speed.
- Acceleration end arc time: indicates the time for a motor to transit from the maximum acceleration rate (determined by the acceleration/deceleration time) to a steady speed when the motor is approaching the steady speed (during acceleration or deceleration).
- Deceleration start arc time: indicates the time for the acceleration rate to change from 0 to the maximum acceleration rate (determined by the deceleration time) when a motor starts to decelerate from a steady speed.
- Deceleration end arc time: indicates the time for the acceleration rate to change from the maximum acceleration rate (determined by the deceleration time) to 0 when the motor is approaching the steady speed (during deceleration).

Different acceleration/deceleration curves can be selected by combining different settings of C8-04 and C8-05. For details, see the following table.

Table 4–7 Acceleration/deceleration curve table

Ramp (RFG) Selection Bit1 C8-05	Ramp (RFG) Selection Bit0 C8-04	Acceleration Time	Deceleration Time	Start Arc Time	End Arc Time	Ramp Acceleration Time Adjustment Coefficient	Ramp Deceleration Time Adjustment Coefficient
0	0	C8-08	C8-09	C8-16	C8-17	C8-41	C8-42
0	1	C8-10	C8-11	C8-18	C8-19		
1	0	C8-12	C8-13	C8-20	C8-21		
1	1	C8-14	C8-15	C8-22	C8-23		

- The acceleration time adjustment coefficient indicated by C8-41 takes effect only for the linear acceleration time. The actual Tacc value is the set acceleration time multiplied by the C8-41 value.
- The deceleration time adjustment coefficient indicated by C8-42 takes effect only for the linear deceleration time. The actual Tdec value is the set deceleration time multiplied by the C8-42 value.
- The acceleration/deceleration time adjustment coefficients have no influence on the arc time.

4.10.3 Low-speed Compensation Gain

When the V/f or SVC control mode is used and OFF1 running is normal, the control characteristics at a low speed is always low due to voltage drop of asynchronous motor stator resistance and parameter deviation, causing insufficient motor torque. However, the running is normal at a medium or high speed.

In case of a heavy load and a great acceleration rate, acceleration at a high speed is normal but locked-rotor occurs due to insufficient torque at a low speed. Alternatively, the acceleration rate is reduced to ensure stable running at a low speed, which causes longer acceleration time.

Set the C8-43 parameter (acceleration time gain at low speed) and the C8-44 parameter (low speed threshold) can be set in a proportion, so that the speed lower than C8-44 can be accelerated with a relatively slow acceleration rate, while the medium or high speed above C8-44 can be accelerated with a normal acceleration rate, as shown in the following figure.

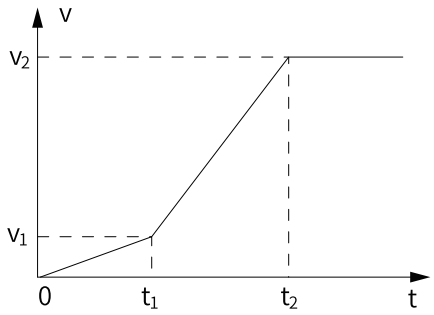


Figure 4-38 Low-speed compensation gain

In the preceding figure, v_1 indicates the speed indicated by C8-44. The motor accelerates from 0 to v_1 within the acceleration time Ta' = [C8-43] x Tacc, in which Tacc is the active acceleration time. The motor accelerates from v_1 to v_2 within the normal acceleration time Tacc.

The low-speed compensation gain is active only for acceleration. The motor decelerates according to the active deceleration time.

4.10.4 Arc Type Selection

In case of abrupt acceleration or deceleration, the output frequency of the ramp function generator is not smooth and the acceleration rate of the output frequency is discontinuous, which may cause motor torque oscillation and damage to mechanical gears.

C8-45 = 0 (arc disabled continuously): The motor immediately decelerates in case of input value change.

C8-45 = 1 (arc enabled continuously): During acceleration, even if the input value suddenly decreases, the motor will execute the end arc (causing overshoot) before deceleration. During deceleration, even if the input value suddenly increases, the motor will execute the end arc (causing overshoot) before acceleration.

Take sudden deceleration during forward acceleration and C8-45 = 1 (arc enabled continuously) as an example. As shown in the following figure, the target frequency at t_0 is F_3 and the motor accelerates to frequency F_2 at t_1. At this time, the target frequency is set to F_1. The RFG output frequency will change with curve 3 (decelerate to run after acceleration rate a is reduced to 0 based on the increasing acceleration of the end arc in the acceleration range) rather than curve 2 (decelerate to run after the acceleration rate is set to 0 in the first period). This helps to solve abrupt change of the acceleration rate a at t_1 and reduces impact of the abrupt change response on the device.

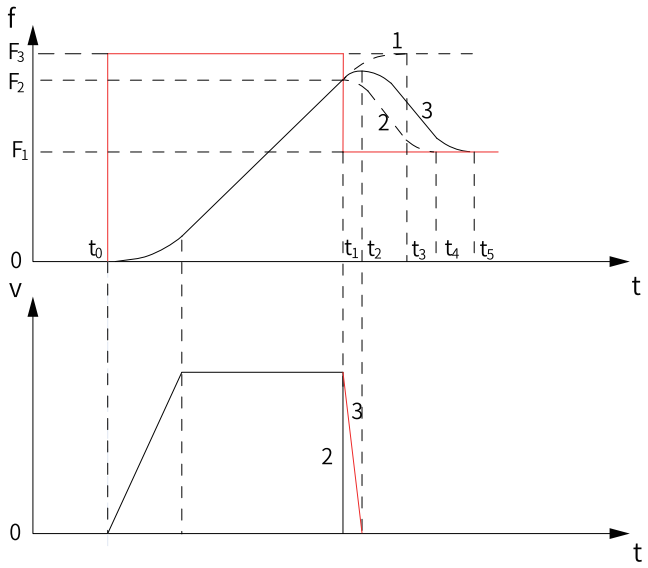


Figure 4-39 Arc type selection

4.11 Brake Control

4.11.1 Overview of Brake Control

Parameters in group L1 are used to set the brake control logic conditions.

Before the drive runs, the mechanical brake is used to block the motor and the driven device in the zero speed state. Users can set d0-16 and L1-00 as needed to determine whether to enable brake control and whether the brake provides the feedback detection function. When brake control is enabled, set relevant parameters based on the actual working conditions and load of the device for effective control by the brake logic to achieve operation safety.

If L1-00 is set to 2, the brake with feedback is selected and the system detects the brake feedback status indicated by L1-03. If the brake opening feedback signal is not obtained within the time indicated by L1-04, the fault ERR84-1 is reported, indicating that the brake fails to open.

If L1-00 is set to 1, the brake is controlled by the time reference and the actual status is not detected.

The L1-23, L1-24, and L1-25 parameters indicate the brake opening conditions. The brake can open only when the output torque is greater than a specified value, ensuring that the gravity load does not slip at the moment the brake opens. In particular, the system speed loop does not act and no torque is output before the brake opens. Therefore, after setting the brake opening conditions, set L1-06 for a starting torque to meet the brake opening conditions. For details about brake control, see the sequence diagram in section 6.5.2.

4.11.2 Typical Brake Configuration

You can configure the brake according to the following templates. (In the following tables, default values are used for parameters in group L1.)

- The brake has no feedback and only has the starting torque to avoid shorting stator during brake opening.

Para.	Name	Value
L1-00	Brake function selection	1: With brake but without detection information
L1-01	Brake open action time	Set the parameter according to the actual brake opening time.
L1-02	Brake close action time	Set the parameter according to the actual brake closing time.
L1-06	Starting torque source in vector control mode	2: L1-07 (digital setting)
L1-07	Digital setting of starting torque	Set according to the estimated load weight.

- The brake has no feedback and uses the retentive torque as the starting torque. After the brake is closed, the motor keeps outputting exciting current for 10s.

Para.	Name	Value
L1-00	Brake function selection	1: With brake but without detection information
L1-01	Brake open action time	Set the parameter according to the actual brake opening time.
L1-02	Brake close action time	10s, or (actual brake closing time + 10s). After the brake is closed, the motor must keep outputting a current for 10s.
L1-06	Starting torque source in vector control mode	1: Automatic retentive torque
L1-07	Digital setting of starting torque	Use the torque set by L1-07 as the retentive torque when the motor is started for the first time. You can also set the parameter according to the estimated load weight.
L1-08	Gain coefficient of automatic retentive torque	It is 100% in general cases. To adjust the proportion of the retentive torque, set L1-08.
L1-22	Braking opening permission command source	This parameter specifies an external brake control condition. When it is set to 0, the brake cannot open. When the brake is open, setting L1-22 to 0 will not close the brake.
L1-23	Brake open comparison source	This parameter specifies an additional condition for determining brake opening. If L1-23 is set to 0, the condition is inactive. If L1-23 is set to a connector, when brake opening determination starts, only when the connector is greater than the threshold for a duration indicated by L1-25 can the brake open.
L1-24	Brake open comparison threshold	
L1-25	Brake open delay	

- The brake can be opened only when the brake has feedback and the output torque is 35% of the rated torque.

Para.	Name	Value
L1-00	Brake function selection	2: With brake and detection information
L1-01	Brake open action time	Set the parameter according to the actual brake opening time.
L1-02	Brake close action time	Set the parameter according to the actual brake closing time.
L1-03	Brake feedback point source	4: DI3 (when brake feedback is assigned to DI3, 1 means brake opening and 0 means brake closing)
L1-06	Starting torque source in vector control mode	2: L1-07 (digital setting)

Para.	Name	Value
L1-07	Digital setting of starting torque	40% (the value here must be greater than 35%)
L1-23	Brake open comparison source	U7-78 (output torque)
L1-24	Brake open comparison threshold	35%
L1-25	Brake open delay	0.5s (you can decrease this value to avoid fluctuation of measured value and accelerate brake opening.)

4.11.3 Timing Sequence Diagram

4.11.3.1 Vector Control

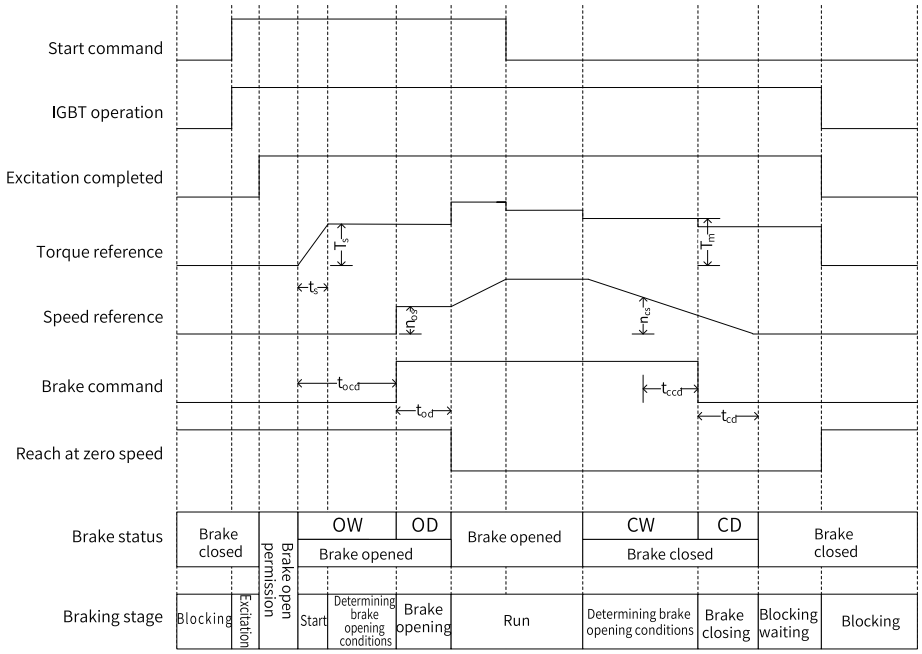


Figure 4-40 Vector control brake sequence diagram

T_s: Starting torque upon brake opening

T_m: Memory torque upon brake closing

n_{os}: Starting speed upon brake opening

n_{cs}: Speed threshold upon brake closing

t_s: Acceleration time reference upon brake opening

t_{ocd}: Comparison delay upon brake opening

t_{od}: Brake open action time

t_{ccd}: Brake close delay

t_{cd}: Brake close action time

OW: Brake open waiting time

OD: Brake open delay

CW: Brake close waiting time

CD: Brake close delay

4.11.3.2 V/f Control

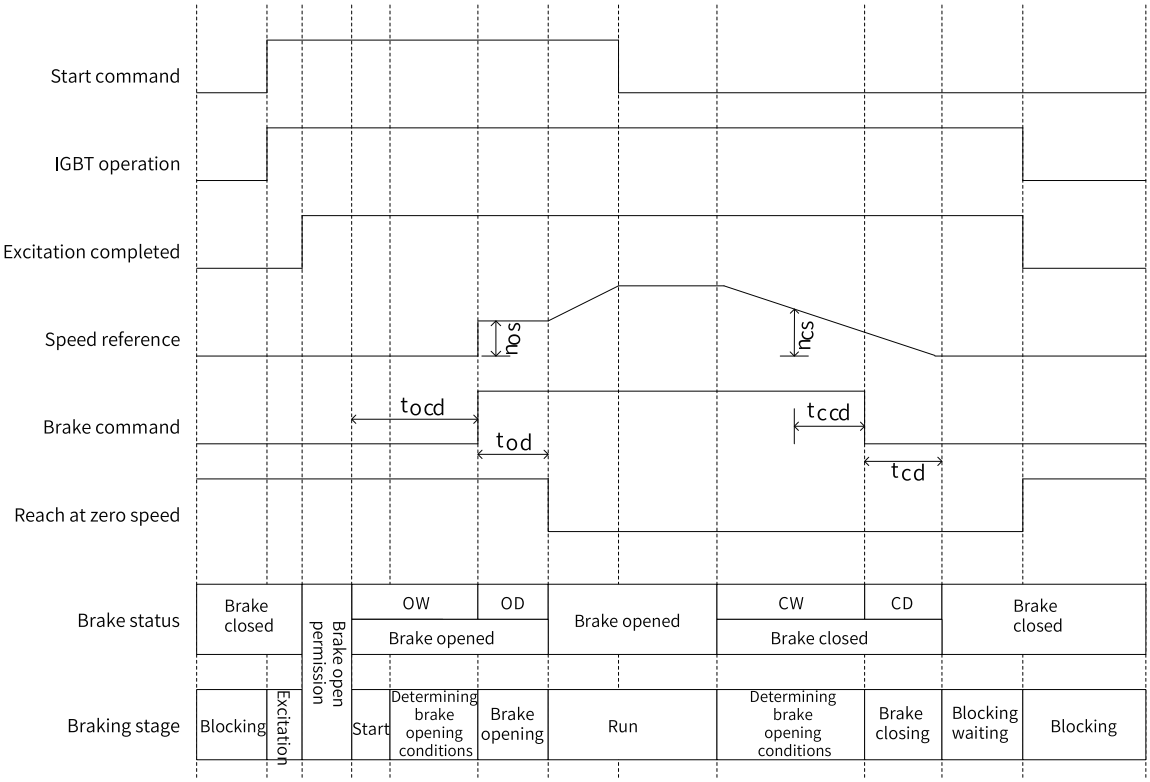


Figure 4-41 V/f control brake sequence diagram

n_{os}: Starting speed upon brake opening

n_{cs}: Speed threshold upon brake closing

$t_{oc}d$: Comparison delay upon brake opening

t_{od}: Brake open action time

t_{ccd}: Brake close delay

t_{cd}: Brake close action time

OW: Brake open waiting time

OD: Brake open delay

CW: Brake close waiting time

CD: Brake close delay

4.11.4 Overview of Brake Stages

All braking actions can be performed only after the operating command is received and the motor is prepared. For asynchronous motors, braking starts after motor pre-excitation. For synchronous motors, braking starts after the motor magnetic pole angle is obtained.

In case of a fault or an emergency stop command, a brake that is being turned on immediately enters the closed stage and the brake close command is output.

Brake turning on and off is generally triggered by operating commands.

In case of OFF2 emergency stop, coast to stop, or that L1-15 is set to 1 at any time, the brake module immediately outputs the close signal (U1-63 = 0).

Para.	Name	Description
L1-15	Source of forced brake close command	0: Disable 1: Immediately output brake close signal (U1-63 = 0)

4.11.4.1 Brake Force Test

The brake force test is optional and can be skipped if not activated.

The brake force may decrease after the brake is used for a long time. To check whether the brake force meets requirements through the internal logic function before startup, set L1-35 to 1 to enable the brake force test.

The test is active only when E0-00 is set to 1 (FVC). During the test, the AC drive continues to output the torque according to the setting of L1-32 and checks whether the feedback torque is normal. If the feedback torque is too low, or the motor is rotating, the brake force is insufficient and fault 84-3 or 84-4 will be reported. If L1-41 is set to "Enable", the self-start upon brake failure function is activated and fault 84-3 or 84-4 is reported.

Parameter Code	Parameter Name	Description
L1-35	Brake self-test	The connector is used to control whether to start brake force self-test. When this parameter is set to 1, the test is performed when pre-excitation is completed but the brake is not released.
L1-36	Brake test hold time	It defines the test duration.
L1-37	Max. torque for brake test	During the test, the output torque increases gradually but the maximum torque cannot exceed the torque specified by this parameter.
L1-38	Torque direction for brake test	It defined the torque direction, which can be modified through the connector. The torque is output forward by default and tested.
L1-39	Slip speed threshold for brake test	During the brake test, if the motor speed exceeds the value of L1-39 for a time longer than that specified by L1-40, the motor slips and rotates.
L1-40	Slip speed hold time for brake test	
L1-41	Self-start activation upon brake test failure	After this function is enabled, self-start will be activated when the brake force is insufficient after test.

Note

The value of L1-40 (slip speed hold time for brake test) must be smaller than the value of L1-36 (brake test duration); otherwise, the brake test slip function cannot take effect.

4.11.4.2 Brake Opening Permission

The brake can proceed with the next stage only after the brake opening permission command (L1-22) is activated. Brake opening permission is enabled by default.

4.11.4.3 Brake Release Preparation Stage

Brake release preparation includes three stages: starting torque establishment, brake release condition determination, and brake release.

- Starting torque establishment: This stage is active only in the vector control mode. To prevent shorting stator braking mode (for PMSM) upon brake release due to gravity load, sufficient torque is output based on the setting of L1-06. Before brake release, the speed loop does not act. If L1-06 is set to 0, no torque is output before brake release.
- Brake release condition determination: After the starting torque is established, you can set L1-23 to L1-25 to add two sets of additional start conditions. By default, there is no additional condition. After the starting torque is established, the brake release acts.
- Brake release: The brake release signal (U1-63 = 1) is output in this stage. In addition, the ramp function generator (RFG) is enabled. If L1-11 is valid, the RFG starts to accelerate from the speed indicated by L1-12. If L1-11 is invalid, the RFG starts to accelerate from 0.

Note

In order to meet the set additional start conditions, the device keeps in the brake release preparation stage. At this time, stop the device and reset parameters reasonably.

Parameter Code	Parameter Name	Description
L1-06	Starting torque source in the vector control mode	Select the torque to be output before brake release.
L1-07	Digital setting of starting torque	It is active when L1-06 is set to 2.
L1-08	Gain coefficient of automatic retentive torque	This parameter is active when L1-06 is set to 1, and it is used to adjust the retentive torque.
L1-11	Enable starting speed	0: After the brake release, the RFG accelerates from 0. 1: After the brake release, the RFG accelerates from L1-12.
L1-12	Digital setting of starting speed	
L1-22	Brake release command source	This parameter specifies an external brake control condition. When it is set to 0, the brake cannot be released. When the brake is released, setting L1-22 to 0 will not close the brake.
L1-23	Comparison value source of brake release	This parameter specifies an additional condition for determining brake release. If L1-23 is set to 0, the condition is invalid. After L1-23 is set to a connector, the brake release condition is met, and the connector value is greater than the threshold for a duration indicated by L1-25, the brake be released.
L1-24	Comparison threshold of brake release	
L1-25	Brake release delay	

4.11.4.4 Brake Opening Action Stage

Brake opening includes the brake opening detection and brake-opened stages.

- Brake opening detection: When the value of U1-63 becomes 1, the system maintains the RFG output and waits until the brake is open. If L1-00 is set to 1, the system waits for a duration indicated by L1-01 as the delay before exiting this stage. If L1-00 is set to 2, whether the feedback indicated by L1-03 is at a low level will be detected at this stage. If it is at a low level, the stage ends. If the delay time indicated by L1-01 is reached but the feedback indicated by L1-03 is kept at a high level, a brake detection fault will be triggered. When the fault duration is longer than that indicated by L1-04, ERR84-1 indicating the brake opening failure will be triggered.
- Brake opened: The RFG is enabled and the RFG output speed is allowed to increase based on the time reference. The brake output remains at the opened state unless the stop and brake closing instructions are received. If L1-00 is set to 2, whether the feedback indicated by L1-03 is at a low level will be always detected.

4.11.4.5 Brake Closing Preparation Stage

When the brake close command is received, the brake output is not immediately closed but enters the closing preparation stage.

- Determining the brake closing conditions: When the actual speed is lower than that indicated by L1-16 and the duration exceeds that indicated by L1-17, the brake closing conditions are met, and the retentive torque and brake output closing stage starts.
- Automatic retentive torque: When L1-06 is set to 1, the torque before brake closing is memorized as the torque output for the next startup.
- Brake close: After the stage starts, the brake close signal (U1-63 = 0) is output and then the brake close action stage starts.

4.11.4.6 Brake Closing Action Stage

Brake closing includes the brake closing detection and brake-closed stages.

- Brake closing detection: After the value of U1-63 becomes 0, the system waits until brake closing is completed. Before the brake is closed, the system holds the current output to prevent the shorting stator braking mode. If L1-00 is set to 1, the system waits for a duration indicated by L1-02 as the delay before exiting this stage. If L1-00 is set to 2, whether the feedback indicated by L1-03 is at a high level will be detected at this stage. If it is at a high level, the stage ends. If the delay time indicated by L1-02 is reached but the feedback indicated by L1-03 is kept at a low level, a brake detection fault will be triggered. When the fault duration is longer than that indicated by L1-04, ERR84-2 indicating the brake closing failure will be triggered.
- Brake closed: The brake output remains at the closed state unless the operation and brake opening instructions are received. If L1-00 is set to 2, whether the feedback indicated by L1-03 is at a high level will be always detected.

4.11.4.7 Blocking Waiting Stage

The blocking waiting stage of the brake logic starts from the time when the switch-on command takes effect to the time when the motor speed reaches zero.

When the motor feedback speed is continuously lower than the zero speed indicated by E1-21 for a period specified by E1-22, the motor speed is considered to reach zero and U1-10 becomes enabled,

and PWM output is blocked. The E1-22 parameter is added to keep a longer excitation time, eliminating the excitation process for opening the brake next time.

4.11.5 Protection upon Brake Failure

This function is available when only the brake function is enabled and the FVC mode is adopted.

The encoder rotation angle is detected when the AC drive stops. If no RUN command is sent and the encoder rotation angle is greater than the limit, the AC drive immediately outputs a current matching the load weight and keeps running at 0 Hz.

The self-protection function cannot be activated when the device is in the switch-on blocked state. To use this function, ensure that OFF1, OFF2, OFF3, and STO are invalid.

Scenarios: Due to brake failure or insufficient brake torque, the load falls down. After determining that the brake fails based on the encoder feedback signal, the AC drive immediately runs at 0 Hz to prevent the load from falling down.

Note

- If the brake fails during operation at zero speed, the AC drive can be restarted and can be run downwards to ensure safe unloading.
- When the AC drive is running automatically, the normal stop instruction will not stop the AC drive. The AC drive will be stopped only when the power supply is cut off, an emergency stop instruction is received, or a coast to stop fault occurs.

Implementation method:

1. Set E0-00 to 0 to select the FVC mode for the motor.
2. Set L1-32 to 1 to enable the self-protection function upon brake failure.
3. Set L1-33 (protection angle judgment threshold upon brake failure). The default value is 60 degrees.
4. The AC drive is ready for startup or operation. No coast to stop fault occurs, and OFF2 and OFF3 commands are invalid.

If the detected encoder rotation angle is greater than the value of L1-33, the AC drive automatically runs at zero speed but does not stop, preventing the load from falling down. At this time, the warning code 84-5 is displayed on the operating panel of the AC drive.

The following table describes related parameters.

Parameter Code	Parameter Name	Description
L1-32	Automatic start upon brake failure for protection	0: Disable 1: Enable
L1-33	Protection angle judgment threshold upon brake failure	In the shutdown state, when the encoder feedback angle is greater than the value of L1-33, and the self-start function upon brake failure is turned on, self-protection is activated.

4.11.6 Common Problems

4.11.6.1 Automatic Memory of Starting Torque

When L1-06 is set to 1, the internal torque memory function of the AC drive is activated. Upon each stop, the torque before brake closing is recorded and will be used as the starting torque output upon next startup. This reduces load drop during brake release. The automatic torque memory function can well adapt to load changes during operation.

When the function is used, a torque fault may occur during the stop process due to external brake faults.

When the load changes, the function of automatic memory of starting torque is not allowed. Set an appropriate starting torque according to the current load.

When the automatic memory of starting torque function is activated for the first time, the initial value of the torque is the value of L1-07.

The L1-08 parameter can be set to adjust the coefficient for automatic torque memory. If L1-08 is set to 80% and the retentive torque during the stop process is 50%, the starting torque will be 40%.

4.11.6.2 Excitation Delay Disable Function

To improve the working efficiency of asynchronous motors, users may want to keep continuous output of motor exciting current for a period even if the brake is closed during the stop process. In this way, when users start motors again within a short period, the brake can directly run without need of motor excitation (excitation time for some motors may take 3s to 5s).

When the motor feedback speed is continuously lower than the zero speed indicated by E1-21 for a period specified by E1-22, the motor speed is considered to reach zero and U1-10 becomes enabled, and PWM output is blocked. Therefore, if the time specified by E1-22 is increased, excitation can last longer after the motor reaches the zero speed, eliminating the need for excitation upon next brake opening.

In addition, if the brake close action time specified L1-02 is increased, the brake module can force the brake to output current, keeping excitation for a period after stop.

Para.	Name	Description
E1-22	Zero-speed stop delay	PWM output can be blocked only after the actual speed stays below the value of E1-21 for a period exceeding the time specified by E1-22.
L1-02	Brake close action time	PWM output can be blocked only after the time specified by L1-02 elapses after the brake close signal is output (U1-63 = 0).

4.11.6.3 Starting Torque Restriction

In some lifting load scenarios, the brake can open only when the load torque is greater than the threshold for security reasons. The speed loop does not act before the brake opens. Therefore, the torque cannot be output even if the speed is specified. In this case, set L1-06 for the starting torque. The torque can be measured by using two methods:

- Method 1: Use the comparison function of L1-24 for AC drive detection. Set L1-06 to a starting torque higher than the threshold, set L1-23 to the output torque indicated by U7-78, set L1-24 to the comparison threshold, and set L1-25 to a delay time. When the absolute value of L1-23 is greater than L1-24 and the duration exceeds the value indicated by L1-25, the AC drive enters the brake opening state.
- Method 2: The torque is detected on the PLC side. After the conditions are met, the PLC transmits a status bit to the AC drive through communication. Set L1-06 to a starting torque higher than the threshold, and then set L1-22 to the received PLC status bit. After the operating command is received, the AC drive does not enter the brake opening state until the bit is 1. When the brake is open, setting L1-22 to 0 will not close the brake.

4.12 Vector Control

4.12.1 Speed Control

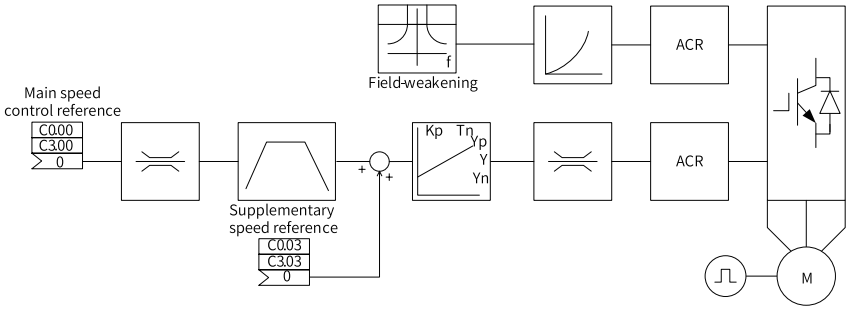


Figure 4-42 Typical block diagram of speed control

In speed control mode, the speed reference undergoes a series of processing, including limiting, ramp function generator process, and superimposition of supplementary speed reference, to produce the actual running speed reference.

Speed control applies to all control modes (E0-00 is set to FVC, SVC, or V/f). The following table lists the switchover between the speed control and torque control modes.

Table 4–8 Actual motor control modes

E0-00	E0-01	b1-10 (b3-10)	Actual control mode
0: SVC; 1: FVC	0: Speed control	0: Disable	Speed Control
0: SVC; 1: FVC	1: Torque control	0: Disable	Torque control
0: SVC; 1: FVC	0: Speed control	1: Forced torque control	Torque control
0: SVC; 1: FVC	1: Torque control	1: Forced torque control	Torque control
2: V/f	-	-	Speed Control

4.12.2 Torque Control

The torque mode can be enabled by setting E0-01 (control mode) and the torque reference source can be selected through C1-00. C1-02 is used to set the torque reference filter time to filter out interference

of the setpoint. C1-03 and C1-04 are used to set the torque acceleration/deceleration time to avoid abrupt torque change.

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode
C1-00	Torque reference source	0: Digital setting Other: Connector	-	0	At once
C1-01	Torque reference digital setting	-400.0 to +400.0	%	0.0	At once
C1-02	Torque filter time	0 to 10000	ms	0	At once
C1-03	Torque acceleration time	0 to 60.000	s	0.000	At once
C1-04	Torque deceleration time	0 to 60.000	s	0.000	At once
C1-05	Speed limit source in torque control mode	0: Digital setting 1: Speed channel	-	0	At once
C1-06	Digital setting of speed limit in torque control mode	-600.0 to +600.0	%	0	At once
C1-07	Speed limit offset mode	0: Bidirectional offset 1: Unidirectional offset	-	0	At once
C1-08	Speed limit offset source	0: Digital setting Other: Connector	-	0	At once
C1-09	Digital setting of speed limit offset	0.0 to 300.0	%	5.0	At once
C1-13	Source of supplementary torque reference 1	0: Digital setting Other: Connector	-	0	At once
C1-14	Digital setting of supplementary torque reference 1	-400.0 to +400.0	%	0.0	At once
C1-15	Supplementary torque reference 2	0: 0 Other: Connector	-	0	At once

When torque control is valid, the output torque directly follows the setpoint. To avoid the problem that the motor accelerates to the extreme speed after load is removed, the drive adjusts the torque when the motor speed reaches a certain value. You can set C1-07 to set the torque adjustment mode when the motor speed exceeds the limit.

The following figure shows the relationship between the effective torque and speed when C1-07 is set to dual-directional offset, the speed limit is H, and the speed limit offset is W (both H and W are positive). When the motor speed is within the range [–W, W+H], the effective torque is the same as the torque reference and the torque does not need to be adjusted. When the motor speed is beyond the range, the torque is always adjusted in a direction that can limit the motor speed within the range. If the load is too light to balance the motor torque and thus the motor speed exceeds the sum of W and

H in the forward direction, the torque reference is reduced with the speed linearly until the torque reaches the negative limit. If the reverse torque of the load is too heavy and the motor speed exceeds –W in the reverse direction, the motor torque reference increases with the exceeded frequency linearly until the torque reaches the positive limit.

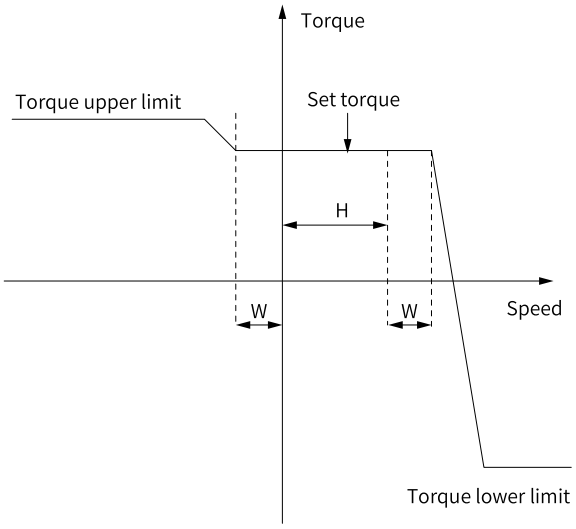
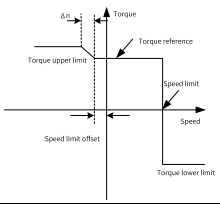
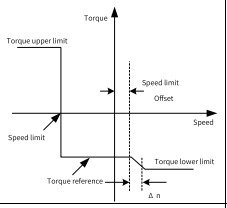
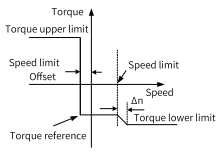
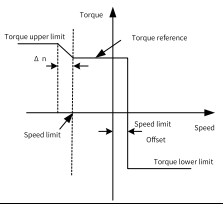
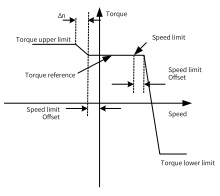
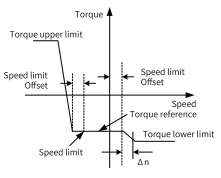
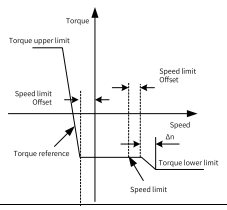
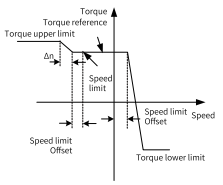
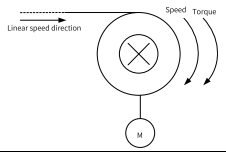
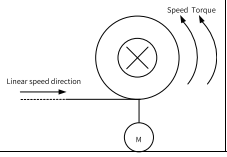
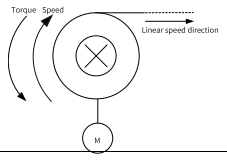
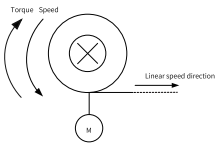


Figure 4-43 Torque control diagram

The following figure shows the relationship between effective torque and speed when torques and speeds at different directions and unidirectional speed offsets are set.

Table 4–9 Speed limit/speed limit offset

Item	Operating Condition			
Torque reference direction	+	-	-	+
Speed limit direction	+	-	+	-
Uni-directional speed limit offset (C1-07 = 1)				
Bi-directional speed limit offset (C1-07 = 0)				
Application example				

4.12.3 Droop Control

Droop control is a control method that uses the output torque of the motor to reduce the motor speed reference by negative feedback. Droop control features good stability and simple application though low control accuracy. It is widely used in working conditions such as belt conveyor transmission, roller bed transmission, and conticasters.

When multiple motors drive the same load together, a slight deviation occurs between the motors even at the same speed reference due to different mechanical behaviors. In addition, the output torque is much different, and even motors may drive each other.

Droop control can be applied to all motors to enable automatic balanced load distribution between motors, requiring no communication between motors. Motors with higher speed bear higher torque. The negative feedback helps to automatically reduce speed reference and distribute torque to other motors.

Droop control features:

- The application is simple, without need for communication between motor controllers.
- Multiple motors can be in stiffness or flexible connection to drive the same load.
- When multiple motors need to implement redundant running, the faulty device can be stopped while other devices can properly run.
- The adjustment range of the speed is generally not greater than the rated motor slip.
- The speed cannot be exactly followed. The actual speed has a static difference with the reference, which is proportional to the load.
- Precise load distribution cannot be ensured during the dynamic process.

To enable the droop function, only the following three parameters need to be set: Set E4-14 to enable the droop function.

After droop is enabled, the drive fine-tunes the frequency reference based on the value of E4-15. In most cases, to prevent the jitter of the droop frequency caused by speed loop disturbance, it is recommended to choose the PID integral upon speed governing as the droop source. The droop coefficient can be adjusted to change the droop frequency.

Note that the droop frequency is based on the rated motor frequency. In general, it is recommended to set the droop coefficient to the ratio of the rated slip to the rated frequency and slightly adjust it according to the effect.

Para.	Name	Value Range	Unit	Default	Change Mode
E4-14	Droop function	0: Disable 1: Enable	-	0	At once
E4-15	Droop input source	0: Disable 1: Torque upon limit 2: PID upon speed governing 3: PID integral upon speed governing	-	0	At once
E4-16	Droop coefficient	0.0 to 50.0	%	0.0	At once

4.12.4 Master-Slave Control

4.12.4.1 Overview of Master-Slave Control

Master-slave control is used in scenarios where multiple motors drive one equipment. Depending on the equipment, master-slave control can be implemented in multiple ways. The connection can be divided into rigid connection and flexible connection based on motor coupling modes.

- Rigid connection is typically implemented by gear matching, and the speeds of the master and slave are exactly the same in this case. Load torque must be well distributed upon control, which can implement higher dynamic response and even regard multiple motors as a high-power motor.
- Flexible connection is the most common way for belt-based transmission and is also used for roller bed transmission in the cold rolling processing line. It is also considered as soft connection upon steel belt connection. Soft connection cannot ensure complete speed synchronization between motors due to possible relative motion. Therefore, it cannot implement very highly dynamic response characteristics.

Droop control are applicable to scenarios without high accuracy requirements, especially to motor synchronization in soft connection, free of communication between control modules. However, it cannot accurately control the running speed and the dynamic response is poor. For better control effect, these control modules can be combined into a master-slave control network to control that all devices run with a specified master.

A quick network is required for data transmission to implement master-slave control. In MD580 series products, the InoLink communication network is generally used (for details, see *"4.15.5 InoLink Communication Network" on page 189*). Data exchange of a maximum of eight drives can be implemented over a network. This section uses the InoLink communication network as an example.

In master-slave control, the master and slave are not related to the node number of the InoLink network. After the InoLink communication network is created and data exchange is implemented, any device can be configured as the master. Assume that the InoLink communication network only contains nodes 1# and 2#, with node 1# as the master and node 2# as the slave.

When configuring master-slave control, ensure the same characteristics for the master and slave, including the acceleration/deceleration time, speed loop parameter, and current loop parameter.

The following sections list the typical master-slave control schemes.

4.12.4.2 Master Speed Control and Slave Torque Control

In master speed control, the slave speed always follows the master speed due to mechanical reasons. In slave torque control, the torque reference is obtained from the master, completing torque distribution.

Application scenarios: The connection between the master and slave must be rigid connection in gear matching mode generally.

Features: The slave torque always follows the master torque. The system runs according to the master speed loop, and the torque response is quick. However, when the master and slave connection is disconnected, the slave speed is out of control and will reach the upper limit. Therefore, the torque

mode speed limit parameter needs to be properly set to prevent motor runaway. For details, see *"4.12.2 Torque Control" on page 151*.

The following figure shows how it works.

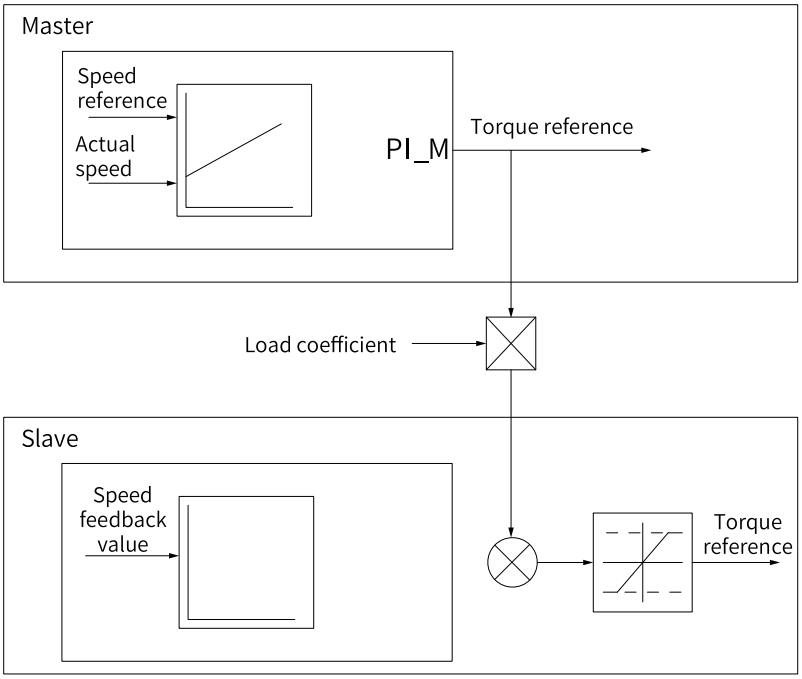


Figure 4-44 Block diagram of master speed and slave torque control

Common torque control or torque control with a window can be selected for the slave. When the torque control with a window is selected, the master needs to send the speed to the slave, ensuring that the master and slave acceleration/deceleration time is the same.

Take control channel 1 as an example. The following table lists the parameters to be set for the typical speed control and torque control.

Para.	Name	Master Setting<1>	Slave Setting<1>
E0-00	Control mode	1: FVC	1: FVC
E0-01	Control mode	0: Speed control	1: Torque control<2>
E1-32	Stop mode in torque control	-	2: Hold the torque control until blocking at zero speed
b0-00	Start/Stop control word source	3: User-defined setting (b0 group setting)	3: User-defined setting (b0 group setting)
b0-01	User-defined OFF1 source	1048 (U0-48 adapter A. PZD1.bit0)<3>	1080 (U0-80 InoLink.PZD1. bit0)<4>
C0-00	Main speed control reference	2519 (U15-19 adapter A. PZD2)<3>	-
C1-00	Torque reference selection in torque control	-	2501 (U15-01 InoLink. PZD2)
C1-06	Digital setting for speed limit of torque control	-	100%, set as required
n0-00	InoLink communication start	1: Start	1: Start
n0-03	InoLink node address	1	2

Para.	Name	Master Setting<1>	Slave Setting<1>
n0-10	Receive data 1 source node	-	1
n0-11	Receive data 1 data selection	-	1
n0-12	Receive data 2 source node	-	1
n0-13	Receive data 2 data selection	-	2
n0-34	Send data 1 selection	2518 (U15-18 adapter A. PZD1)	-
n0-35	Send data 2 selection	1778 (U7-78 output torque)	-

Note

- <1>: Other settings of the master and slave must be consistent, such as the acceleration/deceleration time, acceleration torque compensation, and speed loop parameters.
- <2>: Assume that the control command word is set by PZD1 of fieldbus adapter A, and that the speed reference is set by PZD2 of fieldbus adapter A.
- <3>: The slave command word can be set by the master or the fieldbus adapter.
- <4>: If the master needs to detect the fault state of the slave, set the slave to send the status word for the master to determine the fault status.

4.12.4.3 Master PI Control and Slave P Control

The master and slave both work in the speed control mode and accept the same speed reference. The speed regulator of the master is the PI controller, whereas that of the slave is the P control module. Add the integral component of the speed regulator of the master to the speed regulator output of the slave, completing torque distribution in the steady state.

Application scenarios: The connection between the master and slave motors can be rigid connection or flexible connection.

Features: The slave has its own speed regulator and accepts the master reference. Therefore, when the slave is applied to a rigid connection device, the control performance similar to the master speed control and slave torque control can be obtained. In addition, the slave speed control can be ensured upon rigid disconnection.

The following figure shows how it works.

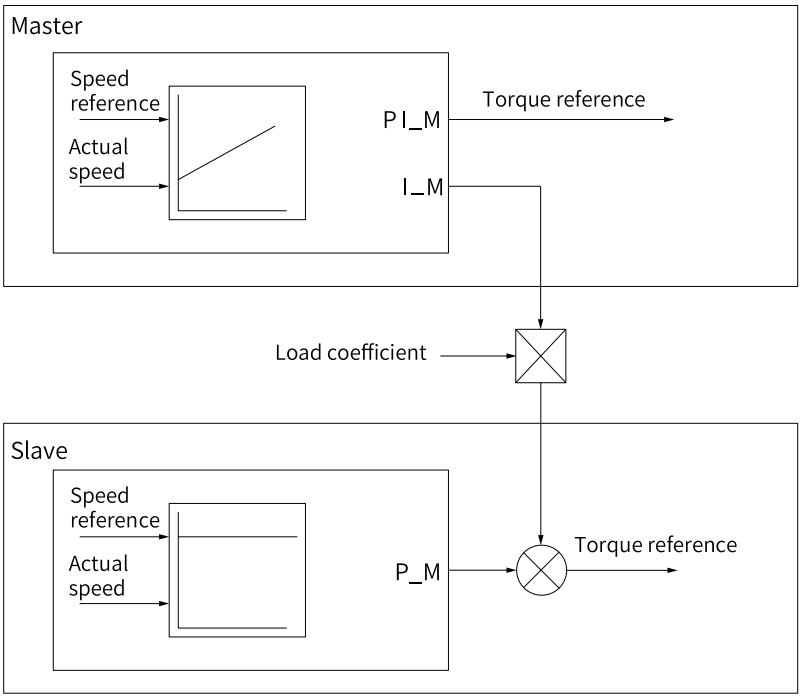


Figure 4-45 Block diagram of master PI and slave P control

Take control channel 1 as an example. The following table lists the parameters to be set for the master PI and slave P control.

Para.	Name	Master Setting<1>	Slave Setting<1>
E0-00	Control mode	1: FVC	1: FVC
E0-01	Control mode	0: Speed control	0: Speed control
b0-00	Start/Stop control word source	3: User-defined setting (b0 group setting)	3: User-defined setting (b0 group setting)
b0-01	User-defined OFF1 source	1048 (U0-48 adapter A. PZD1.bit0)<2>	1048 (U0-48 adapter A. PZD1.bit0)<3>
C0-00	Main speed control reference	2519 (U15-19 adapter A. PZD2)<2>	2519 (U15-19 adapter A. PZD2)<3>
E4-18	Forced source of speed loop integral	0: Disable	1: Enable
E4-19	Source of the force value for speed loop integral	0	2501 (U15-01 InoLink. PZD2)
n0-00	InoLink communication start	1: Start	1: Start
n0-03	InoLink node address	1	2
n0-10	Receive data 1 source node	-	1
n0-11	Receive data 1 data selection	-	1
n0-12	Receive data 2 source node	-	1
n0-13	Receive data 2 data selection	-	2

Para.	Name	Master Setting<1>	Slave Setting<1>
n0-34	Send data 1 selection	2518 (U15-18 adapter A. PZD1)	-
n0-35	Send data 2 selection	1852 (U8-52 integral item output torque upon speed governing)	-

Note

- <1>: Other settings of the master and slave must be consistent, such as the acceleration/deceleration time, acceleration torque compensation, and speed loop parameters.
- <2>: Assume that the control command word is set by PZD1 of fieldbus adapter A, and that the speed reference is set by PZD2 of fieldbus adapter A.
- <3>: The slave command word and speed reference can be set by the master or the fieldbus adapter.
- <4>: If the master needs to detect the fault state of the slave, set the slave to send the status word for the master to determine the fault status.

4.12.4.4 Slave Speed Deviation and Torque Limit

Both the master and slave work in the speed control mode, and the PI controller is used as the speed regulator. However, the slave speed reference contains a speed deviation on the basis on the master speed reference, the master torque reference is transmitted to the slave as the torque limit. The speed deviation is set based on the working condition, ranging from 5% to 10%. The supplementary speed and torque limit direction are related to the running direction.

Application scenario: Upon flexible connection between the master motor and the slave motor, the control effect is better.

Features: Since the slave has its own speed regulator, its speed control can be ensured (deviation from the speed reference does not exceed the supplementary speed, which is generally 5% to 10%) even upon disconnection between devices. Due to the supplementary speed, the slave accelerates to speed up the flexible connection upon startup. Then, due to saturation by the speed regulator, the torque limit is enabled to make the slave torque be the same as the master torque, implementing torque distribution.

The following figure shows how it works.

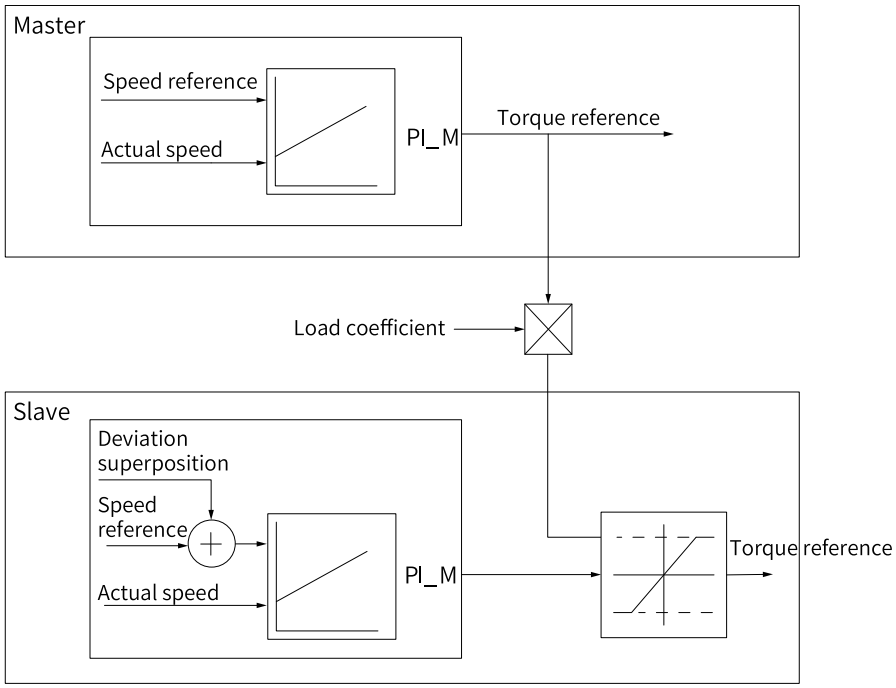


Figure 4-46 Block diagram of lave speed deviation and torque limit control

Take control channel 1 as an example. The following table lists the parameters to be set for the typical slave speed deviation and torque limit control.

Para.	Name	Master Setting<1>	Slave Setting<1>
E0-00	Control mode	1: FVC	1: FVC
E0-01	Control mode	0: Speed control	0: Speed control
b0-00	Start/Stop control word source	3: User-defined setting (b0 group setting)	3: User-defined setting (b0 group setting)
b0-01	User-defined OFF1 source	1048 (U0-48 adapter A. PZD1.bit0)<2>	1048 (U0-48 adapter A. PZD1.bit0)<3>
C0-00	Main speed control reference	2519 (U15-19 adapter A. PZD2)<2>	2519 (U15-19 adapter A. PZD2)<3>
C0-03	Supplementary speed reference	0	2906 (U19-06 multi-reference value 5)
C6-15	Multi-reference value 5	0	5%<4>
E2-10	Torque upper limit reference	400%	2501 (U15-01 InoLink. PZD2)<4>
E4-18	Forced source of speed loop integral	0: Disable	0: Disable
E4-19	Source of the force value for speed loop integral	0	0
n0-00	InoLink communication start	1: Start	1: Start
n0-03	InoLink node address	1	2
n0-10	Receive data 1 source node	-	1
n0-11	Receive data 1 data selection	-	1
n0-12	Receive data 2 source node	-	1

Para.	Name	Master Setting<1>	Slave Setting<1>
n0-13	Receive data 2 data selection	-	2
n0-34	Send data 1 selection	2518 (U15-18 adapter A. PZD1)	-
n0-35	Send data 2 selection	1778 (U7-78 output torque)	-

Note

- <1>: Other settings of the master and slave must be consistent, such as the acceleration/deceleration time, acceleration torque compensation, and speed loop parameters.
- <2>: Assume that the control command word is set by PZD1 of fieldbus adapter A, and that the speed reference is set by PZD2 of fieldbus adapter A.
- <3>: The slave command word and speed reference can be set by the master or the fieldbus adapter.
- <4>: For forward running, supplementary 5% speed reference and the torque upper limit are required. For reverse running, supplementary –5% speed reference and torque lower limit are required.
- If the master needs to detect the fault state of the slave, set the slave to send the status word for the master to determine the fault status.

4.12.5 SVC

In some application scenarios where the encoder suffers large signal interference or installing an encoder is inconvenient or not cost effective, you can set E0-00 to 0 to enable the SVC mode for excellent vector control performance.

SVC control and FVC control differ from each other. The feedback speed of FVC is measured by the encoder, while the feedback speed of SVC is calculated based on back EMF and output current. In the case of low-speed running, the motor speed cannot be accurately calculated, affecting the control accuracy. For long-term running at zero speed with active load, enable the SVC speed open loop control function (E11-08 = 1). (This description has been revised to: For long-term running at zero speed with active load, install an encoder and run in the FVC mode.) In such working conditions, if the device must run in SVC mode, the SVC speed open loop control function must be enabled (E11-10 = 1).

- Active load refers to the load that can pull the motor into reverse, such as the lifting mechanism load.
- Passive load refers to the load that can be driven by the motor but cannot drive the motor, such as the fan, water pump, centrifuge, and extruder.

After the speed open loop function is enabled, when the motor runs to the switchover frequency, the mode automatically switches to the speed open loop mode. In the mode, the output current of the motor reaches the preset value (E11-11 for asynchronous motors and E11-14 for synchronous motors) rather than changing with the load. To ensure that the motor can drive the load, the preset current must be greater than the actual load. Otherwise, the motor may fail to start or be driven by the load. If the actual load is light, appropriately reduce the reference for the speed open loop current to prevent the motor from much motor heating. If the current in the speed open loop area fluctuates greatly, appropriately increase the values of E11-13 and E11-16.

In the SVC speed open loop state, no accurate torque can be output in torque control mode. For tension control at zero speed, install the encoder and run in FVC mode.

Para.	Name	Value Range	Unit	Default	Change Mode
E11-10	Speed open loop in SVC control mode	0: Disable 1: Enable	-	0	At once
E11-11	Speed open loop current reference of asynchronous motor in SVC mode	30 to 170	%	100	At once
E11-12	Speed open loop switchover frequency of asynchronous motor in SVC mode	2.0 to 100.0	Hz	3.0	At once
E11-13	Speed fluctuation migration coefficient of asynchronous motor in SVC mode	0 to 6	-	3	At once
E11-14	Speed open loop current reference of synchronous motor in SVC mode	10 to 200	%	100	At once
E11-15	Speed open loop switchover frequency of synchronous motor in SVC mode	0.1 to 600.0	-	5.0	At once
E11-16	Speed open loop feedback suppression coefficient of synchronous motor in SVC mode	0 to 300	-	32	At once

4.12.6 Speed Controller

The speed loop regulator may need special processing when it is used with the PLC host controller to meet some process application requirements. The following three functions are involved.

- Speed loop integral freezing: This function can be enabled or disabled by E4-17 or controlled by the connector. After the function is enabled, the speed loop integral value is fixed.
- Speed loop integral force: This function can be enabled or disabled by E4-18. After the function is enabled, the speed loop integral value is forced to be the value of the connector indicated by E4-19.
- Speed loop regulator: This function can be enabled or disabled by b1-11 and b6-11.

Para.	Name	Value Range	Unit	Default	Change Mode
E4-17	Source of the freeze command for speed loop integral	0: Disable 1: Enable Other: Connector	-	0	At once
E4-18	Source of the force command for speed loop integral	0: Disable 1: Enable Other: Connector	-	0	At once
E4-19	Source of the force value for speed loop integral	0: 0 Other: Connector	-	0	At once

4.12.7 Speed Controller Adapter

Speed control adapters can optimize speed loop parameters under different operating conditions or based on the process requirements. To meet bandwidth requirements at different speeds in vector control, MD580 provides three groups of speed loop parameters. Setting switchover frequencies through E4-01, E4-04, and E4-07 can implement the switchover of parameter at different speeds. Speed loop parameters at zero speed (E4-01 to E4-03) are available only if the zero speed lock function is enabled.

Para.	Name	Value Range	Unit	Default	Change Mode
E4-00	Zero speed lock	0: Disable 1: Enable	-	0	At stop
E4-01	Speed loop switchover frequency upon zero speed lock	0.00 to 10.00	Hz	0.05	Unchangeable
E4-02	Speed loop Kp upon zero speed lock	0.00 to 200.00	-	15	At once
E4-03	Speed loop Ti upon zero speed lock	1 to 10000	ms	120	At once
E4-04	Low-speed speed loop switchover frequency	0.0 to 600.0	Hz	5	At once
E4-05	Low-speed speed loop Kp	0.00 to 200.00	-	15	At once
E4-06	Low-speed speed loop Ti	1 to 10000	ms	120	At once
E4-07	High-speed speed loop switchover frequency	0.0 to 600.0	Hz	10	At once
E4-08	High-speed speed loop Kp	0.01 to 200.00	-	10	At once
E4-09	High-speed speed loop Ti	1 to 10000	ms	200	At once

During operation at high speed, current control becomes weak, resulting in decrease of the speed loop bandwidth. In this case, the enabled Kp and Ti parameters need to be adjusted in real time based on the feedback speed. The following figure shows the relationship between the enabled speed loop parameters and actual speed.

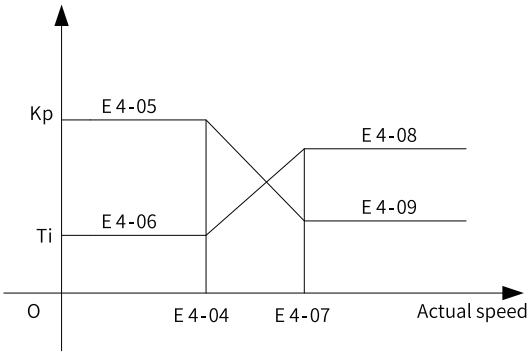


Figure 4-47 Speed controller adapter

4.12.8 Speed Limit

The upper limit of the motor speed is determined by the d0-06, E2-10, and E2-12 parameters. The upper limit must not be negative and its minimum value is 0.

The lower limit of the motor speed is determined by the d0-06, E2-11, and E2-13 parameters. The lower limit must not be positive and its maximum value is 0.

Para.	Name	Description
d0-06	Max. motor speed	The maximum motor speed cannot exceed the value of d0-06 in both the forward direction and the reverse direction. The value of 100% corresponds to the motor per-unit speed (synchronous speed) indicated by d3-00.
E2-10	Max. speed in forward direction	The value indicates the maximum speed in the forward direction. The value of 100% corresponds to the motor per-unit speed (synchronous speed) indicated by d3-00.
E2-11	Max. speed in reverse direction	The value is negative and indicates the maximum speed in the reverse direction. The value of –100% corresponds to the motor per-unit speed (synchronous speed) indicated by d3-00.
E2-12	Speed limit in forward direction	The value is restricted by d0-06 and E2-10. The connector is used to restrict the maximum speed in the forward direction. The value of 100% corresponds to the motor per-unit speed (synchronous speed) indicated by d3-00.
E2-13	Speed limit in reverse direction	The value is restricted by d0-06 and E2-11. The connector is used to restrict the maximum speed in the reverse direction. The value of –100% corresponds to the motor per-unit speed (synchronous speed) indicated by d3-00.

4.12.9 Current Limit

When a motor runs properly, the current cannot exceed the maximum motor current indicated by d0-08.

In V/f control mode, the overcurrent suppression function needs to be enabled to ensure that the current is lower than the maximum current.

In FVC or SVC control mode, the current regulator automatically controls the current, ensuring that the total current output does not exceed the value of d0-08.

When the maximum motor current is limited, the overload capacity of the motor may be affected and the motor torque output will be reduced.

4.12.10 Torque Limit

The torque limit of a motor is active only in vector control modes (including FVC and SVC). It is inactive in V/f mode.

The actual torque restriction of the motor is affected by the current limit, torque limit, and power limit.

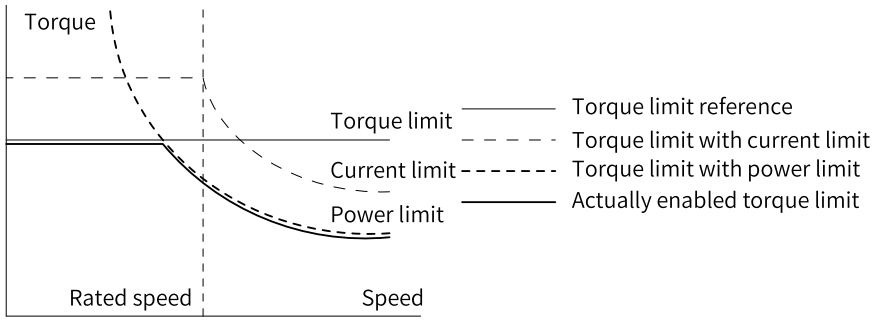


Figure 4-48 Torque limit diagram

The preceding figure takes the motoring working condition as an example to illustrate the impact of the three limits on the actual torque limit. The actual torque limit is determined by the most restrictive conditions among the limits. In the figure, in order to facilitate comparison, the effective torque limit is slightly moved down, and the curve of the actually effective torque limit reference is coincident with the curve of the power-limiting torque limit.

The following table lists the torque limit reference.

Para.	Name	Description
E2-20	Forward torque limit 1 reference	The motor forward direction is the torque forward direction. The torque upper limit reference is the value of E2-20 or [E2-12], whichever is lower. Take the positive and negative signs into account when setting the torque limit reference.
E2-22	Forward torque limit 2 source	
E2-21	Reverse torque limit 1 reference	The motor reverse direction is the torque reverse direction. The torque lower limit reference is the value of E2-21 or [E2-23], whichever is higher. Take the positive and negative signs into account when setting the torque limit reference.
E2-23	Reverse torque limit 2 source	

In terms of the process, the output torque of the speed regulator may need to be separately limited.

Para.	Name	Description
E2-28	Torque upper limit coefficient source for speed governing	This parameter is set to 100% by default. It is used to restrict the upper limit of the speed regulator PID output torque.
E2-29	Torque lower limit coefficient source for speed governing	This parameter is set to 100% by default. It is used to restrict the lower limit of the speed regulator PID output torque.

4.12.11 Power Limit

The power limit of a motor is active only in vector control modes (including FVC and SVC). It is inactive in V/f mode.

The power limit can restrict the total power output by the motor. The output torque limit decreases as the motor speed increases due to the power limit. The power limit is determined by the power limit value and the power limit coefficient.

Para.	Name	Description
E2-30	Motoring power limit	Allowed maximum power output during motoring. When [E2-32] is Disable, the motoring power limit is determined by E2-30. When [E2-32] is Enable, the motoring power limit is determined by the result of E2-30 x E2-33.
E2-32	Motoring power coefficient enable	
E2-33	Motoring power coefficient source	
E2-31	Generating power limit	Allowed maximum regenerative power during generating. When [E2-34] is Disable, the regenerating power limit is determined by E2-31. When [E2-34] is Enable, the regenerating power limit is determined by the result of E2-31 x E2-35.
E2-34	Generating power coefficient enable	
E2-35	Generating power coefficient source	

4.12.12 Excitation Control

4.12.12.1 Asynchronous Motor Field Weakening Control

When the motor speed increases, the motor back EMF also increases. When the motor back EMF exceeds the maximum output voltage, the AC drive loses the ability to regulate the current, and the motor will run out of control.

Reducing the magnetic flux can reduce the back EMF, preventing the motor from running out of control, so that the motor speed can rise to a high level. For an asynchronous motor, set parameter E6-08 to select a field weakening mode. The value of this parameter is 1 (mode 1) by default. If the current fluctuates greatly in the field weakening stage, set the parameter to 2 to switch to a different field weakening control mode.

4.12.12.2 Synchronous Motor Field Weakening Control

A synchronous motor's back EMF increases with its running speed. When the back EMF exceeds the maximum voltage that can be output by the AC drive, the synchronous motor enters the field weakening control state. In the field weakening control mode, the synchronous motor increases the demagnetization current to reduce the magnetic chain of the motor stator and then to reduce the motor voltage. A higher field weakening current means a higher output current and speed.

The field weakening current of a synchronous motor can be set by either the maximum voltage controller or the field weakening curve module.

When E6-01 is set to 1 (field weakening by automatic adjustment), the field weakening current of the synchronous motor is completely generated by the maximum output voltage controller. The field weakening current can be adjusted to quickly make the voltage at the synchronous motor stabilize at the target value. The target output voltage is determined by E6-03 and the bus voltage. A larger value of E6-02 means a faster dynamic output voltage response and better dynamic current response. However, an excessive value may cause oscillation.

When E6-01 is set to 2 (field weakening by automatic adjustment and calculation), the synchronous motor's demagnetization current consists of two parts: demagnetization current obtained through maximum output voltage control of the AC drive and demagnetization current obtained from the field weakening curve similar to that of the asynchronous motor. Compared with field weakening by automatic adjustment, this mode can better adjust the current in the field weakening range but is greatly affected by the motor parameter accuracy.

Para.	Name	Description	Reference
E6-01	Field weakening mode	Defines a field weakening mode for the synchronous motor and asynchronous motor.	0: No field weakening 1: Field weakening by automatic adjustment 2: Field weakening by automatic adjustment and calculation
E6-02	Field weakening gain of synchronous motor	Defines the gain of the maximum voltage output controller. The field weakening current can be adjusted to quickly make the voltage at the synchronous motor stabilize at the target value. A larger gain means a better responsivity. However, an excessive value may cause oscillation.	0 to 50
E6-03	Output voltage upper limit margin of synchronous motor	When the synchronous motor runs in the field weakening mode, the output voltage of the AC drive cannot reach the upper limit. Instead, a certain voltage should be reserved to dynamically adjust the current. A larger value means a better dynamic current response in the field weakening range. However, a lower stable output voltage means a higher stable current under a given load.	0 to 50

Para.	Name	Description	Reference
E6-06	Maximum demagnetization current of synchronous motor	Defines the field weakening current limit of the synchronous motor. A higher synchronous motor speed in the field weakening range means a larger the field weakening current. When the field weakening current reaches this limit, the speed cannot be increased any longer. To further increase the speed, increase this limit, but this may cause demagnetization due to excessive field weakening current.	0% to 300%
E6-07	Low-speed excitation current of synchronous motor	Defines the excitation current of the synchronous motor running at a low speed in the SVC mode. You can increase the excitation current to improve the load capacity when the motor runs at a low speed.	0% to 80%

4.12.13 Vdc Control in Vector Control Mode

When the power supply lacks the regenerative capability, the Vdc control function can be activated upon overvoltage or undervoltage in the DC bus. Vdc control consists of VdcMax control and VdcMin control. VdcMax control and VdcMin control use a common PI controller. The parameter gain of the controller is automatically calculated.

4.12.13.1 Overvoltage in DC Bus

When the motor is in the power generation state, the DC bus voltage rises. The rise of the DC bus voltage can be suppressed directly by reducing the power generation torque. With the VdcMax control activated, if the motor power generation torque is too large or the regenerative energy is too much, this function will automatically reduce the power generation torque to adjust the DC bus voltage. If the voltage rises too quickly, the motor may enter the motoring state to consume excessive energy in the bus through motoring torque. This function intuitively extends the motor deceleration time.

Pay attention to the following aspects when using this function:

- Use the VdcMax control function only when the power supply lacks the regenerative capability.
- The VdcMax function needs to be disable when the braking resistor is used; otherwise, the output torque may be insufficient.
- In the case of common bus, enable the VdcMax control function on only one drive unit, typically the drive unit with the largest inertia, and disable this function on other drive units.
- In the torque control mode, exert caution before enabling the VdcMax function. If the torque cannot adjust the system bus, the torque may be adjusted to the limit.

The following figure shows the VdcMax control process.

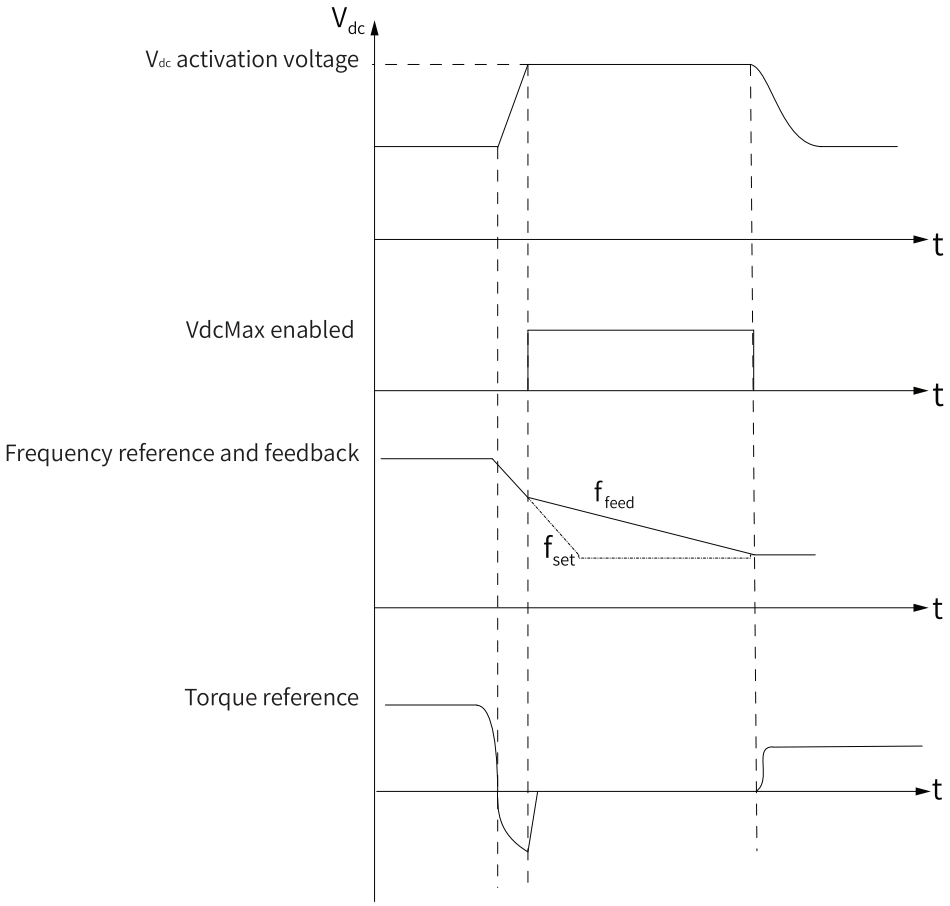


Figure 4-49 VdcMax control process

4.12.13.2 Undervoltage in DC Bus

When the power supply or DC bus incurs short-term power-off, undervoltage will occur if the fault is not handled in time, causing coast to stop. After the VdcMin function is enabled, undervoltage can be suppressed in a short period, preventing stop upon instantaneous power-off. When the power supply or DC bus incurs long-term power failure, you need to enable the VdcMin function for power generation to compensate for bus energy loss until all motors stop reliably. After the bus voltage falls below the allowable value, the VdcMin function makes the motor enter the power generation state to compensate for energy loss to stabilize the voltage in the DC bus.

The following figure shows the VdcMin control process.

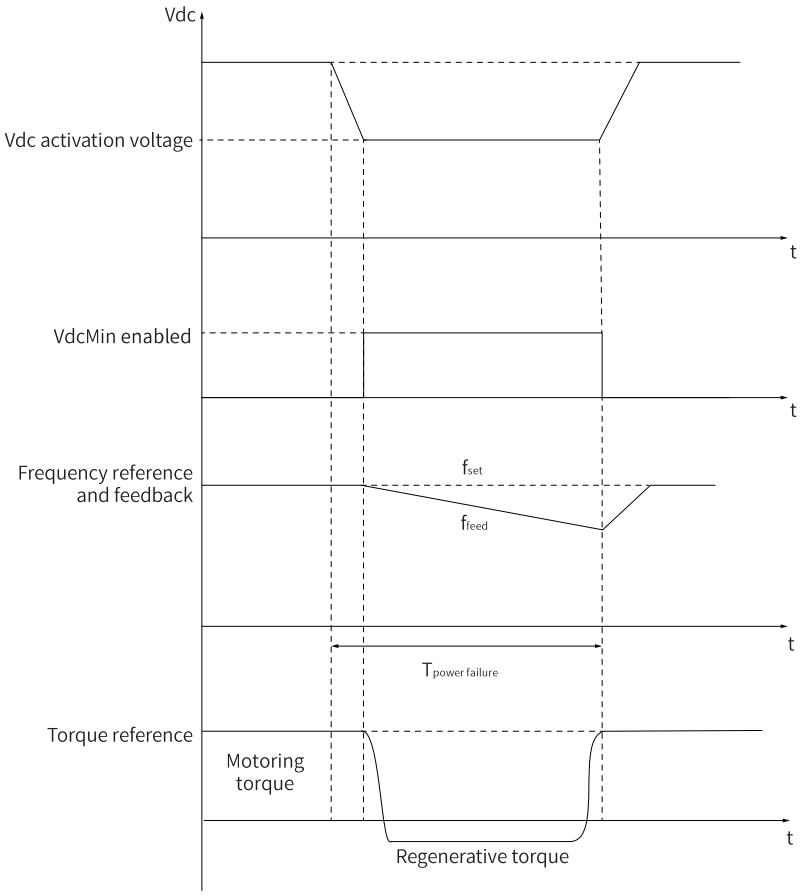


Figure 4-50 VdcMin control process

Para.	Name	Value Range	Unit	Default	Change Mode
E9-09	VdcMin minimum running frequency	0.0 to 50.0	Hz	5.0	At stop
E9-10	VdcMinKp adjustment coefficient	0.0 to 1000.0	%	100.0	At once
E9-11	VdcMinKi adjustment coefficient	0.0 to 1000.0	%	100.0	At once
E9-12	VdcMax in vector control mode	0: Disable 1: Enable	-	1	At stop
E9-14	VdcMax action voltage in vector control mode	650.0 to 800.0	V	700.0	At once
E9-15	Actual effective value of VdcMax action voltage in vector control mode	-	V	-	Unchangeable
E9-16	VdcMaxKp adjustment coefficient in vector control mode	0 to 1000.0	%	100.0	At once

Para.	Name	Value Range	Unit	Default	Change Mode
E9-17	Bus capacitance coefficient in vector control mode	50.0 to 100.0	%	100.0	At once
E9-18	VdcMax integral in vector control mode	0: Disable 1: Enable	-	0	At once

4.12.14 Acceleration Torque Compensation

Motor motion equation: $T_e - T_L = J \times dw/dt$

where

- T_e: motor electromagnetic torque
- T_L: load torque and friction torque
- J: moment of inertia, displayed in parameter d2-00 after auto-tuning. The per unit value is equal to the electromechanical time constant (d2-05).
- dw/dt: motor speed change rate

To allow the motor to accelerate and decelerate according to a given RFG curve, it is necessary to provide the motor with an appropriate acceleration torque $T_a = T_e - T_L$. The effect is not very satisfactory when only the speed regulator is used, which may result in overshoot at the end of acceleration and speed lag at the beginning of acceleration. Acceleration torque compensation can resolve this problem. In this solution, the required acceleration torque is directly calculated based on the auto-tuned moment of inertia and the expected acceleration, and then superimposed on the output of the speed regulator. This avoids the adjustment of the speed regulator and improves the speed following characteristics.

Using acceleration torque to calculate the output acceleration of RFG can obtain accurate acceleration torque when a reference speed curve is only generated by RFG. For example, when control channel 1 is used, set parameter E4-22 to 1, parameter c1-10 to 1, and parameter E4-23 to 100%, and accurate acceleration torque can be obtained. The acceleration torque value can be viewed through U5-08.

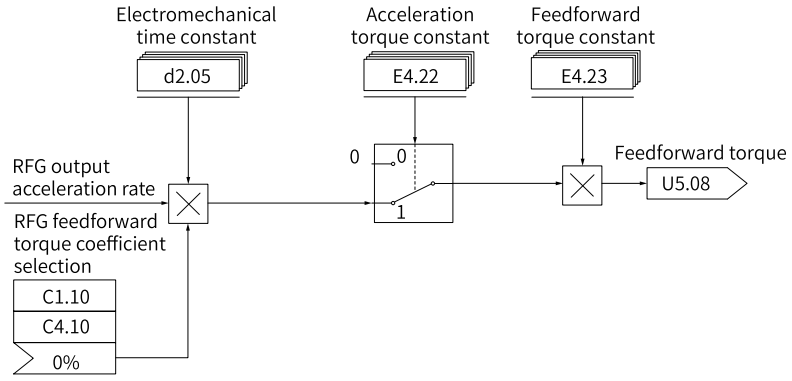
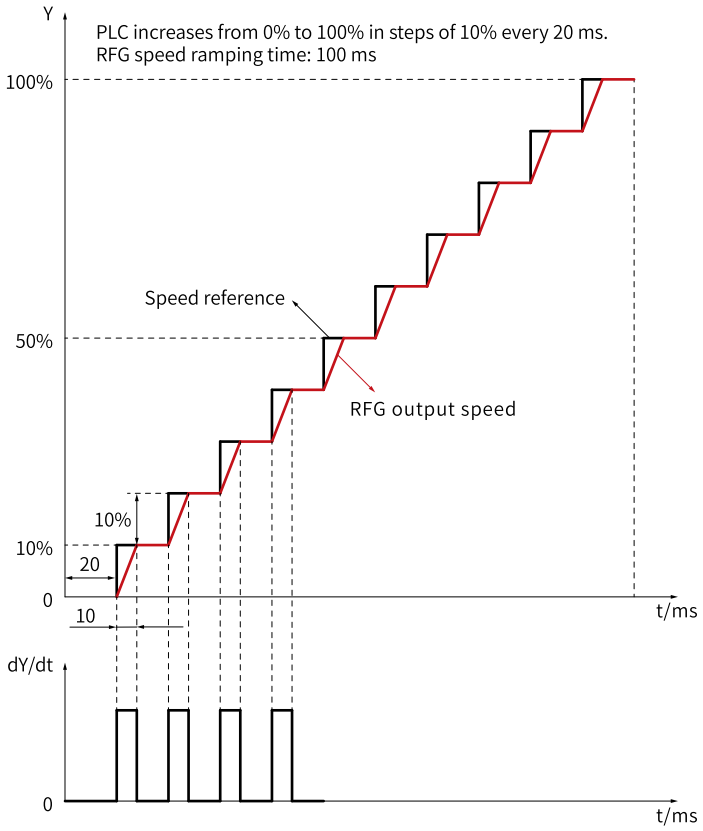


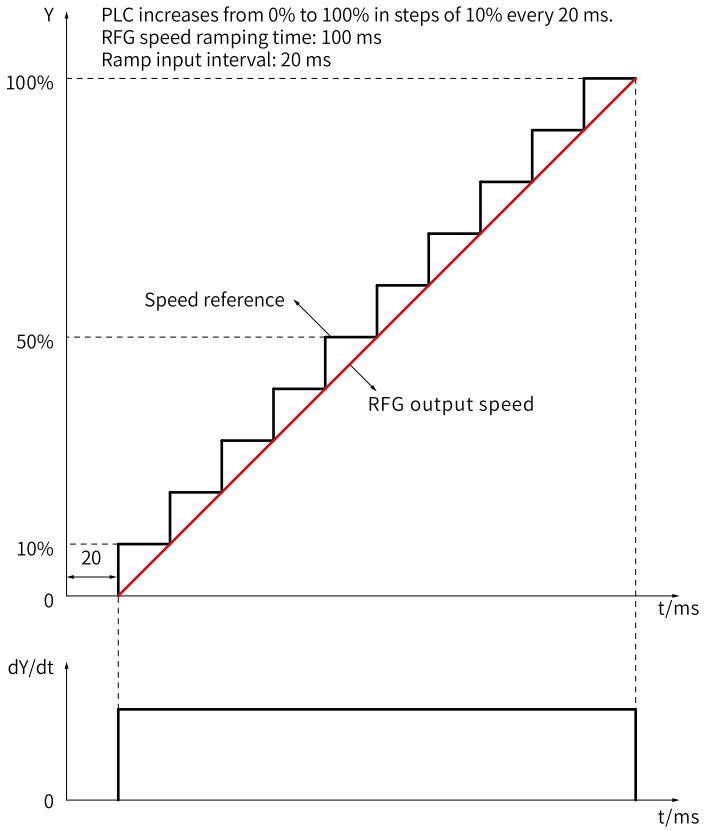
Figure 4-51 Feedforward torque

Note

The speed reference sent by PLC is discontinuous due to the long communication period between PLC and AC drive. If the speed reference is set through PLC communication, the RFG output speed may not be smooth, which results in discontinuous calculated acceleration. The jumping feedforward torque calculated using the acceleration torque compensation function will lead to motor output torque oscillation, which may damage the rigid structure connected by gears.



The slope of the speed ramp is controlled during the change of the speed reference, resulting in a continuous change. When the signal update interval of the external control system (interval of PLC transmission) is consistent with the slope change interval (C8-49), the RFG output speed reference (U9-13) is a straight line.



To enable the RFG ramp input continuous change function, only the following two parameters need to be set:

Para.	Name	Description
C8-48	Ramp input continuous change	You can select any bit connector for control: • [C8-48] = 0: Disable the function. • [C8-48] = 1: Enable the function.
C8-49	Ramp input change interval	Sets the ramp input change interval

4.13 V/f Control

4.13.1 Overview of V/f Control

V/f control is applicable to universal load such as fans and water pumps, and application scenarios where one device drives multiple motors or where the device power differs greatly from the motor power. In V/f control mode, the drive runs in open loop control, without the need for speed feedback. With low dependence on motor parameters and high robustness, this mode is typically suitable for occasions with low dynamic requirements.

4.13.2 V/f Curve Selection

V/f control modes include the V/f curve mode and V/f separation mode. The following table lists the parameters related to the V/f curve mode.

Para.	Name	Value Range	Unit	Default	Change Mode
E3-00	V/f mode	0: V/f curve 1: V/f separation	-	0	At stop
E3-01	V/f curve	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	-	0	At once
E3-02	Linear V/f curve frequency 1	0.0 to 100.0	%	0.0	At once
E3-03	Linear V/f curve voltage 1	0.0 to 100.0	%	0.0	At once
E3-04	Linear V/f curve frequency 2	0.0 to 100.0	%	0.0	At once
E3-05	Linear V/f curve voltage 2	0.0 to 100.0	%	0.0	At once
E3-06	Linear V/f curve frequency 3	0.0 to 100.0	%	0.0	At once
E3-07	Linear V/f curve voltage 3	0.0 to 100.0	%	0.0	At once
E3-16	Frequency RFG time in V/f separation	0: RFG time forced to 0 1: Preset RFG time	-	0	At stop
E3-17	Current frequency source in V/f separation or non-linear V/f	0: RFG output 1: V/f output frequency (after slip compensation)	-	0	At stop
E3-18	Voltage reference source in V/f separation	0: [0] Other: [Connector]	-	0	At once
E3-19	Voltage rise time in V/f separation	0.00 to 600.00	s	0.00	At once
E3-20	Voltage fall time in V/f separation	0.00 to 600.00	s	0.00	At once
E3-21	Stop mode selection for V/f separation	0: Coast to stop	-	0	Unchangeable

Options of E3-01 for the V/f curve mode:

- 0: Linear V/f. When the motor runs at a rated frequency, a linear relationship is kept between the output voltage and the frequency. It is applicable to common constant-torque load.
- 1: Multi-point V/f. It is applicable to special load such as dehydrator and centrifuge. Users can set the E3-02 to E3-07 parameters to define the V/f curve frequency and voltage. Multi-point V/f needs to be set according to the motor load characteristics. The relationship between the three voltages and three frequencies should meet the following conditions: V1 ≤ V2 ≤ V3, F1 < F2 < F3.
- 2: Square V/f. It is applicable to centrifugal load such as the fan and water pump. Voltages vary squarely with frequencies.
- 3 to 8: 1.2-power V/f curve, 1.6-power V/f curve, and 1.8-power V/f curve. Voltages vary 1.2-power, 1.4-power, 1.6-power, and 1.8-power with frequencies. It is between the linear mode and the square V/f curve mode.

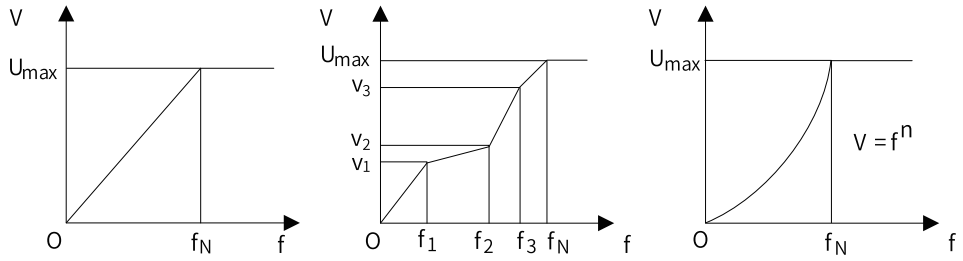


Figure 4-52 Diagram of linear V/f, multi-point V/f, and n-power V/f curve

The V/f separation mode is typically applicable to scenarios such as induction heating and drive unit power supply. The output voltage of the AC drive is not related to the frequency, and the output frequency is specified in E3-17. The output voltage can be configured by selecting a connector (E3-18). Set the voltage rise and fall time through E3-19 and E3-20 to prevent abrupt change in voltage.

4.13.3 V/f Low-speed Torque Boost

When a motor runs at a low speed in V/f control mode, voltage drop on the stator resistor makes the actual output torque of the motor smaller, resulting in poor low-speed load capacity of the motor. The torque boost function can be used to compensate the voltage loss on the stator resistor, improving the load capacity of the motor at a low speed. Customized or automatic torque boost can be selected through parameter E3-11.

If customized torque boost is selected, set the boost voltage and effective frequency range through parameters E3-12 and E3-13. When the motor starting torque is insufficient upon heavy load, set E3-12 to a larger value within 3% based on the actual current. If the value is too large, faults such as motor over-temperature and AC drive overcurrent and overload may occur. Set E3-13 for the cutoff frequency of torque boost. If the actual frequency is lower than the value, the boost is enabled. Otherwise, the boost is disabled. The following figure shows the diagram of the V/f curve after customized torque boost.

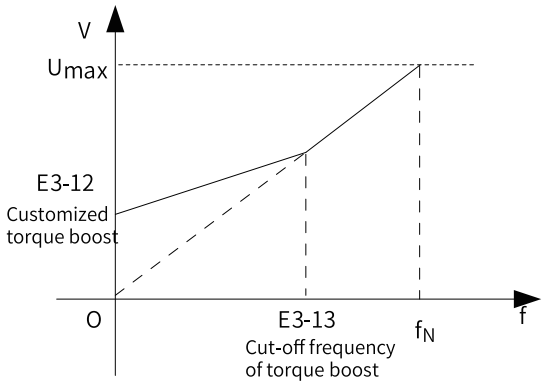


Figure 4-53 Comparison of V/f curves before and after customized torque boost

If automatic torque boost is selected, the AC drive automatically calculates the voltage loss on the stator resistor based on motor parameters and provides compensation. To adjust the automatic torque boost, set E3-56 for the online torque compensation gain. When the value is 100%, the compensation is not adjusted. Note that the automatic torque boost depends on motor parameters. Therefore, ensure that motor parameters are auto-tuned before automatic torque boost.

In addition, torque boost is disabled in V/f separation mode and multi-point V/f mode. When customized torque boost is selected and the online torque compensation gain coefficient is greater than 100%, the torque boost is in hybrid mode of customized torque boost and automatic torque boost. The actual voltage boost equals to the customized torque boost plus the automatic torque boost.

The following table lists the parameters related to V/f low-speed torque boost.

Table 4–10 Parameters related to V/f low-speed torque boost

Para.	Name	Value Range	Unit	Default	Change Mode
E3-11	V/f torque boost mode	0: Disable 1: Customized 2: Automatic	-	0	At stop
E3-12	V/f customized torque boost	0.0 to 30.0	%	0	At once
E3-13	Cut-off frequency of V/F torque boost	0.0 to 600.0	%	100.0	At once
E3-56	Online torque compensation gain	80 to 150	%	100	At once

4.13.4 V/f Slip Compensation Gain

V/f control is open loop control. Therefore, the speed of a motor in V/f control will be affected by the load, causing lower speed accuracy. The slip compensation gain function can remain the motor speed almost unchanged under different loads based on the compensation frequency of motor loads.

Set E3-30 indicating the slip compensation gain to adjust the compensation frequency. When the coefficient is 100%, the motor bears a rated load, and the compensation frequency is the rated motor

slip. When E3-30 is set to 0, the slip compensation gain function is disabled. When adjusting the V/f slip compensation gain, confirm that the motor speed under the rated load is the same as the target motor speed. If they are different, slightly adjust the parameter.

T3-31 indicates the V/f slip compensation time coefficient. A smaller coefficient means faster slip compensation gain response to load change. However, an excessively small value may cause oscillation or instability during the dynamic process of the motor.

Para.	Name	Value Range	Unit	Default	Change Mode
E3-30	V/f slip compensation gain	0.0 to 200.0	%	0.0	At once
E3-31	Slip compensation time constant	0.1 to 10.0	-	0.5	At once

4.13.5 V/f Overcurrent Suppression

The Imax function is mainly used to prevent overcurrent caused by excessively large motor current in V/f control. This function can be enabled by using the E3-34 parameter. After this function is enabled, if the output current of the AC drive reaches the operating current set through E3-35 (on the base of the rated motor current), the drive adjusts the output frequency based on the current power generation or motoring state, so that the output current is stable below the operating current. The Imax process ends when the actual motor frequency reaches the target. Therefore, during motor acceleration/deceleration, if Imax control is active, the actual acceleration/deceleration time is prolonged. The E3-36 parameter indicates the Imax controller gain. A larger value of this parameter means greater current during acceleration and faster actual acceleration. However, an excessively large value may cause the oscillation. The E3-37 parameter indicates the Imax controller adjustment coefficient in the field weakening area. After the motor enters the field weakening area, current oscillation occurs. Reduce the parameter value appropriately.

The following figure shows frequency modulation after the Imax function is enabled when the motor is in different states.

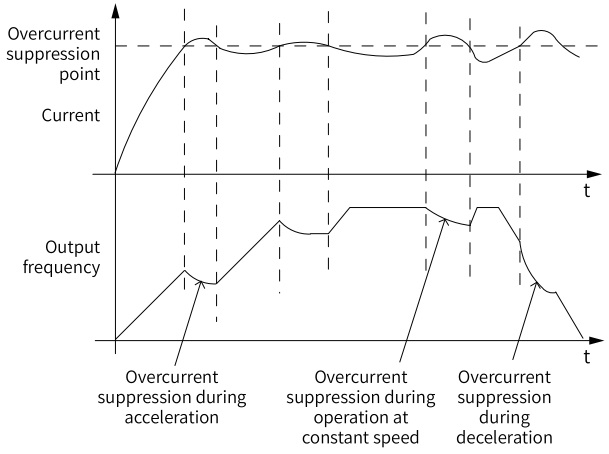


Figure 4-54 V/f overcurrent suppression

Table 4–11 V/f overcurrent suppression parameters

Para.	Name	Value Range	Unit	Default	Change Mode
E3-34	Imax control	0: Disable 1: Enable	-	1	At once
E3-35	Imax operating current	50 to 200	%	150	At once
E3-36	Frequency modulation gain in Imax control mode	0 to 100	-	20	At once
E3-37	Field weakening coefficient in Imax control mode	50 to 200	-	50	At once

4.13.6 V/f Oscillation Suppression

During motor operation, mechanical resonance causes system oscillation. E3-24 can be set to enable oscillation suppression for a better control effect. E3-25 indicates V/f oscillation suppression gain. When oscillation suppression fails, appropriately increase the value (100 at most) at a step of 10 till no obvious oscillation of the motor.

If the motor runs at a low speed, oscillation cannot be effectively suppressed due to low current. In this case, enable torque boost.

The following table lists parameters related to V/f oscillation suppression.

Para.	Name	Value Range	Unit	Default	Change Mode
E3-24	V/f oscillation suppression	0: Enable 1: Enable	-	1	At once
E3-25	V/f oscillation suppression gain	0 to 100	-	40	At once

Note

Motor oscillation in V/f mode is also related to the wave sending mode. Users can try to enable or disable the dead zone compensation (A4-16), adjust the compensation coefficient (A4-15), or adjust the DPWM switchover (A4-32) and the DPWM switchover frequency (A4-09) to observe the improvement of oscillation.

4.13.7 V/f Droop Control

The V/f droop function is typically used to solve the load distribution problem when two or more motors drive one load together. When multiple motors drive one load together, motors and drives with higher speed bear heavier load. After the V/f droop function is enabled, drives slightly adjust the frequency reference based on the actual load size to droop the motor mechanical characteristics, balancing the load distribution.

Set the E3-14 parameter to enable or disable the droop function to adjust the frequency reference. E3-15 specifies the droop coefficient. The V/f droop frequency is proportional to droop coefficient and motor load torque.

Table 4–12 V/f droop parameters

Para.	Name	Value Range	Unit	Default	Change Mode
E3-14	V/f droop enable	0: Disable 1: Enable	-	0	At once
E3-15	V/f droop coefficient	0.0	%	0	At once

Note

The V/f droop frequency is dependent on the rated motor frequency. Motor droop adjustment = (–1 x Motor output torque x Rated motor frequency x [E3-15])

The V/f droop frequency is dependent on the rated motor frequency.

4.13.8 V/f Energy-saving Control

Energy-saving control is applicable to scenarios where a motor runs with light load for a long time. After the E6-00 parameter is set to enable the function, when the motor runs with low load, the AC drive continuously reduces the output voltage to lower exciting current, reducing energy consumption. When the load gets higher, the AC drive automatically increases the output voltage to improve the load capacity.

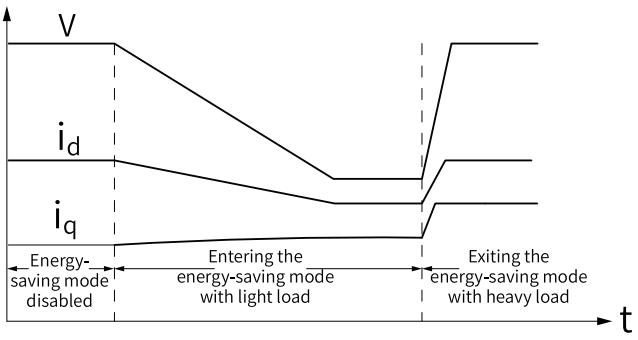


Figure 4-55 V/f energy-saving control

Table 4–13 V/f energy-saving control parameters

Para.	Name	Description
E6-00	Energy-saving control	0: Disable 1: Enable

Note

The energy-saving mode does not cause decrease in motor speed. When the motor load increases, the AC drive restores the original output voltage and automatically exits the energy-saving mode.

4.13.9 Vdc Control in V/f Control

4.13.9.1 VdcMax Function

In the V/f control mode, you can enable the VdcMax function by using the E9-20 parameter. When the bus voltage reaches the value indicated by E9-21 due to the rapid deceleration of the motor, the drive adjusts the output frequency through closed-loop control of the bus voltage. The deceleration time of the motor gets longer and the motor even enters the motoring state to control the energy fed back to the bus.

VdcMax control in V/f control mode consists of two modes: mode 0 and mode 1. In mode 0, if the motor deceleration time is too short and results in large voltage overshoot, you can increase the value of E9-27 to increase the response speed. In mode 1, if the motor deceleration time is too short and results in large voltage overshoot, you can increase the value of E9-23 to make the voltage response faster to reduce the overshoot. However, a greater coefficient will increase the frequency fluctuation, affecting the steady state. VdcMax in V/f control mode also adjusts the voltage in addition to the output frequency. A large value of E9-23 can increase the motor excitation and speed up energy consumption during deceleration.

Table 4–14 VdcMax parameters

Para.	Name	Value Range	Unit	Default	Change Mode
E9-20	VdcMax in V/f control mode	0: Disable 1: Enable	-	1	At once
E9-21	VdcMax action voltage in V/f control mode	650.0 to 800.0	V	700	At once
E9-22	VdcMax frequency modulation proportional coefficient in V/f control mode	0 to 100	%	30	At once
E9-23	VdcMax voltage regulating gain in V/f control mode	0 to 100	%	30	At once
E9-24	VdcMax frequency increase limit in V/f control mode	0 to 50	Hz	5	At once
E9-25	VdcMax mode in V/f control mode	0: Mode 0 1: Mode 1	-	0	At once
E9-26	Vdc flux adjustment coefficient	50 to 200	%	100	At once
E9-27	Voltage closed-loop coefficient in Vdc mode 0	10 to 1000	%	100	At once

When using the VdcMax function, note that:

- Use the VdcMax control function only when the power supply lacks the regenerative capability.

- When using a braking resistor, set the braking voltage reference to a value less than the VdcMax trigger voltage or disable the VdcMax function.
- The VdcMax function limits the power generation torque to control the power fed back to the bus. Therefore, in case of proactive load such as the lifting load, disable this function to avoid accidents such as falling.
- Once the VdcMax function is enabled, the actual motor speed does not need to be the same as the reference. Therefore, do not enable this function in the process scenarios that require accurate motor speed following.
- If VdcMax control is set to mode 0, perform parameter auto-tuning or select b5-02 for parameter calculation.

4.13.9.2 VdcMin Function

When the power supply or DC bus incurs short-term power-off, undervoltage will occur if the fault is not handled in time, causing coast to stop. Set E9-00 to enable the VdcMin function to suppress undervoltage in a short period, preventing stop upon instantaneous power-off. When the bus voltage is lower than a certain value, the VdcMin function regulates the motor frequency to make the motor enter the power generation state and use the regenerative electrical energy to compensate the voltage drop in the DC bus, stabilizing the bus voltage.

Set E9-03 for the voltage reserve to adjust the bus voltage that triggers VdcMin. The bus voltage that triggers VdcMin equals to the value of A4-23 at the undervoltage point plus the voltage reserve indicated by E9-03.

- In mode 0, increase the value of E9-27 to make the voltage response faster.
- In mode 1, set E9-06 and E9-07 to the proportion and integral coefficients during VdcMin frequency modulation, respectively.
- If the bus drop overshoot is large in VdcMin control, increase the frequency modulation gain coefficient to accelerate the dynamic response to adjust the bus.
- If the difference between the bus voltage and the target value is great when VdcMin control is in steady state, increase the integral coefficient to reduce the offset.
- E9-09 indicates the lowest running frequency of VdcMin. If the motor speed in VdcMin control constantly reduces to the value, or the actual motor speed is lower than the value before VdcMin trigger, the drive reports a fault and coasts to stop, not maintaining the bus voltage any more.

When the motor is in VdcMin control, if the bus voltage increases, the drive determines whether the bus is restored to normal based on the bus voltage and the stabilization duration, which are indicated by E9-01 and E9-02, respectively. In the period, the output frequency remains unchanged. After the bus is restored to normal, the motor restores to normal operation by acceleration.

The control mode is not specified for the preceding VdcMin parameters. The following figure shows the diagram of VdcMin control and restoration to normal operation.

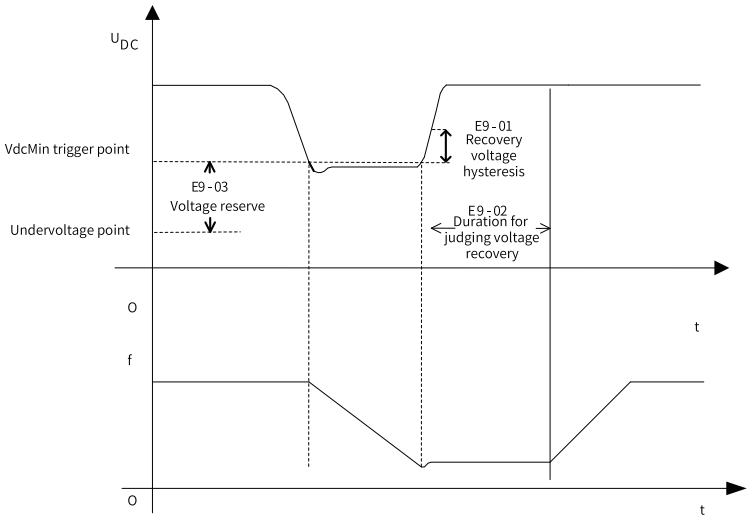


Table 4–15 VdcMin parameters

Para.	Name	Value Range	Unit	Default	Change Mode
E9-00	VdcMin control	0: Disable 1: Enable	-	0	At stop
E9-01	VdcMin recovery voltage hysteresis	1 to 50	V	20	At stop
E9-02	Duration for judging VdcMin voltage recovery	0.0 to 100.0	s	0.5	At stop
E9-03	VdcMin voltage reserve	20 to 300	V	50	At stop
E9-04	VdcMin recovery frequency hysteresis	0.0 to 10.0	Hz	2.0	At once
E9-05	VdcMin mode in V/f control mode	0: Mode 0 1: Mode 1	-	0	At once
E9-06	VdcMin frequency modulation gain	0 to 100		40	At once
E9-07	VdcMin integral coefficient	0 to 100	-	30	At once
E9-09	VdcMin minimum running frequency	0.0 to 50.0	Hz	5.0	At stop
E9-26	Vdc flux adjustment coefficient	50 to 200	%	100	At once
E9-27	Voltage closed-loop coefficient in Vdc mode 0	10 to 1000	%	100	At once

When using the VdcMax function, note that:

If VdcMax control is set to mode 0, perform parameter auto-tuning or select b5-02 for parameter calculation.

4.14 Flying Start

If a motor in rotation is started in direct start mode, an overcurrent fault may be caused due to inrush current upon startup. The flying start function is applicable when no encoder is used to measure the motor speed and the startup and running of motors in rotation must be tracked. In this case, the AC drive can automatically track the motor speed and direction to start the rotating motor smoothly without impact.

The following figure shows the motor speed flying start diagram. After startup, the motor synchronous frequency tracks the motor speed, after which the motor enters the normal operation mode.

- In FVC control, when flying start is enabled, the encoder obtains the feedback speed to start the motor.
- In V/f and SVC control, the flying start module is needed to observe the motor running speed.

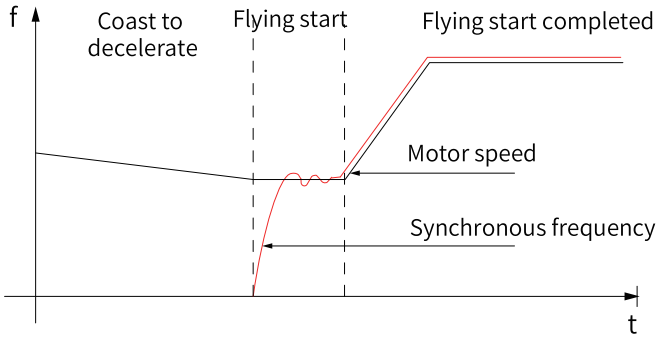


Figure 4-56 Diagram of the flying start process

The following table lists the parameters related to flying start.

Para.	Name	Value Range	Unit	Default	Change Mode
E7-00	V/f flying start mode	0: From stop frequency 1: From 50 Hz 2: From maximum frequency	-	0	At once
E7-01	V/f flying start speed	0 to 100	-	20	At once
E7-02	V/f flying start closed-loop current Kp	0 to 1000	-	500	At once
E7-03	V/f flying start closed-loop current Ki	0 to 1000	-	800	At once
E7-06	V/f flying start current	30 to 200	%	100	At once

Para.	Name	Value Range	Unit	Default	Change Mode
E7-07	Timeout interval of flying start in SVC control mode	0.010 to 60.000	s	1.000	At once
E7-08	Timeout interval of flying start in V/f control mode	0.100 to 60.000	s	15.000	At once

Motor start modes can be set through E1-00. Parameters E7-00 to E7-06 are enabled in V/f control mode. The frequency search mode is used for V/f flying start. Set E7-00 for the start frequency. When it is set to 0, the search always starts from the frequency upon last stop. The tracking mode has low dependence on motor parameters and high robustness. However, note that this search method may drive the motor speed in case of low-inertia motors and load.

E7-07 and E7-08 indicate the flying start timeout intervals in SVC and V/f control modes, respectively. If the motor speed cannot be detected for a period longer than the set interval, a flying start timeout fault will be reported.

Note

The flying start function depends on motor-related parameters. Therefore, before using the function, use the auto-tuning function to ensure correctness of the motor parameters.

4.15 Communication Module

4.15.1 Fieldbus Adapter

Fieldbus adapters are used for communication between fieldbus and transmission control devices. A fieldbus adapter supports a maximum of 16 pieces of 16-bit process data. The following figure shows how the fieldbus adapter works.

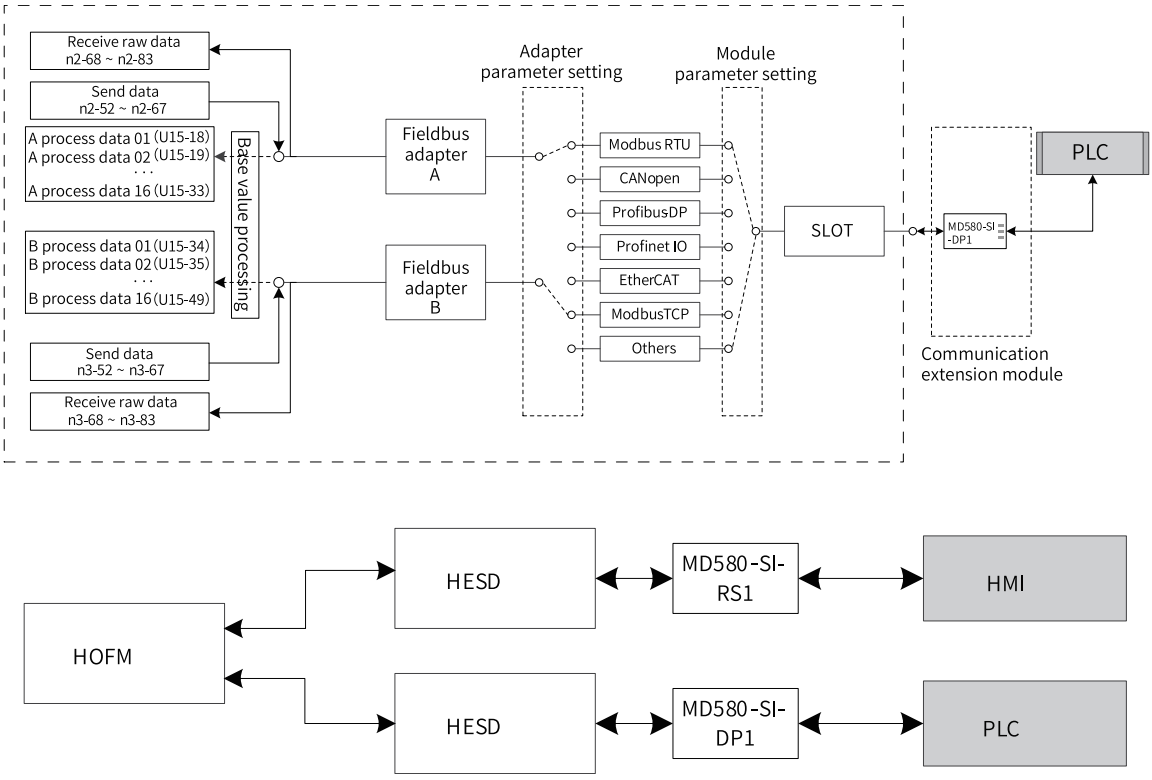


Figure 4-57 Fieldbus adapter working principle diagram 1

If two communication expansion modules are required, configure the optical fiber expansion module HOFM and the function expansion module dock HESD. The following figure shows how they work.

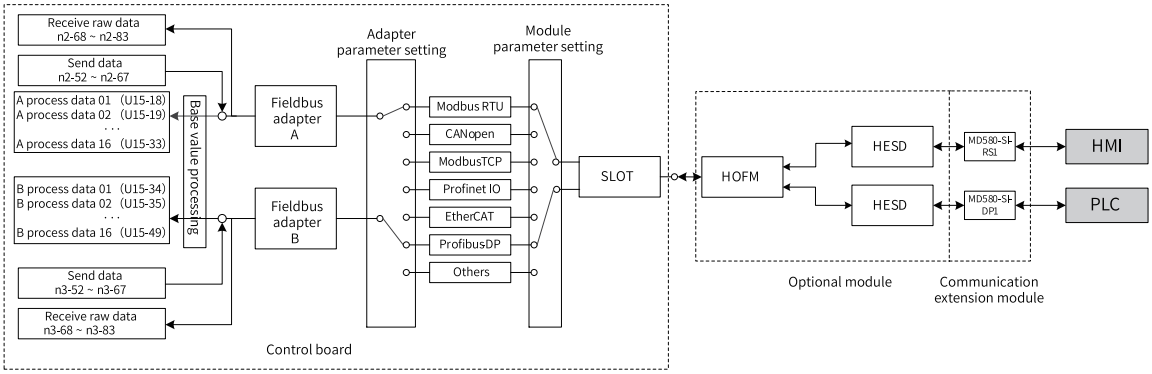


Figure 4-58 Fieldbus adapter working principle diagram 2

Fieldbus adapters support the following communication modules: Modbus RTU field bus module, CANopen field bus module, EtherCAT industrial Ethernet module, PROFIBUS DP field bus module, PROFINET IO industrial Ethernet module, Modbus TCP industrial Ethernet module, EtherNet/IP industrial Ethernet module, and other customized communication modules.

Table 4–16 Settings of fieldbus adapters A/B

Item	Fieldbus Adapter A	Fieldbus Adapter B	Setting Description
1	n2-00	n3-00	It is used to select the required bus protocol type. 0 indicates that no fieldbus is selected.
2	n2-01	n3-01	It is used for communication timeout detection. 0.00 indicates that communication timeout fault is not detected.
3	n2-02	n3-02	It indicates the communication fault detection switch. 0 indicates that communication faults are detected, and 1 indicates that communication faults are not detected.
4	n2-03	n3-03	It is used for communication CRC error verification. 0 indicates that CRC fault detection is disabled.
5	n2-04 to n2-19	n3-04 to n3-19	It is used to select output sources for fieldbus adapter process data.
6	n2-20 to n2-35	n3-20 to n3-35	It is used to set the base value for the output process data. The calculation formula is as follows: Sent data = Selected data x (n2-20 to n2-35)/4096. The value 0 equals to 4096.
7	n2-36 to n2-51	n3-36 to n3-51	It is used to set the base value for the input process data. The calculation formula is as follows: Used data = Received data x 4096/ (n2-36 to n2-51). The value 0 equals to 4096.
8	n2-90	n3-90	It is used to set whether to store parameters to EEPROM when writing parameters.
9	n2-91	n3-91	It is used to set whether to upload the current fault information of devices to the host controller.

Fieldbus adapters support the email and process data formats.

Mailbox data is used for parameter read and write, start/stop, fault reset, status monitoring, and command delivery, which is non-periodically delivered.

Process data is used for command reference, status interaction, speed reference, and torque reference, which is exchanged periodically.

4.15.2 Process Data Configuration

4.15.2.1 Overview of Process Data Configuration

The process data can be configured when the communication card is working properly.

4.15.2.2 Reception of Verification Data

The 16 parameters, n2-68 to n2-83, correspond to 16 pieces of process data. When the PLC sends a piece of process data, for example, when PZD1 sends 0x0406, the corresponding data can be viewed in n2-68.

Received data must be converted using the base value before being saved to the 16 connector parameters U15-18 to U15-33. For details about base value conversion, see *"4.15.3 Adaptation to Communication Base Value" on page 187*.

Note that bit10 for PZD1 must be 1 for PROFIBUS DP. Otherwise, the 16 parameters (U15-18 to U15-33) will maintain the last data, rather than being updated. However, n2-68 to n2-83 will reflect the received data.

The PZD1 data is disassembled into 16 bits, which are saved into connectors U0-48 to U0-63.

To use received process data for control, configure corresponding control channel and reference channel parameters. For details, see section 6.1 "Control Channels and Start/Stop Commands" and section 6.2 "Reference Channels".

Note

When PROFIBUS DP is used for communication, the parity bit of the process data PZD1 must be 1 (PZD1.bit10 by default, which can be modified or disabled by setting n16-10). Otherwise, the drive considers the received process data to be disabled, U15-18 to U15-33 (or U15-34 to U15-49) will retain the earlier data, and n2-68 to n2-83 (or n3-68 to n3-83) will display the actually received raw data.

4.15.2.3 Configuration of Send Data

The reference source parameters from n2-04 to n2-19 can be used to select data to be sent to the PLC. This section takes the scenario in which all the base values of n2-20 to n2-35 are 0 as an example. For details about setting communication base values, see the next section.

When a connector is selected through n2-04 to n2-19, the n2-52 to n2-67 parameters will show corresponding data. Such data is the data sent to the PLC and must be exactly the same as that received by the PLC.

- If n2-04 is set to 1601 (that is, U6-01 is the per-unit value and 100% corresponds to hexadecimal 0x1000), [n2-52] is 0x1000.
- If n2-05 is set to 1603 (that is, U6-03 is the per-unit value and 200% corresponds to hexadecimal 0x2000), [n2-53] is 0x2000.

Typically, all the data, such as torque, speed, and current, to be received by the PLC can be found in connectors in group U.

4.15.3 Adaptation to Communication Base Value

Most connector data is stored as per-unit values. The rated values of motor parameters are selected as the per-unit values. When the fieldbus adapter interacts with the PLC, data scaling may be inconsistent. A communication base value, that is, the numerical value corresponding to 100%, is provided for each process data channel in the fieldbus adapter. The communication base values can be changed to adjust the gain for the fieldbus adapter to send and receive data.

The communication base value is 0 by default, indicating no special processing upon data sending and receiving. The data sent and received by the PLC and the drive is the same.

The base value must not be converted for the data consisting of multiple bits. The parameter for the communication base value should be set to 0, for example, the control word sent by the PLC or the status word uploaded by the drive.

Formula for calculating the communication base value:

$$\text{Communication base value} = \frac{\text{Motor per-unit base value}}{\text{PLC per-unit base value}} \times \text{PLC communication base value}$$

The per-unit value of the motor is the rated value of the motor in the system, corresponding to parameter d3-00 to d3-05.

The PLC communication base value and the PLC per unit base value are used for the data expression mode during PLC communication. For example, if 16384 indicates that the motor current is 50 A, the PLC per unit base value is 50 and the PLC communication base value is 16384. If the actual motor current multiplied by 10 as the transmission current, the PLC per unit base value is 50 and the PLC communication base value is 500.

The parameter of the communication base value is used to adjust the data format in the system to the format same as the PLC communication data.

When the communication base value needs to be changed, choose "Inverter > Configuration > PDO configuration". On the page that appears, click the "Adapter A Input Data Configuration/Adapter A Output Data Configuration" tab and then click "Calculate Datum data".

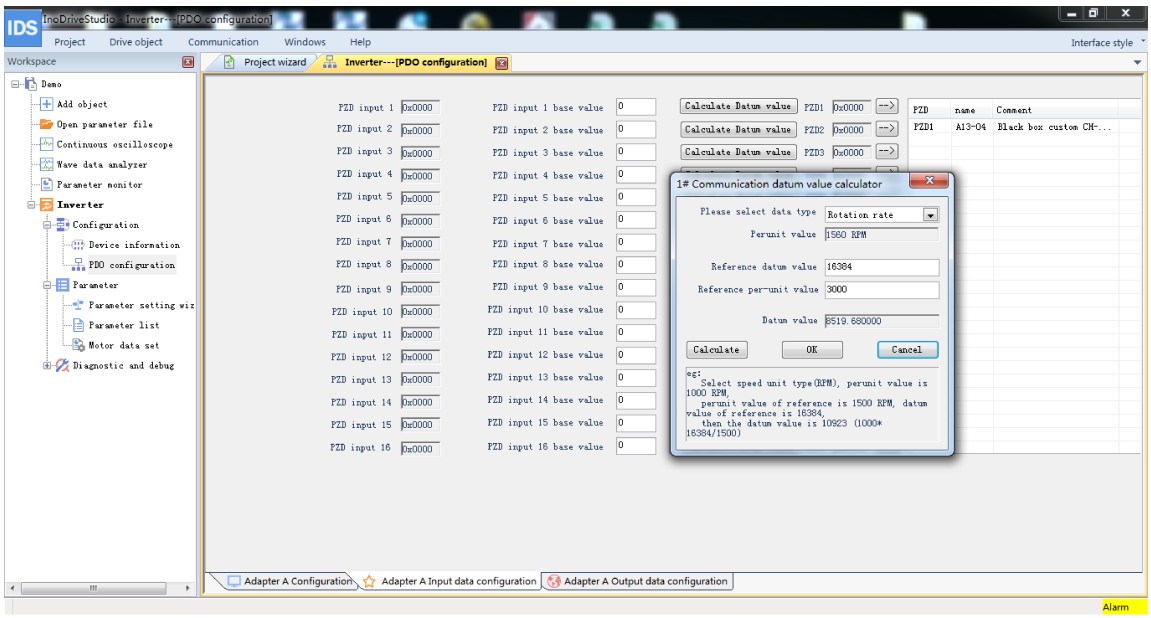


Figure 4-59 Base value calculation

As shown in the preceding figure, when the drive speed per unit base value is 1500 RPM and the PLC speed per unit base value is 3000 RPM in the PLC system, the communication base value of the drive must be changed so that the drive can run at the actual speed specified by the PLC. For example, when the PLC sends the 100% speed command for running, the actual running speed of the drive is 3000 RPM rather than 1500 RPM.

Assume that the PLC communication base value is 16384. That is, when the PLC sends speed 100%, 16384 is sent to the drive. When the peer communication base value (PLC communication base value) and the peer per-unit value (PLC speed per-unit value) are input in the communication base value calculator, click Calculate to obtain the communication base value of the MD580 series speed transmission channel.

4.15.4 Communication Expansion Module

Table 4–17 Communication expansion module

Item	Expansion Module	Description
1	Modbus RTU module	This module is used for the Modbus communication protocol, which is a standard communication protocol. For details, see the communication expansion card guide. Parameters of this module are in group n10.
2	CANopen module	This module is used for the CANopen communication protocol. For details, see the communication expansion module guide. The CANopen expansion card supports seven communication speeds. Parameters of this module are in group n12.
3	EtherCAT module	This module is used for the EtherCAT communication protocol. For details, see the communication expansion module guide. Parameters of this module are in group n14.
4	PROFIBUS DP module	This module is used for the PROFIBUS DP communication protocol. For details, see the communication expansion module guide. Parameters of this module are in group n16.
5	PROFINET IO module	This module is used for the PROFINET IO communication protocol. For details, see the communication expansion module guide. Parameters of this module are in group n17.
6	Customized communication module	This module is used for the Modbus TCP communication protocol. For details about parameters, see the descriptions of expansion modules and their usage in the section of control board usage. This module is used for user-defined communication protocols for various application scenarios. For details, see the communication protocol expansion module guide. Parameters of this module are in group n18.
7	EtherNet/IP module	This module is used for the EtherNet/IP communication protocol. For details, see the communication expansion module guide. Parameters of this module are in group n19.

4.15.5 InoLink Communication Network

InoLink is used for master/slave communication among multiple drive units. Master/slave communication means that the logic master station in a network sends information such as control bit or setpoints to logic slave stations. InoLink supports eight 16-bit data entries for communication.

Currently, one InoLink communication network can contain up to eight controllers. Data information sent by each controller is saved by other controllers in the network.

During InoLink communication, the logic master station sends information to logic slave stations (other controllers) and logic slave stations receive such information and use it for control. Each logic slave station can be configured with a data source, which can be one or more logic master stations.

One InoLink communication network can consist of one or more master/slave networks. A master/slave network is a communication network consisting of logic master and slave stations.

Currently, InoLink supports baud rates of 1 Mbps, 500 kbps, and 250 kbps, and the communication interval is 2 ms. All controllers in an InoLink communication network interact data with each other once every 2 ms. The first four 16-bit data entries are sent once every 2 ms. The last four 16-bit data entries can be not sent or sent once every 2 ms or 16 ms to reduce the field load rate.

If one controller does not receive data from the specified controller within the specified time, this controller reports the timeout fault of receiving data from specified node. If this controller does not receive data from the logic master station within the specified time, the controller reports the communication offline fault. If the communication station ID set for a controller added to the network is repeated with that of any existing controller in the network, the controller reports the address conflict fault.

InoLink communication settings

Table 4–18 InoLink communication settings

No.	InoLink Communication Settings	Setting Description
1	n0-00	Enables an InoLink communication node.
2	n0-01	Sets the communication baud rate. 0: 1 Mbps 1: 500 kbps 2: 250 kbps
3	n0-03	Sets the address of an InoLink communication node.
4	n0-04	Sets the InoLink communication mode. 0: Standard mode 1: Faultless mode
5	n0-05	Sets the communication timeout time.
6	n0-07	Sets the transmission mode of data entries 5 to 8. 0: No transmission 1: Periodical transmission (2 ms) 2: Periodical transmission (16 ms)
7	n0-10, n0-12, n0-14, n0-16, n0-18, n0-20, n0-22, and n0-24	Sets the logic master station for a node, that is, from which node other than the current node on the network the current node has to receive data.
8	n0-11, n0-13, n0-15, n0-17, n0-19, n0-21, n0-23, and n0-25	Sets which data entry sent by the logic master station the node has to use. That is, which data entry sent by nodes other than the current node in the network the current node has to use.
9	n0-26 to n0-33	Sets the proportional coefficient of the received data, that is, the data finally used by this node is the data sent by the logical master station multiplied by the coefficient.
10	n0-34 to n0-41	Sets the data to be sent by the current node.

4.15.6 Fieldbus Adapter Slot Configuration

Before using an extension card, configure an extension slot for the extension card. Typically, set the parameter to 1, indicating extension slot 1-1.

For example, when installing a PROFIBUS DP module in the slot, set n16-00 to 1 to select extension slot 1-1. Normally, n16-01 indicates the online state.

The following table lists the configuration of the extension slot of the PROFIBUS DP module.

Para.	Name	Value Range
n16-00	Extension slot	0: Disable 1: Extension slot 1_1 2: Extension slot 1_2 3: Extension slot 1_3
n16-01	Module online/offline state	0: Offline 1: Online

4.16 AIO, DIO, and HDIO Parameter Settings

4.16.1 Overview of AIO, DIO, and HDIO Parameter Setting

Drives are equipped with six channels of DIs (DI1 to DI6), one channel of high-speed input (HDI, or common DI), three channels of relay output (RO), one channel of high-speed output (HDO, or common DO), two channels of analog input, and two channels of analog output. Relevant parameters are in group F.

The AI1 combination can be used to measure the motor temperature. For details, see *"4.17 Motor Temperature Detection" on page 210*.

4.16.2 DI

4.16.2.1 Overview of DI

A drive is configured with six channels of DI signals and one channel of HDI, which can be used for DI signals. The following figure shows the function diagram.

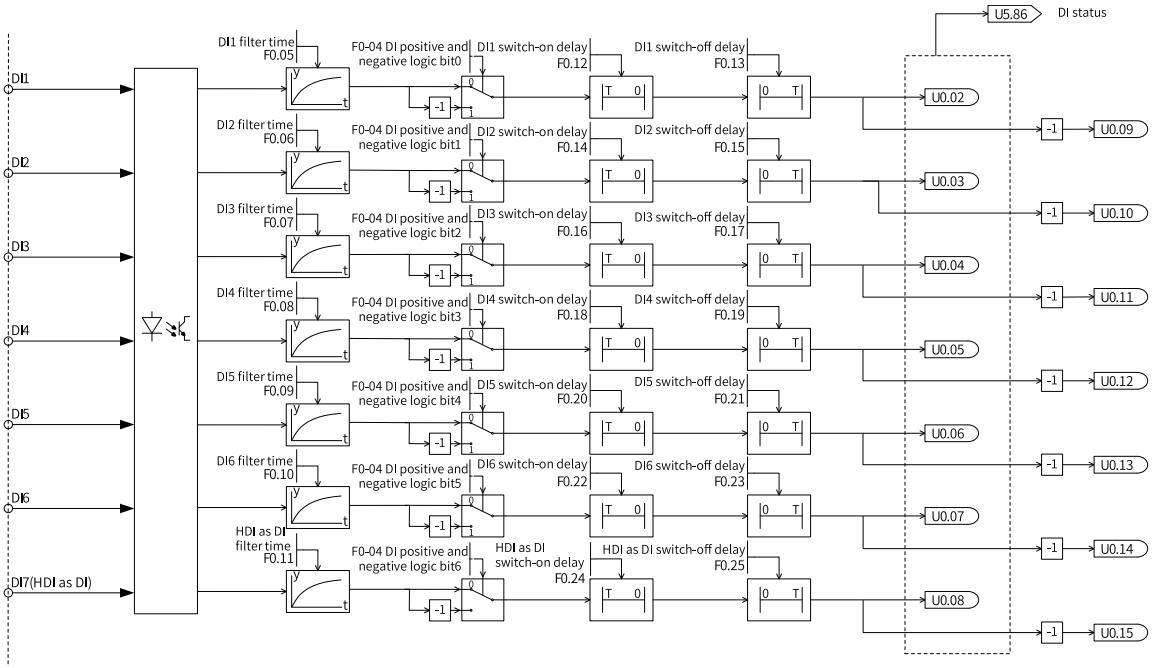


Figure 4-60 Schematic diagram of DI functions

Before using DI terminals, configure the DI internal and external power supplies based on the actual hardware connection. For details, see the MD580 Series Low-Voltage High-Performance Engineering AC Drive Hardware Guide.

4.16.2.2 DI Force

DI state supports the force function. F0-02 is used to select the DI to be forced, and F0-03 is used to set the status of the forced DI. One bit corresponds to the status of one DI. Bit0 to bit 5 correspond to DI1 to DI6, and bit6 corresponds to DI7 (HDI1 as DI). The following table lists the forced states.

F0-02		DI1 (U0-02)	DI2 (U0-03)	DI3 (U0-04)	DI4 (U0-05)	DI5 (U0-06)	DI6 (U0-07)	DI7 (U0-08)
Bit0	0	Hardware dependent DI1	x	x	x	x	x	x
	1	F0-03 (bit0)	x	x	x	x	x	x
bit1	0	x	Hardware dependent DI2	x	x	x	x	x
	1	x	F0-03 (bit1)	x	x	x	x	x
bit2	0	x	x	Hardware dependent DI3	x	x	x	x
	1	x	x	F0-03 (bit2)	x	x	x	x

F0-02		DI1 (U0-02)	DI2 (U0-03)	DI3 (U0-04)	DI4 (U0-05)	DI5 (U0-06)	DI6 (U0-07)	DI7 (U0-08)
bit3	0	x	x	x	Hardware dependent DI4	x	x	x
	1	x	x	x	F0-03 (bit3)	x	x	x
bit4	0	x	x	x	x	Hardware dependent DI5	x	x
	1	x	x	x	x	F0-03 (bit4)	x	x
bit5	0	x	x	x	x	x	Hardware dependent DI6	x
	1	x	x	x	x	x	F0-03 (bit5)	x
bit6	0	x	x	x	x	x	x	Hardware dependent HDI1
	1	x	x	x	x	x	x	F0-03 (bit6)

Note

DI force is not affected by the DI positive or negative logic.

4.16.2.3 DI Filter Delay

Switch-on delay and switch-off delay can be separately set for each DI. As shown in the following figure, the DI filter function is provided for both switch-on delay and switch-off delay. When the DI signal status holding time is shorter than the duration reference, the DI status will be maintained. Parameters F0-05 to F0-25 are used to set filter time, switch-on delay, and switch-off delay for each DI.

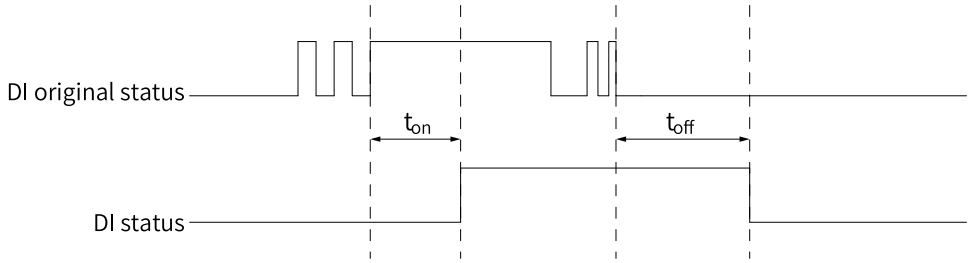


Figure 4-61 DI switch-on and switch-off delay sequence diagram

Switch-on delay can filter out high-level pulses with the period less than t_{on}. Therefore, the first two pulses of the signal source will be filtered out, while the third pulse of the signal source will be switched on after the delay time of t_{on} and changed to the high level.

The switch-off delay time is indicated by t_{off}, and low-level pulses with the period less than t_{off} are filtered out, as shown in the preceding figure. Switch-on delay and switch-off delay can filter out interference or control logic delay. The relevant parameters are F0-12 to F0-25.

Within the DI filter time, high-level and low-level pulses with the period less than the filter time reference will be filtered out. The relevant parameters are F0-05 to F0-11.

4.16.2.4 DI Connector

When using DI for drive control or other functions, associate relevant parameters with the DI connector. Two sets of bit connectors are provided for DI status.

Para.	Description	Para.	Description
U0-02	DI1 status	U0-09	DI1 status inversion
U0-03	DI2 status	U0-10	DI2 status inversion
U0-04	DI3 status	U0-11	DI3 status inversion
U0-05	DI4 status	U0-12	DI4 status inversion
U0-06	DI5 status	U0-13	DI5 status inversion
U0-07	DI6 status	U0-14	DI6 status inversion
U0-08	HDI1 as DI status	U0-15	HDI1 as DI status inversion

4.16.3 DO

The drive supports three RO channels and one HDO channel, which can be used as a DO channel.

The three RO channels and one HDO channel (as DO channel) support independent setting of switch-on delay and switch-off delay. They also support positive logic and negative logic (set through F1-02). When the negative logic is enabled, logic 0 indicates that the output (normally open) is enabled, and logic 1 indicates that the output (normally open) is disabled.

F1-00 indicates the DO source signal status. F1-01 indicates the status after delay logic and positive and negative logic processing. The following figure shows the schematic diagram of DO functions.

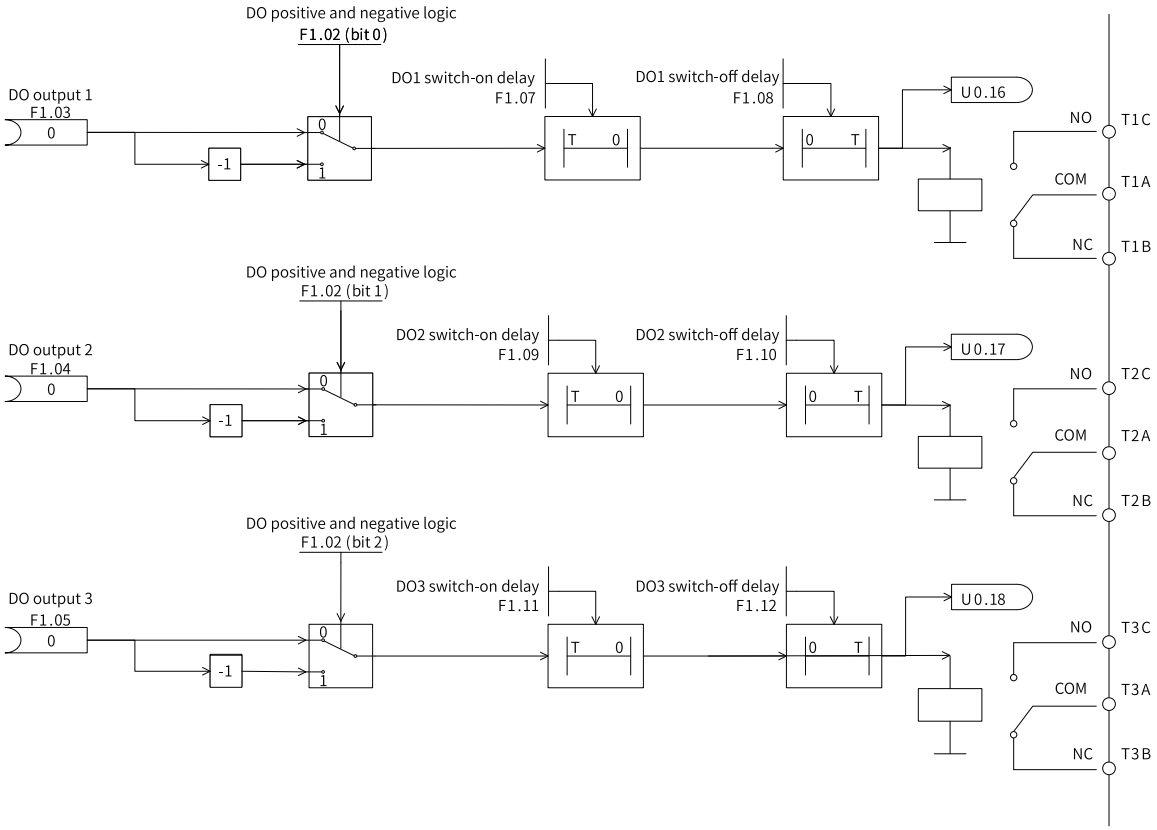


Figure 4-62 Schematic diagram of DO functions

DO status bit connectors

Table 4–19 DO status bit connectors

Para.	Description
U0-16	RO1 status
U0-17	RO2 status
U0-18	RO3 status
U0-19	HDO1 as DO status

4.16.4 AI

The drive supports two AIs, which support the current signal type and voltage signal type. In the current mode, you can set the input resistance to 500 Ω or 250 Ω. Before using AI, check that the external signal is a current signal or a voltage signal and then set parameters F2-04 to F2-07 correctly.

The following figure shows how to implement the AI function.

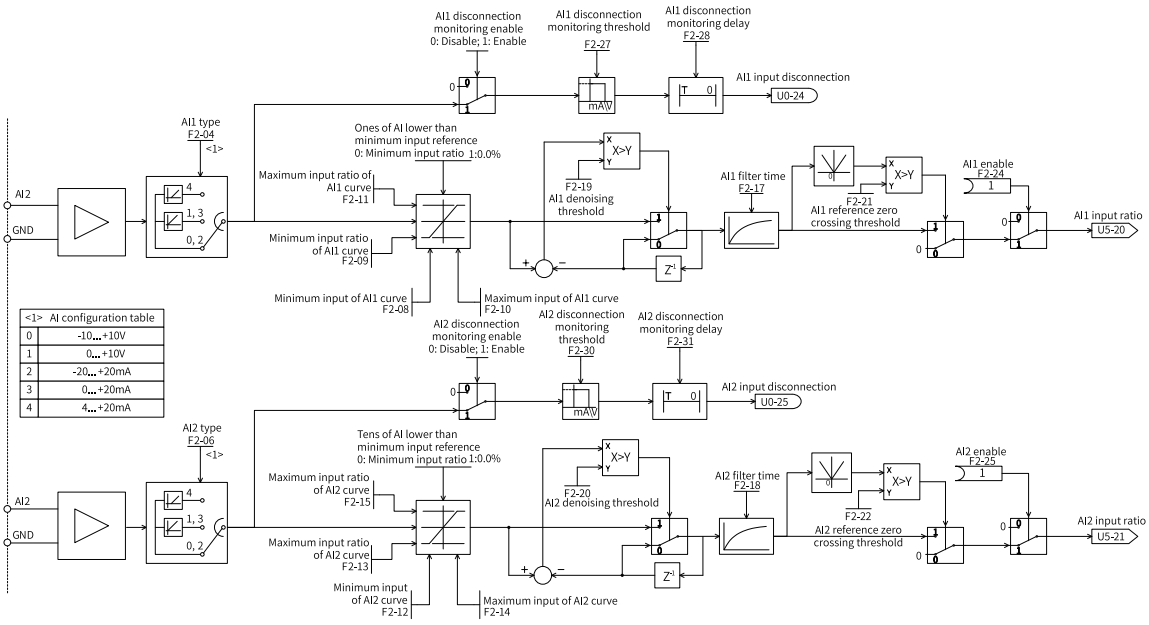


Figure 4-63 AI function

The following table lists relevant parameters.

Parameter Code	Parameter Name	Description
F2.00	AI1 input value	It displays AI1 input value in V or mA according to the selection of F2-04.
F2.01	AI1 input proportion	It displays the percentage corresponding to AI3 input, which is the final output after AI module processing.
F2.02	AI2 input value	It displays AI2 input value in V or mA according to the selection of F2-06.
F2.03	AI2 input proportion	It displays the percentage corresponding to AI2 input, which is the final output after AI module processing.
F2.04	AI1 type	0: －10 V to +10 V 1: 0 V to 10 V 2: -20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA
F2.05	Input impedance in current mode of AI1	0: 500 Ω 1: 250 Ω
F2.06	AI2 type	0: －10 V to +10 V 1: 0 V to 10 V 2: -20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA
F2.07	Input impedance in current mode of AI2	0: 500 Ω 1: 250 Ω

Parameter Code	Parameter Name	Description
F2.08	Min. input value of AI1 curve	It calibrates AI1. F2-08 and F2-10 also limit the range of AI1 input (the unit is V or mA according to F2-04). Within the value range, the output percentage is converted according to the line. When the input value is less than the value of F2-08, the default output is F2-09, or the output can be set to 0.0%, which is the bit value of the ones position of F2-16 (selection when AI value < min. input value).
F2.09	Min. input proportion of AI1 curve	
F2.10	Max. input value of AI1 curve	
F2.11	Max. input proportion of AI1 curve	
F2.12	Min. input value of AI2 curve	It calibrates AI2. F2-12 and F2-14 also limit the range of AI2 input (the unit is V or mA according to F2-06). Within the value range, the output percentage is converted according to the line. When the input value is less than the value of F2-12, the default output is F2-13, or the output can be set to 0.0%, which is the bit value of the ones position of F2-16 (selection when AI value < min. input value).
F2.13	Min. input proportion of AI2 curve	
F2.14	Max. input value of AI2 curve	
F2.15	Max. input proportion of AI2 curve	
F2.16	Selection when AI value < minimum input value	Ones position: Selection when AI1 value < minimum input value • 0: Minimum input proportion • 1: 0.0% Tens position: Selection when AI2 value < minimum input value • 0: Minimum input proportion • 1: 0.0%
F2.17	AI1 filter time	It defines the AI filter time, which can remove interference and generate a delay effect.
F2.18	AI2 filter time	
F2.19	AI1 denoising threshold	It defines the denoising threshold. When the AI input fluctuation is smaller than the threshold, the AI input proportion remains unchanged.
F2.20	AI2 denoising threshold	
F2.21	AI1 zero-crossing threshold	When the AI input proportion is smaller than the threshold, the AI input proportion is 0%.
F2.22	AI2 zero-crossing threshold	
F2.24	AI1	It is used to enable or disable the AI. When the AI is disabled, the AI output is forced to be 0.
F2.25	AI2	
F2.26	AI1 disconnection monitoring	0: Disable 1: Enable If the function is enabled, a disconnection alarm is triggered when the AI1 input value is smaller than the value of F2-27 for the time of F2-28.
F2.27	AI1 disconnection monitoring threshold	The unit is V or mA, depending on the setting of F2-04.
F2.28	AI1 disconnection monitoring delay	0.00s to 10.00s
F2.29	AI2 disconnection monitoring	0: Disable; 1: Enable If the function is enabled, a disconnection alarm is triggered when the AI2 input value is smaller than the value of F2-30 for the time of F2-31.

Parameter Code	Parameter Name	Description
F2.30	AI2 disconnection monitoring threshold	The unit is V or mA, depending on the setting of F2-06.
F2.31	AI2 disconnection monitoring delay	0.00s to 10.00s

Note

When the AI1 temperature detection type (F6-06) is valid, the setting for AI1 is disabled.

AI signals are used as speed or torque reference in many field applications. To monitor the actual AI value in real time and enable the AC drive to execute the corresponding protection action after AI overlimit, use the AI monitoring function. After this function is enabled, set the upper and lower limits of AI monitoring. After the actual value crosses a limit, the AC drive executes the corresponding protection action. The following four action modes are available:

- No action
- Report a fault and stop
- Report an alarm and run at the last speed
- Report an alarm and run at the safe operation speed

Relevant parameters and their description are as follows:

Parameter Code	Parameter Name	Description
F2-33	Minimum value monitored through AI1	Minimum value monitored in AI1 channel
F2-35	Maximum value monitored through AI1	Maximum value monitored in AI1 channel
F2-37	Minimum value monitored through AI2	Minimum value monitored in AI2 channel
F2-39	Maximum value monitored through AI2	Maximum value monitored in AI2 channel
F2-40	AI monitoring hysteresis value	It indicates the hysteresis value on the basis of the AI input proportion. For example, if the maximum value is set to 8, the corresponding input proportion is 80%, and the default value of this parameter is 0.2%, AI monitoring is activated at 80.2%.
F2-41	AI monitoring function	It sets whether to enable AI monitoring.
F2-42	AI monitoring activation condition selection	• Bit 0: AI1 value < Minimum value of AI1 • Bit 1: AI1 value > Maximum value of AI1 • Bit 2: AI2 value < Minimum value of AI2 • Bit 3: AI2 value > Maximum value of AI2 This parameter specifies the conditions of activating AI monitoring. One or more conditions can be specified.

Parameter Code	Parameter Name	Description
F2-43	AI monitoring and control channel selection	• Bit 0: AI1 monitoring activation in the remote reference channel 1 control mode • Bit 1: AI1 monitoring activation in the remote reference channel 2 control mode • Bit 2: AI1 monitoring activation in the local operating panel control mode • Bit 0: AI2 monitoring activation in the remote reference channel 1 control mode • Bit 1: AI2 monitoring activation in the remote reference channel 2 control mode • Bit 2: AI2 monitoring activation in the local operating panel control mode This parameter specifies the control channel under which AI monitoring can be activated. One or more options can be specified.
F2-44	Protection class for AI monitoring activation	AC drive protection action modes when AI monitoring is activated: • 0: No action • 1: Fault • 2: Report an alarm and run at the last speed • 3: Report an alarm and run at the safe operation speed
F2-45	Safe operation speed upon AI monitoring activation	It is option 3 of F2-44.

4.16.5 AO

The drive supports two AO channels and voltage and current signals. Set the F3-06 to F3-07 parameters based on the site requirements before applying AO.

The following function implementation flowchart shows how to use the AO function.

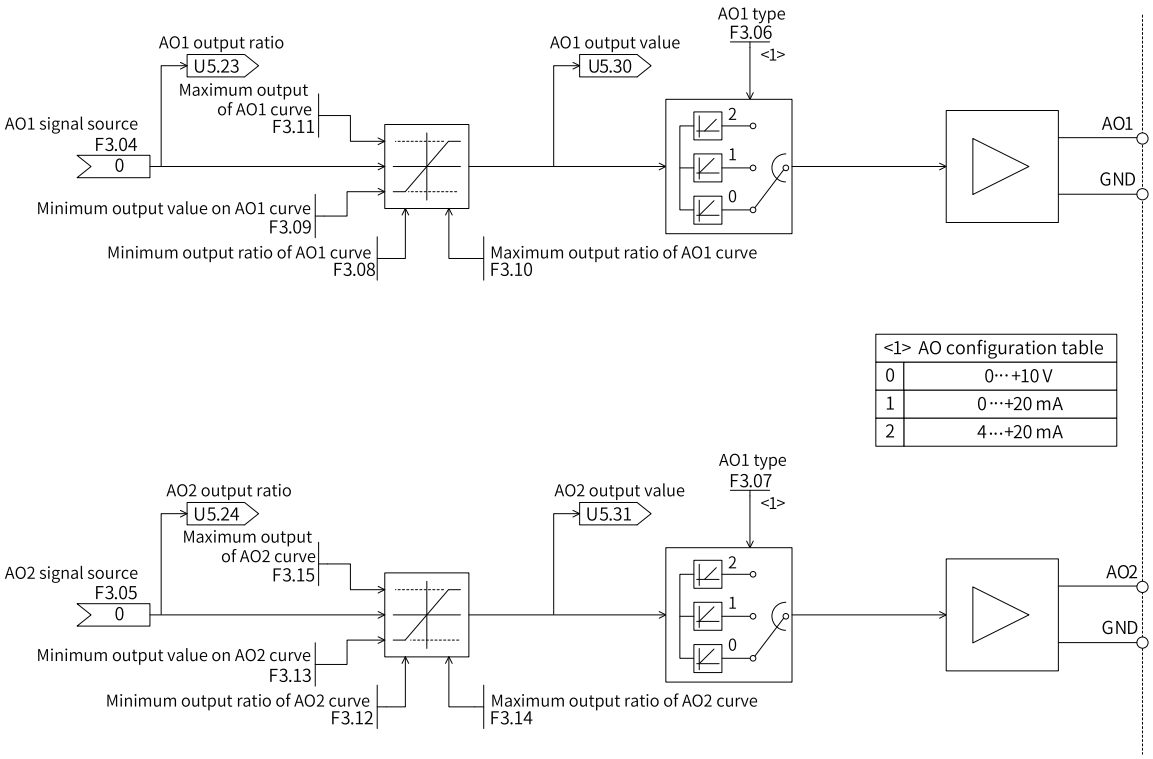


Figure 4-64 AO function implementation flowchart

The following table lists the function parameters.

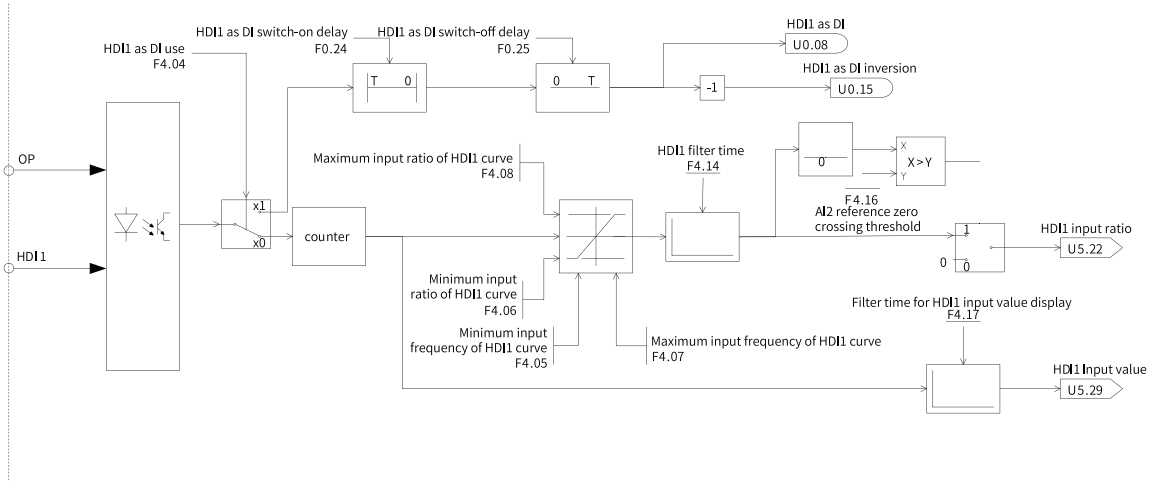
Para.	Name	Description
F3-00	AO1 output value	Shows the AO1 output value, which is set through F3-06, in V or mA.
F3-01	AO1 output proportion	Shows the percentage of AO1 output, corresponding to [F3-04].
F3-02	AO2 output value	Shows the AO2 output value, which is set through F3-07, in V or mA.
F3-03	AO2 output proportion	Shows the percentage of AO2 output, corresponding to [F3-05].
F3-04	AO1 signal source	Sets the signal source of AO1 output.
F3-05	AO2 signal source	Sets the signal source of AO2 output.
F3-06	AO1 type	Sets the signal type of AO1 or AO2 output. 0: 0 V to 10 V; 1: 0 mA to 20 mA; 2: 4 mA to 20 mA
F3-07	AO2 type	
F3-08	Min. output proportion of AO1 curve	Sets the scale factor of AO1. F3-08 and F3-10 restrict the range of the AO1 output percentage. Within the range, the output numerical value is calculated according to the line (the unit is V or mA, depending on the setting of F3-06).
F3-09	Min. output value of AO1 curve	
F3-10	Max. output proportion of AO1 curve	
F3-11	Max. output value of AO1 curve	

Para.	Name	Description
F3-12	Min. output proportion of AO2 curve	Sets the scale factor of AO2. F3-12 and F3-14 restrict the range of the AO2 output percentage. Within the range, the output numerical value is calculated according to the line (the unit is V or mA, depending on the setting of F3-07).
F3-13	Min. output value of AO2 curve	
F3-14	Max. output proportion of AO2 curve	
F3-15	Max. output value of AO2 curve	

4.16.6 HDI

The drive supports one channel of HDI (DI7) signal. For details about HDI, see the MD580 Series Low-voltage High-performance Engineering AC Drive Hardware Guide.

The following function implementation flowchart shows how to use the software function.



The following table lists the function parameters.

Para.	Name	Description
F4.00	HDI1 input value	Shows the HDI1 input value in kHz.
F4.01	HDI1 input proportion	Shows the input proportion of HDI1 after linear processing and filtering.
F4.04	Using HDI as DI	Ones: Using HDI1 as DI: 0: Disable 1: Enable Default value: 0
F4.05	Min. input frequency of HDI1 curve	Sets the scale factor of HDI1. F4-06 and F4-08 restrict the range of the HDI1 proportion. Within the range, the input proportion is calculated according to the line.
F4.06	Min. input proportion of HDI1 curve	
F4.07	Max. input frequency of HDI1 curve	
F4.08	Max. input proportion of HDI1 curve	

Para.	Name	Description
F4.13	Setting for HDI lower than minimum input	Ones: Setting for HDI1 lower than minimum input 0: Minimum input proportion 1: 0.0%
F4.14	HDI1 filter time	0.000 to 10.000s
F4.16	HDI setting zero-crossing threshold	When the HDI input proportion is less than the threshold, the HDI input proportion is considered as 0%.
F4.17	Filter time for HDI1 input value display	0.000 to 10.000s

Note

- HDI can be used as DI. For details about relevant parameter settings in this case, see section 6.10.1 "DI".
- HDI1 is forced to be used as DI, and is used as the reactor over-temperature detection signals.

4.16.7 HDO

The drive supports one channel of HDO signal. For details about HDO, see the hardware guide. The following function implementation flowchart shows how to use the software function.

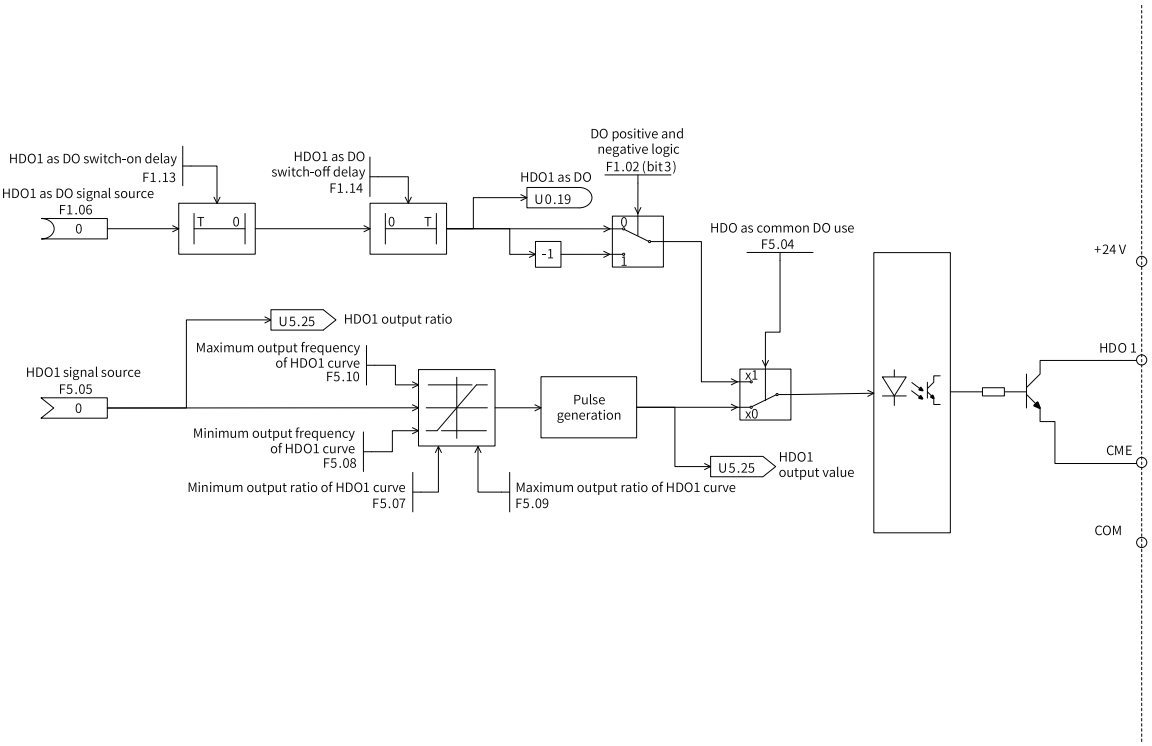


Figure 4-65 HDO function implementation flowchart

The following table lists the function parameters.

Para.	Name	Description
F5.00	HDO1 output value	Shows the HDI1 input value in kHz.
F5.01	HDO1 output proportion	Shows the input proportion of HDI1 after linear processing and filtering.

Para.	Name	Description
F5.04	Using HDO as common DO	Ones: Using HDO1 as DO: 0: Disable 1: Enable Default value: 0
F5.05	HDO1 signal source	Sets the signal source of HDO1.
F5.07	Min. output proportion of HDO1 curve	Sets the scale factor of HDO1. F5-08 and F5-10 restrict the range of the HDO1 output frequency. Within the range, the output frequency is calculated according to the line.
F5.08	Min. output frequency of HDO1 curve	
F5.09	Max. output proportion of HDO1 curve	
F5.10	Max. output frequency of HDO1 curve	

Note

HDO can be used as DO. For details about relevant parameter settings in this case, see section *"4.16.3 DO" on page 194*.

4.16.8 Expansion I/O Card

The MD580 supports one expansion I/O module. For details on how to install the I/O module, see *MD580 Series Low-Voltage High-Performance Engineering AC Drive Installation Guide*. The following table describes the module model, terminals, and related parameters.

Model	Module Name	Terminal	Related Parameter Group
MD580-IO-M1	MD580 I/O terminal expansion module	Four DIs (DI8 to DI11) Two ROs (RO4 and RO5) Two AIs (AI3 and AI4) Two AOs (AO3 and AO4)	F7

- Expanded DI
  The expansion I/O module provides four DIs. The following figure describes functions of the four DIs.

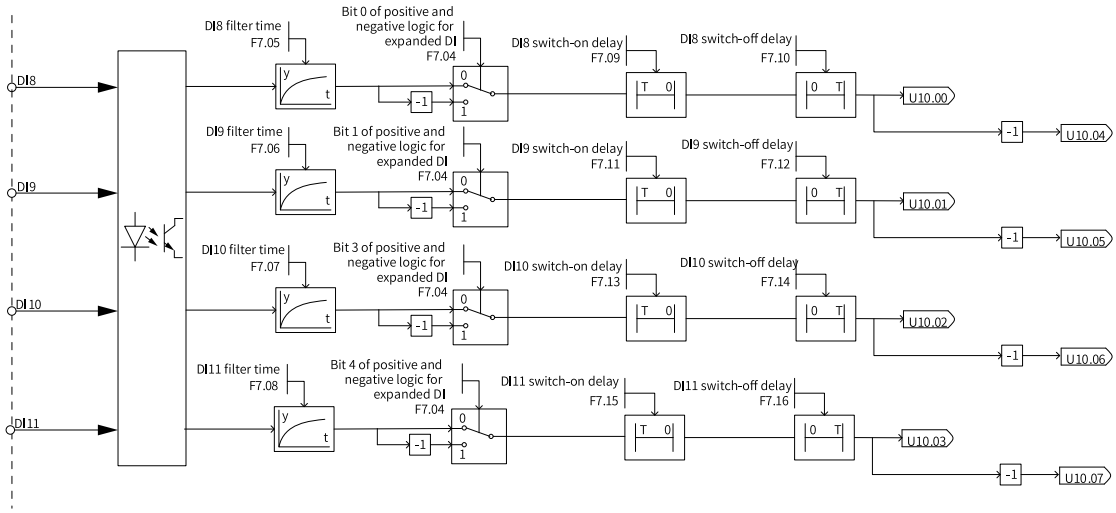


Figure 4-66 Functions of the four DIs

The DI on the expansion I/O module supports the force function. F7-02 is used to select the DI to be forced, and F7-03 is used to set the status of the forced DI. One bit corresponds to the status of one DI. Bit 0 to bit 3 correspond to DI8 to DI11. The following table describes the forced state.

F7-02		DI8 (U10-00)	DI9 (U10-01)	D10 (U10-02)	D11 (U10-03)
Bit 0	0	Determined by hardware	X	X	X
	1	Bit 0 of F7-03	X	X	X
Bit 1	0	X	Determined by hardware	X	X
	1	X	Bit 1 of F7-03	X	X
Bit 2	0	X	X	Determined by hardware	X
	1	X	X	Bit 2 of F7-03	X
Bit 3	0	X	X	X	Determined by hardware
	1	X	X	X	Bit 3 of F7-03

Note

The DI force function is not affected by the DI positive or negative logic.

Each DI supports settings of switch-on delay time and switch-off delay time, which support DI filtering. When the DI signal state holding time is shorter than the set time, the DI state will remain in the original state.

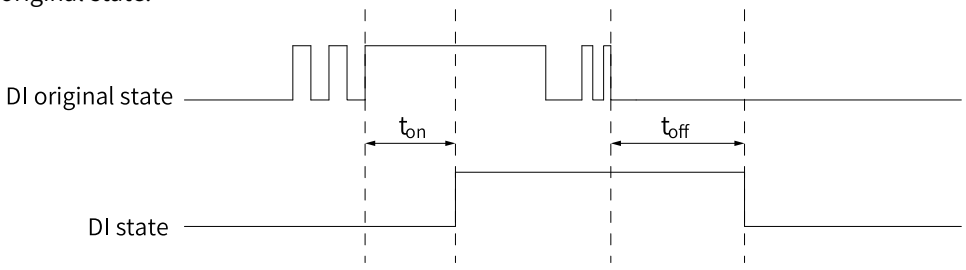


Figure 4-67 DI switch-on and switch-off delay sequence diagram

Switch-on delay can filter out high-level pulses with the period shorter than t_{on}. Therefore, the first two pulses of the signal source will be filtered out, while the third pulse of the signal source will be switched on after the delay time of t_{on} and changed to the high level.

The switch-off delay time is t_{off}. The low level pulses with the period shorter than t_{off} will be filtered out. The switch-off delay can be used to filter interference or for logical delay control. The related parameters are F7-09 to F7-16.

Within the DI filter time, high-level and low-level pulses with the period shorter than the filter time will be filtered out. The related parameters are F7-05 to F7-08.

The following table describes connector parameters of DI8 to DI11 on the expansion I/O module.

Connector Parameter	Description	Connector Parameter	Description
U10-00	DI8	U10-04	Opposite to DI8
U10-01	DI9	U10-05	Opposite to DI9
U10-02	DI10	U10-06	Opposite to DI10
U10-03	DI11	U10-07	Opposite to DI11
U5-86	DI state	U5-88	DI status (including status of expanded DI)

- Expanded DO

The I/O expansion module supports two ROs, each of which can be set with switch-on delay and switch-off delay. The two ROs support positive and negative logic processing functions (F7-22). When the negative logic is valid, logic 0 indicates that output (normally open) is valid and logic 1 indicates that output (normally open) is invalid.

F7-20 indicates the status of the DO source signal, and F7-21 indicates the status after the delay logic and positive and negative logic processing. The DO function diagram is as follows.

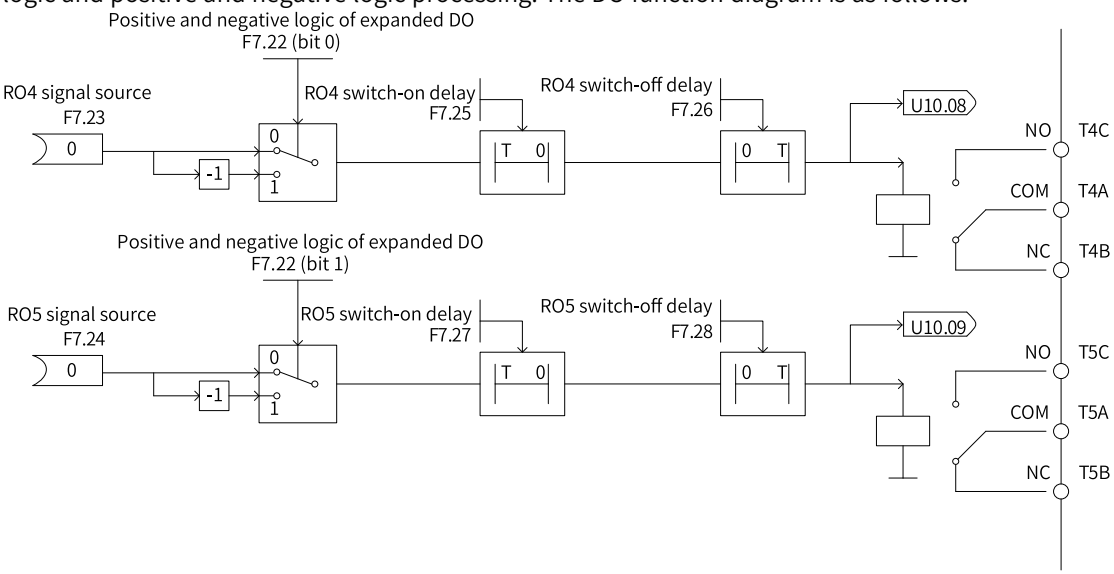


Figure 4-68 Functions of the expanded DOs

The following table describes the DO status connectors.

Connector Parameter	Description
U10-08	RO4 status
U10-09	RO5 status

Connector Parameter	Description
U5-87	RO state
U5-89	RO status (including status of expanded RO)

- The drive supports two AIs and two types of signals: current and voltage. In the current mode, you can set the input resistance to 500 Ω or 250 Ω. The I/O expansion card provides two expanded AIs, which support current and voltage signal types. In the current type, you can set the input resistance to 500 Ω or 250 Ω. Before use, confirm the external signal is a current signal or a voltage signal, and then set F7-44 to F7-47 correctly.

  The following figure shows how to implement the AI function.

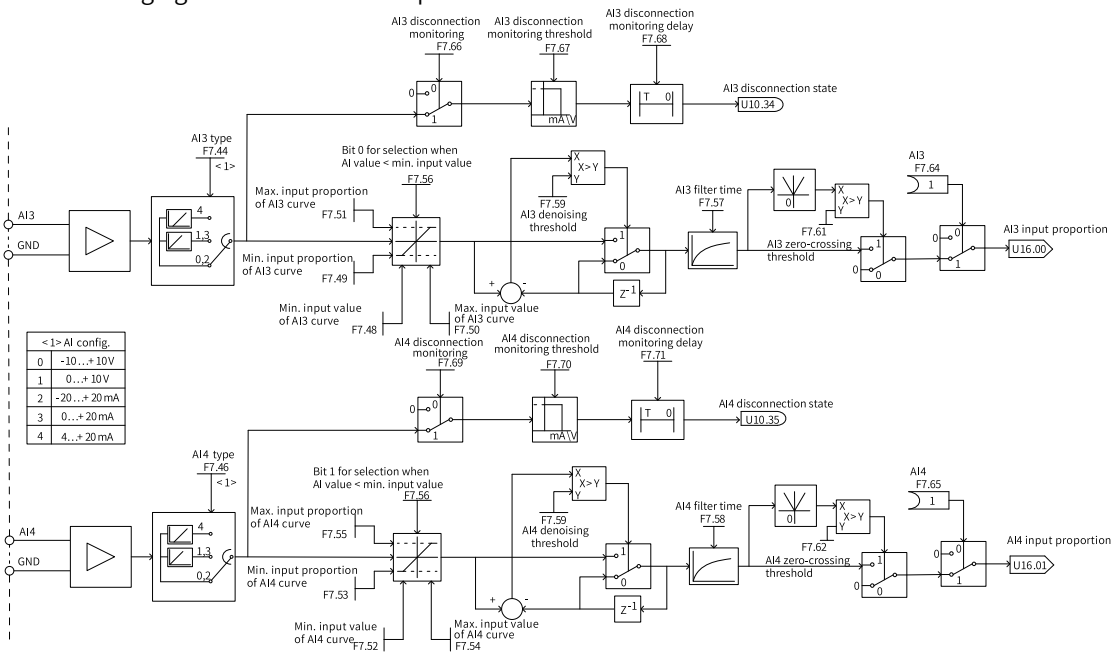


Figure 4-69 Functions of the expanded AIs

The following table describes AI-related parameters and connector parameters.

Table 4–20

Parameter Code	Parameter Name	Description
F7-40	AI3 input value	It displays AI3 input value in V or mA according to the selection of F7-44.
F7-41	AI3 input proportion	It displays the percentage corresponding to AI3 input, which is the final output after AI module processing.
F7-42	AI4 input value	It displays AI4 input value in V or mA according to the selection of F7-44.
F7-43	AI4 input proportion	It displays the percentage corresponding to AI4 input, which is the final output after AI module processing.

Parameter Code	Parameter Name	Description
F7-44	AI3 type	0: －10 V to +10 V 1: 0 V to 10 V 2: -20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA
F7-45	Input impedance in current mode of AI3	0: 500 Ω 1: 250 Ω
F7-46	AI4 type	0: －10 V to +10 V 1: 0 V to 10 V 2: -20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA
F7-47	Input impedance in current mode of AI4	0: 500 Ω 1: 250 Ω
F7-48	Min. input value of AI3 curve	It calibrates AI3. F7-48 and F7-50 also limit the range of AI3 input (the unit is V or mA according to F7-44). Within the value range, the output percentage is converted according to the line. When the input value is less than the value of F7-48, the default output is F7-49, or the output can be set to 0.0%, which is the bit value of the ones position of F7-56 (selection when AI value < min. input value).
F7-49	Min. input proportion of AI3 curve	
F7-50	Max. input value of AI3 curve	
F7-51	Max. input proportion of AI3 curve	
F7-52	Min. input value of AI4 curve	It calibrates AI4. F7-52 and F7-55 also limit the range of AI4 input (the unit is V or mA according to F7-46). Within the value range, the output percentage is converted according to the line. When the input value is less than the value of F7-52, the default output is F7-52, or the output can be set to 0.0%, which is the bit value of the tens position of F7-56 (selection when AI value < min. input value).
F7-53	Min. input proportion of AI4 curve	
F7-54	Max. input value of AI4 curve	
F7-55	Max. input proportion of AI4 curve	
F7-56	Selection when AI value < minimum input value	Ones position: Selection when AI3 value < min. input value • 0: Minimum input proportion • 1: 0.0% Ones position: Selection when AI4 value < min. input value • 0: Minimum input proportion • 1: 0.0%
F7-57	AI3 filter time	It defines the AI filter time, which can remove interference and generate a delay effect.
F7-58	AI4 filter time	

Parameter Code	Parameter Name	Description
F7-59	AI3 denoising threshold	It sets the denoising threshold. When the AI input fluctuation is less than the threshold, the AI ratio keeps the original value.
F7-60	AI4 denoising threshold	
F7-61	AI3 zero-crossing threshold	When the AI input proportion is smaller than the threshold, the AI input proportion is 0%.
F7-62	AI4 zero-crossing threshold	
F7-64	AI3	It is used to enable or disable the AI. When the AI is disabled, the AI output is forced to be 0.
F7-65	AI4	
F7-66	AI3 disconnection monitoring	0: Disable 1: Enable If the function is enabled, a disconnection alarm is triggered when the AI3 input value is smaller than the value of F7-67 for the time of F7-68.
F7-67	AI3 disconnection monitoring threshold-current/voltage	The unit is V or mA, depending on the setting of F2-04.
F7-68	AI3 disconnection monitoring delay	0.00s to 10.00s
F7-69	AI4 disconnection monitoring	0: Disable 1: Enable If the function is enabled, a disconnection alarm is triggered when the AI2 input value is smaller than the value of F7-70 for the time of F7-71.
F7-70	AI4 disconnection monitoring threshold-current/voltage	The unit is V or mA, depending on the setting of F7-46.
F7-71	AI4 disconnection monitoring delay	0.00s to 10.00s
U10-30	AI3 below lower limit	
U10-31	AI3 over upper limit	
U10-32	AI4 below lower limit	
U10-33	AI4 over upper limit	
U10-34	AI3 disconnection	
U10-35	AI4 disconnection	
U16-00	AI3 input proportion	
U16-01	AI4 input proportion	
U16-02	AI3 input value	
U16-03	AI4 input value	

- Expanded AO

  The MD580 supports two AOs, which support the voltage and current signal types. Before using AOs, set F7-86 to F7-87 based on the site requirements.

  The following function implementation flowchart shows how to use the AO function.

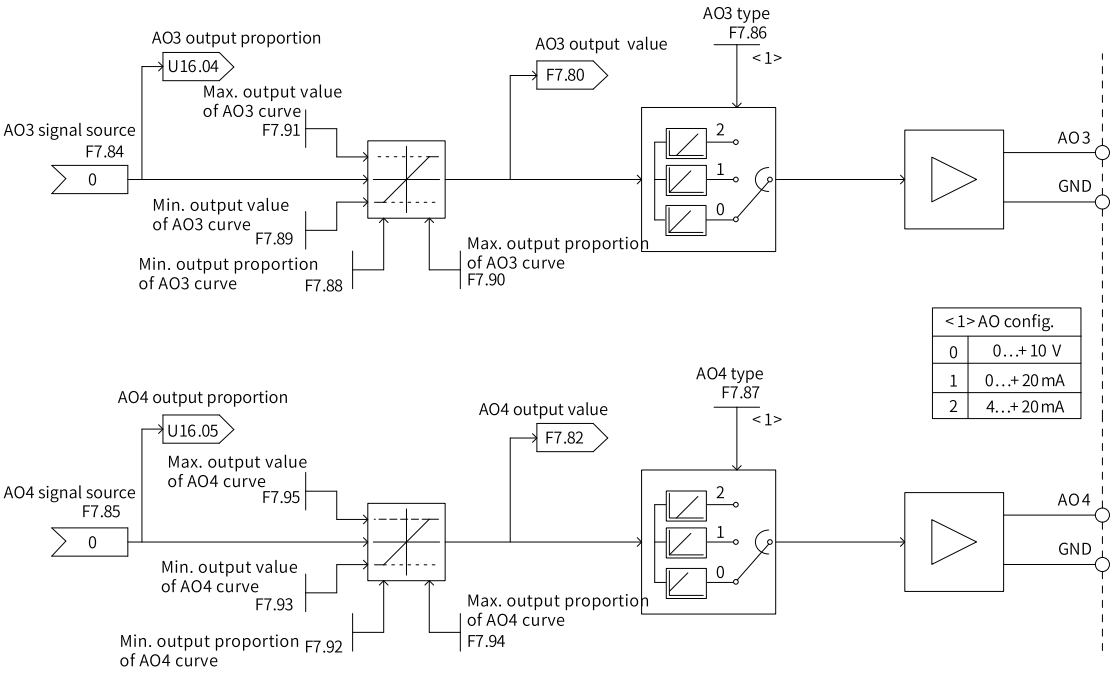


Figure 4-70 Functions of the expanded AO

The following table lists the AO function parameters.

Table 4–21

Parameter Code	Parameter Name	Description
F7-80	AO3 output value	It displays the AO3 output value in V or mA according to the setting of F7-86.
F7-81	AO3 output proportion	It displays the AO3 output percentage, corresponding to F7-86.
F7-82	AO4 output value	It displays the AO4 output value in V or mA according to the setting of F7-87.
F7-83	AO4 output proportion	It displays the AO4 output percentage, corresponding to F7-87.
F7-84	AO3 signal source	It sets the signal source of AO3 output.
F7-85	AO4 signal source	It sets the signal source of AO4 output.
F7-86	AO3 type	It sets the signal type of AO3 or AO4 output. 0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA
F7-87	AO4 type	

Parameter Code	Parameter Name	Description
F7-88	Min. output proportion of AO3 curve	It sets the calibration factor of AO3. F7-88 and F7-90 limit the range of the AO3 output percentage. Within the range, the output value is converted according to the line (the unit is V or mA, depending on the setting of F7-86).
F7-89	Min. output value of AO3 curve	
F7-90	Max. output proportion of AO3 curve	
F7-91	Max. output value of AO3 curve	
F7-92	Min. output proportion of AO4 curve	It sets the calibration factor of AO4. F7-92 and F7-94 limit the range of the AO4 output percentage. Within the range, the output value is converted according to the line (the unit is V or mA, depending on the setting of F7-87).
F7-93	Min. output value of AO4 curve	
F7-94	Max. output proportion of AO4 curve	
F7-95	Max. output value of AO4 curve	
U16-04	AO3 output proportion	
U16-05	AO4 output proportion	
U16-06	AO3 output value	
U16-07	AO4 output value	

4.17 Motor Temperature Detection

The drive supports up to four channels for temperature measurement. You can enable the function and set the type of temperature detection sensor via F6-00 to F6-07, and view the measured temperature values via U6-91 to U6-94. The measured temperature values can be selected by the motor temperature function module for motor temperature protection. Supported detection modes are KTY84-130, PT100, PT1000, PTC130, and PTC130*3.

The motor temperature can be detected through simple wiring and parameter setting. The drive can support detection and protection for three motor temperatures at a time. You can select the motor temperature detection source via E8-29 to E8-43, corresponding to settings of F6-00 to F6-07. You can set the motor over-temperature threshold and warning threshold. You can also view the three detected motor temperature values via U5-10 to U5-12.

When the motor temperature detection source is the connector, the temperature value is in the unit of °C and is used for obtaining the motor temperature through communication. When E8-29 is set to the value of U15-18, PZD1 received is the motor temperature. When U15-18 is set to 100, the current motor temperature is 100°C.

The following table lists relevant parameters.

Para.	Name	Description
U5-10	Detected motor temperature 1	The measured temperature is displayed based on the temperature measurement mode selected in E8-29. Unit: °C
U5-11	Detected motor temperature 2	The measured temperature is displayed based on the temperature measurement mode selected in E8-34. Unit: °C

Para.	Name	Description
U5-12	Detected motor temperature 3	The measured temperature is displayed based on the temperature measurement mode selected in E8-39. Unit: °C Unit: °C
U6-91	PT1 temperature detection value	The measured temperature is displayed based on the temperature measurement mode selected in F6-00. Unit: °C
U6-92	PT2 temperature detection value	The measured temperature is displayed based on the temperature measurement mode selected in F6-02. Unit: °C
U6-93	PT3 temperature detection value	The measured temperature is displayed based on the temperature measurement mode selected in F6-04. Unit: °C
U6-94	AI1 temperature detection value<1>	The measured temperature is displayed based on the temperature measurement mode selected in F6-06. Unit: °C
F6-00	PT1 temperature detection type	0: Disable 1: PT1000 2: PT100 3: PTC130 4: KTY84 5: PTC130*3
F6-02	PT2 temperature detection type	
F6-04	PT3 temperature detection type	
F6-06	AI1 temperature detection type<1>	
E8-29<2>	Motor temperature 1 detection source	0: Disable 1: PT1 temperature detection 2: PT2 temperature detection 3: PT3 temperature detection 4: AI1 temperature detection Other: K connector
E8-30	Motor over-temperature 1 threshold	When the value of U5-10 is greater than or equal to that of E8-31, the motor over-temperature fault occurs and the motor coasts to stop. When the value of U5-10 is greater than or equal to that of E8-32, only an alarm is triggered. The fault or alarm can be cleared only when the value of U5-10 is less than the result of [Fault or alarm threshold] minus [Fault or alarm threshold hysteresis]. The minimum and maximum temperature measurements vary with temperature detection types. If the protection threshold exceeds the allowed range, the minimum or maximum value is used.
E8-31	Motor over-temperature 1 threshold hysteresis	
E8-32	Motor over-temperature 1 warning value	
E8-33	Motor over-temperature 1 warning hysteresis	
E8-34<2>	Motor temperature 2 detection source	0: Disable 1: PT1 temperature detection 2: PT2 temperature detection 3: PT3 temperature detection 4: AI1 temperature detection Other: K connector

Para.	Name	Description
E8-35	Motor over-temperature 2 threshold	Same as motor temperature detection 1.
E8-36	Motor over-temperature 2 threshold hysteresis	
E8-37	Motor over-temperature 2 warning value	
E8-38	Motor over-temperature 2 warning hysteresis	
E8-39<2>	Motor temperature 2 detection source	0: Disable 1: PT1 temperature detection 2: PT2 temperature detection 3: PT3 temperature detection 4: AI1 temperature detection Other: K connector
E8-40	Motor over-temperature 3 threshold	Same as motor temperature detection 1.
E8-41	Motor over-temperature 3 threshold hysteresis	
E8-42	Motor over-temperature 3 warning value	
E8-43	Motor over-temperature 3 warning hysteresis	

The following table lists the measurement range of each temperature type.

F6-00/F6-02/F6-04/ F6-06 Temperature Detection Type	Minimum Detectable Temperature (°C)	Maximum Detectable Temperature (°C)
1: PT1000	-50	280
2: PT100	-50	280
3: PTC130	125	180
4: KTY84-130	-40	230
5: PTC130*3	70	170

Note

- <1>: When the AI1 temperature detection type is valid, the AI1 analog function is unavailable.
- <2>: When the connector is used for motor temperature detection, the raw value on the connector indicates the temperature. For example, the value 204 indicates 20.4°C.

4.18 Process PID Module

In industrial control application, to control the speed, pressure, temperature, or current for the controlled objects and maintain a stable output, the closed-loop control mode is generally used. The proportional control (P), integral control (I), and differential control (D) are used together to keep the feedback value consistent with the reference.

The output of P control is proportional to the deviation. In case of proportional control only, the system output contains steady state errors.

The output of I control is proportional to the deviation integral. The integral item is introduced to clear system static errors.

The output of D control is proportional to the deviation differential. The differential item can be used to predict the deviation change trend, optimizing the dynamic response of large-inertia controlled objects with a great delay.

Set parameters in group L4 as needed and adjust PID parameters for well control on controlled variables. Set L4-00 to enable the PID function and set L4-04 to the execution period of the PID controller.

4.18.1 PID Input

Set L4-08 and L4-15 to the target value and actual value of the controlled variable as the reference source and feedback source of the controller. Filter (L4-11, L4-16) the reference and feedback as required. For inverse characteristic load, set the PID action direction (L4-03) as the reverse direction, so that when the input value is positive, the PID output is reduced. The input deviation (U9-90) is added to the supplementary reference of deviation (L4-20) as the final PID input (U9-91). When reference freezing (L4-10) is enabled, the reference does not change. The following figure shows the details.

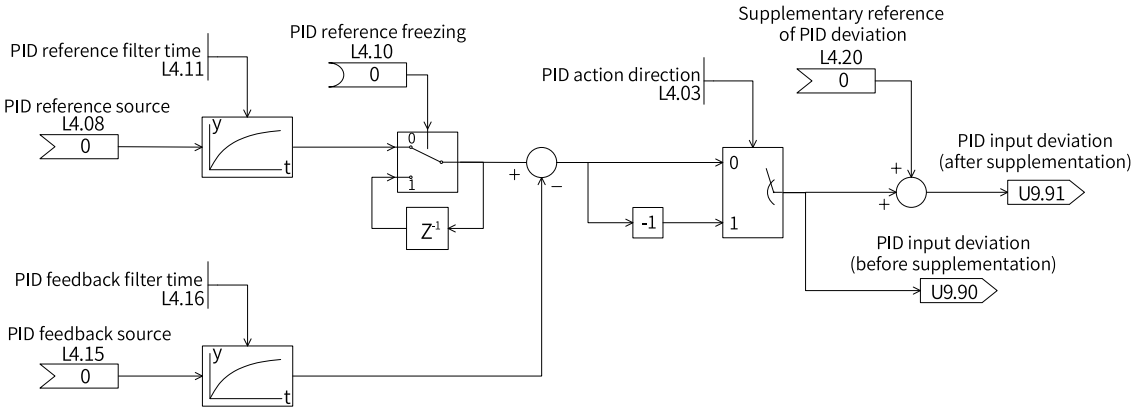


Figure 4-71 PID input

4.18.2 PID Output

When the input deviation is out of the dead zone reference, the PID controller starts to work. When the controller input is not 0, the control volume will continue to increase or decrease under the PID function till the output limit. Adjust the proportional gain Kp and integral time Ti to ensure the dynamic response and steady accuracy of PID output. See the following figure.

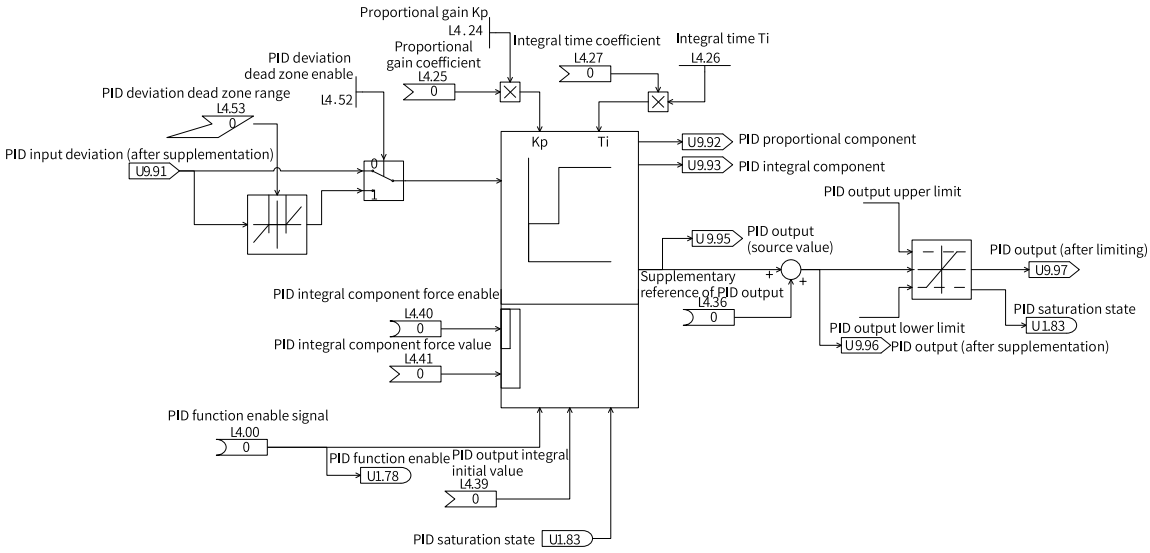


Figure 4-72 PID Output

4.18.3 PID Limit

Set the upper and lower limits and the rise and fall time to limit the PID output, ensuring that the controller output is within the controllable range. See the following figure.

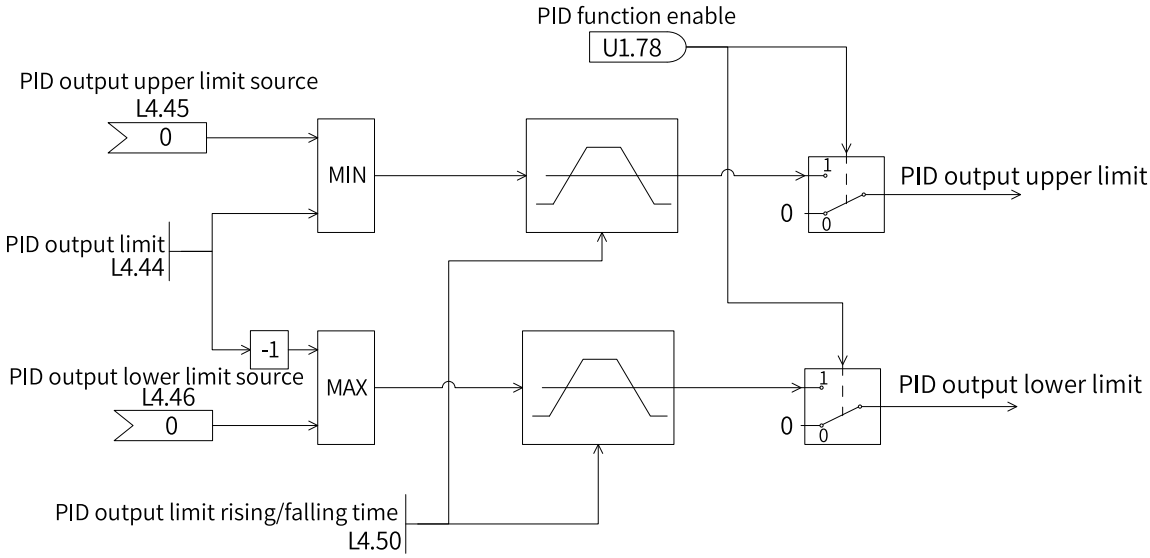


Figure 4-73 PID limit

4.18.4 Detection of PID Feedback Loss

When the absolute value of the PID feedback is continuously lower than the detection value (L4-56) within the detection time (L4-57), the system determines PID feedback loss and reports error code 31, asking users to check the sensor or connection.

4.19 Encoder Speed Measurement

The MD580 supports incremental (ABZ) encoders, resolvers, sin-cos encoders, and SSI encoders by using the PG expansion card.

4.19.1 Encoder Parameter Settings

4.19.1.1 Incremental Encoder Settings

The following table lists parameters of the incremental (ABZ) encoder.

Parameter Code	Parameter Name	Description
n5-02/n6-02	Encoder Type	Set the parameter according to the actual encoder detection card. 0: ABZ encoder (MD38PGMD) 6: ABZ encoder (MD580-PG-AU1)
n5-03/n6-03	Input A/B phase sequence	If the encoder speed is opposite to the selected motor direction, modify this parameter to adjust the speed measurement direction.
n5-07/n6-07	Encoder resolution (number of pulses/ revolutions)	This parameter is marked on the nameplate of an incremental encoder, indicating the number of pulses upon each revolution.
n5-12/n6-12	Encoder installation position angle	It indicates the Z signal position when the motor magnetic pole angle of an ABZ encoder is 0. This parameter is important for synchronous motors in the FVC control mode. It can be obtained through synchronous motor no-load complete auto-tuning or synchronous motor with-load auto-tuning. Any change to the wiring phase sequence of the synchronous motor will affect this parameter, requiring re-auto-tuning.

4.19.1.2 Resolver Settings

The following table describes parameters of the resolver.

Parameter Code	Parameter Name	Description
n5-02/n6-02	Encoder type	It sets the encoder type. 2: Resolver (MD38PG4)
n5-03/n6-03	Input A/B phase sequence	If the encoder speed is opposite to the selected motor direction, modify this parameter to adjust the speed measurement direction.
n5-13/n6-13	Number of resolver pole pairs	Set this parameter based on the actual resolver model.
n5-12/n6-12	Encoder installation position angle	This parameter indicates the resolver feedback angle when the motor magnetic pole angle is 0. This parameter is important for synchronous motors in the FVC control mode. It can be obtained through synchronous motor no-load complete auto-tuning or synchronous motor with-load auto-tuning. Any change to the wiring phase sequence of the synchronous motor will affect this parameter, requiring re-auto-tuning.

4.19.1.3 Sin-Cos Encoder Settings

The following table describes parameters of the sin-cos encoder.

Parameter Code	Parameter Name	Description
n5-02/n6-02	Encoder type	It sets the encoder type. 4: Sin-cos encoder (MD580-PG-AR1)
n5-03/n6-03	Input A/B phase sequence	If the encoder speed is opposite to the selected motor direction, modify this parameter to adjust the speed measurement direction.
n5-07/n6-07	Encoder resolution (number of pulses/revolutions)	This parameter is marked on the nameplate of a sin-cos encoder, indicating the number of pulses per each revolution.
n5-12/n6-12	Encoder installation position angle	This parameter indicates the sin-cos encoder feedback angle when the motor magnetic pole angle is 0. This parameter is important for synchronous motor FVC control. It can be obtained through synchronous motor no-load complete auto-tuning or synchronous motor with-load auto-tuning. Any change to the wiring phase sequence of the synchronous motor will affect this parameter, requiring re-auto-tuning.

4.19.1.4 SSI Encoder Settings

The following table describes parameters of the SSI encoder.

Table 4–22

Parameter Code	Parameter Name	Description
n5-02/n6-02	Encoder type	Set the parameter according to the actual encoder detection card. 5: SSI encoder (MD580-PG-AR1) 7: SSI encoder (MD580-PG-AU1)
n5-03/n6-03	Input A/B phase sequence	If the encoder speed direction is opposite to the selected motor direction, modify this parameter to adjust the speed measurement direction.
n5-50/n6-50	Clock frequency of SSI encoder	Set the parameter according to the parameter of the connected SSI encoder.
n5-51/n6-51	SSI encoder output coding type	Set the parameter according to the parameter of the connected SSI encoder.
n5-52/n6-52	SSI encoder verification mode	Set the parameter according to the parameter of the connected SSI encoder.

Parameter Code	Parameter Name	Description
n5-53/n6-53	Number of SSI encoder error bits	Set the parameter according to the parameter of the connected SSI encoder.
n5-54/n6-54	Number of SSI encoder single-turn bits	Set the parameter according to the parameter of the connected SSI encoder.
n5-55/n6-55	Number of SSI encoder multi-turn bits	Set the parameter according to the parameter of the connected SSI encoder.
n5-12/n6-12	Encoder installation position angle	This parameter indicates the SSI encoder feedback angle when the motor magnetic pole angle is 0. This parameter is important for synchronous motors in the FVC control mode. It can be obtained through synchronous motor no-load complete auto-tuning or synchronous motor with-load auto-tuning. Any change to the wiring phase sequence of the synchronous motor will affect this parameter, requiring re-auto-tuning.

4.19.2 Disconnection Detection

4.19.2.1 Encoder Hardware Disconnection Detection Settings

The following table lists the parameters for encoder hardware disconnection detection.

Parameter Code	Parameter Name	Description
n5-10	ABZ encoder disconnection hardware detection mode	The ABZ encoder detection module detects the connection status of the encoder signal cables. A fault is reported once disconnection is detected. 0: Disable 2: Detect whether ABZ signal cable is connected
n5-11	Hardware detection time for encoder disconnection	When the encoder disconnection duration exceeds the value of n5-11, a disconnection fault is reported. If faults are mistakenly reported, increase the value of n5-11.

Parameter Code	Parameter Name	Description
n5-22	Hardware detection for encoder disconnection	The encoder detection module detects the connection status of the encoder signal cables. A fault is reported once disconnection is detected. 0: Disable 1: Enable
n5-23	Interval for resolver disconnection detection	When the resolver disconnection duration exceeds the value of n5-23, a disconnection fault is reported. If faults are mistakenly reported, increase the value of n5-23.

4.19.2.2 Software Disconnection Detection Settings

If the encoder signal cable is not properly routed or the shield is not properly connected, the encoder signal will be interfered, causing great fluctuation in measured speed. The software disconnection detection function can be used to identify such exceptions, prompting users to detect cables. A loose encoder shaft may also cause the encoder software disconnection fault.

Parameter Code	Parameter Name	Description
n5-06/n6-06	Encoder burr removal	This function is enabled by default. Speed glitches that exceed the value of n5-15/n6-15 and are shorter than the value of n5-16/n6-16 can be removed, therefore suppressing the interference signals.
n5-14/n6-14	Software detection for encoder disconnection	After this function is enabled, speed glitches that exceed the value of n5-15/n6-15 and are shorter than the value of n5-16/n6-16 can be removed. If the duration exceeds the value of n5-16/n6-15, a software disconnection fault is reported.
n5-15/n6-15	Display of software detection threshold for encoder abnormality	This parameter indicates the speed glitch threshold for the encoder deglitching and software disconnection detection functions. The system automatically calculates the value based on motor parameters, displays the value using this parameter, which can be adjusted using n5-17/n6-17.
n5-16/n6-16	Software detection time for encoder disconnection	This parameter specifies the time threshold of the speed for the encoder deglitching and software disconnection detection functions.
n5-17/n6-17	Adjustment factor for software detection threshold upon encoder abnormality	This parameter specifies the coefficient for adjusting the speed glitch threshold. A larger value indicates a higher tolerance to speed glitches.

4.19.3 Pulse Counting and Encoder Angle Simulation

The calculation function of the drive enables you to use an incremental encoder to measure the speed and count the pulses, implementing position measurement by simulating an absolute encoder. You can change the current count value to correct the initial position.

The position value of the encoder can be converted into the rotor rotation angle and turns based on the encoder pulses per revolution. The following table lists the parameters.

Parameter Code	Parameter Name	Description
U9-38/U9-39	Accumulative pulse count of encoder 1/encoder 2 (four times)	It displays the accumulative pulse count of the encoder (four times). The position increases upon forward running and decreases upon reverse running. If not, you can modify n5-21/n6-21. For incremental encoders, if the motor runs forwardly by one turn, the pulse position increases by 4 x n5-07/n6-07 (encoder pulse number). For resolvers, if the motor runs forwardly by one turn, the pulse position increases by 4 x (number of resolver poles n5-13/n6-13 x 1024). For sin-cos encoders, if the motor runs forwardly by one turn, the pulse position increases by 2^{24}. For SSI encoders, if the motor runs forwardly by one turn, the pulse position increases by 2^{n} (n indicates the bit per turn).
U6-10/U6-15	Raw pulse count of encoder 1/ encoder 2 (four times)	It displays the number of raw incremental input pulses counted by the current encoder. The value of this parameter corresponds to four times the input pulses. Specifically, when the 1024-line encoder rotates by one turn, the count value increases by 4096. The value range of this parameter is 0 to 65535.
U6-11/U6-16	Relative pulse count of encoder 1/ encoder 2	It displays the number of pulses at the current position relative to the encoder initial position (n5-20/n6-20). The value ranges from 0 to the number of encoder pulses (n5-07/ n6-07) multiplied by four.
U6-12/U6-17	Measurement angle of encoder 1/ encoder 2	It is used to simulate the absolute encoder to convert the number of encoder pulses to the angle. The angle increases upon forward running and decreases upon reverse running. 0 to 65535 correspond to angles of 0° to 360°.
U6-13/U6-18	Measurement revolution of encoder 1/encoder 2	
n5-20/n6-20	Update source for encoder 1/ encoder 2 initial angle	When the set connector value changes, set the changed value to U6-12/U6-17 (angle) or U6-13/U6-18 (revolution). If the connector is single-word, the changed value will be set to the value of U16-12/U6-17. If the connector is double-word, the low-order byte of the changed value will be set to the value of U16-12/ U6-17 and the high-order byte to the value of U16-13/U6-18.

Parameter Code	Parameter Name	Description
n5-24/n6-24	Force command source for pulse count of encoder 1/encoder 2	The encoder pulse force command takes effect at the rising edge. After the command takes effect, the pulse value of n5-25/n6-25 is forcibly assigned to the value of U9-38/U9-39 (accumulative pulse count of encoder 1/encoder 2 (quadruplicated frequency). The values of U6-10 to U6-13, and U6-15 to U6-18 will be updated.
n5-25/n6-25	Force value for pulse count of encoder 1/encoder 2	
U6-11	Relative encoder pulse count	It displays the number of pulses in the current position relative to the encoder initial position indicated by n5-20. The value ranges from 0 to the number of encoder pulses (n5-07) multiplied by four.
U6-12	Encoder measurement angle	It is used to simulate the absolute encoder to convert the number of encoder pulses to the angle. The angle increases upon forward running and decreases upon reverse running. 0 to 65535 correspond to angles of 0° to 360°. U16-12 and U16-13 can be used together to simulate a multi-turn absolute encoder.
U6-13	Encoder measurement turns	
n5-20	Encoder initial angle trigger reference	When the set connector value changes, set the changed value to U6-12 (angle) or U6-13 (revolution). If the connector is single-word, the changed value will be set to the value of U16-12. If the connector is double-word, the low-order byte of the changed value will be set to the value of U16-12 and the high-order byte to the value of U16-13.

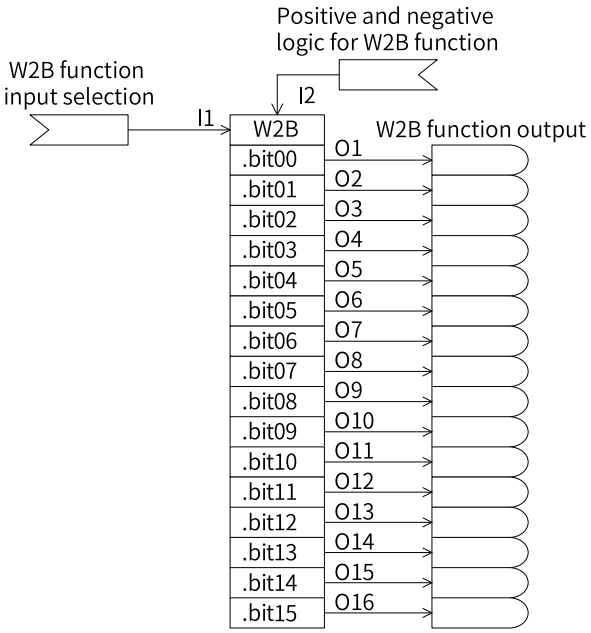
4.20 Application Function

In engineering application, the AC drive control needs to be applied in logic operation function blocks. These function blocks can associate multiple status signals and control signals. The MD580 series application functions include the logic operation, arithmetic function, word-bit conversion, W-DW conversion, switch function, control function, multi-point curve, constant setting, and parameter monitoring and modification modules. Parameters in group L can be set as required to implement simple logic operation.

4.20.1 Word-to-Bit Function

4.20.1.1 W2B Module (A to E)

Diagram



Operation

When input I1 is single-word input, outputs O1 to O16 correspond to bit 00 to bit 15 of input I1. When input I1 is double-word input, outputs O1 to O16 correspond to bit 00 to bit 15 of the high-order 16 bits of input I1. When the bit of I2 is 0, the value is not inverted. When the bit is 1, the value is inverted.

Connection

Input I1 is an unsigned number.

Input I2 is an unsigned number.

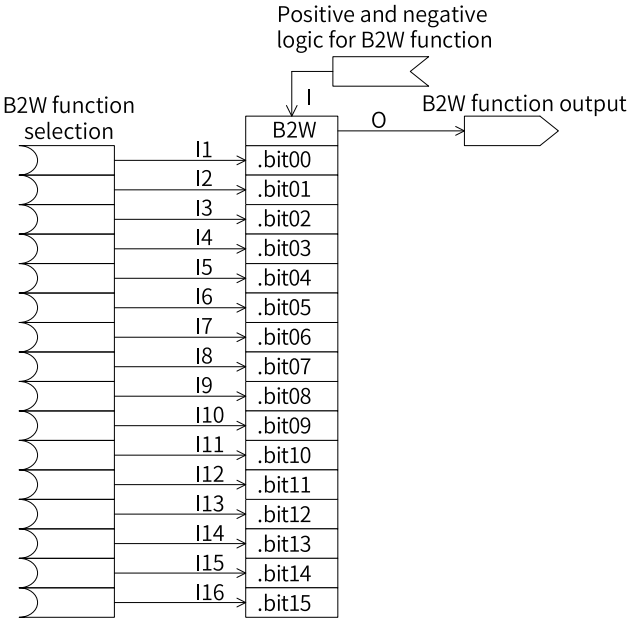
Outputs O1 to O16 are binary numbers.

W2B Module		A	B	C	D	E
Input	I1	L10-00	L10-01	L10-02	L10-03	L10-04
	I2	L10-78	L10-79	L10-80	L10-81	L10-82

Output	O1 (bit 00)	U4-00	U4-16	U4-32	U4-48	U4-64
	O2 (bit 01)	U4-01	U4-17	U4-33	U4-49	U4-65
	O3 (bit 02)	U4-02	U4-18	U4-34	U4-50	U4-66
	O4 (bit 03)	U4-03	U4-19	U4-35	U4-51	U4-67
	O5 (bit 04)	U4-04	U4-20	U4-36	U4-52	U4-68
	O6 (bit 05)	U4-05	U4-21	U4-37	U4-53	U4-69
	O7 (bit 06)	U4-06	U4-22	U4-38	U4-54	U4-70
	O8 (bit 07)	U4-07	U4-23	U4-39	U4-55	U4-71
	O9 (bit 08)	U4-08	U4-24	U4-40	U4-56	U4-72
	O10 (bit 09)	U4-09	U4-25	U4-41	U4-57	U4-73
	O11 (bit 10)	U4-10	U4-26	U4-42	U4-58	U4-74
	O12 (bit 11)	U4-11	U4-27	U4-43	U4-59	U4-75
	O13 (bit 12)	U4-12	U4-28	U4-44	U4-60	U4-76
	O14 (bit 13)	U4-13	U4-29	U4-45	U4-61	U4-77
	O15 (bit 14)	U4-14	U4-30	U4-46	U4-62	U4-78
	O16 (bit 15)	U4-15	U4-31	U4-47	U4-63	U4-79

4.20.1.2 B2W Module (A to D)

Diagram



Operation

Bit 00 to bit 16 of output O correspond to inputs I1 to I16. When the bit of I is 0, the value is not inverted. When the bit is 1, the value is inverted.

Connection

Input I is an unsigned number.

Inputs I1 to I16 are binary numbers.

Output O is an unsigned number.

B2W Module		1	2	3	4
Input	I1 (bit 00)	L10-11	L10-28	L10-45	L10-62
	I2 (bit 01)	L10-12	L10-29	L10-46	L10-63
	I3 (bit 02)	L10-13	L10-30	L10-47	L10-64
	I4 (bit 03)	L10-14	L10-31	L10-48	L10-65
	I5 (bit 04)	L10-15	L10-32	L10-49	L10-66
	I6 (bit 05)	L10-16	L10-33	L10-50	L10-67
	I7 (bit 06)	L10-17	L10-34	L10-51	L10-68
	I8 (bit 07)	L10-18	L10-35	L10-52	L10-69
	I9 (bit 08)	L10-19	L10-36	L10-53	L10-70
	I10 (bit 09)	L10-20	L10-37	L10-54	L10-71
	I11 (bit 10)	L10-21	L10-38	L10-55	L10-72
	I12 (bit 11)	L10-22	L10-39	L10-56	L10-73
	I13 (bit 12)	L10-23	L10-40	L10-57	L10-74
	I14 (bit 13)	L10-24	L10-41	L10-58	L10-75
	I15 (bit 14)	L10-25	L10-42	L10-59	L10-76
	I16 (bit 15)	L10-26	L10-43	L10-60	L10-77
	I	L10-11	L10-28	L10-45	L10-62
Output	O	L10-12	L10-29	L10-46	L10-63

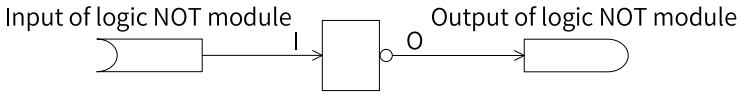
Note

This module can be disabled or enabled using L10-10, L10-27, L10-44, or L10-61, and can be used for calculation only after being enabled.

4.20.2 Logical Operation Function

4.20.2.1 Logic NOT Module (A to H)

Diagram



Operation

$$O=\bar{I}$$

The output is the inversion of input I. The truth table is as follows.

Input	Output
I	O
0	1
1	0

Connection

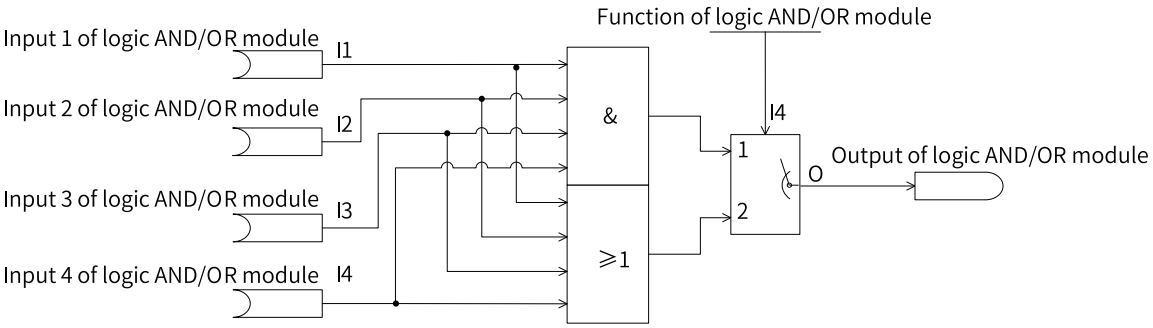
Input I is a binary number.

Output O is a binary number.

Logic NOT Module	Input	Output
	I	O
A	L12-72	U3-20
B	L12-73	U3-21
C	L12-74	U3-22
D	L12-75	U3-23
E	L12-76	U3-24
F	L12-77	U3-25
G	L12-78	U3-26
H	L12-79	U3-27

4.20.2.2 Logic AND-OR Module (A to H)

Diagram



Operation

For function selection of the logic AND-OR module, if I4 is 1, logic AND is valid and $O = I1 \& I2 \& I3 \& I4$.

Only if inputs I1, I2, I3, and I4 are all true, output O is true. Otherwise, output O is false. The truth table is as follows.

Input				Output
I1	I2	I3	I4	O
0	0	0	0	0
1	0	0	0	0
0	1	0	0	0
1	1	0	0	0
0	0	1	0	0
1	0	1	0	0
0	1	1	0	0
1	1	1	0	0
0	0	0	1	0
1	0	0	1	0
0	1	0	1	0
1	1	0	1	0
0	0	1	1	0

Input				Output
I1	I2	I3	I4	O
1	0	1	1	0
0	1	1	1	0
1	1	1	1	1

For function selection of the logic AND-OR module, if I4 is 2, logic OR is valid and $O = I1 \mid I2 \mid I3 \mid I4$.

If any of inputs I1, I2, I3, and I4 is true, the output is also true. The truth table is as follows.

Input				Output
I1	I2	I3	I4	O
0	0	0	0	0
1	0	0	0	1
0	1	0	0	1
1	1	0	0	1
0	0	1	0	1
1	0	1	0	1
0	1	1	0	1
1	1	1	0	1
0	0	0	1	1
1	0	0	1	1
0	1	0	1	1
1	1	0	1	1
0	0	1	1	1
1	0	1	1	1
0	1	1	1	1
1	1	1	1	1

Connection

Inputs I1, I2, I3, I4, and I5 are binary numbers.

Output O is a binary number.

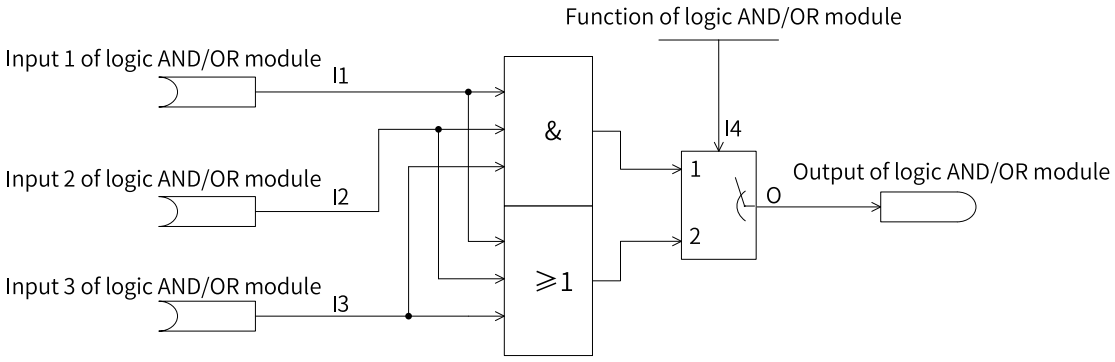
Logic AND-OR Module	Input					Output
	I1	I2	I3	I4	I5	O
A	L12-01	L12-02	L12-03	L12-04	L12-00	U3-04
B	L12-06	L12-07	L12-08	L12-09	L12-05	U3-05
C	L12-11	L12-12	L12-13	L12-14	L12-10	U3-06
D	L12-16	L12-17	L12-18	L12-19	L12-15	U3-07
E	L12-21	L12-22	L12-23	L12-24	L12-20	U3-08
F	L12-26	L12-27	L12-28	L12-29	L12-25	U3-09
G	L12-31	L12-32	L12-33	L12-34	L12-30	U3-10
H	L12-36	L12-37	L12-38	L12-39	L12-35	U3-11

Note

This module can be disabled or enabled using L12-00, L12-05, L12-10, L12-15, L12-20, L12-25, L12-30, or L12-35, and can be used for calculation only after being enabled.

4.20.2.3 Logic AND-OR Module (I to P)

Diagram



Operation

For function selection of the logic AND-OR module, if I4 is 1, logic AND is valid and $O=I1\&I2\&I3$.

If inputs I1, I2, and I3 are true, output O is true. Otherwise, output O is false. The truth table is as follows.

Input			Output
I1	I2	I3	O
0	0	0	0
1	0	0	0
0	1	0	0
1	1	0	0
0	0	1	0
1	0	1	0
0	1	1	0
1	1	1	1

For function selection of the logic AND-OR module, if I4 is 2, logic OR is valid and $O=I1|I2|I3$.

If any of inputs I1, I2, and I3 are true, the output is also true. The truth table is as follows.

Input			Output
I1	I2	I3	O
0	0	0	0
1	0	0	1
0	1	0	1
1	1	0	1
0	0	1	1
1	0	1	1
0	1	1	1
1	1	1	1

Connection

Inputs I1, I2, I3, and I4 are binary numbers.

Output O is a binary number.

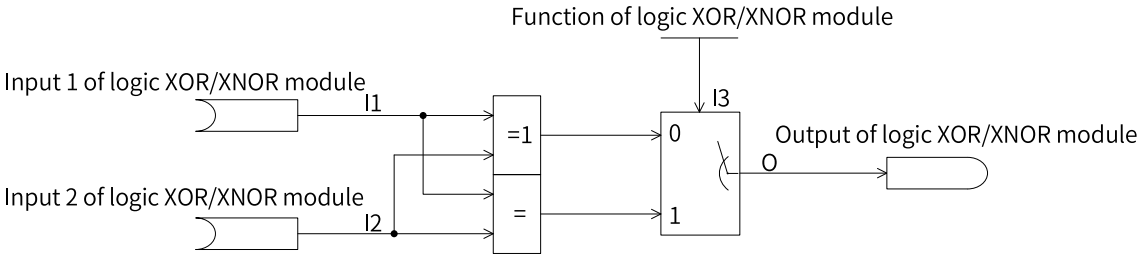
Logic AND-OR Module	Input				Output
	I1	I2	I3	I4	O
I	L12-41	L12-42	L12-43	L12-40	U3-12
J	L12-45	L12-46	L12-47	L12-44	U3-13
K	L12-49	L12-50	L12-51	L12-48	U3-14
L	L12-53	L12-54	L12-55	L12-52	U3-15
M	L12-57	L12-58	L12-59	L12-56	U3-16
N	L12-61	L12-62	L12-63	L12-60	U3-17
O	L12-65	L12-66	L12-67	L12-64	U3-18
P	L12-69	L12-70	L12-71	L12-68	U3-19

Note

This module can be disabled or enabled using L12-40, L12-44, L12-48, L12-52, L12-56, L12-60, L12-64, or L12-68, and can be used for calculation only after being enabled.

4.20.2.4 Logic XOR/XNOR Module (A to D)

Diagram



Operation

When I3 (logic XOR/XNOR module function) is set to 0, logic XOR is enabled and $O=\overline{I1}I2+I1\overline{I2}$.

When input I1 and I2 are the same, output O is 0. When input I1 and I2 are different, output O is 1. The truth table is as follows.

Input		Output
I1	I2	O
0	0	0
1	0	1
0	1	1
1	1	0

When I3 (logic XOR/XNOR module function) is set to 1, logic XNOR is enabled, and $O=I1I2+\overline{I1}\overline{I2}$.

When input I1 and I2 are the same, output O is 1. When input I1 and I2 are different, output O is 0. The truth table is as follows.

Input		Output
I1	I2	O
0	0	1
1	0	0

Input		Output
I1	I2	O
0	1	0
1	1	1

Connection

Inputs I1, I2, and I3 are binary numbers.

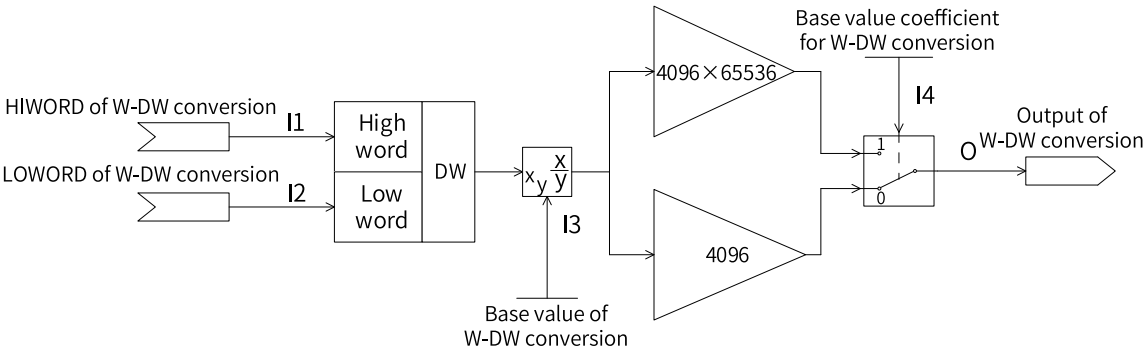
Output O is a binary number.

Logic XOR/XNOR Module	Input			Output
	I1	I2	I3	O
A	L12-86	L12-87	L12-85	U3-36
B	L12-89	L12-90	L12-88	U3-37
C	L12-92	L12-93	L12-91	U3-38
D	L12-95	L12-96	L12-94	U3-39

4.20.3 Word-to-Double Word Function

4.20.3.1 W-DW Conversion (A to E)

Diagram



Operation

$$O=\begin{cases}\frac{I1\times 65536+I2}{I3}\times 4096\times 65536, I4=1\\ \frac{I1\times 65536+I2}{I3}\times 4096, I4=0\end{cases}$$

The output equals I1 (high-order 16 bits) or I2 (low-order 16 bits) double word divided by base value I3 and then multiplied by the base value coefficient (specified by I4). When the input value is a double word, the high-order 16 bits are used.

When I3 is set to 0, the output value equals the input value without base value conversion.

Connection

Inputs I1 and I2 are unsigned numbers.

Input I3 is an unsigned number.

Output O is an unsigned number.

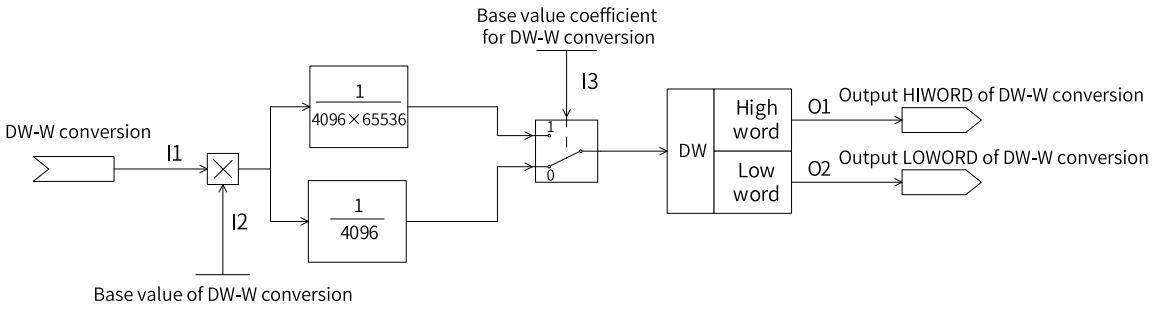
W-DW Conversion	Input				Output
	I1	I2	I3	I4	O
A	L11-01	L11-02	L11-03	L11-00 (bit 0)	U19-18
B	L11-04	L11-05	L11-06	L11-00 (bit 1)	U19-19
C	L11-07	L11-08	L11-09	L11-00 (bit 2)	U19-20
D	L11-10	L11-11	L11-12	L11-00 (bit 3)	U19-21
E	L11-13	L11-14	L11-15	L11-00 (bit 4)	U19-22

Note

I1 can also enable modules. Modules can be used for calculation only after being enabled.

4.20.3.2 DW-W Conversion (A to H)

Diagram



Operation

$$O1=\begin{cases}\left(\frac{I1\cdot I2}{4096\times 65536}>>16\right)\&0xFFF, I3=1\\ \left(\frac{I1\cdot I2}{4096}>>16\right)\&0xFFF, I3=0\end{cases}$$

$$O2=\begin{cases}\left(\frac{I1\cdot I2}{4096\times 65536}>>16\right)\&0xFFF, I3=1\\ \left(\frac{I1\cdot I2}{4096}>>16\right)\&0xFFF, I3=0\end{cases}$$

The output high word equals to the high-order 16 bits of I1 multiplied by the base value I2 and divided by the base value coefficient (specified by I3). The output low word equals to the low-order 16 bits of I1 multiplied by the base value I2 and divided by the base value coefficient (specified by I3).

When I2 is set to 0, the output high word is the input high word while the output low word is the input low word, without base value conversion.

Connection

Input I1 is an unsigned number.

Input I2 is an unsigned number.

Outputs O1 and O2 are unsigned numbers.

DW-W Conversion	Input			Output	
	I1	I2	I3	O1	O2
A	L11-29	L11-30	L11-28 (bit0)	U6-28	U6-29
B	L11-31	L11-32	L11-28 (bit 1)	U6-30	U6-31
C	L11-33	L11-34	L11-28 (bit 2)	U6-32	U6-33
D	L11-35	L11-36	L11-28 (bit 3)	U6-34	U6-35
E	L11-37	L11-38	L11-28 (bit 4)	U6-36	U6-37

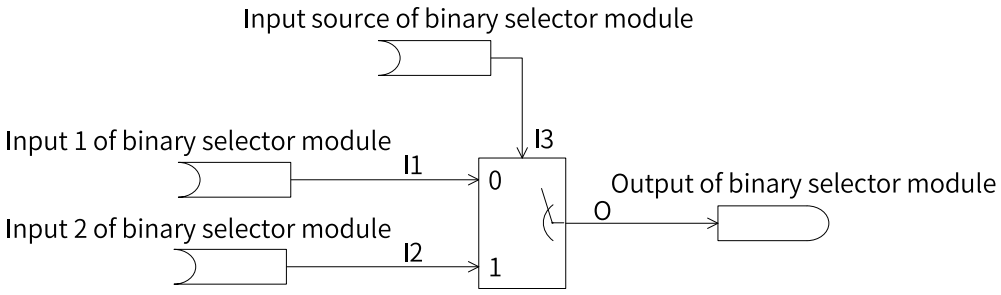
Note

I1 can also enable modules. Modules can be used for calculation only after being enabled.

4.20.4 Switch Function Block

4.20.4.1 Binary Selector Module (A to H)

Diagram



Operation

$$O=\begin{cases} I1, I3=0 \\ I2, I3=1 \end{cases}$$

When I3 (binary selector module input) is set to 0, output O equals I1 (bit). When I3 (binary selector module input) is set to 1, output O equals I2 (bit).

Connection

Inputs I1, I2, and I3 are binary numbers.

Output O is a binary number.

Binary Selector Module	Input			Output
	I1	I2	I3	O
A	L15-01	L15-02	L15-00	U3-68
B	L15-04	L15-05	L15-03	U3-69
C	L15-07	L15-08	L15-06	U3-70

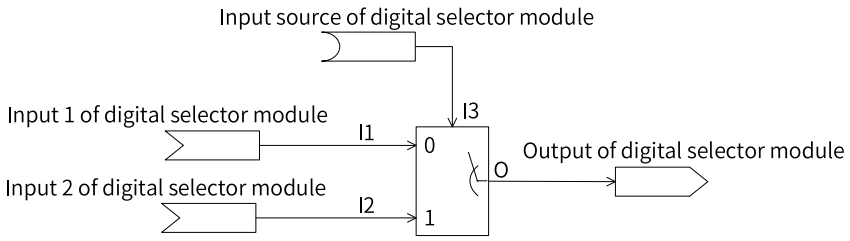
Binary Selector Module	Input			Output
	I1	I2	I3	O
D	L15-10	L15-11	L15-09	U3-71
E	L15-13	L15-14	L15-12	U3-72
F	L15-16	L15-17	L15-15	U3-73
G	L15-19	L15-20	L15-18	U3-74
H	L15-22	L15-23	L15-21	U3-75

Note

I3 can also enable modules. Modules can be used for calculation only after being enabled.

4.20.4.2 Digital Selector Module (A to H)

Diagram



Operation

$$O=\begin{cases} I1, I3=0 \\ I2, I3=1 \end{cases}$$

When I3 (digital selector module input) is set to 0, output O equals I1 (word). When I3 (digital selector module input) is set to 1, output O equals I2 (word).

If the input is a 16-bit connector, the output (double word) is the input numerical value shifted left by 16 bits.

Connection

Inputs I1 and I2 are signed numbers.

Input I3 is a binary number.

Output O is a signed number (double word).

Digital Selector Module	Input			Output
	I1	I2	I3	O
A	L15-25	L15-26	L15-24	U19-36
B	L15-28	L15-29	L15-27	U19-37
C	L15-31	L15-32	L15-30	U19-38
D	L15-34	L15-35	L15-33	U19-39
E	L15-37	L15-38	L15-36	U19-40
F	L15-40	L15-41	L15-39	U19-41

Digital Selector Module	Input			Output
	I1	I2	I3	O
G	L15-43	L15-44	L15-42	U19-42
H	L15-46	L15-47	L15-45	U19-43

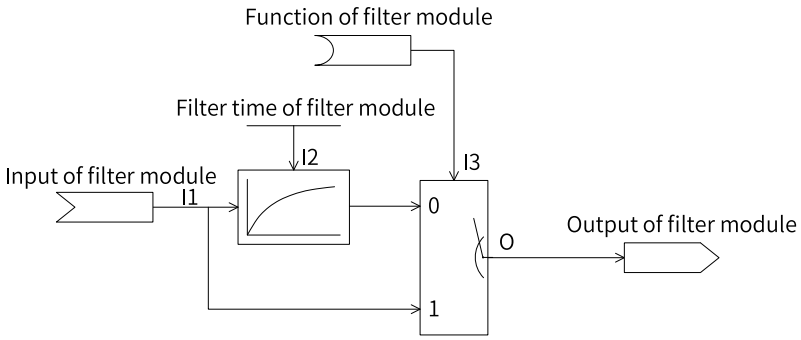
Note

I3 can also enable modules. Modules can be used for calculation only after being enabled.

4.20.5 Control Function Block

4.20.5.1 Filter Module (A to D)

Diagram



Operation

When I3 (filter module function) is set to 0, output O equals to the filter value of input I1. When I3 (filter module function) is set to 1, output O equals to input I1.

Connection

Input I1 is a signed number.

Input I2 is an unsigned number.

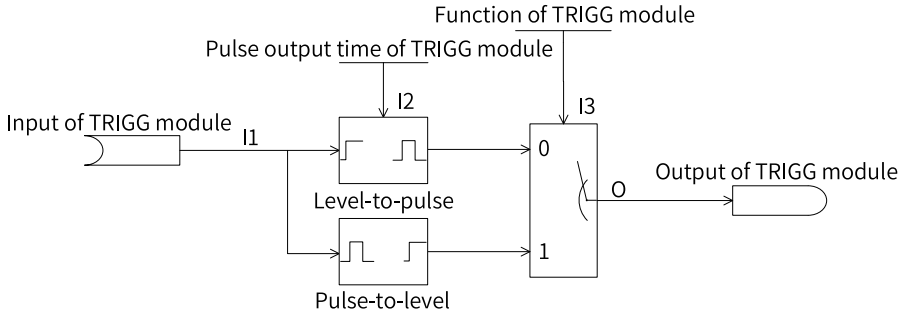
Input I3 is a binary number.

Output O is a signed number.

Filter module	Input			Output
	I1	I2	I3	O
A	L16-01	L16-02	L16-00	U9-60
B	L16-04	L16-05	L16-03	U9-61
C	L16-07	L16-08	L16-06	U9-62
D	L16-10	L16-11	L16-09	U9-63

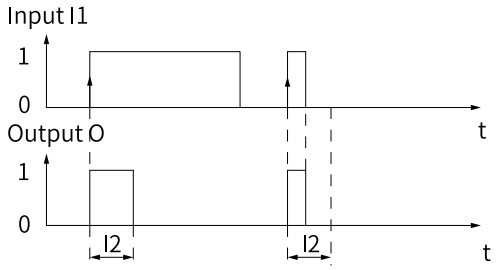
4.20.5.2 Level-Pulse Conversion Module (A to D)

Diagram

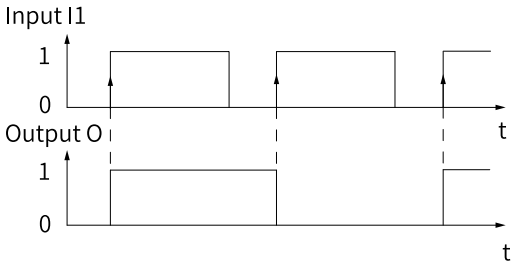


Operation

When the level-pulse conversion module function (I3) is set to 0, level-to-pulse conversion is active. In this case, the output becomes high on the rising edge of input I1 within the pulse output time indicated by I2. If input I1 is set to 0, the output immediately changes to 0, regardless of whether the pulse duration is reached.



When the level-pulse conversion module function is set to 2, pulse-to-level conversion is active. In this case, the output becomes high on the first rising edge of input I1, and becomes low on the second rising edge of input I1, and so on. That is, the pulse output of odd numbers is at a high level, while the pulse output of even numbers is at a low level.



Connection

Inputs I1 and I3 are binary numbers.

Input I2 is an unsigned number.

Output O is a binary number.

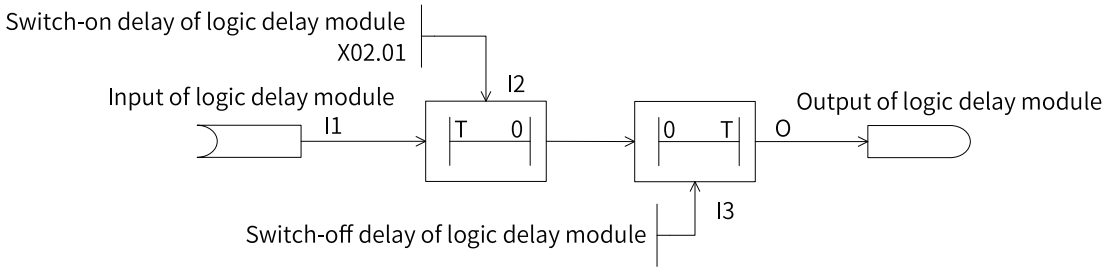
Level-to-pulse Conversion Module	Input			Output
	I1	I2	I3	O
A	L16-25	L16-26	L16-24	U3-44
B	L16-28	L16-29	L16-27	U3-45
C	L16-31	L16-32	L16-30	U3-46
D	L16-34	L16-35	L16-33	U3-47

Note

I3 can also enable modules. Modules can be used for calculation only after being enabled.

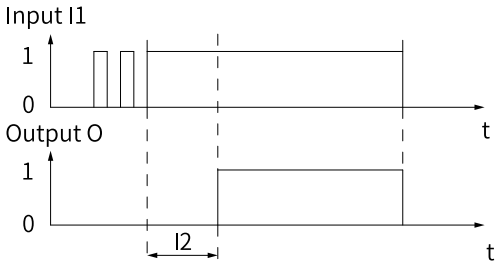
4.20.5.3 Logic Delay Module (A to H)

Diagram

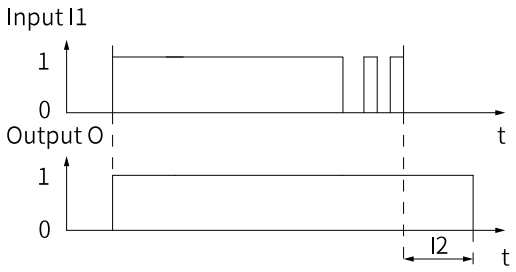


Operation

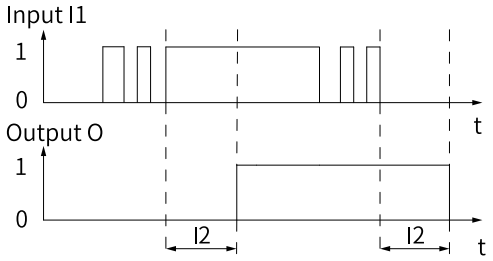
After the logic delay module function is enabled, switch-on delay becomes active when input I1 changes from 0 to 1, and the delay time is determined by I2 (switch-on delay time). After switch-on delay is enabled, high-level pulses lasting less than I2 will be filtered out, as shown in the following figure.



After the logic delay module function is enabled, switch-off delay becomes active when input I1 changes from 1 to 0, and the delay time is determined by I3 (switch-off delay time). After switch-off delay is disabled, low-level pulses lasting less than I2 will be filtered out, as shown in the following figure.



Appropriate configurations allow switch-on delay and switch-off delay when input I1 changes from 0 to 1 and from 1 to 0, respectively. The delay time is determined be I2 (switch-on delay time) and I3 (switch-off delay time), as shown in the following figure.



Connection

Input I1 is a binary number.

Inputs I2 and I3 are unsigned numbers.

Output O is a binary number.

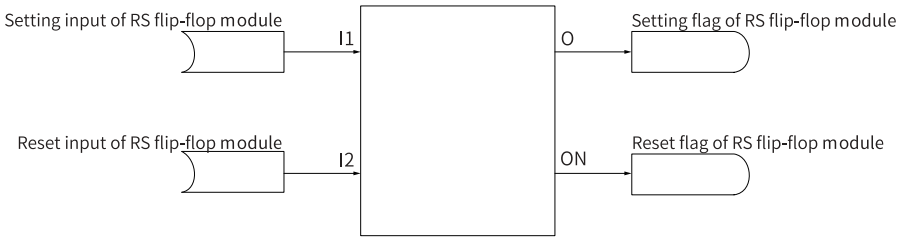
Logic Delay Module	Input			Output
	I1	I2	I3	O
A	L16-48	L16-49	L16-50	U3-52
B	L16-51	L16-52	L16-53	U3-53
C	L16-54	L16-55	L16-56	U3-54
D	L16-57	L16-58	L16-59	U3-55
E	L16-60	L16-61	L16-62	U3-56
F	L16-63	L16-64	L16-65	U3-57
G	L16-66	L16-67	L16-68	U3-58
H	L16-69	L16-70	L16-71	U3-59

Note

I1 can also enable modules. Modules can be used for calculation only after being enabled.

4.20.5.4 RS Flip-flop (A to D)

Diagram



Operation

- If both inputs I1 and I2 are set to 0, output O remains at the current value.
- If input I1 is set to 1 and input I2 is set to 0, output O is 1.
- If input I2 is set to 1, output O is 0.
- If both inputs I1 and I2 are set to 1, output O is 0.
- Output ON is always opposite to the value of output O.

Input		Output	
I1	I2	O	ON
0	0	Unchanged	Unchanged
1	0	1	0
0	1	0	1
1	1	0	1

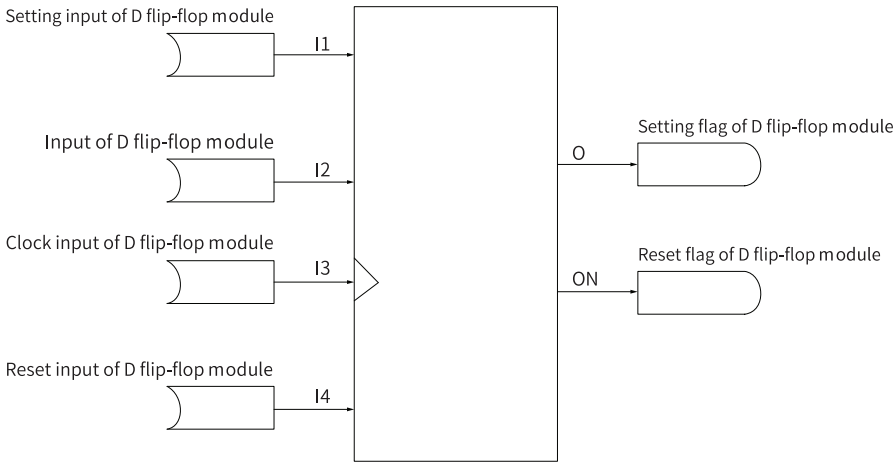
Connection

- Inputs I1 and I2 are binary numbers.
- Outputs O and ON are binary numbers.

RS flip-flop module	Input		Output	
	I1	I2	O	ON
A	L16-72	L16-73	U4-80	U4-81
B	L16-74	L16-75	U4-82	U4-83
C	L16-76	L16-77	U4-84	U4-85
D	L16-78	L16-79	U4-86	U4-87

4.20.5.5 D Flip-flop (A to D)

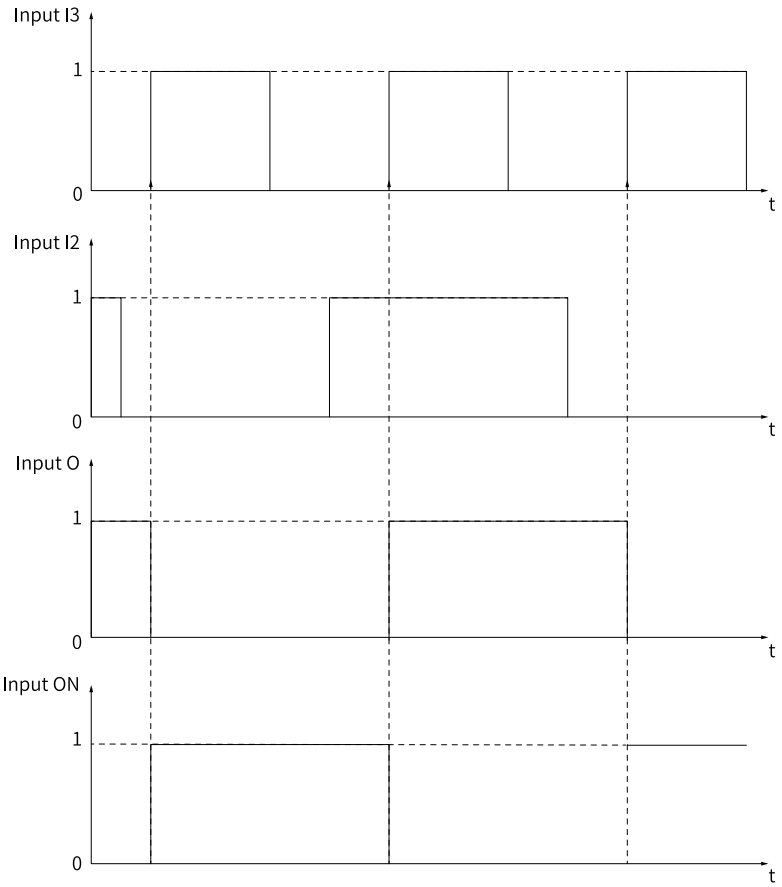
Diagram



Operation

- If both inputs I1 and I4 are set to 0, output O is equal to input I2 on the rising edge of input I3. If input I1 is set to 1, output O is 1. If input I4 is set to 1, output O is to 0.
- If both inputs I1 and I4 are set to 0 and input I3 has no rising edge, output O remains at the current value. If both inputs I1 and I4 are set to 1, output O is 0. Output ON is always opposite to the value of output O.

When I1 = I4 = 0, the timing diagrams of output O, output ON, input I2, and clock I3 are as follows:



Connection

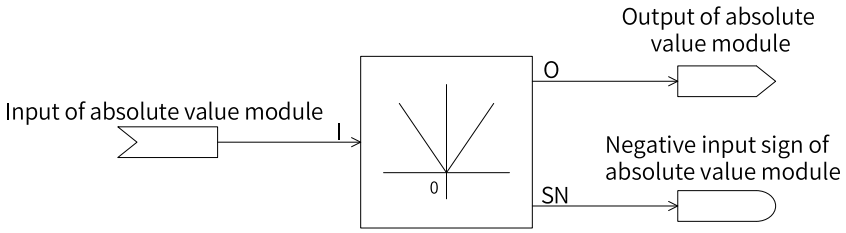
- Inputs I1, I2, I3, and I4 are binary numbers.
- Outputs O and ON are binary numbers.

D flip-flop module	Input				Output	
	I1	I2	I3	I4	O	ON
A	L16-81	L16-80	L16-83	L16-82	U4-88	U4-89
B	L16-85	L16-84	L16-87	L16-86	U4-90	U4-91
C	L16-89	L16-88	L16-91	L16-90	U4-92	U4-93
D	L16-93	L16-92	L16-95	L16-94	U4-94	U4-95

4.20.6 Arithmetic Function Block

4.20.6.1 Absolute Value Module (A to H)

Diagram



Operation

$O=|I|$

$SN=\begin{cases}1, I<0\\0, I\geqslant 0\end{cases}$

The output equals the absolute value of input I. When the input value is negative, the flag bit SN is 1. Otherwise, the flag bit is 0.

Connection

Input I is a signed number.

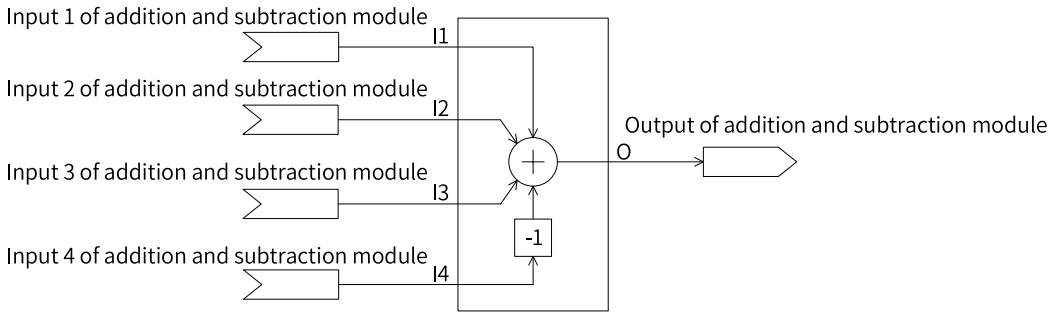
Output O is a signed number.

The output SN is a binary number.

Absolute Value Module	Input		Output
	I	SN	O
A	L13-00	U3-60	U19-28
B	L13-01	U3-61	U19-29
C	L13-02	U3-62	U19-30
D	L13-03	U3-63	U19-31
E	L13-04	U3-64	U19-32
F	L13-05	U3-65	U19-33
G	L13-06	U3-66	U19-34
H	L13-07	U3-67	U19-35

4.20.6.2 Addition and Subtraction Module (A to H)

Diagram



Operation

O=I1+I2+I3-I4

The value of output O equals the sum of I1, I2, and I3 minus I4.

Connection

Inputs I1, I2, I3, and I4 are signed numbers.

Output O is a signed number.

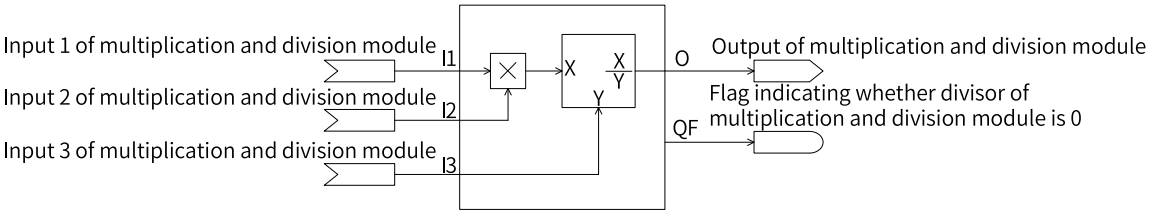
Addition and Subtraction Module	Input				Output
	I1	I2	I3	I4	O
A	L13-08	L13-09	L13-10	L13-11	U19-44
B	L13-12	L13-13	L13-14	L13-15	U19-45
C	L13-16	L13-17	L13-18	L13-19	U19-46
D	L13-20	L13-21	L13-22	L13-23	U19-47
E	L13-24	L13-25	L13-26	L13-27	U19-48
F	L13-28	L13-29	L13-30	L13-31	U19-49
G	L13-32	L13-33	L13-34	L13-35	U19-50
H	L13-36	L13-37	L13-38	L13-39	U19-51

Note

I4 can also enable modules. Modules can be used for calculation only after being enabled.

4.20.6.3 Multiplication and Division Module (A to H)

Diagram



Operation

$$O=(I1 \cdot I2)/I3$$

$$QF=\begin{cases}1, I3=0\\0, I3\neq 0\end{cases}$$

Connection

Inputs I1, I2, and I3 are signed numbers.

Output O is a signed number.

Output QF is a binary number.

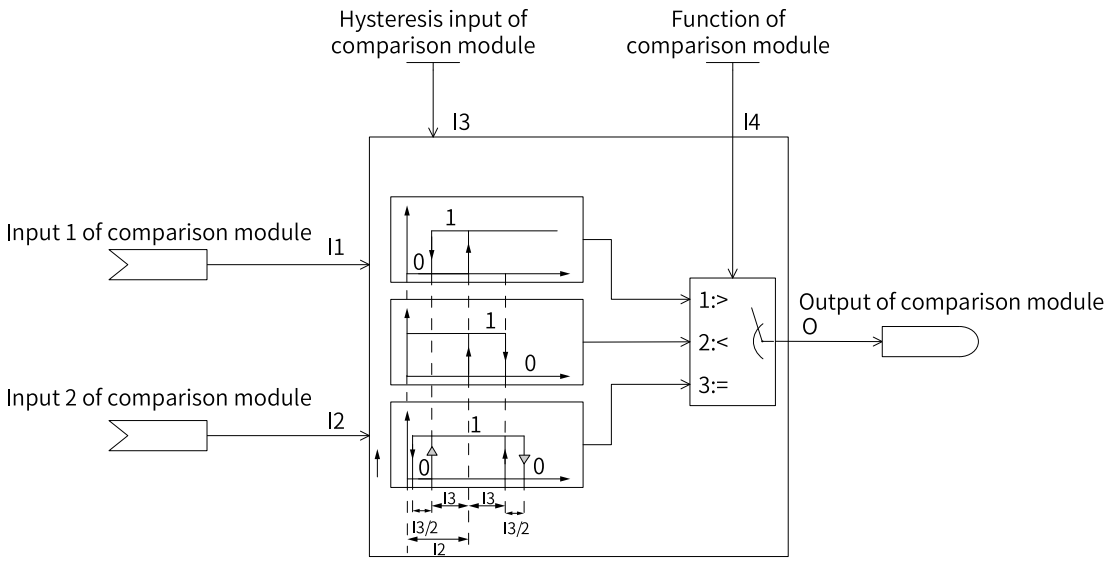
Multiplication and Division Module	Input				Output
	I1	I2	I3	QF	O
A	L13-40	L13-41	L13-42	U3-76	U19-52
B	L13-43	L13-42	L13-43	U3-77	U19-53
C	L13-46	L13-43	L13-44	U3-78	U19-54
D	L13-49	L13-44	L13-45	U3-79	U19-55
E	L13-52	L13-45	L13-46	U3-80	U19-56
F	L13-55	L13-46	L13-47	U3-81	U19-57
G	L13-58	L13-47	L13-48	U3-82	U19-58
H	L13-61	L13-48	L13-49	U3-83	U19-59

Note

I1 can also enable modules. Modules can be used for calculation only after being enabled.

4.20.6.4 Comparison Module (A to H)

Diagram



Operation

If the comparison module function (I4) is set to 1, output O remains at a low level before I1 increases to I2 from 0 in the forward direction. When I1 exceeds I2, output O changes to a high level. If I1 further increases, output O remains at the high level. If I1 decreases but is still greater than I2 minus I3, output O still remains at the high level. Output O changes to the low level only when I1 becomes less than I2 minus I3.

If the comparison module function (I4) is set to 2, output O remains at a high level before I1 increases to I2 plus I3 from 0 in the forward direction. When I1 becomes greater than I2 plus I3, output O changes to a low level. If I1 further increases, output O remains at the low level. If I1 decreases but is still greater than I2, output O still remains at the low level. Output O changes to the high level only when I1 becomes less than I2.

If the comparison module function (I4) is set to 3, output O remains at a low level before I1 increases to I2 minus I3 from 0 in the forward direction. When I1 becomes greater than I2 minus I3 but less than I2 plus I3, output O changes to a high level. If I1 further increases to become greater than I2 plus I3 multiplied by 1.5, output O changes to the low level. If I1 decreases, output O still remains at the low level when I1 is less than I2 plus I3. Output O changes to the high level when I1 becomes less than I2 plus I3 but greater than I2 minus I3 multiplied by 1.5. Output O changes to the low level when I1 becomes less than I2 minus I3 multiplied by 1.5.

Hysteresis input I3 suppresses frequent connection and disconnection.

Connection

Inputs I1 and I2 are signed numbers.

Inputs I3 and I4 are unsigned numbers.

Output O is a binary number.

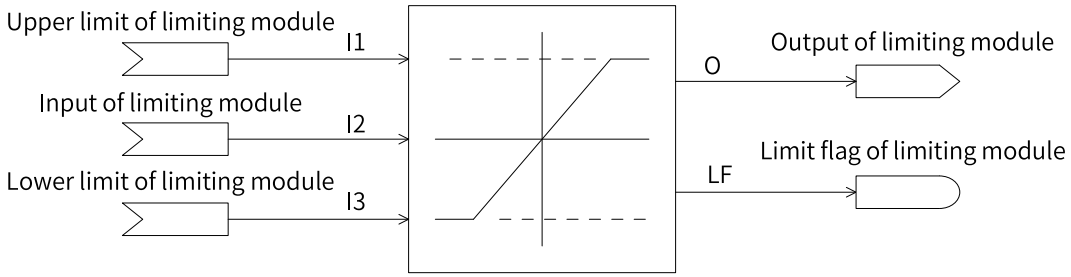
Comparison Module	Input				Output
	I1	I2	I3	I4	O
A	L13-65	L13-66	L13-67	L13-64	U3-84
B	L13-69	L13-70	L13-71	L13-68	U3-85
C	L13-73	L13-74	L13-75	L13-72	U3-86
D	L13-77	L13-78	L13-79	L13-76	U3-87
E	L13-81	L13-82	L13-83	L13-80	U3-88
F	L13-85	L13-86	L13-87	L13-84	U3-89
G	L13-89	L13-90	L13-91	L13-88	U3-90
H	L13-93	L13-94	L13-95	L13-92	U3-91

Note

I4 can also enable modules. Modules can be used for calculation only after being enabled.

4.20.6.5 Limiting Module (A to D)

Diagram



Operation

$$O=\begin{cases} I1, & I2>I1 \\ I2, & I3\leqslant I2\leqslant I1 \\ I3, & I2<I3 \end{cases}$$

$$LF=\begin{cases} 1, & I2>I1 \text{ or } I2<I3 \\ 0, & I3\leqslant I2\leqslant I1 \end{cases}$$

When input I2 is greater than the upper limit I1, output O equals to I1. When input I2 is less than the lower limit I3, output O equals to I3. When input I2 is within the limits, the output value equals to the input value. When input I2 is greater than the upper limit I1 or less than the lower limit I3, the limit flag is at position 1.

Connection

Inputs I1, I2, and I3 are signed numbers.

Output O is a signed number.

The output LF is a binary number.

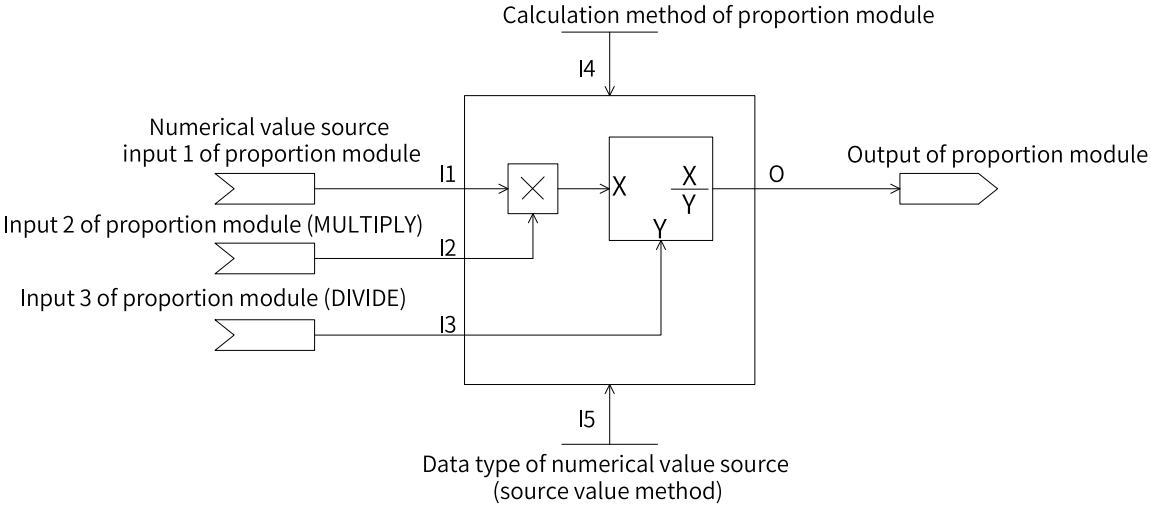
Limiting Module	Input				Output
	I1	I2	I3	LF (upper/lower limit)	O
A	L16-36	L16-37	L16-38	U3-92/U2-93	U19-64
B	L16-39	L16-40	L16-41	U3-94/U2-95	U19-65
C	L16-42	L16-43	L16-44	U3-96/U2-97	U19-66
D	L16-45	L16-46	L16-47	U3-98/U2-99	U19-67

Note

I1 can enable modules. Modules can be used for calculation only after being enabled. I2 can enable the upper limit. I3 can enable the lower limit.

4.20.6.6 Proportion Module (1 to 16)

Diagram



Operation

The operation of the proportion module is similar to that of the multiplication and division module. However, the calculation method and data type for I1 can be selected as required. According to section 2.4.2, 4096 corresponds to 100% for single-word connectors, and 4096x65536 corresponds to 100% for double-word connectors. Proportion modules 1 to 10 are used for single-word connector operation, and proportion modules 11 to 16 are used for double-word connector operation.

Connection

Inputs I1, I3, I4, and I5 are unsigned numbers.

Input I2 is a signed number.

Output O is a signed number.

Proportion Module	Input					Output
	I1	I2	I3	I4	I5	O
1	L14-02	L14-03	L14-04	L14-00 (bit0)	L14-01 (bit0)	U6-50
2	L14-05	L14-06	L14-07	L14-00 (bit 1)	L14-01 (bit1)	U6-51
3	L14-08	L14-09	L14-10	L14-00 (bit 2)	L14-01 (bit2)	U6-52
4	L14-11	L14-12	L14-13	L14-00 (bit 3)	L14-01 (bit3)	U6-53
5	L14-14	L14-15	L14-16	L14-00 (bit 4)	L14-01 (bit4)	U6-54
6	L14-17	L14-18	L14-19	L14-00 (bit5)	L14-01 (bit 5)	U6-55
7	L14-20	L14-21	L14-22	L14-00 (bit6)	L14-01 (bit 6)	U6-56
8	L14-23	L14-24	L14-25	L14-00 (bit7)	L14-01 (bit 7)	U6-57
9	L14-26	L14-27	L14-28	L14-00 (bit8)	L14-01 (bit 8)	U6-58
10	L14-29	L14-30	L14-31	L14-00 (bit9)	L14-01 (bit 9)	U6-59
11	L14-32	L14-33	L14-34	L14-00 (bit 10)	L14-01 (bit10)	U19-68
12	L14-35	L14-36	L14-37	L14-00 (bit 11)	L14-01 (bit11)	U19-69

Proportion Module	Input					Output
	I1	I2	I3	I4	I5	O
13	L14-38	L14-39	L14-40	L14-00 (bit 12)	L14-01 (bit12)	U19-70
14	L14-41	L14-42	L14-43	L14-00 (bit 13)	L14-01 (bit13)	U19-71
15	L14-44	L14-45	L14-46	L14-00 (bit 14)	L14-01 (bit14)	U19-72
16	L14-47	L14-48	L14-49	L14-00 (bit 14)	L14-01 (bit14)	U19-73

Example:

- The multiply and divide operation is performed on the single-word connector U6-00 by using proportion module 1.
  Input 1 of the numerical value source of proportion module 1 is set by connector U6-00, and input 2 (multiply) of proportion module 1 and input 3 (divide) of proportion module 1 are set to 1.

Para.	Name	Reference
L14-02	Numerical value source input 1 of proportion module 1	U6-00 [output of constant reference 1]
L14-03	Input 2 of proportion module 1 (MULTIPLY)	1
L14-04	Input 3 of proportion module 1 (DIVIDE)	1

  The following table lists the proportion module output values upon different calculation methods and data types when the constant reference 1 (single word) is ±10.0%.

[L9-00] Constant reference 1	[L11-00] Bit0	[L11-01] Bit0	[U6-50]
10.0	0 (Raw value)	0 (Signed number)	10%
	0	1 (Unsigned number)	10%
	1 (Per-unit value)	-	10%
-10.0	0	0	-10%
	0	1	800%<1>
	1	-	-10%

Note

If –10.0% is processed as an unsigned number, the output value will reach the positive limit.

- The multiply and divide operation is performed on the double-word connector U19-74 by using proportion module 11.
  Input 11 of the numerical value source of proportion module 1 is set by connector U19-74, and input 2 (multiply) of proportion module 11 and input 3 (divide) of proportion module 11 are set to 1.

Para.	Name	Reference
L14-32	Numerical value source input 1 of proportion module 11	U19-74 [Output of constant reference 6]
L14-33	Input 2 of proportion module 11 (MULTIPLY)	1
L14-34	Input 3 of proportion module 11 (DIVIDE)	1

  The following table lists the proportion module output values upon different calculation methods and data types when the constant reference 6 (double word) is ±10.00%.

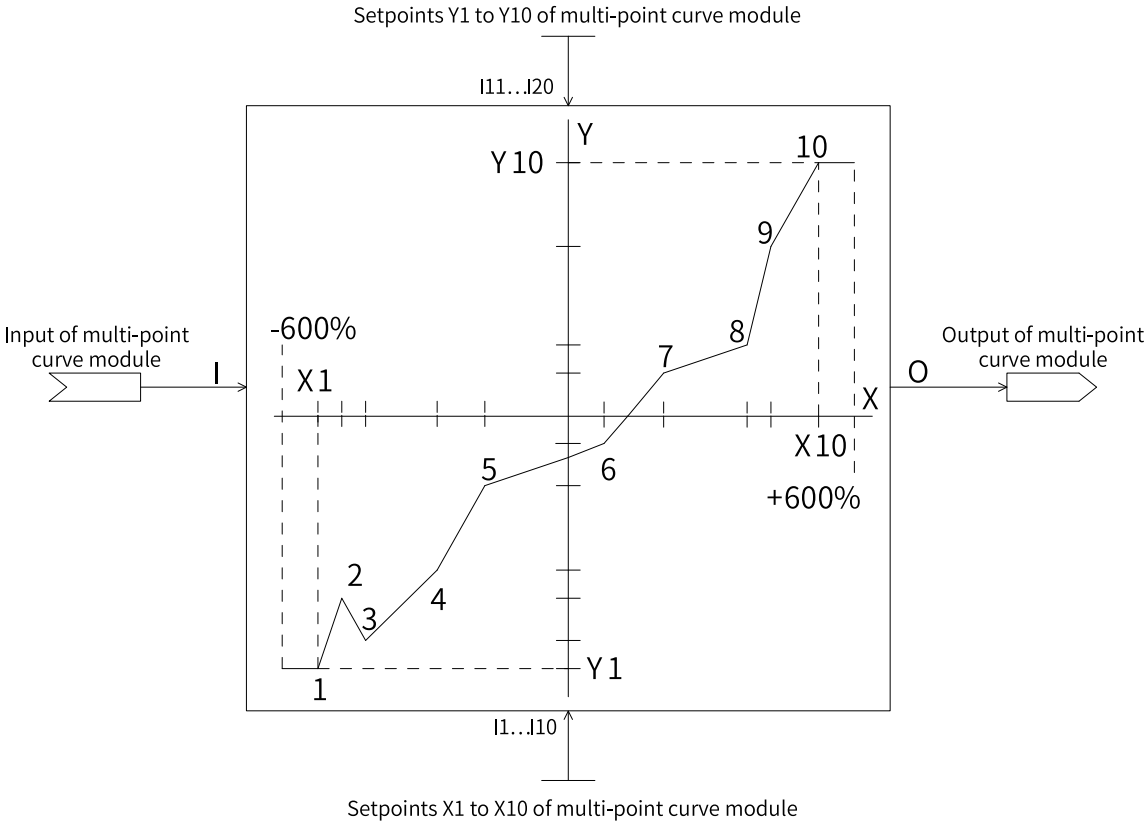
[L9-05] Constant reference 6	[L11-00] bit10	[L11-01] bit10	[U19-68]
10.00%	0 (Raw value)	0 (Signed number)	10%
	0	1 (Unsigned number)	10%
	1 (Per-unit value)	-	10%
-10.00%	0	0	-10%
	0	1	800%<1>
	1	-	-10

Note

If –10.0% is processed as an unsigned number, the output value will reach the positive limit.

4.20.7 Multi-point Curve Module

Diagram



Operation

Only when the X1 < X2 <... condition is met, the set coordinate points are enabled. When the input is out of the enabled coordinate points, the output equals the ordinate value of the adjacent enabled coordinate points. When the input is within the enabled coordinate points, the ordinate value corresponding to the output can be calculated according to the curve.

Connection

Inputs I and I1 to I20 are signed numbers.

Output O is a signed number.

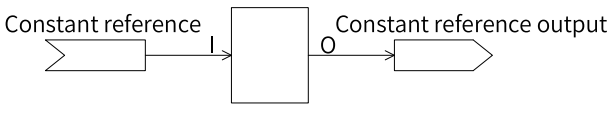
Multi-point Curve Module		A	B
Input	I	L17-00	L17-21
	I1 (X1)	L17-01	L17-22
	I2 (X2)	L17-03	L17-24
	I3 (X3)	L17-05	L17-26
	I4 (X4)	L17-07	L17-28
	I5 (X5)	L17-09	L17-30
	I6 (X6)	L17-11	L17-32
	I7 (X7)	L17-13	L17-34
	I8 (X8)	L17-15	L17-36
	I9 (X9)	L17-17	L17-38
	I10 (X10)	L17-19	L17-40
	I11 (Y1)	L17-02	L17-23
	I12 (Y2)	L17-04	L17-25
	I13 (Y3)	L17-06	L17-27
	I14 (Y4)	L17-08	L17-29
	I15 (Y5)	L17-10	L17-31
	I16 (Y6)	L17-12	L17-33
	I17 (Y7)	L17-14	L17-35
	I18 (Y8)	L17-16	L17-37
	I19 (Y9)	L17-18	L17-39
	I20 (Y10)	L17-20	L17-41
Output	O	U19-24	U19-25

Note

I can also enable modules. Modules can be used for calculation only after being enabled.

4.20.8 Constant Setting Module

Diagram



Operation

O = I

Output O equals to input I.

Constant setting modules 1 to 10 are in percentage setting mode. Constant setting modules 1 to 5 contain one decimal place, and constant setting modules 6 to 10 contain two decimal places, with higher accuracy.

Constant setting modules 11 to 20 are in digital setting mode. Constant setting modules 11 to 15 are 16-bit data, and constant setting modules 16 to 20 are 32-bit data, with higher accuracy.

Connection

Input I is a signed number.

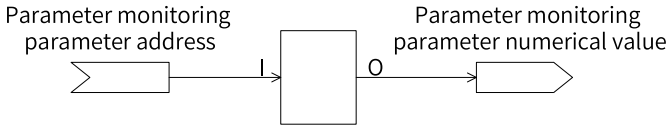
Output O is a signed number.

Constant Setting Module	Input	Output
	I	O
1	L9-00	U6-00
2	L9-01	U6-01
3	L9-02	U6-02
4	L9-03	U6-03
5	L9-04	U6-04
6	L9-05	U19-74
7	L9-06	U19-75
8	L9-07	U19-76
9	L9-08	U19-77
10	L9-09	U19-78
11	L9-10	U6-05
12	L9-11	U6-06
13	L9-12	U6-07
14	L9-13	U6-08
15	L9-14	U6-09
16	L9-15	U19-79
17	L9-16	U19-80
18	L9-17	U19-81
19	L9-18	U19-82
20	L9-19	U19-83

4.20.9 Parameter Monitoring and Modification

4.20.9.1 Parameter Monitoring (1 to 10)

Diagram



Operation

Output O of the parameter monitoring modules corresponds to the reference of the parameter monitoring parameter address I. Parameter monitoring modules include 10 single-word parameter monitoring modules and 3 double-word parameter monitoring modules.

Single-word parameter monitoring modules 1 to 5 can monitor the parameters with the value range of 0 to 65535, and modules 6 to 10 can monitor the parameters with the value range of –32768 to +32767.

Connection

Input I is an unsigned number.

Output O of modules 1 to 5 is an unsigned number, and that of modules 6 to 10 is a signed number.

Single-word Parameter Monitoring Module	Input	Output
	I	O
1	L8-00	U6-60
2	L8-01	U6-61
3	L8-02	U6-62
4	L8-03	U6-63
5	L8-04	U6-64
6	L8-05	U6-65
7	L8-06	U6-66
8	L8-07	U6-67
9	L8-08	U6-68
10	L8-09	U6-69

Double-word Parameter Monitoring Module	Input	Output
	I	O
1	L8-20	U19-89
2	L8-21	U19-90
3	L8-22	U19-91

Example:

Use parameter monitoring modules 1 and 6 to monitor constant reference 1 of L9-00.

Both parameter monitoring modules 1 and 6 are set to 1371, which corresponds to the address of constant reference 1 of L9-00.

Para.	Name	Reference
L8-00	Single-word parameter monitoring parameter address 1	1371
L8-05	Single-word parameter monitoring parameter address 6	1371

The following table lists the output values of parameter monitoring modules 1 and 6 when the constant reference 1 of L9-00 is set to ±10.0%.

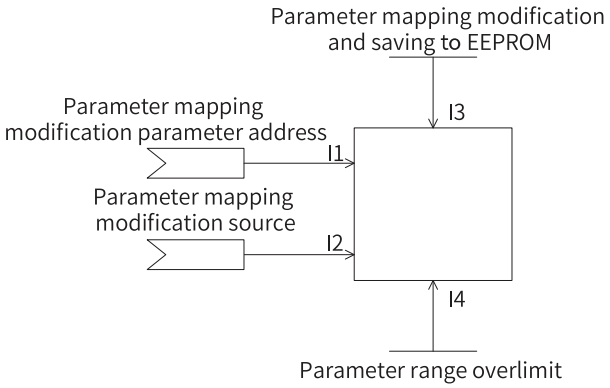
[L9-00]	[U6-60]	[U6-65]
10.0	100	100
-10.0	65436<1>	-100

Note

<1>: The output data types of parameter monitoring modules 1 to 5 are 16-bit unsigned numbers. The 16-bit unsigned number corresponding to the complement of －100 is 65436. Therefore, parameter monitoring modules 6 to 10 are required to monitor signed parameter values.

4.20.9.2 Parameter Mapping (1 to 16)

Diagram



Operation

For a modified value of I2 written to a parameter indicated by address I1, you can set I3 to determine whether to retain the modified parameter indicated by I1 at power failure, and set I4 to determine whether to apply limits if the modified value of I2 exceeds the upper limit/lower limit of I1.

Connection

Inputs I1, I2, I3, and I4 are unsigned numbers.

Parameter Mapping Module	Input			Output
	I1	I2	I3	I4
1	L8-28	L8-29	L8-26 (bit0)	L8-27 (bit0)
2	L8-30	L8-31	L8-26(bit1)	L8-27 (bit1)
3	L8-32	L8-33	L8-26(bit2)	L8-27 (bit2)
4	L8-34	L8-35	L8-26(bit3)	L8-27 (bit3)
5	L8-36	L8-37	L8-26(bit4)	L8-27 (bit4)
6	L8-38	L8-39	L8-26 (bit5)	L8-27 (bit 5)
7	L8-40	L8-41	L8-26 (bit6)	L8-27 (bit 6)
8	L8-42	L8-43	L8-26 (bit7)	L8-27 (bit 7)
9	L8-44	L8-45	L8-26 (bit8)	L8-27 (bit 8)
10	L8-46	L8-47	L8-26 (bit9)	L8-27 (bit 9)
11	L8-48	L8-49	L8-26(bit10)	L8-27 (bit10)
12	L8-50	L8-51	L8-26(bit11)	L8-27 (bit11)
13	L8-52	L8-53	L8-26(bit12)	L8-27 (bit12)
14	L8-54	L8-55	L8-26(bit13)	L8-27 (bit13)
15	L8-56	L8-57	L8-26(bit14)	L8-27 (bit14)
16	L8-58	L8-59	L8-26(bit15)	L8-27 (bit15)

Example:

Connector U6-00 (output of constant reference 1) modifies C6-11 (multi-reference value 1) using the parameter mapping module 1.

The L8-28 parameter is set to 1355, indicating the address of multi-reference value 1 (C6-11). The L8-29 parameter is set to U6-00, indicating the output of constant reference 1.

Para.	Name	Reference
L8-28	Parameter mapping modification parameter address 1	1355
L8-29	Parameter mapping modification source 1	U6-00 [output of constant reference 1]

The following table lists the reference of C6-11 when the constant reference 1 of L9-00 is set to ±10.0% or ±150.0%.

[L9-00]	[L8-27] Bit0	[C6-11]
10.0	-	41.0<1>
-10.0	-	-41.0
150.0	0: No action	Disable
	1 (upper or lower limit)	600.0<2>
-150.0	0: No action	Disable
	1 (upper or lower limit)	-600.0<2>

Note

- <1>: According to section 2.4.2, 4096 corresponds to 100% for single-word connectors. When [U6-00] is 10.00%, the 10% per-unit value corresponds to the original value 410. In addition, C6-11 contains one decimal place. Therefore, the value of [C6-11] is 41.0.
- <2>: The ±150.0% per-unit value theoretically corresponds to the original value ±1.5 x 4096 = ±6144, exceeding the upper limit 6000 and lower limit –6000 of the C6-11 parameter. When modification range overlimit processing is enabled, the C6-11 value is the maximum value/minimum value.

4.21 Auxiliary Functions

4.21.1 Hibernation and Wakeup

The hibernation and wakeup function is typically used in water supply applications to implement automatic start/stop of AC drives.

The function is enabled (L0.01 set to 1) and both the L0.08 and L0.09 parameters are set to defaults. When the frequency reference becomes lower than or equal to L0.02/L0.03 during running, the AC drive enters the hibernation state (U1.86 = 1) and automatically stops after the time defined by L0.04 (hibernation delay) elapses.

The AC drive is in the hibernation state, both the L0.10 and L0.11 parameters are set to defaults, and the RUN command is valid. When the frequency reference becomes equal to or higher than L0.05/L0.06 (wakeup threshold), the AC drive starts (U1.86 = 0) after the delay time set by L0.07 (wakeup delay) elapses.

You can define the hibernation and wakeup logic and threshold sources as needed by setting parameters L0.08 to L0.11, which can meet various operating condition requirements.

The following table lists relevant parameters.

Parameter Code	Parameter Name	Description
L0.01	Hibernation and wakeup function	0: Disable 1: Enable Other: B connector
L0.02	Hibernation threshold reference	0: Digital setting Other: K connector
L0.03	Digital setting of hibernation threshold	0.0% to 600.0%
L0.04	Hibernation delay	0.0 to 6553.5s
L0.05	Wakeup threshold	0: Digital setting Other: K connector
L0.06	Digital setting of wakeup threshold	0.0% to 600.0%
L0.07	Wakeup delay	0.0 to 6553.5s
L0.08	Positive and negative logic selection for hibernation activation	0: Hibernation activated when L0.09 ⩽ hibernation threshold 1: Hibernation activated when L0.09 ⩾ hibernation threshold
L0.09	Hibernation judgment source selection	0: Frequency reference Other: K connector
L0.10	Positive and negative logic selection for wakeup activation	0: Wakeup activated when L0.11 ⩽ wakeup threshold 1: Wakeup activated when L0.11 ⩾ wakeup threshold
L0.11	Wakeup judgment source selection	0: Frequency reference Other: K connector
U1.86	Hibernation	0: Disable 1: Enable. The system is in the hibernation state.
U1.87	Wakeup	0: Disable 1: Enable. The system is in the wakeup state.

4.21.2 Voltage Dip Resistance

The voltage dip resistance function meets the requirements of some industries for uninterrupted system operation or automatic restoration after shutdown upon a temporary grid failure. The voltage dip resistance function requires an external 24 V power supply of the control board. The voltage dip resistance function of the MD580 includes a total of three stages.

- Enable the VdcMin control function. When the bus voltage dips to the VdcMin activation voltage, the VdcMin control is enabled, the output frequency of the AC drive decreases, and the motor is in power generation state. At this moment, the bus voltage can be maintained for a short period of time, depending on the motor inertia and load.
- If the bus voltage is not recovered within the VdcMin maintaining time, the bus voltage further dips. At this moment, the AC drive blocks the output and reports an undervoltage alarm. The motor continues rotating due to inertia until it completely stops. If the bus voltage is not recovered until

the automatic restart time for voltage dip resistance expires, an undervoltage fault is reported. If the bus voltage is recovered within this time, the voltage dip resistance enters stage 3.

- At this moment, the AC drive detects that the bus voltage is recovered, which triggers the run command. The motor is started in the flying start mode and finally restores the speed to that before bus voltage dip and continues to run.

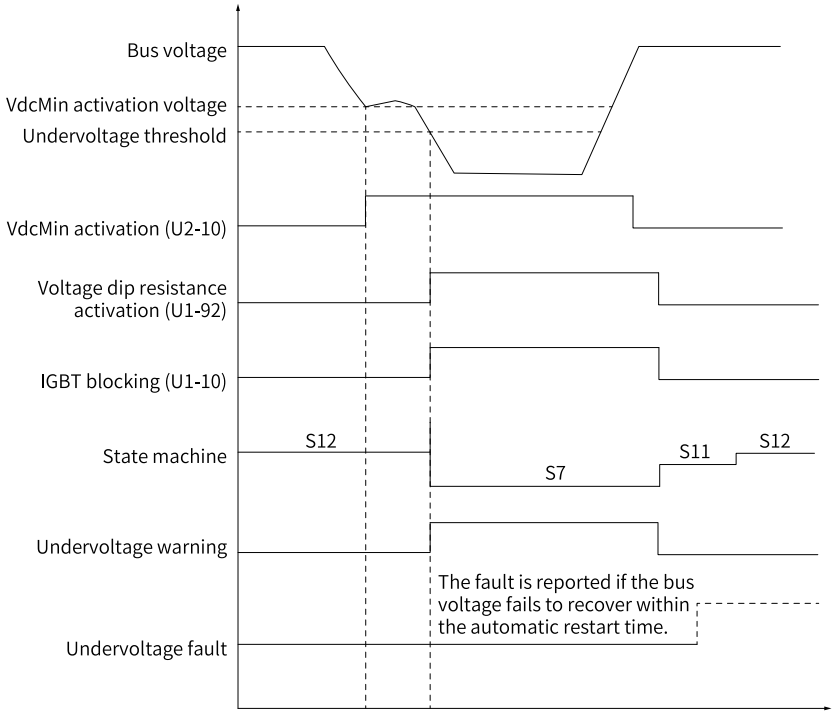


Figure 4-74 Voltage dip resistance sequence diagram

Parameter Code	Parameter Name	Description
E9-00	VdcMin control	VdcMin control switch
L0-16	Voltage dip resistance function	Voltage dip resistance function switch
L0-17	Automatic restart time for voltage dip resistance	If the waiting time exceeds the time set by L0-17, an undervoltage fault is reported.
L0-18	Flying start upon automatic restart for voltage dip resistance	It indicates the start mode after the bus voltage is recovered. The default is forced flying start.
H1-45	Undervoltage alarm detection selection upon voltage dip resistance activation	This function is enabled by default. You can disable this function.
U1-92	Voltage dip resistance activation	The voltage dip resistance state is activated and the AC drive starts to count the restart time.

4.21.3 Energy Conservation Statistics

The energy conservation statistics function can be used to record the power output and the power saved over a period of time, and record the amount saved during this period. The following table lists relevant parameters in group L20.

Table 4–23

Parameter Code	Parameter Name	Description
L20-10	Start year of energy conservation	They are read-only. The parameters indicate the start time of energy conservation. L20-35 and L20-36 can be used to update the current time to L20-10 to L20-12.
L20-11	Start date of energy conservation	
L20-12	Start time of energy conservation	
L20-13	Output power during energy conservation	It is read-only and can be saved upon a power failure. It indicates the accumulate output power since the statistics start time.
L20-14	Saved power during energy conservation	It is read-only and can be saved upon a power failure. It indicates the accumulate saved power since the statistics start time.
L20-16	Saved amount (*1000000) during energy conservation	It is read-only and can be saved upon a power failure. It indicates the accumulate saved amount since the statistics start time.
L20-17	Saved amount (*1000) during energy conservation	
L20-18	Saved amount (*1) during energy conservation	
L20-29	Effective reference power	It indicates the effective reference power.
L20-30	Reference power source	The default is the motor power. The parameter value can also be L20-31.
L20-31	It indicates the digital setting of the reference power.	
L20-32	Price 1 of electricity per kWh	L20-34 can be set to the value of L20-32 or L20-33 for calculation of saved amount.
L20-33	Price 2 of electricity per kWh	
L20-34	Selection of electricity price	
L20-35	Energy conservation statistics reset	L20-35 is used to select the energy conservation statistics reset operation and L20-36 is used to confirm the operation.
L20-36	Confirmation of energy conservation statistics reset	

4.22 Fan Running Control

The speed governing function for the fan in the power module of the MD580 AC drive can be set using parameter A4-29.

Para.	Name	Description
A4-29	Fan control mode	0: Run at full speed after startup 1: Run at full speed after power-on 2: Automatic speed governing after startup

Setting parameter A4-29 to 2 can take effect in the MD580-7 model only.

Note

- When the temperature of the A0-22 module is higher than 50°C, the fan is forced to run. When the temperature is lower than 45°C, the fan stops.
- After the AC drive stops, the fan stops after running for one more minute.

4.23 Positioning Control

4.23.1 Positioning Control

During positioning control, when the controller receives a position reference or encoder pulse, the controller plans a real-time motion curve internally under the limits of acceleration/deceleration time and limit speed, making the motor shaft follow the position curve and the load reach the target position.

The positioning control of the MD580 enables fast and accurate positioning of the load shaft. Position control applies to asynchronous motors and permanent magnet synchronous motors. In addition, position control can be used to drive the rotary or linear axis, and supports incremental and absolute positioning. Requirements of most positioning applications can be met.

If you set o15-01 (position control) to "1: Enable", the positioning function takes effect. According to the actual application, positioning control is further divided into linear axis and rotary axis, which can be selected through o15-05 (load axis type of position control).

Linear axis means that the load generally moves back and forth linearly, such as the hoisting device. The following figure shows the schematic diagram of the linear axis positioning control.

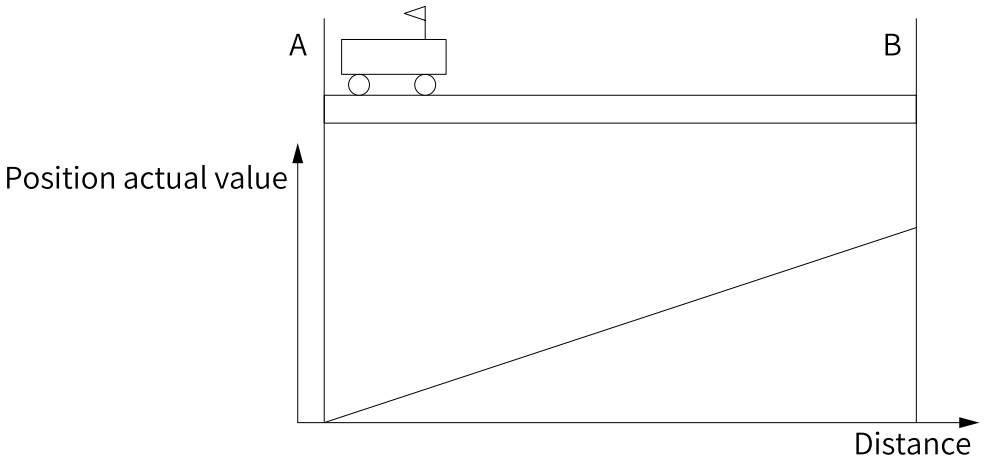


Figure 4-75 Linear axis positioning control

Rotary axis means that the load generally moves back and forth circularly, such as the rotary table. The setting range of the rotary axis can be set through o15-06. The following figure shows the schematic diagram of rotary axis positioning control.

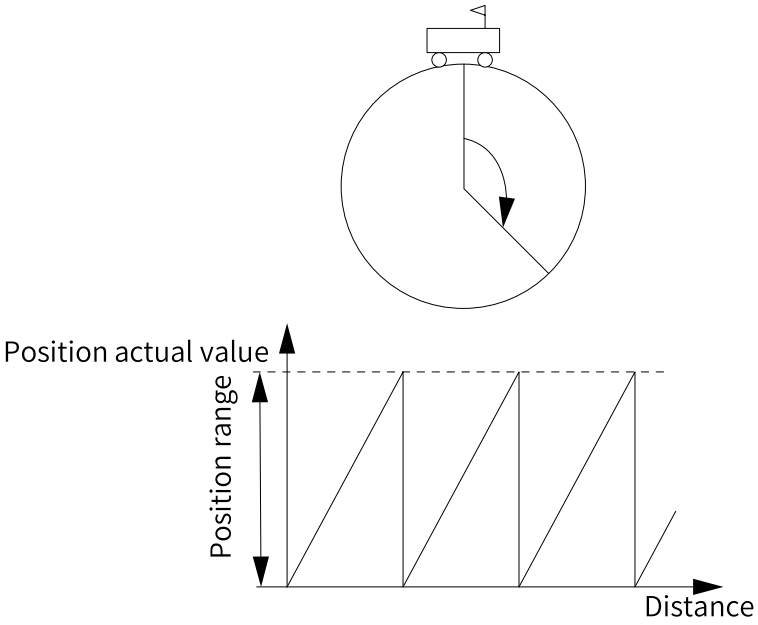


Figure 4-76 Rotary axis positioning control

The following figure shows the flow of positioning function commissioning.

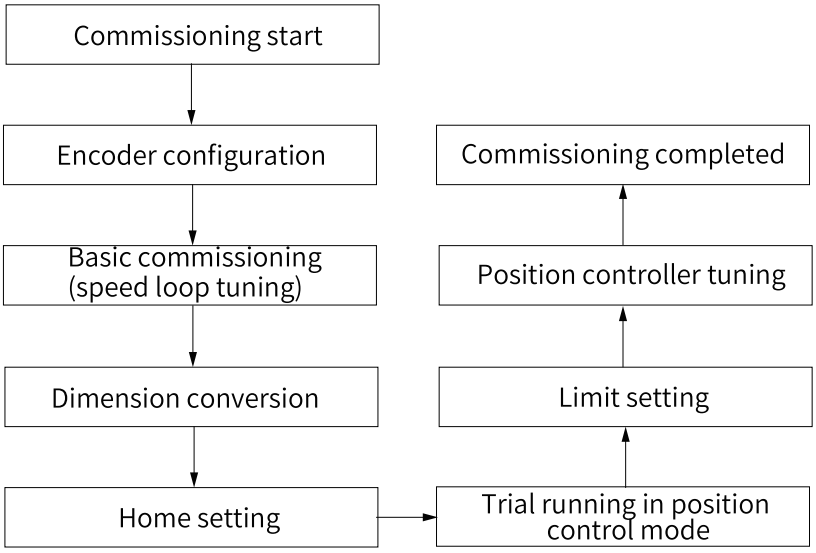


Figure 4-77 Positioning function commissioning flow

4.23.2 Encoder Configuration

The dynamic response and control accuracy of position control is subject to the speed and current loops of the inner loop. The best control performance can be provided only when the inner loop is tuned to the optimum and the vector control mode with the encoder is adopted (E0-00 = 1). The dynamic response will be slow and the accuracy will be decrease in position control with the vector control mode without the encoder (E0-00 = 0) or V/f control mode (E0-00 = 2).

Position control must be implemented with an encoder. The controller of the MD580 supports up to two encoder detection modules at the same time. You can set the two encoders through parameters in

group n5 and group n6, respectively. The following table shows the encoder types supported by position control.

Table 4–24 Encoder types supported by position control

Encoder Detection Module Type	Encoder Detection Module Model	Remarks
ABZ incremental encoder	MD38PGMD	\
Resolver encoder	MD38PG4	\
Sin-cos and SSI dual encoder	MD580-PG-AR1	\
ABZ incremental and SSI dual encoder	MD580-PG-AU1	

For a ABZ incremental encoder, you can set the encoder PPR through parameter n5-07 (encoder resolution (pulse numbers/PPR)). When the motor is connected coaxially with the encoder, the position value per one motor rotation increases by four times the encoder PPR. For example, for a 2500-PPR encoder, the position value (U29-00) increases by 10000 per one motor rotation in the forward direction.

For a resolver encoder, if n5-13 (number of pole pairs of the resolver) is set to 1, the position value per one motor rotation increases by 4096 by default. If the number of pole pairs of the resolver is not 1, the position value (U29-00) per one motor rotation increases by 4096 x the number of pole pairs.

For example, for a sin-cos encoder, the position value (U29-00) increases by 16777216 (2^{24}) per one motor rotation.

For an SSI absolute encoder, the position value (U29-00) increases by 2^n (n indicates the bit of one turn) per one motor rotation.

Note

Before commissioning the positioning function, run the drive in the speed control mode first to confirm that the absolute position value of U29-00 increases during forward running. During reverse running, the absolute position value of U29-00 decreases. If the test result is opposite, modify parameters n5-21/n6-21 (direction for calculating the number of encoder pulses).

Position control of the MD580 is applicable to fully closed-loop field applications and can support up to two encoder detection modules at the same time. The logic diagram of fully closed-loop position control is as follows.

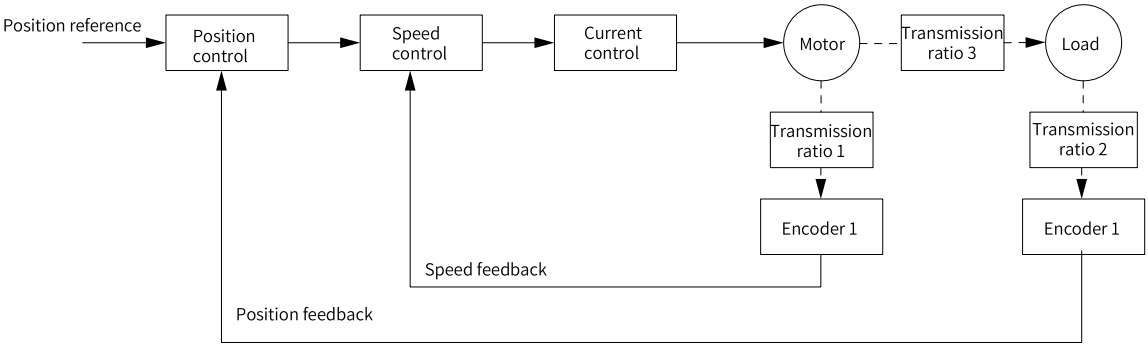


Figure 4-78 Logic diagram of fully closed-loop position control

The two encoders for fully closed-loop position control serve as speed feedback and position feedback. Their feedback sources can be configured by using the following parameters.

Table 4–25 Speed feedback and position feedback parameters

Parameter Code	Parameter Name	Parameter Value	Remarks
d0-12	Speed feedback encoder	0: Encoder 1 1: Encoder 2	
o15-10	Position detection feedback source	0: Determined by d0-12 (speed feedback encoder) 1: Encoder 1 2: Encoder 2 3: User-defined	
o15-11	User-defined position feedback source	0: 0 Other: K connector	
o15-12	User-defined feedback conversion coefficient numerator	1 LU to 2147483647 LU	
o15-13	User-defined feedback conversion coefficient denominator	1 to 2147483647	

When the position feedback value is issued by the host controller through communication, the position feedback source can be set to user-defined feedback. When parameters o15-20 (position feedback average filter time) and o15-21 (position feedback first-order filter time) are not set to 0, the position feedback value is filtered.

4.23.3 Dimension Conversion

Dimensions of position reference and feedback position may be different in different application scenarios, and may be different even in the same application scenario. Therefore, unify the dimension of the reference value and feedback value before activating position control so that the positioning system can operate normally. The following figure shows the logic diagram of position control dimension conversion, which contains the calibration relationship among the reference dimension UU of the host controller, internal operation dimension LU of position control, and the load position feedback dimension FU.

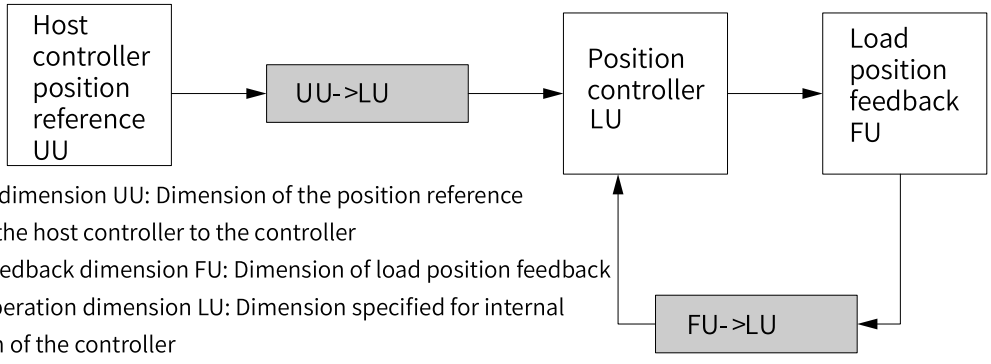


Figure 4-79 Logic diagram of position control dimension conversion

Therefore, when applying position control in a site, confirm the customer's requirement on positioning accuracy, the dimension UU sent by the customer's host controller, and the position feedback dimension FU. Based on the above information, determine the internal calculated dimension LU of the controller. LU can be 1 p, 1 mm, or 0.1°.

Here is an example of the dimension calibration procedure.

1. In a linear axis application, the customer requires the accuracy of approximately 1 mm, the transmission ratio of the motor to the load axis of 1:1, a 2500-PPR ABZ encoder used for position feedback, and 1 pulse (1p) equals 0.01 mm. The user sends the dimension of 1 m.
2. Based on the above information, it can be determined that UU is 1 m, LU is 1 mm, and FU is 1 p.
3. Confirm the ratio of the reference dimension UU of the host controller to the internal operation dimension LU. That is, 1 UU = 1000 LU. When the host controller sends 1 UU, the controller's internal position reference is 1000 LU. The settings of the related parameters are shown in the following table.

Table 4–26 UU-to-LU conversion parameter

Parameter Code	Parameter Name	Unit	Remarks
o17-05	Numerator of reference unit conversion coefficient	LU	According to the above example, 1000 should be filled in.
o17-06	Denominator of reference unit conversion coefficient	UU	According to the above example, 1 should be filled in.

4. Confirm the ratio of the position feedback dimension FU to the internal operation dimension LU. Two methods are provided for the calibration of position feedback: incremental calibration method and nominal calibration method. Both methods support position feedback calibration in any positioning application site. When the on-site transmission mechanism can be moved and the on-site transmission ratio is not clear or a high accuracy is required, the incremental calibration method is recommended . During commissioning, the load can be moved manually for a certain distance and the ratio of FU to LU can be obtained by averaging results of several experiments. For the incremental calibration method, the settings of the related parameters are as follows.

Table 4–27 FU-to-LU incremental calibration parameter

Parameter Code	Parameter Name	Unit	Remarks
o15-14	Position feedback calibration method selection	-	Select "0: Incremental calibration method".
o15-15	Incremental method-Running distance increment on the load side	LU	According to the above example, 1 should be filled in.
o15-16	Incremental method-Pulse increment of feedback encoder	p	According to the above example, 100 should be filled in.

The nameplate calibration method can be used based on the available information when the on-site transmission mechanism cannot be moved. For the nameplate calibration method, the parameters are as follows.

Table 4–28 FU-to-LU nameplate calibration parameter

Parameter Code	Parameter Name	Unit	Remarks
o15-14	Position feedback calibration method selection	-	Select "1: Nameplate calibration method".
o15-17	Nameplate method-LU/ Revolution setting on the load side	LU	According to the above example, 100 should be filled in.
o15-18	Nameplate method-Motor revolutions for motor/ load transmission ratio	-	According to the above example, 1 should be filled in.
o15-19	Nameplate method-Load revolutions for motor/ load transmission ratio	-	According to the above example, 1 should be filled in.

5. Unit calibration is completed.

Note

A higher accuracy requirement of position control indicates that higher resolution should be selected for LU. However, the highest resolution of LU should not exceed the resolution of FU. For example, 1 pulse (1p) of the encoder corresponds to 0.1 mm of linear operation of the load, that is, FU = 0.1 mm. In this case, the LU must be greater than or equal to 0.1 mm.

4.23.4 Homing

After the AC drive is powered on again, execute homing before positioning starts to redefine the home. Otherwise, when the positioning start command is triggered, o17-00 (positioner valid status) will prompt "5 home invalid".

After triggering the homing command, set the current position as the reference point through the parameter, or allow the motor to search for the home during motor operation. Parameter o19-03 (homing type) has four options:

- Current position as reference point
- Current position as reference point (position control not required)
- Proximity switch 1 as reference point
- Proximity switch 2 as reference point

Current position as reference point: The motor does not rotate. As long as the homing command is triggered, regardless of the current position, the current position is used as the home. The source and reference of the current position are determined by parameters o19-03 (source of current position) and o19-04 (digital setting of current position).

Proximity switch 1 or 2 as reference point: The motor runs and returns to the home actively, which usually requires mechanical switches such as proximity switches or photoelectric sensors. Because the motor runs in this case, you must set the limit switches at both ends to prevent the motor from running beyond the limit and crashing the mechanical devices. The homing process is divided into three steps.

1. The motor starts to run in the direction specified by parameter o19-02 (homing direction) and follows the set speed movement curve specified by parameters o19-15 to o19-18 to search for the home switch signal.
2. When the switch signal is detected, the current position is recorded and deceleration starts. The source of the switch signal and the effective mode can be set by parameters o19-06 and o19-07 or o19-10 and o19-11.
3. After the motor decelerates to 0, positioning is triggered once, targeting the home position detected in step 2. After the home position is reached, the current absolute position is changed to the position reference of parameter o19-09 or o19-13. Homing is completed.

The following figure shows the preceding process.

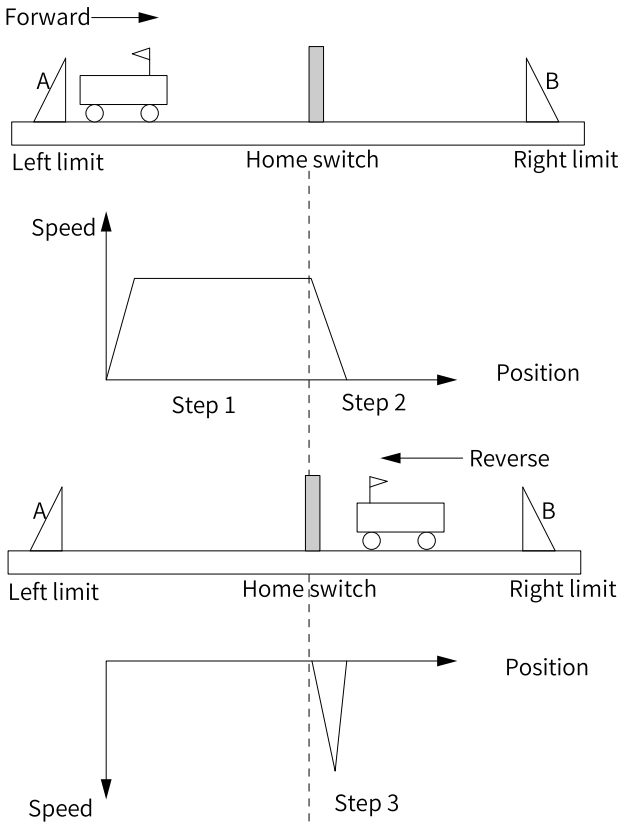


Figure 4-80 Homing process

After homing is completed, the bit connector U20-22 (position control home active) flag bit will be set to 1 and U29-00 (current absolute position value) will be changed to the home position reference. When the homing execution time exceeds the time set by o19-21 (home search timeout), home search timeout will be reported.

Position deviation may occur after long-time running. Position can be corrected by using the home switch because the home position value is fixed. The relevant parameters are o19-22 to o19-25.

Table 4–29 Home position correction parameters

Parameter Code	Parameter Name	Unit	Remarks
o19-22	Home position correction activation	-	/
o19-23	Minimum value of home position deviation correction	UU	/
o19-24	Maximum value of home position deviation correction	UU	/
o19-25	Home position correction linear change time	ms	/

The schematic diagram of home position deviation compensation is shown below.

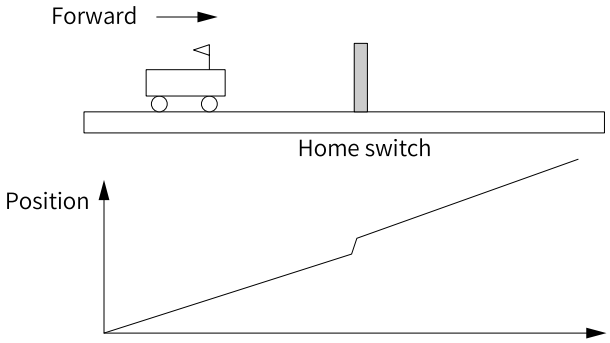


Figure 4-81 Schematic diagram of home position deviation compensation

If the home position needs to be retentive upon power failure, o19-28 (home retentive at power failure) can be used to record the current absolute position value at power failure of the AC drive. After the AC drive is powered on again, the AC drive directly reads the absolute position value recorded at the last power failure to ensure that the home is valid. Note that the mechanical devices cannot be moved upon power failure to avoid position deviation.

4.23.5 Position Reference

4.23.5.1 Position Reference

The positioner's reference channel consists of the primary and auxiliary reference channels. The final position reference is determined by the sum of the two references. The primary reference source is set by parameter o17-01. Options include multi-position reference and user-defined source. Multi-position reference means an optional internal position reference of the controller. User-defined source can be configured to external communication.

4.23.5.2 Multi-position Reference

When parameter o17-01 (main reference source of positioner) is set to 0 (multi-position reference), the positioning control setting source is the multi-position reference currently in effect.

The controller provides 32-position references internally. You can customize the set value of each reference and its attribute by setting parameters in group o18 or set the execution mode through parameter o18-02 (multi-position running mode). The following execution modes are supported:

- Digital setting of multi-position reference determined by o18-03
- Multi-position switchover (determined by o18-17 to o18-21)
- Operation once in a sequence (determined by o18-04 and o18-05)
- Loop operation (determined by o18-04 and o18-05)

The following table takes multi-position reference 1 as an example to describe parameters of position reference attributes.

Table 4–30 Parameters of position reference attributes

Parameter Code	Parameter Name	Parameter Bit Name	Value	Remarks
o18-23	Multi-position 1 attribute setting	Ones position: Acceleration/ Deceleration time	0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4	o17-25 to o17-32
		Tens position: Forward/Reverse speed limit	0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	o17-33 to o17-48
		Hundreds position: Waiting time for positioning completion	0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion	o17-49 to o17-52
		Thousands position: Positioner command output filter time	0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4	o17-53 to o17-56
		Ten thousands position: Stroke type	0: Absolute 1: Incremental	

Positioner attribute parameters, such as acceleration/deceleration time and forward/reverse speed limit, affect the positioner operating characteristics. By default, the controller completes the positioning control according to the following motion curves.

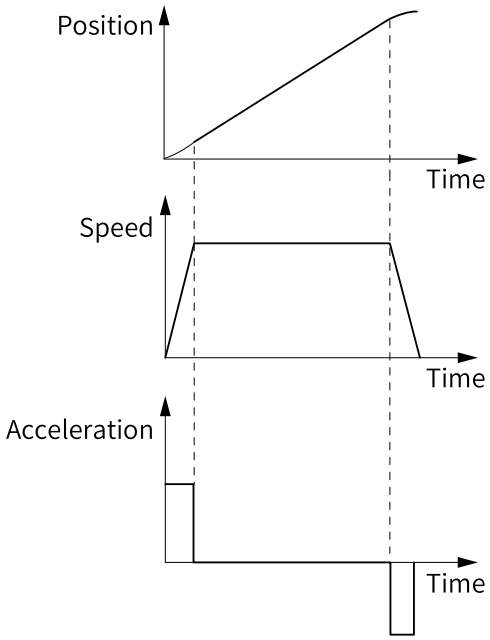


Figure 4-82 Position-speed-acceleration curves for positioning control

The current positioning control curve contains the acceleration section, constant speed section, and deceleration section. The acceleration time of the positioner indicates the time spent in the acceleration phase from 0% to 100%, which affects the acceleration in motion. Similarly, the deceleration time of the positioner indicates the time spent in the deceleration phase from 100% to 0%. The following figure shows the impact of positioning acceleration/deceleration time on the curve when the position reference and other parameters are the same.

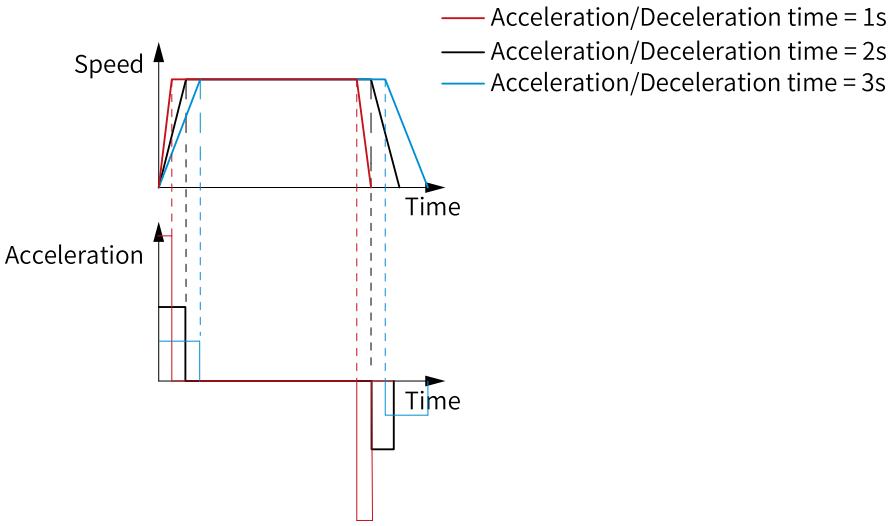


Figure 4-83 Impact of positioning acceleration/deceleration time on the curve

The forward/reverse speed limit of the positioner indicates the maximum speed reached after the acceleration phase, and such a speed is used as the constant speed for subsequent running. Note that o17-15 (curve profile limit speed margin) defaults to 3%, that is, when the forward limit is 100%, the forward speed limit actually in effect is 97% (100% – 3%). The following figure shows the impact of the forward/reverse speed limit on the curve when the position reference and other parameters are the same.

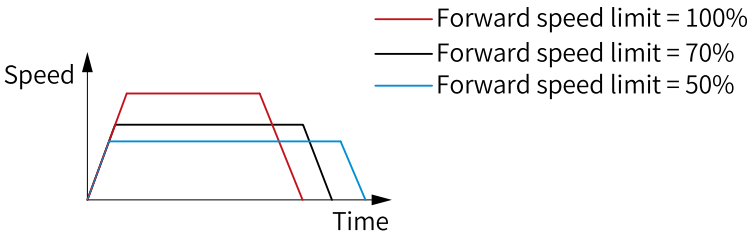


Figure 4-84 Impact of the forward/reverse speed limit on the curve

Waiting time for positioning completion refers to the interval for starting the next section of positioning after the completion of positioning once in sequence or a single execution of loop operation. During the waiting time, the flag bit of U2-06 (waiting for positioning completion) will be set to 1. After the waiting time elapses, the flag bit of U2-06 (waiting for positioning completion) will be set to 0 and the flag bit of U20-04 (positioning ended) will be set to 1.

The positioner command output filter time is the time of the first-order low-pass filtering for the position reference. Longer filter time means a smoother curve but longer execution time. The following figure shows the impact of filter time on the curve when the position reference and other parameters are the same.

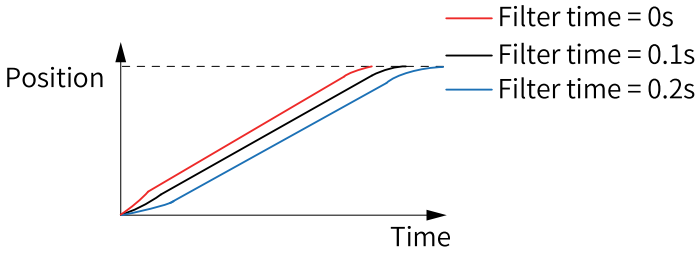


Figure 4-85 Impact of positioner filter time on the curve

There are two stroke types: incremental positioning and absolute positioning. Their difference lies in the reference points during positioning. Incremental positioning uses the current point at the start of each positioning signal as the reference point, and the position reference is based on increments to the reference point. The schematic diagram of incremental positioning is shown below.

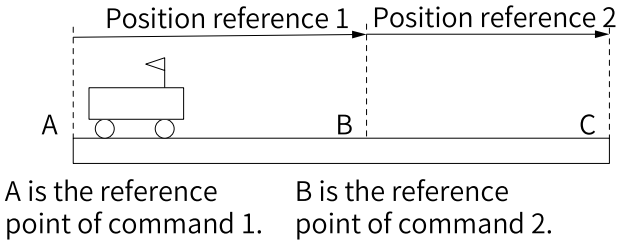


Figure 4-86 Incremental positioning

Absolute positioning uses the home as the reference point for each start after the home is confirmed to be valid.

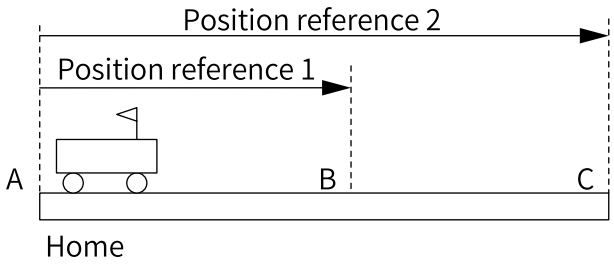


Figure 4-87 Absolute positioning

4.23.5.3 User-defined Reference

When parameter o17-01 (positioner primary reference source) is set to "1: user-defined", the positioning control reference source is o17-02 (user-defined reference source). For example, you can send the position reference through communication and set o17-02 to the related word connector parameter.

Note that only two words can be sent through communication. If the sent position instruction is a double word, use the word-to-double word module to convert two words into a double word, and then set o17-02 to the related double word connector parameter.

Parameter o17-03 (user-defined reference attribute configuration) can also be used to configure the operation characteristics of the user-defined position command. For parameter influence, see *"2.3.1 Main Screen" on page 38*.

4.23.5.4 Positioning Start and Position Direction

You can set parameter o17-07 (positioning start signal source) to the DI or bit connector and set the signal to be active at the rising edge. Parameter o15-00 (position control state) displays the current position control state. The flowchart of position control state switching during positioning start is shown below.

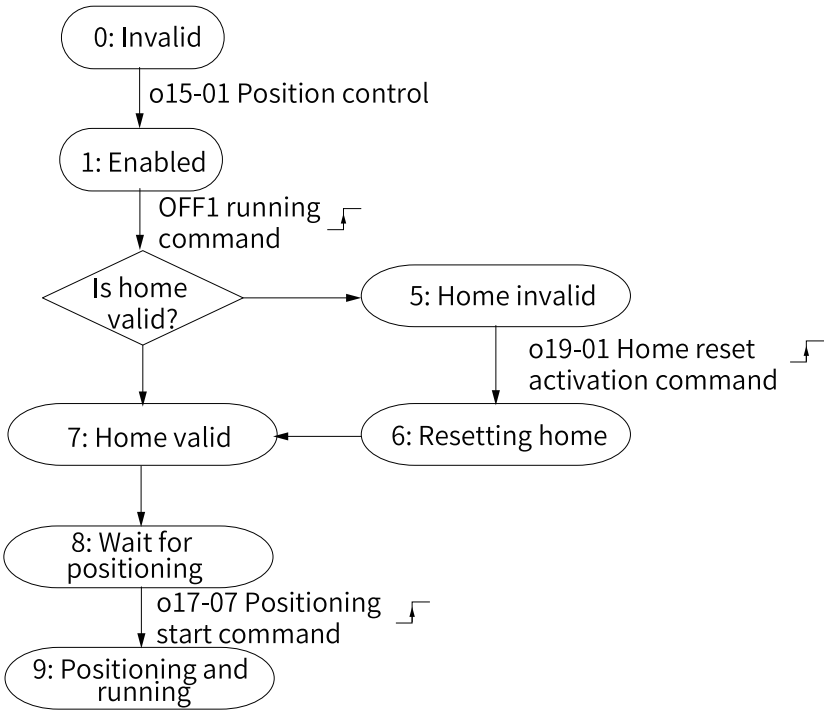


Figure 4-88 Position control state change during positioning start

Note

When o17-01 (main reference source of positioner) is set to multi-position reference and o18-02 (multi-position running mode) is set to loop execution, the position reference will be cyclically executed once the positioning start command is triggered. To stop the execution, cancel the OFF1 running command.

During positioning, when the user retriggers the positioning start command or wants to change the position reference, different activation modes can be configured through the parameters. See o17-09 and o17-10 for details.

Table 4–31 Parameters of positioning and position reference

Parameter Code	Parameter Name	Parameter Bit	Parameter Value	Remarks
o17-09	Positioner function selection	Ones position: Re-positioning when incremental positioning is not completed	0: Start command invalid 1: Perform positioning again based on the current position 2: Add to the unfinished stroke and perform positioning again	
		Tens position: Re-positioning when incremental positioning is completed	0: Add the current error to the stroke upon startup 1: Clear the error upon startup	
o17-10	Position reference activation method	-	0: Activated for a single time when the start command is triggered 1: Continuously effective (absolute positioning) 2: Continuously effective before positioning is completed (absolute positioning)	

During the commissioning of a linear axis application, if the user-given position direction is opposite to the expected operation direction, use parameter o17-17 (reverse linear axis target position) to reverse the target position.

During the commissioning of a rotary axis application, if the user expects the axis to run in the forward or reverse direction all the time or to turn to the target position in the nearest direction, set parameter o17-16 (rotary axis running direction) accordingly.

4.23.5.5 Position Control Pause

Configure the triggering source for the position control pause command through parameter o15-02 (position control pause source). When this function is triggered by the rising edge of the signal, the speed is reduced to 0 based on the deceleration time for the ramp function generator, and the current positioning is ended. After the pause command is removed, repositioning requires retriggering the positioning start command. The position control state change flowchart for pause triggered during positioning is shown below.

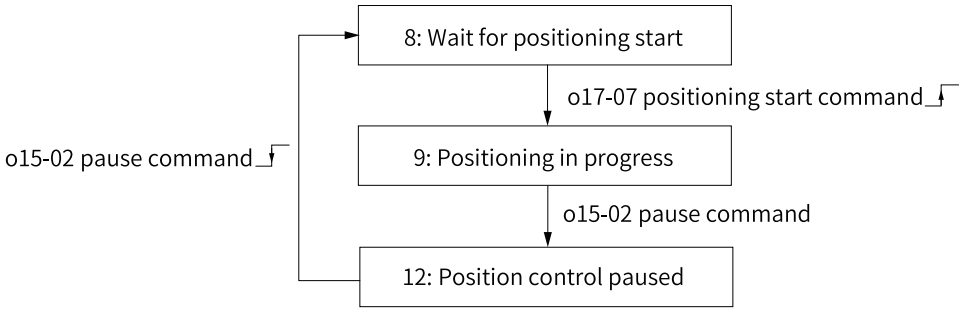


Figure 4-89 Position control pause state change flowchart

The following figure shows the position and speed curves when position control is paused.

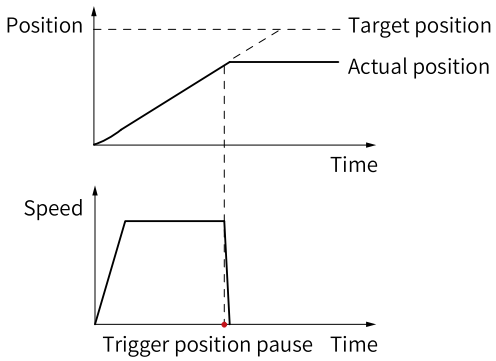


Figure 4-90 Position and speed curves for position control pause

4.23.5.6 Positioning Interruption

With the position control enabled, after the positioning interruption command is triggered, the current operation state is interrupted (regardless of whether the current state is waiting for positioning or positioning in progress) and the position command set by positioning interruption will be executed. The flowchart of position control state change during positioning interruption is shown below.

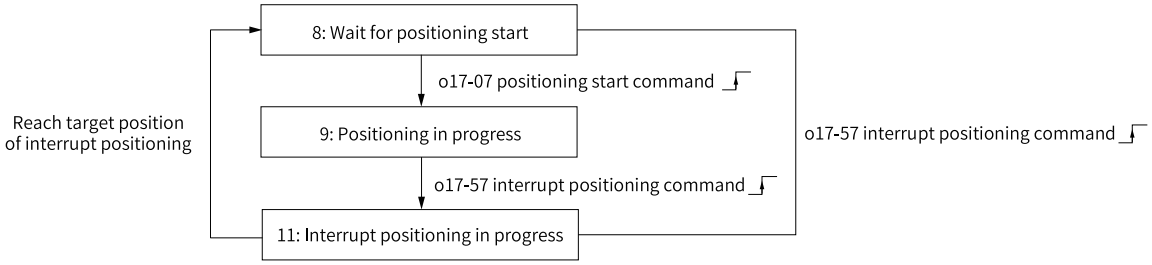


Figure 4-91 Flowchart of position control state change during positioning interruption

Parameter o17-57 (positioning interruption signal source) is used to configure the trigger command source. Parameter o17-59 (position reference source of positioning interruption) can be set directly by o17-60 or given by the connector. Parameter o17-58 (positioning interruption attribute configuration) can be used to configure the operation characteristics of the positioning interruption position command.

4.23.6 Position Loop Parameters

Before optimizing the position controller, ensure that the AC drive speed control has been optimized. Only after the speed controller is tuned, the optimal dynamic response and control accuracy of position control be achieved. The following figure shows the position controller within the AC drive.

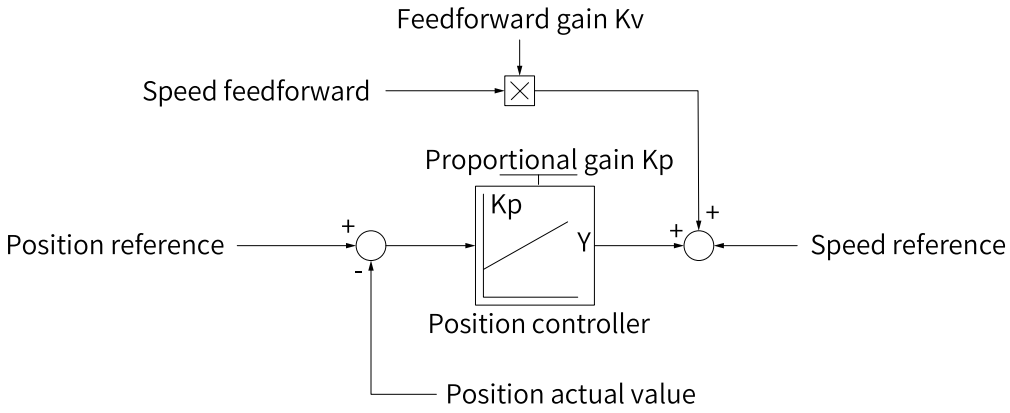


Figure 4-92 Position controller

The AC drive provides two sets of position loop parameters, as shown in the following table. Position loop 1 or position loop 2 can be activated through parameters or switched based on deviations. Position loop 1 is activated by default. Bit 10 to bit 11 of U17-01 (position controller status word 1) can be used to determine the current effective position loop. 0 indicates position loop 1, 1 indicates position loop 2, and 2 indicates the change position loop.

Table 4–32 Position loop parameters

Parameter Code	Parameter Name	Parameter Value	Remarks
o15-27	Position loop switchover function selection	0: Determined by position loop selection 1: Switched based on position deviation	
o15-28	Position loop selection	0: Position loop 1 1: Position loop 2 Other: B connector	
o15-29	Position loop switchover position deviation 1	0 LU to 65535 LU	
o15-30	Position loop switchover position deviation 2	0 LU to 65535 LU	
o15-31	Position loop Kp 1	0.00 to 100.00	
o15-32	Position loop Kp 2	0.00 to 100.00	

The proportional gains of the two position loops can be adjusted by parameters o15-31 and o15-32, respectively. Increasing the proportional gain Kp of the position loop can improve the dynamic response speed of the position controller. However, for equipment with low stiffness, the increase in the proportional gain may lead to vibration of the mechanical equipment.

Similarly, increasing the speed feedforward gain Kv can also improve the dynamic response speed, but it may lead to overshoot or equipment vibration. Therefore, adjust the feedforward gain gradually.

For most field applications, the default values of the preceding parameters can meet the field requirements. However, if the default value of the gain parameter fails to meet the field application requirements, you can manually optimize the parameter based on the real-time position deviation and other characteristics.

4.23.7 Limit Function

4.23.7.1 Limit Function

For fixed stroke applications such as hoisting, the operating range must be limited to prevent the device from running out of range or hitting equipment on either end. The controller provides hard limit and soft limit. When the running stroke exceeds the limit, the corresponding action will be taken and a fault or warning will be reported. The following figure shows the limit application which ensures that the equipment moves between the left and right limits.

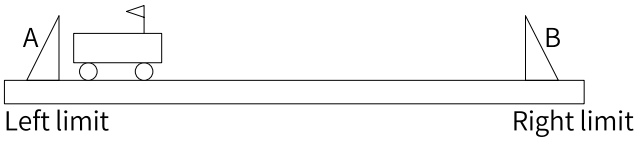


Figure 4-93 Limit application

4.23.7.2 Hard Limit

A limit switch is placed in the limit position and the digital switch signal fed back by the limit switch is connected to the controller. Parameters L13-00 to L13-03 provide two groups of forward and reverse hard limit functions. You can configure the function as needed. The limit function is activated at the rising edge.

When the limit switch is crossed during operation, the limit status will be activated and warning 189 is reported. In this case, the controller takes action according to parameters L13-04 and L13-05. The following four actions are available.

- Coast to stop: The output is inhibited immediately, but the shaft continues running for some distance due to inertia.
- Decelerate to stop: The speed is reduced to zero and the drive stops according to the effective deceleration time of the ramp function generator.
- OFF3 stop mode: The drive stops as specified by parameter E1-16.
- Decelerate to zero speed and run at zero speed: The drive decelerates to zero speed and runs at zero speed based on the deceleration time set by L13-07.

Note

When the limiting status is activated, the drive must run reversely into the hardware limit switch range to reset the limiting status.

4.23.7.3 Soft Limit

When the home is confirmed to be valid, the system compares the real-time position feedback of the controller with the limit and takes corresponding actions if the actual position exceeds the limit. This process is called soft limit. The prerequisite for using soft limit is that homing has been performed.

The soft limit function can be enabled or disabled through parameter o17-61. The limits are set by parameters o17-62 and o17-63. The unit is consistent with the position reference UU given by the host controller.

The action mode of the soft limit is set by parameter L13-06. The available actions are the same as the four actions for hard limit.

The following table compares the hard limit with the soft limit.

Table 4–33 Comparison between hard limit and soft limit

Hard Limit		Soft Limit	
1	Only linear operation and single-turn rotating movement are supported.	1	Linear operation, and single-turn or multi-turn rotating applications are supported.
2	External mechanical limit switch are required.	2	Hardware wiring is not required, preventing malfunction due to poor cable connection.
3	Mechanical slip cannot be detected..	3	Internal position comparison can prevent malfunction due to mechanical slip.

4.23.8 State Monitoring

4.23.8.1 Target Position Approach

The target position approach flag bit indicates that the distance between the current actual position and the target position is shorter than the threshold. The flag bit can be viewed through connector U20-18 (target position approach) to help the host controller take the next action. The judgment threshold and time can be set through the following parameters.

Table 4–34 Target position approach parameters

Parameter Code	Parameter Name	Range	Default
o17-66	Target position approach judgment threshold	0 LU to 2147483647 LU	500 LU
o17-67	Target position approach judgment time	0-60000 ms	10 ms

4.23.8.2 Positioning Completion

The positioning completion flag bit indicates that the current position has reached the target position. The flag bit can be viewed through connector U20-19 (positioning completion) to help the host controller take the next action. The threshold and time of the judgment can be set through the following parameters. Judgment for positioning completion timeout starts from the time when the

positioning motion curve has been planned. Theoretically, for a control system with good following performance, the positioning process ends once the positioning curve has been planned. If the timeout duration is exceeded, a fault will be reported.

Table 4–35 Positioning completion parameters

Parameter Code	Parameter Name	Range	Default
o15-52	Threshold of positioning completion	0 LU to 2147483647 LU	10 LU
o15-53	Positioning completion judgment time	0-60000 ms	4 ms
o15-54	Positioning completion timeout	0s to 600.00s	5s

4.23.8.3 Excessive Position Deviation

The excessive position deviation flag bit indicates that the deviation between the reference and the feedback of the position controller is excessive. The flag bit can be viewed through connector U20-20 (excessive position deviation). If the position deviation exceeds the deviation threshold for a period longer than the judgment time, a fault will be reported. The following figure shows the position deviation.

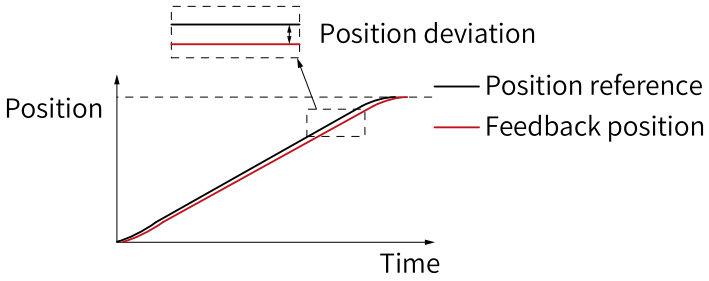


Figure 4-94 Position deviation

Solution to excessive position deviation:

- Check whether the encoder position value is increased/decreased with the value of U29-00 (current absolute position).
- Adjust the gain of the position controller to improve the dynamic response speed of the position controller.
- Set filtering for position references.
- Increase the position deviation detection threshold.

The parameters related to excessive position deviation are as follows:

Table 4–36 Parameters related to excessive position deviation

Parameter Code	Parameter Name	Value	Default
o15-49	Detection threshold for excessive position deviation	0 LU to 2147483647 LU	600 LU
o15-50	Detection time for excessive position deviation	0s to 600.00s	0.5s

4.23.9 Position Compensation

There are two types of position compensation: absolute position compensation and position deviation compensation. The related parameters are as follows.

Table 4–37 Position compensation parameters for positioning control

Parameter Code	Parameter Name	Range	Remarks
o16-07	Position compensation input type	0: Position deviation value 1: Absolute position value	/
o16-08	Position compensation input source	0: 0 Other: K connector	/
o16-09	Position compensation trigger command		/
o16-10	Trigger command source transmission delay	0-128 ms	/
o16-11	Numerator of position deviation compensation conversion coefficient	1 to 65535	/
o16-12	Denominator of position deviation compensation conversion coefficient	1 to 65535	/
o16-13	Position deviation compensation linear change time	0-65000 ms	/

Absolute position value compensation: The signal from the proximity switch is detected during operation. The position of the proximity switch is measured in advance and fixed to an absolute position value. After the proximity switch is reached during movement, the current absolute position value is corrected and compensated once . The following figure shows the absolute position compensation. For example, the absolute position of the proximity switch is defined as 10000 LU, that is, the value of the position compensation input source is 10000 LU. If the current absolute position is 9900 LU, then 10 LU will be compensated to the current absolute position at the proximity switch.

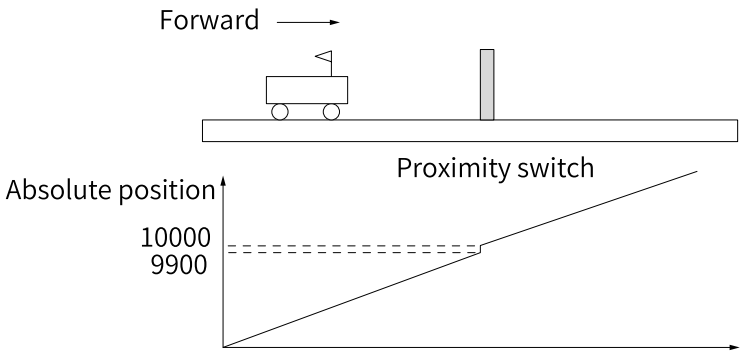


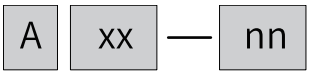
Figure 4-95 Absolute position compensation

Position deviation compensation is used to compensate the difference between the reference and the feedback of the position controller. Note that longer linear change time of position deviation compensation means a smaller actual speed fluctuation during the change time. This is because the total deviation compensation value compensates the deviation evenly during the change time.

5 Parameter Description

5.1 Parameter Categories

Parameters of the MD580 are grouped by function and displayed in three levels of menus, as shown below:



- A indicates the level-1 menu, which is represented by one letter and corresponds to a group of complete functions.
- xx indicates the number of the level-2 menu, which is represented by one or two digits. It combines with the level-1 menu to indicate a group of specific functions.
- nn indicates the number of the level-3 menu, which is represented by two digits. It combines with the level-1 or level-2 menu to indicate a specific parameter.

The level-2 menu and the level-3 menu are separated by "-" for the communication purpose, or by"." for display on LEDs. Axx-nn and Axx.nn indicate the same parameter.

The following table shows the menu classification of parameters.

Level-1 Menu	Name of Level-1 Menu	Level-2 Menu	Name of Level-2 Menu	Remarks
A	System	A0	Status monitoring	Common variables for monitoring the motor running status
		A1	Fault and alarm	It displays the currently activated fault and alarm codes.
		A2	Drive information	It displays rated module parameters and software version.
		A4	Power unit control	It is used to set the carrier frequency and dead zone compensation or select the fan running control mode.
		A5	Brake control	-
		A6	Power supply unit control	-
		A7	System scheduling	-
		A8	Environment setting	It is used to reset, back up, and restore parameters, and set the parameter access level.
		A9	Data set selection	It is used to switch the command channels, motor data sets, and process parameter groups.
		A10	Operating panel/ Repeater communication	It is used to set communication parameters through the operating panel (including using a repeater to connect to the InoDriveStudio).
		A13	Black box	It is used to record the data when a user-defined fault occurs or customize the trigger condition.
b	Control channel	b0	Start/Stop control word settings of channel 1	It is used to set the start/stop control word when control channel 1 is active.
		b1	Other control word settings of channel 1	It is used to set the control word when control channel 1 is active.
		b2	Start/Stop control word reference of channel 2	It is used to set the start/stop control word when control channel 2 is active.
		b3	Other control word reference of channel 2	It is used to set the control word when control channel 2 is active.
		b4	Terminal start/stop module	It is used to set the start/stop mode in the DI terminal control mode.
		b5	Auto-tuning/Self-test	It is used to set the self-check or auto-tuning request.

Level-1 Menu	Name of Level-1 Menu	Level-2 Menu	Name of Level-2 Menu	Remarks
C	Reference channel	C0	Speed reference set through channel 1	It is used to set the primary and secondary speed and supplementary speed when channel 1 is active.
		C1	Torque reference set through channel 1	It is used to set the torque reference, supplementary torque reference, and torque ramp time when channel 1 is active.
		C2	Jog speed set through channel 1	It is used to set the jog speed.
		C3	Speed reference set through channel 2	It is used to set the primary and secondary speed and supplementary speed when channel 2 is active.
		C4	Torque reference set through channel 2	It is used to set the torque reference, supplementary torque reference, and torque ramp time when channel 2 is active.
		C5	Jog speed set through channel 2	It is used to set the jog speed.
		C6	Multi-reference	Sixteen fixed references can be set.
		C7	Motorized potentiometer	It is used to set the parameters of the motorized potentiometer.
		C8	Ramp function generator	It is used to set the parameters of the ramp function generator.
d	Motor parameter	d0	Basic motor parameter	It is used to set the rated motor parameter.
		d1	Basic tuned parameter	It refers to the basic tuned motor parameter.
		d2	Additional auto-tuning parameter	It refers to the parameter related to motor mechanical features.
		d3	Base value information	Base values used for system per-unit values
E	Motor control	E0	Control setting	-
		E1	Start/Stop control	-
		E2	Limit	-
		E3	V/f control	-
		E4	Speed regulator	-
		E5	Current regulator	-
		E6	Excitation control	-
		E7	Flying start	-
		E8	Protection	-
		E9	Vdc control	-
		E11	Motor model	-
F	Input/Output (I/O)	F0	DI	-
		F1	DO	-
		F2	AI	-
		F3	AO	-
		F4	HDI	-
		F5	HDO	-
		F6	Temperature detection	
		F7	Expanded I/O module	

Level-1 Menu	Name of Level-1 Menu	Level-2 Menu	Name of Level-2 Menu	Remarks
H	Fault and protection	H0	Troubleshooting	-
		H1	Fault protection level	-
		H2	Current fault record	-
		H3	Latest fault record	-
		H4	Second latest fault record	-
		H5	Third latest fault record	-
		H6	Fourth latest fault record	-
		H7	Fifth latest fault record	-
		H10	User-defined fault word	-
L	Application function	L0	Auxiliary function	-
		L1	Brake control	-
		L4	Process PID	-
		L8	Parameter monitoring and modification	-
		L9	Constant setting module	-
		L10	Word-to-bit conversion	-
		L11	Word-to-double word conversion	-
		L12	Logic function	-
		L13	Arithmetic function 1	-
		L14	Arithmetic function 2	-
		L15	Switch function	-
		L16	Control function	-
		L17	Multi-point curve	-
		L19	Limit function	-
		L20	Energy conservation statistics	-

Level-1 Menu	Name of Level-1 Menu	Level-2 Menu	Name of Level-2 Menu	Remarks
n	Bus adapter and expansion module	n0	InoLink communication	It is used to implement peer-to-peer communication between MD580 AC drives for load distribution or master-slave control.
		n1	On-board Modbus RTU communication	It is used to implement on-board functions of the control board and supports communication with external Modbus RTU devices.
		n2	Fieldbus adapter A	It is used to set receiving and sending of communication data.
		n3	Fieldbus adapter B	
		n5	Encoder 1 configuration	It is used to set encoder 1 and measure the motor speed.
		n6	Encoder 2 configuration	It is used to set encoder 2 and measure the motor speed.
		n10	Modbus RTU module	It is used to set the slot and parameters for the communication module.
		n12	CANopen module	
		n14	EtherCAT module	
		n16	PROFIBUS DP module	
		n17	PROFINET IO module	
		n18	Customized communication module	Other communication modules use this parameter group for settings.
o	Process parameter	o15	Position controller	-
		o17	Positioning control	-
		o18	Multi-position reference	-
		o19	Homing	-
U	Connector	U0 and U29	-	It is the read-only parameter, which can be used to view the status of inputs, outputs, and program execution, or used as inputs for reference source parameters

5.2 Parameter List

5.2.1 Group A: System

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A0: Status Monitoring						
A0-00	Current state machine	0: Invalid 1: System initialization 2: Power-on check 3: Fault 4: Switch-on blocked 5: Ready to switch on 6: Pre-charge 7: Ready to run 8: Waiting for demagnetization 9: Detection before operation 10: Pre-excitation 11: Flying start 12: Running 13: Decelerate to stop 14: Quick stop 15: DC braking at startup	-	0	Unchangeable	16737
A0-00	Current state machine	16: Ready for self test 17: Self test in progress 18: Ready for auto-tuning 19: Auto-tuning in progress 20: Parameter restoration 21: Parameter download 22: Jogging 25: DC braking at stop 26: Waiting for DC braking at stop 27: Stop at maximum capability 28: Motor parameter calculation 29: Switchover between speed control and torque control 30: Waiting for heat dissipation	-	0	Unchangeable	16737
A0-03	RFG speed reference	-	RPM	-	Modification prohibited	16744
A0-04	Motor speed reference	-	RPM	-	Modification prohibited	16743

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A0-05	Actual motor speed	-	RPM	-	Modification prohibited	16745
A0-09	RFG frequency reference	-	Hz	-	Modification prohibited	16741
A0-10	Motor frequency reference	-	Hz	-	Modification prohibited	16740
A0-11	Actual motor frequency	-	Hz	-	Modification prohibited	16742
A0-15	Output voltage	-	V	-	Modification prohibited	16746
A0-16	Output current	-	A	-	Modification prohibited	16747
A0-17	Output torque	-	%	-	Modification prohibited	16748
A0-18	Output power	-	kW	-	Modification prohibited	16749
A0-21	DC bus voltage	-	V	-	Modification prohibited	16750
A0-22	Module temperature	-	°C	-	Modification prohibited	16751
A0-24	Current motor data set (MDS)	0: Motor parameter group 1 1: Motor parameter group 2 2: Motor parameter group 3 3: Motor parameter group 4	-	-	Modification prohibited	16734
A0-25	Current control channel	0: Control channel 1 1: Control channel 2	-	-	Modification prohibited	16735
A0-26	Current reference channel	0: Reference channel 1 1: Reference channel 2	-	-	Modification prohibited	16736

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A0-30	Abnormality prompt type	0: None 1: OFF1/Jog command not cleared. Switch-on blocked. 2: OFF2 activated. Switch-on blocked. 3: OFF3 activated. Switch-on blocked. 4: Running permission command set to 0. The drive is ready to run. 9: STO1/STO2 activated 18: Performance running is not permitted. Switch-on blocked. 19: Hibernation activated. The drive is ready to run. 20: Parameters under operation. Switch-on blocked.	-	-	Modification prohibited	16782
A0-32	Battery voltage detection	-	V	-	Modification prohibited	16507
A0-33	Internal 5 V voltage detection value 1	-	V	-	Modification prohibited	16509
A0-34	Internal 10 V voltage detection value 1	-	V	-	Modification prohibited	16508
A0-35	Internal 5 V voltage detection value 2	-	V	-	Modification prohibited	16510
A0-36	Internal 1.2 V voltage detection value 1	-	V	-	Modification prohibited	16506
A1: Fault and Warning						
A1-00	Code of current fault 1	-	-	-	Modification prohibited	16440
A1-01	Subcode of current fault 1	-	-	-	Modification prohibited	16441
A1-02	Information of current fault 1	-	-	-	Modification prohibited	16442
A1-03	Code of current fault 2	-	-	-	Modification prohibited	16443
A1-04	Subcode of current fault 2	-	-	-	Modification prohibited	16444
A1-05	Information of current fault 2	-	-	-	Modification prohibited	16445
A1-06	Code of current fault 3	-	-	-	Modification prohibited	16446
A1-07	Subcode of current fault 3	-	-	-	Modification prohibited	16447

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A1-08	Information of current fault 3	-	-	-	Modification prohibited	16448
A1-09	Code of current fault 4	-	-	-	Modification prohibited	16449
A1-10	Subcode of current fault 4	-	-	-	Modification prohibited	16450
A1-11	Information of current fault 4	-	-	-	Modification prohibited	16451
A1-12	Code of current fault 5	-	-	-	Modification prohibited	16452
A1-13	Subcode of current fault 5	-	-	-	Modification prohibited	16453
A1-14	Information of current fault 5	-	-	-	Modification prohibited	16454
A1-15	Code of current fault 6	-	-	-	Modification prohibited	16455
A1-16	Subcode of current fault 6	-	-	-	Modification prohibited	16456
A1-17	Information of current fault 6	-	-	-	Modification prohibited	16457
A1-18	Code of current minor fault 1	-	-	-	Modification prohibited	16476
A1-19	Subcode of current minor fault 1	-	-	-	Modification prohibited	16477
A1-20	Information of current minor fault 1	-	-	-	Modification prohibited	16478
A1-21	Code of current minor fault 2	-	-	-	Modification prohibited	16479
A1-22	Subcode of current minor fault 2	-	-	-	Modification prohibited	16480
A1-23	Information of current minor fault 2	-	-	-	Modification prohibited	16481
A1-24	Code of current minor fault 3	-	-	-	Modification prohibited	16482
A1-25	Subcode of current minor fault 3	-	-	-	Modification prohibited	16483
A1-26	Information of current minor fault 3	-	-	-	Modification prohibited	16484
A1-27	Code of current minor fault 4	-	-	-	Modification prohibited	16485
A1-28	Subcode of current minor fault 4	-	-	-	Modification prohibited	16486

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A1-29	Information of current minor fault 4	-	-	-	Modification prohibited	16487
A1-30	Code of current minor fault 5	-	-	-	Modification prohibited	16488
A1-31	Subcode of current minor fault 5	-	-	-	Modification prohibited	16489
A1-32	Information of current minor fault 5	-	-	-	Modification prohibited	16490
A1-33	Code of current minor fault 6	-	-	-	Modification prohibited	16491
A1-34	Subcode of current minor fault 6	-	-	-	Modification prohibited	16492
A1-35	Information of current minor fault 6	-	-	-	Modification prohibited	16493
A1-36	Code of current warning 1	-	-	-	Modification prohibited	16458
A1-37	Subcode of current warning 1	-	-	-	Modification prohibited	16459
A1-38	Information of current warning 1	-	-	-	Modification prohibited	16460
A1-39	Code of current warning 2	-	-	-	Modification prohibited	16461
A1-40	Subcode of current warning 2	-	-	-	Modification prohibited	16462
A1-41	Information of current warning 2	-	-	-	Modification prohibited	16463
A1-42	Code of current warning 3	-	-	-	Modification prohibited	16464
A1-43	Subcode of current warning 3	-	-	-	Modification prohibited	16465
A1-44	Information of current warning 3	-	-	-	Modification prohibited	16466
A1-45	Code of current warning 4	-	-	-	Modification prohibited	16467
A1-46	Subcode of current warning 4	-	-	-	Modification prohibited	16468
A1-47	Information of current warning 4	-	-	-	Modification prohibited	16469
A1-48	Code of current warning 5	-	-	-	Modification prohibited	16470
A1-49	Subcode of current warning 5	-	-	-	Modification prohibited	16471

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A1-50	Information of current warning 5	-	-	-	Modification prohibited	16472
A1-51	Code of current warning 6	-	-	-	Modification prohibited	16473
A1-52	Subcode of current warning 6	-	-	-	Modification prohibited	16474
A1-53	Information of current warning 6	-	-	-	Modification prohibited	16475
A2: Drive Information						
A2-00	Product type	0: MD580	-	-	Modification prohibited	16512
A2-01	Module rated power	-	kW	-	Modification prohibited	16513
A2-02	Module rated voltage	-	V	-	Modification prohibited	16514
A2-03	Module rated current	-	A	-	Modification prohibited	16515
A2-04	Overload reference current	-	A	-	Modification prohibited	16516
A2-07	Software type	0: Standard software 1: Customized software 2: Temporary software	-	-	Modification prohibited	16536
A2-08	ARM function software version	-	-	-	Modification prohibited	16537
A2-09	ARM function software sub-version	-	-	-	Modification prohibited	16538
A2-10	DSP performance software version	-	-	-	Modification prohibited	16539
A2-12	DSP function software version	-	-	-	Modification prohibited	16541
A2-14	Parameter version	-	-	-	Modification prohibited	16545
A2-16	STO function version	-	-	-	Modification prohibited	16543

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A2-29	Type of module in expansion slot 1_1	0: No expansion card 112: PROFIBUS DP module 113: CANopen module 115: Modbus RTU module 116: Modbus TCP module 117: PROFINET IO module 118: EtherCAT module 125: Customized communication module	-	-	Modification prohibited	16608
A2-30	Software version of expansion slot 1_1	-	-	-	Modification prohibited	16611
A2-31	Type of module in expansion slot 1_2	0: No expansion card 112: PROFIBUS DP module 113: CANopen module 115: Modbus RTU module 116: Modbus TCP module 117: PROFINET IO module 118: EtherCAT module 125: Customized communication module	-	-	Modification prohibited	16609
A2-32	Software version of expansion slot 1_2	-	-	-	Modification prohibited	16612
A2-33	Type of module in expansion slot 1_3	0: No expansion card 112: PROFIBUS DP module 113: CANopen module 115: Modbus RTU module 116: Modbus TCP module 117: PROFINET IO module 118: EtherCAT module 125: Customized communication module	-	-	Modification prohibited	16610
A2-34	Software version of expansion slot 1_3	-	-	-	Modification prohibited	16613
A2-36	Type of communication encoder detection module	4: MD580-PG-AR1 (sin-cos + SSI encoder) 12: MD580-PG-AU1 (ABZ + SSI encoder)	-	-	Modification prohibited	16673
A2-37	Version of communication encoder detection module	-	-	-	Modification prohibited	16672
A2-38	Expansion card type	0: No expansion card 1: No expansion card 2: HSMT-10 card 3: No expansion card 17: I/O expansion card (MD580-IO-M1)	-	-	Modification prohibited	16632

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A2-39	Software version of I/O expansion card	-	-	-	Modification prohibited	16631
A2-40	Current system year	-	-	-	Modification prohibited	16494
A2-41	Current system date	-	-	-	Modification prohibited	16500
A2-42	Current system hour and minute	-	-	-	Modification prohibited	16501
A2-43	Current system second	-	-	-	Modification prohibited	16499
A2-44	Year of system power-on	-	-	-	Modification prohibited	16502
A2-45	Date of system power-on	-	-	-	Modification prohibited	16503
A2-46	Hour and minute of system power-on	-	-	-	Modification prohibited	16504
A2-47	Second of system power-on	-	-	-	Modification prohibited	16505
A2-48	Current control power-on duration	-	s	-	Modification prohibited	29060
A2-50	Current mains power-on duration	-	s	-	Modification prohibited	29064
A2-51	Current running duration	-	s	-	Modification prohibited	29066
A2-52	Accumulative mains power-on duration	-	s	-	Modification prohibited	29068
A2-53	Accumulative running duration	-	s	-	Modification prohibited	29070
A2-60	System time setting - year	2021 to 2099	-	2021	At once	577
A2-61	System time setting - month	1–12	-	10	At once	578
A2-62	System time setting - day	1 to 31	-	1	At once	579
A2-63	System time setting - hour (24h)	0 to 23	-	23	At once	580
A2-64	System time setting - minute	0 to 59	-	59	At once	581
A2-65	System time setting - second	0 to 59	-	30	At once	582
A2-66	System time setting confirmation	0: Invalid 1: Valid	-	0	At once	16607
A4: Power Unit Control						
A4-00	Max. carrier frequency	-	kHz	-	Modification prohibited	16639

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A4-01	Actual effective carrier frequency	-	kHz	-	Modification prohibited	16640
A4-02	Carrier frequency reference	0.8 to 12.0	kHz	6.0	At once	504
A4-03	Carrier frequency change with temperature	0: Disable 1: Enable	-	0	At once	512
A4-09	DPWM switchover frequency	0.00 to 300.00	Hz	12.0	At once	507
A4-10	PWM modulation pattern	0: Asynchronous modulation 1: Synchronous modulation	-	0	At once	513
A4-11	Overmodulation (reserved)	0: Disable 1: Enable	-	0	At once	514
A4-13	Random PWM	0 to 10	-	0	At once	508
A4-14	Cut-off frequency for dead zone compensation	0.1 to 200.0	%	50.0	At once	4220
A4-15	Dead zone compensation coefficient	0.1 to 150.0	%	94.0	At once	571
A4-16	Dead zone compensation function	0: Disable 1: Mode 1 2: Mode 2	-	2	At once	516
A4-21	Pulse-by-pulse current limit	0: Disable 1: Enable	-	1	At once	517
A4-23	DC bus undervoltage threshold	350.0 to 455.0	V	410.0	At stop	510
A4-24	Adjustment coefficient of DC bus undervoltage threshold	0: 100% Other: K connector	-	0	At stop	501
A4-25	DC bus overvoltage threshold	410.0 to 820.0	V	800.0	At stop	511
A4-26	Adjustment coefficient of DC bus overvoltage threshold	0: 100% Other: K connector	-	0	At stop	502
A4-27	Overload prevention	0: Disable 1: Enable	-	0	At once	505
A4-28	Overload mode	1: Light overload 2: Heavy overload	-	2	At stop	503
A4-29	Fan control mode	0: Auto operating 1: Forcible start after power-on	-	0	At once	78
A4-32	DPWM switchover	0: Disable 1: Enable	-	1	At once	76
A4-33	Carrier frequency reduction	0: Disable 1: Enable	-	0	At once	77
A4-35	Module pre-overtemperature threshold	1 to 80	°C	5	At once	80

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A4-36	Module low-temperature detection value	-20 to +30	°C	-15	At once	81
A4-39	Actual effective value of DC bus undervoltage threshold	-	V	-	Modification prohibited	16667
A4-40	Actual effective value of DC bus overvoltage threshold	-	V	-	Modification prohibited	16668
A4-48	Modulation ratio limit	0: Disable 1: Enable	-	0	At once	4285
A4-49	Modulation ratio limit coefficient	70 to 100	%	90	At once	4286
A5: Brake Control						
A5-01	Braking self-test	0: Disable 1: Enable	-	0	At once	583
A5-02	Brake usage rate	0 to 100	%	100	At once	584
A5-03	Braking action start voltage	600.0 to 850.0	V	760	At once	506
A5-04	Actual effective value of braking action start voltage	-	V	-	Modification prohibited	16669
A6: Power Supply Unit Control						
A6-00	Power supply unit control	0: Disable 1: Enable	-	0	At once	567
A6-01	Pre-charge timeout interval	0.0 to 100.0	s	10.0	At once	568
A6-02	Pre-charge completion input source	0: Invalid 1: Valid Other: B connector	-	1	At stop	496
A6-03	Validity detection time for pre-drive input completion	0.0 to 100.00	s	0.00	At once	497
A7: System Scheduling						
A7-00	Max. scheduling interval for tasks triggered every 0.5 ms	-	us	-	Modification prohibited	16840
A7-01	Current scheduling interval for tasks triggered every 0.5 ms	-	us	-	Modification prohibited	16837
A7-02	Maximum execution time for tasks triggered every 0.5 ms	-	us	-	Modification prohibited	16839
A7-03	Current execution time for tasks triggered every 0.5 ms	-	us	-	Modification prohibited	16836
A7-04	Number of scheduling times for tasks triggered every 0.5 ms	-	-	-	Modification prohibited	16838
A7-05	Maximum scheduling interval for tasks triggered every 1 ms	-	us	-	Modification prohibited	16618
A7-06	Current scheduling interval for tasks triggered every 1 ms	-	us	-	Modification prohibited	16615

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A7-07	Maximum execution time for tasks triggered every 1 ms	-	us	-	Modification prohibited	16617
A7-08	Current execution time for tasks triggered every 1 ms	-	us	-	Modification prohibited	16614
A7-09	Number of scheduling times for tasks triggered every 1 ms	-	-	-	Modification prohibited	16616
A7-10	Maximum scheduling interval for tasks triggered every 2 ms	-	us	-	Modification prohibited	16623
A7-11	Current scheduling interval for tasks triggered every 2 ms	-	us	-	Modification prohibited	16620
A7-12	Maximum execution time for tasks triggered every 2 ms	-	us	-	Modification prohibited	16622
A7-13	Current execution time for tasks triggered every 2 ms	-	us	-	Modification prohibited	16619
A7-14	Number of scheduling times for tasks triggered every 2 ms	-	-	-	Modification prohibited	16621
A7-15	Maximum scheduling interval for tasks triggered every 16 ms	-	us	-	Modification prohibited	16628
A7-16	Current scheduling interval for tasks triggered every 16 ms	-	us	-	Modification prohibited	16625
A7-17	Maximum execution time for tasks triggered every 16 ms	-	us	-	Modification prohibited	16627
A7-18	Current execution time for tasks triggered every 16 ms	-	us	-	Modification prohibited	16624
A7-19	Number of scheduling times for tasks triggered every 16 ms	-	-	-	Modification prohibited	16626
A7-26	Scheduling interval for tasks trigger every 0.5 ms on DSP side	-	us	-	Modification prohibited	16841
A7-30	Execution time for tasks trigger every 2 ms on DSP side	-	us	-	Modification prohibited	16845
A7-31	Execution time for ADC tasks on DSP side	-	us	-	Modification prohibited	16847
A7-36	Number of tasks stored at power-off	-	-	-	Modification prohibited	16629
A7-37	Number of parameter processing tasks	-	-	-	Modification prohibited	16630
A8: Environment Settings						

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A8-00	Parameter operation mode	0: No operation 1: Restore some parameters to default settings. 2: Restore all parameters to default settings. 3: Clear fault records.	-	0	At stop	3731
A8-01	Parameter operation confirmation	0: Cancel 1: Confirm	-	0	At once	3732
A8-02	Parameter access level	0: Monitoring parameters 1: Basic parameters 2: Professional parameters 3: Maintenance parameters	-	1	At once	86
A8-03	Manufacturer password	0 to 65535	-	0	At once	87
A8-05	Parameter backup function selection	0: No operation 1: Back up current parameters to the internal memory. 2: Restore parameters from the internal memory. 3: Verify parameters. 4: Clear parameters that are backed up from the internal memory.	-	0	At stop	3737
A8-06	Parameter backup function confirmation	0: Cancel 1: Confirm	-	0	At stop	3738

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A8-07	Parameter backup status	0: The backup parameter file does not exist. 1: The backup parameter file exists. 30: Backing up parameters 31: Restoring parameters 32: Checking backup parameter file upon power-on 33: Clearing backed up parameters 34: Verifying parameters 35: Saving parameters 50: Internal memory busy 51: The parameter file does not exist. 52: Parameter file abnormal 53: Parameter file type mismatch 54: Parameter file version mismatch 55: Parameter file electronic label mismatch 56: Parameter backup completed 57: Parameter restoration completed 58: Parameter verification succeeded 59: Parameter verification failed 60: Backup parameters cleared 61: Parameter file check upon power-on completed 62: Parameter restoration completed (some parameters fail the restoration) 99: Operation failed	-	-	Modification prohibited	16769
A8-08	Parameter backup prompt	-	-	-	Modification prohibited	16770
A8-11	Time record clearing selection	0: No operation 1: Clear the current running duration. 2: Clear the current mains power-on duration. 3: Clear the accumulative running duration. 4: Clear the accumulative mains power-on duration. 5: Clear the current control power-on duration. 10: Clear all time records.	-	0	At once	3729
A8-12	Confirmation for time record clearing	0: Cancel 1: Confirm	-	0	At once	3730

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A8-20	Motor data set copy mode	0: No operation 1: MDS 1 -> MDS 2 2: MDS 1 -> MDS 3 3: MDS 1 -> MDS 4 4: MDS 2 -> MDS 1 5: MDS 2 -> MDS 3 6: MDS 2 -> MDS 4 7: MDS 3 -> MDS 1 8: MDS 3 -> MDS 2 9: MDS 3 -> MDS 4 10: MDS 4 -> MDS 1 11: MDS 4 -> MDS 2 12: MDS 4 -> MDS 3	-	0	At stop	3735
A8-21	MDS copy confirmation	0: Cancel 1: Confirm	-	0	At stop	3736
A8-22	MDS copy status	0: No operation 1: Save the flag of triggering motor parameter copy. 2: Wait until the flag of triggering motor parameter copy is saved. 3: Copying motor parameters 4: Save motor parameters. 5: Wait until motor parameters are stored. 6: Save the flag of ending motor parameter copy. 50: Motor parameters copied	-	-	Modification prohibited	16576
A8-23	Status of parameter copy through SOP-20	0: No operation 1: Check the electronic label 2: Write the copy mode 3: Confirm the total count 4: Transmitting parameters 5: Parameters transmitted 7: Applying and saving parameters 55: Parameters copied 99: Parameter copy failed	-	-	Modification prohibited	216

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A8-24	Procedure of parameter copy through SOP-20	0: No operation 1: Start parameter transmission 2: Clear the whole sector. 3: Query parameter caches to be saved 4: Save parameters to the flash 5: Save the flag indicating the end of file 6: Save the file head 7: Parameter saved to the flash 100: Start to update parameters 101: Check parameter file heads 102: Check parameter file integrity 103: Read parameters 104: Update parameter values 105: Trigger operations after modifying parameters 106: Save parameters to EEPROM 107: Parameter copy operation ended	-	-	Modification prohibited	16602
A9: Data Set Selection						
A9-00	Control channel	0: Control channel 1 1: Control channel 2 Other: B connector	-	0	At stop	446
A9-02	Reference channel	0: Reference channel 1 1: Reference channel 2 Other: B connector	-	0	At stop	447
A9-04	Bit 0 of MDS selection	0: 0 1: 1 Other: B connector	-	0	At stop	444
A9-05	Bit 1 of MDS selection	0: 0 1: 1 Other: B connector	-	0	At stop	445
A10: Operating Panel/Repeater Communication						
A10-00	Operating panel control	0: Disable 1: Enabled Other: B connector	-	1	At once	167
A10-01	Speed reference source in operating panel control mode	0: UP/DOWN keys on operating panel 1: Reference channel Other: K connector	-	0	At once	168
A10-03	Operating panel/Relay communication address	1 to 64	-	1	At once	149

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A10-04	Operating panel/Relay communication rate	0: 115200 bps 1: 1 Mbps 2: 2 Mbps 3: 4 Mbps	-	0	At once	150
A10-05	Operating panel disconnection detection	0: Disable 1: Enable Other: B connector	-	1	At once	84
A10-06	Detection time of operating panel disconnection	0.5 to 500.0	s	2.0	At once	213
A10-07	Fault reset always enabled in operating panel control	0: Disable 1: Enable	-	1	At once	217
A10-10	Reset source for output by UP/ DOWN key on operating panel	0: Invalid 1: Valid Other: B connector	-	0	At once	223
A10-11	Max. step value set by UP key on SOP-20	0.01 to 100	%	10.00	At once	219
A10-12	Min. step value set by UP key on SOP-20	0.01 to 100	%	0.5	At once	220
A10-13	Max. step value set by DOWN key on SOP-20	0.01 to 100	%	10.00	At once	221
A10-14	Min. step value set by DOWN key on SOP-20	0.01 to 100	%	0.5	At once	222
A10-15	Max. output value set by UP/ DOWN key on operating panel	0: 100% Other: K connector	-	0	At once	224
A10-16	Min. output value set by UP/ DOWN key on operating panel	0: 100% Other: K connector	-	0	At once	225
A10-17	Source of the force command for output by UP/DOWN key on operating panel	0: Invalid 1: Valid Other: B connector	-	0	At once	246
A10-18	Source of the force value for output by UP/DOWN key on operating panel	0: Digital setting Other: K connector	-	0	At once	247
A10-19	Digital setting of the force value for output by UP/DOWN key on operating panel	-	%	0.0	At once	248
A10-20	IDS control	0: Disable 1: Enabled	-	1	At once	215
A10-22	IDS disconnection detection time	0.5 to 500.0	-	5.0	At once	214
A10-23	Fault reset always enabled in IDS control mode	0: Disable 1: Enable	-	-	Modification prohibited	218

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A10-24	Start/Stop command mandatory in LED operating panel remote control mode	0: Invalid 1: Valid Other: B connector	-	0	At once	190
A10-25	UP/DOWN key forcibly enabled in LED operating panel remote control mode	0: Invalid 1: Valid Other: B connector	-	0	At once	191

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A10-30	Parameter selection 1 on home interface when drive is started by LED operating panel	Bit 00: Motor frequency reference 0: Hide 1: Display Bit 01: Actual motor frequency 0: Hide 1: Display Bit 02: Motor speed reference 0: Hide 1: Display Bit 03: Actual motor speed 0: Hide 1: Display (To be continued) Bit 04: Reserved 0: Hide 1: Display Bit 05: RFG frequency reference 0: Hide 1: Display Bit 06: RFG speed reference 0: Hide 1: Display Bit 07: DC bus voltage 0: Hide 1: Display Bit 08: Output voltage 0: Hide 1: Display Bit 09: Output current 0: Hide 1: Display Bit 10: Output torque 0: Hide 1: Display Bit 11: Output power 0: Hide 1: Display	-	0x2383	At once	3724

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A10-30	Parameter selection 1 on home interface when drive is started by LED operating panel	(Continued) Bit 12: Module temperature 0: Hide 1: Display Bit 13: Current state machine 0: Hide 1: Display Bit 14: AI1 voltage 0: Hide 1: Display Bit 15: AI2 voltage 0: Hide 1: Display	-	0x2383	At once	3724
A10-32	Parameter selection 1 on home interface when drive is stopped by LED operating panel	Bit 00: State machine 0: Hide 1: Display Bit 01: RFG frequency reference 0: Hide 1: Display Bit 02: RFG speed reference 0: Hide 1: Display Bit 03: DC bus voltage 0: Hide 1: Display Bit 04: Module temperature 0: Hide 1: Display Bit 05: AI1 proportion 0: Hide 1: Display Bit 06: AI2 proportion 0: Hide 1: Display Bit 07: Reserved 0: Hide 1: Display (To be continued)	-	0x001F	At once	3726

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A10-32	Parameter selection 1 on home interface when drive is stopped by LED operating panel	(Continued) Bit 08: Reserved 0: Hide 1: Display Bit 09: Reserved 0: Hide 1: Display Bit 10: Reserved 0: Hide 1: Display Bit 11: Reserved 0: Hide 1: Display Bit 12: Reserved 0: Hide 1: Display Bit 13: Reserved 0: Hide 1: Display Bit 14: Reserved 0: Hide 1: Display Bit 15: Reserved 0: Hide 1: Display	-	0x001F	At once	3726
A10-40	Frequency reference set through operating panel (Hz)	-	Hz	-	At once	4227
A10-41	Speed reference set through operating panel (RPM)	-	RPM	-	At once	4228
A10-42	Speed reference set through operating panel (%)	-	%	-	At once	4229
A10-43	Start/Stop control by SOP-20	0: SOP-20 valid 1: Control reference channel Other: B connector	-	0	At stop	4230
A10-45	Saving option at power failure in operating panel local or remote control	0: Non-retentive 1: Retentive Other: B connector	-	0	At once	4232
A13: Black Box						

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A13-00	Current black box status	0: Paused 1: Running 2: Triggered 3: Preparing data 4: Storing data to black box 100: No operation 101: Initializing black box 102: Obtain the flash permission 103: Clear black box contents 104: Clear black box data 105: Operation completed 202: Restore black box configuration parameters 203: Save black box configuration parameters 204: Wait until black box configuration parameters are saved 299: Black box parameters restored 2001: Initializing black box storage 2002: Obtain the flash permission 2003: Clear black box data storage area 2004: Clear transmission buffering area 2005: Prepare black box file head data (To be continued)	-	-	Modification prohibited	16771

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A13-00	Current black box status	(Continued) 2006: Save black box file head data 2007: Clear transmission buffering area 2008: Prepare description of data area 1 2009: Save description of data area 1 2010: Prepare records of data area 1 2011: Save records of data area 1 2012: Clear transmission buffering area 2013: Prepare description of data area 2 2014: Save description of data area 2 2015: Prepare records of data area 2 2016: Save records of data area 2 2017: Clear transmission buffering area 2018: Prepare description of the first 32 data in data area 3 2019: Save description of the first 32 data in data area 3 2020: Prepare description of the last 32 data in data area 3 (To be continued)	-	-	Modification prohibited	16771

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A13-00	Current black box status	(Continued) 2021: Save description of the last 32 data in data area 3 2022: Prepare records of data area 3 2023: Save records of data area 3 2024: Clear transmission buffering area 2025: Prepare description of data area 4 2026: Save description of data area 4 2027: Prepare records of data area 4 2028: Save records of data area 4 2029: Clear transmission buffering area 2030: Prepare the flag indicating the end of file 2031: Save the flag indicating the end of file 2032: Prepare the flag indicating that the file exists 2033: Save the flag indicating that the file exists 2034: Prepare to read black box contents 2035: Read black box contents 2036: Clear black box contents 2037: Clear black box transmission buffer 2038: Prepare contents data 2039: Save contents data 2040: Clear all contents information 2050: Black box storage completed	-	-	Modification prohibited	16771
A13-01	Black box reset function	0: No operation 1: Clear all black box records 2: Restore black box configuration parameters	-	0	At once	3722
A13-02	Black box reset confirmation	0: Cancel 1: Confirm	-	0	At once	3723

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A13-03	Configuration mode of user-defined triggering condition	0: Disable all user-defined triggering conditions 1: Enable only user-defined triggering condition 1 2: Enable only user-defined triggering condition 2 3: Two triggering conditions logic AND 4: Two triggering conditions logic OR 5: Two triggering conditions logic XOR	-	0	At once	3624
A13-04	Mode of user-defined triggering condition 1	0: Analog comparison 2: Digital triggering 3: State machine comparison	-	0	At once	3625
A13-05	Analog comparison mode of user-defined triggering condition 1	0: Greater than (>) 1: Less than (<) 2: Equal to (=) 3: Greater than or equal to (≥) 4: Less than or equal to (≤)	-	0	At once	3628
A13-06	Analog source of user-defined triggering condition 1	0: Disabled Other: K connector	-	0	At once	3626
A13-07	Analog comparison value of user-defined triggering condition 1	0: Disabled Other: K connector	-	0	At once	3627
A13-08	Digital triggering mode of user-defined triggering condition 1	0: Rising edge (0 -> 1) 1: Falling edge (1 -> 0) 2: Edge (0 ->1 or 1 -> 0) 3: Logic 1 4: Logic 0	-	0	At once	3630
A13-09	Digital source of user-defined triggering condition 1	0: Disabled Other: B connector	-	0	At once	3629
A13-10	State machine comparison mode of user-defined triggering condition 1	0: Greater than (>) 1: Less than (<) 2: Equal to (=) 3: Greater than or equal to (≥) 4: Less than or equal to (≤)	-	0	At once	3631

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A13-11	State machine comparison value of user-defined triggering condition 1	0: Disabled 1: System initialization 2: Power-on check 3: Fault 4: Switch-on blocked 5: Ready to switch on 6: Pre-drive 7: Ready to run 8: Waiting for demagnetization 9: Detection before operation 10: Pre-excitation 11: Flying start 12: Running 13: Decelerate to stop 14: Quick stop 15: DC braking at startup	-	0	At once	3632
A13-11	State machine comparison value of user-defined triggering condition 1	16: Ready for self test 17: Self test in progress 18: Ready for auto-tuning 19: Auto-tuning in progress 20: Parameter restoration 21: Parameter download 22: Jogging 25: DC braking at stop 26: Waiting for DC braking at stop 27: Stop at maximum capability 28: Motor parameter calculation 29: Switchover between speed control and torque control 30: Waiting for heat dissipation	-	0	At once	3632
A13-12	Mode of user-defined triggering condition 2	0: Analog comparison 2: Digital triggering 3: State machine comparison	-	0	At once	3633
A13-13	Analog comparison mode of user-defined triggering condition 2	0: Greater than (>) 1: Less than (<) 2: Equal to (=) 3: Greater than or equal to (≥) 4: Less than or equal to (≤)	-	0	At once	3636

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A13-14	Analog source of user-defined triggering condition 2	0: Disabled Other: K connector	-	0	At once	3634
A13-15	Analog comparison value of user-defined triggering condition 2	0: Disabled Other: K connector	-	0	At once	3635
A13-16	Digital triggering mode of user-defined triggering condition 2	0: Rising edge (0 -> 1) 1: Falling edge (1 -> 0) 2: Edge (0 ->1 or 1 -> 0) 3: Logic 1 4: Logic 0	-	0	At once	3638
A13-17	Digital source of user-defined triggering condition 2	0: Disabled Other: B connector	-	0	At once	3637
A13-18	State machine comparison mode of user-defined triggering condition 2	0: Greater than (>) 1: Less than (<) 2: Equal to (=) 3: Greater than or equal to (≥) 4: Less than or equal to (≤)	-	0	At once	3639

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A13-19	State machine comparison value of user-defined triggering condition 2	0: Disabled 1: System initialization 2: Power-on check 3: Fault 4: Switch-on blocked 5: Ready to switch on 6: Pre-drive 7: Ready to run 8: Waiting for demagnetization 9: Detection before operation 10: Pre-excitation 11: Flying start 12: Running 13: Decelerate to stop 14: Quick stop 15: DC braking at startup 16: Ready for self test 17: Self test in progress 18: Ready for auto-tuning 19: Auto-tuning in progress 20: Parameter restoration 21: Parameter download 22: Jogging 25: DC braking at stop 26: Waiting for DC braking at stop 27: Stop at maximum capability 28: Motor parameter calculation 29: Switchover between speed control and torque control 30: Waiting for heat dissipation	-	0	At once	3640
A13-20	Black box user-defined channel 1	0: 0 Other: K connector	-	0	At once	3642
A13-21	Black box user-defined channel 2	0: 0 Other: K connector	-	0	At once	3643
A13-22	Black box user-defined channel 3	0: 0 Other: K connector	-	0	At once	3644
A13-23	Black box user-defined channel 4	0: 0 Other: K connector	-	0	At once	3645

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
A13-24	Black box user-defined channel 5	0: 0 Other: K connector	-	0	At once	3646
A13-25	Black box user-defined channel 6	0: 0 Other: K connector	-	0	At once	3647
A13-26	Black box user-defined channel 7	0: 0 Other: K connector	-	0	At once	3648
A13-27	Black box user-defined channel 8	0: 0 Other: K connector	-	0	At once	3649
A13-28	Black box user-defined channel 9	0: 0 Other: K connector	-	0	At once	3650
A13-29	Black box user-defined channel 10	0: 0 Other: K connector	-	0	At once	3651
A13-30	Black box user-defined channel 11	0: 0 Other: K connector	-	0	At once	3652
A13-31	Black box user-defined channel 12	0: 0 Other: K connector	-	0	At once	3653
A13-32	Black box user-defined channel 13	0: 0 Other: K connector	-	0	At once	3654
A13-33	Black box user-defined channel 14	0: 0 Other: K connector	-	1685	At once	3655
A13-34	Black box user-defined channel 15	0: 0 Other: K connector	-	1686	At once	3656
A13-35	Black box user-defined channel 16	0: 0 Other: K connector	-	1687	At once	3657

5.2.2 Group b: Control Channels

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b0: Start/Stop Control Word Reference of Channel 1						
b0-00	Start/Stop control word source	0: Terminal start/stop module 1: User-defined reference Other: B connector	-	0	At stop	306
b0-01	User-defined OFF1 source	0: Disable Other: B connector	-	0	At once	309
b0-02	User-defined OFF2 source 1	0: Active 1: Disable Other: B connector	-	1	At once	315

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b0-03	User-defined OFF3 source 1	0: Active 1: Disable Other: B connector	-	1	At once	312
b0-04	User-defined running permission source	0: Disable 1: Enable Other: B connector	-	1	At once	316
b0-05	User-defined fault reset source 1	0: Disable 1: Enable Other: B connector	-	0	At once	317
b0-06	User-defined jog 1 source	0: Disable Other: B connector	-	0	At once	318
b0-07	User-defined jog 2 source	0: Disable Other: B connector	-	0	At once	306
b0-08	User-defined speed inversion source	0: Disable 1: Enable Other: B connector	-	0	At once	309
b0-10	Jog priority mode	0: Same priority for OFF1 and jog 1: OFF1 preferred 2: Jog preferred	-	0	At stop	325
b1: Other Control Word Reference of Channel 1						
b1-00	OFF2 source 2	0: Active 1: Disable Other: B connector	-	1	At once	313
b1-01	OFF2 source 3	0: Active 1: Disable Other: B connector	-	1	At once	314
b1-02	OFF3 source 2	0: Active 1: Disable Other: B connector	-	1	At once	319
b1-03	OFF3 source 3	0: Active 1: Disable Other: B connector	-	1	At once	320
b1-04	Fault reset source 2	0: Disable 1: Enable Other: B connector	-	0	At once	321
b1-05	Fault reset source 3	0: Disable 1: Enable Other: B connector	-	0	At once	324

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b1-06	RFG prohibition source	0: Active 1: Disable Other: B connector	-	1	At once	323
b1-07	RFG pause source	0: Active 1: Disable Other: B connector	-	1	At once	322
b1-08	Source of setting RFG reference to 0	0: Active 1: Disable Other: B connector	-	1	At once	313
b1-09	Source of forced flying start	0: Disable 1: Enable Other: B connector	-	0	At once	314
b1-10	Source of forced torque control	0: Disable 1: Enable Other: B connector	-	0	At once	319
b1-11	Speed regulator enable source	0: Disable 1: Enable Other: B connector	-	1	At once	320
b2: Start/Stop Control Word Reference of Channel 2						
b2-00	Start/Stop control word source	0: Terminal start/stop module 1: User-defined reference Other: B connector	-	0	At stop	334
b2-01	User-defined OFF1 source	0: Disable Other: B connector	-	0	At once	335
b2-02	User-defined OFF2 source 1	0: Active 1: Disable Other: B connector	-	1	At once	336
b2-03	User-defined OFF3 source 1	0: Active 1: Disable Other: B connector	-	1	At once	339
b2-04	User-defined running permission source	0: Disable 1: Enable Other: B connector	-	1	At once	345
b2-05	User-defined fault reset source 1	0: Disable 1: Enable Other: B connector	-	0	At once	342
b2-06	User-defined jog 1 source	0: Disable Other: B connector	-	0	At once	346

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b2-07	User-defined jog 2 source	0: Disable Other: B connector	-	0	At once	347
b2-08	User-defined speed inversion source	0: Disable 1: Enable Other: B connector	-	0	At once	348
b2-10	Jog priority mode	0: Same priority for OFF1 and jog 1: OFF1 preferred 2: Jog preferred	-	0	At stop	355
b3: Other Control Word Reference of Channel 2						
b3-00	OFF2 source 2	0: Active 1: Disable Other: B connector	-	1	At once	337
b3-01	OFF2 source 3	0: Active 1: Disable Other: B connector	-	1	At once	338
b3-02	OFF3 source 2	0: Active 1: Disable Other: B connector	-	1	At once	340
b3-03	OFF3 source 3	0: Active 1: Disable Other: B connector	-	1	At once	341
b3-04	Fault reset source 2	0: Disable 1: Enable Other: B connector	-	0	At once	343
b3-05	Fault reset source 3	0: Disable 1: Enable Other: B connector	-	0	At once	344
b3-06	RFG prohibition source	0: Active 1: Disable Other: B connector	-	1	At once	349
b3-07	RFG pause source	0: Active 1: Disable Other: B connector	-	1	At once	350
b3-08	Source of setting RFG reference to 0	0: Active 1: Disable Other: B connector	-	1	At once	351
b3-09	Source of forced flying start	0: Disable 1: Enable Other: B connector	-	0	At once	354

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b3-10	Source of forced torque control	0: Disable 1: Enable Other: B connector	-	0	At once	353
b3-11	Speed regulator enable source	0: Disable 1: Enable Other: B connector	-	1	At once	352
b4: Terminal Start/Stop Module						
b4-00	OFF1 status	0: Disable 1: Enable	-	-	Unchangeable	16732
b4-01	Speed inversion status	0: Inversion disabled 1: Inversion enabled	-	-	Unchangeable	16733
b4-02	Terminal start/stop module A/B selection	0: Module A 1: Module B Other: B connector	-	0	At once	424
b4-03	Mode of terminal start/stop module A	0: Disable 1: IN1 start 2: IN1 start, IN2 direction 3: IN1 start in forward direction, IN2 start in reverse direction 4: IN1P start, IN2 stop 5: IN1P start, IN2 stop, IN3 direction 6: IN1 start in forward direction, IN2 start in reverse direction, IN3 stop	-	0	At stop	426
b4-05	Input 1 of terminal start/stop module A	0: Disable Other: B connector	-	0	At stop	427
b4-06	Input 2 of terminal start/stop command A	0: Disable Other: B connector	-	0	At stop	428
b4-07	Input 3 of terminal start/stop command A	0: Disable Other: B connector	-	0	At stop	429
b4-08	Running permission source of terminal start/stop module A	0: Disable 1: Enable Other: B connector	-	1	At stop	430
b4-09	Terminal start/stop module A fault reset source	0: Disable 1: Enable Other: B connector	-	1	At stop	431
b4-10	Jog 1 source of terminal start/stop module A	0: Disable Other: B connector	-	0	At stop	432
b4-11	Jog 2 source of terminal start/stop module A	0: Disable Other: B connector	-	0	At stop	433

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b4-13	Mode of terminal start/stop module B	0: Disable 1: IN1 start 2: IN1 start, IN2 direction 3: IN1 start in forward direction, IN2 start in reverse direction 4: IN1P start, IN2 stop 5: IN1P start, IN2 stop, IN3 direction 6: IN1 start in forward direction, IN2 start in reverse direction, IN3 stop	-	0	At stop	435
b4-15	Input 1 of terminal start/stop module B	0: Disable Other: B connector	-	0	At stop	436
b4-16	Input 2 of terminal start/stop command B	0: Disable Other: B connector	-	0	At stop	437
b4-17	Input 3 of terminal start/stop command B	0: Disable Other: B connector	-	0	At stop	438
b4-18	Running permission source of terminal start/stop module B	0: Disable 1: Enable Other: B connector	-	1	At stop	439
b4-19	Terminal start/stop module B fault reset source	0: Disable 1: Enable Other: B connector	-	0	At stop	440
b4-20	Jog 1 source of terminal start/ stop module B	0: Disable Other: B connector	-	0	At stop	441
b4-21	Jog 2 source of terminal start/ stop module B	0: Disable Other: B connector	-	0	At stop	442
b5: Auto-tuning/Self-test						
b5-00	Auto-tuning mode	0: No operation 1: Asynchronous motor static auto-tuning 2: Asynchronous motor no-load complete auto-tuning 4: Asynchronous motor inertia auto-tuning (SVC or FVC) 11: Synchronous motor with-load auto-tuning in FVC mode 12: Synchronous motor no-load auto-tuning 13: Synchronous motor static auto-tuning 14: Synchronous motor inertia auto-tuning	-	0	At stop	3734

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b5-02	Parameter calculation options	0: No operation 1: Calculate motor parameters	-	0	At stop	3739
b5-03	Parameter calculation confirmation	0: Cancel 1: Confirm	-	0	At stop	3740

5.2.3 Group C: Reference Channels

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C0: Speed Reference of Channel 1						
C0-00	Source of main speed in speed control	0: Digital setting Other: K connector	-	0	At once	364
C0-01	Digital setting of main speed in speed control	–600.0 to·+600.0	%	0.0	At once	365
C0-02	Source of auxiliary speed in speed control	0: 0 Other: K connector	-	0	At once	366
C0-03	Source of supplementary speed in speed control	0: 0 Other: K connector	-	0	At once	367
C1: Torque Reference of Channel 1						
C1-00	Torque reference source	0: Digital setting Other: K connector	-	0	At once	368
C1-01	Digital setting of torque reference	-400.0 to 400.0	%	0.0	At once	369
C1-02	Torque filter time	0 to 10000	ms	0	At once	383
C1-03	Torque acceleration time	0.000 to 60.000	s	0.000	At once	384
C1-04	Torque deceleration time	0.000 to 60.000	s	0.000	At once	385
C1-05	Speed limit source in torque control mode	0: Digital setting 1: Speed command channel	-	0	At once	370
C1-06	Digital setting of speed limit in torque control mode	-600.0 to 600.0	%	0.0	At once	371
C1-07	Speed limit offset mode	0: Bidirectional offset 1: Unidirectional offset	-	0	At once	372
C1-08	Speed limit offset source	0: Digital setting Other: K connector	-	0	At once	373
C1-09	Digital setting of speed limit offset	0.0 to 300.0	%	5.0	At once	374
C1-10	RFG feedforward torque coefficient	0: 0% 1: 100% Other: K connector	-	0	At once	387

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C1-13	Source of supplementary torque reference 1	0: Digital setting Other: K connector	-	0	At once	375
C1-14	Digital setting of supplementary torque reference 1	-400.0 to 400.0	%	0.0	At once	376
C1-15	Supplementary torque reference 2	0: 0 Other: K connector	-	0	At once	377
C1-16	Friction torque reference (reserved)	0: 0 Other: K connector	-	0	At once	378
C2: Jog Reference of Channel 1						
C2-00	JOG1 speed source	0: Digital setting Other: K connector	-	0	At once	379
C2-01	Digital setting of JOG1 speed	-600.0 to 600.0	%	10.0	At once	380
C2-05	JOG2 speed source	0: Digital setting Other: K connector	-	0	At once	381
C2-06	Digital setting of JOG2 speed	-600.0 to 600.0	%	-10.0	At once	382
C2-10	Forced speed control in jogging mode	0: Disable 1: Enable	-	1	At once	386
C3: Speed Reference of Channel 2						
C3-00	Source of main speed in speed control	0: Digital setting Other: K connector	-	0	At once	394
C3-01	Digital setting of main speed in speed control	–600.0 to·+600.0	%	0.0	At once	395
C3-02	Source of auxiliary speed in speed control	0: 0 Other: K connector	-	0	At once	396
C3-03	Source of supplementary speed in speed control	0: 0 Other: K connector	-	0	At once	397
C4: Torque Reference of Channel 2						
C4-00	Torque reference source	0: Digital setting Other: K connector	-	0	At once	398
C4-01	Digital setting of torque reference	-400.0 to 400.0	%	0.0	At once	399
C4-02	Torque filter time	0 to 10000	ms	0	At once	413
C4-03	Torque acceleration time	0.000 to 60.000	s	0.000	At once	414
C4-04	Torque deceleration time	0.000 to 60.000	s	0.000	At once	415
C4-05	Speed limit source in torque control mode	0: Digital setting 1: Speed command channel	-	0	At once	400
C4-06	Digital setting of speed limit in torque control mode	-600.0 to 600.0	%	0.0	At once	401

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C4-07	Speed limit offset mode	0: Bidirectional offset 1: Unidirectional offset	-	0	At once	402
C4-08	Speed limit offset source	0: Digital setting Other: K connector	-	0	At once	403
C4-09	Digital setting of speed limit offset	0.0 to 300.0	%	5.0	At once	404
C4-10	RFG feedforward torque coefficient	0: 0% 1: 100% Other: K connector	-	0	At once	387
C4-13	Source of supplementary torque reference 1	0: Digital setting Other: K connector	-	0	At once	405
C4-14	Digital setting of supplementary torque reference 1	-400.0 to 400.0	%	0.0	At once	406
C4-15	Supplementary torque reference 2	0: 0 Other: K connector	-	0	At once	407
C4-16	Friction torque reference (reserved)	0: 0 Other: K connector	-	0	At once	408
C5: Jog Reference of Channel 2						
C5-00	JOG1 speed source	0: Digital setting Other: K connector	-	0	At once	409
C5-01	Digital setting of JOG1 speed	-600.0 to 600.0	%	10.0	At once	410
C5-05	JOG2 speed source	0: Digital setting Other: K connector	-	0	At once	411
C5-06	Digital setting of JOG2 speed	-600.0 to 600.0	%	-10.0	At once	412
C5-10	Forced speed control in jogging mode	0: Disable 1: Enable	-	1	At once	416
C6: Multi-reference Value						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C6-00	Multi-reference selection	0: Multi-reference value 1 1: Multi-reference value 2 2: Multi-reference value 3 3: Multi-reference value 4 4: Multi-reference value 5 5: Multi-reference value 6 6: Multi-reference value 7 7: Multi-reference value 8 8: Multi-reference value 9 9: Multi-reference value 10 10: Multi-reference value 11 11: Multi-reference value 12 12: Multi-reference value 13 13: Multi-reference value 14 14: Multi-reference value 15 15: Multi-reference value 16	-	-	Unchangeable	16635
C6-01	Multi-reference value selection	-	%	-	Unchangeable	16636
C6-03	Multi-reference value bit0	0: 0 1: 1 Other: B connector	-	0	At once	1351
C6-04	Multi-reference value bit1	0: 0 1: 1 Other: B connector	-	0	At once	1352
C6-05	Multi-reference value bit2	0: 0 1: 1 Other: B connector	-	0	At once	1353
C6-06	Multi-reference value bit3	0: 0 1: 1 Other: B connector	-	0	At once	1354
C6-07	Source of multi-reference value 1	0: C6-11 parameter setting Other: K connector	-	0	At once	1399
C6-08	Source of multi-reference value 2	0: C6-12 parameter setting Other: K connector	-	0	At once	1400
C6-09	Source of multi-reference value 3	0: C6-13 parameter setting Other: K connector	-	0	At once	1401
C6-10	Source of multi-reference value 4	0: C6-14 parameter setting Other: K connector	-	0	At once	1402
C6-11	Multi-reference value 1	-600.0 to 600.0	%	10.0	At once	1355
C6-12	Multi-reference value 2	-600.0 to 600.0	%	10.0	At once	1356

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C6-13	Multi-reference value 3	-600.0 to 600.0	%	0.0	At once	1357
C6-14	Multi-reference value 4	-600.0 to 600.0	%	0.0	At once	1358
C6-15	Multi-reference value 5	-600.0 to 600.0	%	0.0	At once	1359
C6-16	Multi-reference value 6	-600.0 to 600.0	%	0.0	At once	1360
C6-17	Multi-reference value 7	-600.0 to 600.0	%	0.0	At once	1361
C6-18	Multi-reference value 8	-600.0 to 600.0	%	0.0	At once	1362
C6-19	Multi-reference value 9	-600.0 to 600.0	%	0.0	At once	1363
C6-20	Multi-reference value 10	-600.0 to 600.0	%	0.0	At once	1364
C6-21	Multi-reference value 11	-600.0 to 600.0	%	0.0	At once	1365
C6-22	Multi-reference value 12	-600.0 to 600.0	%	0.0	At once	1366
C6-23	Multi-reference value 13	-300.00 to 300.00	%	0.00	At once	1367
C6-24	Multi-reference value 14	-300.00 to 300.00	%	0.00	At once	1368
C6-25	Multi-reference value 15	-300.00 to 300.00	%	0.00	At once	1369
C6-26	Multi-reference value 16	-300.00 to 300.00	%	0.00	At once	1370
C7: Motor-driven Potentiometer						
C7-00	Motor-driven potentiometer	0: Disable 1: Enable	-	0	At once	1381
C7-01	Memory retention at power failure of motor-driven potentiometer	0: Disable 1: Enable	-	0	At once	1382
C7-02	Initial value of motor-driven potentiometer	-600.0 to 600.0	%	0.0	At once	1383
C7-03	Increase time base of motor-driven potentiometer	0.00 to 600.00	s	20.00	At once	1384
C7-04	Decrease time base of motor-driven potentiometer	0.00 to 600.00	s	20.00	At once	1385
C7-05	Source of motor-driven potentiometer increase command	0: Disable 1: Enable Other: B connector	-	0	At once	1386
C7-06	Source of motor-driven potentiometer decrease command	0: Disable 1: Enable Other: B connector	-	0	At once	1387
C7-07	Maximum value of motor-driven potentiometer output	-600.0 to 600.0	%	100.0	At once	1388
C7-08	Minimum value of motor-driven potentiometer output	-600.0 to 600.0	%	0.0	At once	1389
C7-09	Source 1 of motor-driven potentiometer pause command	0: Disable 1: Enable Other: B connector	-	0	At once	1390

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C7-10	Source 2 of motor-driven potentiometer pause command	0: Disable 1: Enable Other: B connector	-	0	At once	1391
C7-11	Source 1 of motor-driven potentiometer reset command	0: Disable 1: Enable Other: B connector	-	0	At once	1392
C7-12	Source 2 of motor-driven potentiometer reset command	0: Disable 1: Enable Other: B connector	-	0	At once	1393
C7-13	Source of motor-driven potentiometer reset value	0: Digital setting Other: K connector	-	0	At once	1394
C7-14	Reset value of motor-driven potentiometer	-600.0 to 600.0	%	0.0	At once	1395
C7-15	Source of motor-driven potentiometer force command	0: Disable 1: Enable Other: B connector	-	0	At once	1396
C7-16	Source of motor-driven potentiometer force value	0: Digital setting Other: K connector	-	0	At once	1397
C7-17	Force value of motor-driven potentiometer	-600.0 to 600.0	%	0.0	At once	1398
C8: Ramp Function Generator						
C8-04	Ramp (RFG) selection bit0	0: 0 1: 1 Other: B connector	-	0	At once	520
C8-05	Ramp (RFG) selection bit1	0: 0 1: 1 Other: B connector	-	0	At once	521
C8-08	Ramp 1 acceleration time	0.0 to 1000.0	s	20.0	At once	522
C8-09	Ramp 1 deceleration time	0.0 to 1000.0	s	20.0	At once	523
C8-10	Ramp 2 acceleration time	0.0 to 1000.0	s	20.0	At once	528
C8-11	Ramp 2 deceleration time	0.0 to 1000.0	s	20.0	At once	529
C8-12	Ramp 3 acceleration time	0.0 to 1000.0	s	20.0	At once	534
C8-13	Ramp 3 deceleration time	0.0 to 1000.0	s	20.0	At once	535
C8-14	Ramp 4 acceleration time	0.0 to 1000.0	s	20.0	At once	540
C8-15	Ramp 4 deceleration time	0.0 to 1000.0	s	20.0	At once	541
C8-16	Ramp 1 acceleration initial arc	0.000 to 20.000	s	0.000	At once	524
C8-17	Ramp 1 acceleration final arc	0.000 to 20.000	s	0.000	At once	525
C8-18	Ramp 1 deceleration initial arc	0.000 to 20.000	s	0.000	At once	526
C8-19	Ramp 1 deceleration final arc	0.000 to 20.000	s	0.000	At once	527

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C8-20	Ramp 2 acceleration initial arc	0.000 to 20.000	s	0.000	At once	530
C8-21	Ramp 2 acceleration final arc	0.000 to 20.000	s	0.000	At once	531
C8-22	Ramp 2 deceleration initial arc	0.000 to 20.000	s	0.000	At once	532
C8-23	Ramp 2 deceleration final arc	0.000 to 20.000	s	0.000	At once	533
C8-24	Ramp 3 acceleration initial arc	0.000 to 20.000	s	0.000	At once	536
C8-25	Ramp 3 acceleration final arc	0.000 to 20.000	s	0.000	At once	537
C8-26	Ramp 3 deceleration initial arc	0.000 to 20.000	s	0.000	At once	538
C8-27	Ramp 3 deceleration final arc	0.000 to 20.000	s	0.000	At once	539
C8-28	Ramp 4 acceleration initial arc	0.000 to 20.000	s	0.000	At once	542
C8-29	Ramp 4 acceleration final arc	0.000 to 20.000	s	0.000	At once	543
C8-30	Ramp 4 deceleration initial arc	0.000 to 20.000	s	0.000	At once	544
C8-31	Ramp 4 deceleration final arc	0.000 to 20.000	s	0.000	At once	545
C8-32	Jog ramp source	0: Ramp selection 1: Jog ramp time	-	1	At once	546
C8-33	Jog acceleration time	0.0 to 1000.0	s	10.0	At once	547
C8-34	Jog deceleration time	0.0 to 1000.0	s	10.0	At once	548
C8-37	Deceleration time for quick stop	0.0 to 1000.0	s	1.0	At once	549
C8-38	Initial arc of quick stop	0.000 to 20.000	s	0.000	At once	550
C8-39	Final arc of quick stop	0.000 to 20.000	s	0.000	At once	551
C8-41	Ramp Acceleration Time Adjustment Coefficient	0: 100% Other: K connector	-	0	At once	558
C8-42	Ramp Deceleration Time Adjustment Coefficient	0: 100% Other: K connector	-	0	At once	559
C8-43	Acceleration time gain at low speed	0.1 to 1000.0	%	100.0	At once	552
C8-44	Threshold at low speed	0.00 to 300.00	%	15.00	At once	553
C8-45	Ramp arc mode	0: Uncontinuous smoothing 1: Continuous smoothing	-	0	At once	560
C8-46	Ramp output force enable	0: Disable 1: Enable Other: B connector	-	0	At once	554
C8-47	Ramp output force value	0: 100% Other: K connector	-	0	At once	555
C8-48	Ramp input continuous change	0: Disable 1: Enable Other: B connector	-	0	At once	556
C8-49	Ramp input change interval	2 to 10000	ms	50	At once	557

5.2.4 Group d: Motor Parameters

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
d0: Basic Motor Parameters						
d0-00	Motor type	0: Induction motor 2: PMSM	-	-	At once	1552
d0-01	Rated motor power	0.1 to 6553.5	kW	3.7	At stop	1556
d0-02	Rated motor voltage	0.1 to 1500	V	380	At stop	1560
d0-03	Rated motor current	0.1 to 6553.5	A	9.0	At stop	1512
d0-04	Rated motor frequency	0.1 to 600.0	Hz	50.0	At stop	1516
d0-05	Rated motor speed	1 to 36000	RPM	1440	At stop	1520
d0-06	Max. motor speed	0.0 to 600.0	%	100.0	At stop	1524
d0-07	Min. motor speed	0.0 to 600.0	%	0.0	At stop	1528
d0-08	Max. motor current	50.0 to 600.0	%	150.0	At stop	1532
d0-09	Number of motor pole pairs	-	-	-	Modification prohibited	1536
d0-10	Motor power factor	0.700 to 0.999	-	0.860	At stop	1548
d0-12	Speed feedback encoder	0: Encoder 1 1: Encoder 2	-	0	At stop	4866
d0-16	Motor brake control	0: Disable 1: Enable	-	0	At stop	1544
d1: Basic Auto-tuning Parameters						
d1-00	Asynchronous motor stator resistance	0.0001 to 65.0000	Ω	1.2040	At stop	7190
d1-01	Asynchronous motor rotor resistance	0.0001 to 65.0000	Ω	0.9080	At stop	7198
d1-02	Leakage inductive reactance of asynchronous motor	0.001 to 650.000	mH	5.280	At stop	7206
d1-03	Mutual inductive reactance of asynchronous motor	0.01 to 6500.00	mH	158.60	At stop	7214
d1-04	No-load current of asynchronous motor	0.0 to 6553.5	A	4.2	At stop	1584
d1-06	Asynchronous magnetic field saturation mutual inductance coefficient 1	50.0 to 6553.5	%	86.0	At stop	1588
d1-08	Asynchronous magnetic field saturation mutual inductance coefficient 2	100.0 to 150.0	%	130.0	At stop	1592
d1-10	Asynchronous magnetic field saturation mutual inductance coefficient 3	100.0 to 170.0	%	140.0	At stop	1596

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
d1-12	Asynchronous magnetic field saturation mutual inductance coefficient 4	100.0 to 180.0	%	150.0	At stop	1600
d1-13	Time constant of asynchronous magnetic field rotor	-	ms	-	At stop	1604
d1-20	Synchronous motor stator resistance	0.0001 to 65.0000	Ω	1.2040	At once	7222
d1-21	Axis-D inductance of synchronous motor	0.001 to 650.000	mH	15.860	At stop	7230
d1-22	Axis-Q inductance of synchronous motor	0.001 to 650.000	mH	15.860	At stop	7238
d1-23	Synchronous motor back EMF coefficient	0.0 to 6553.5	V	300.0	At stop	1620
d2: Supplementary Auto-tuning Parameters						
d2-00	Inertia	0.001 to 50.000	kg/m^2	0.158	At stop	1644
d2-05	Electromechanical time constant	-	-	-	Modification prohibited	1664
d3: Base Value Information						
d3-00	Per-unit base value of speed	-	RPM	-	Modification prohibited	16641
d3-01	Per-unit base value of frequency	-	Hz	-	Modification prohibited	16642
d3-02	Per-unit base value of voltage	-	V	-	Modification prohibited	16643
d3-03	Per-unit base value of current	-	A	-	Modification prohibited	16644
d3-04	Per-unit base value of DC voltage	-	V	-	Modification prohibited	16645
d3-05	Per-unit base value of power	-	kW	-	Modification prohibited	16646
d3-06	Position control speed base value	-	Lu/s	-	Modification prohibited	17582

5.2.5 Group E: Motor Control

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E0: Control Reference						
E0-00	Control mode	0: SVC 1: FVC 2: V/f	-	2	At stop	1688

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E0-01	Control mode	0: Speed mode 1: Torque mode Other: B connector	-	0	At stop	1692
E0-02	Positive speed permission	0: Disable 1: Enable Other: B connector	-	1	At once	1696
E0-03	Negative speed permission	0: Disable 1: Enable Other: B connector	-	1	At once	1700
E1: Start/Stop Control						
E1-00	Start mode	0: Direct start 1: Flying start 2: DC braking start	-	0	At stop	1704
E1-03	Pre-excitation time	0.00 to 20.00	s	0.00	At stop	1712
E1-05	Digital setting of pre-excitation current	0.1 to 200.0	%	80.0	At once	1720
E1-08	DC braking current at startup	0.0 to 100.0	%	0.0	At stop	1724
E1-09	DC braking time at startup	0.00 to 100.00	s	0.00	At stop	3743
E1-11	DC braking at stop	0: Disable 1: Enable Other: B connector	-	0	At once	3807
E1-12	Starting speed of DC braking at stop	0.0 to 6000.0	RPM	30.0	At once	3747
E1-13	DC braking current at stop	0.0 to 100.0	%	0.0	At once	3751
E1-14	DC braking time at stop	0.00 to 100.00	s	0.00	At once	3755
E1-15	Demagnetization time (DC braking delay at stop)	0.00 to 100.00	s	1.0	At once	3767
E1-21	Threshold of motor zero speed determination	0.0 to 6000.0	RPM	10.0	At once	3759
E1-22	Delay of motor zero speed determination	0.000 to 60.000	s	0.100	At once	3763
E1-23	Threshold reference of zero speed determination	0.0 to 6000.0	RPM	0.0	At once	3799
E1-24	Delay reference of zero speed determination	0.000 to 60.000	s	4.000	At once	3795
E1-25	Stop at zero speed	0: Disable 1: Enable Other: B connector	-	0	At stop	3803

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E1-27	OFF1 stop mode	0: Coast to stop 1: Decelerate to stop 2: Stop at maximum capability	-	1	At once	3771
E1-28	OFF2 stop mode	0: Coast to stop	-	-	Unchangeable	3775
E1-29	OFF3 stop mode	1: Quick stop 2: Stop at maximum capability	-	1	At once	3779
E1-31	Stop mode during running	0: OFF1 stop mode 1: OFF2 stop mode 2: OFF3 stop mode	-	1	At once	3787
E1-32	Stop mode in torque control	0: Coast to stop forcibly 1: Switch to speed control mode and then stop 2: Maintain torque control mode until zero speed and then block	-	1	At once	3791
E2: Limits						
E2-00	Skip band valid flag	-	-	-	Unchangeable	16752
E2-01	Lower limit of skip band 1	0.0 to 600.0	%	0.0	At once	2576
E2-02	Upper limit of skip band 1	0.0 to 600.0	%	0.0	At once	2572
E2-03	Lower limit of skip band 2	0.0 to 600.0	%	0.0	At once	2584
E2-04	Upper limit of skip band 2	0.0 to 600.0	%	0.0	At once	2580
E2-05	Lower limit of skip band 3	0.0 to 600.0	%	0.0	At once	2592
E2-06	Upper limit of skip band 3	0.0 to 600.0	%	0.0	At once	2588
E2-07	Lower limit of skip band 4	0.0 to 600.0	%	0.0	At once	2600
E2-08	Upper limit of skip band 4	0.0 to 600.0	%	0.0	At once	2596
E2-10	Forward speed limit 1 reference	0.0 to 600.0	%	100.0	At stop	2620
E2-11	Reverse speed limit 1 reference	-600.0 to 0.0	%	-100.0	At stop	2624
E2-12	Forward speed limit 2 source	0: 600% Other: K connector	-	0	At once	2628
E2-13	Reverse speed limit 2 source	0: -600% Other: K connector	-	0	At once	2632
E2-20	Forward torque limit 1 reference	0.0 to 400.0	%	150.0	At once	2604
E2-21	Reverse torque limit 1 reference	-400.0 to 0.0	%	-150.0	At once	2608
E2-22	Forward torque limit 2 source	0: 400% Other: K connector	-	0	At once	2612

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E2-23	Reverse torque limit 2 source	0: -400% Other: K connector	-	0	At once	2616
E2-28	Torque upper limit coefficient source for speed governing	0: 100% Other: K connector	-	0	At stop	2700
E2-29	Torque lower limit coefficient source for speed governing	0: 100% Other: K connector	-	0	At stop	2704
E2-30	Motoring power limit reference	0.0 to 400.0	%	200.0	At once	2708
E2-31	Generating power limit reference	0.0 to 400.0	%	200.0	At once	2712
E2-32	Motoring power coefficient enable	0: Disable 1: Enable Other: B connector	-	0	At once	2716
E2-33	Motoring power coefficient source	0: 100% Other: K connector	-	0	At once	2720
E2-34	Generating power coefficient enable	0: Disable 1: Enable Other: B connector	-	0	At once	2724
E2-35	Generating power coefficient source	0: 100% Other: K connector	-	0	At once	2728
E3: V/f Control						
E3-00	V/f mode	0: V/f curve 1: V/f separation	-	0	At stop	3815
E3-01	V/f curve	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	-	0	At once	3819
E3-02	Multi-point V/f curve frequency 1	0.0 to 100.0	%	0.0	At once	3823
E3-03	Multi-point V/f curve voltage 1	0.0 to 100.0	%	0.0	At once	3827
E3-04	Multi-point V/f curve frequency 2	0.0 to 100.0	%	0.0	At once	3831
E3-05	Multi-point V/f curve voltage 2	0.0 to 100.0	%	0.0	At once	3835
E3-06	Multi-point V/f curve frequency 3	0.0 to 100.0	%	0.0	At once	1824
E3-07	Multi-point V/f curve voltage 3	0.0 to 100.0	%	0.0	At once	1828

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E3-11	V/f torque boost mode	0: Disable 1: Customized 2: Automatic	-	0	At stop	1832
E3-12	V/f customized torque boost	0.0 to 30.0	%	1.0	At once	1836
E3-13	Cut-off frequency of V/F torque boost	0.0 to 600.0	%	100.0	At stop	1840
E3-14	V/f droop enable	0: Disable 1: Enable Other: B connector	-	0	At once	2644
E3-15	V/f droop coefficient	0.0 to 50.0	%	0.0	At once	2648
E3-16	Frequency RFG time in V/f separation	0: RFG time forced to 0 1: Preset RFG time	-	0	At stop	1848
E3-17	Current frequency source in V/f separation or non-linear V/f	0: RFG output 1: V/f output frequency (after slip compensation)	-	0	At stop	1852
E3-18	Voltage reference source in V/f separation	0: 0 Other: K connector	-	0	At once	1856
E3-19	Voltage rise time in V/f separation	0.00 to 600.00	s	0.00	At once	1860
E3-20	Voltage fall time in V/f separation	0.00 to 600.00	s	0.00	At once	1864
E3-21	Stop mode selection for V/f separation	0: Coast to stop 1: Frequency and voltage decline to 0 independently 2: Frequency declines to 0 after voltage declines to 0	-	-	Unchangeable	1868
E3-24	V/f oscillation suppression	0: Disable 1: Enable	-	1	At once	1872
E3-25	V/f oscillation suppression gain	0 to 100	-	40	At once	1876
E3-30	V/f slip compensation gain	0.0 to 200.0	%	0.0	At once	1884
E3-31	Slip compensation time constant	0.1 to 5.0	-	0.5	At once	1888
E3-32	V/f over-excitation gain	0 to 200	-	64	At once	1952
E3-34	Imax control	0: Disable 1: Enable	-	1	At once	1892
E3-35	Imax operating current	50 to 200	%	150	At once	1896
E3-36	Frequency modulation gain in Imax control mode	0 to 100	-	20	At once	1900
E3-37	Field weakening coefficient in Imax control mode	50 to 200	-	50	At once	1904

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E3-51	Automatic frequency rise	0: Disable 1: Enable	-	0	At stop	1928
E3-56	Online torque compensation gain	80 to 150	%	100	At once	1948
E4: Speed Regulator						
E4-00	Zero speed lock	0: Disable 1: Enable	-	0	At stop	1992
E4-01	Speed loop switchover frequency upon zero speed lock	0.00 to 10.00	Hz	0.05	At once	1996
E4-02	Speed loop Kp upon zero speed lock	0.00 to 200.00	-	10.00	At once	2000
E4-03	Speed loop Ti upon zero speed lock	1 to 10000	ms	150	At once	2004
E4-04	Low-speed speed loop switchover frequency	0.0 to 600.0	Hz	5.0	At once	2008
E4-05	Low-speed speed loop Kp	0.00 to 200.00	-	7.00	At once	2012
E4-06	Low-speed speed loop Ti	1 to 10000	ms	200	At once	2016
E4-07	High-speed speed loop switchover frequency	0.0 to 600.0	Hz	10.0	At once	2020
E4-08	High-speed speed loop Kp	0.01 to 200.0	-	5.00	At once	2024
E4-09	High-speed speed loop Ti	1 to 10000	ms	300	At once	2028
E4-13	Speed feedback filter time	0.000 to 0.100	s	0.004	At once	2032
E4-14	Droop function	0: Disable 1: Enable Other: B connector	-	0	At once	2652
E4-15	Droop input source	0: Disable 1: Torque upon limit 2: PID output upon speed governing 3: PID integral upon speed governing	-	0	At once	2656
E4-16	Droop coefficient	0.0 to 50.0	%	0.0	At once	2660
E4-17	Source of the freeze command for speed loop integral	0: Disable 1: Enable Other: B connector	-	0	At once	2036
E4-18	Source of the force command for speed loop integral	0: Disable 1: Enable Other: B connector	-	0	At once	2040
E4-19	Source of the force value for speed loop integral	0: 0 Other: K connector	-	0	At once	2044

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E4-22	Feedforward torque source	0: Disable 1: RFG feedforward	-	0	At once	2050
E4-23	Feedforward torque coefficient	0 to 400	%	100	At once	2054
E5: Current Regulator						
E5-01	Adjustment coefficient of low-speed current loop Kp	0.1 to 10.0	-	1.0	At once	2056
E5-02	Adjustment coefficient of low-speed current loop Ki	0.1 to 10.0	-	1.0	At once	2060
E5-04	Adjustment coefficient of high-speed current loop Kp	0.1 to 10.0	-	1.0	At once	2064
E5-05	Adjustment coefficient of high-speed current loop Ki	0.1 to 10.0	-	1.0	At once	2068
E6: Excitation Control						
E6-00	Energy-saving control	0: Disable 1: Enable	-	0	At once	2640
E6-01	Field weakening mode	0: No field weakening 1: Field weakening by automatic adjustment 2: Field weakening control by automatic adjustment and calculation	-	1	At once	2436
E6-02	Field weakening gain of synchronous motor	0 to 50	-	5	At once	2440
E6-03	Output voltage upper limit margin of synchronous motor	0 to 50	-	5	At once	2444
E6-06	Maximum demagnetization current of synchronous motor	0 to 300	%	100	At once	2448
E6-07	Low-speed excitation current of synchronous motor	0 to 80	%	30	At once	2452
E6-08	Field weakening mode of asynchronous motor	0: Mode 2 1: Mode 1 2: Voltage controller plus calculation	-	1	At stop	2732
E6-11	Minimum magnetic flux of efficiency optimization	10 to 100	%	50	At once	4267
E6-12	Additional filter time of efficiency optimization	0 to 1000	ms	4	At once	4271
E6-13	Filter exit time of efficiency optimization	0 to 1000	ms	20	At once	4275
E6-14	Start frequency of efficiency optimization	0 to 50	%	10	At once	4283
E6-15	Energy-saving control coefficient of synchronous motor	0 to 10	-	5	At once	4277
E7: Flying Start						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E7-00	V/f flying start mode	0: From stop frequency 1: From 50 Hz 2: From maximum frequency	-	0	At once	2092
E7-01	V/f flying start speed	0 to 100	-	20	At once	2096
E7-02	V/f flying start closed-loop current Kp	0 to 1000	-	500	At once	2100
E7-03	V/f flying start closed-loop current Ki	0 to 1000	-	800	At once	2104
E7-06	V/f flying start current	30 to 200	%	100	At once	2256
E7-07	Timeout interval of flying start in SVC control mode	0.010 to 60.000	s	1.000	At once	2688
E7-08	Timeout interval of flying start in V/f control mode	0.100 to 60.000	s	15.000	At once	2692
E8: Protection						
E8-00	Motor overload software protection	0: Disable 1: Enable	-	1	At once	2124
E8-01	Motor overload software protection gain	0.20 to 10.00	-	1.00	At once	2128
E8-02	Motor overload software protection pre-warning coefficient	50 to 100	%	80	At once	2132
E8-05	Overspeed detection threshold	0.0 to 50.0	%	20.0	At once	2136
E8-06	Overspeed detection time	0.00 to 60.00	s	0.50	At once	2140
E8-08	Alarm for excessive speed deviation	0: Disable 1: Enable	-	1	At once	2248
E8-09	Detection threshold of excessive speed deviation	0.0 to 100.0	%	6.0	At once	2144
E8-10	Detection time of excessive speed deviation	0.00 to 600.00	s	1.00	At once	2148
E8-13	Speed comparison value reach threshold	0.0 to 600.0	%	100.0	At once	2180
E8-14	Speed comparison value reach hysteresis	0.0 to 600.0	%	3.0	At once	2184
E8-15	Speed comparison value reach detection time	0.00 to 100.00	s	3.00	At once	2188
E8-16	Target speed reach hysteresis	0.0 to 600.0	%	3.0	At once	2192
E8-17	Target speed reach detection time	0.0 to 100.0	s	3.0	At once	2196

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E8-18	Output phase loss detection	Ones: Detection before startup 0: Disable 1: Enable Tens: Detection during operation 0: Disable 1: Enable	-	10	At stop	2200
E8-19	Output phase loss detection current threshold	0.0 to 100.0	%	5.0	At once	2240
E8-20	Output phase loss detection time	0.010 to 60.000	s	1.000	At once	2244
E8-21	Short-circuit to ground detection mode	0: Disable 1: Detection before power-on 2: Detection before operation 3: Detection before power-on and operation	-	1	At stop	2176
E8-22	Instantaneous overcurrent protection of synchronous motor	0: Disable 1: Enable	-	1	At once	1624
E8-23	Instantaneous overcurrent protection threshold of synchronous motor	0.1 to 800.0	%	300.0	At once	1628
E8-24	Input phase loss detection mode	0: Disable 1: Detection for both software and hardware 2: Detection for software 3: Detection for hardware	-	1	At once	1564
E8-25	Input pre-charge contactor detection	0: Disable 1: Enable	-	1	At once	1632
E8-29	Motor temperature 1 detection source	0: Disable 1: PT1 temperature detection 2: PT2 temperature detection 3: PT3 temperature detection 4: AI1 temperature detection Other: K connector	-	0	At once	644
E8-30	Motor over-temperature 1 threshold	0 to 250	℃	130	At once	648
E8-31	Motor over-temperature 1 threshold hysteresis	0 to 100	℃	5	At once	652
E8-32	Motor over-temperature 1 warning value	0 to 250	℃	110	At once	656
E8-33	Motor over-temperature 1 warning hysteresis	0 to 100	℃	5	At once	660

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E8-34	Motor temperature 2 detection source	0: Disable 1: PT1 temperature detection 2: PT2 temperature detection 3: PT3 temperature detection 4: AI1 temperature detection Other: K connector	-	0	At once	664
E8-35	Motor over-temperature 2 threshold	0 to 250	℃	130	At once	668
E8-36	Motor over-temperature 2 threshold hysteresis	0 to 100	℃	5	At once	672
E8-37	Motor over-temperature 2 warning value	0 to 250	℃	110	At once	676
E8-38	Motor over-temperature 2 warning hysteresis	0 to 100	℃	5	At once	680
E8-39	Motor temperature 3 detection source	0: Disable 1: PT1 temperature detection 2: PT2 temperature detection 3: PT3 temperature detection 4: AI1 temperature detection Other: K connector	-	0	At once	2220
E8-40	Motor over-temperature 3 threshold	0 to 250	℃	130	At once	2224
E8-41	Motor over-temperature 3 threshold hysteresis	0 to 100	℃	5	At once	2228
E8-42	Motor over-temperature 3 warning value	0 to 250	℃	110	At once	2232
E8-43	Motor over-temperature 3 warning hysteresis	0 to 100	℃	5	At once	2236
E8-48	Motor locked-rotor detection	0: Disable 1: Enable Other: B connector	-	1151	At once	2664
E8-49	Motor locked-rotor speed reference	0.0 to 100.0	%	6.0	At once	2668
E8-50	Motor locked-rotor detection time	0.000 to 65.000	s	2.000	At once	2672
E8-55	Current control exception detection	0: Disable 1: Enable	-	1	At once	2676
E8-56	Current control exception detection threshold	10.0 to 80.0	%	25.0	At once	2680
E8-57	Current control exception detection time	0 to 500	ms	50	At once	2684
E9: V_{dc} Protection						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E9-00	VdcMin control	0: Disable 1: Enable	-	0	At stop	2260
E9-01	VdcMin recovery voltage hysteresis	1 to 50	%	20	At stop	2264
E9-02	Duration for judging VdcMin voltage recovery	0.1 to 100.0	s	0.5	At stop	2268
E9-04	VdcMin recovery frequency hysteresis	0.0 to 10.0	Hz	2.0	At once	1968
E9-05	VdcMin mode in V/f control mode	0: Mode 0 1: Mode 1	-	0	At once	1984
E9-03	VdcMin voltage reserve	20 to 300	%	50	At stop	2272
E9-06	VdcMin frequency modulation gain	0 to 100	-	40	At once	2276
E9-07	VdcMin integral coefficient	0 to 100	-	30	At once	2280
E9-09	VdcMin minimum running frequency	0.0 to 50.0	Hz	5.0	At stop	2300
E9-10	VdcMinKp adjustment coefficient	0.0 to 1000.0	%	100.0	At once	1976
E9-11	VdcMinKi adjustment coefficient	0.0 to 1000.0	%	100.0	At once	1980
E9-12	VdcMax in vector control mode	0: Disable 1: Enable	-	1	At stop	2288
E9-14	VdcMax action voltage in vector control mode	650.0 to 800.0	V	700.0	At once	2296
E9-15	Actual effective value of VdcMax action voltage in vector control mode	-	V	-	Unchangeable	16671
E9-16	VdcMaxKp adjustment coefficient in vector control mode	0 to 1000.0	%	100.0	At once	1974
E9-17	Bus capacitance coefficient in vector control mode	50.0 to 100.0	%	100.0	At once	1966
E9-18	VdcMax integral in vector control mode	0: Disable 1: Enable	-	0	At once	1962
E9-19	Actual effective value of VdcMax action voltage in V/f control mode	-	V	-	Unchangeable	16670
E9-20	VdcMax in V/f control mode	0: Disable 1: Enable	-	0	At once	1908
E9-21	VdcMax action voltage in V/f control mode	650.0 to 800.0	V	700.0	At once	1912

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E9-22	VdcMax frequency modulation proportional coefficient in V/f control mode	0 to 100	%	30	At once	1916
E9-23	VdcMax voltage regulating gain in V/f control mode	0 to 100	%	30	At once	1920
E9-24	VdcMax frequency increase limit in V/f control mode	0 to 50	Hz	5	At once	1924
E9-25	VdcMax mode in V/f control mode	0: Mode 0 1: Mode 1	-	0	At once	4303
E9-26	Exit voltage in VdcMax mode 0	80 to 100	%	95	At once	4307
E9-27	Voltage closed-loop coefficient in Vdc mode 0	10 to 1000	%	100	At once	4311
E11: Motor Model						
E11-00	FVC-SVC switchover	0: Disable 1: Passive switchover enabled 2: Active switchover enabled	-	0	At stop	2304
E11-01	Active switchover upper frequency	0.0 to 100.0	%	25.0	At once	2308
E11-02	Active switchover lower frequency	0.0 to 100.0	%	15.0	At once	2312
E11-10	Speed open loop in SVC control mode	0: Disable 1: Enable	-	0	At once	2384
E11-11	Speed open loop current reference of asynchronous motor in SVC mode	30 to 170	%	100	At once	2392
E11-12	Speed open loop switchover frequency of asynchronous motor in SVC mode	2.0 to 100.0	Hz	3.0	At once	2396
E11-13	Speed fluctuation suppression coefficient of asynchronous motor in SVC mode	0 to 6	-	3	At once	2400
E11-14	Speed open loop current reference of synchronous motor in SVC mode	10 to 200	%	100	At once	1672
E11-15	Speed open loop switchover frequency of synchronous motor in SVC mode	0.1 to 600.0	Hz	5.0	At stop	1668
E11-16	Speed open loop feedback suppression coefficient of synchronous motor in SVC mode	0 to 300	-	32	At once	1640

5.2.6 Group F: Input and Output

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
F0: DI						
F0-00	DI physical status value	-	-	-	Modification prohibited	16784
F0-01	DI status value after processing	-	-	–	Modification prohibited	16785
F0-02	DI force selection	0x0000 and 0xFFFF	-	0x0000	At once	3277
F0-03	DI force data	0x0000 and 0xFFFF	-	0x0000	At once	3278
F0-04	DI positive and negative logic	0x0000 and 0xFFFF	-	0x0000	At once	3276
F0-05	DI1 filter time	0.000 to 10.000	s	0.010	At once	3281
F0-06	DI2 filter time	0.000 to 10.000	s	0.010	At once	3284
F0-07	DI3 filter time	0.000 to 10.000	s	0.010	At once	3287
F0-08	DI4 filter time	0.000 to 10.000	s	0.010	At once	3290
F0-09	DI5 filter time	0.000 to 10.000	s	0.010	At once	3293
F0-10	DI6 filter time	0.000 to 10.000	s	0.010	At once	3296
F0-11	DI7 (HDI1 used as DI) filter time	0.000 to 10.000	s	0.010	At once	3299
F0-12	DI1 switch-on delay	0.00 to 360.00	s	0.00	At once	3279
F0-13	DI1 switch-off delay	0.00 to 360.00	s	0.00	At once	3280
F0-14	DI2 switch-on delay	0.00 to 360.00	s	0.00	At once	3282
F0-15	DI2 switch-off delay	0.00 to 360.00	s	0.00	At once	3283
F0-16	DI3 switch-on delay	0.00 to 360.00	s	0.00	At once	3285
F0-17	DI3 switch-off delay	0.00 to 360.00	s	0.00	At once	3286
F0-18	DI4 switch-on delay	0.00 to 360.00	s	0.00	At once	3288
F0-19	DI4 switch-off delay	0.00 to 360.00	s	0.00	At once	3289
F0-20	DI5 switch-on delay	0.00 to 360.00	s	0.00	At once	3291
F0-21	DI5 switch-off delay	0.00 to 360.00	s	0.00	At once	3292
F0-22	DI6 switch-on delay	0.00 to 360.00	s	0.00	At once	3294
F0-23	DI6 switch-off delay	0.00 to 360.00	s	0.00	At once	3295
F0-24	DI7 (HDI1 used as DI) switch-on delay	0.00 to 360.00	s	0.00	At once	3297
F0-25	DI7 (HDI1 used as DI) switch-off delay	0.00 to 360.00	s	0.00	At once	3298
F1: DO						
F1-00	DO signal source status value	-	-	-	Modification prohibited	16786
F1-01	Processed DO state value	-	-	-	Modification prohibited	16787
F1-02	DO positive and negative logic	0x0000 and 0xFFFF	-	0x0000	At once	3306

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
F1-03	RO1 signal source	0: Low level 1: High level Other: B connector	-	0	At once	3309
F1-04	RO2 signal source	0: Low level 1: High level Other: B connector	-	0	At once	3312
F1-05	RO3 signal source	0: Low level 1: High level Other: B connector	-	0	At once	3315
F1-06	Signal source of HDO1 used as DO	0: Low level 1: High level Other: B connector	-	0	At once	3318
F1-07	RO1 switch-on delay	0.00 to 360.00	s	0.01	At once	3307
F1-08	RO1 switch-off delay	0.00 to 360.00	s	0.01	At once	3308
F1-09	RO2 switch-on delay	0.00 to 360.00	s	0.01	At once	3310
F1-10	RO2 switch-off delay	0.00 to 360.00	s	0.01	At once	3311
F1-11	RO3 switch-on delay	0.00 to 360.00	s	0.01	At once	3313
F1-12	RO3 switch-off delay	0.00 to 360.00	s	0.01	At once	3314
F1-13	Switch-on delay of HDO1 used as DO	0.00 to 360.00	s	0.01	At once	3316
F1-14	Switch-off delay of HDO1 used as DO	0.00 to 360.00	s	0.01	At once	3317
F2: AI						
F2-00	AI1 input value	-	-	-	Modification prohibited	16792
F2-01	AI1 input proportion	-	%	-	Modification prohibited	16794
F2-02	AI2 input value	-	-	-	Modification prohibited	16793
F2-03	AI2 input proportion	-	%	-	Modification prohibited	16795
F2-04	AI1 type	0: －10 V to +10 V 1: 0 V to 10 V 2: -20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA	-	1	At once	3331
F2-05	Input impedance for AI1 in current mode	0: 500 Ω 1: 250 Ω	-	0	At once	3357

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
F2-06	AI2 type	0: －10 V to +10 V 1: 0 V to 10 V 2: -20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA	-	1	At once	3332
F2-07	Input impedance for AI2 in current mode	0: 500 Ω 1: 250 Ω	-	0	At once	3358
F2-08	Min. input value of AI1 curve	-20.000 to +20.000	-	0.000	At once	3337
F2-09	Min. input proportion of AI1 curve	-600.0 to +600.0	%	0.0	At once	3338
F2-10	Max. input value of AI1 curve	-20.000 to +20.000	-	0.000	At once	3339
F2-11	Max. input proportion of AI1 curve	-600.0 to 600.0	%	0.0	At once	3340
F2-12	Min. input value of AI2 curve	-20.000 to +20.000	-	0.000	At once	3341
F2-13	Min. input proportion of AI2 curve	-600.0 to +600.0	%	0.0	At once	3342
F2-14	Max. input value of AI2 curve	-20.000 to +20.000	-	0.000	At once	3343
F2-15	Max. input proportion of AI2 curve	-600.0 to +600.0	%	0.0	At once	3344
F2-16	Selection when AI value < minimum input value	Ones position: Selection when AI1 value < minimum input value 0: Minimum input proportion 1: 0.0% Tens position: Selection when AI2 value < minimum input value 0: Minimum input proportion 1: 0.0%	-	0	At once	3352
F2-17	AI1 filter time	0.000 to 10.000	s	0.000	At once	3333
F2-18	AI2 filter time	0.000 to 10.000	s	0.000	At once	3334
F2-19	AI1 denoising threshold	0.0 to 20.0	%	0.0	At once	3335
F2-20	AI2 denoising threshold	0.0 to 20.0	%	0.0	At once	3336
F2-21	AI1 zero-crossing threshold	0.0 to 1.0	%	0.0	At once	3353
F2-22	AI2 zero-crossing threshold	0.0 to 1.0	%	0.0	At once	3354
F2-24	AI1	0: Disable 1: Enable Other: B connector	-	1	At once	3355
F2-25	AI2	0: Disable 1: Enable Other: B connector	-	1	At once	3356

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
F2-26	AI1 disconnection monitoring	0: Disable 1: Enable Other: B connector	-	0	At once	3346
F2-27	AI1 disconnection monitoring threshold	0.000 to 4.000	mA	2.000	At once	3347
F2-28	AI1 disconnection monitoring delay	0.00 to 10.00	s	1.00	At once	3348
F2-29	AI2 disconnection monitoring	0: Disable 1: Enable Other: B connector	-	0	At once	3349
F2-30	AI2 disconnection monitoring threshold	0.000 to 4.000	mA	2.000	At once	3350
F2-31	AI2 disconnection monitoring delay	0.00 to 10.00	s	1.00	At once	3351
F2-33	Minimum value monitored through AI1	-20.000 to +20.000	-	0.000	At once	4222
F2-35	Maximum value monitored through AI1	-20.000 to +20.000	-	10.000	At once	4223
F2-37	Minimum value monitored through AI2	-20.000 to +20.000	-	0.000	At once	4224
F2-39	Maximum value monitored through of AI2	-20.000 to +20.000	-	10.000	At once	4225
F2-40	Hysteresis value monitored through AI	0.000 to 1.000	%	0.200	At once	4221
F2-41	AI monitoring function	0: Disable 1: Enable Other: B connector	-	0	At once	4237

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
F2-42	AI monitoring activation condition selection	Bit 00: AI1 value < Minimum value of AI1 0: Invalid 1: Enable Bit 01: AI1 value > Maximum value of AI1 0: Invalid 1: Enable Bit 02: AI2 value < Minimum value of AI2 0: Invalid 1: Enable Bit 03: AI2 value > Maximum value of AI2 0: Invalid 1: Enable Bit 04: Reserved 0: Disabled 1: Enable Bit 05: Reserved 0: Disabled 1: Enable Bit 06: Reserved 0: Disabled 1: Enable Bit 07: Reserved 0: Disabled 1: Enable Bit 08: Reserved 0: Disabled 1: Enable Bit 09: Reserved 0: Disabled 1: Enable Bit 10: Reserved 0: Disabled 1: Enable Bit 11: Reserved 0: Disabled 1: Enable Bit 12: Reserved 0: Disabled 1: Enable	-	0x0000	At once	4238

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
F2-42	AI monitoring activation condition selection	Bit 13: Reserved 0: Disabled 1: Enable Bit 14: Reserved 0: Disabled 1: Enable Bit 15: Reserved 0: Disabled 1: Enable	-	0x0000	At once	4238

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
F2-43	AI monitoring and control channel selection	Bit 00: AI1 monitoring activation in the remote reference channel 1 control mode 0: Invalid 1: Valid Bit 01: AI1 monitoring activation in the remote reference channel 2 control mode 0: Invalid 1: Valid Bit 02: AI1 monitoring activation in the local operating panel control mode 0: Invalid 1: Valid Bit 03: AI2 monitoring activation in the remote reference channel 1 control mode 0: Invalid 1: Valid Bit 04: AI2 monitoring activation in the remote reference channel 2 control mode 0: Invalid 1: Valid Bit 05: AI2 monitoring activation in the local operating panel control mode 0: Invalid 1: Valid Bit 06: Reserved 0: Invalid 1: Valid Bit 07: Reserved 0: Invalid 1: Valid Bit 08: Reserved 0: Invalid 1: Valid	-	0x0000	At once	4239

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
F2-43	AI monitoring and control channel selection	Bit 09: Reserved 0: Invalid 1: Valid Bit 10: Reserved 0: Invalid 1: Valid Bit 11: Reserved 0: Invalid 1: Valid Bit 12: Reserved 0: Invalid 1: Valid Bit 13: Reserved 0: Invalid 1: Valid Bit 14: Reserved 0: Invalid 1: Valid Bit 15: Reserved 0: Invalid 1: Valid	-	0x0000	At once	4239
F2-44	Protection class for AI monitoring activation	0: No action 1: Fault 2: Report an alarm and run at the last speed 3: Report an alarm and run at the safe operation speed	-	0	At once	4240
F2-45	Safe operation speed upon AI monitoring activation	-600.00 to +600.00	%	0.0	At once	4226
F3: AO						
F3-00	AO1 output value	-	-	-	Modification prohibited	16796
F3-01	AO1 output proportion	-	%	-	Modification prohibited	16798
F3-02	AO2 output value	-	-	-	Modification prohibited	16797
F3-03	AO2 output proportion	-	%	-	Modification prohibited	16799
F3-04	AO1 signal source	0: 0 Other: K connector	-	0	At once	3364

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
F3-05	AO2 signal source	0: 0 Other: K connector	-	0	At once	3365
F3-06	AO1 type	0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA	-	0	At once	3362
F3-07	AO2 type	0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA	-	0	At once	3363
F3-08	Min. output proportion of AO1 curve	-600.0 to +600.0	%	0.0	At once	3367
F3-09	Min. output value of AO1 curve	0.000 to 20.000	-	0.000	At once	3366
F3-10	Max. output proportion of AO1 curve	-600.0 to +600.0	%	100.0	At once	3369
F3-11	Max. output value of AO1 curve	0.000 to 20.000	-	10.000	At once	3368
F3-12	Min. output proportion of AO2 curve	-600.0 to +600.0	%	0.0	At once	3371
F3-13	Min. output value of AO2 curve	0.000 to 20.000	-	0.000	At once	3370
F3-14	Max. output proportion of AO2 curve	-600.0 to +600.0	%	100.0	At once	3373
F3-15	Max. output value of AO2 curve	0.000 to 20.000	-	10.000	At once	3372
F4: HDI						
F4-00	HDI1 input value	-	kHz	-	Modification prohibited	16800
F4-01	HDI2 input proportion	-	%	-	Modification prohibited	16801
F4-04	HDI used as DI	Ones position: HDI1 used as DI 0: Disable 1: Enable	-	0	At stop	3386
F4-05	Min. input frequency of HDI1 curve	10.00 to 100.00	kHz	10.0	At once	3382
F4-06	Min. input proportion of HDI1 curve	-600.0 to +600.0	%	0.0	At once	3383
F4-07	Max. input frequency of HDI1 curve	10.00 to 100.00	kHz	100.00	At once	3384
F4-08	Max. input proportion of HDI1 curve	-600.0 to +600.0	%	100.0	At once	3385
F4-13	Selection when HDI value < minimum input value	Ones position: Selection when HDI1 value < minimum input value 0: Minimum input proportion 1: 0.0%	-	0	At once	3381
F4-14	HDI1 filter time	0.000 to 10.000	s	0.100	At once	3380

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
F4-16	HDI zero-crossing threshold	0.0 to 1.0	%	0.0	At once	3379
F5: HDO						
F5-00	HDO1 output value	-	kHz	-	Modification prohibited	16802
F5-01	HDO2 output proportion	-	%	-	Modification prohibited	16804
F5-04	HDO used as common DO	Ones position: HDO1 used as DO 0: Disable 1: Enable	-	0	At stop	3397
F5-05	HDO1 signal source	0: 0 Other: K connector	-	0	At once	3392
F5-07	Min. output proportion of HDO1 curve	-600.0 to +600.0	%	0.0	At once	3394
F5-08	Min. output frequency of HDO1 curve	0.00 to 100.00	kHz	0.00	At once	3393
F5-09	Max. output proportion of HDO1 curve	-600.0 to +600.0	%	100.0	At once	3396
F5-10	Max. output frequency of HDO1 curve	0.00 to 100.00	kHz	100.00	At once	3395
F6: Temperature Detection						
F6-00	PT1 temperature detection type	0: Invalid 1: PT1000 2: PT100 3: PTC130 4: KTY84-130 5: PTC130*3	-	0	At once	3403
F6-01	PT1 temperature detection value	-	℃	-	Modification prohibited	24767
F6-02	PT2 temperature detection type	0: Invalid 1: PT1000 2: PT100 3: PTC130 4: KTY84-130 5: PTC130*3	-	0	At once	3404
F6-03	PT2 temperature detection value	-	℃	-	Modification prohibited	24768

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
F6-04	PT3 temperature detection type	0: Invalid 1: PT1000 2: PT100 3: PTC130 4: KTY84-130 5: PTC130*3	-	0	At once	3405
F6-05	PT3 temperature detection value		℃	-	Modification prohibited	24769
F6-06	AI1 temperature detection type	0: Invalid 1: PT1000 2: PT100 3: PTC130 4: KTY84-130 5: PTC130*3	-	0	At once	3406
F6-07	AI1 temperature detection value	-	℃	-	Modification prohibited	24770
F7: Expansion I/O Card						
F7-00	Expanded DI physical state value	-	-	-	Modification prohibited	17682
F7-01	Processed expanded DI state value	-	-	-	Modification prohibited	17683
F7-02	Expanded DI forced selection	0x0000 and 0xFFFF	-	0x0000	At once	4762
F7-03	Expanded DI forced data	0x0000 and 0xFFFF	-	0xx0000	At once	4763
F7-04	Positive and negative logic of expanded DI	0x0000 and 0xFFFF	-	0x0000	At once	4761
F7-05	DI8 filter time	0.000 to 10.000	s	0.010	At once	4766
F7-06	DI9 filter time	0.000 to 10.000	s	0.010	At once	4769
F7-07	DI10 filter time	0.000 to 10.000	s	0.010	At once	4772
F7-08	DI11 filter time	0.000 to 10.000	s	0.010	At once	4775
F7-09	DI8 switch-on delay	0.00 to 360.00	s	0.00	At once	4764
F7-10	DI8 switch-off delay	0.00 to 360.00	s	0.00	At once	4765
F7-11	DI9 switch-on delay	0.00 to 360.00	s	0.00	At once	4767
F7-12	DI9 switch-off delay	0.00 to 360.00	s	0.00	At once	4768
F7-13	DI10 switch-on delay	0.00 to 360.00	s	0.00	At once	4770
F7-14	DI10 switch-off delay	0.00 to 360.00	s	0.00	At once	4771
F7-15	DI11 switch-on delay	0.00 to 360.00	s	0.00	At once	4773
F7-16	DI11 switch-off delay	0.00 to 360.00	s	0.00	At once	4774

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
F7-20	Signal source state value of expanded DO	-	-	-	Modification prohibited	17684
F7-21	Processed expanded DO state value	-	-	-	Modification prohibited	17685
F7-22	Positive and negative logic of expanded DO	0x0000 and 0xFFFF	-	0x0000	At once	4776
F7-23	RO4 signal source	0: Low level 1: High level Other: B connector	-	0	At once	4779
F7-24	RO5 signal source	0: Low level 1: High level Other: B connector	-	0	At once	4782
F7-25	RO4 switch-on delay	0.00 to 360.00	s	0.01	At once	4777
F7-26	RO4 switch-off delay	0.00 to 360.00	s	0.01	At once	4778
F7-27	RO5 switch-on delay	0.00 to 360.00	s	0.01	At once	4780
F7-28	RO5 switch-off delay	0.00 to 360.00	s	0.01	At once	4781
F7-29	RO4 forced output state upon communication disconnection	0: Low level 1: High level	-	0	At once	4855
F7-30	RO5 forced output state upon communication disconnection	0: Low level 1: High level	-	0	At once	4856
F7-40	AI3 input value	-	-	-	Modification prohibited	17686
F7-41	AI3 input proportion	-	%	-	Modification prohibited	17688
F7-42	AI4 input value	-	-	-	Modification prohibited	17687
F7-43	AI4 input proportion	-	%	-	Modification prohibited	17689
F7-44	AI3 type	0: －10 V to +10 V 1: 0 V to 10 V 2: -20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA	-	1	At once	4783
F7-45	AI3 input impedance in current mode	0: 500 Ω 1: 250 Ω	-	0	At once	4808

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
F7-46	AI3 type	0: －10 V to +10 V 1: 0 V to 10 V 2: -20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA	-	1	At once	4784
F7-47	AI3 input impedance in current mode	0: 500 Ω 1: 250 Ω	-	0	At once	4809
F7-48	Min. input value of AI3 curve	-20.000 to +20.000	-	0.000	At once	4789
F7-49	Min. input proportion of AI3 curve	-600.0 to +600.0	%	0.0	At once	4790
F7-50	Max. input value of AI3 curve	-20.000 to +20.000	-	10.000	At once	4791
F7-51	Max. input proportion of AI3 curve	-600.0 to +600.0	%	100.0	At once	4792
F7-52	Min. input value of AI4 curve	-20.000 to +20.000	-	0.000	At once	4793
F7-53	Min. input proportion of AI4 curve	-600.0 to +600.0	%	0.0	At once	4794
F7-54	Max. input value of AI4 curve	-20.000 to +20.000	-	10.000	At once	4795
F7-55	Max. input proportion of AI4 curve	-600.0 to +600.0	%	100.0	At once	4796
F7-56	Selection when AI value < minimum input value	Ones position: Selection when AI3 value < minimum input value 0: Minimum input proportion 1: 0.0% Tens position: Selection when AI4 value < minimum input value 0: Minimum input proportion 1: 0.0%	-	0	Unchangeable	4803
F7-57	AI3 filter time	0.000 to 10.000	s	0.000	At once	4785
F7-58	AI4 filter time	0.000 to 10.000	s	0.000	At once	4786
F7-59	AI3 denoising threshold	0.0 to 20.0	%	0.0	At once	4787
F7-60	AI4 denoising threshold	0.0 to 20.0	%	0.0	At once	4788
F7-61	AI3 zero-crossing threshold	0.0 to 1.0	%	0.0	At once	4787
F7-62	AI4 zero-crossing threshold	0.0 to 1.0	%	0.0	At once	4788
F7-64	AI3	0: Disable 1: Enable Other: B connector	-	1	At once	4806
F7-65	AI4	0: Disable 1: Enable Other: B connector	-	1	At once	4807

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
F7-66	AI3 disconnection monitoring	0: Disable 1: Enable Other: B connector	-	0	At once	4797
F7-67	AI3 disconnection monitoring threshold-current/voltage	-8.000 to +8.000	-	2.000	At once	4798
F7-68	AI3 disconnection monitoring delay	0.00 to 10.00	s	1.00	At once	4799
F7-69	AI4 disconnection monitoring	0: Disable 1: Enable Other: B connector	-	0	At once	4800
F7-70	AI4 disconnection monitoring threshold-current/voltage	-8.000 to +8.000	-	2.000	At once	4801
F7-71	AI4 disconnection monitoring delay	0.00 to 10.00	s	1.00	At once	4802
F7-80	AO3 output value	-	-	-	Modification prohibited	17692
F7-81	AO3 output proportion	-	%	-	Modification prohibited	17694
F7-82	AO4 output value	-	-	-	Modification prohibited	17693
F7-83	AO4 output proportion	-	%	-	Modification prohibited	17695
F7-84	AO3 signal source	0: 0 Other: K connector	-	0	At once	4812
F7-85	AO4 signal source	0: 0 Other: K connector	-	0	At once	4813
F7-86	AO3 type	0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA	-	0	At once	4810
F7-87	AO4 type	0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA	-	0	At once	4811
F7-88	Min. output proportion of AO3 curve	-600.0 to +600.0	%	0.0	At once	4815
F7-89	Min. input value of AO3 curve	0 to 20.000	-	0.000	At once	4814
F7-90	Max. output proportion of AO3 curve	-600.0 to +600.0	%	100.0	At once	4817
F7-91	Max. input value of AO3 curve	0 to 20.000	-	10.000	At once	4816
F7-92	Min. output proportion of AO3 curve	-600.0 to +600.0	%	0.0	At once	4815
F7-93	Min. input value of AO3 curve	0 to 20.000	-	0.000	At once	4814

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
F7-94	Max. output proportion of AO3 curve	-600.0 to +600.0	%	100.0	At once	4817
F7-95	Max. input value of AO3 curve	0 to 20.000	-	10.000	At once	4816

5.2.7 Group H: Faults and Protection

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H0: Troubleshooting						
H0-00	Source of external fault 1	0: Disable 1: Enable Other: B connector	-	0	At once	2986
H0-01	Source of external fault 2	0: Disable 1: Enable Other: B connector	-	0	At once	2987
H0-05	Source of external alarm 1	0: Disable 1: Enable Other: B connector	-	0	At once	2988
H0-06	Source of external alarm 2	0: Disable 1: Enable Other: B connector	-	0	At once	2989
H0-08	STO activation state restoration mode	0: Manual reset 1: Auto reset	-	1	At once	2998
H0-09	STO signal filter time	2 to 20	ms	3	At once	2999
H0-10	Source of user-defined fault 1	0: Disable 1: Enable Other: B connector	-	0	At once	2990
H0-11	Source of user-defined fault 2	0: Disable 1: Enable Other: B connector	-	0	At once	2991
H0-12	Source of user-defined fault 3	0: Disable 1: Enable Other: B connector	-	0	At once	2992
H0-13	Source of user-defined fault 4	0: Disable 1: Enable Other: B connector	-	0	At once	2993
H0-15	Source of user-defined alarm 1	0: Disable 1: Enable Other: B connector	-	0	At once	2994

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H0-16	Source of user-defined alarm 2	0: Disable 1: Enable Other: B connector	-	0	At once	2995
H0-17	Source of user-defined alarm 3	0: Disable 1: Enable Other: B connector	-	0	At once	2996
H0-18	Source of user-defined alarm 4	0: Disable 1: Enable Other: B connector	-	0	At once	2997
H0-19	Reset time for auto reset attempts	0.0 to 6553.5	s	0.0	At once	3234
H0-20	Auto fault reset	0: Disable 1: Enable	-	0	At once	3230
H0-21	Auto reset attempts	0 to 100	-	0	At once	3231
H0-22	Auto reset interval	0.1 to 600.0	s	1.0	At once	3232
H0-23	Auto reset terminated upon manual reset	0: No action 1: Terminate	-	0	At once	3233
H0-24	Remaining auto reset attempts	-	-	-	Unchangeable	3030
H0-25	Code of non-resettable exception 1	0 to 199	-	0	At once	3238
H0-26	Subcode of non-resettable exception 1	0 to 9	-	0	At once	3239
H0-27	Code of non-resettable exception 2	0 to 199	-	0	At once	3240
H0-28	Subcode of non-resettable exception 2	0 to 9	-	0	At once	3241
H0-29	Code of non-resettable exception 3	0 to 199	-	0	At once	3242
H0-30	Subcode of non-resettable exception 3	0 to 9	-	0	At once	3243
H0-31	Code of non-resettable exception 4	0 to 199	-	0	At once	3244
H0-32	Subcode of non-resettable exception 4	0 to 9	-	0	At once	3245
H0-33	Code of non-resettable exception 5	0 to 199	-	0	At once	3246
H0-34	Subcode of non-resettable exception 5	0 to 9	-	0	At once	3247
H0-35	Code of non-resettable exception 6	0 to 199	-	0	At once	3248

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H0-36	Subcode of non-resettable exception 6	0 to 9	-	0	At once	3249
H0-37	Code of non-resettable exception 7	0 to 199	-	0	At once	3250
H0-38	Subcode of non-resettable exception 7	0 to 9	-	0	At once	3251
H0-39	Code of non-resettable exception 8	0 to 199	-	0	At once	3252
H0-40	Subcode of non-resettable exception 8	0 to 9	-	0	At once	3253
H0-41	Code of non-resettable exception 9	0 to 199	-	0	At once	3254
H0-42	Subcode of non-resettable exception 9	0 to 9	-	0	At once	3255
H0-43	Code of non-resettable exception 10	0 to 199	-	0	At once	3256
H0-44	Subcode of non-resettable exception 10	0 to 9	-	0	At once	3257
H0-45	Auto reset status	0: Initializing 1: Disable 2: No fault 4: Waiting at an interval 6: Fault resetting 8: Waiting before restart 10: Auto resetting 11: Reset canceled 12: Reset failed	-	-	Unchangeable	16817
H0-46	Fault level status word	-	-	-	Unchangeable	16816
H0-48	Restart after auto reset	0: Disable 1: Enable	-	0	At once	3258
H0-49	Waiting time of restart after auto reset	0.1 to 600.0	s	0.5	At once	3260
H0-50	Source of exceptions that allow restart	0: Allow restart for specified exception codes 1: Inhibit restart for specified exception codes	-	1	At once	3259
H0-51	Code of specified exception 1	0 to 199	-	0	At once	3264
H0-52	Subcode of specified exception 1	0 to 9	-	0	At once	3265
H0-53	Code of specified exception 2	0 to 199	-	0	At once	3266

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H0-54	Subcode of specified exception 2	0 to 9	-	0	At once	3267
H0-55	Code of specified exception 3	0 to 199	-	0	At once	3268
H0-56	Subcode of specified exception 3	0 to 9	-	0	At once	3269
H0-57	Code of specified exception 4	0 to 199	-	0	At once	3270
H0-58	Subcode of specified exception 4	0 to 9	-	0	At once	3271
H0-59	Code of specified exception 5	0 to 199	-	0	At once	3272
H0-60	Subcode of specified exception 5	0 to 9	-	0	At once	3273
H0-61	Code of specified exception 6	0 to 199	-	0	At once	3274
H0-62	Subcode of specified exception 6	0 to 9	-	0	At once	3275
H0-63	Flying start upon restart after auto reset	0: Specified by users 1: Forced restart by flying start	-	0	At once	3261
H1: Fault Protection Level						
H1-00	Code of exception 1	0 to 199	-	0	At once	3200
H1-01	Subcode of exception 1	0 to 9	-	0	At once	3201
H1-02	Protection level of exception 1	0: No action 1: Coast to stop 2: Stop at maximum capability 3: Quick stop 4: Decelerate to stop 5: Run at limited speed 7: Run at limited current 8: Run at limited torque 9: Display warning 10: Reserved 11: Not detected	-	0	At once	3202
H1-03	Code of exception 2	0 to 199	-	0	At once	3203
H1-04	Subcode of exception 2	0 to 9	-	0	At once	3204

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H1-05	Protection level of exception 2	0: No action 1: Coast to stop 2: Stop at maximum capability 3: Quick stop 4: Decelerate to stop 5: Run at limited speed 7: Run at limited current 8: Run at limited torque 9: Display warning 10: Reserved 11: Not detected	-	0	At once	3205
H1-06	Code of exception 3	0 to 199	-	0	At once	3206
H1-07	Subcode of exception 3	0 to 9	-	0	At once	3207
H1-08	Protection level of exception 3	0: No action 1: Coast to stop 2: Stop at maximum capability 3: Quick stop 4: Decelerate to stop 5: Run at limited speed 7: Run at limited current 8: Run at limited torque 9: Display warning 10: Reserved 11: Not detected	-	0	At once	3208
H1-09	Code of exception 4	0 to 199	-	0	At once	3209
H1-10	Subcode of exception 4	0 to 9	-	0	At once	3210
H1-11	Protection level of exception 4	0: No action 1: Coast to stop 2: Stop at maximum capability 3: Quick stop 4: Decelerate to stop 5: Run at limited speed 7: Run at limited current 8: Run at limited torque 9: Display warning 10: Reserved 11: Not detected	-	0	At once	3211
H1-12	Code of exception 5	0 to 199	-	0	At once	3212
H1-13	Subcode of exception 5	0 to 9	-	0	At once	3213

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H1-14	Protection level of exception 5	0: No action 1: Coast to stop 2: Stop at maximum capability 3: Quick stop 4: Decelerate to stop 5: Run at limited speed 7: Run at limited current 8: Run at limited torque 9: Display warning 10: Reserved 11: Not detected	-	0	At once	3214
H1-15	Code of exception 6	0 to 199	-	0	At once	3215
H1-16	Subcode of exception 6	0 to 9	-	0	At once	3216
H1-17	Protection level of exception 6	0: No action 1: Coast to stop 2: Stop at maximum capability 3: Quick stop 4: Decelerate to stop 5: Run at limited speed 7: Run at limited current 8: Run at limited torque 9: Display warning 10: Reserved 11: Not detected	-	0	At once	3217
H1-18	Code of exception 7	0 to 199	-	0	At once	3218
H1-19	Subcode of exception 7	0 to 9	-	0	At once	3219
H1-20	Protection level of exception 7	0: No action 1: Coast to stop 2: Stop at maximum capability 3: Quick stop 4: Decelerate to stop 5: Run at limited speed 7: Run at limited current 8: Run at limited torque 9: Display warning 10: Reserved 11: Not detected	-	0	At once	3220
H1-21	Code of exception 8	0 to 199	-	0	At once	3221
H1-22	Subcode of exception 8	0 to 9	-	0	At once	3222

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H1-23	Protection level of exception 8	0: No action 1: Coast to stop 2: Stop at maximum capability 3: Quick stop 4: Decelerate to stop 5: Run at limited speed 7: Run at limited current 8: Run at limited torque 9: Display warning 10: Reserved 11: Not detected	-	0	At once	3223
H1-24	Code of exception 9	0 to 199	-	0	At once	3224
H1-25	Subcode of exception 9	0 to 9	-	0	At once	3225
H1-26	Protection level of exception 9	0: No action 1: Coast to stop 2: Stop at maximum capability 3: Quick stop 4: Decelerate to stop 5: Run at limited speed 7: Run at limited current 8: Run at limited torque 9: Display warning 10: Reserved 11: Not detected	-	0	At once	3226
H1-27	Code of exception 10	0 to 199	-	0	At once	3227
H1-28	Subcode of exception 10	0 to 9	-	0	At once	3228
H1-29	Protection level of exception 10	0: No action 1: Coast to stop 2: Stop at maximum capability 3: Quick stop 4: Decelerate to stop 5: Run at limited speed 7: Run at limited current 8: Run at limited torque 9: Display warning 10: Reserved 11: Not detected	-	0	At once	3229
H1-40	OFF2/OFF3 activation detection	0: Disable 1: Enable	-	1	At once	3546

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H1-41	RTC low battery voltage detection	0: Disable 1: Enable	-	1	At once	3547
H1-42	InoLink high load rate detection	0: Disable 1: Enable	-	1	At once	3548
H1-43	Auto fault reset and restart detection	0: Disable 1: Enable	-	1	At once	3549
H1-79	Black box fault trigger mode	0: Triggered by any fault 1: Triggered by fault during running	-	0	At once	3623
H1-80	Speed-limited running mode	0: Run with a maximum speed limit 1: Run at a specified safe speed	-	0	At once	3576
H1-81	Restricted safe running speed	-600.0 to 600.0	%	0.0	At once	3577
H1-82	Forward speed limit in restricted running mode	0.0 to 600.0	%	10.0	At once	3578
H1-83	Reverse speed limit in restricted running mode	-600.0 to 0.0	%	-10.0	At once	3579
H1-86	Forward torque limit in restricted running mode	0.0 to 400.0	%	50.0	At once	3582
H1-87	Reverse torque limit in restricted running mode	-400.0 to 0.0	%	-50.0	At once	3583
H1-88	Maximum allowable current in restricted running mode	50.0 to 400.0	%	90.0	At once	3584
H2: Current Fault Record						
H2-00	Code of current fault 1	-	-	-	Unchangeable	3839
H2-01	Subcode of current fault 1	-	-	-	Unchangeable	3840
H2-02	Information of current fault 1	-	-	-	Unchangeable	3841
H2-03	Code of current fault 2	-	-	-	Unchangeable	3842
H2-04	Subcode of current fault 2	-	-	-	Unchangeable	3843
H2-05	Information of current fault 2	-	-	-	Unchangeable	3844
H2-06	Code of current fault 3	-	-	-	Unchangeable	3845
H2-07	Subcode of current fault 3	-	-	-	Unchangeable	3846
H2-08	Information of current fault 3	-	-	-	Unchangeable	3847
H2-09	Code of current fault 4	-	-	-	Unchangeable	3848
H2-10	Subcode of current fault 4	-	-	-	Unchangeable	3849
H2-11	Information of current fault 4	-	-	-	Unchangeable	3850
H2-12	Code of current fault 5	-	-	-	Unchangeable	3851
H2-13	Subcode of current fault 5	-	-	-	Unchangeable	3852
H2-14	Information of current fault 5	-	-	-	Unchangeable	3853
H2-15	Code of current fault 6	-	-	-	Unchangeable	3854
H2-16	Subcode of current fault 6	-	-	-	Unchangeable	3855

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H2-17	Information of current fault 6	-	-	-	Unchangeable	3856
H2-18	Motor speed upon current fault	-	RPM	-	Unchangeable	3857
H2-19	Output current upon current fault	-	A	-	Unchangeable	3858
H2-20	Bus voltage upon current fault	-	V	-	Unchangeable	3859
H2-21	Output torque upon current fault	-	%	-	Unchangeable	3860
H2-22	Control word 1 upon current fault	-	-	-	Unchangeable	3861
H2-23	Control word 2 upon current fault	-	-	-	Unchangeable	3862
H2-24	Status word 1 upon current fault	-	-	-	Unchangeable	3863
H2-25	State machine upon current fault	-	-	-	Unchangeable	3864
H2-26	Year of current fault	-	-	-	Unchangeable	3868
H2-27	Date of current fault	-	-	-	Unchangeable	3866
H2-28	Hour and minute of current fault	-	-	-	Unchangeable	3865
H2-29	Second of current fault	-	-	-	Unchangeable	3869
H2-30	Millisecond of current fault	-	-	-	Unchangeable	3867
H3: Latest Fault Record						
H3-00	Code of the latest fault 1	-	-	-	Unchangeable	3871
H3-01	Subcode of the latest fault 1	-	-	-	Unchangeable	3872
H3-02	Information of the latest fault 1	-	-	-	Unchangeable	3873
H3-03	Code of the latest fault 2	-	-	-	Unchangeable	3874
H3-04	Subcode of the latest fault 2	-	-	-	Unchangeable	3875
H3-05	Information of the latest fault 2	-	-	-	Unchangeable	3876
H3-06	Code of the latest fault 3	-	-	-	Unchangeable	3877
H3-07	Subcode of the latest fault 3	-	-	-	Unchangeable	3878
H3-08	Information of the latest fault 3	-	-	-	Unchangeable	3879
H3-09	Code of the latest fault 4	-	-	-	Unchangeable	3880
H3-10	Subcode of the latest fault 4	-	-	-	Unchangeable	3881
H3-11	Information of the latest fault 4	-	-	-	Unchangeable	3882
H3-12	Code of the latest fault 5	-	-	-	Unchangeable	3883

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H3-13	Subcode of the latest fault 5	-	-	-	Unchangeable	3884
H3-14	Information of the latest fault 5	-	-	-	Unchangeable	3885
H3-15	Code of the latest fault 6	-	-	-	Unchangeable	3886
H3-16	Subcode of the latest fault 6	-	-	-	Unchangeable	3887
H3-17	Information of the latest fault 6	-	-	-	Unchangeable	3888
H3-18	Motor speed upon the latest fault	-	RPM	-	Unchangeable	3889
H3-19	Output current upon the latest fault	-	A	-	Unchangeable	3890
H3-20	Bus voltage upon the latest fault	-	V	-	Unchangeable	3891
H3-21	Output torque upon the latest fault	-	%	-	Unchangeable	3892
H3-22	Control word 1 upon the latest fault	-	-	-	Unchangeable	3893
H3-23	Control word 2 upon the latest fault	-	-	-	Unchangeable	3894
H3-24	Status word 1 upon the latest fault	-	-	-	Unchangeable	3895
H3-25	State machine upon the latest fault	-	-	-	Unchangeable	3896
H3-26	Year of the latest fault	-	-	-	Unchangeable	3900
H3-27	Date of the latest fault	-	-	-	Unchangeable	3898
H3-28	Hour and minute of the latest fault	-	-	-	Unchangeable	3897
H3-29	Second of the latest fault	-	-	-	Unchangeable	3901
H3-30	Millisecond of the latest fault	-	-	-	Unchangeable	3899
H4: Second Latest Fault Record						
H4-00	Code of the second latest fault 1	-	-	-	Unchangeable	3903
H4-01	Subcode of the second latest fault 1	-	-	-	Unchangeable	3904
H4-02	Information of the second latest fault 1	-	-	-	Unchangeable	3905
H4-03	Code of the second latest fault 2	-	-	-	Unchangeable	3906
H4-04	Subcode of the second latest fault 2	-	-	-	Unchangeable	3907
H4-05	Information of the second latest fault 2	-	-	-	Unchangeable	3908

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H4-06	Code of the second latest fault 3	-	-	-	Unchangeable	3909
H4-07	Subcode of the second latest fault 3	-	-	-	Unchangeable	3910
H4-08	Information of the second latest fault 3	-	-	-	Unchangeable	3911
H4-09	Code of the second latest fault 4	-	-	-	Unchangeable	3912
H4-10	Subcode of the second latest fault 4	-	-	-	Unchangeable	3913
H4-11	Information of the second latest fault 4	-	-	-	Unchangeable	3914
H4-12	Code of the second latest fault 5	-	-	-	Unchangeable	3915
H4-13	Subcode of the second latest fault 5	-	-	-	Unchangeable	3916
H4-14	Information of the second latest fault 5	-	-	-	Unchangeable	3917
H4-15	Code of the second latest fault 6	-	-	-	Unchangeable	3918
H4-16	Subcode of the second latest fault 6	-	-	-	Unchangeable	3919
H4-17	Information of the second latest fault 6	-	-	-	Unchangeable	3920
H4-18	Motor speed upon the second latest fault	-	RPM	-	Unchangeable	3921
H4-19	Output current upon the second latest fault	-	A	-	Unchangeable	3922
H4-20	Bus voltage upon the second latest fault	-	V	-	Unchangeable	3923
H4-21	Output torque upon the second latest fault	-	%	-	Unchangeable	3924
H4-22	Control word 1 upon the second latest fault	-	-	-	Unchangeable	3925
H4-23	Control word 2 upon the second latest fault	-	-	-	Unchangeable	3926
H4-24	Status word 1 upon the second latest fault	-	-	-	Unchangeable	3927
H4-25	State machine upon the second latest fault	-	-	-	Unchangeable	3928
H4-26	Year of the second latest fault	-	-	-	Unchangeable	3932
H4-27	Date of the second latest fault	-	-	-	Unchangeable	3930
H4-28	Hour and minute of the second latest fault	-	-	-	Unchangeable	3929

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H4-29	Second of the second latest fault	-	-	-	Unchangeable	3933
H4-30	Millisecond of the second latest fault	-	-	-	Unchangeable	3931
H5: Third Latest Fault Record						
H5-00	Code of the third latest fault 1	-	-	-	Unchangeable	3935
H5-01	Subcode of the third latest fault 1	-	-	-	Unchangeable	3936
H5-02	Information of the third latest fault 1	-	-	-	Unchangeable	3937
H5-03	Code of the third latest fault 2	-	-	-	Unchangeable	3938
H5-04	Subcode of the third latest fault 2	-	-	-	Unchangeable	3939
H5-05	Information of the third latest fault 2	-	-	-	Unchangeable	3940
H5-06	Code of the third latest fault 3	-	-	-	Unchangeable	3941
H5-07	Subcode of the third latest fault 3	-	-	-	Unchangeable	3942
H5-08	Information of the third latest fault 3	-	-	-	Unchangeable	3943
H5-09	Code of the third latest fault 4	-	-	-	Unchangeable	3944
H5-10	Subcode of the third latest fault 4	-	-	-	Unchangeable	3945
H5-11	Information of the third latest fault 4	-	-	-	Unchangeable	3946
H5-12	Code of the third latest fault 5	-	-	-	Unchangeable	3947
H5-13	Subcode of the third latest fault 5	-	-	-	Unchangeable	3948
H5-14	Information of the third latest fault 5	-	-	-	Unchangeable	3949
H5-15	Code of the third latest fault 6	-	-	-	Unchangeable	3950
H5-16	Subcode of the third latest fault 6	-	-	-	Unchangeable	3951
H5-17	Information of the third latest fault 6	-	-	-	Unchangeable	3952
H5-18	Motor speed upon the third latest fault	-	RPM	-	Unchangeable	3953
H5-19	Output current upon the third latest fault	-	A	-	Unchangeable	3954
H5-20	Bus voltage upon the third latest fault	-	V	-	Unchangeable	3955
H5-21	Output torque upon the third latest fault	-	%	-	Unchangeable	3956

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H5-22	Control word 1 upon the third latest fault	-	-	-	Unchangeable	3957
H5-23	Control word 2 upon the third latest fault	-	-	-	Unchangeable	3958
H5-24	Status word 1 upon the third latest fault	-	-	-	Unchangeable	3959
H5-25	State machine upon the third latest fault	-	-	-	Unchangeable	3960
H5-26	Year of the third latest fault	-	-	-	Unchangeable	3964
H5-27	Date of the third latest fault	-	-	-	Unchangeable	3962
H5-28	Hour and minute of the third latest fault	-	-	-	Unchangeable	3961
H5-29	Second of the third latest fault	-	-	-	Unchangeable	3965
H5-30	Millisecond of the third latest fault	-	-	-	Unchangeable	3963
H6: Fourth Latest Fault Record						
H6-00	Code of the fourth latest fault 1	-	-	-	Unchangeable	3967
H6-01	Subcode of the fourth latest fault 1	-	-	-	Unchangeable	3968
H6-02	Information of the fourth latest fault 1	-	-	-	Unchangeable	3969
H6-03	Code of the fourth latest fault 2	-	-	-	Unchangeable	3970
H6-04	Subcode of the fourth latest fault 2	-	-	-	Unchangeable	3971
H6-05	Information of the fourth latest fault 2	-	-	-	Unchangeable	3972
H6-06	Code of the fourth latest fault 3	-	-	-	Unchangeable	3973
H6-07	Subcode of the fourth latest fault 3	-	-	-	Unchangeable	3974
H6-08	Information of the fourth latest fault 3	-	-	-	Unchangeable	3975
H6-09	Code of the fourth latest fault 4	-	-	-	Unchangeable	3976
H6-10	Subcode of the fourth latest fault 4	-	-	-	Unchangeable	3977
H6-11	Information of the fourth latest fault 4	-	-	-	Unchangeable	3978
H6-12	Code of the fourth latest fault 5	-	-	-	Unchangeable	3979

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H6-13	Subcode of the fourth latest fault 5	-	-	-	Unchangeable	3980
H6-14	Information of the fourth latest fault 5	-	-	-	Unchangeable	3981
H6-15	Code of the fourth latest fault 6	-	-	-	Unchangeable	3982
H6-16	Subcode of the fourth latest fault 6	-	-	-	Unchangeable	3983
H6-17	Information of the fourth latest fault 6	-	-	-	Unchangeable	3984
H6-18	Motor speed upon the fourth latest fault	-	RPM	-	Unchangeable	3985
H6-19	Output current upon the fourth latest fault	-	A	-	Unchangeable	3986
H6-20	Bus voltage upon the fourth latest fault	-	V	-	Unchangeable	3987
H6-21	Output torque upon the fourth latest fault	-	%	-	Unchangeable	3988
H6-22	Control word 1 upon the fourth latest fault	-	-	-	Unchangeable	3989
H6-23	Control word 2 upon the fourth latest fault	-	-	-	Unchangeable	3990
H6-24	Status word 1 upon the fourth latest fault	-	-	-	Unchangeable	3991
H6-25	State machine upon the fourth latest fault	-	-	-	Unchangeable	3992
H6-26	Year of the fourth latest fault	-	-	-	Unchangeable	3996
H6-27	Date of the fourth latest fault	-	-	-	Unchangeable	3994
H6-28	Hour and minute of the fourth latest fault	-	-	-	Unchangeable	3993
H6-29	Second of the fourth latest fault	-	-	-	Unchangeable	3997
H6-30	Millisecond of the fourth latest fault	-	-	-	Unchangeable	3995
H7: Fifth Latest Fault Record						
H7-00	Code of the fifth latest fault 1	-	-	-	Unchangeable	3999
H7-01	Subcode of the fifth latest fault 1	-	-	-	Unchangeable	4000
H7-02	Information of the fifth latest fault 1	-	-	-	Unchangeable	4001
H7-03	Code of the fifth latest fault 2	-	-	-	Unchangeable	4002
H7-04	Subcode of the fifth latest fault 2	-	-	-	Unchangeable	4003

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H7-05	Information of the fifth latest fault 2	-	-	-	Unchangeable	4004
H7-06	Code of the fifth latest fault 3	-	-	-	Unchangeable	4005
H7-07	Subcode of the fifth latest fault 3	-	-	-	Unchangeable	4006
H7-08	Information of the fifth latest fault 3	-	-	-	Unchangeable	4007
H7-09	Code of the fifth latest fault 4	-	-	-	Unchangeable	4008
H7-10	Subcode of the fifth latest fault 4	-	-	-	Unchangeable	4009
H7-11	Information of the fifth latest fault 4	-	-	-	Unchangeable	4010
H7-12	Code of the fifth latest fault 5	-	-	-	Unchangeable	4011
H7-13	Subcode of the fifth latest fault 5	-	-	-	Unchangeable	4012
H7-14	Information of the fifth latest fault 5	-	-	-	Unchangeable	4013
H7-15	Code of the fifth latest fault 6	-	-	-	Unchangeable	4014
H7-16	Subcode of the fifth latest fault 6	-	-	-	Unchangeable	4015
H7-17	Information of the fifth latest fault 6	-	-	-	Unchangeable	4016
H7-18	Motor speed upon the fifth latest fault	-	RPM	-	Unchangeable	4017
H7-19	Output current upon the fifth latest fault	-	A	-	Unchangeable	4018
H7-20	Bus voltage upon the fifth latest fault	-	V	-	Unchangeable	4019
H7-21	Output torque upon the fifth latest fault	-	%	-	Unchangeable	4020
H7-22	Control word 1 upon the fifth latest fault	-	-	-	Unchangeable	4021
H7-23	Control word 2 upon the fifth latest fault	-	-	-	Unchangeable	4022
H7-24	Status word 1 upon the fifth latest fault	-	-	-	Unchangeable	4023
H7-25	State machine upon the fifth latest fault	-	-	-	Unchangeable	4024
H7-26	Year of the fifth latest fault	-	-	-	Unchangeable	4028
H7-27	Date of the fifth latest fault	-	-	-	Unchangeable	4026
H7-28	Hour and minute of the fifth latest fault	-	-	-	Unchangeable	4025
H7-29	Second of the fifth latest fault	-	-	-	Unchangeable	4029

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H7-30	Millisecond of the fifth latest fault	-	-	-	Unchangeable	4027
H10: User-Defined Fault Word						
H10-00	Fault word 1.Bit00 code	0 to 65535	-	1	At once	3482
H10-01	Fault word 1.Bit00 subcode	0 to 65535	-	1	At once	3498
H10-02	Fault word 1.Bit01 code	0 to 65535	-	2	At once	3483
H10-03	Fault word 1.Bit01 subcode	0 to 65535	-	1	At once	3499
H10-04	Fault word 1.Bit02 code	0 to 65535	-	5	At once	3484
H10-05	Fault word 1.Bit02 subcode	0 to 65535	-	1	At once	3500
H10-06	Fault word 1.Bit03 code	0 to 65535	-	9	At once	3485
H10-07	Fault word 1.Bit03 subcode	0 to 65535	-	1	At once	3501
H10-08	Fault word 1.Bit04 code	0 to 65535	-	10	At once	3486
H10-09	Fault word 1.Bit04 subcode	0 to 65535	-	1	At once	3502
H10-10	Fault word 1.Bit05 code	0 to 65535	-	11	At once	3487
H10-11	Fault word 1.Bit05 subcode	0 to 65535	-	1	At once	3503
H10-12	Fault word 1.Bit06 code	0 to 65535	-	13	At once	3488
H10-13	Fault word 1.Bit06 subcode	0 to 65535	-	5	At once	3504
H10-14	Fault word 1.Bit07 code	0 to 65535	-	15	At once	3489
H10-15	Fault word 1.Bit07 subcode	0 to 65535	-	1	At once	3505
H10-16	Fault word 1.Bit08 code	0 to 65535	-	15	At once	3490
H10-17	Fault word 1.Bit08 subcode	0 to 65535	-	2	At once	3506
H10-18	Fault word 1.Bit09 code	0 to 65535	-	14	At once	3491
H10-19	Fault word 1.Bit09 subcode	0 to 65535	-	6	At once	3507
H10-20	Fault word 1.Bit10 code	0 to 65535	-	93	At once	3492
H10-21	Fault word 1.Bit10 subcode	0 to 65535	-	1	At once	3508
H10-22	Fault word 1.Bit11 code	0 to 65535	-	23	At once	3493
H10-23	Fault word 1.Bit11 subcode	0 to 65535	-	1	At once	3509
H10-24	Fault word 1.Bit12 code	0 to 65535	-	43	At once	3494
H10-25	Fault word 1.Bit12 subcode	0 to 65535	-	1	At once	3510
H10-26	Fault word 1.Bit13 code	0 to 65535	-	67	At once	3495
H10-27	Fault word 1.Bit13 subcode	0 to 65535	-	1	At once	3511
H10-28	Fault word 1.Bit14 code	0 to 65535	-	68	At once	3496
H10-29	Fault word 1.Bit14 subcode	0 to 65535	-	1	At once	3512
H10-30	Fault word 1.Bit15 code	0 to 65535	-	48	At once	3497
H10-31	Fault word 1.Bit15 subcode	0 to 65535	-	1	At once	3513
H10-32	Fault word 2.Bit00 code	0 to 65535	-	20	At once	3514
H10-33	Fault word 2.Bit00 subcode	0 to 65535	-	1	At once	3530
H10-34	Fault word 2.Bit01 code	0 to 65535	-	20	At once	3515
H10-35	Fault word 2.Bit01 subcode	0 to 65535	-	5	At once	3531
H10-36	Fault word 2.Bit02 code	0 to 65535	-	63	At once	3516

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-37	Fault word 2.Bit02 subcode	0 to 65535	-	1	At once	3532
H10-38	Fault word 2.Bit03 code	0 to 65535	-	63	At once	3517
H10-39	Fault word 2.Bit03 subcode	0 to 65535	-	2	At once	3533
H10-40	Fault word 2.Bit04 code	0 to 65535	-	52	At once	3518
H10-41	Fault word 2.Bit04 subcode	0 to 65535	-	1	At once	3534
H10-42	Fault word 2.Bit05 code	0 to 65535	-	52	At once	3519
H10-43	Fault word 2.Bit05 subcode	0 to 65535	-	2	At once	3535
H10-44	Fault word 2.Bit06 code	0 to 65535	-	117	At once	3520
H10-45	Fault word 2.Bit06 subcode	0 to 65535	-	1	At once	3536
H10-46	Fault word 2.Bit07 code	0 to 65535	-	172	At once	3521
H10-47	Fault word 2.Bit07 subcode	0 to 65535	-	4	At once	3537
H10-48	Fault word 2.Bit08 code	0 to 65535	-	31	At once	3522
H10-49	Fault word 2.Bit08 subcode	0 to 65535	-	1	At once	3538
H10-50	Fault word 2.Bit09 code	0 to 65535	-	42	At once	3523
H10-51	Fault word 2.Bit09 subcode	0 to 65535	-	1	At once	3539
H10-52	Fault word 2.Bit10 code	0 to 65535	-	47	At once	3524
H10-53	Fault word 2.Bit10 subcode	0 to 65535	-	1	At once	3540
H10-54	Fault word 2.Bit11 code	0 to 65535	-	48	At once	3525
H10-55	Fault word 2.Bit11 subcode	0 to 65535	-	2	At once	3541
H10-56	Fault word 2.Bit12 code	0 to 65535	-	84	At once	3526
H10-57	Fault word 2.Bit12 subcode	0 to 65535	-	1	At once	3542
H10-58	Fault word 2.Bit13 code	0 to 65535	-	84	At once	3527
H10-59	Fault word 2.Bit13 subcode	0 to 65535	-	2	At once	3543
H10-60	Fault word 2.Bit14 code	0 to 65535	-	83	At once	3528
H10-61	Fault word 2.Bit14 subcode	0 to 65535	-	3	At once	3544
H10-62	Fault word 2.Bit15 code	0 to 65535	-	83	At once	3529
H10-63	Fault word 2.Bit15 subcode	0 to 65535	-	2	At once	3545

5.2.8 Group L: Application Functions

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L0: Auxiliary Function Parameters						
L0-00	Current running duration threshold	0.0 to 6553.5	min	0.0	At once	3031
L0-01	Hibernation and wakeup function	0: Disable 1: Enable Other: B connector	-	0	At once	3032
L0-02	Hibernation frequency source	0: Digital setting Other: K connector	-	0	At once	3033

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L0-03	Digital setting of hibernation frequency	0.0 to 600.0	%	0.0	At once	3034
L0-04	Hibernation delay time	0.0 to 6553.5	s	0.0	At once	3035
L0-05	Wakeup frequency source	0: Digital setting Other: K connector	-	0	At once	3036
L0-06	Digital setting of wakeup frequency	0.0 to 600.0	%	0.0	At once	3037
L0-07	Wakeup delay time	0.0 to 6553.5	s	0.0	At once	3038
L0-16	Voltage dip resistance function	0: Disable 1: Enable Other: B connector	-	0	At once	3008
L0-17	Automatic restart time for voltage dip resistance	0.1 to 30.0	s	10.0	At once	3009
L0-18	Flying start upon automatic restart for voltage dip resistance	0: Determined by the start mode 1: Forced flying start	-	1	At once	3010
L1: Brake Control Parameters						
L1-00	Brake function selection	0: Without brake 1: With brake but without detection information 2: With brake and detection information	-	0	At stop	3456
L1-01	Brake apply time	0.00 to 30.00	s	0.20	At once	3457
L1-02	Brake close time	0.00 to 30.00	s	0.20	At once	3458
L1-03	Brake feedback point source	0: Brake apply 1: Brake close Other: B connector	-	0	At once	3473
L1-04	Brake feedback fault delay time	0.00 to 30.00	s	2.00	At once	3474
L1-06	Start torque source (only in vector control)	0: Disable 1: Automatic retentive torque 2: Digital setting Other: K connector	-	0	At once	3461
L1-07	Digital setting of start torque	-200.0 to +200.0	%	0.0	At once	3462
L1-08	Gain coefficient of automatic retentive torque	0.0 to 300.0	%	100.0	At once	3463
L1-11	Start speed enable selection	0: Disable 1: Enable	-	0	At once	3459
L1-12	Start speed reference	-30.0 to +30.0	%	0.0	At once	3460
L1-15	Forced brake close command source	0: Invalid 1: Valid Other: B connector	-	0	At once	3472

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L1-16	Actual speed monitoring threshold upon brake close	0.0 to 100.0	%	3.0	At once	3468
L1-17	Actual speed monitoring time upon brake close	0.00 to 300.00	s	0.10	At once	3469
L1-19	Set speed monitoring threshold upon brake closing	0.0 to 100.0	%	0.0	At once	3470
L1-20	Set speed monitoring time upon brake closing	0.00 to 60.0	s	5.00	At once	3471
L1-22	Brake apply permission source	0: Invalid 1: Valid Other: B connector	-	1	At once	3464
L1-23	Comparison value source of brake apply	0: Disable Other: K connector	-	0	At once	3465
L1-24	Comparison threshold of brake apply	0.0 to 300.0	%	0.0	At once	3466
L1-25	Brake apply delay time	0.00 to 30.00	s	0.20	At once	3467
L1-28	Brake operation status	0: Initialization 1: Disable 2: Brake closing 3: Brake closed 4: Brake self-test 5: Determining brake apply conditions 6: Brake applying 7: Brake applied 8: Determining brake close conditions	-	-	Modification prohibited	16826
L1-29	Internal control word of brake	-	-	-	Modification prohibited	16827
L1-30	Internal status word of brake	-	-	-	Modification prohibited	16828
L1-32	Automatic start upon brake failure for protection	0: Disable 1: Enable	-	0	At stop	4758
L1-33	Protection angle judgment threshold upon brake failure	0 to 360	°	60	At once	4759
L1-35	Brake self-test	0: Disable 1: Enable Other: B connector	-	0	At once	4740
L1-36	Brake test hold time	0.01 to 30.00	s	0.30	At once	4741
L1-37	Max. verification torque for brake test	0.0 to 200.0	%	10.0	At once	4742

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L1-38	Torque direction for brake test	0: Not reversed 1: Reversed Other: B connector	-	0	At once	4743
L1-39	Slip speed threshold for brake test	0.01 to 30.00	%	0.10	At once	4744
L1-40	Slip speed hold time for brake test	0.000 to 10.000	s	0.004	At once	4745
L1-41	Self-start activation upon brake test failure	0: Disable 1: Enable	-	0	At once	4747
L4: Process PID Parameters						
L4-00	PID function	0: Disable 1: Enable Other: B connector	-	0	At once	3418
L4-03	PID action direction	0: Forward direction 1: Reverse direction	-	0	At once	3419
L4-04	PID calculation cycle	2 to 20	ms	2	At once	3442
L4-08	PID reference source	0: L4-09 Other: K connector	-	0	At once	3420
L4-09	PID reference digital setting	-600.0 to +600.0	%	0.0	At once	3421
L4-10	PID reference freezing	0: Disable 1: Enable Other: B connector	-	0	At once	3422
L4-11	PID reference filter time	0.00 to 60.00	s	0.00	At once	3423
L4-15	PID feedback source	0: 0 Other: K connector	-	0	At once	3424
L4-16	PID feedback filter time	0.00 to 60.00	s	0.00	At once	3425
L4-20	Additional reference source of PID deviation	0: 0 Other: K connector	-	0	At once	3426
L4-24	PID proportional gain	0.00 to 125.00	-	1.00	At once	3427
L4-25	PID proportional gain coefficient	0: Invalid Other: K connector	-	0	At once	3428
L4-26	PID integral time	0.01 to 100.00	s	2.00	At once	3429
L4-27	PID integral time coefficient	0: Invalid Other: K connector	-	0	At once	3430
L4-36	Additional reference of PID output	0: 0 Other: K connector	-	0	At once	3433
L4-39	PID integral initial value	0: 0 Other: K connector	-	0	At once	3445

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L4-40	PID integral forcibly enable	0: Disable 1: Enable Other: B connector	-	0	At once	3434
L4-41	PID integral mandatory value	0: 0 Other: K connector	-	0	At once	3435
L4-44	PID output limit	0.0 to 600.0	%	100.0	At once	3436
L4-45	Source of PID output upper limit	0: 100% Other: K connector	%	0	At once	3437
L4-46	Source of PID output lower limit	0: 0 Other: K connector	%	0	At once	3438
L4-50	PID output limit change time	0.00 to 100.00	s	2.00	At once	3439
L4-52	PID deviation dead zone enable	0: Disable 1: Enable	-	0	At once	3440
L4-53	PID deviation dead zone range	0.0 to 600.0	%	0.0	At once	3441
L4-56	Detection threshold of PID feedback loss	0.0 to 100.0	%	0.0	At once	3443
L4-57	Detection time of PID feedback loss	0.00 to 60.00	s	0.00	At once	3444
L8: Parameter Monitoring and Modification						
L8-00	Single-word monitoring parameter address 1	0 to 65535	-	0	At once	197
L8-01	Single-word monitoring parameter address 2	0 to 65535	-	0	At once	198
L8-02	Single-word monitoring parameter address 3	0 to 65535	-	0	At once	199
L8-03	Single-word monitoring parameter address 4	0 to 65535	-	0	At once	200
L8-04	Single-word monitoring parameter address 5	0 to 65535	-	0	At once	201
L8-05	Single-word monitoring parameter address 6	0 to 65535	-	0	At once	202
L8-06	Single-word monitoring parameter address 7	0 to 65535	-	0	At once	203
L8-07	Single-word monitoring parameter address 8	0 to 65535	-	0	At once	204
L8-08	Single-word monitoring parameter address 9	0 to 65535	-	0	At once	205
L8-09	Single-word monitoring parameter address 10	0 to 65535	-	0	At once	206
L8-20	Double-word monitoring parameter address 1	0 to 65535	-	0	At once	207

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L8-21	Double-word monitoring parameter address 2	0 to 65535	-	0	At once	208
L8-22	Double-word monitoring parameter address 3	0 to 65535	-	0	At once	209
L8-26	Parameter mapping modification saved to EEPROM	Bit 00: Modification of parameter mapping group 1 0: Not saved 1: Saved Bit 01: Modification of parameter mapping group 2 0: Not saved 1: Saved Bit 02: Modification of parameter mapping group 3 0: Not saved 1: Saved Bit 03: Modification of parameter mapping group 4 0: Not saved 1: Saved Bit 04: Modification of parameter mapping group 5 0: Not saved 1: Saved Bit 05: Modification of parameter mapping group 6 0: Not saved 1: Saved Bit 06: Modification of parameter mapping group 7 0: Not saved 1: Saved Bit 07: Modification of parameter mapping group 8 0: Not saved 1: Saved	-	0x0000	At once	3117

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L8-26	Parameter mapping modification saved to EEPROM	Bit 08: Modification of parameter mapping group 9 0: Not saved 1: Saved bit 09: Modification of parameter mapping group 10 0: Not saved 1: Saved Bit 10: Modification of parameter mapping group 11 0: Not saved 1: Saved Bit 11: Modification of parameter mapping group 12 0: Not saved 1: Saved Bit 12: Modification of parameter mapping group 13 0: Not saved 1: Saved Bit 13: Modification of parameter mapping group 14 0: Not saved 1: Saved Bit 14: Modification of parameter mapping group 15 0: Not saved 1: Saved Bit 15: Modification of parameter mapping group 16 0: Not saved 1: Saved	-	0x0000	At once	3117

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L8-27	Modification range overlimit	Bit 00: Modification of parameter mapping group 1 0: Modification invalid 1: Limit to upper or lower limit Bit 01: Modification of parameter mapping group 2 0: Modification invalid 1: Limit to upper or lower limit Bit 02: Modification of parameter mapping group 3 0: Modification invalid 1: Limit to upper or lower limit	-	0x0000	At once	3116
L8-27	Modification range overlimit	Bit 03: Modification of parameter mapping group 4 0: Modification invalid 1: Limit to upper or lower limit Bit 04: Modification of parameter mapping group 5 0: Modification invalid 1: Limit to upper or lower limit Bit 05: Modification of parameter mapping group 6 0: Modification invalid 1: Limit to upper or lower limit Bit 06: Modification of parameter mapping group 7 0: Modification invalid 1: Limit to upper or lower limit Bit 07: Modification of parameter mapping group 8 0: Modification invalid 1: Limit to upper or lower limit Bit 08: Modification of parameter mapping group 9 0: Modification invalid 1: Limit to upper or lower limit	-	0x0000	At once	3116

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L8-27	Modification range overlimit	Bit 09: Modification of parameter mapping group 10 0: Modification invalid 1: Limit to upper or lower limit Bit 10: Modification of parameter mapping group 11 0: Modification invalid 1: Limit to upper or lower limit Bit 11: Modification of parameter mapping group 12 0: Modification invalid 1: Limit to upper or lower limit Bit 12: Modification of parameter mapping group 13 0: Modification invalid 1: Limit to upper or lower limit Bit 13: Modification of parameter mapping group 14 0: Modification invalid 1: Limit to upper or lower limit Bit 14: Modification of parameter mapping group 15 0: Modification invalid 1: Limit to upper or lower limit Bit 15: Modification of parameter mapping group 16 0: Modification invalid 1: Limit to upper or lower limit	-	0x0000	At once	3116
L8-28	Parameter mapping modification parameter address 1	0 to 65535	-	0	At once	3118
L8-29	Parameter mapping modification source 1	0: Disabled Other: K connector	-	0	At once	3134
L8-30	Parameter mapping modification parameter address 2	0 to 65535	-	0	At once	3119
L8-31	Parameter mapping modification source 2	0: Disabled Other: K connector	-	0	At once	3135
L8-32	Parameter mapping modification parameter address 3	0 to 65535	-	0	At once	3120

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L8-33	Parameter mapping modification source 3	0: Disabled Other: K connector	-	0	At once	3136
L8-34	Parameter mapping modification parameter address 4	0 to 65535	-	0	At once	3121
L8-35	Parameter mapping modification source 4	0: Disabled Other: K connector	-	0	At once	3137
L8-36	Parameter mapping modification parameter address 5	0 to 65535	-	0	At once	3122
L8-37	Parameter mapping modification source 5	0: Disabled Other: K connector	-	0	At once	3138
L8-38	Parameter mapping modification parameter address 6	0 to 65535	-	0	At once	3123
L8-39	Parameter mapping modification source 6	0: Disabled Other: K connector	-	0	At once	3139
L8-40	Parameter mapping modification parameter address 7	0 to 65535	-	0	At once	3124
L8-41	Parameter mapping modification source 7	0: Disabled Other: K connector	-	0	At once	3140
L8-42	Parameter mapping modification parameter address 8	0 to 65535	-	0	At once	3125
L8-43	Parameter mapping modification source 8	0: Disabled Other: K connector	-	0	At once	3141
L8-44	Parameter mapping modification parameter address 9	0 to 65535	-	0	At once	3126
L8-45	Parameter mapping modification source 9	0: Disabled Other: K connector	-	0	At once	3142
L8-46	Parameter mapping modification parameter address 10	0 to 65535	-	0	At once	3127
L8-47	Parameter mapping modification source 10	0: Disabled Other: K connector	-	0	At once	3143
L8-48	Parameter mapping modification parameter address 11	0 to 65535	-	0	At once	3128
L8-49	Parameter mapping modification source 11	0: Disabled Other: K connector	-	0	At once	3144

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L8-50	Parameter mapping modification parameter address 12	0 to 65535	-	0	At once	3129
L8-51	Parameter mapping modification source 12	0: Disabled Other: K connector	-	0	At once	3145
L8-52	Parameter mapping modification parameter address 13	0 to 65535	-	0	At once	3130
L8-53	Parameter mapping modification source 13	0: Disabled Other: K connector	-	0	At once	3146
L8-54	Parameter mapping modification parameter address 14	0 to 65535	-	0	At once	3131
L8-55	Parameter mapping modification source 14	0: Disabled Other: K connector	-	0	At once	3147
L8-56	Parameter mapping modification parameter address 15	0 to 65535	-	0	At once	3132
L8-57	Parameter mapping modification source 15	0: Disabled Other: K connector	-	0	At once	3148
L8-58	Parameter mapping modification parameter address 16	0 to 65535	-	0	At once	3133
L8-59	Parameter mapping modification source 16	0: Disabled Other: K connector	-	0	At once	3149
L9: Constant Setting Module Parameters						
L9-00	Constant reference 1 (U6-00)	-600.0 to +600.0	%	0.0	At once	1371
L9-01	Constant reference 2 (U6-01)	-600.0 to +600.0	%	100.0	At once	1372
L9-02	Constant reference 3 (U6-02)	-600.0 to +600.0	%	-100.0	At once	1373
L9-03	Constant reference 4 (U6-03)	-600.0 to +600.0	%	200.0	At once	1374
L9-04	Constant reference 5 (U6-04)	-600.0 to +600.0	%	-200.0	At once	1375
L9-05	Constant reference 6 (U19-74)	-300.00 to +300.00	%	0.00	At once	1376
L9-06	Constant reference 7 (U19-75)	-300.00 to +300.00	%	100.00	At once	1377
L9-07	Constant reference 8 (U19-76)	-300.00 to +300.00	%	-100.00	At once	1378
L9-08	Constant reference 9 (U19-77)	-300.00 to +300.00	%	200.00	At once	1379
L9-09	Constant reference 10 (U19-78)	-300.00 to +300.00	%	-200.00	At once	1380
L9-10	Constant reference 11 (U6-05)	-32767 to +32767	-	0	At once	2158
L9-11	Constant reference 12 (U6-06)	-32767 to +32767	-	0	At once	2159
L9-12	Constant reference 13 (U6-07)	-32767 to +32767	-	0	At once	2160
L9-13	Constant reference 14 (U6-08)	-32767 to +32767	-	0	At once	2161

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L9-14	Constant reference 15 (U6-09)	-32767 to +32767	-	0	At once	2162
L9-15	Constant reference 16 (U19-79)	-2147483648 to +2147483647	-	0	At once	7178
L9-16	Constant reference 17 (U19-80)	-2147483648 to +2147483647	-	0	At once	7180
L9-17	Constant reference 18 (U19-81)	-2147483648 to +2147483647	-	0	At once	7182
L9-18	Constant reference 19 (U19-82)	-2147483648 to +2147483647	-	0	At once	7184
L9-19	Constant reference 20 (U19-83)	-2147483648 to +2147483647	-	0	At once	7186
L10: Constant Setting Module Parameters						
L10-00	Input of W2B module A	0: Value 0 Other: K connector	-	0	At once	772
L10-01	Input of W2B module B	0: Value 0 Other: K connector	-	0	At once	773
L10-02	Input of W2B module C	0: Value 0 Other: K connector	-	0	At once	774
L10-03	Input of W2B module D	0: Value 0 Other: K connector	-	0	At once	775
L10-04	Input of W2B module E	0: Value 0 Other: K connector	-	0	At once	776
L10-10	Bit-to-word module A	0: Disable 1: Enable	-	0	At once	704
L10-11	Bit 00 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	708
L10-12	Bit 01 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	709
L10-13	Bit 02 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	710
L10-14	Bit 03 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	711
L10-15	Bit 04 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	712
L10-16	Bit 05 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	713

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L10-17	Bit 06 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	714
L10-18	Bit 07 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	715
L10-19	Bit 08 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	716
L10-20	Bit 09 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	717
L10-21	Bit 10 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	718
L10-22	Bit 11 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	719
L10-23	Bit 12 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	720
L10-24	Bit 13 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	721
L10-25	Bit 14 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	722
L10-26	Bit 15 selection of bit-to-word module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	723
L10-27	Bit-to-word module B	0: Disable 1: Enable	-	0	At once	705
L10-28	Bit 00 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	724
L10-29	Bit 01 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	725

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L10-30	Bit 02 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	726
L10-31	Bit 03 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	727
L10-32	Bit 04 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	728
L10-33	Bit 05 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	729
L10-34	Bit 06 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	730
L10-35	Bit 07 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	731
L10-36	Bit 08 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	732
L10-37	Bit 09 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	733
L10-38	Bit 10 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	734
L10-39	Bit 11 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	735
L10-40	Bit 12 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	736
L10-41	Bit 13 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	737
L10-42	Bit 14 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	738

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L10-43	Bit 15 selection of bit-to-word module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	739
L10-44	Bit-to-word module C	0: Disable 1: Enable	-	0	At once	706
L10-45	Bit 00 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	740
L10-46	Bit 01 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	741
L10-47	Bit 02 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	742
L10-48	Bit 03 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	743
L10-49	Bit 04 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	744
L10-50	Bit 05 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	745
L10-51	Bit 06 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	746
L10-52	Bit 07 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	747
L10-53	Bit 08 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	748
L10-54	Bit 09 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	749
L10-55	Bit 10 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	750

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L10-56	Bit 11 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	751
L10-57	Bit 12 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	752
L10-58	Bit 13 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	753
L10-59	Bit 14 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	754
L10-60	Bit 15 selection of bit-to-word module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	755
L10-61	Bit-to-word module D	0: Disable 1: Enable	-	0	At once	707
L10-62	Bit 00 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	756
L10-63	Bit 01 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	757
L10-64	Bit 02 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	758
L10-65	Bit 03 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	759
L10-66	Bit 04 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	760
L10-67	Bit 05 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	761
L10-68	Bit 06 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	762

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L10-69	Bit 07 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	763
L10-70	Bit 08 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	764
L10-71	Bit 09 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	765
L10-72	Bit 10 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	766
L10-73	Bit 11 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	767
L10-74	Bit 12 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	768
L10-75	Bit 13 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	769
L10-76	Bit 14 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	770
L10-77	Bit 15 selection of bit-to-word module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	771
L11: Word-Double Word Conversion Parameters						

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L11-00	Base value coefficient for word-to-double word	Bit 00: Word-to-double word A 0: x 65536 1: x 1 Bit 01: Word-to-double word B 0: x 65536 1: x 1 Bit 02: Word-to-double word C 0: x 65536 1: x 1 Bit 03: Word-to-double word D 0: x 65536 1: x 1 Bit 04: Word-to-double word E 0: x 65536 1: x 1	-	0x0000	At once	1350
L11-01	High word of word-to-double word A	0: Disable Other: K connector	-	0	At once	1335
L11-02	Low word of word-to-double word A	0: Value 0 Other: K connector	-	0	At once	1340
L11-03	Base value of word-to-double word A	0 to 65535	-	0	At once	1345
L11-04	High word of word-to-double word B	0: Disable Other: K connector	-	0	At once	1336
L11-05	Low word of word-to-double word B	0: Value 0 Other: K connector	-	0	At once	1341
L11-06	Base value of word-to-double word B	0 to 65535	-	0	At once	1346
L11-07	High word of word-to-double word C	0: Disable Other: K connector	-	0	At once	1337
L11-08	Low word of word-to-double word C	0: Value 0 Other: K connector	-	0	At once	1342
L11-09	Base value of word-to-double word C	0 to 65535	-	0	At once	1347
L11-10	High word of word-to-double word D	0: Disable Other: K connector	-	0	At once	1338
L11-11	Low word of word-to-double word D	0: Value 0 Other: K connector	-	0	At once	1343
L11-12	Base value of word-to-double word D	0 to 65535	-	0	At once	1348

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L11-13	High word of word-to-double word E	0: Disable Other: K connector	-	00	At once	1339
L11-14	Low word of word-to-double word E	0: Value 0 Other: K connector	-	0	At once	1344
L11-15	Base value of word-to-double word E	0 to 65535	-	0	At once	1349
L11-28	Base value coefficient for double word-to word	Bit 00: Double word-to-word A 0: x 65536 1: x 1 Bit 01: Double word-to-word B 0: x 65536 1: x 1 Bit 02: Double word-to-word C 0: x 65536 1: x 1 Bit 03: Double word-to-word D 0: x 65536 1: x 1 Bit 04: Double word-to-word E 0: x 65536 1: x 1	-	0x0000	At once	1333
L11-29	Double word-to-word A	0: Disable Other: K connector	-	0	At once	1319
L11-30	Base value of double word-to-word A	0 to 65535	-	0	At once	1326
L11-31	Double word-to-word B	0: Disable Other: K connector	-	0	At once	1320
L11-32	Base value of double word-to-word B	0 to 65535	-	0	At once	1327
L11-33	Double word-to-word C	0: Disable Other: K connector	-	0	At once	1321
L11-34	Base value of double word-to-word C	0 to 65535	-	0	At once	1328
L11-35	Double word-to-word D	0: Disable Other: K connector	-	0	At once	1322
L11-36	Base value of double word-to-word D	0 to 65535	-	0	At once	1329
L11-37	Double word-to-word E	0: Disable Other: K connector	-	0	At once	1323

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L11-38	Base value of double word-to-word E	0 to 65535	-	0	At once	1330
L12: Logic Function Parameters						
L12-00	Function of logic AND/OR module A	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	836
L12-01	Input 1 of logic AND/OR module A	0: Logic 0 Other: B connector	-	0	At once	780
L12-02	Input 2 of logic AND/OR module A	0: Logic 0 Other: B connector	-	0	At once	781
L12-03	Input 3 of logic AND/OR module A	0: Logic 0 Other: B connector	-	0	At once	782
L12-04	Input 4 of logic AND/OR module A	0: Logic 0 Other: B connector	-	0	At once	783
L12-05	Function of logic AND/OR module B	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	837
L12-06	Input 1 of logic AND/OR module B	0: Logic 0 Other: B connector	-	0	At once	784
L12-07	Input 2 of logic AND/OR module B	0: Logic 0 Other: B connector	-	0	At once	785
L12-08	Input 3 of logic AND/OR module B	0: Logic 0 Other: B connector	-	0	At once	786
L12-09	Input 4 of logic AND/OR module B	0: Logic 0 Other: B connector	-	0	At once	787
L12-10	Function of logic AND/OR module C	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	838
L12-11	Input 1 of logic AND/OR module C	0: Logic 0 Other: B connector	-	0	At once	788
L12-12	Input 2 of logic AND/OR module C	0: Logic 0 Other: B connector	-	0	At once	789
L12-13	Input 3 of logic AND/OR module C	0: Logic 0 Other: B connector	-	0	At once	790
L12-14	Input 4 of logic AND/OR module C	0: Logic 0 Other: B connector	-	0	At once	791
L12-15	Function of logic AND/OR module D	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	839

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L12-16	Input 1 of logic AND/OR module D	0: Logic 0 Other: B connector	-	0	At once	792
L12-17	Input 2 of logic AND/OR module D	0: Logic 0 Other: B connector	-	0	At once	793
L12-18	Input 3 of logic AND/OR module D	0: Logic 0 Other: B connector	-	0	At once	794
L12-19	Input 4 of logic AND/OR module D	0: Logic 0 Other: B connector	-	0	At once	795
L12-20	Function of logic AND/OR module E	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	840
L12-21	Input 1 of logic AND/OR module E	0: Logic 0 Other: B connector	-	0	At once	796
L12-22	Input 2 of logic AND/OR module E	0: Logic 0 Other: B connector	-	0	At once	797
L12-23	Input 3 of logic AND/OR module E	0: Logic 0 Other: B connector	-	0	At once	798
L12-24	Input 4 of logic AND/OR module E	0: Logic 0 Other: B connector	-	0	At once	799
L12-25	Function of logic AND/OR module F	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	841
L12-26	Input 1 of logic AND/OR module F	0: Logic 0 Other: B connector	-	0	At once	800
L12-27	Input 2 of logic AND/OR module F	0: Logic 0 Other: B connector	-	0	At once	801
L12-28	Input 3 of logic AND/OR module F	0: Logic 0 Other: B connector	-	0	At once	802
L12-29	Input 4 of logic AND/OR module F	0: Logic 0 Other: B connector	-	0	At once	803
L12-30	Function of logic AND/OR module G	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	842
L12-31	Input 1 of logic AND/OR module G	0: Logic 0 Other: B connector	-	0	At once	804
L12-32	Input 2 of logic AND/OR module G	0: Logic 0 Other: B connector	-	0	At once	805
L12-33	Input 3 of logic AND/OR module G	0: Logic 0 Other: B connector	-	0	At once	806

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L12-34	Input 4 of logic AND/OR module G	0: Logic 0 Other: B connector	-	0	At once	807
L12-35	Function of logic AND/OR module H	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	843
L12-36	Input 1 of logic AND/OR module H	0: Logic 0 Other: B connector	-	0	At once	808
L12-37	Input 2 of logic AND/OR module H	0: Logic 0 Other: B connector	-	0	At once	809
L12-38	Input 3 of logic AND/OR module H	0: Logic 0 Other: B connector	-	0	At once	810
L12-39	Input 4 of logic AND/OR module H	0: Logic 0 Other: B connector	-	0	At once	811
L12-40	Function of logic AND/OR module I	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	844
L12-41	Input 1 of logic AND/OR module I	0: Logic 0 Other: B connector	-	0	At once	812
L12-42	Input 2 of logic AND/OR module I	0: Logic 0 Other: B connector	-	0	At once	813
L12-43	Input 3 of logic AND/OR module I	0: Logic 0 Other: B connector	-	0	At once	814
L12-44	Function of logic AND/OR module J	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	845
L12-45	Input 1 of logic AND/OR module J	0: Logic 0 Other: B connector	-	0	At once	815
L12-46	Input 2 of logic AND/OR module J	0: Logic 0 Other: B connector	-	0	At once	816
L12-47	Input 3 of logic AND/OR module J	0: Logic 0 Other: B connector	-	0	At once	817
L12-48	Function of logic AND/OR module K	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	846
L12-49	Input 1 of logic AND/OR module K	0: Logic 0 Other: B connector	-	0	At once	818
L12-50	Input 2 of logic AND/OR module K	0: Logic 0 Other: B connector	-	0	At once	819

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L12-51	Input 3 of logic AND/OR module K	0: Logic 0 Other: B connector	-	0	At once	820
L12-52	Function of logic AND/OR module L	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	847
L12-53	Input 1 of logic AND/OR module L	0: Logic 0 Other: B connector	-	0	At once	821
L12-54	Input 2 of logic AND/OR module L	0: Logic 0 Other: B connector	-	0	At once	822
L12-55	Input 3 of logic AND/OR module L	0: Logic 0 Other: B connector	-	0	At once	823
L12-56	Function of logic AND/OR module M	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	848
L12-57	Input 1 of logic AND/OR module M	0: Logic 0 Other: B connector	-	0	At once	824
L12-58	Input 2 of logic AND-OR module M	0: Logic 0 Other: B connector	-	0	At once	825
L12-59	Input 3 of logic AND-OR module M	0: Logic 0 Other: B connector	-	0	At once	826
L12-60	Function of logic AND/OR module N	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	849
L12-61	Input 1 of logic AND/OR module N	0: Logic 0 Other: B connector	-	0	At once	827
L12-62	Input 2 of logic AND-OR module N	0: Logic 0 Other: B connector	-	0	At once	828
L12-63	Input 3 of logic AND-OR module N	0: Logic 0 Other: B connector	-	0	At once	829
L12-64	Function of logic AND/OR module O	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	850
L12-65	Input 1 of logic AND/OR module O	0: Logic 0 Other: B connector	-	0	At once	830
L12-66	Input 2 of logic AND-OR module O	0: Logic 0 Other: B connector	-	0	At once	831
L12-67	Input 3 of logic AND-OR module O	0: Logic 0 Other: B connector	-	0	At once	832

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L12-68	Function of logic AND/OR module P	0: Disable 1: Logic AND 2: Logic OR	-	0	At once	851
L12-69	Input 1 of logic AND/OR module P	0: Logic 0 Other: B connector	-	0	At once	833
L12-70	Input 2 of logic AND-OR module P	0: Logic 0 Other: B connector	-	0	At once	834
L12-71	Input 3 of logic AND-OR module P	0: Logic 0 Other: B connector	-	0	At once	835
L12-72	Input of logic NOT module A	0: Disable Other: B connector	-	0	At once	864
L12-73	Input of logic NOT module B	0: Disable Other: B connector	-	0	At once	865
L12-74	Input of logic NOT module C	0: Disable Other: B connector	-	0	At once	866
L12-75	Input of logic NOT module D	0: Disable Other: B connector	-	0	At once	867
L12-76	Input of logic NOT module E	0: Disable Other: B connector	-	0	At once	868
L12-77	Input of logic NOT module F	0: Disable Other: B connector	-	0	At once	869
L12-78	Input of logic NOT module G	0: Disable Other: B connector	-	0	At once	870
L12-79	Input of logic NOT module H	0: Disable Other: B connector	-	0	At once	871
L12-85	Function of logic XOR/XNOR module A	0: Disable 1: XOR 2: XNOR	-	0	At once	880
L12-86	Input 1 of logic XOR/XNOR module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	896
L12-87	Input 2 of logic XOR/XNOR module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	912
L12-88	Function of logic XOR/XNOR module B	0: Disable 1: XOR 2: XNOR	-	0	At once	881

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L12-89	Input 1 of logic XOR/XNOR module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	897
L12-90	Input 2 of logic XOR/XNOR module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	913
L12-91	Function of logic XOR/XNOR module C	0: Disable 1: XOR 2: XNOR	-	0	At once	882
L12-92	Input 1 of logic XOR/XNOR module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	898
L12-93	Input 2 of logic XOR/XNOR module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	914
L12-94	Function of logic XOR/XNOR module D	0: Disable 1: XOR 2: XNOR	-	0	At once	883
L12-95	Input 1 of logic XOR/XNOR module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	899
L12-96	Input 2 of logic XOR/XNOR module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	915
L13: Arithmetic Function 1 Parameters						
L13-00	Input of absolute value module A	0: Disable Other: K connector	-	0	At once	928
L13-01	Input of absolute value module B	0: Disable Other: K connector	-	0	At once	929
L13-02	Input of absolute value module C	0: Disable Other: K connector	-	0	At once	930
L13-03	Input of absolute value module D	0: Disable Other: K connector	-	0	At once	931
L13-04	Input of absolute value module E	0: Disable Other: K connector	-	0	At once	932
L13-05	Input of absolute value module F	0: Disable Other: K connector	-	0	At once	933
L13-06	Input of absolute value module G	0: Disable Other: K connector	-	0	At once	934

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L13-07	Input of absolute value module H	0: Disable Other: K connector	-	0	At once	935
L13-08	Input 1 of addition and subtraction module A	0: Disable Other: K connector	-	0	At once	940
L13-09	Input 2 of addition and subtraction module A (ADD)	0: Value 0 Other: K connector	-	0	At once	948
L13-10	Input 3 of addition and subtraction module A (ADD)	0: Value 0 Other: K connector	-	0	At once	956
L13-11	Input 4 of addition and subtraction module A (SUBTRACT)	0: Value 0 Other: K connector	-	0	At once	964
L13-12	Input 1 of addition and subtraction module B	0: Disable Other: K connector	-	0	At once	941
L13-13	Input 2 of addition and subtraction module B (ADD)	0: Value 0 Other: K connector	-	0	At once	949
L13-14	Input 3 of addition and subtraction module B (ADD)	0: Value 0 Other: K connector	-	0	At once	957
L13-15	Input 4 of addition and subtraction module B (SUBTRACT)	0: Value 0 Other: K connector	-	0	At once	965
L13-16	Input 1 of addition and subtraction module C	0: Disable Other: K connector	-	0	At once	942
L13-17	Input 2 of addition and subtraction module C (ADD)	0: Value 0 Other: K connector	-	0	At once	950
L13-18	Input 3 of addition and subtraction module C (ADD)	0: Value 0 Other: K connector	-	0	At once	958
L13-19	Input 4 of addition and subtraction module C (SUBTRACT)	0: Value 0 Other: K connector	-	0	At once	966
L13-20	Input 1 of addition and subtraction module D	0: Disable Other: K connector	-	0	At once	943
L13-21	Input 2 of addition and subtraction module D (ADD)	0: Value 0 Other: K connector	-	0	At once	951
L13-22	Input 3 of addition and subtraction module D (ADD)	0: Value 0 Other: K connector	-	0	At once	959
L13-23	Input 4 of addition and subtraction module D (SUBTRACT)	0: Value 0 Other: K connector	-	0	At once	967
L13-24	Input 1 of addition and subtraction module E	0: Disable Other: K connector	-	0	At once	944

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L13-25	Input 2 of addition and subtraction module E (ADD)	0: Value 0 Other: K connector	-	0	At once	952
L13-26	Input 3 of addition and subtraction module E (ADD)	0: Value 0 Other: K connector	-	0	At once	960
L13-27	Input 4 of addition and subtraction module E (SUBTRACT)	0: Value 0 Other: K connector	-	0	At once	968
L13-28	Input 1 of addition and subtraction module F	0: Disable Other: K connector	-	0	At once	945
L13-29	Input 2 of addition and subtraction module F (ADD)	0: Value 0 Other: K connector	-	0	At once	953
L13-30	Input 3 of addition and subtraction module F (ADD)	0: Value 0 Other: K connector	-	0	At once	961
L13-31	Input 4 of addition and subtraction module F (SUBTRACT)	0: Value 0 Other: K connector	-	0	At once	969
L13-32	Input 1 of addition and subtraction module G	0: Disable Other: K connector	-	0	At once	946
L13-33	Input 2 of addition and subtraction module G (ADD)	0: Value 0 Other: K connector	-	0	At once	954
L13-34	Input 3 of addition and subtraction module G (ADD)	0: Value 0 Other: K connector	-	0	At once	962
L13-35	Input 4 of addition and subtraction module G (SUBTRACT)	0: Value 0 Other: K connector	-	0	At once	970
L13-36	Input 1 of addition and subtraction module H	0: Disable Other: K connector	-	0	At once	947
L13-37	Input 2 of addition and subtraction module H (ADD)	0: Value 0 Other: K connector	-	0	At once	955
L13-38	Input 3 of addition and subtraction module H (ADD)	0: Value 0 Other: K connector	-	0	At once	963
L13-39	Input 4 of addition and subtraction module H (SUBTRACT)	0: Value 0 Other: K connector	-	0	At once	971
L13-40	Input 1 of multiplication and division module A	0: Disable Other: K connector	-	0	At once	1004
L13-41	Input 2 of multiplication and division module A (MULTIPLY)	0: No arithmetic operation Other: K connector	-	0	At once	1012
L13-42	Input 3 of multiplication and division module A (DIVIDE)	0: No arithmetic operation Other: K connector	-	0	At once	1020

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L13-43	Input 1 of multiplication and division module B	0: Disable Other: K connector	-	0	At once	1005
L13-44	Input 2 of multiplication and division module B (MULTIPLY)	0: No arithmetic operation Other: K connector	-	0	At once	1013
L13-45	Input 3 of multiplication and division module B (DIVIDE)	0: No arithmetic operation Other: K connector	-	0	At once	1021
L13-46	Input 1 of multiplication and division module C	0: Disable Other: K connector	-	0	At once	1006
L13-47	Input 2 of multiplication and division module C (MULTIPLY)	0: No arithmetic operation Other: K connector	-	0	At once	1014
L13-48	Input 3 of multiplication and division module C (DIVIDE)	0: No arithmetic operation Other: K connector	-	0	At once	1022
L13-49	Input 1 of multiplication and division module D	0: Disable Other: K connector	-	0	At once	1007
L13-50	Input 2 of multiplication and division module D (MULTIPLY)	0: No arithmetic operation Other: K connector	-	0	At once	1015
L13-51	Input 3 of multiplication and division module D (DIVIDE)	0: No arithmetic operation Other: K connector	-	0	At once	1023
L13-52	Input 1 of multiplication and division module E	0: Disable Other: K connector	-	0	At once	1008
L13-53	Input 2 of multiplication and division module E (MULTIPLY)	0: No arithmetic operation Other: K connector	-	0	At once	1016
L13-54	Input 3 of multiplication and division module E (DIVIDE)	0: No arithmetic operation Other: K connector	-	0	At once	1024
L13-55	Input 1 of multiplication and division module F	0: Disable Other: K connector	-	0	At once	1009
L13-56	Input 2 of multiplication and division module F (MULTIPLY)	0: No arithmetic operation Other: K connector	-	0	At once	1017
L13-57	Input 3 of multiplication and division module F (DIVIDE)	0: No arithmetic operation Other: K connector	-	0	At once	1025
L13-58	Input 1 of multiplication and division module G	0: Disable Other: K connector	-	0	At once	1010
L13-59	Input 2 of multiplication and division module G (MULTIPLY)	0: No arithmetic operation Other: K connector	-	0	At once	1018
L13-60	Input 3 of multiplication and division module G (DIVIDE)	0: No arithmetic operation Other: K connector	-	0	At once	1026
L13-61	Input 1 of multiplication and division module H	0: Disable Other: K connector	-	0	At once	1011

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L13-62	Input 2 of multiplication and division module H (MULTIPLY)	0: No arithmetic operation Other: K connector	-	0	At once	1019
L13-63	Input 3 of multiplication and division module H (DIVIDE)	0: No arithmetic operation Other: K connector	-	0	At once	1027
L13-64	Function of comparison module A	0: Disable 1: Input 1 > Input 2 2: Input 1 < Input 2 3: Input 1 = Input 2	-	0	At once	1053
L13-65	Input 1 of comparison module A	0: Value 0 Other: K connector	-	0	At once	1061
L13-66	Input 2 of comparison module A	0: Value 0 Other: K connector	-	0	At once	1069
L13-67	Hysteresis input of comparison module A	0.00 to 200.0	%	0	At once	1077
L13-68	Function of comparison module B	0: Disable 1: Input 1 > Input 2 2: Input 1 < Input 2 3: Input 1 = Input 2	-	0	At once	1054
L13-69	Input 1 of comparison module B	0: Value 0 Other: K connector	-	0	At once	1062
L13-70	Input 2 of comparison module B	0: Value 0 Other: K connector	-	0	At once	1070
L13-71	Hysteresis input of comparison module B	0.00 to 200.0	%	0	At once	1078
L13-72	Function of comparison module C	0: Disable 1: Input 1 > Input 2 2: Input 1 < Input 2 3: Input 1 = Input 2	-	0	At once	1055
L13-73	Input 1 of comparison module C	0: Value 0 Other: K connector	-	0	At once	1063
L13-74	Input 2 of comparison module C	0: Value 0 Other: K connector	-	0	At once	1071
L13-75	Hysteresis input of comparison module C	0.00 to 200.0	%	0	At once	1079
L13-76	Function of comparison module D	0: Disable 1: Input 1 > Input 2 2: Input 1 < Input 2 3: Input 1 = Input 2	-	0	At once	1056

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L13-77	Input 1 of comparison module D	0: Value 0 Other: K connector	-	0	At once	1064
L13-78	Input 2 of comparison module D	0: Value 0 Other: K connector	-	0	At once	1072
L13-79	Hysteresis input of comparison module D	0.00 to 200.0	%	0	At once	1080
L13-80	Function of comparison module E	0: Disable 1: Input 1 > Input 2 2: Input 1 < Input 2 3: Input 1 = Input 2	-	0	At once	1057
L13-81	Input 1 of comparison module E	0: Value 0 Other: K connector	-	0	At once	1065
L13-82	Input 2 of comparison module E	0: Value 0 Other: K connector	-	0	At once	1073
L13-83	Hysteresis input of comparison module E	0.00 to 200.0	%	0	At once	1081
L13-84	Function of comparison module F	0: Disable 1: Input 1 > Input 2 2: Input 1 < Input 2 3: Input 1 = Input 2	-	0	At once	1058
L13-85	Input 1 of comparison module F	0: Value 0 Other: K connector	-	0	At once	1066
L13-86	Input 2 of comparison module F	0: Value 0 Other: K connector	-	0	At once	1074
L13-87	Hysteresis input of comparison module F	0.00 to 200.0	%	0	At once	1082
L13-88	Function of comparison module G	0: Disable 1: Input 1 > Input 2 2: Input 1 < Input 2 3: Input 1 = Input 2	-	0	At once	1059
L13-89	Input 1 of comparison module G	0: Value 0 Other: K connector	-	0	At once	1067
L13-90	Input 2 of comparison module G	0: Value 0 Other: K connector	-	0	At once	1075
L13-91	Hysteresis input of comparison module G	0.00 to 200.0	%	0	At once	1083

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L13-92	Function of comparison module H	0: Disable 1: Input 1 > Input 2 2: Input 1 < Input 2 3: Input 1 = Input 2	-	0	At once	1060
L13-93	Input 1 of comparison module H	0: Value 0 Other: K connector	-	0	At once	1068
L13-94	Input 2 of comparison module H	0: Value 0 Other: K connector	-	0	At once	1076
L13-95	Hysteresis input of comparison module H	0.00 to 200.0	%	0	At once	1084
L14: Arithmetic Function 2 Parameters						
L14-00	Calculation method of proportion module	Bit 00: Proportion module 1 0: Raw value 1: Per-unit value Bit 01: Proportion module 2 0: Raw value 1: Per-unit value Bit 02: Proportion module 3 0: Raw value 1: Per-unit value Bit 03: Proportion module 4 0: Raw value 1: Per-unit value bit04: Proportion module 5 0: Raw value 1: Per-unit value Bit 05: Proportion module 6 0: Raw value 1: Per-unit value bit06: Proportion module 7 0: Raw value 1: Per-unit value Bit 07: Proportion module 8 0: Raw value 1: Per-unit value Bit 08: Proportion module 9 0: Raw value 1: Per-unit value	-	0x0000	At once	3150

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L14-00	Calculation method of proportion module	Bit 09: Proportion module 10 0: Raw value 1: Per-unit value Bit 10: Proportion module 11 0: Raw value 1: Per-unit value Bit 11: Proportion module 12 0: Raw value 1: Per-unit value Bit 12: Proportion module 13 0: Raw value 1: Per-unit value Bit 13: Proportion module 14 0: Raw value 1: Per-unit value Bit 14: Proportion module 15 0: Raw value 1: Per-unit value Bit 15: Proportion module 16 0: Raw value 1: Per-unit value	-	0x0000	At once	3150
L14-01	Data type of numerical value source (source value method)	Bit 00: Proportion module 1 0: Signed 1: Unsigned Bit 01: Proportion module 2 0: Signed 1: Unsigned Bit 02: Proportion module 3 0: Signed 1: Unsigned Bit 03: Proportion module 4 0: Signed 1: Unsigned Bit 04: Proportion module 5 0: Signed 1: Unsigned	-	0x0000	At once	3151

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L14-01	Data type of numerical value source (source value method)	Bit 05: Proportion module 6 0: Signed 1: Unsigned Bit 06: Proportion module 7 0: Signed 1: Unsigned Bit 07: Proportion module 8 0: Signed 1: Unsigned Bit 08: Proportion module 9 0: Signed 1: Unsigned Bit 09: Proportion module 10 0: Signed 1: Unsigned Bit 10: Proportion module 11 0: Signed 1: Unsigned Bit 11: Proportion module 12 0: Signed 1: Unsigned Bit 12: Proportion module 13 0: Signed 1: Unsigned Bit 13: Proportion module 14 0: Signed 1: Unsigned Bit 14: Proportion module 15 0: Signed 1: Unsigned Bit 15: Proportion module 16 0: Signed 1: Unsigned	-	0x0000	At once	3151
L14-02	Numerical value source input 1 of proportion module 1	0: Disabled Other: K connector	-	0	At once	3152
L14-03	Input 2 of proportion module 1 (MULTIPLY)	-32768 to +32767	-	1	At once	3162
L14-04	Input 3 of proportion module 1 (DIVIDE)	1 to 65535	-	1	At once	3172

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L14-05	Numerical value source input 1 of proportion module 2	0: Disabled Other: K connector	-	0	At once	3153
L14-06	Input 2 of proportion module 2 (MULTIPLY)	-32768 to +32767	-	1	At once	3163
L14-07	Input 3 of proportion module 2 (DIVIDE)	1 to 65535	-	1	At once	3173
L14-08	Numerical value source input 1 of proportion module 3	0: Disabled Other: K connector	-	0	At once	3154
L14-09	Input 2 of proportion module 3 (MULTIPLY)	-32768 to +32767	-	1	At once	3164
L14-10	Input 3 of proportion module 3 (DIVIDE)	1 to 65535	-	1	At once	3174
L14-11	Numerical value source input 1 of proportion module 4	0: Disabled Other: K connector	-	0	At once	3155
L14-12	Input 2 of proportion module 4 (MULTIPLY)	-32768 to +32767	-	1	At once	3165
L14-13	Input 3 of proportion module 4 (DIVIDE)	1 to 65535	-	1	At once	3175
L14-14	Numerical value source input 1 of proportion module 5	0: Disabled Other: K connector	-	0	At once	3156
L14-15	Input 2 of proportion module 5 (MULTIPLY)	-32768 to +32767	-	1	At once	3166
L14-16	Input 3 of proportion module 5 (DIVIDE)	1 to 65535	-	1	At once	3176
L14-17	Numerical value source input 1 of proportion module 6	0: Disabled Other: K connector	-	0	At once	3157
L14-18	Input 2 of proportion module 6 (MULTIPLY)	-32768 to +32767	-	1	At once	3167
L14-19	Input 3 of proportion module 6 (DIVIDE)	1 to 65535	-	1	At once	3177
L14-20	Numerical value source input 1 of proportion module 7	0: Disabled Other: K connector	-	0	At once	3158
L14-21	Input 2 of proportion module 7 (MULTIPLY)	-32768 to +32767	-	1	At once	3168
L14-22	Input 3 of proportion module 7 (DIVIDE)	1 to 65535	-	1	At once	3178
L14-23	Numerical value source input 1 of proportion module 8	0: Disabled Other: K connector	-	0	At once	3159
L14-24	Input 2 of proportion module 8 (MULTIPLY)	-32768 to +32767	-	1	At once	3169

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L14-25	Input 3 of proportion module 8 (DIVIDE)	1 to 65535	-	1	At once	3179
L14-26	Numerical value source input 1 of proportion module 9	0: Disabled Other: K connector	-	0	At once	3160
L14-27	Input 2 of proportion module 9 (MULTIPLY)	-32768 to +32767	-	1	At once	3170
L14-28	Input 3 of proportion module 9 (DIVIDE)	1 to 65535	-	1	At once	3180
L14-29	Numerical value source input 1 of proportion module 10	0: Disabled Other: K connector	-	0	At once	3161
L14-30	Input 2 of proportion module 10 (MULTIPLY)	-32768 to +32767	-	1	At once	3171
L14-31	Input 3 of proportion module 10 (DIVIDE)	1 to 65535	-	1	At once	3181
L14-32	Numerical value source input 1 of proportion module 11	0: Disabled Other: K connector	-	0	At once	3182
L14-33	Input 2 of proportion module 11 (MULTIPLY)	-32768 to +32767	-	1	At once	3188
L14-34	Input 3 of proportion module 11 (DIVIDE)	1 to 65535	-	1	At once	3194
L14-35	Numerical value source input 1 of proportion module 12	0: Disabled Other: K connector	-	0	At once	3183
L14-36	Input 2 of proportion module 12 (MULTIPLY)	-32768 to +32767	-	1	At once	3189
L14-37	Input 3 of proportion module 12 (DIVIDE)	1 to 65535	-	1	At once	3195
L14-38	Numerical value source input 1 of proportion module 13	0: Disabled Other: K connector	-	0	At once	3184
L14-39	Input 2 of proportion module 13 (MULTIPLY)	-32768 to +32767	-	1	At once	3190
L14-40	Input 3 of proportion module 13 (DIVIDE)	1 to 65535	-	1	At once	3196
L14-41	Numerical value source input 1 of proportion module 14	0: Disabled Other: K connector	-	0	At once	3185
L14-42	Input 2 of proportion module 14 (MULTIPLY)	-32768 to +32767	-	1	At once	3191
L14-43	Input 3 of proportion module 14 (DIVIDE)	1 to 65535	-	1	At once	3197
L14-44	Numerical value source input 1 of proportion module 15	0: Disabled Other: K connector	-	0	At once	3186

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L14-45	Input 2 of proportion module 15 (MULTIPLY)	-32768 to +32767	-	1	At once	3192
L14-46	Input 3 of proportion module 15 (DIVIDE)	1 to 65535	-	1	At once	3198
L14-47	Numerical value source input 1 of proportion module 16	0: Disabled Other: K connector	-	0	At once	3187
L14-48	Input 2 of proportion module 16 (MULTIPLY)	-32768 to +32767	-	1	At once	3193
L14-49	Input 3 of proportion module 16 (DIVIDE)	1 to 65535	-	1	At once	3199
L15: Switch Function Parameters						
L15-00	Input source of binary selector module A	0: Disable Other: B connector	-	0	At once	1085
L15-01	Input 1 of binary selector module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1101
L15-02	Input 2 of binary selector module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1117
L15-03	Input source of binary selector module B	0: Disable Other: B connector	-	0	At once	1086
L15-04	Input 1 of binary selector module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1102
L15-05	Input 2 of binary selector module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1118
L15-06	Input source of binary selector module C	0: Disable Other: B connector	-	0	At once	1087
L15-07	Input 1 of binary selector module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1103
L15-08	Input 2 of binary selector module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1119
L15-09	Input source of binary selector module D	0: Disable Other: B connector	-	0	At once	1088

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L15-10	Input 1 of binary selector module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1104
L15-11	Input 2 of binary selector module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1120
L15-12	Input source of binary selector module E	0: Disable Other: B connector	-	0	At once	1089
L15-13	Input 1 of binary selector module E	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1105
L15-14	Input 2 of binary selector module E	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1121
L15-15	Input source of binary selector module F	0: Disable Other: B connector	-	0	At once	1090
L15-16	Input 1 of binary selector module F	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1106
L15-17	Input 2 of binary selector module F	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1122
L15-18	Input source of binary selector module G	0: Disable Other: B connector	-	0	At once	1091
L15-19	Input 1 of binary selector module G	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1107
L15-20	Input 2 of binary selector module G	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1123
L15-21	Input source of binary selector module H	0: Disable Other: B connector	-	0	At once	1092
L15-22	Input 1 of binary selector module H	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1108
L15-23	Input 2 of binary selector module H	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1124

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L15-24	Input source of digital selector module A	0: Disable Other: B connector	-	0	At once	1133
L15-25	Input 1 of digital selector module A	0: Value 0 Other: K connector	-	0	At once	1149
L15-26	Input 2 of digital selector module A	0: Value 0 Other: K connector	-	0	At once	1165
L15-27	Input source of digital selector module B	0: Disable Other: B connector	-	0	At once	1134
L15-28	Input 1 of digital selector module B	0: Value 0 Other: K connector	-	0	At once	1150
L15-29	Input 2 of digital selector module B	0: Value 0 Other: K connector	-	0	At once	1166
L15-30	Input source of digital selector module C	0: Disable Other: B connector	-	0	At once	1135
L15-31	Input 1 of digital selector module C	0: Value 0 Other: K connector	-	0	At once	1151
L15-32	Input 2 of digital selector module C	0: Value 0 Other: K connector	-	0	At once	1167
L15-33	Input source of digital selector module D	0: Disable Other: B connector	-	0	At once	1136
L15-34	Input 1 of digital selector module D	0: Value 0 Other: K connector	-	0	At once	1152
L15-35	Input 2 of digital selector module D	0: Value 0 Other: K connector	-	0	At once	1168
L15-36	Input source of digital selector module E	0: Disable Other: B connector	-	0	At once	1137
L15-37	Input 1 of digital selector module E	0: Value 0 Other: K connector	-	0	At once	1153
L15-38	Input 2 of digital selector module E	0: Value 0 Other: K connector	-	0	At once	1169
L15-39	Input source of digital selector module F	0: Disable Other: B connector	-	0	At once	1138
L15-40	Input 1 of digital selector module F	0: Value 0 Other: K connector	-	0	At once	1154
L15-41	Input 2 of digital selector module F	0: Value 0 Other: K connector	-	0	At once	1170
L15-42	Input source of digital selector module G	0: Disable Other: B connector	-	0	At once	1139

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L15-43	Input 1 of digital selector module G	0: Value 0 Other: K connector	-	0	At once	1155
L15-44	Input 2 of digital selector module G	0: Value 0 Other: K connector	-	0	At once	1171
L15-45	Input source of digital selector module H	0: Disable Other: B connector	-	0	At once	1140
L15-46	Input 1 of digital selector module H	0: Value 0 Other: K connector	-	0	At once	1156
L15-47	Input 2 of digital selector module H	0: Value 0 Other: K connector	-	0	At once	1172
L16: Control Function Parameters						
L16-00	Filter module A	0: Enable 1: Disable Other: B connector	-	0	At once	1181
L16-01	Input of filter module A	0: 0 Other: K connector	-	0	At once	1185
L16-02	Filter time of filter module A	0.000 to 60.000	s	0.000	At once	1189
L16-03	Filter module B	0: Enable 1: Disable Other: B connector	-	0	At once	1182
L16-04	Input of filter module B	0: 0 Other: K connector	-	0	At once	1186
L16-05	Filter time of filter module B	0.000 to 60.000	s	0.000	At once	1190
L16-06	Filter module C	0: Enable 1: Disable Other: B connector	-	0	At once	1183
L16-07	Input of filter module C	0: 0 Other: K connector	-	0	At once	1187
L16-08	Filter time of filter module C	0.000 to 60.000	s	0.000	At once	1191
L16-09	Filter module D	0: Enable 1: Disable Other: B connector	-	0	At once	1184
L16-10	Input of filter module D	0: 0 Other: K connector	-	0	At once	1188
L16-11	Filter time of filter module D	0.000 to 60.000	s	0.000	At once	1192
L16-24	Function of level-pulse conversion module A	0: Disable 1: Level to pulse 2: Pulse to level	-	0	At once	1253

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L16-25	Input of level-pulse conversion module A	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1257
L16-26	Pulse width of level-pulse conversion module A	0.00 to 600.000	s	0.10	At once	1261
L16-27	Function of level-pulse conversion module B	0: Disable 1: Level to pulse 2: Pulse to level	-	0	At once	1254
L16-28	Input of level-pulse conversion module B	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1258
L16-29	Pulse width of level-pulse conversion module B	0.00 to 600.000	s	0.10	At once	1262
L16-30	Function of level-pulse conversion module C	0: Disable 1: Level to pulse 2: Pulse to level	-	0	At once	1255
L16-31	Input of level-pulse conversion module C	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1259
L16-32	Pulse width of level-pulse conversion module C	0.00 to 600.000	s	0.10	At once	1263
L16-33	Function of level-pulse conversion module D	0: Disable 1: Level to pulse 2: Pulse to level	-	0	At once	1256
L16-34	Input of level-pulse conversion module D	0: Logic 0 1: Logic 1 Other: B connector	-	0	At once	1260
L16-35	Pulse width of level-pulse conversion module D	0.00 to 600.000	s	0.10	At once	1264
L16-36	Input of limiting module A	0: Disable Other: K connector	-	0	At once	852
L16-37	Upper limit of limiting module A	0: Disable Other: K connector	-	0	At once	856
L16-38	Lower limit of limiting module A	0: Disable Other: K connector	-	0	At once	860
L16-39	Input of limiting module B	0: Disable Other: K connector	-	0	At once	853
L16-40	Upper limit of limiting module B	0: Disable Other: K connector	-	0	At once	857

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L16.41	Lower limit of limiting module B	0: Disable Other: K connector	-	0	At once	861
L16-42	Input of limiting module C	0: Disable Other: K connector	-	0	At once	854
L16-43	Upper limit of limiting module C	0: Disable Other: K connector	-	0	At once	858
L16-44	Lower limit of limiting module C	0: Disable Other: K connector	-	0	At once	862
L16-45	Input of limiting module D	0: Disable Other: K connector	-	0	At once	855
L16-46	Upper limit of limiting module D	0: Disable Other: K connector	-	0	At once	859
L16-47	Lower limit of limiting module D	0: Disable Other: K connector	-	0	At once	863
L16-48	Input of logic delay module A	0: Disable Other: B connector	-	0	At once	1205
L16-49	Switch-on delay time of logic delay module A	0.00 to 600.000	s	0.0	At once	1213
L16-50	Switch-off delay time of logic delay module A	0.00 to 600.000	s	0.0	At once	1221
L16-51	Input of logic delay module B	0: Disable Other: B connector	-	0	At once	1206
L16-52	Switch-on delay time of logic delay module B	0.00 to 600.000	s	0.0	At once	1214
L16-53	Switch-off delay time of logic delay module B	0.00 to 600.000	s	0.0	At once	1222
L16-54	Input of logic delay module C	0: Disable Other: B connector	-	0	At once	1207
L16-55	Switch-on delay time of logic delay module C	0.00 to 600.000	s	0.0	At once	1215
L16-56	Switch-off delay time of logic delay module C	0.00 to 600.000	s	0.0	At once	1223
L16-57	Input of logic delay module D	0: Disable Other: B connector	-	0	At once	1208
L16-58	Switch-on delay time of logic delay module D	0.00 to 600.000	s	0.0	At once	1216
L16-59	Switch-off delay time of logic delay module D	0.00 to 600.000	s	0.0	At once	1224
L16-60	Input of logic delay module E	0: Disable Other: B connector	-	0	At once	1209

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L16-61	Switch-on delay time of logic delay module E	0.00 to 600.000	s	0.0	At once	1217
L16-62	Switch-off delay time of logic delay module E	0.00 to 600.000	s	0.0	At once	1225
L16-63	Input of logic delay module F	0: Disable Other: B connector	-	0	At once	1210
L16-64	Switch-on delay time of logic delay module F	0.00 to 600.000	s	0.0	At once	1218
L16-65	Switch-off delay time of logic delay module F	0.00 to 600.000	s	0.0	At once	1226
L16-66	Input of logic delay module G	0: Disable Other: B connector	-	0	At once	1211
L16-67	Switch-on delay time of logic delay module G	0.00 to 600.000	s	0.0	At once	1219
L16-68	Switch-off delay time of logic delay module G	0.00 to 600.000	s	0.0	At once	1227
L16-69	Input of logic delay module H	0: Disable Other: B connector	-	0	At once	1212
L16-70	Switch-on delay time of logic delay module H	0.00 to 600.000	s	0.0	At once	1220
L16-71	Switch-off delay time of logic delay module H	0.00 to 600.000	s	0.0	At once	1228
L16-72	Setting input of RS flip-flop module A	0: Disable Other: B connector	-	0	At once	3092
L16-73	Reset input of RS flip-flop module A	0: Disable Other: B connector	-	0	At once	3096
L16-74	Setting input of RS flip-flop module B	0: Disable Other: B connector	-	0	At once	3093
L16-75	Reset input of RS flip-flop module B	0: Disable Other: B connector	-	0	At once	3097
L16-76	Setting input of RS flip-flop module C	0: Disable Other: B connector	-	0	At once	3094
L16-77	Reset input of RS flip-flop module C	0: Disable Other: B connector	-	0	At once	3098
L16-78	Setting input of RS flip-flop module D	0: Disable Other: B connector	-	0	At once	3095
L16-79	Reset input of RS flip-flop module D	0: Disable Other: B connector	-	0	At once	3099
L16-80	Input of D flip-flop module A	0: Disable Other: B connector	-	0	At once	3100

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L16-81	Setting input of D flip-flop module A	0: Disable Other: B connector	-	0	At once	3108
L16-82	Reset input of D flip-flop module A	0: Disable Other: B connector	-	0	At once	3104
L16-83	Clock input of D flip-flop module A	0: Disable Other: B connector	-	0	At once	3112
L16-84	Input of D flip-flop module B	0: Disable Other: B connector	-	0	At once	3101
L16-85	Setting input of D flip-flop module B	0: Disable Other: B connector	-	0	At once	3109
L16-86	Reset input of D flip-flop module B	0: Disable Other: B connector	-	0	At once	3105
L16-87	Clock input of D flip-flop module B	0: Disable Other: B connector	-	0	At once	3113
L16-88	Input of D flip-flop module C	0: Disable Other: B connector	-	0	At once	3102
L16-89	Setting input of D flip-flop module C	0: Disable Other: B connector	-	0	At once	3110
L16-90	Reset input of D flip-flop module C	0: Disable Other: B connector	-	0	At once	3106
L16-91	Clock input of D flip-flop module C	0: Disable Other: B connector	-	0	At once	3114
L16-92	Input of D flip-flop module D	0: Disable Other: B connector	-	0	At once	3103
L16-93	Setting input of D flip-flop module D	0: Disable Other: B connector	-	0	At once	3111
L16-94	Reset input of D flip-flop module D	0: Disable Other: B connector	-	0	At once	3107
L16-95	Clock input of D flip-flop module D	0: Disable Other: B connector	-	0	At once	3115
L17: Multi-point Curve Parameters						
L17-00	Input of multi-point curve module A	0: Disable Other: K connector	-	0	At once	1277
L17-01	Setpoint X1 of multi-point curve module A	-600.0 to +600.0	%	0.0	At once	1278
L17-02	Setpoint Y1 of multi-point curve module A	-600.0 to +600.0	%	0.0	At once	1288
L17-03	Setpoint X2 of multi-point curve module A	-600.0 to +600.0	%	10.0	At once	1279

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L17-04	Setpoint Y2 of multi-point curve module A	-600.0 to +600.0	%	10.0	At once	1289
L17-05	Setpoint X3 of multi-point curve module A	-600.0 to +600.0	%	20.0	At once	1280
L17-06	Setpoint Y3 of multi-point curve module A	-600.0 to +600.0	%	20.0	At once	1290
L17-07	Setpoint X4 of multi-point curve module A	-600.0 to +600.0	%	30.0	At once	1281
L17-08	Setpoint Y4 of multi-point curve module A	-600.0 to +600.0	%	30.0	At once	1291
L17-09	Setpoint X5 of multi-point curve module A	-600.0 to +600.0	%	40.0	At once	1282
L17-10	Setpoint Y5 of multi-point curve module A	-600.0 to +600.0	%	40.0	At once	1292
L17-11	Setpoint X6 of multi-point curve module A	-600.0 to +600.0	%	50.0	At once	1283
L17-12	Setpoint Y6 of multi-point curve module A	-600.0 to +600.0	%	50.0	At once	1293
L17-13	Setpoint X7 of multi-point curve module A	-600.0 to +600.0	%	60.0	At once	1284
L17-14	Setpoint Y7 of multi-point curve module A	-600.0 to +600.0	%	60.0	At once	1294
L17-15	Setpoint X8 of multi-point curve module A	-600.0 to +600.0	%	70.0	At once	1285
L17-16	Setpoint Y8 of multi-point curve module A	-600.0 to +600.0	%	70.0	At once	1295
L17-17	Setpoint X9 of multi-point curve module A	-600.0 to +600.0	%	80.0	At once	1286
L17-18	Setpoint Y9 of multi-point curve module A	-600.0 to +600.0	%	80.0	At once	1296
L17-19	Setpoint X10 of multi-point curve module A	-600.0 to +600.0	%	90.0	At once	1287
L17-20	Setpoint Y10 of multi-point curve module A	-600.0 to +600.0	%	90.0	At once	1297
L17-21	Input of multi-point curve module B	0: Disable Other: K connector	-	0	At once	1298
L17-22	Setpoint X1 of multi-point curve module B	-600.0 to +600.0	%	0.0	At once	1299
L17-23	Setpoint Y1 of multi-point curve module B	-600.0 to +600.0	%	0.0	At once	1309
L17-24	Setpoint X2 of multi-point curve module B	-600.0 to +600.0	%	10.0	At once	1300
L17-25	Setpoint Y2 of multi-point curve module B	-600.0 to +600.0	%	10.0	At once	1310

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L17-26	Setpoint X3 of multi-point curve module B	-600.0 to +600.0	%	20.0	At once	1301
L17-27	Setpoint Y3 of multi-point curve module B	-600.0 to +600.0	%	20.0	At once	1311
L17-28	Setpoint X4 of multi-point curve module B	-600.0 to +600.0	%	30.0	At once	1302
L17-29	Setpoint Y4 of multi-point curve module B	-600.0 to +600.0	%	30.0	At once	1312
L17-30	Setpoint X5 of multi-point curve module B	-600.0 to +600.0	%	40.0	At once	1303
L17-31	Setpoint Y5 of multi-point curve module B	-600.0 to +600.0	%	40.0	At once	1313
L17-32	Setpoint X6 of multi-point curve module B	-600.0 to +600.0	%	50.0	At once	1304
L17-33	Setpoint Y6 of multi-point curve module B	-600.0 to +600.0	%	50.0	At once	1314
L17-34	Setpoint X7 of multi-point curve module B	-600.0 to +600.0	%	60.0	At once	1305
L17-35	Setpoint Y7 of multi-point curve module B	-600.0 to +600.0	%	60.0	At once	1315
L17-36	Setpoint X8 of multi-point curve module B	-600.0 to +600.0	%	70.0	At once	1306
L17-37	Setpoint Y8 of multi-point curve module B	-600.0 to +600.0	%	70.0	At once	1316
L17-38	Setpoint X9 of multi-point curve module B	-600.0 to +600.0	%	80.0	At once	1307
L17-39	Setpoint Y9 of multi-point curve module B	-600.0 to +600.0	%	80.0	At once	1317
L17-40	Setpoint X10 of multi-point curve module B	-600.0 to +600.0	%	90.0	At once	1308
L17-41	Setpoint Y10 of multi-point curve module B	-600.0 to +600.0	%	90.0	At once	1318
L17: Limit Function Parameters						
L19-00	Forward hardware limit 1 source	0: Disable Other: B connector	-	0	At once	4399
L19-01	Reverse hardware limit 1 source	0: Disable Other: B connector	-	0	At once	4401
L19-02	Forward hardware limit 2 source	0: Disable Other: B connector	-	0	At once	4400
L19-03	Reverse hardware limit 2 source	0: Disable Other: B connector	-	0	At once	4402

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
L19-04	Hardware limit 1 action	0: Coast to stop 1: Decelerate to stop 2: OFF3 stop 3: Decelerate to run at zero speed	-	0	At once	4403
L19-05	Hardware limit 2 action	0: Coast to stop 1: Decelerate to stop 2: OFF3 stop 3: Decelerate to run at zero speed	-	0	At once	4404
L19-06	Software limit action	0: Coast to stop 1: Decelerate to stop 2: OFF3 stop 3: Decelerate to run at zero speed	-	0	At once	4407
L19-07	Limit deceleration time	0.0 to 1000.0	s	1.0	At once	4411

5.2.9 Group n: Bus Adapter and Expansion Module

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n0: InoLink Module						
n0-00	InoLink enable option	0: Disable 1: Enable Other: B connector	-	0	At once	2764
n0-01	Communication baud rate	0: 1 Mbps 1: 500 kbps 2: 250 kbps	-	1	At once	2765
n0-03	InoLink node address	0: Invalid 1: 1# node 2: 2# node 3: 3# node 4: 4# node 5: 5# node 6: 6# node 7: 7# node 8: 8# node	-	0	At once	2766
n0-04	Communication mode selection	0: Standard mode 1: Faultless mode Other: B connector	-	0	At once	2767
n0-05	Communication timeout time	0.050 to 60.00	s	0.500	At once	2768

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n0-06	Transmission mode for data 1-4	0: No transmission 1: Periodical transmission (2 ms) 2: Periodical transmission (16 ms)	-	0	Unchangeable	2769
n0-07	Transmission mode for data 5-8	0: No transmission 1: Periodical transmission (2 ms) 2: Periodical transmission (16 ms)	-	0	At once	2770
n0-10	Source node of received data 1	0: Invalid 1: 1# node 2: 2# node 3: 3# node 4: 4# node 5: 5# node 6: 6# node 7: 7# node 8: 8# node	-	0	At once	2777
n0-11	Received data 1 source	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	2785
n0-12	Source node of received data 2	0: Invalid 1: 1# node 2: 2# node 3: 3# node 4: 4# node 5: 5# node 6: 6# node 7: 7# node 8: 8# node	-	0	At once	2778

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n0-13	Received data 2 source	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	2786
n0-14	Source node of received data 3	0: Invalid 1: 1# node 2: 2# node 3: 3# node 4: 4# node 5: 5# node 6: 6# node 7: 7# node 8: 8# node	-	0	At once	2779
n0-15	Received data 3 source	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	2787
n0-16	Source node of received data 4	0: Invalid 1: 1# node 2: 2# node 3: 3# node 4: 4# node 5: 5# node 6: 6# node 7: 7# node 8: 8# node	-	0	At once	2780

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n0-17	Received data 4 source	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	2788
n0-18	Source node of received data 5	0: Invalid 1: 1# node 2: 2# node 3: 3# node 4: 4# node 5: 5# node 6: 6# node 7: 7# node 8: 8# node	-	0	At once	2781
n0-19	Received data 5 source	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	2789
n0-20	Source node of received data 6	0: Invalid 1: 1# node 2: 2# node 3: 3# node 4: 4# node 5: 5# node 6: 6# node 7: 7# node 8: 8# node	-	0	At once	2782

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n0-21	Received data 6 source	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	2790
n0-22	Source node of received data 7	0: Invalid 1: 1# node 2: 2# node 3: 3# node 4: 4# node 5: 5# node 6: 6# node 7: 7# node 8: 8# node	-	0	At once	2783
n0-23	Received data 7 source	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	2791
n0-24	Source node of received data 8	0: Invalid 1: 1# node 2: 2# node 3: 3# node 4: 4# node 5: 5# node 6: 6# node 7: 7# node 8: 8# node	-	0	At once	2784

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n0-25	Received data 8 source	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	2792
n0-26	Received data 1 ratio	-8.000 to +8.000	-	1.000	At once	2793
n0-27	Received data 2 ratio	-8.000 to +8.000	-	1.000	At once	2794
n0-28	Received data 3 ratio	-8.000 to +8.000	-	1.000	At once	2795
n0-29	Received data 4 ratio	-8.000 to +8.000	-	1.000	At once	2796
n0-30	Received data 5 ratio	-8.000 to +8.000	-	1.000	At once	2797
n0-31	Received data 6 ratio	-8.000 to +8.000	-	1.000	At once	2798
n0-32	Received data 7 ratio	-8.000 to +8.000	-	1.000	At once	2799
n0-33	Received data 8 ratio	-8.000 to +8.000	-	1.000	At once	2800
n0-34	Sent data 1 selection	0: 0 Other: K connector	-	0	At once	2801
n0-35	Sent data 2 selection	0: 0 Other: K connector	-	0	At once	2802
n0-36	Sent data 3 selection	0: 0 Other: K connector	-	0	At once	2803
n0-37	Sent data 4 selection	0: 0 Other: K connector	-	0	At once	2804
n0-38	Sent data 5 selection	0: 0 Other: K connector	-	0	At once	2805
n0-39	Sent data 6 selection	0: 0 Other: K connector	-	0	At once	2806
n0-40	Sent data 7 selection	0: 0 Other: K connector	-	0	At once	2807
n0-41	Sent data 8 selection	0: 0 Other: K connector	-	0	At once	2808
n1: Onboard Modbus RTU Communication						
n1-00	Modbus enable option	0: Disable 1: Enable	-	1	At once	2809
n1-02	Modbus local address	1 to 255	-	1	At once	2810

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n1-03	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	-	9	At once	2811
n1-04	Modbus data type	0: Even parity check (8-E-1) 1: Odd parity check (8-O-1) 2: No parity check 1 (8-N-2) 3: No parity check 2 (8-N-1)	-	2	At once	2812
n1-08	Modbus response delay	0 to 20	ms	4	At once	2816
n1-09	Modbus communication timeout	0.0 to 600.0	s	0.0	At once	2817
n2: Bus Adapter A						
n2-00	Bus type for bus adapter A	0: Disable 1: Modbus RTU module 3: CANopen module 5: EtherCAT module 7: PROFIBUS DP module 8: PROFINET IO module 9: Customized communication module	-	0	At stop	1403
n2-01	Disconnection detection delay of bus adapter A	0.00 to 60.00	s	0.10	At once	1404
n2-02	Communication mode selection for bus adapter A	0: Standard mode 1: No fault prompt Other: B connector	-	0	At once	1509
n2-03	Continuous CRC error detection setting	0 to 5000	-	0	At once	1406
n2-04	Process data output 1	0: 0 Other: K connector	-	0	At once	1407
n2-05	Process data output 2	0: 0 Other: K connector	-	0	At once	1408
n2-06	Process data output 3	0: 0 Other: K connector	-	0	At once	1409

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n2-07	Process data output 4	0: 0 Other: K connector	-	0	At once	1410
n2-08	Process data output 5	0: 0 Other: K connector	-	0	At once	1411
n2-09	Process data output 6	0: 0 Other: K connector	-	0	At once	1412
n2-10	Process data output 7	0: 0 Other: K connector	-	0	At once	1413
n2-11	Process data output 8	0: 0 Other: K connector	-	0	At once	1414
n2-12	Process data output 9	0: 0 Other: K connector	-	0	At once	1415
n2-13	Process data output 10	0: 0 Other: K connector	-	0	At once	1416
n2-14	Process data output 11	0: 0 Other: K connector	-	0	At once	1417
n2-15	Process data output 12	0: 0 Other: K connector	-	0	At once	1418
n2-16	Process data output 13	0: 0 Other: K connector	-	0	At once	1419
n2-17	Process data output 14	0: 0 Other: K connector	-	0	At once	1420
n2-18	Process data output 15	0: 0 Other: K connector	-	0	At once	1421
n2-19	Process data output 16	0: 0 Other: K connector	-	0	At once	1422
n2-20	Communication base value for process data output 1	0 to 65535	-	0	At once	1439
n2-21	Communication base value for process data output 2	0 to 65535	-	0	At once	1440
n2-22	Communication base value for process data output 3	0 to 65535	-	0	At once	1441
n2-23	Communication base value for process data output 4	0 to 65535	-	0	At once	1442
n2-24	Communication base value for process data output 5	0 to 65535	-	0	At once	1443
n2-25	Communication base value for process data output 6	0 to 65535	-	0	At once	1444
n2-26	Communication base value for process data output 7	0 to 65535	-	0	At once	1445

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n2-27	Communication base value for process data output 8	0 to 65535	-	0	At once	1446
n2-28	Communication base value for process data output 9	0 to 65535	-	0	At once	1447
n2-29	Communication base value for process data output 10	0 to 65535	-	0	At once	1448
n2-30	Communication base value for process data output 11	0 to 65535	-	0	At once	1449
n2-31	Communication base value for process data output 12	0 to 65535	-	0	At once	1450
n2-32	Communication base value for process data output 13	0 to 65535	-	0	At once	1451
n2-33	Communication base value for process data output 14	0 to 65535	-	0	At once	1452
n2-34	Communication base value for process data output 15	0 to 65535	-	0	At once	1453
n2-35	Communication base value for process data output 16	0 to 65535	-	0	At once	1454
n2-36	Communication base value for process data input 1	0 to 65535	-	0	At once	1423
n2-37	Communication base value for process data input 2	0 to 65535	-	0	At once	1424
n2-38	Communication base value for process data input 3	0 to 65535	-	0	At once	1425
n2-39	Communication base value for process data input 4	0 to 65535	-	0	At once	1426
n2-40	Communication base value for process data input 5	0 to 65535	-	0	At once	1427
n2-41	Communication base value for process data input 6	0 to 65535	-	0	At once	1428
n2-42	Communication base value for process data input 7	0 to 65535	-	0	At once	1429
n2-43	Communication base value for process data input 8	0 to 65535	-	0	At once	1430
n2-44	Communication base value for process data input 9	0 to 65535	-	0	At once	1431
n2-45	Communication base value for process data input 10	0 to 65535	-	0	At once	1432
n2-46	Communication base value for process data input 11	0 to 65535	-	0	At once	1433
n2-47	Communication base value for process data input 12	0 to 65535	-	0	At once	1434

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n2-48	Communication base value for process data input 13	0 to 65535	-	0	At once	1435
n2-49	Communication base value for process data input 14	0 to 65535	-	0	At once	1436
n2-50	Communication base value for process data input 15	0 to 65535	-	0	At once	1437
n2-51	Communication base value for process data input 16	0 to 65535	-	0	At once	1438
n2-52	Display of process data output 1	-	-	-	Modification prohibited	17439
n2-53	Display of process data output 2	-	-	-	Modification prohibited	17440
n2-54	Display of process data output 3	-	-	-	Modification prohibited	17441
n2-55	Display of process data output 4	-	-	-	Modification prohibited	17442
n2-56	Display of process data output 5	-	-	-	Modification prohibited	17443
n2-57	Display of process data output 6	-	-	-	Modification prohibited	17444
n2-58	Display of process data output 7	-	-	-	Modification prohibited	17445
n2-59	Display of process data output 8	-	-	-	Modification prohibited	17446
n2-60	Display of process data output 9	-	-	-	Modification prohibited	17447
n2-61	Display of process data output 10	-	-	-	Modification prohibited	17448
n2-62	Display of process data output 11	-	-	-	Modification prohibited	17449
n2-63	Display of process data output 12	-	-	-	Modification prohibited	17450
n2-64	Display of process data output 13	-	-	-	Modification prohibited	17451
n2-65	Display of process data output 14	-	-	-	Modification prohibited	17452
n2-66	Display of process data output 15	-	-	-	Modification prohibited	17453
n2-67	Display of process data output 16	-	-	-	Modification prohibited	17454
n2-68	Display of process data input 1	-	-	-	Modification prohibited	17423

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n2-69	Display of process data input 2	-	-	-	Modification prohibited	17424
n2-70	Display of process data input 3	-	-	-	Modification prohibited	17425
n2-71	Display of process data input 4	-	-	-	Modification prohibited	17426
n2-72	Display of process data input 5	-	-	-	Modification prohibited	17427
n2-73	Display of process data input 6	-	-	-	Modification prohibited	17428
n2-74	Display of process data input 7	-	-	-	Modification prohibited	17429
n2-75	Display of process data input 8	-	-	-	Modification prohibited	17430
n2-76	Display of process data input 9	-	-	-	Modification prohibited	17431
n2-77	Display of process data input 10	-	-	-	Modification prohibited	17432
n2-78	Display of process data input 11	-	-	-	Modification prohibited	17433
n2-79	Display of process data input 12	-	-	-	Modification prohibited	17434
n2-80	Display of process data input 13	-	-	-	Modification prohibited	17435
n2-81	Display of process data input 14	-	-	-	Modification prohibited	17436
n2-82	Display of process data input 15	-	-	-	Modification prohibited	17437
n2-83	Display of process data input 16	-	-	-	Modification prohibited	17438
n2-90	Saving selection for parameter written through adapter A email data	0: Do not save to EEPROM 1: Save to EEPROM	-	1	Unchangeable	4189
n2-91	Upload prohibition of device diagnosis information for adapter A	0: Disable 1: Enable	-	1	Unchangeable	1809
n3: Fieldbus Adapter B						

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n3-00	Bus type for bus adapter B	0: Disable 1: Modbus RTU module 3: CANopen module 5: EtherCAT module 7: PROFIBUS DP module 8: PROFINET IO module 9: Customized communication module	-	0	At stop	1455
n3-01	Disconnection detection delay of bus adapter B	0.00 to 60.00	s	0.10	At once	1456
n3-02	Communication mode selection for bus adapter B	0: Standard mode 1: No fault prompt Other: B connector	-	0	At once	1510
n3-03	Continuous CRC error detection setting	0 to 5000	-	0	At once	1458
n3-04	Process data output 1	0: 0 Other: K connector	-	0	At once	1459
n3-05	Process data output 2	0: 0 Other: K connector	-	0	At once	1460
n3-06	Process data output 3	0: 0 Other: K connector	-	0	At once	1461
n3-07	Process data output 4	0: 0 Other: K connector	-	0	At once	1462
n3-08	Process data output 5	0: 0 Other: K connector	-	0	At once	1463
n3-09	Process data output 6	0: 0 Other: K connector	-	0	At once	1464
n3-10	Process data output 7	0: 0 Other: K connector	-	0	At once	1465
n3-11	Process data output 8	0: 0 Other: K connector	-	0	At once	1466
n3-12	Process data output 9	0: 0 Other: K connector	-	0	At once	1467
n3-13	Process data output 10	0: 0 Other: K connector	-	0	At once	1468
n3-14	Process data output 11	0: 0 Other: K connector	-	0	At once	1469
n3-15	Process data output 12	0: 0 Other: K connector	-	0	At once	1470

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n3-16	Process data output 13	0: 0 Other: K connector	-	0	At once	1471
n3-17	Process data output 14	0: 0 Other: K connector	-	0	At once	1472
n3-18	Process data output 15	0: 0 Other: K connector	-	0	At once	1473
n3-19	Process data output 16	0: 0 Other: K connector	-	0	At once	1474
n3-20	Communication base value for process data output 1	0 to 65535	-	0	At once	1491
n3-21	Communication base value for process data output 2	0 to 65535	-	0	At once	1492
n3-22	Communication base value for process data output 3	0 to 65535	-	0	At once	1493
n3-23	Communication base value for process data output 4	0 to 65535	-	0	At once	1494
n3-24	Communication base value for process data output 5	0 to 65535	-	0	At once	1495
n3-25	Communication base value for process data output 6	0 to 65535	-	0	At once	1496
n3-26	Communication base value for process data output 7	0 to 65535	-	0	At once	1497
n3-27	Communication base value for process data output 8	0 to 65535	-	0	At once	1498
n3-28	Communication base value for process data output 9	0 to 65535	-	0	At once	1499
n3-29	Communication base value for process data output 10	0 to 65535	-	0	At once	1500
n3-30	Communication base value for process data output 11	0 to 65535	-	0	At once	1501
n3-31	Communication base value for process data output 12	0 to 65535	-	0	At once	1502
n3-32	Communication base value for process data output 13	0 to 65535	-	0	At once	1503
n3-33	Communication base value for process data output 14	0 to 65535	-	0	At once	1504
n3-34	Communication base value for process data output 15	0 to 65535	-	0	At once	1505
n3-35	Communication base value for process data output 16	0 to 65535	-	0	At once	1506
n3-36	Communication base value for process data input 1	0 to 65535	-	0	At once	1475

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n3-37	Communication base value for process data input 2	0 to 65535	-	0	At once	1476
n3-38	Communication base value for process data input 3	0 to 65535	-	0	At once	1477
n3-39	Communication base value for process data input 4	0 to 65535	-	0	At once	1478
n3-40	Communication base value for process data input 5	0 to 65535	-	0	At once	1479
n3-41	Communication base value for process data input 6	0 to 65535	-	0	At once	1480
n3-42	Communication base value for process data input 7	0 to 65535	-	0	At once	1481
n3-43	Communication base value for process data input 8	0 to 65535	-	0	At once	1482
n3-44	Communication base value for process data input 9	0 to 65535	-	0	At once	1483
n3-45	Communication base value for process data input 10	0 to 65535	-	0	At once	1484
n3-46	Communication base value for process data input 11	0 to 65535	-	0	At once	1485
n3-47	Communication base value for process data input 12	0 to 65535	-	0	At once	1486
n3-48	Communication base value for process data input 13	0 to 65535	-	0	At once	1487
n3-49	Communication base value for process data input 14	0 to 65535	-	0	At once	1488
n3-50	Communication base value for process data input 15	0 to 65535	-	0	At once	1489
n3-51	Communication base value for process data input 16	0 to 65535	-	0	At once	1490
n3-52	Display of process data output 1	-	-	-	Modification prohibited	17471
n3-53	Display of process data output 2	-	-	-	Modification prohibited	17472
n3-54	Display of process data output 3	-	-	-	Modification prohibited	17473
n3-55	Display of process data output 4	-	-	-	Modification prohibited	17474
n3-56	Display of process data output 5	-	-	-	Modification prohibited	17475
n3-57	Display of process data output 6	-	-	-	Modification prohibited	17476

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n3-58	Display of process data output 7	-	-	-	Modification prohibited	17477
n3-59	Display of process data output 8	-	-	-	Modification prohibited	17478
n3-60	Display of process data output 9	-	-	-	Modification prohibited	17479
n3-61	Display of process data output 10	-	-	-	Modification prohibited	17480
n3-62	Display of process data output 11	-	-	-	Modification prohibited	17481
n3-63	Display of process data output 12	-	-	-	Modification prohibited	17482
n3-64	Display of process data output 13	-	-	-	Modification prohibited	17483
n3-65	Display of process data output 14	-	-	-	Modification prohibited	17484
n3-66	Display of process data output 15	-	-	-	Modification prohibited	17485
n3-67	Display of process data output 16	-	-	-	Modification prohibited	17486
n3-68	Display of process data input 1	-	-	-	Modification prohibited	17455
n3-69	Display of process data input 2	-	-	-	Modification prohibited	17456
n3-70	Display of process data input 3	-	-	-	Modification prohibited	17457
n3-71	Display of process data input 4	-	-	-	Modification prohibited	17458
n3-72	Display of process data input 5	-	-	-	Modification prohibited	17459
n3-73	Display of process data input 6	-	-	-	Modification prohibited	17460
n3-74	Display of process data input 7	-	-	-	Modification prohibited	17461
n3-75	Display of process data input 8	-	-	-	Modification prohibited	17462
n3-76	Display of process data input 9	-	-	-	Modification prohibited	17463
n3-77	Display of process data input 10	-	-	-	Modification prohibited	17464
n3-78	Display of process data input 11	-	-	-	Modification prohibited	17465

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n3-79	Display of process data input 12	-	-	-	Modification prohibited	17466
n3-80	Display of process data input 13	-	-	-	Modification prohibited	17467
n3-81	Display of process data input 14	-	-	-	Modification prohibited	17468
n3-82	Display of process data input 15	-	-	-	Modification prohibited	17469
n3-83	Display of process data input 16	-	-	-	Modification prohibited	17470
n3-90	Adapter B mail box write data save selection	0: Do not save to EEPROM 1: Save to EEPROM	-	1	Unchangeable	4190
n3-91	Upload prohibition of device diagnosis information for adapter B	0: Disable 1: Enable	-	1	Unchangeable	1808
n5: Encoder 1 Configuration						
n5-00	Encoder 1 enable	0: Disable 1: Enable	-	1	At stop	4892
n5-02	Encoder Type	0: ABZ encoder (MD38PGMD) 2: Resolver (MD38PG4) 4: Sin-cos encoder (MD580-PG-AR1) 5: SSI encoder (MD580-PG-AR1) 6: ABZ encoder (MD580-PG-AU1) 7: SSI encoder (MD580-PG-AU1)	-	0	At stop	2736
n5-03	Input A/B phase sequence	0: Forward 1: Reverse	-	0	At stop	2738
n5-06	Encoder signal burr removal	0: Disable 1: Enable	-	1	At once	2753
n5-07	Encoder resolution (number of pulses/revolutions)	1 to 20000	-	2500	At stop	2737
n5-08	Transmission ratio (numerator)	1 to 65535	-	1	At stop	2742
n5-09	Transmission ratio (denominator)	1 to 65535	-	1	At stop	2743
n5-10	Hardware detection for encoder disconnection	0: Disable 2: ABZ differential	-	2	At once	2740
n5-11	Hardware detection time for encoder disconnection	0 to 20	ms	10	At once	2747
n5-12	Encoder installation position angle	0.0 to 359.9	°	0.0	At stop	2739
n5-13	Number of resolver pole pairs	1 to 32	-	1	At stop	2741

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n5-14	Software detection for encoder disconnection	0: Disable 1: Enable	-	0	At once	2744
n5-15	Display of software detection threshold for encoder abnormality	-	%	-	Modification prohibited	16848
n5-16	Software detection time for encoder disconnection	0 to 200	ms	5	At once	2750
n5-17	Adjustment coefficient of software detection threshold for encoder abnormality	0.0 to 800.0	%	100.0	At once	2754
n5-20	Initial angle update source of encoder	0: Disabled Other: K connector	-	0	At once	2749
n5-21	Direction for calculating the number of encoder pulses	0: Forward 1: Reverse	-	0	At once	2748
n5-22	Hardware detection for resolver disconnection	0: Disable 1: Enable	-	1	At once	2751
n5-23	Interval for resolver disconnection detection by hardware	1 to 5000	-	20	At once	2752
n5-24	Force command source for encoder pulses per revolution	0: Invalid 1: Valid Other: B connector	-	0	At once	2755
n5-25	Force value for encoder pulses per revolution	0: 0 Other: K connector	-	0	At once	2756
n5-50	Clock frequency of SSI encoder	0: 2 MHz 1: 1.5 MHz 2: 1 MHz 3: 500 kHz 4: 400 kHz 5: 200 kHz 6: 125 kHz	-	3	At stop	4860
n5-51	SSI encoder output coding type	0: Binary code 1: Gray code	-	0	At stop	4861
n5-52	SSI encoder verification mode	0: No check 1: Even-odd parity check	-	0	At stop	4862
n5-53	Number of SSI encoder state bits	0 to 7	-	0	At stop	4863
n5-54	Number of SSI encoder single-turn bits	0 to 24	-	12	At stop	4864
n5-55	Number of SSI encoder multi-turn bits	0 to 24	-	0	At stop	4865

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n6: Encoder Configuration						
n6-00	Encoder 2 enable	0: Disable 1: Enable	-	1	At stop	4893
n6-02	Encoder Type	0: ABZ encoder (MD38PGMD) 2: Resolver (MD38PG4) 4: Sin-cos encoder (MD580-PG-AR1) 5: SSI encoder (MD580-PG-AR1) 6: ABZ encoder (MD580-PG-AU1) 7: SSI encoder (MD580-PG-AU1)	-	0	At stop	4867
n6-03	Input A/B phase sequence	0: Forward 1: Reverse	-	0	At stop	4869
n6-06	Encoder signal burr removal	0: Disable 1: Enable	-	1	At once	4884
n6-07	Encoder resolution (number of pulses/revolutions)	1 to 20000	-	2500	At stop	4868
n6-08	Transmission ratio (numerator)	1 to 65535	-	1	At stop	4873
n6-09	Transmission ratio (denominator)	1 to 65535	-	1	At stop	4874
n6-10	Hardware detection for encoder disconnection	0: Disable 2: ABZ differential	-	2	At once	4871
n6-11	Hardware detection time for encoder disconnection	0 to 20	ms	10	At once	4878
n6-12	Encoder installation position angle	0.0 to 359.9	°	0.0	At stop	4870
n6-13	Number of resolver pole pairs	1 to 32	-	1	At stop	4872
n6-14	Software detection for encoder disconnection	0: Disable 1: Enable	-	0	At once	4875
n6-15	Display of software detection threshold for encoder abnormality	-	%	-	Modification prohibited	17696
n6-16	Software detection time for encoder disconnection	0 to 200	ms	5	At once	4881
n6-17	Adjustment coefficient of software detection threshold for encoder abnormality	0.0 to 800.0	%	100.0	At once	4885
n6-20	Initial angle update source of encoder	0: Disabled Other: K connector	-	0	At once	4880
n6-21	Direction for calculating the number of encoder pulses	0: Forward 1: Reverse	-	0	At once	4879

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n6-22	Hardware detection for resolver disconnection	0: Disable 1: Enable	-	1	At once	4882
n6-23	Interval for resolver disconnection detection by hardware	1 to 5000	-	20	At once	4883
n6-24	Force command source for encoder pulses per revolution	0: Invalid 1: Valid Other: B connector	-	0	At once	4894
n6-25	Force value of encoder pulses per revolution	0: 0 Other: K connector	-	0	At once	4895
n6-50	Clock frequency of SSI encoder	0: 2 MHz 1: 1.5 MHz 2: 1 MHz 3: 500 kHz 4: 400 kHz 5: 200 kHz 6: 125 kHz	-	3	At stop	4886
n6-51	SSI encoder output coding type	0: Binary code 1: Gray code	-	0	At stop	4887
n6-52	SSI encoder verification mode	0: No check 1: Even-odd parity check	-	0	At stop	4888
n6-53	Number of SSI encoder state bits	0 to 7	-	0	At stop	4889
n6-54	Number of SSI encoder single-turn bits	0 to 24	-	12	At stop	4890
n6-55	Number of SSI encoder multi-turn bits	0 to 24	-	0	At stop	4891
n10: Modbus RTU Module						
n10-00	Expansion slot selection	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3	-	0	At stop	1728
n10-01	Module online/offline state	0: Offline 1: Online	-	-	Modification prohibited	17498

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n10-02	Modbus baud rate	0: 1200 bps 1: 2400 bps 2: 4800 bps 3: 9600 bps 4: 19200 bps 5: 38400 bps 6: 57600 bps 7: 115200 bps	-	7	At stop	1731
n10-03	Modbus data format	0: Even parity check (8-E-1) 1: Odd parity check (8-O-1) 2: No parity check 1 (8-N-2) 3: No parity check 2 (8-N-1)	-	1	At stop	1732
n10-04	Modbus local address	1 to 255	-	1	At stop	1733
n10-05	Modbus response delay	0 to 20	ms	4	At stop	1734
n10-06	Modbus communication timeout	0.0 to 60.0	s	20.0	At stop	1735
n10-07	Reserved	0 to 65535	-	0	At stop	1736
n10-08	Reserved	0 to 65535	-	0	At stop	1737
n10-09	Reserved	0 to 65535	-	0	At stop	1738
n10-10	Reserved	0 to 65535	-	0	At stop	1739
n12: CANopen Module						
n12-00	Expansion slot selection	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3	-	0	At stop	1752
n12-01	Module online/offline state	0: Offline 1: Online	-	0	Unchangeable	17500
n12-02	CANopen node address	0 to 63	-	1	At stop	1755
n12-03	CANopen 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	1756
n12-07	Auto entering OP upon power-on	0: Disable 1: Enable	-	0	At stop	1760

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n12-08	Transmitting boot-up through communication timeout	0: Disable 1: Enable	-	0	At stop	1761
n12-09	Communication timeout time	0.0 to 60.0	s	0.0	At stop	1762
n12-10	CANopen configuration source	0: Default configuration 1: User-defined configuration	-	0	At stop	1763
n12-11	RPDO1 CAN-ID	0x0180 and 0x057F	-	0x0200	At once	3055
n12-12	RPDO1 mode	0 to 255	-	255	At once	3059
n12-13	Number of RPDO1 mappings	0 to 4	-	4	At once	3063
n12-14	RPDO2 CAN-ID	0x0180 and 0x057F	-	0x0300	At once	3056
n12-15	RPDO2 mode	0 to 255	-	255	At once	3060
n12-16	Number of RPDO2 mappings	0 to 4	-	4	At once	3064
n12-17	RPDO3 CAN-ID	0x0180 and 0x057F	-	0x0400	At once	3057
n12-18	RPDO3 mode	0 to 255	-	255	At once	3061
n12-19	Number of RPDO3 mappings	0 to 4	-	4	At once	3065
n12-20	RPDO4 CAN-ID	0x0180 and 0x057F	-	0x0500	At once	3058
n12-21	RPDO4 mode	0 to 255	-	255	At once	3062
n12-22	Number of RPDO4 mappings	0 to 4	-	4	At once	3066
n12-23	TPDO1 CAN-ID	0x0180 and 0x057F	-	0x0180	At once	3039
n12-24	TPDO1 mode	0 to 255	-	255	At once	3043
n12-25	Number of TPDO1 mappings	0 to 4	-	4	At once	3047
n12-26	TPDO1 transmission interval	1 to 65535	ms	50	At once	3051
n12-27	TPDO2 CAN-ID	0x0180 and 0x057F	-	0x0280	At once	3040
n12-28	TPDO2 mode	0 to 255	-	255	At once	3044
n12-29	Number of TPDO2 mappings	0 to 4	-	4	At once	3048
n12-30	TPDO2 transmission interval	1 to 65535	ms	50	At once	3052
n12-31	TPDO3 CAN-ID	0x0180 and 0x057F	-	0x0380	At once	3041
n12-32	TPDO3 mode	0 to 255	-	255	At once	3045
n12-33	Number of TPDO3 mappings	0 to 4	-	4	At once	3049
n12-34	TPDO3 transmission interval	1 to 65535	ms	50	At once	3053
n12-35	TPDO4 CAN-ID	0x0180 and 0x057F	-	0x0480	At once	3042
n12-36	TPDO4 mode	0 to 255	-	255	At once	3046
n12-37	Number of TPDO4 mappings	0 to 4	-	4	At once	3050
n12-38	TPDO4 transmission interval	1 to 65535	ms	50	At once	3054
n14: EtherCAT Module						
n14-00	Expansion slot selection	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3	-	0	At stop	1776

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n14-01	Module online/offline state	0: Offline 1: Online	-	-	Modification prohibited	17502
n14-02	EtherCAT slave name	0 to 65535	-	1	At stop	1779
n14-03	EtherCAT slave alias	0 to 65535	-	1	At stop	1780
n14-04	Number of times for synchronization interruption signal loss allowed by the EtherCAT module	4 to 20	-	4	At stop	1781
n14-05	Reserved	0 to 1	-	0	At stop	1782
n14-06	Alias setup function switch	0: n14-03 1: Host controller	-	0	At stop	1783
n14-07	Reserved	0 to 65535	-	0	At stop	1784
n14-08	Reserved	0 to 65535	-	0	At stop	1785
n14-09	Reserved	0 to 65535	-	0	At stop	1786
n14-10	Reserved	0 to 65535	-	0	At stop	1787
n14-11	Number of errors received by port 1_0	0x0000 and 0xFFFF	-	0x0000	At once	17412
n14-12	Number of invalid frames over port 1_0	0x0000 and 0xFFFF	-	0x0000	At once	17413
n14-13	Maximum number of errors transmitted by port 1_0	0x0000 and 0xFFFF	-	0x0000	At once	17414
n14-14	Number of PDI and processing unit errors	0x0000 and 0xFFFF	-	0x0000	At once	17415
n14-15	Number of lost links over port 1_0	0x0000 and 0xFFFF	-	0x0000	At once	17416
n14-16	Synchronization signal loss count	0 to 65535	-	0	At once	17417
n14-17	Application layer fault code	0 to 65535	-	0	At once	17418
n14-18	State machine and port link state	0x0000 and 0xFFFF	-	0x0000	At once	17419
n14-19	Reserved	0 to 65535	-	0	At once	17420
n14-20	Reserved	0 to 65535	-	0	At once	17421
n14-21	Reserved	0 to 65535	-	0	At once	17422
n16: PROFIBUS DP Module						
n16-00	Expansion slot selection	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3	-	0	At stop	1800
n16-01	Module online/offline state	0: Offline 1: Online	-	-	Modification prohibited	17504

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n16-02	Expansion card ID	1 to 125	-	1	At stop	1803
n16-03	Reserved	0 to 65535	-	0	At stop	1804
n16-04	Reserved	0 to 65535	-	0	At stop	1805
n16-05	Reserved	0 to 65535	-	0	At stop	1806
n16-09	Feature code	0: Default value 1: 0806 2: 0956 3: 8045 4: 0812 5: 0815 6: 6012 7: 80b5 8: 4149 9: 0572 10: 4150 11: 0612+JH 12: 0812+SL 13: 0959v2.145 14: 0959v2.161 15: Reserved 16: Reserved	-	0	At stop	1810
n16-10	DP data check bit	0: Bit 10 of PZD1 (default) 1: Disable 2: Bit 0 of PZD1 3: Bit1 of PZD1 4: Bit 2 of PZD1 5: Bit 3 of PZD1 6: Bit 4 of PZD1 7: Bit 5 of PZD1 8: Bit 6 of PZD1 9: Bit 7 of PZD1 10: Bit 8 of PZD1	-	0	At stop	1811

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n16-10	DP data check bit	11: Bit 9 of PZD1 12: Bit 10 of PZD1 13: Bit 11 of PZD1 14: Bit 12 of PZD1 15: Bit 13 of PZD1 16: Bit 14 of PZD1 17: Bit 15 of PZD1	-	0	At stop	1811
n17: PROFIBUS IO Module						
n17-00	Expansion slot selection	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3	-	0	At stop	1812
n17-01	Module online/offline state	0: Offline 1: Online	-	-	Modification prohibited	17505
n17-02	Reserved	1 to 65535	-	1	At stop	1815
n17-03	MAC address word 1	-	-	-	Modification prohibited	17487
n17-04	MAC address word 2	-	-	-	Modification prohibited	17488
n17-05	MAC address word 3	-	-	-	Modification prohibited	17489
n17-06	Reserved	0 to 65535	-	-	At stop	1819
n17-07	Reserved	0 to 65535	-	-	At stop	1820
n17-08	Reserved	0 to 65535	-	-	At stop	1821
n17-09	Reserved	0 to 65535	-	-	At stop	1822
n17-10	Reserved	0 to 65535	-	-	At stop	1823
n18: Customized Communication Module						
n18-00	Expansion slot selection	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3	-	0	At stop	2163
n18-01	Module online/offline state	0: Offline 1: Online 2: Not supported	-	-	Modification prohibited	17541

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n18-02	Expansion slot module type	0: No expansion card 17: I/O module HIO-10 32: Encoder detection module PG-10 35: Encoder detection module PG-40 36: Encoder detection module PG-50 48: Synchronous voltage detection module HSVM-10 49: Synchronous voltage detection module HSVM-20 64: HINT module (HE200) 96: HOFR module 112: PROFIBUS DP module 113: CANopen module 114: CANlink module 115: Modbus RTU module 116: Modbus TCP module 117: PROFINET IO module 118: EtherCAT module 121: EtherNet module 122: DeviceNet module 123: CAN listening module 124: IBA module 125: HYAS module	-	-	Modification prohibited	17540
n18-03	Customized communication module ID	0 to 65535	-	0	At stop	2352
n18-11	Customized communication card parameter 1	0 to 65535	-	0	At stop	2166
n18-12	Customized communication card parameter 2	0 to 65535	-	0	At stop	2164
n18-13	Customized communication card parameter 3	0 to 65535	-	0	At stop	2165
n18-14	Customized communication card parameter 4	0 to 65535	-	0	At stop	2167
n18-15	Customized communication card parameter 5	0 to 65535	-	0	At stop	2168
n18-16	Customized communication card parameter 6	0 to 65535	-	0	At stop	2169
n18-17	Customized communication card parameter 7	0 to 65535	-	0	At stop	2170
n18-18	Customized communication card parameter 8	0 to 65535	-	0	At stop	2171

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n18-19	Customized communication card parameter 9	0 to 65535	-	0	At stop	2172
n18-20	Customized communication card parameter 10	0 to 65535	-	0	At stop	2173
n18-21	Customized communication card parameter 11	0 to 65535	-	0	At stop	2174
n18-22	Customized communication card parameter 12	0 to 65535	-	0	At stop	2345
n18-23	Customized communication card parameter 13	0 to 65535	-	0	At stop	2346
n18-24	Customized communication card parameter 14	0 to 65535	-	0	At stop	2347
n18-25	Customized communication card parameter 15	0 to 65535	-	0	At stop	2348
n18-27	Customized communication card parameter 17	0 to 65535	-	0	At stop	2350
n18-28	Customized communication card parameter 18	0 to 65535	-	0	At stop	2351
n18: Customized Communication Module						
n19-00	Expansion slot selection	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3	-	0	At once	3086
n19-01	Module online/offline state	0: Offline 1: Online	-	-	Modification prohibited	17538
n19-02	DHCP enable	0: Enable 1: Enable	-	0	At once	3067
n19-03	IP address 1	1 to 254	-	192	At once	3068
n19-04	IP address 2	0 to 254	-	168	At once	3069
n19-05	IP address 3	0 to 254	-	0	At once	3070
n19-06	IP address 4	0 to 253	-	10	At once	3071
n19-07	Subnet mask address 1	0 to 255	-	255	At once	3072
n19-08	Subnet mask address 2	0 to 255	-	255	At once	3073
n19-09	Subnet mask address 3	0 to 255	-	255	At once	3074
n19-10	Subnet mask address 4	0 to 255	-	0	At once	3075
n19-11	Gateway address 1	1 to 254	-	192	At once	3076
n19-12	Gateway address 2	0 to 254	-	168	At once	3077
n19-13	Gateway address 3	0 to 254	-	0	At once	3078
n19-14	Gateway address 4	0 to 254	-	1	At once	3079
n19-15	MAC address 1	0 to 255	-	0	At once	3080

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
n19-16	MAC address 2	0 to 255	-	0	At once	3081
n19-17	MAC address 3	0 to 255	-	0	At once	3082
n19-18	MAC address 4	0 to 255	-	0	At once	3083
n19-19	MAC address 5	0 to 255	-	0	At once	3084
n19-20	MAC address 6	0 to 255	-	0	At once	3085

5.2.10 Group o: Process Parameters

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o15: Position Controller						
o15-00	Position control status	0: Invalid 1: Enabled 2: Initializing 3: Waiting for position synchronization 4: Synchronizing position 5: Home invalid 6: Homing 7: Home valid 8: Waiting for positioning 9: Positioning in progress 10: Positioning holding 11: Positioning interruption in progress 12: Position control paused	-	-	Modification prohibited	17543
o15-01	Position control	0: Disable 1: Enable Other: B connector	-	0	At stop	4515
o15-02	Position control pause source	0: Disable 1: Enable Other: B connector	-	0	At once	4517
o15-05	Position control load axis type	0: Linear axis 1: Rotary axis	-	0	At stop	4532

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o15-06	Rotary axis position range	1 to 2147483647	Uu	3600	At once	7490
o15-10	Position detection feedback source	0: d0-12 (speed feedback encoder) 1: Encoder 1 2: Encoder 2 3: User-defined	-	0	At stop	4534
o15-11	User-defined position feedback source	0: 0 Other: K connector	-	0	At stop	4535
o15-12	Numerator of user-defined feedback conversion coefficient	1 to 2147483647	Lu	1	At stop	7492
o15-13	Denominator of user-defined feedback conversion coefficient	1 to 2147483647	-	1	At stop	7494
o15-14	Selection of position feedback calibration method	0: Incremental calibration method 1: Nameplate setting method	-	0	At stop	4544
o15-15	Incremental calibration method - Running distance increment at the load side	1 to 2147483647	Lu	1	At stop	7504
o15-16	Incremental calibration method - Position feedback encoder pulse increment	1 to 2147483647	-	1	At stop	7506
o15-17	Nameplate setting method - Lu/rpm setting at the load side	1 to 2147483647	Lu	1	At stop	7502
o15-18	Nameplate setting method-Motor revolutions for motor/load transmission ratio	1 to 65535	-	1	At stop	4527

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o15-19	Nameplate setting method-Load revolutions for motor/load transmission ratio	1 to 65535	-	1	At stop	4528
o15-20	Average filter time of position feedback	0 to 128	ms	0	At stop	4540
o15-21	Filter time of first-order position feedback	0 to 1000	ms	0	At stop	4541
o15-27	Position loop switchover function selection	0: Determined by position loop selection 1: Switched based on position deviation	-	0	At stop	4547
o15-28	Position loop selection	0: Position loop 1 1: Position loop 2 Other: B connector	-	0	At once	4548
o15-29	Position loop switchover position deviation 1	0 to 65535	Lu	20	At once	4549
o15-30	Position loop switchover position deviation 2	0 to 65535	Lu	100	At once	4550
o15-31	Position loop Kp 1	0.00 to 100.00	-	10.00	At once	4545
o15-32	Position loop Kp 2	0.00 to 100.00	-	20.00	At once	4546
o15-33	Position-loop speed feedforward source	0: Automatic calculation Other: K connector	-	0	At stop	4561
o15-34	Position-loop speed feedforward Kv 1	0.000 to 2.000	-	1.000	At once	4551
o15-35	Position loop speed feedforward Kv 2	0.000 to 2.000	-	1.000	At once	4552
o15-36	Position loop acceleration feedforward source	0: Automatic calculation Other: K connector	-	0	At stop	4563
o15-37	Position loop acceleration feedforward Ka 1	0.000 to 2.000	-	0.000	At once	4553

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o15-38	Position loop acceleration feedforward Ka 2	0.000 to 2.000	-	0.000	At once	4554
o15-45	Position loop deviation dead zone	0: Disable 1: Enable Other: B connector	-	0	At once	4557
o15-46	Position loop deviation dead zone range	0 to 5000	Lu	0	At once	4558
o15-48	Position deviation clear command source	0: Disable 1: Enable Other: B connector	-	0	At once	4565
o15-49	Detection threshold of excessive position deviation	0 to 2147483647	LU	2000	At once	7496
o15-50	Detection time of excessive position deviation	0.00 to 600.00	s	0.50	At once	4568
o15-51	Position deviation compensation limit	0 to 65535	Lu	6000	At once	4419
o15-52	Positioning completion judgment threshold	0 to 2147483647	Lu	10	At once	7500
o15-53	Positioning completion judgment time	0 to 60000	ms	4	At once	4577
o15-54	Positioning completion timeout	0.00 to 600.00	s	5.00	At once	4371
o15-55	Filter time of internal deviation compensation	0 to 1000	ms	0	At once	4588
Group o17: Positioning Control						
o17-00	Positioning control status	0: Invalid 1: Valid	-	-	Modification prohibited	17594
o17-01	Positioner primary reference source	0: Multi-position reference 1: User-defined	-	0	At stop	4423
o17-02	User-defined reference source	0: 0 Other: K connector	Uu	0	At once	4424

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o17-03	User-defined reference attribute configuration	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4425

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o17-03	User-defined reference attribute configuration	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4425
o17-04	Positioner secondary reference source	0: 0 Other: K connector	Uu	0	At once	4426
o17-05	Numerator of reference unit conversion coefficient	1 to 65535	Lu	1	At stop	4555
o17-06	Denominator of reference unit conversion coefficient	1 to 65535	Uu	1	At stop	4556

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o17-07	Positioner start signal source	0: Invalid 1: Valid Other: B connector	-	0	At once	4320
o17-09	Positioner function selection	Ones position: Start of positioning when incremental positioning is not completed 0: The start command is invalid. 1: Perform positioning again based on the current position. 2: Add to the unfinished stroke and perform positioning again. Tens position: Start of positioning when incremental positioning is completed 0: Add the current error to the stroke upon startup. 1: Clear the error upon startup. Hundreds position: Reserved Thousands position: Reserved Ten thousands position: Reserved	-	0	At once	4321

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o17-10	Position reference activation method	0: Activated for a single time when the start command is triggered. 1: Continuously activated (absolute positioning) 2: Continuously activated before positioning is completed (absolute positioning)	-	0	At once	4370
o17-11	Reverse gap at forward running	0.0 to 6553.5	UU	0.0	At once	4322
o17-12	Reverse gap at reverse running	0.0 to 6553.5	Uu	0.0	At once	4323
o17-16	Running direction of rotary axis	0: Forward 1: Reverse 2: Nearby positioning	-	0	At once	4326
o17-17	Inverse linear axis target position command	0: Invalid 1: Valid Other: B connector	-	0	At once	4327
o17-18	Position compensation input type	0: Position deviation value 1: Absolute position value	-	0	At once	4582
o17-19	Position compensation input source	0: 0 Other: K connector	-	0	At once	4395
o17-20	Position compensation triggering command	0: Invalid 1: Valid Other: B connector	-	0	At once	4580
o17-21	Triggering command source transmission delay	0 to 128	ms	0	At once	4583
o17-22	Numerator of position deviation compensation conversion coefficient	1 to 65535	LU	1	At once	4396

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o17-23	Denominator of position deviation compensation conversion coefficient	1 to 65535	-	1	At once	4397
o17-24	Linear change time of position deviation compensation	0 to 65000	ms	100	At once	4398
o17-25	Positioner acceleration time 1	0.00 to 600.00	s	10.00	At once	4328
o17-26	Positioner deceleration time 1	0.00 to 600.00	s	10.00	At once	4332
o17-27	Positioner acceleration time 2	0.00 to 600.00	s	10.00	At once	4329
o17-28	Positioner deceleration time 2	0.00 to 600.00	s	10.00	At once	4333
o17-29	Positioner acceleration time 3	0.00 to 600.00	s	10.00	At once	4330
o17-30	Positioner deceleration time 3	0.00 to 600.00	s	10.00	At once	4334
o17-31	Positioner acceleration time 4	0.00 to 600.00	s	10.00	At once	4331
o17-32	Positioner deceleration time 4	0.00 to 600.00	s	10.00	At once	4335
o17-33	Positioner forward limit speed 1	0: Digital setting Other: K connector	-	0	At once	4336
o17-34	Digital setting 1 of positioner forward limit speed	0.0 to 600.0	%	100.0	At once	4340
o17-35	Positioner reverse limit speed 1	0: Digital setting 1: Forward limit speed reversed Other: K connector	-	0	At once	4344
o17-36	Digital setting 1 of positioner reverse limit speed	-600.0 to 0.0	%	-100.0	At once	4348
o17-37	Positioner forward limit speed 2	0: Digital setting Other: K connector	-	0	At once	4337

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o17-38	Digital setting 2 of positioner forward limit speed	0.0 to 600.0	%	100.0	At once	4341
o17-39	Positioner reverse limit speed 2	0: Digital setting 1: Forward limit speed reversed Other: K connector	-	0	At once	4345
o17-40	Digital setting 2 of positioner reverse limit speed	-600.0 to 0.0	%	-100.0	At once	4349
o17-41	Positioner forward limit speed 3	0: Digital setting Other: K connector	-	0	At once	4338
o17-42	Digital setting 3 of positioner forward limit speed	0.0 to 600.0	%	100.0	At once	4342
o17-43	Positioner reverse limit speed 3	0: Digital setting 1: Forward limit speed reversed Other: K connector	-	0	At once	4346
o17-44	Digital setting 3 of positioner reverse limit speed	-600.0 to 0.0	%	-100.0	At once	4350
o17-45	Positioner forward limit speed 4	0: Digital setting Other: K connector	-	0	At once	4339
o17-46	Digital setting 4 of positioner forward limit speed	0.0 to 600.0	%	100.0	At once	4343
o17-47	Positioner reverse limit speed 4	0: Digital setting 1: Forward limit speed reversed Other: K connector	-	0	At once	4347
o17-48	Digital setting 4 of positioner reverse limit speed	-600.0 to 0.0	%	-100.0	At once	4351
o17-49	Positioning completion waiting time 1	0.00 to 600.00	s	10.00	At once	4352
o17-50	Positioning completion waiting time 2	0.00 to 600.00	s	10.00	At once	4353
o17-51	Positioning completion waiting time 3	0.00 to 600.00	s	10.00	At once	4354

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o17-52	Positioning completion waiting time 4	0.00 to 600.00	s	10.00	At once	4355
o17-53	Filter time 1 of positioner command output	0.00 to 1.00	s	0.00	At once	4356
o17-54	Filter time 2 of positioner command output	0.00 to 1.00	s	0.00	At once	4357
o17-55	Filter time 3 of positioner command output	0.00 to 1.00	s	0.00	At once	4358
o17-56	Filter time 4 of positioner command output	0.00 to 1.00	s	0.00	At once	4359
o17-57	Positioning interruption signal source	0: Invalid 1: Valid Other: B connector	-	0	At once	4360

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o17-58	Positioning interruption attribute setting	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	10000	At once	4361

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o17-58	Positioning interruption attribute setting	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	10000	At once	4361
o17-59	Position command source for positioning interruption	0: Positioning interruption position setting Other: K connector	-	0	At once	4362
o17-60	Positioning interruption position setting	-2147483647 to +2147483647	Uu	0	At once	7476
o17-61	Software limit	0: Disable 1: Enable Other: B connector	-	0	At once	4365
o17-62	Positive position of software limit	-2147483647 to +2147483647	Uu	0	At stop	7478

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o17-63	Negative position of software limit	-2147483647 to +2147483647	Uu	0	At stop	7480
o17-66	Target position approach judgment threshold	0 to 2147483647	Lu	500	At once	7498
o17-67	Target position approach judgment time	0 to 60000	ms	10	At once	4572
Group o18: Multi-position reference						
o18-00	Current setpoint of multi-position reference	-	Uu	-	Modification prohibited	17590
o18-01	Current position reference segment	-	-	-	Modification prohibited	17592
o18-02	Multi-position operation mode	0: Fixed (digital setting of multi-position reference) 1: Multi-position selection switchover 2: Operation in sequence once 3: Cyclic operation	-	0	At stop	4604
o18-03	Digital setting of multi-position reference	1 to 32	-	1	At once	4605
o18-04	Start segment of multi-position reference	1 to 32	-	1	At once	4606
o18-05	End segment of multi-position reference	1 to 32	-	1	At once	4607
o18-06	Multi-position running recovery selection	0: Continue to execute unfinished segments 1: Start from the start segment	-	0	At once	4608
o18-17	Multi-position selection input 1	0: Invalid 1: Valid Other: B connector	-	0	At once	4609
o18-18	Multi-position selection input 2	0: Invalid 1: Valid Other: B connector	-	0	At once	4610

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-19	Multi-position selection input 3	0: Invalid 1: Valid Other: B connector	-	0	At once	4611
o18-20	Multi-position selection input 4	0: Invalid 1: Valid Other: B connector	-	0	At once	4612
o18-21	Multi-position selection input 5	0: Invalid 1: Valid Other: B connector	-	0	At once	4613
o18-22	Multi-position 1 reference	-2147483647 to +2147483647	Uu	0	At once	7412
o18-23	Multi-position 1 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4678

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-23	Multi-position 1 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4678
o18-24	Multi-position 2 reference setting	-2147483647 to +2147483647	Uu	0	At once	7414

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-25	Multi-position 2 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4679

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-25	Multi-position 2 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4679
o18-26	Multi-position 3 reference	-2147483647 to +2147483647	Uu	0	At once	7416

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-27	Multi-position 3 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4680

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-27	Multi-position 3 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4680
o18-28	Multi-position 4 reference	-2147483647 to +2147483647	Uu	0	At once	7418

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-29	Multi-position 4 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4681

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-29	Multi-position 4 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4681
o18-30	Multi-position 5 reference	-2147483647 to +2147483647	Uu	0	At once	7420

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-31	Multi-position 5 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4682

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-31	Multi-position 5 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4682
o18-32	Multi-position 6 reference	-2147483647 to +2147483647	Uu	0	At once	7422

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-33	Multi-position 6 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4683

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-33	Multi-position 6 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4683
o18-34	Multi-position 7 reference	-2147483647 to +2147483647	Uu	0	At once	7424

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-35	Multi-position 7 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4684

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-35	Multi-position 7 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4684
o18-36	Multi-position 8 reference	-2147483647 to +2147483647	Uu	0	At once	7426

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-37	Multi-position 8 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4685

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-37	Multi-position 8 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4685
o18-38	Multi-position 9 reference	-2147483647 to +2147483647	Uu	0	At once	7428

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-39	Multi-position 9 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4686

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-39	Multi-position 9 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4686
o18-40	Multi-position 10 reference	-2147483647 to +2147483647	Uu	0	At once	7430

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-41	Multi-position 10 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4687

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-41	Multi-position 10 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4687
o18-42	Multi-position 11 reference	-2147483647 to +2147483647	Uu	0	At once	7432

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-43	Multi-position 11 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4688

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-43	Multi-position 11 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4688
o18-44	Multi-position 12 reference	-2147483647 to +2147483647	Uu	0	At once	7434

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-45	Multi-position 12 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4689

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-45	Multi-position 12 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4689
o18-46	Multi-position 13 reference	-2147483647 to +2147483647	Uu	0	At once	7436

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-47	Multi-position 13 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4690

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-47	Multi-position 13 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4690
o18-48	Multi-position 14 reference	-2147483647 to +2147483647	Uu	0	At once	7438

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-49	Multi-position 14 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4691

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-49	Multi-position 14 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4691
o18-50	Multi-position 15 reference	-2147483647 to +2147483647	Uu	0	At once	7440

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-51	Multi-position 15 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4692

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-51	Multi-position 15 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4692
o18-52	Multi-position 16 reference	-2147483647 to +2147483647	Uu	0	At once	7442

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-53	Multi-position 16 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4693

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-53	Multi-position 16 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4693
o18-54	Multi-position 17 reference	-2147483647 to +2147483647	Uu	0	At once	7444

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-55	Multi-position 17 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4694

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-55	Multi-position 17 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4694
o18-56	Multi-position 18 reference	-2147483647 to +2147483647	Uu	0	At once	7446

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-57	Multi-position 18 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4695

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-57	Multi-position 18 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4695
o18-58	Multi-position 19 reference	-2147483647 to +2147483647	Uu	0	At once	7448

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-59	Multi-position 19 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4696

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-59	Multi-position 19 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4696
o18-60	Multi-position 20 reference	-2147483647 to +2147483647	Uu	0	At once	7450

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-61	Multi-position 20 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4697

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-61	Multi-position 20 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4697
o18-62	Multi-position 21 reference	-2147483647 to +2147483647	Uu	0	At once	7452

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-63	Multi-position 21 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4698

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-63	Multi-position 21 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4698
o18-64	Multi-position 22 reference	-2147483647 to +2147483647	Uu	0	At once	7454

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-65	Multi-position 22 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4699

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-65	Multi-position 22 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4699
o18-66	Multi-position 23 reference	-2147483647 to +2147483647	Uu	0	At once	7456

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-67	Multi-position 23 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4700

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-67	Multi-position 23 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4700
o18-68	Multi-position 24 reference	-2147483647 to +2147483647	Uu	0	At once	7458

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-69	Multi-position 24 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4701

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-69	Multi-position 24 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4701
o18-70	Multi-position 25 reference	-2147483647 to +2147483647	Uu	0	At once	7460

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-71	Multi-position 25 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4702

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-71	Multi-position 25 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4702
o18-72	Multi-position 26 reference	-2147483647 to +2147483647	Uu	0	At once	7462

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-73	Multi-position 26 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4703

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-73	Multi-position 26 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4703
o18-74	Multi-position 27 reference	-2147483647 to +2147483647	Uu	0	At once	7464

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-75	Multi-position 27 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4704

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-75	Multi-position 27 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4704
o18-76	Multi-position 28 reference	-2147483647 to +2147483647	Uu	0	At once	7466

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-77	Multi-position 28 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4705

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-77	Multi-position 28 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4705
o18-78	Multi-position 29 reference	-2147483647 to +2147483647	Uu	0	At once	7468

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-79	Multi-position 29 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4706

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-79	Multi-position 29 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4706
o18-80	Multi-position 30 reference	-2147483647 to +2147483647	Uu	0	At once	7470

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-81	Multi-position 30 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4707

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-81	Multi-position 30 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4707
o18-82	Multi-position 31 reference	-2147483647 to +2147483647	Uu	0	At once	7472

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-83	Multi-position 31 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4708

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-83	Multi-position 31 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4708
o18-84	Multi-position 32 reference	-2147483647 to +2147483647	Uu	0	At once	7474

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-85	Multi-position 32 attribute	Ones position: Acceleration/ Deceleration time 0: Positioner acceleration/ deceleration time 1 1: Positioner acceleration/ deceleration time 2 2: Positioner acceleration/ deceleration time 3 3: Positioner acceleration/ deceleration time 4 Tens position: Forward/Reverse speed limit 0: Positioner forward/reverse speed limit 1 1: Positioner forward/reverse speed limit 2 2: Positioner forward/reverse speed limit 3 3: Positioner forward/reverse speed limit 4	-	0	At once	4709

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o18-85	Multi-position 32 attribute	Hundreds position: Waiting time for positioning completion 0: No waiting 1: Waiting time 1 for positioning completion 2: Waiting time 2 for positioning completion 3: Waiting time 3 for positioning completion 4: Waiting time 4 for positioning completion Thousands position: Positioner command output filter time 0: No filter 1: Filter time 1 2: Filter time 2 3: Filter time 3 4: Filter time 4 Ten thousands position: Stroke type 0: Absolute 1: Incremental	-	0	At once	4709
Group o19: Homing						
o19-00	Homing trigger mode	0: Triggered by activation command 1: Automatically triggered upon positioning start when the home is not available	-	0	At once	4372
o19-01	Homing activation command source	0: Invalid 1: Valid Other: B connector	-	0	At once	4378

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o19-02	Homing direction	0: Forward 1: Reverse Other: B connector	-	0	At once	4377
o19-03	Homing type	0: Current position as reference point 1: Current position as reference point (position control activation not required) 2: Proximity switch 1 as reference point 3: Proximity switch 2 as reference point	-	0	At once	4373
o19-04	Current position value source	0: Digital setting 1: Current absolute position Other: K connector	Uu	0	At once	4374
o19-05	Current position digital setting	-2147483647 to +2147483647	Uu	0	At once	7482
o19-06	Signal source of proximity switch 1	0: Invalid 1: Valid Other: B connector	-	0	At stop	4379
o19-07	Valid mode of proximity switch 1 signal	0: Rising edge-triggered 1: Falling edge-triggered 2: Edge-triggered	-	0	At once	4412
o19-08	Transmission delay of proximity switch 1 signal source	0 to 128	ms	0	At once	4586
o19-09	Proximity switch 1 position setting	-2147483647 to +2147483647	Uu	0	At once	7484
o19-10	Signal source of proximity switch 2	0: Invalid 1: Valid Other: B connector	-	0	At stop	4380

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o19-11	Valid mode of proximity switch 2 signal	0: Rising edge-triggered 1: Falling edge-triggered 2: Edge-triggered	-	0	At once	4413
o19-12	Transmission delay of proximity switch 2 signal source	0 to 128	ms	0	At once	4587
o19-13	Proximity switch 2 position setting	-2147483647 to +2147483647	Uu	0	At once	7486
o19-15	Homing speed reference	0: Digital setting Other: K connector	-	0	At once	4382
o19-16	Homing speed digital setting	-600.0 to +600.0	%	10.0	At once	4383
o19-17	Homing acceleration time	0.00 to 600.00	s	10.00	At once	4384
o19-18	Homing deceleration time	0.00 to 600.00	s	10.00	At once	4385
o19-19	Home offset setpoint (relative to reference point)	-2147483647 to +2147483647	Uu	0	At once	7488
o19-20	Home clearing signal source	0: Invalid 1: Valid Other: B connector	-	0	At once	4388
o19-21	Home search timeout	0.0 to 6000.0	s	60.0	At once	4389
o19-22	Position correction activation	0: Disable 1: Enable Other: B connector	-	0	At once	4390
o19-23	Min. value of position deviation correction	0 to 65535	Uu	0	At once	4391
o19-24	Max. value of position deviation correction	0 to 65535	Uu	100	At once	4392
o19-25	Linear change time of position correction	0 to 65000	ms	10	At once	4418
o19-26	Threshold of reference point loss count	0 to 1000	-	0	At once	4393

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
o19-27	Position deviation threshold for reference point loss	0 to 65535	Uu	100	At once	4381
o19-28	Home retentive at power failure	0: Disable 1: Enable	-	0	At once	4394

6 Connector Resources

6.1 Description of Common Connectors

6.1.1 Description of Common Connectors

Connectors are indicated by parameters in group U, which store and display the middle variables of system control. Connectors are divided into bit connectors (U0-00 to U4-99 and U10-00 to U14-99) and word connectors (U5-00 to U9-99 and U15-00 to U19-99) based on data types.

Word connectors are divided into single-word connectors (16 bits, occupying one-word storage address, corresponding to U5-00 to U8-99 and U15-00 to U18-99) and double-word connectors (32 bits, occupying two-word storage address, corresponding to U9-00 to U9-99 and U19-00 to U19-99) based on data types. A double-word connector can indicate more valid digits, improving the numerical value accuracy.

Word connectors are divided into three categories based on units: per-unit value (expressed as percentage of a base value, indicating the speed, torque, and current), actual value (with meaningful units of V, A, and kW), and unitless numerical value (for example, communication data received, which is displayed as the original value, without actual meaning determined).

The per-unit value system is expressed based on the following rules:

- For single-word connectors, 0x1000 (decimal 4096) indicates 100%, which can be displayed as Value (actual value) or Percent (per-unit value). The conversion formula is as follows: Percent = Value/4096.
- For double-word connectors, 01000 0000 (4096x65536) indicates 100%, which can be displayed as Value (actual value) or Percent (per-unit value). The conversion formula is as follows: Percent = Value/4096/65536.
- Per-unit values expressed by single-word indicators and double-word indicators both range from –800.00% to +799.99%.
- Single-word indicators and double-word indicators can be converted to each other. When a single-word connector is granted to a double-word connector, the low word is 0 and the high word is the value of the single-word connector. When a double-word connector is granted to a single-word connector, the low word is discarded and the high word is granted to the single-word connector, indicating that the number of valid bits for the numerical value is reduced but the value range does not change.

6.1.2 Speed and Frequency

Para.	Name	Description
U5-00	Actual motor speed (filter)	100% corresponds to the rated motor speed. It is processed with filter smoothing.
U9-00	Actual motor speed	100% corresponds to the rated motor speed. It is not filtered.
U9-01	Final motor speed reference	100% corresponds to the rated motor speed. It is the speed reference before speed governing PID filter.
U9-20	Encoder feedback speed	100% corresponds to the rated motor speed. It is detected by the encoder.

6.1.3 Current and Voltage

Para.	Name	Description
U5-01	Output voltage (filter)	100% corresponds to the rated motor voltage processed with filter smoothing.
U5-02	Output current (filter)	100% corresponds to the rated motor current processed with filter smoothing.
U5-05	DC bus voltage (filter)	It is the actual value of the bus voltage, in 0.1 V, with filter smoothing.
U7-25	Phase-U current	Phase-U current can be switched to the per-unit value, actual value, or unitless numerical value through display attribute switchover. 100% corresponds to the rated motor current.
U7-26	Phase-V current	Phase-V current can be switched to the per-unit value, actual value, or unitless numerical value through display attribute switchover. 100% corresponds to the rated motor current.
U7-27	Phase-W current	Phase-W current can be switched to the per-unit value, actual value, or unitless numerical value through display attribute switchover. 100% corresponds to the rated motor current.

6.1.4 Torque

Para.	Name	Description
U5-04	Output torque (filter)	100% corresponds to the rated motor torque (rated power (kW) x 9550/rated speed (RPM)) processed with filter smoothing.
U5-35	Target torque after limiting	It indicates the actually active torque reference after limits such as the torque reference limit, power limit, and Vdc control are applied. The value of 100% corresponds to the rated motor torque.
U5-36	Target torque after filtering	It indicates the torque reference of U5-35 after filtering by the delay time indicated by C1-02/C4-02. The value of 100% corresponds to the rated motor torque.
U7-78	Output torque	It indicates the final output torque. The value of 100% corresponds to the rated motor torque.
U7-86	Main reference for torque control	It indicates the main reference of torque control for the reference channel. The value of 100% corresponds to the rated motor torque.
U7-87	Supplementary torque reference	It indicates the torque reference obtained after torque reference 1 is added to supplementary torque reference 2. The value of 100% corresponds to the rated motor torque.
U7-88	Max. forward torque	It indicates the upper limit of the actually active torque reference of the speed governing module after limits such as the power limit and Vdc control. The value of 100% corresponds to the rated motor torque.
U7-89	Max. reverse torque	It indicates the lower limit of the actually active torque reference of the speed governing module after limits such as the power limit and Vdc control. The value of 100% corresponds to the rated motor torque.

Para.	Name	Description
U8-51	PI output torque upon speed governing	It indicates the PI output torque upon speed governing. The value of 100% corresponds to the rated motor torque.
U8-52	Integral item output torque upon speed governing	It indicates the integral item output torque upon speed governing. The value of 100% corresponds to the rated motor torque.

6.1.5 Other Word Connectors

Para.	Name	Description
U5-50	Current state machine	Current status of the system
U5-40	Internal control word 1	A word composed of bit 0 to bit 15 of control word 1
U5-41	Internal control word 2	A word composed of bit 0 to bit 15 of control word 2
U5-44	Internal status word 1	A word composed of bit 0 to bit 15 of status word 1
U5-45	Internal status word 2	A word composed of bit 0 to bit 15 of status word 2
U15-08	Modbus communication reference 1	Writing data to address 24984 through Modbus can change the value of U15-08, which is used for control word setting.
U15-09 to U15-17	Modbus communication reference 2 to 10	Writing data to addresses 24985 to 24993 through Modbus can change the values of U15-09 to U15-17, which are used for speed setting.

6.1.6 Common Bit Connectors

Para.	Name	Description
U0-00	Logic 0	Constant 0
U0-01	Logic 1	Constant 1
U0-02/U0-09	DI1/DI1 inversion	Status of DI terminals after processing according to parameter settings in group F0
U0-03/U0-10	DI2/DI2 inversion	
U0-04/U0-11	DI3/DI3 inversion	
U0-05/U0-12	DI4/DI4 inversion	
U0-06/U0-13	DI5/DI5 inversion	
U0-07/U0-14	DI6/DI6 inversion	
U0-08/U0-15	HDI1/HDI1 inversion	Status of HDI terminals as DI terminals after processing according to parameter settings in group F0
U1-12	Ready to switch on	Bit 0 of status word 1, indicating that no emergency stop or fault occurs in the system
U1-13	Ready to run	Bit 1 of status word 1, indicating that the system receives the OFF1 command, without the running permission signal, and that the bus voltage has been build-up
U1-14	Run	Bit 2 of status word 1, indicating the normal running state
U1-15	Fault activation	Bit 3 of status word 1, indicating that a fault is active
U1-16	OFF2	Bit 4 of status word 1, where value 0 indicates that the emergency stop command OFF2 is active
U1-17	OFF3	Bit 5 of status word 1, where value 0 indicates that the quick stop command OFF3 is active

Para.	Name	Description
U1-18	Switch-on blocking	Bit 6 of status word 1, indicating that the system cannot become ready to switch on and cannot receive the OFF1 command. Typically, this is due to emergency stop or fault activation.
U1-19	Alarm/Active limit	Bit 7 of status word 1, indicating that an alarm or a limit is active
U1-20	Deviation between motor speed and speed reference	Bit 8 of status word 1, where value 1 indicates that the feedback speed follows the speed reference
U1-21	IDS control disable	Bit 9 of status word 1, where value 1 indicates disabled
U1-22	Comparison value reached	Bit 10 of status word 1, where value 1 indicates that the feedback speed is greater than the value of E8-13
U1-23	Torque/Current reaching limit	Bit 11 of status word 1, where value 1 indicates that the torque or current has reached the limit
U1-24	Forward speed	Bit 12 of status word 1, where value 1 indicates that the speed is forward
U1-25	Reverse speed	Bit 13 of status word 1, where value 1 indicates that the speed is reverse
U1-26	Current control channel	Bit 14 of status word 1, where value 0 indicates control channel 1 and value 1 indicates control channel 2
U1-27	IGBT operation	Bit 15 of status word 1, where value 1 indicates IGBT operation
U1-98	Ready to switch on	Ready to switch on, with [U1-12] being 1 and [U1-13] being 0
U1-99	Ready to run	Ready to run, with [U1-13] being 1 and [U1-14] being 0
U0-48 to U0-63	Fieldbus adapter A.PZD1.0 to fieldbus adapter A.PZD1.15	Corresponding to each bit of connector U15-18 and typically used for control channel setting
U0-64 to U0-79	Fieldbus adapter B.PZD1.0 to fieldbus adapter B.PZD1.15	Corresponding to each bit of connector U15-34 and typically used for control channel setting
U0-80 to U0-95	InoLink.PZD1.0 to InoLink. PZD1.15	Corresponding to each bit of connector U15-00 and can be used for control channel setting
U10-12 to U10-27	Modbus communication reference 1.PZD1.0 to Modbus communication reference. PZD1.15	Corresponding to each bit of connector U15-08 and can be used for control channel setting

6.2 Connector Parameter List

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U0: Bit Connector 1 Parameters						
U0-00	Logic 0	0 to 1	-	-	Modification prohibited	30720
U0-01	Logic 1	0 to 1	-	-	Modification prohibited	30721

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U0-02	DI1	0 to 1	-	-	Modification prohibited	30722
U0-03	DI2	0 to 1	-	-	Modification prohibited	30723
U0-04	DI3	0 to 1	-	-	Modification prohibited	30724
U0-05	DI4	0 to 1	-	-	Modification prohibited	30725
U0-06	DI5	0 to 1	-	-	Modification prohibited	30726
U0-07	DI6	0 to 1	-	-	Modification prohibited	30727
U0-08	HDI1 used as DI	0 to 1	-	-	Modification prohibited	30728
U0-09	DI1 reversal	0 to 1	-	-	Modification prohibited	30729
U0-10	DI2 reversal	0 to 1	-	-	Modification prohibited	30730
U0-11	DI3 reversal	0 to 1	-	-	Modification prohibited	30731
U0-12	DI4 reversal	0 to 1	-	-	Modification prohibited	30732
U0-13	DI5 reversal	0 to 1	-	-	Modification prohibited	30733
U0-14	DI6 reversal	0 to 1	-	-	Modification prohibited	30734

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U0-15	Reversal of HDI1 used as DI	0 to 1	-	-	Modification prohibited	30735
U0-16	RO1	0 to 1	-	-	Modification prohibited	30736
U0-17	RO2	0 to 1	-	-	Modification prohibited	30737
U0-18	RO3	0 to 1	-	-	Modification prohibited	30738
U0-19	HDO1 used as DO	0 to 1	-	-	Modification prohibited	30739
U0-20	AI1 below lower limit	0 to 1	-	-	Modification prohibited	30740
U0-21	AI1 over upper limit	0 to 1	-	-	Modification prohibited	30741
U0-22	AI2 below lower limit	0 to 1	-	-	Modification prohibited	30742
U0-23	AI2 over upper limit	0 to 1	-	-	Modification prohibited	30743
U0-24	AI1 disconnected	0 to 1	-	-	Modification prohibited	30744
U0-25	AI2 disconnected	0 to 1	-	-	Modification prohibited	30745
U0-26	Reserved	0 to 1	-	-	Modification prohibited	30746
U0-27	Reserved	0 to 1	-	-	Modification prohibited	30747

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U0-28	Reserved	0 to 1	-	-	Modification prohibited	30748
U0-29	Reserved	0 to 1	-	-	Modification prohibited	30749
U0-30	Reserved	0 to 1	-	-	Modification prohibited	30750
U0-31	Reserved	0 to 1	-	-	Modification prohibited	30751
U0-32	Multi-reference value bit 0	0 to 1	-	-	Modification prohibited	30752
U0-33	Multi-reference value bit 1	0 to 1	-	-	Modification prohibited	30753
U0-34	Multi-reference value bit 2	0 to 1	-	-	Modification prohibited	30754
U0-35	Multi-reference value bit 3	0 to 1	-	-	Modification prohibited	30755
U0-36	Reserved	0 to 1	-	-	Modification prohibited	30756
U0-37	Reserved	0 to 1	-	-	Modification prohibited	30757
U0-38	Reserved	0 to 1	-	-	Modification prohibited	30758
U0-39	Reserved	0 to 1	-	-	Modification prohibited	30759
U0-48	Bit 00 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30768

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U0-49	Bit 01 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30769
U0-50	Bit 02 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30770
U0-51	Bit 03 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30771
U0-52	Bit 04 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30772
U0-53	Bit 05 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30773
U0-54	Bit 06 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30774
U0-55	Bit 07 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30775
U0-56	Bit 08 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30776
U0-57	Bit 09 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30777
U0-58	Bit 10 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30778
U0-59	Bit 11 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30779
U0-60	Bit 12 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30780
U0-61	Bit 13 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30781

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U0-62	Bit 14 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30782
U0-63	Bit 15 of input PZD1 for bus adapter A	0 to 1	-	-	Modification prohibited	30783
U0-64	Bit 00 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30784
U0-65	Bit 01 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30785
U0-66	Bit 02 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30786
U0-67	Bit 03 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30787
U0-68	Bit 04 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30788
U0-69	Bit 05 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30789
U0-70	Bit 06 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30790
U0-71	Bit 07 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30791
U0-72	Bit 08 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30792
U0-73	Bit 09 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30793
U0-74	Bit 10 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30794

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U0-75	Bit 11 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30795
U0-76	Bit 12 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30796
U0-77	Bit 13 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30797
U0-78	Bit 14 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30798
U0-79	Bit 15 of input PZD1 for bus adapter B	0 to 1	-	-	Modification prohibited	30799
U0-80	Bit 00 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30800
U0-81	Bit 01 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30801
U0-82	Bit 02 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30802
U0-83	Bit 03 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30803
U0-84	Bit 04 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30804
U0-85	Bit 05 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30805
U0-86	Bit 06 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30806
U0-87	Bit 07 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30807

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U0-88	Bit 08 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30808
U0-89	Bit 09 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30809
U0-90	Bit 10 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30810
U0-91	Bit 11 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30811
U0-92	Bit 12 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30812
U0-93	Bit 13 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30813
U0-94	Bit 14 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30814
U0-95	Bit 15 of input PZD1 for InoLink	0 to 1	-	-	Modification prohibited	30815
U1: Bit Connector 2 Parameters						
U1-03	OFF1 command	0: Invalid 1: Valid	-	-	Modification prohibited	30823
U1-04	Not ready to switch on	0 to 1	-	-	Modification prohibited	30824
U1-05	Not ready to run	0 to 1	-	-	Modification prohibited	30825
U1-06	Not running	0 to 1	-	-	Modification prohibited	30826
U1-07	Switch-on not blocked	0 to 1	-	-	Modification prohibited	30827

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U1-08	Speed comparison value not reached	0 to 1	-	-	Modification prohibited	30828
U1-09	Current/Torque limit not reached	0 to 1	-	-	Modification prohibited	30829
U1-10	IGBT blocked	0 to 1	-	-	Modification prohibited	30830
U1-11	Brake closing	0 to 1	-	-	Modification prohibited	30831
U1-12	Ready to switch on	0 to 1	-	-	Modification prohibited	30832
U1-13	Ready to run	0 to 1	-	-	Modification prohibited	30833
U1-14	Running	0 to 1	-	-	Modification prohibited	30834
U1-15	Fault activated	0: No fault 1: Fault present	-	-	Modification prohibited	30835
U1-16	OFF2 invalid	0: Valid (OFF2 = 0) 1: Invalid (OFF2 = 1)	-	-	Modification prohibited	30836
U1-17	OFF3 invalid	0: Valid (OFF3 = 0) 1: Invalid (OFF3 = 1)	-	-	Modification prohibited	30837
U1-18	Switch-on blocked	0 to 1	-	-	Modification prohibited	30838
U1-19	Alarm/Minor fault activated	0 to 1	-	-	Modification prohibited	30839
U1-20	No deviation between motor speed and speed reference	0 to 1	-	-	Modification prohibited	30840

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U1-21	IDS control invalid	0: Valid 1: Invalid	-	-	Modification prohibited	30841
U1-22	Speed comparison value reached	0 to 1	-	-	Modification prohibited	30842
U1-23	Current/Torque limit reached	0 to 1	-	-	Modification prohibited	30843
U1-24	Forward speed	0 to 1	-	-	Modification prohibited	30844
U1.25	Reverse speed	0 to 1	-	-	Modification prohibited	30845
U1-26	Current control channel	0: Control channel 1 1: Control channel 2	-	-	Modification prohibited	30846
U1-27	IGBT running	0 to 1	-	-	Modification prohibited	30847
U1-28	RFG enable	0 to 1	-	-	Modification prohibited	30848
U1-29	RFG running	0 to 1	-	-	Modification prohibited	30849
U1-30	Stop state upon fault	0 to 1	-	-	Modification prohibited	30850
U1-31	Normal operation	0 to 1	-	-	Modification prohibited	30851
U1-32	Jogging	0 to 1	-	-	Modification prohibited	30852
U1-33	Current reference channel	0: Reference channel 1 1: Reference channel 2	-	-	Modification prohibited	30853

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U1-34	Motor auto-tuning	0 to 1	-	-	Modification prohibited	30854
U1-35	Minor fault activated	0 to 1	-	-	Modification prohibited	30855
U1-36	Alarm activated	0 to 1	-	-	Modification prohibited	30856
U1-37	Bit 0 of motor parameter group selection	0 to 1	-	-	Modification prohibited	30857
U1-38	Bit 1 of motor parameter group selection	0 to 1	-	-	Modification prohibited	30858
U1-39	Operating panel control valid	0: Invalid 1: Valid	-	-	Modification prohibited	30859
U1-40	No fault	0: Fault present 1: No fault	-	-	Modification prohibited	30860
U1-41	No alarm or minor fault	0: Alarm or minor fault reported 1: No alarm or minor fault reported	-	-	Modification prohibited	30861
U1-42	No minor fault	0: Reported 1: Not reported	-	-	Modification prohibited	30862
U1-43	No alarm	0: Reported 1: Not reported	-	-	Modification prohibited	30863
U1-44	Self checking	0 to 1	-	-	Modification prohibited	30864
U1-45	Decelerate to stop	0 to 1	-	-	Modification prohibited	30865
U1-46	Quick stop	0 to 1	-	-	Modification prohibited	30866

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U1-47	Speed reference 0	0 to 1	-	-	Modification prohibited	30867
U1-48	Motor overspeed	0 to 1	-	-	Modification prohibited	30868
U1-49	Motor at zero speed	0 to 1	-	-	Modification prohibited	30869
U1-50	Actual speed reached target speed	0 to 1	-	-	Modification prohibited	30870
U1-51	Excessive speed deviation of motor	0 to 1	-	-	Modification prohibited	30871
U1-52	Stopping at maximum capability	0 to 1	-	-	Modification prohibited	30872
U1-53	Fan start/stop command	0: Fan stop 1: Fan start	-	-	Modification prohibited	30873
U1-54	DC bus voltage normal	0: Invalid 1: Activated	-	-	Modification prohibited	30874
U1-55	STO activation	0: Activated 1: Not activated	-	-	Modification prohibited	30875
U1-56	STO not activated	0: Invalid 1: Valid	-	-	Modification prohibited	30876
U1-57	IDS control valid	0: Valid 1: Invalid	-	-	Modification prohibited	30877
U1-58	Local control invalid	0: Invalid 1: Valid	-	-	Modification prohibited	30878
U1-59	Local control active	0 to 1	-	-	Modification prohibited	30879

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U1-60	Speed control active	0 to 1	-	-	Modification prohibited	30880
U1-61	Torque control active	0 to 1	-	-	Modification prohibited	30881
U1-62	Position control active (reserved)	0 to 1	-	-	Modification prohibited	30882
U1-63	Brake releasing	0 to 1	-	-	Modification prohibited	30883
U1-64	Brake control enable	0 to 1	-	-	Modification prohibited	30884
U1-65	Storing to black box	0 to 1	-	-	Modification prohibited	30885
U1-66	Brake released	0 to 1	-	-	Modification prohibited	30886
U1-67	Brake closed	0 to 1	-	-	Modification prohibited	30887
U1-68	Establishing start torque	0 to 1	-	-	Modification prohibited	30888
U1-69	Establishing start speed	0 to 1	-	-	Modification prohibited	30889
U1-70	Memory torque valid	0 to 1	-	-	Modification prohibited	30890
U1-71	Started (brake apply)	0 to 1	-	-	Modification prohibited	30891
U1-72	DC braking	0 to 1	-	-	Modification prohibited	30892

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U1-73	Flying start	0 to 1	-	-	Modification prohibited	30893
U1-74	Pre-exciting	0 to 1	-	-	Modification prohibited	30894
U1-75	OFF3 activated	0: Invalid (OFF3 = 1) 1: Valid (OFF3 = 0)	-	-	Modification prohibited	30895
U1-76	V/f separation activated	0: Invalid 1: Valid	-	-	Modification prohibited	30896
U1-77	OFF2 activated	0: Invalid (OFF2 = 1) 1: Valid (OFF2 = 0)	-	-	Modification prohibited	30897
U1-78	PID enable	0 to 1	-	-	Modification prohibited	30898
U1-79	PID action direction	0 to 1	-	-	Modification prohibited	30899
U1-80	PID reference freezing enable	0 to 1	-	-	Modification prohibited	30900
U1-81	PID integral component forcibly enabled	0 to 1	-	-	Modification prohibited	30901
U1-82	PID deviation dead zone enable	0 to 1	-	-	Modification prohibited	30902
U1-83	PID saturation status	0 to 1	-	-	Modification prohibited	30903
U1-84	PID feedback loss state	0 to 1	-	-	Modification prohibited	30904
U1-85	Current running duration reach	0 to 1	-	-	Modification prohibited	30905

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U1-86	Hibernation activation	0 to 1	-	-	Modification prohibited	30906
U1-87	Wakeup activation	0 to 1	-	-	Modification prohibited	30907
U1-88	Low battery voltage	0 to 1	-	-	Modification prohibited	30908
U1-89	RFG acceleration	0 to 1	-	-	Modification prohibited	30909
U1-90	RFG deceleration	0 to 1	-	-	Modification prohibited	30910
U1-91	RFG constant speed	0 to 1	-	-	Modification prohibited	30911
U1-92	Voltage dip resistance activation	0 to 1	-	-	Modification prohibited	30912
U1-98	Ready to switch on	0 to 1	-	-	Modification prohibited	30918
U1-99	Ready to run	0 to 1	-	-	Modification prohibited	30919
U2: Bit Connector 3 Parameters						
U2-08	Pre-excitation in progress	0 to 1	-	-	Modification prohibited	30928
U2-09	Pre-excitation completed	0 to 1	-	-	Modification prohibited	30929
U2-10	VdcMin in progress	0 to 1	-	-	Modification prohibited	30930
U2-11	VdcMax in progress	0 to 1	-	-	Modification prohibited	30931

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U2-12	DC braking in progress	0 to 1	-	-	Modification prohibited	30932
U2-13	DC braking completed	0 to 1	-	-	Modification prohibited	30933
U2-14	Position lock in progress	0 to 1	-	-	Modification prohibited	30934
U2-15	Reserved	0 to 1	-	-	Modification prohibited	30935
U2-16	Flying start in progress	0 to 1	-	-	Modification prohibited	30936
U2-17	Flying start completed	0 to 1	-	-	Modification prohibited	30937
U2-18	FVC-to-SVC flag	0 to 1	-	-	Modification prohibited	30938
U2-19	Reserved	0 to 1	-	-	Modification prohibited	30939
U2-20	Reserved	0 to 1	-	-	Modification prohibited	30940
U2-21	Reserved	0 to 1	-	-	Modification prohibited	30941
U2-22	Reserved	0 to 1	-	-	Modification prohibited	30942
U2-23	Reserved	0 to 1	-	-	Modification prohibited	30943
U2-24	Speed loop enable	0 to 1	-	-	Modification prohibited	30944

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U2-25	Integral holding activation	0 to 1	-	-	Modification prohibited	30945
U2-26	Integral forcibly activated	0 to 1	-	-	Modification prohibited	30946
U2-27	Positive limit reach of torque current	0 to 1	-	-	Modification prohibited	30947
U2-28	Negative limit reach of torque current	0 to 1	-	-	Modification prohibited	30948
U2-29	Reserved	0 to 1	-	-	Modification prohibited	30949
U2-30	Reserved	0 to 1	-	-	Modification prohibited	30950
U2-40	Hardware overcurrent	0 to 1	-	-	Modification prohibited	30960
U2-41	DC bus overvoltage	0 to 1	-	-	Modification prohibited	30961
U2-42	DC bus undervoltage	0 to 1	-	-	Modification prohibited	30962
U2-43	Motor overload	0 to 1	-	-	Modification prohibited	30963
U2-44	Drive overload	0 to 1	-	-	Modification prohibited	30964
U2-45	Activation of external fault 1	0 to 1	-	-	Modification prohibited	30965
U2-46	Activation of external fault 2	0 to 1	-	-	Modification prohibited	30966

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U2-47	Encoder disconnection activation (hardware detection)	0 to 1	-	-	Modification prohibited	30967
U2-48	Drive overtemperature	0 to 1	-	-	Modification prohibited	30968
U2-49	Drive overtemperature warning	0 to 1	-	-	Modification prohibited	30969
U2-50	Motor overtemperature	0 to 1	-	-	Modification prohibited	30970
U2-51	Motor overtemperature warning	0 to 1	-	-	Modification prohibited	30971
U2-52	Communication disconnection of bus adapter A	0 to 1	-	-	Modification prohibited	30972
U2-53	Communication disconnection of bus adapter B	0 to 1	-	-	Modification prohibited	30973
U2-54	AC drive pre-overload	0 to 1	-	-	Modification prohibited	30974
U2-55	Motor pre-overload	0 to 1	-	-	Modification prohibited	30975
U2-56	EEPROM fault	0 to 1	-	-	Modification prohibited	30976
U2-57	Flash fault	0 to 1	-	-	Modification prohibited	30977
U2-58	STO fault	0 to 1	-	-	Modification prohibited	30978
U3: Bit Connector 4 Parameters						
U3-04	Output of logic AND/OR module A	0 to 1	-	-	Modification prohibited	31024

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U3-05	Output of logic AND/OR module B	0 to 1	-	-	Modification prohibited	31025
U3-06	Output of logic AND/OR module C	0 to 1	-	-	Modification prohibited	31026
U3-07	Output of logic AND/OR module D	0 to 1	-	-	Modification prohibited	31027
U3-08	Output of logic AND/OR module E	0 to 1	-	-	Modification prohibited	31028
U3-09	Output of logic AND/OR module F	0 to 1	-	-	Modification prohibited	31029
U3-10	Output of logic AND/OR module G	0 to 1	-	-	Modification prohibited	31030
U3-11	Output of logic AND/OR module H	0 to 1	-	-	Modification prohibited	31031
U3-12	Output of logic AND/OR module I	0 to 1	-	-	Modification prohibited	31032
U3-13	Output of logic AND/OR module J	0 to 1	-	-	Modification prohibited	31033
U3-14	Output of logic AND/OR module K	0 to 1	-	-	Modification prohibited	31034
U3-15	Output of logic AND/OR module L	0 to 1	-	-	Modification prohibited	31035
U3-16	Output of logic AND/OR module M	0 to 1	-	-	Modification prohibited	31036
U3-17	Output of logic AND/OR module N	0 to 1	-	-	Modification prohibited	31037

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U3-18	Output of logic AND/OR module O	0 to 1	-	-	Modification prohibited	31038
U3-19	Output of logic AND/OR module P	0 to 1	-	-	Modification prohibited	31039
U3-20	Output of logic AND/OR module M	0 to 1	-	-	Modification prohibited	31040
U3-21	Output of logic AND/OR module N	0 to 1	-	-	Modification prohibited	31041
U3-22	Output of logic AND/OR module O	0 to 1	-	-	Modification prohibited	31042
U3-23	Output of logic AND/OR module P	0 to 1	-	-	Modification prohibited	31043
U3-24	Output of logic NOT module A	0 to 1	-	-	Modification prohibited	31044
U3-25	Output of logic NOT module B	0 to 1	-	-	Modification prohibited	31045
U3-26	Output of logic NOT module C	0 to 1	-	-	Modification prohibited	31046
U3-27	Output of logic NOT module D	0 to 1	-	-	Modification prohibited	31047
U3-36	Reserved	0 to 1	-	-	Modification prohibited	31056
U3-37	Reserved	0 to 1	-	-	Modification prohibited	31057
U3-38	Reserved	0 to 1	-	-	Modification prohibited	31058

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U3-39	Reserved	0 to 1	-	-	Modification prohibited	31059
U3-44	Output of level-to-pulse module A	0 to 1	-	-	Modification prohibited	31064
U3-45	Output of level-to-pulse module B	0 to 1	-	-	Modification prohibited	31065
U3-46	Output of level-to-pulse module C	0 to 1	-	-	Modification prohibited	31066
U3-47	Output of level-to-pulse module D	0 to 1	-	-	Modification prohibited	31067
U3-52	Output of logic delay module A	0 to 1	-	-	Modification prohibited	31072
U3-53	Output of logic delay module B	0 to 1	-	-	Modification prohibited	31073
U3-54	Output of logic delay module C	0 to 1	-	-	Modification prohibited	31074
U3-55	Output of logic delay module D	0 to 1	-	-	Modification prohibited	31075
U3-56	Output of logic delay module E	0 to 1	-	-	Modification prohibited	31076
U3-57	Output of logic delay module F	0 to 1	-	-	Modification prohibited	31077
U3-58	Output of logic delay module G	0 to 1	-	-	Modification prohibited	31078
U3-59	Output of logic delay module H	0 to 1	-	-	Modification prohibited	31079

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U3-60	Input of absolute value module A	0: Non-negative value 1: Negative value	-	-	Modification prohibited	31080
U3-61	Input of absolute value module B	0: Non-negative value 1: Negative value	-	-	Modification prohibited	31081
U3-62	Input of absolute value module C	0: Non-negative value 1: Negative value	-	-	Modification prohibited	31082
U3-63	Input of absolute value module D	0: Non-negative value 1: Negative value	-	-	Modification prohibited	31083
U3-64	Input of absolute value module E	0: Non-negative value 1: Negative value	-	-	Modification prohibited	31084
U3-65	Input of absolute value module F	0: Non-negative value 1: Negative value	-	-	Modification prohibited	31085
U3-66	Input of absolute value module G	0: Non-negative value 1: Negative value	-	-	Modification prohibited	31086
U3-67	Input of absolute value module H	0: Non-negative value 1: Negative value	-	-	Modification prohibited	31087
U3-68	Output of binary selector module A	0 to 1	-	-	Modification prohibited	31088
U3-69	Output of binary selector module B	0 to 1	-	-	Modification prohibited	31089
U3-70	Output of binary selector module C	0 to 1	-	-	Modification prohibited	31090
U3-71	Output of binary selector module D	0 to 1	-	-	Modification prohibited	31091
U3-72	Output of binary selector module E	0 to 1	-	-	Modification prohibited	31092

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U3-73	Output of binary selector module F	0 to 1	-	-	Modification prohibited	31093
U3-74	Output of binary selector module G	0 to 1	-	-	Modification prohibited	31094
U3-75	Output of binary selector module H	0 to 1	-	-	Modification prohibited	31095
U3-76	Flag indicating whether divisor of MUL_DIV module A is 0	0 to 1	-	-	Modification prohibited	31096
U3-77	Flag indicating whether divisor of multiplication and division module B is 0	0 to 1	-	-	Modification prohibited	31097
U3-78	Flag indicating whether divisor of multiplication and division module C is 0	0 to 1	-	-	Modification prohibited	31098
U3-79	Flag indicating whether divisor of multiplication and division module D is 0	0 to 1	-	-	Modification prohibited	31099
U3-80	Flag indicating whether divisor of multiplication and division module E is 0	0 to 1	-	-	Modification prohibited	31100
U3-81	Flag indicating whether divisor of multiplication and division module F is 0	0 to 1	-	-	Modification prohibited	31101
U3-82	Flag indicating whether divisor of multiplication and division module G is 0	0 to 1	-	-	Modification prohibited	31102
U3-83	Flag indicating whether divisor of multiplication and division module H is 0	0 to 1	-	-	Modification prohibited	31103
U3-84	Output of comparison module A	0 to 1	-	-	Modification prohibited	31104
U3-85	Output of comparison module B	0 to 1	-	-	Modification prohibited	31105

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U3-86	Output of comparison module C	0 to 1	-	-	Modification prohibited	31106
U3-87	Output of comparison module D	0 to 1	-	-	Modification prohibited	31107
U3-88	Output of comparison module E	0 to 1	-	-	Modification prohibited	31108
U3-89	Output of comparison module F	0 to 1	-	-	Modification prohibited	31109
U3-90	Output of comparison module G	0 to 1	-	-	Modification prohibited	31110
U3-91	Output of comparison module H	0 to 1	-	-	Modification prohibited	31111
U3-92	Upper limit flag of limiting module A	0 to 1	-	-	Modification prohibited	31112
U3-93	Lower limit flag of limiting module A	0 to 1	-	-	Modification prohibited	31113
U3-94	Upper limit flag of limiting module B	0 to 1	-	-	Modification prohibited	31114
U3-95	Lower limit flag of limiting module B	0 to 1	-	-	Modification prohibited	31115
U3-96	Upper limit flag of limiting module C	0 to 1	-	-	Modification prohibited	31116
U3-97	Lower limit flag of limiting module C	0 to 1	-	-	Modification prohibited	31117
U3-98	Upper limit flag of limiting module D	0 to 1	-	-	Modification prohibited	31118

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U3-99	Lower limit flag of limiting module D	0 to 1	-	-	Modification prohibited	31119
U4: Bit Connector 5 Parameters						
U4-00	Bit 00 of word-to-bit module A output	-	-	-	-	-
U4-01	Bit 01 of word-to-bit module A output	-	-	-	-	-
U4-02	Bit 02 of word-to-bit module A output	-	-	-	-	-
U4-03	Bit 03 of word-to-bit module A output	-	-	-	-	-
U4-04	Bit 04 of word-to-bit module A output	-	-	-	-	-
U4-05	Bit 05 of word-to-bit module A output	-	-	-	-	-
U4-06	Bit 06 of word-to-bit module A output	-	-	-	-	-
U4-07	Bit 07 of word-to-bit module A output	-	-	-	-	-
U4-08	Bit 08 of word-to-bit module A output	-	-	-	-	-
U4-09	Bit 09 of word-to-bit module A output	-	-	-	-	-
U4-10	Bit 10 of word-to-bit module A output	-	-	-	-	-
U4-11	Bit 11 of word-to-bit module A output	-	-	-	-	-
U4-12	Bit 12 of word-to-bit module A output	-	-	-	-	-
U4-13	Bit 13 of word-to-bit module A output	-	-	-	-	-
U4-14	Bit 14 of word-to-bit module A output	-	-	-	-	-
U4-15	Bit 15 of word-to-bit module A output	-	-	-	-	-
U4-16	Bit 00 of word-to-bit module B output	-	-	-	-	-
U4-17	Bit 01 of word-to-bit module B output	-	-	-	-	-
U4-18	Bit 02 of word-to-bit module B output	-	-	-	-	-
U4-19	Bit 03 of word-to-bit module B output	-	-	-	-	-
U4-20	Bit 04 of word-to-bit module B output	-	-	-	-	-
U4-21	Bit 05 of word-to-bit module B output	-	-	-	-	-

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U4-22	Bit 06 of word-to-bit module B output	-	-	-	-	-
U4-23	Bit 07 of word-to-bit module B output	-	-	-	-	-
U4-24	Bit 08 of word-to-bit module B output	-	-	-	-	-
U4-25	Bit 09 of word-to-bit module B output	-	-	-	-	-
U4-26	Bit 10 of word-to-bit module B output	-	-	-	-	-
U4-27	Bit 11 of word-to-bit module B output	-	-	-	-	-
U4-28	Bit 12 of word-to-bit module B output	-	-	-	-	-
U4-29	Bit 13 of word-to-bit module B output	-	-	-	-	-
U4-30	Bit 14 of word-to-bit module B output	-	-	-	-	-
U4-31	Bit 15 of word-to-bit module B output	-	-	-	-	-
U4-32	Bit 00 of word-to-bit module C output	-	-	-	-	-
U4-33	Bit 01 of word-to-bit module C output	-	-	-	-	-
U4-34	Bit 02 of word-to-bit module C output	-	-	-	-	-
U4-35	Bit 03 of word-to-bit module C output	-	-	-	-	-
U4-36	Bit 04 of word-to-bit module C output	-	-	-	-	-
U4-37	Bit 05 of word-to-bit module C output	-	-	-	-	-
U4-38	Bit 06 of word-to-bit module C output	-	-	-	-	-
U4-39	Bit 07 of word-to-bit module C output	-	-	-	-	-
U4-40	Bit 08 of word-to-bit module C output	-	-	-	-	-
U4-41	Bit 09 of word-to-bit module C output	-	-	-	-	-
U4-42	Bit 10 of word-to-bit module C output	-	-	-	-	-
U4-43	Bit 11 of word-to-bit module C output	-	-	-	-	-
U4-44	Bit 12 of word-to-bit module C output	-	-	-	-	-
U4-45	Bit 13 of word-to-bit module C output	-	-	-	-	-

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U4-46	Bit 14 of word-to-bit module C output	-	-	-	-	-
U4-47	Bit 15 of word-to-bit module C output	-	-	-	-	-
U4-48	Bit 00 of word-to-bit module D output	-	-	-	-	-
U4-49	Bit 01 of word-to-bit module D output	-	-	-	-	-
U4-50	Bit 02 of word-to-bit module D output	-	-	-	-	-
U4-51	Bit 03 of word-to-bit module D output	-	-	-	-	-
U4-52	Bit 04 of word-to-bit module D output	-	-	-	-	-
U4-53	Bit 05 of word-to-bit module D output	-	-	-	-	-
U4-54	Bit 06 of word-to-bit module D output	-	-	-	-	-
U4-55	Bit 07 of word-to-bit module D output	-	-	-	-	-
U4-56	Bit 08 of word-to-bit module D output	-	-	-	-	-
U4-57	Bit 09 of word-to-bit module D output	-	-	-	-	-
U4-58	Bit 10 of word-to-bit module D output	-	-	-	-	-
U4-59	Bit 11 of word-to-bit module D output	-	-	-	-	-
U4-60	Bit 12 of word-to-bit module D output	-	-	-	-	-
U4-61	Bit 13 of word-to-bit module D output	-	-	-	-	-
U4-62	Bit 14 of word-to-bit module D output	-	-	-	-	-
U4-63	Bit 15 of word-to-bit module D output	-	-	-	-	-
U4-64	Bit 00 of word-to-bit module E output	-	-	-	-	-
U4-65	Bit 01 of word-to-bit module E output	-	-	-	-	-
U4-66	Bit 02 of word-to-bit module E output	-	-	-	-	-
U4-67	Bit 03 of word-to-bit module E output	-	-	-	-	-
U4-68	Bit 04 of word-to-bit module E output	-	-	-	-	-
U4-69	Bit 05 of word-to-bit module E output	-	-	-	-	-

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U4-70	Bit 06 of word-to-bit module E output	-	-	-	-	-
U4-71	Bit 07 of word-to-bit module E output	-	-	-	-	-
U4-72	Bit 08 of word-to-bit module E output	-	-	-	-	-
U4-73	Bit 09 of word-to-bit module E output	-	-	-	-	-
U4-74	Bit 10 of word-to-bit module E output	-	-	-	-	-
U4-75	Bit 11 of word-to-bit module E output	-	-	-	-	-
U4-76	Bit 12 of word-to-bit module E output	-	-	-	-	-
U4-77	Bit 13 of word-to-bit module E output	-	-	-	-	-
U4-78	Bit 14 of word-to-bit module E output	-	-	-	-	-
U4-79	Bit 15 of word-to-bit module E output	-	-	-	-	-
U4-80	Setting flag of RS flip-flop module A	-	-	-	-	-
U4-81	Reset flag of RS flip-flop module A	-	-	-	-	-
U4-82	Setting flag of RS flip-flop module B	-	-	-	-	-
U4-83	Reset flag of RS flip-flop module B	-	-	-	-	-
U4-84	Setting flag of RS flip-flop module C	-	-	-	-	-
U4-85	Reset flag of RS flip-flop module C	-	-	-	-	-
U4-86	Setting flag of RS flip-flop module D	-	-	-	-	-
U4-87	Reset flag of RS flip-flop module D	-	-	-	-	-
U4-88	Setting flag of D flip-flop module A	-	-	-	-	-
U4-89	Reset flag of D flip-flop module A	-	-	-	-	-
U4-90	Setting flag of D flip-flop module B	-	-	-	-	-
U4-91	Reset flag of D flip-flop module B	-	-	-	-	-
U4-92	Setting flag of D flip-flop module C	-	-	-	-	-
U4-93	Reset flag of D flip-flop module C	-	-	-	-	-
U4-94	Setting flag of D flip-flop module D	-	-	-	-	-

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U4-95	Reset flag of D flip-flop module D	-	-	-	-	-
U5: Word Connector 1						
U5-00	Actual motor speed (filter)	-	%	-	Modification prohibited	24576
U5-01	Output voltage (filter)	-	%	-	Modification prohibited	24577
U5-02	Output current (filter)	-	%	-	Modification prohibited	24578
U5-03	Output power (filter)	-	%	-	Modification prohibited	24579
U5-04	Output torque (filter)	-	%	-	Modification prohibited	24580
U5-05	DC bus voltage (filter)	-	V	-	Modification prohibited	24581
U5-06	Reserved	-	-	-	Modification prohibited	24582
U5-07	Reserved	-	%	-	Modification prohibited	24583
U5-08	Feedforward torque	-	-	-	Modification prohibited	24584
U5-09	V/f output frequency (after slip compensation)	-	%	-	Modification prohibited	24585
U5-10	Motor detection temperature 1	-	°C	-	Modification prohibited	24586
U5-11	Motor detection temperature 2	-	°C	-	Modification prohibited	24587

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U5-12	Motor detection temperature 3	-	°C	-	Modification prohibited	24588
U5-13	Module temperature	-	°C	-	Modification prohibited	24589
U5-14	RFG frequency reference	-	Hz	-	Modification prohibited	24590
U5-15	Motor frequency reference	-	Hz	-	Modification prohibited	24591
U5-16	Actual motor frequency	-	Hz	-	Modification prohibited	24592
U5-17	RFG speed reference	-	RPM	-	Modification prohibited	24593
U5-18	Motor speed reference	-	RPM	-	Modification prohibited	24594
U5-19	Actual motor speed	-	RPM	-	Modification prohibited	24595
U5-20	AI1 input proportion	-	%	-	Modification prohibited	24596
U5-21	AI2 input proportion	-	%	-	Modification prohibited	24597
U5-22	HDI1 input proportion	-	%	-	Modification prohibited	24598
U5-23	AO1 output proportion	-	%	-	Modification prohibited	24599
U5-24	AO2 output proportion	-	%	-	Modification prohibited	24600

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U5-25	HDO1 output proportion	-	%	-	Modification prohibited	24601
U5-27	AI1 input value	-	-	-	Modification prohibited	24603
U5-28	AI2 input value	-	-	-	Modification prohibited	24604
U5-29	HDI1 input value	-	%	-	Modification prohibited	24605
U5-30	AO1 output	-	%	-	Modification prohibited	24606
U5-31	AO2 output	-	-	-	Modification prohibited	24607
U5-32	HDO1 output	-	kHz	-	Modification prohibited	24608
U5-34	Additional torque	-	%	-	Modification prohibited	24610
U5-35	Target torque after limiting	-	%	-	Modification prohibited	24611
U5-36	Target torque after filtering	-	%	-	Modification prohibited	24612
U5-37	Target torque after acceleration/deceleration	-	%	-	Modification prohibited	24613
U5-38	Forward torque limit	-	%	-	Modification prohibited	24614
U5-39	Reverse torque limit	-	%	-	Modification prohibited	24615

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U5-40	Internal control word 1	-	-	-	Modification prohibited	24616
U5-41	Internal control word 2	-	-	-	Modification prohibited	24617
U5-42	Internal control word 3	-	-	-	Modification prohibited	24618
U5-43	Internal control word 4	-	-	-	Modification prohibited	24619
U5-44	Internal status word 1	-	-	-	Modification prohibited	24620
U5-45	Internal status word 2	-	-	-	Modification prohibited	24621
U5-46	Internal status word 3	-	-	-	Modification prohibited	24622
U5-47	Internal status word 4	-	-	-	Modification prohibited	24623
U5-48	User-defined fault word 1	-	-	-	Modification prohibited	24624
U5-49	User-defined fault word 2	-	-	-	Modification prohibited	24625
U5-50	Current state machine	-	-	-	Modification prohibited	24626
U5-51	Latest state machine	-	-	-	Modification prohibited	24627
U5-52	Second latest state machine	-	-	-	Modification prohibited	24628

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U5-53	Third latest state machine	-	-	-	Modification prohibited	24629
U5-54	Fourth latest state machine	-	-	-	Modification prohibited	24630
U5-55	Fifth latest state machine	-	-	-	Modification prohibited	24631
U5-56	Sixth latest state machine	-	-	-	Modification prohibited	24632
U5-57	Seventh latest state machine	-	-	-	Modification prohibited	24633
U5-58	Eighth latest state machine	-	-	-	Modification prohibited	24634
U5-59	Ninth latest state machine	-	-	-	Modification prohibited	24635
U5-60	Control word of terminal control module	-	-	-	Modification prohibited	24636
U5-61	Control word of terminal control module A	-	-	-	Modification prohibited	24637
U5-62	Control word of terminal control module B	-	-	-	Modification prohibited	24638
U5-63	STO state word	-	-	-	Modification prohibited	24639
U5-64	Operating panel command word	-	-	-	Modification prohibited	24640
U5-65	InoDriveStudio command word	-	-	-	Modification prohibited	24641

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U5-66	System status word 1	-	-	-	Modification prohibited	24642
U5-67	System status word 2	-	-	-	Modification prohibited	24643
U5-68	Reserved	-	-	-	Modification prohibited	24644
U5-69	Current motor data set (MDS)	0: Motor parameter group 1 1: Motor parameter group 2 2: Motor parameter group 3 3: Motor parameter group 4	-	-	Modification prohibited	24645
U5-70	RFG running state	-	-	-	Modification prohibited	24646
U5-71	RFG arc state	-	-	-	Modification prohibited	24647
U5-72	RFG control word	-	-	-	Modification prohibited	24648
U5-73	PID control word	-	-	-	Modification prohibited	24649
U5-74	PID state word	-	-	-	Modification prohibited	24650
U5-75	Auto-tuning state	-	-	-	Modification prohibited	24651
U5-76	Auto-tuning step	-	-	-	Modification prohibited	24652
U5-77	Reserved	-	-	-	Modification prohibited	24653
U5-78	Effective undervoltage threshold	-	V	-	Modification prohibited	24654

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U5-79	Effective overvoltage threshold	-	V	-	Modification prohibited	24655
U5-80	Voltage reference in V/f separation	-	V	-	Modification prohibited	24656
U5-81	Target voltage in V/f separation	-	%	-	Modification prohibited	24657
U5-82	Current voltage in V/f separation	-	%	-	Modification prohibited	24658
U5-83	V/f operation mode	-	-	-	Modification prohibited	24659
U5-84	Reserved	-	-	-	Modification prohibited	24660
U5-85	Terminal signal status word	-	-	-	Modification prohibited	24661
U5-86	DI state	-	-	-	Modification prohibited	24662
U5-87	RO state	-	-	-	Modification prohibited	24663
U5-90	Retentive torque value of brake module	-	-	-	Modification prohibited	24666
U5-91	Brake module status word	-	-	-	Modification prohibited	24667
U5-92	Parameter setting error code	-	-	-	Modification prohibited	24668
U5-93	Reserved	-	-	-	Modification prohibited	24669

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U5-94	Code of current fault	-	-	-	Modification prohibited	24670
U5-95	Subcode of current fault	-	-	-	Modification prohibited	24671
U5-96	Code of minor fault	-	-	-	Modification prohibited	24672
U5-97	Subcode of minor fault	-	-	-	Modification prohibited	24673
U5-98	Code of current alarm	-	-	-	Modification prohibited	24674
U5-99	Subcode of current alarm	-	-	-	Modification prohibited	24675
U6: Word Connector 2 Parameters						
U6-00	Constant reference 1	-	%	-	Modification prohibited	24676
U6-01	Constant reference 2	-	%	-	Modification prohibited	24677
U6-02	Constant reference 3	-	%	-	Modification prohibited	24678
U6-03	Constant reference 4	-	%	-	Modification prohibited	24679
U6-04	Constant reference 5	-	%	-	Modification prohibited	24680
U6-05	Constant reference 11	-	-	-	Modification prohibited	24681
U6-06	Constant reference 12	-	-	-	Modification prohibited	24682

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U6-07	Constant reference 13	-	-	-	Modification prohibited	24683
U6-08	Constant reference 14	-	-	-	Modification prohibited	24684
U6-09	Constant reference 15	-	-	-	Modification prohibited	24685
U6-10	Encoder pulse count	-	-	-	Modification prohibited	24686
U6-11	Relative encoder pulse count	-	-	-	Modification prohibited	24687
U6-12	Encoder measured angle	-	-	-	Modification prohibited	24688
U6-13	Encoder revolutions	-	-	-	Modification prohibited	24689
U6-20	Output of bit-to-word module A	-	-	-	Modification prohibited	24696
U6-21	Output of bit-to-word module B	-	-	-	Modification prohibited	24697
U6-22	Output of bit-to-word module C	-	-	-	Modification prohibited	24698
U6-23	Output of bit-to-word module D	-	-	-	Modification prohibited	24699
U6-28	HIWORD of double word-to-word module A output	-	-	-	Modification prohibited	24704
U6-29	LOWORD of double word-to-word module A output	-	-	-	Modification prohibited	24705

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U6-30	HIWORD of double word-to-word module B output	-	-	-	Modification prohibited	24706
U6-31	LOWORD of double word-to-word module B output	-	-	-	Modification prohibited	24707
U6-32	HIWORD of double word-to-word module C output	-	-	-	Modification prohibited	24708
U6-33	LOWORD of double word-to-word module C output	-	-	-	Modification prohibited	24709
U6-34	HIWORD of double word-to-word module D output	-	-	-	Modification prohibited	24710
U6-35	LOWORD of double word-to-word module D output	-	-	-	Modification prohibited	24711
U6-36	HIWORD of double word-to-word module E output	-	-	-	Modification prohibited	24712
U6-37	LOWORD of double word-to-word module E output	-	-	-	Modification prohibited	24713
U6-50	Output of proportion module 1	-	%	-	Modification prohibited	24726
U6-51	Output of proportion module 2	-	%	-	Modification prohibited	24727
U6-52	Output of proportion module 3	-	%	-	Modification prohibited	24728
U6-53	Output of proportion module 4	-	%	-	Modification prohibited	24729
U6-54	Output of proportion module 5	-	%	-	Modification prohibited	24730

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U6-55	Output of proportion module 6	-	%	-	Modification prohibited	24731
U6-56	Output of proportion module 7	-	%	-	Modification prohibited	24732
U6-57	Output of proportion module 8	-	%	-	Modification prohibited	24733
U6-58	Output of proportion module 9	-	%	-	Modification prohibited	24734
U6-59	Output of proportion module 10	-	%	-	Modification prohibited	24735
U6-60	Single-word parameter monitoring numerical value 1	-	-	-	Modification prohibited	24736
U6-61	Single-word parameter monitoring numerical value 2	-	-	-	Modification prohibited	24737
U6-62	Single-word parameter monitoring numerical value 3	-	-	-	Modification prohibited	24738
U6-63	Single-word parameter monitoring numerical value 4	-	-	-	Modification prohibited	24739
U6-64	Single-word parameter monitoring numerical value 5	-	-	-	Modification prohibited	24740
U6-65	Single-word parameter monitoring numerical value 6	-	-	-	Modification prohibited	24741
U6-66	Single-word parameter monitoring numerical value 7	-	-	-	Modification prohibited	24742
U6-67	Single-word parameter monitoring numerical value 8	-	-	-	Modification prohibited	24743

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U6-68	Single-word parameter monitoring numerical value 9	-	-	-	Modification prohibited	24744
U6-69	Single-word parameter monitoring numerical value 10	-	-	-	Modification prohibited	24745
U6.70	Arbitrary single-word RAM monitoring 1	-	-	-	Modification prohibited	24746
U6-71	Arbitrary single-word RAM monitoring 2	-	-	-	Modification prohibited	24747
U6-72	Arbitrary single-word RAM monitoring 3	-	-	-	Modification prohibited	24748
U6-73	Arbitrary single-word RAM monitoring 4	-	-	-	Modification prohibited	24749
U6-74	Arbitrary single-word RAM monitoring 5	-	-	-	Modification prohibited	24750
U6-75	Reserved	-	-	-	Modification prohibited	24751
U6-76	Number of received InoLink frames of type 1	-	-	-	Modification prohibited	24752
U6-77	Number of received InoLink frames of type 2	-	-	-	Modification prohibited	24753
U6-78	Reserved	-	-	-	Modification prohibited	24754
U6-79	Reserved	-	-	-	Modification prohibited	24755
U6-80	Reserved	-	-	-	Modification prohibited	24756

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U6-81	Reserved	-	-	-	Modification prohibited	24757
U6-82	Reserved	-	-	-	Modification prohibited	24758
U6-83	Reserved	-	-	-	Modification prohibited	24759
U6-84	Number of duplicate internal interaction frames	-	-	-	Modification prohibited	24760
U6-85	Number of internal interaction frame errors	-	-	-	Modification prohibited	24761
U6-86	Number of internal interaction frames that are not received	-	-	-	Modification prohibited	24762
U6-87	Incorrect frame header of internal interaction frame	-	-	-	Modification prohibited	24763
U6-88	Reserved	-	-	-	Modification prohibited	24764
U6-89	Reserved	-	-	-	Modification prohibited	24765
U6-90	Reserved	-	-	-	Modification prohibited	24766
U6-91	PT1 temperature detection value	-	°C	-	Modification prohibited	24767
U6-92	PT2 temperature detection value	-	°C	-	Modification prohibited	24768
U6-93	PT3 temperature detection value	-	°C	-	Modification prohibited	24769

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U6-94	AI1 temperature detection value	-	°C	-	Modification prohibited	24770
U6-95	Reserved	-	-	-	Modification prohibited	24771
U6-96	Reserved	-	-	-	Modification prohibited	24772
U6-97	Reserved	-	-	-	Modification prohibited	24773
U6-98	Current key on LED operating panel	-	-	-	Modification prohibited	24774
U6-99	InoLink bus load rate	-	%	-	Modification prohibited	24775
U7: Word Connector 3 Parameters						
U7-00	Drive status word	-	-	-	Modification prohibited	24776
U7-01	Program control status word	-	-	-	Modification prohibited	24777
U7-02	Fault code	-	-	-	Modification prohibited	24778
U7-03	Fault prompt code	-	-	-	Modification prohibited	24779
U7-04	Reserved	-	-	-	Modification prohibited	24780
U7-05	Carrier frequency reference	-	kHz	-	Modification prohibited	24781
U7-08	Output voltage	-	%	-	Modification prohibited	24784

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U7-09	Output current	-	%	-	Modification prohibited	24785
U7-10	Output power	-	kW	-	Modification prohibited	24786
U7-11	DC bus voltage	-	V	-	Modification prohibited	24787
U7-15	Line current	-	%	-	Modification prohibited	24791
U7-16	Current angle	-	-	-	Modification prohibited	24792
U7-17	Line voltage	-	%	-	Modification prohibited	24793
U7-18	Voltage angle	-	-	-	Modification prohibited	24794
U7-19	Reserved	-	-	-	Modification prohibited	24795
U7-20	Synchronous rotation angle	-	-	-	Modification prohibited	24796
U7-21	Reserved	-	-	-	Modification prohibited	24797
U7-22	Pulse output delay compensation angle	-	-	-	Modification prohibited	24798
U7-23	Reserved	-	-	-	Modification prohibited	24799
U7-24	Reserved	-	-	-	Modification prohibited	24800

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U7-25	Phase U current	-	%	-	Modification prohibited	24801
U7-26	Phase V current	-	%	-	Modification prohibited	24802
U7-27	Phase W current	-	%	-	Modification prohibited	24803
U7-28	Alpha current	-	%	-	Modification prohibited	24804
U7-29	Beta current	-	%	-	Modification prohibited	24805
U7-30	Reserved	-	%	-	Modification prohibited	24806
U7-31	Reserved	-	%	-	Modification prohibited	24807
U7-32	Phase-U voltage	-	%	-	Modification prohibited	24808
U7-33	Phase-V voltage	-	%	-	Modification prohibited	24809
U7-34	Phase-W voltage	-	%	-	Modification prohibited	24810
U7-35	Alpha voltage	-	%	-	Modification prohibited	24811
U7-36	Beta voltage	-	%	-	Modification prohibited	24812
U7-37	D-axis voltage	-	%	-	Modification prohibited	24813

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U7-38	Q-axis voltage	-	%	-	Modification prohibited	24814
U7-39	DC bus voltage (no filtering)	-	V	-	Modification prohibited	24815
U7-40	Sampling value of phase-U current	-	-	-	Modification prohibited	24816
U7-41	Sampling value of phase-V current	-	-	-	Modification prohibited	24817
U7-42	Sampling value of phase-W current	-	-	-	Modification prohibited	24818
U7-43	Modulation coefficient	-	%	-	Modification prohibited	24819
U7-44	Output PWM angle	-	-	-	Modification prohibited	24820
U7-45	Phase-U PWM	-	-	-	Modification prohibited	24821
U7-46	Phase-V PWM	-	-	-	Modification prohibited	24822
U7-47	Phase-W PWM	-	-	-	Modification prohibited	24823
U7-48	Reserved	-	-	-	Modification prohibited	24824
U7-49	Reserved	-	-	-	Modification prohibited	24825
U7-50	Effective carrier frequency	-	kHz	-	Modification prohibited	24826

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U7-51	Carrier period	-	-	-	Modification prohibited	24827
U7-52	Phase-U dead zone compensation	-	-	-	Modification prohibited	24828
U7-53	Phase-V dead zone compensation	-	-	-	Modification prohibited	24829
U7-54	Phase-W dead zone compensation	-	-	-	Modification prohibited	24830
U7-63	Motor control status word	-	-	-	Modification prohibited	24839
U7-64	AC drive control status word	-	-	-	Modification prohibited	24840
U7-65	Monitoring variable 0	-	-	-	Modification prohibited	24841
U7-66	Monitoring variable 1	-	-	-	Modification prohibited	24842
U7-67	Monitoring variable 2	-	-	-	Modification prohibited	24843
U7-68	Monitoring variable 3	-	-	-	Modification prohibited	24844
U7-69	Monitoring variable 4	-	-	-	Modification prohibited	24845
U7-70	Monitoring variable 5	-	-	-	Modification prohibited	24846
U7-71	Monitoring variable 6	-	-	-	Modification prohibited	24847

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U7-72	Monitoring variable 7	-	-	-	Modification prohibited	24848
U7-73	Monitoring variable 8	-	-	-	Modification prohibited	24849
U7-74	Monitoring variable 9	-	-	-	Modification prohibited	24850
U7-75	Operation step	-	-	-	Modification prohibited	24851
U7-76	Operation substep	-	-	-	Modification prohibited	24852
U7-77	Reserved	-	-	-	Modification prohibited	24853
U7-78	Output torque	-	%	-	Modification prohibited	24854
U7-79	Reserved	-	-	-	Modification prohibited	24855
U7-80	Max. forward frequency	-	%	-	Modification prohibited	24856
U7-81	Max. reverse frequency	-	%	-	Modification prohibited	24857
U7-82	Voltage reference in V/f separation	-	%	-	Modification prohibited	24858
U7-83	Reserved	-	-	-	Modification prohibited	24859
U7-84	Reserved	-	-	-	Modification prohibited	24860

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U7-85	Reserved	-	-	-	Modification prohibited	24861
U7-86	Torque reference in torque mode	-	%	-	Modification prohibited	24862
U7-87	Supplementary torque reference	-	%	-	Modification prohibited	24863
U7-88	Max. forward torque	-	%	-	Modification prohibited	24864
U7-89	Max. reverse torque	-	%	-	Modification prohibited	24865
U7-93	Vector droop frequency	-	%	-	Modification prohibited	24869
U7-98	Motor auto-tuning mode	-	-	-	Modification prohibited	24874
U7-99	Auto-tuning substep	-	-	-	Modification prohibited	24875
U8: Word Connector 4 Parameters						
U8-00	AC drive overload	-	%	-	Modification prohibited	24876
U8-01	Motor overload	-	%	-	Modification prohibited	24877
U8-02	Braking transistor overload	-	%	-	Modification prohibited	24878
U8-03	D-axis feedback current	-	%	-	Modification prohibited	24879
U8-04	Q-axis feedback current	-	%	-	Modification prohibited	24880

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U8-05	D-axis current reference	-	%	-	Modification prohibited	24881
U8-06	Q-axis current reference	-	%	-	Modification prohibited	24882
U8-07	Braking transistor current	-	A	-	Modification prohibited	24883
U8-15	Speed controller status word	-	-	-	Modification prohibited	24891
U8-16	Q-axis current for torque reference	-	%	-	Modification prohibited	24892
U8-17	Q-axis final current reference	-	%	-	Modification prohibited	24893
U8-18	Q-axis current for supplementary torque	-	%	-	Modification prohibited	24894
U8-19	Q-axis current for pre-torque	-	%	-	Modification prohibited	24895
U8-20	Q-axis current of PI output upon speed regulation	-	%	-	Modification prohibited	24896
U8-21	Q-axis current of integral output upon speed regulation	-	%	-	Modification prohibited	24897
U8-24	Proportional coefficient upon speed regulation	-	%	-	Modification prohibited	24898
U8-25	Integral coefficient upon speed regulation	-	%	-	Modification prohibited	24899
U8-30	Generating torque limit	-	%	-	Modification prohibited	24906

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U8-31	Motoring torque limit	-	%	-	Modification prohibited	24907
U8-32	Torque current coefficient	-	%	-	Modification prohibited	24908
U8-36	Frequency reference after droop	-	%	-	Modification prohibited	24912
U8-37	Speed loop frequency deviation	-	%	-	Modification prohibited	24913
U8-38	Reserved	-	-	-	Modification prohibited	24914
U8-39	Reserved	-	-	-	Modification prohibited	24915
U8-40	Excitation module status word	-	-	-	Modification prohibited	24916
U8-41	Magnetic flux reference value	-	-	-	Modification prohibited	24917
U8-42	Magnetic flux feedback value	-	-	-	Modification prohibited	24918
U8-43	Excitation current reference of excitation module	-	%	-	Modification prohibited	24919
U8-44	Max. available voltage	-	%	-	Modification prohibited	24920
U8-50	Final torque reference	-	%	-	Modification prohibited	24926
U8-51	PI output torque upon speed regulation	-	%	-	Modification prohibited	24927

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U8-52	Integral item output torque upon speed regulation	-	%	-	Modification prohibited	24928
U8-56	Observed magnetic flux phase in SVC mode	-	-	-	Modification prohibited	24932
U8-57	Observed magnetic flux amplitude in SVC mode	-	-	-	Modification prohibited	24933
U8-58	Observed synchronous frequency in SVC mode	-	%	-	Modification prohibited	24934
U8-59	Slip frequency	-	%	-	Modification prohibited	24935
U8-60	Estimated speed in SVC mode	-	%	-	Modification prohibited	24936
U8-63	Voltage saturation flag	-	-	-	Modification prohibited	24939
U8-65	Current loop status word	-	-	-	Modification prohibited	24941
U8-66	Current loop proportional gain of D axis upon auto-tuning	-	-	-	Modification prohibited	24942
U8-67	Current loop integral gain of D axis upon auto-tuning	-	-	-	Modification prohibited	24943
U8-68	Current loop proportional gain of Q axis upon auto-tuning	-	-	-	Modification prohibited	24944
U8-69	Current loop integral gain of Q axis upon auto-tuning	-	-	-	Modification prohibited	24945
U8-70	Current loop proportional coefficient of Q axis	-	-	-	Modification prohibited	24946

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U8-71	Current loop integral coefficient of Q axis	-	-	-	Modification prohibited	24947
U8-72	Current loop proportional coefficient of D axis	-	-	-	Modification prohibited	24948
U8-73	Current loop integral coefficient of D axis	-	-	-	Modification prohibited	24949
U8-74	Current loop PI output of D axis	-	-	-	Modification prohibited	24950
U8-75	Current loop PI output of Q axis	-	-	-	Modification prohibited	24951
U8-76	Current loop integral output of Q axis	-	%	-	Modification prohibited	24952
U8-77	Current loop integral output of D axis	-	%	-	Modification prohibited	24953
U8-78	Current loop CPC output of D axis	-	%	-	Modification prohibited	24954
U8-79	Current loop CPC output of Q axis	-	%	-	Modification prohibited	24955
U8-89	V/f droop frequency	-	%	-	Modification prohibited	24965
U8-90	Imax control frequency adjustment	-	%	-	Modification prohibited	24966
U8-91	Imax control voltage adjustment	-	%	-	Modification prohibited	24967
U8-92	Over-excitation output voltage adjustment	-	%	-	Modification prohibited	24968

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U8-93	Undervoltage suppression frequency adjustment	-	%	-	Modification prohibited	24969
U8-94	Overvoltage suppression frequency adjustment	-	%	-	Modification prohibited	24970
U8-95	Overvoltage suppression voltage adjustment	-	%	-	Modification prohibited	24971
U8-96	Frequency compensation for slip compensation	-	%	-	Modification prohibited	24972
U8-97	Voltage compensation for torque boost	-	%	-	Modification prohibited	24973
U8-98	V/f output voltage after energy-saving control	-	%	-	Modification prohibited	24974
U8-99	Oscillation suppression frequency superposition	-	%	-	Modification prohibited	24975
U9: Double Word Connector 1 Parameters						
U9-00	Actual motor speed	-	%	-	Modification prohibited	28672
U9-01	Final motor speed reference	-	%	-	Modification prohibited	28674
U9-02	Main speed reference	-	%	-	Modification prohibited	28676
U9-03	Auxiliary speed reference	-	%	-	Modification prohibited	28678
U9-04	Original speed reference	-	%	-	Modification prohibited	28680
U9-05	Speed reference after forward and reverse limiting	-	%	-	Modification prohibited	28682

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U9-06	Speed reference after limiting	-	%	-	Modification prohibited	28684
U9-07	Speed reference after jump frequency	-	%	-	Modification prohibited	28686
U9-08	Speed reference after ramp shift	-	%	-	Modification prohibited	28688
U9-09	Target speed after supplementation	-	%	-	Modification prohibited	28690
U9-10	RFG speed reference	-	%	-	Modification prohibited	28692
U9-11	RFG input speed	-	%	-	Modification prohibited	28694
U9-12	Current RFG input speed	-	%	-	Modification prohibited	28696
U9-13	RFG output speed	-	%	-	Modification prohibited	28698
U9-14	Acceleration	-	%	-	Modification prohibited	28700
U9-15	Supplementary speed	-	%	-	Modification prohibited	28702
U9-16	Speed reference after supplementation	-	%	-	Modification prohibited	28704
U9-17	Reserved	-	%	-	Modification prohibited	28706
U9-18	Reserved	-	%	-	Modification prohibited	28708

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U9-19	Reserved	-	%	-	Modification prohibited	28710
U9-20	Encoder feedback speed	-	%	-	Modification prohibited	28712
U9-21	Observed speed	-	%	-	Modification prohibited	28714
U9-22	Reserved	-	%	-	Modification prohibited	28716
U9-23	Synchronous speed	-	%	-	Modification prohibited	28718
U9-24	Motor rotor angle reference	-	%	-	Modification prohibited	28720
U9-25	Motor rotor feedback angle	-	%	-	Modification prohibited	28722
U9-26	Reserved	-	%	-	Modification prohibited	28724
U9-27	Speed set by operating panel	-	%	-	Modification prohibited	28726
U9-28	Speed set by InoDriveStudio	-	%	-	Modification prohibited	28728
U9-29	Speed set through reference channel	-	%	-	Modification prohibited	28730
U9-30	Supplementary speed set through reference channel	-	%	-	Modification prohibited	28732
U9-31	Max. positive speed	-	%	-	Modification prohibited	28734

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U9-32	Minimum positive speed	-	%	-	Modification prohibited	28736
U9-33	Max. negative speed	-	%	-	Modification prohibited	28738
U9-34	Minimum negative speed	-	%	-	Modification prohibited	28740
U9-35	Positive speed limit reference	-	%	-	Modification prohibited	28742
U9-36	Negative speed limit reference	-	%	-	Modification prohibited	28744
U9-37	Actual motor frequency	-	%	-	Modification prohibited	28746
U9-38	Accumulative encoder pulse count	-	%	-	Modification prohibited	28748
U9-50	PT1 temperature port detection resistance	-	%	-	Modification prohibited	28772
U9-51	PT2 temperature port detection resistance	-	%	-	Modification prohibited	28774
U9-52	PT3 temperature port detection resistance	-	%	-	Modification prohibited	28776
U9-53	AI1 temperature port detection resistance	-	%	-	Modification prohibited	28778
U9-54	Reserved	-	%	-	Modification prohibited	28780
U9-55	Reserved	-	%	-	Modification prohibited	28782

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U9-56	Reserved	-	%	-	Modification prohibited	28784
U9-57	Reserved	-	%	-	Modification prohibited	28786
U9-58	Reserved	-	%	-	Modification prohibited	28788
U9-59	Reserved	-	%	-	Modification prohibited	28790
U9-60	Reserved	-	%	-	Modification prohibited	28792
U9-61	Reserved	-	%	-	Modification prohibited	28794
U9-62	Reserved	-	%	-	Modification prohibited	28796
U9-63	Reserved	-	%	-	Modification prohibited	28798
U9-64	Reserved	-	%	-	Modification prohibited	28800
U9-65	Reserved	-	%	-	Modification prohibited	28802
U9-66	Reserved	-	%	-	Modification prohibited	28804
U9-67	Reserved	-	%	-	Modification prohibited	28806
U9-68	Reserved	-	%	-	Modification prohibited	28808

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U9-69	Reserved	-	%	-	Modification prohibited	28810
U9-70	Reserved	-	%	-	Modification prohibited	28812
U9-71	Reserved	-	%	-	Modification prohibited	28814
U9-72	Reserved	-	%	-	Modification prohibited	28816
U9-73	Reserved	-	%	-	Modification prohibited	28818
U9-74	Reserved	-	%	-	Modification prohibited	28820
U9-75	Reserved	-	%	-	Modification prohibited	28822
U9-76	Reserved	-	%	-	Modification prohibited	28824
U9-77	Reserved	-	%	-	Modification prohibited	28826
U9-78	Reserved	-	%	-	Modification prohibited	28828
U9-79	Reserved	-	%	-	Modification prohibited	28830
U9-80	Reserved	-	%	-	Modification prohibited	28832
U9-81	Reserved	-	%	-	Modification prohibited	28834

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U9-82	Reserved	-	%	-	Modification prohibited	28836
U9-83	Reserved	-	%	-	Modification prohibited	28838
U9-84	Reserved	-	%	-	Modification prohibited	28840
U9-85	Reserved	-	%	-	Modification prohibited	28842
U9-86	Reserved	-	%	-	Modification prohibited	28844
U9-87	Reserved	-	%	-	Modification prohibited	28846
U9-88	Reserved	-	%	-	Modification prohibited	28848
U9-89	Reserved	-	%	-	Modification prohibited	28850
U9-90	PID input deviation (before additional deviation)	-	%	-	Modification prohibited	28852
U9-91	PID input deviation (after additional deviation)	-	%	-	Modification prohibited	28854
U9-92	PID proportional component	-	%	-	Modification prohibited	28856
U9-93	PID integral component	-	%	-	Modification prohibited	28858
U9-95	PID output (original value)	-	%	-	Modification prohibited	28862

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U9-96	PID output (after supplementation)	-	%	-	Modification prohibited	28864
U9-97	PID output (limited)	-	%	-	Modification prohibited	28866
U9-98	PID reference	-	%	-	Modification prohibited	28868
U9-99	PID feedback	-	%	-	Modification prohibited	28870
U10: Bit Connector 6 Parameters						
U10-00	DI8	-	-	-	Modification prohibited	31220
U10-01	DI9	-	-	-	Modification prohibited	31221
U10-02	DI10	-	-	-	Modification prohibited	31222
U10-03	DI11	-	-	-	Modification prohibited	31223
U10-04	DI8 reversal	-	-	-	Modification prohibited	31224
U10-05	DI9 reversal	-	-	-	Modification prohibited	31225
U10-06	DI10 reversal	-	-	-	Modification prohibited	31226
U10-07	DI11 reversal	-	-	-	Modification prohibited	31227
U10-08	RO4	-	-	-	Modification prohibited	31228

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U10-09	RO5	-	-	-	Modification prohibited	31229
U10-10	Reserved	-	-	-	Modification prohibited	31230
U10-11	Reserved	-	-	-	Modification prohibited	31231
U10-12	Bit 00 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31232
U10-13	Bit 01 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31233
U10-14	Bit 02 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31234
U10-15	Bit 03 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31235
U10-16	Bit 04 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31236
U10-17	Bit 05 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31237
U10-18	Bit 06 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31238
U10-19	Bit 07 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31239
U10-20	Bit 08 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31240
U10-21	Bit 09 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31241

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U10-22	Bit 10 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31242
U10-23	Bit 11 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31243
U10-24	Bit 12 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31244
U10-25	Bit 13 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31245
U10-26	Bit 14 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31246
U10-27	Bit 15 of Modbus communication setpoint 1	-	-	-	Modification prohibited	31247
U10-28	Reserved	-	-	-	Modification prohibited	31248
U10-29	Reserved	-	-	-	Modification prohibited	31249
U10-30	AI3 below lower limit	-	-	-	Modification prohibited	31250
U10-31	AI3 over upper limit	-	-	-	Modification prohibited	31251
U10-32	AI4 below lower limit	-	-	-	Modification prohibited	31252
U10-33	AI4 over upper limit	-	-	-	Modification prohibited	31253
U10-34	AI3 disconnected	-	-	-	Modification prohibited	31254

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U10-35	AI4 disconnected	-	-	-	Modification prohibited	31255
U11: Bit Connector 7 Parameters						
U11-00	Reserved	-	-	-	Modification prohibited	31320
U11-01	Reserved	-	-	-	Modification prohibited	31321
U11-02	Reserved	-	-	-	Modification prohibited	31322
U11-03	Reserved	-	-	-	Modification prohibited	31323
U11-04	Reserved	-	-	-	Modification prohibited	31324
U11-05	Reserved	-	-	-	Modification prohibited	31325
U11-06	Reserved	-	-	-	Modification prohibited	31326
U11-07	Reserved	-	-	-	Modification prohibited	31327
U11-08	Reserved	-	-	-	Modification prohibited	31328
U11-09	Reserved	-	-	-	Modification prohibited	31329
U11-10	Reserved	-	-	-	Modification prohibited	31330
U11-11	Reserved	-	-	-	Modification prohibited	31331

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U11-12	Reserved	-	-	-	Modification prohibited	31332
U11-13	Reserved	-	-	-	Modification prohibited	31333
U11-14	Reserved	-	-	-	Modification prohibited	31334
U12: Bit Connector 8 Parameters						
U12-00	Reserved	-	-	-	Modification prohibited	31420
U12-01	Reserved	-	-	-	Modification prohibited	31421
U12-02	Reserved	-	-	-	Modification prohibited	31422
U12-03	Reserved	-	-	-	Modification prohibited	31423
U12-04	Reserved	-	-	-	Modification prohibited	31424
U12-05	Reserved	-	-	-	Modification prohibited	31425
U12-06	Reserved	-	-	-	Modification prohibited	31426
U12-07	Reserved	-	-	-	Modification prohibited	31427
U12-08	Reserved	-	-	-	Modification prohibited	31428
U12-09	Reserved	-	-	-	Modification prohibited	31429

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U12-10	Reserved	-	-	-	Modification prohibited	31430
U12-11	Reserved	-	-	-	Modification prohibited	31431
U12-12	Reserved	-	-	-	Modification prohibited	31432
U12-13	Reserved	-	-	-	Modification prohibited	31433
U12-14	Reserved	-	-	-	Modification prohibited	31434
U13: Bit Connector 9 Parameters						
U13-00	Reserved	-	-	-	Modification prohibited	31520
U13-01	Reserved	-	-	-	Modification prohibited	31521
U13-02	Reserved	-	-	-	Modification prohibited	31522
U13-03	Reserved	-	-	-	Modification prohibited	31523
U13-04	Reserved	-	-	-	Modification prohibited	31524
U13-05	Reserved	-	-	-	Modification prohibited	31525
U13-06	Reserved	-	-	-	Modification prohibited	31526
U13-07	Reserved	-	-	-	Modification prohibited	31527

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U13-08	Reserved	-	-	-	Modification prohibited	31528
U13-09	Reserved	-	-	-	Modification prohibited	31529
U13-10	Reserved	-	-	-	Modification prohibited	31530
U13-11	Reserved	-	-	-	Modification prohibited	31531
U13-12	Reserved	-	-	-	Modification prohibited	31532
U13-13	Reserved	-	-	-	Modification prohibited	31533
U13-14	Reserved	-	-	-	Modification prohibited	31534
U14: Bit Connector 10 Parameters						
U14-00	Reserved	-	-	-	Modification prohibited	31620
U14-01	Reserved	-	-	-	Modification prohibited	31621
U14-02	Reserved	-	-	-	Modification prohibited	31622
U14-03	Reserved	-	-	-	Modification prohibited	31623
U14-04	Reserved	-	-	-	Modification prohibited	31624
U14-05	Reserved	-	-	-	Modification prohibited	31625

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U14-06	Reserved	-	-	-	Modification prohibited	31626
U14-07	Reserved	-	-	-	Modification prohibited	31627
U14-08	Reserved	-	-	-	Modification prohibited	31628
U14-09	Reserved	-	-	-	Modification prohibited	31629
U14-10	Reserved	-	-	-	Modification prohibited	31630
U14-11	Reserved	-	-	-	Modification prohibited	31631
U14-12	Reserved	-	-	-	Modification prohibited	31632
U14-13	Reserved	-	-	-	Modification prohibited	31633
U14-14	Reserved	-	-	-	Modification prohibited	31634
U15: Word Connector 5 Parameters						
U15-00	PZD1 of InoLink	-	-	-	Modification prohibited	24976
U15-01	PZD2 of InoLink	-	-	-	Modification prohibited	24977
U15-02	PZD3 of InoLink	-	-	-	Modification prohibited	24978
U15-03	PZD4 of InoLink	-	-	-	Modification prohibited	24979

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U15-04	PZD5 of InoLink	-	-	-	Modification prohibited	24980
U15-05	PZD6 of InoLink	-	-	-	Modification prohibited	24981
U15-06	PZD7 of InoLink	-	-	-	Modification prohibited	24982
U15-07	PZD8 of InoLink	-	-	-	Modification prohibited	24983
U15-08	Modbus communication setpoint 1	-	-	-	Modification prohibited	24984
U15-09	Modbus communication setpoint 2	-	-	-	Modification prohibited	24985
U15-10	Modbus communication setpoint 3	-	-	-	Modification prohibited	24986
U15-11	Modbus communication setpoint 4	-	-	-	Modification prohibited	24987
U15-12	Modbus communication setpoint 5	-	-	-	Modification prohibited	24988
U15-13	Modbus communication setpoint 6	-	-	-	Modification prohibited	24989
U15-14	Modbus communication setpoint 7	-	-	-	Modification prohibited	24990
U15-15	Modbus communication setpoint 8	-	-	-	Modification prohibited	24991
U15-16	Modbus communication setpoint 9	-	-	-	Modification prohibited	24992

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U15-17	Modbus communication setpoint 10	-	-	-	Modification prohibited	24993
U15-18	PZD1 of bus adapter A	-	-	-	Modification prohibited	24994
U15-19	PZD2 of bus adapter A	-	-	-	Modification prohibited	24995
U15-20	PZD3 of bus adapter A	-	-	-	Modification prohibited	24996
U15-21	PZD4 of bus adapter A	-	-	-	Modification prohibited	24997
U15-22	PZD5 of bus adapter A	-	-	-	Modification prohibited	24998
U15-23	PZD6 of bus adapter A	-	-	-	Modification prohibited	24999
U15-24	PZD7 of bus adapter A	-	-	-	Modification prohibited	25000
U15-25	PZD8 of bus adapter A	-	-	-	Modification prohibited	25001
U15-26	PZD9 of bus adapter A	-	-	-	Modification prohibited	25002
U15-27	PZD10 of bus adapter A	-	-	-	Modification prohibited	25003
U15-28	PZD11 of bus adapter A	-	-	-	Modification prohibited	25004
U15-29	PZD12 of bus adapter A	-	-	-	Modification prohibited	25005

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U15-30	PZD13 of bus adapter A	-	-	-	Modification prohibited	25006
U15-31	PZD14 of bus adapter A	-	-	-	Modification prohibited	25007
U15-32	PZD15 of bus adapter A	-	-	-	Modification prohibited	25008
U15-33	PZD16 of bus adapter A	-	-	-	Modification prohibited	25009
U15-34	PZD1 of bus adapter B	-	-	-	Modification prohibited	25010
U15-35	PZD2 of bus adapter B	-	-	-	Modification prohibited	25011
U15-36	PZD3 of bus adapter B	-	-	-	Modification prohibited	25012
U15-37	PZD4 of bus adapter B	-	-	-	Modification prohibited	25013
U15-38	PZD5 of bus adapter B	-	-	-	Modification prohibited	25014
U15-39	PZD6 of bus adapter B	-	-	-	Modification prohibited	25015
U15-40	PZD7 of bus adapter B	-	-	-	Modification prohibited	25016
U15-41	PZD8 of bus adapter B	-	-	-	Modification prohibited	25017
U15-42	PZD9 of bus adapter B	-	-	-	Modification prohibited	25018

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U15-43	PZD10 of bus adapter B	-	-	-	Modification prohibited	25019
U15-44	PZD11 of bus adapter B	-	-	-	Modification prohibited	25020
U15-45	PZD12 of bus adapter B	-	-	-	Modification prohibited	25021
U15-46	PZD13 of bus adapter B	-	-	-	Modification prohibited	25022
U15-47	PZD14 of bus adapter B	-	-	-	Modification prohibited	25023
U15-48	PZD15 of bus adapter B	-	-	-	Modification prohibited	25024
U15-49	PZD16 of bus adapter B	-	-	-	Modification prohibited	25025
U15-96	STO_FLASH self-test CRC	-	-	-	Modification prohibited	25072
U15-97	Communication status of bus adapter A	-	-	-	Modification prohibited	25073
U15-98	Communication status of bus adapter B	-	-	-	Modification prohibited	25074
U15-99	Communication status of bus adapter C (reserved)	-	-	-	Modification prohibited	25075
U16: Word Connector 6 Parameters						
U16-00	AI3 input proportion	-	-	-	Modification prohibited	25076
U16-01	AI4 input proportion	-	-	-	Modification prohibited	25077

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U16-02	AI3 input value	-	-	-	Modification prohibited	25078
U16-03	AI4 input value	-	-	-	Modification prohibited	25079
U16-04	AO3 output proportion	-	-	-	Modification prohibited	25080
U16-05	AO4 output proportion	-	-	-	Modification prohibited	25081
U16-06	AO3 output value	-	-	-	Modification prohibited	25082
U16-07	AO4 output value	-	-	-	Modification prohibited	25083
U16-08	Reserved	-	-	-	Modification prohibited	25084
U17: Word Connector 7 Parameters						
U17-00	Position control status	0: Invalid 1: Enabled 2: Initializing 3: Waiting for position synchronization 4: Synchronizing position 5: Home invalid 6: Homing 7: Home valid 8: Waiting for positioning 9: Positioning in progress 10: Positioning holding 11: Positioning interruption in progress 12: Position control paused	-	-	Modification prohibited	25176
U17-01	Position controller status word 1	-	-	-	Modification prohibited	25177

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U17-02	Position controller status word 2	-	-	-	Modification prohibited	25178
U17-03	Position controller command word 1	-	-	-	Modification prohibited	25179
U17-04	Position controller command word 2	-	-	-	Modification prohibited	25180
U17-05	Positioning control status word 1	-	-	-	Modification prohibited	25181
U17-06	Positioning control status word 2	-	-	-	Modification prohibited	25182
U17-07	Positioning control command word 1	-	-	-	Modification prohibited	25183
U17-08	Positioning control command word 2	-	-	-	Modification prohibited	25184
U17-20	Real-time position deviation	-	-	-	Modification prohibited	25196
U17-21	Home deviation compensation	-	-	-	Modification prohibited	25197
U17-22	External deviation compensation	-	-	-	Modification prohibited	25198
U17-23	Internal deviation compensation	-	-	-	Modification prohibited	25199
U18: Word Connector 8 Parameters						
U18-00	Reserved	-	-	-	Modification prohibited	25276
U18-01	Reserved	-	-	-	Modification prohibited	25277

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U18-02	Reserved	-	-	-	Modification prohibited	25278
U18-03	Reserved	-	-	-	Modification prohibited	25279
U18-04	Reserved	-	-	-	Modification prohibited	25280
U18-05	Reserved	-	-	-	Modification prohibited	25281
U18-06	Reserved	-	-	-	Modification prohibited	25282
U18-07	Reserved	-	-	-	Modification prohibited	25283
U18-08	Reserved	-	-	-	Modification prohibited	25284
U19: Double Word Connector 2 Parameters						
U19-00	Motor-driven potentiometer output	-	%	-	Modification prohibited	28872
U19-01	Multi-reference selection output	-	%	-	Modification prohibited	28874
U19-02	Multi-reference 1 output	-	%	-	Modification prohibited	28876
U19-03	Multi-reference 2 output	-	%	-	Modification prohibited	28878
U19-04	Multi-reference 3 output	-	%	-	Modification prohibited	28880
U19-05	Multi-reference 4 output	-	%	-	Modification prohibited	28882

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U19-06	Multi-reference 5 output	-	%	-	Modification prohibited	28884
U19-07	Multi-reference 6 output	-	%	-	Modification prohibited	28886
U19-08	Multi-reference 7 output	-	%	-	Modification prohibited	28888
U19-09	Multi-reference 8 output	-	%	-	Modification prohibited	28890
U19-10	Multi-reference 9 output	-	%	-	Modification prohibited	28892
U19-11	Multi-reference 10 output	-	%	-	Modification prohibited	28894
U19-12	Multi-reference 11 output	-	%	-	Modification prohibited	28896
U19-13	Multi-reference 12 output	-	%	-	Modification prohibited	28898
U19-14	Multi-reference 13 output	-	%	-	Modification prohibited	28900
U19-15	Multi-reference 14 output	-	%	-	Modification prohibited	28902
U19-16	Multi-reference 15 output	-	%	-	Modification prohibited	28904
U19-17	Multi-reference 16 output	-	%	-	Modification prohibited	28906
U19-18	Output of word-to-double word module A	-	-	-	Modification prohibited	28908

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U19-19	Output of word-to-double word module B	-	-	-	Modification prohibited	28910
U19-20	Output of word-to-double word module C	-	-	-	Modification prohibited	28912
U19-21	Output of word-to-double word module D	-	-	-	Modification prohibited	28914
U19-22	Output of word-to-double word module E	-	-	-	Modification prohibited	28916
U19-23	Reserved	-	-	-	Modification prohibited	28918
U19-24	Output of multi-point curve module A	-	%	-	Modification prohibited	28920
U19-25	Output of multi-point curve module B	-	%	-	Modification prohibited	28922
U19-26	Reserved	-	%	-	Modification prohibited	28924
U19-27	Reserved	-	%	-	Modification prohibited	28926
U19-28	Output of absolute value module A	-	%	-	Modification prohibited	28928
U19-29	Output of absolute value module B	-	%	-	Modification prohibited	28930
U19-30	Output of absolute value module C	-	%	-	Modification prohibited	28932
U19-31	Output of absolute value module D	-	%	-	Modification prohibited	28934

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U19-32	Output of absolute value module E	-	%	-	Modification prohibited	28936
U19-33	Output of absolute value module F	-	%	-	Modification prohibited	28938
U19-34	Output of absolute value module G	-	%	-	Modification prohibited	28940
U19-35	Output of absolute value module H	-	%	-	Modification prohibited	28942
U19-36	Output of digital selector module A	-	%	-	Modification prohibited	28944
U19-37	Output of digital selector module B	-	%	-	Modification prohibited	28946
U19-38	Output of digital selector module C	-	%	-	Modification prohibited	28948
U19-39	Output of digital selector module D	-	%	-	Modification prohibited	28950
U19-40	Output of digital selector module E	-	%	-	Modification prohibited	28952
U19-41	Output of digital selector module F	-	%	-	Modification prohibited	28954
U19-42	Output of digital selector module G	-	%	-	Modification prohibited	28956
U19-43	Output of digital selector module H	-	%	-	Modification prohibited	28958
U19-44	Output of addition and subtraction module A	-	%	-	Modification prohibited	28960

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U19-45	Output of addition and subtraction module B	-	%	-	Modification prohibited	28962
U19-46	Output of addition and subtraction module C	-	%	-	Modification prohibited	28964
U19-47	Output of addition and subtraction module D	-	%	-	Modification prohibited	28966
U19-48	Output of addition and subtraction module E	-	%	-	Modification prohibited	28968
U19-49	Output of addition and subtraction module F	-	%	-	Modification prohibited	28970
U19-50	Output of addition and subtraction module G	-	%	-	Modification prohibited	28972
U19-51	Output of addition and subtraction module H	-	%	-	Modification prohibited	28974
U19-52	Output of multiplication and division module A	-	%	-	Modification prohibited	28976
U19-53	Output of multiplication and division module B	-	%	-	Modification prohibited	28978
U19-54	Output of multiplication and division module C	-	%	-	Modification prohibited	28980
U19-55	Output of multiplication and division module D	-	%	-	Modification prohibited	28982
U19-56	Output of multiplication and division module E	-	%	-	Modification prohibited	28984
U19-57	Output of multiplication and division module F	-	%	-	Modification prohibited	28986

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U19-58	Output of multiplication and division module G	-	%	-	Modification prohibited	28988
U19-59	Output of multiplication and division module H	-	%	-	Modification prohibited	28990
U19-60	Output of filter module A	-	%	-	Modification prohibited	28992
U19-61	Output of filter module B	-	%	-	Modification prohibited	28994
U19-62	Output of filter module C	-	%	-	Modification prohibited	28996
U19-63	Output of filter module D	-	%	-	Modification prohibited	28998
U19-64	Output of limiting module A	-	%	-	Modification prohibited	29000
U19-65	Output of limiting module B	-	%	-	Modification prohibited	29002
U19-66	Output of limiting module C	-	%	-	Modification prohibited	29004
U19-67	Output of limiting module D	-	%	-	Modification prohibited	29006
U19-68	Output of proportion module 11	-	%	-	Modification prohibited	29008
U19-69	Output of proportion module 12	-	%	-	Modification prohibited	29010
U19-70	Output of proportion module 13	-	%	-	Modification prohibited	29012

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U19-71	Output of proportion module 14	-	%	-	Modification prohibited	29014
U19-72	Output of proportion module 15	-	%	-	Modification prohibited	29016
U19-73	Output of proportion module 16	-	%	-	Modification prohibited	29018
U19-74	Constant reference 6	-	%	-	Modification prohibited	29020
U19-75	Constant reference 7	-	%	-	Modification prohibited	29022
U19-76	Constant reference 8	-	%	-	Modification prohibited	29024
U19-77	Constant reference 9	-	%	-	Modification prohibited	29026
U19-78	Constant reference 10	-	%	-	Modification prohibited	29028
U19-79	Constant reference 16	-	-	-	Modification prohibited	29030
U19-80	Constant reference 17	-	-	-	Modification prohibited	29032
U19-81	Constant reference 18	-	-	-	Modification prohibited	29034
U19-82	Constant reference 19	-	-	-	Modification prohibited	29036
U19-83	Constant reference 20	-	-	-	Modification prohibited	29038

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U19-84	Arbitrary double-word RAM monitoring 1	-	-	-	Modification prohibited	29040
U19-85	Arbitrary double-word RAM monitoring 2	-	-	-	Modification prohibited	29042
U19-86	Arbitrary double-word RAM monitoring 3	-	-	-	Modification prohibited	29044
U19-87	Arbitrary double-word RAM monitoring 4	-	-	-	Modification prohibited	29046
U19-88	Arbitrary double-word RAM monitoring 5	-	-	-	Modification prohibited	29048
U19-89	Double-word parameter monitoring numerical value 1	-	-	-	Modification prohibited	29050
U19-90	Double-word parameter monitoring numerical value 2	-	-	-	Modification prohibited	29052
U19-91	Double-word parameter monitoring numerical value 3	-	-	-	Modification prohibited	29054
U19-92	Reserved	-	-	-	Modification prohibited	29056
U19-93	Reserved	-	%	-	Modification prohibited	29058
U19-94	Current control power-on duration	-	s	-	Modification prohibited	29060
U19-96	Current mains power-on duration	-	s	-	Modification prohibited	29064
U19-97	Current running duration	-	s	-	Modification prohibited	29066

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U19-98	Accumulative mains power-on duration	-	s	-	Modification prohibited	29068
U19-99	Accumulative running duration	-	s	-	Modification prohibited	29070
U20: Bit Connector 11 Parameters						
U20-00	Position control setting valid	-	%	-	Modification prohibited	31720
U20-01	Position control ready	-	%	-	Modification prohibited	31721
U20-02	Position control in progress	-	%	-	Modification prohibited	31722
U20-03	Positioning interruption in progress	-	%	-	Modification prohibited	31723
U20-04	End of this positioning	-	%	-	Modification prohibited	31724
U20-05	Position control valid	-	%	-	Modification prohibited	31725
U20-06	Positioning end waiting	-	%	-	Modification prohibited	31726
U20-11	Ready for synchronous control	-	%	-	Modification prohibited	31731
U20-12	Synchronous control in progress	-	%	-	Modification prohibited	31732
U20-17	Position lock state	-	%	-	Modification prohibited	31737
U20-18	Target position approach	-	%	-	Modification prohibited	31738

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U20-19	Positioning completed	-	%	-	Modification prohibited	31739
U20-20	Excessive position deviation	-	%	-	Modification prohibited	31740
U20-21	Position control pause valid	-	%	-	Modification prohibited	31741
U20-22	Position control home valid	-	%	-	Modification prohibited	31742
U20-23	Position control forward speed limited	-	%	-	Modification prohibited	31743
U20-24	Position control negative speed limited	-	%	-	Modification prohibited	31744
U29: Double Word Connector 3 Parameters						
U29-00	Current absolute position	-	%	-	Modification prohibited	29072
U29-02	Target position setpoint	-	%	-	Modification prohibited	29076
U29-03	Valid target position	-	%	-	Modification prohibited	29078
U29-04	Remaining distance	-	%	-	Modification prohibited	29080
U29-05	Real-time position deviation	-	%	-	Modification prohibited	29082
U29-06	Input position (position controller)	-	%	-	Modification prohibited	29084
U29-07	Input speed (position controller)	-	%	-	Modification prohibited	29086

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U29-08	Input acceleration (position controller)	-	%	-	Modification prohibited	29088
U29-09	Position Kp adjustment (position controller)	-	%	-	Modification prohibited	29090
U29-10	Speed kV feedforward (position controller)	-	%	-	Modification prohibited	29092
U29-11	Acceleration Ka feedforward (position controller)	-	%	-	Modification prohibited	29094
U29-12	Unfiltered output position (positioner)	-	%	-	Modification prohibited	29096
U29-13	Unfiltered output speed (positioner)	-	%	-	Modification prohibited	29098
U29-14	Unfiltered output acceleration (positioner)	-	%	-	Modification prohibited	29100
U29-15	Unfiltered feedback position	-	%	-	Modification prohibited	29102
U29-16	Filtered feedback position	-	%	-	Modification prohibited	29104
U29-17	Internal p-to-Lu coefficient numerator (Lu)	-	%	-	Modification prohibited	29106
U29-18	Internal p-to-Lu coefficient denominator (P)	-	%	-	Modification prohibited	29108
U29-19	Position control output speed (before limiting)	-	%	-	Modification prohibited	29110
U29-20	Position control output speed (limited)	-	%	-	Modification prohibited	29112

Parameter Code	Parameter Name	Value Range	Unit	Default	Change Mode	Address
U29-21	Home deviation compensation	-	%	-	Modification prohibited	29114
U29-22	External deviation compensation	-	%	-	Modification prohibited	29116
U29-23	Internal deviation compensation	-	%	-	Modification prohibited	29118

7 Troubleshooting

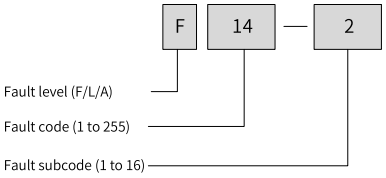
7.1 Fault View

7.1.1 Fault Levels

Faults can be divided into the following three levels based on the emergency level.

- Fault: The system incurs major faults or errors and immediately stops running, waiting for troubleshooting.
- Limit: The system incurs faults but still can run after derating. However, a deviation occurs between the running result and control reference. In this case, the following modes are supported: run at limited current, run at limited speed, and run at limited torque.
- Alarm: The system prompts users of errors, which do not affect system running because the severity is low. Users determine the troubleshooting solution.

A fault code consists of three parts. In terms of fault levels, F indicates fault, L indicates limit, and A indicates alarm, as shown in the following figure.



7.1.2 Viewing Fault Information

Faults are represented by fault codes and subcodes. Fault codes indicate the fault classification and subcodes indicate specific faults. For example, in ERR15-2, 15 indicates an external fault and 2 indicates the external fault 2.

Current faults

MD580 can record up to six faults occurring at a time. Additional faults are not recorded. You can view currently activated faults in group A1.

Current Fault		Active Limit		Current Alarm	
Fault Code	Fault Subcode	Fault Code	Fault Subcode	Fault Code	Fault Subcode
A1-00	A1-01	A1-18	A1-19	A1-36	A1-37
A1-03	A1-04	A1-21	A1-22	A1-39	A1-40
A1-06	A1-07	A1-24	A1-25	A1-42	A1-43
A1-09	A1-10	A1-27	A1-28	A1-45	A1-46
A1-12	A1-13	A1-30	A1-31	A1-48	A1-49
A1-15	A1-16	A1-33	A1-34	A1-51	A1-52

Previous faults

MD580 records the latest six faults.

Latest Fault		Second Latest Fault		Third Latest Fault		Fourth Latest Fault		Fifth Latest Fault		Sixth Latest Fault	
Fault Code	Fault Sub code	Fault Code	Fault Sub code	Fault Code	Fault Sub code	Fault Code	Fault Sub code	Fault Code	Fault Sub code	Fault Code	Fault Sub code
H2-00	H2-01	H3-00	H3-01	H4-00	H4-01	H5-00	H5-01	H6-00	H6-01	H7-00	H7-01
H2-03	H2-04	H3-03	H3-04	H4-03	H4-04	H5-03	H5-04	H6-03	H6-04	H7-03	H7-04
H2-06	H2-07	H3-06	H3-07	H4-06	H4-07	H5-06	H5-07	H6-06	H6-07	H7-06	H7-07
H2-09	H2-10	H3-09	H3-10	H4-09	H4-10	H5-09	H5-10	H6-09	H6-10	H7-09	H7-10
H2-12	H2-13	H3-12	H3-13	H4-12	H4-13	H5-12	H5-13	H6-12	H6-13	H7-12	H7-13
H2-15	H2-16	H3-15	H3-16	H4-15	H4-16	H5-15	H5-16	H6-15	H6-16	H7-15	H7-16

Fault data records

MD580 records both faults and relevant data upon occurrence of faults.

Recorded Item	Data of Latest Fault	Data of Second Latest Fault	Data of Third Latest Fault	Data of Fourth Latest Fault	Data of Fifth Latest Fault	Data of Sixth Latest Fault
Motor speed upon current fault	H2-18	H3-18	H4-18	H5-18	H6-18	H7-18
Output current upon current fault	H2-19	H3-19	H4-19	H5-19	H6-19	H7-19
Bus voltage upon current fault	H2-20	H3-20	H4-20	H5-20	H6-20	H7-20
Output torque upon current fault	H2-21	H3-21	H4-21	H5-21	H6-21	H7-21
Control word 1 upon current fault	H2-22	H3-22	H4-22	H5-22	H6-22	H7-22
Control word 2 upon current fault	H2-23	H3-23	H4-23	H5-23	H6-23	H7-23
Status word 1 upon current fault	H2-24	H3-24	H4-24	H5-24	H6-24	H7-24
State machine upon latest fault	H2-25	H3-25	H4-25	H5-25	H6-25	H7-25
Year of current fault	H2-26	H3-26	H4-26	H5-26	H6-26	H7-26
Date of current fault	H2-27	H3-27	H4-27	H5-27	H6-27	H7-27
Hour and minute of current fault	H2-28	H3-28	H4-28	H5-28	H6-28	H7-28
Second of current fault	H2-29	H3-29	H4-29	H5-29	H6-29	H7-29
Millisecond of current fault	H2-30	H3-30	H4-30	H5-30	H6-30	H7-30

Viewing faults through SOP-20-880

SOP-20-880 allows you to directly view fault information using the above-mentioned parameters or view fault information in the fault menu.

Function	Key	Description
View the current fault	Key operation	Choose Menu > Fault Status > Active Fault.
View the active limit	Key operation	Choose Menu > Fault Status> Active Limit.
View the current alarm	Key operation	Choose Menu > Fault Status > Current alarm.
View fault-related help information		Select a fault and press this key, the help information related to the fault will be displayed.
View previous faults	Key operation	Choose Menu > Fault Status > History Faults.

It is recommended to use the fault menu to view fault information. The fault menu presents all the recorded faults with fault descriptions and help information in text.

Viewing faults through InoDriveStudio

When using InoDriveStudio, you can access the "Fault alarm list" to view faults.

The "Fault and alarm list" provides the fault descriptions, causes, and solutions, and allows you to view relevant data upon occurrence of a fault.

It is recommended to use the fault menu to view fault information. The fault menu presents all the recorded faults with fault descriptions and help information in text.

Viewing faults through MDKE-10 LED operating panel

The MDKE-10 LED operating panel allows you to directly view the fault code displayed in the status display area. You can press the Up or Down key to view other fault codes or warning codes, but fault descriptions in text are not displayed.

7.1.3 Fault Reset Modes

The MD580 series products support the following modes for reset upon fault: SOP-20 reset, MDKE-10 reset, InoDriveStudio reset, control channel reset, auto reset by parameter setting, and reset by re-power-on. The following table lists the relationships between the reset command sources and control channels.

Mode	Description
SOP-20	After successful connection, press "STOP" on any screen to reset upon fault.
MDKE-10	After successful connection, press "STOP" on any screen to reset upon fault.
InoDriveStudio	After successful connection, click the reset button on the control panel to reset upon fault.
Control channel	Reset upon fault by parameter settings. For details, see the following table.
Parameter setting	Set H0-20 to 1 to set a proper reset interval and a proper number of auto reset retry times to reset upon faults.
Re-power-on	Power on the MD580 product again to reset upon fault.

Reset commands have multiple sources. The reset command corresponding to the selected command source is active, while others are inactive. The following table lists the relationship between the reset command sources and the control channels (In the table, SOP indicates the reset by key pressing on SOP-20-880, and IDS indicates the reset command sent by InoDriveStudio).

Active Control Channel	Command Word Source	Reset Command Source								
		b0-05	b1-04	b1-05	b2-05	b3-04	b3-05	MDKE-10	SOP	IDS
A9-00 = 0	b0-00 = 0	X	0→1	0→1	X	X	X	0→1	0→1	0→1
	b0-00 = 1	0→1	0→1	0→1	X	X	X	0→1	0→1	0→1
	MDKE-10 control	X	0→1	0→1	X	X	X	0→1	0→1	0→1
	SOP control	X	0→1	0→1	X	X	X	0→1	0→1	0→1
	IDS control	X	0→1	0→1	X	X	X	0→1	0→1	0→1
A9-00 = 1	b2-00 = 0	X	X	X	X	0→1	0→1	0→1	0→1	0→1
	b2-00 = 1	X	X	X	0→1	0→1	0→1	0→1	0→1	0→1
	MDKE-10 control	X	X	X	X	0→1	0→1	0→1	0→1	0→1
	SOP control	X	X	X	X	0→1	0→1	0→1	0→1	0→1
	IDS control	X	X	X	X	0→1	0→1	0→1	0→1	0→1

Note

- "X" in the table indicates that the corresponding command source is disabled. The reset command takes effect only at the rising edge. Do not always keep a high level.
- The reset command from the MDKE-10, SOP-20, or InoDriveStudio is always active once connected, regardless of control sources.

7.1.4 Fault Level Change and Auto Reset

Fault level change

The system can prompt faults, limits, and alarms, which are divided into 10 levels. Users can set fault prompts to different levels based on actual conditions. The following table lists the 10 user-definable fault levels.

Para.	Value
Codes of exceptions 1 to 10 (such as H1-00 and H1-01), which need modification of exception levels	Fault display code
Levels of exceptions 1 to 10 (such as H1-02)	0: No action 1: Coast to stop 2: Stop at maximum capability 3: Quick stop 4: Decelerate to stop 5: Run at limited speed 7: Run at limited current 8: Run at limited torque 9: Display warning 11: Not detected

The following table lists the definition of fault levels.

Fault Level	Description	Remarks
1: Coast to stop	The system directly blocks output.	Fault
2: Stop at maximum capability	The system stops at the maximum capability and cannot run again.	
3: Quick stop	The system stops in the set RFG quick-stop deceleration time and cannot run again.	
4: Decelerate to stop	The system stops in the set RFG deceleration time and cannot run again.	Limit
5: Run at limited speed	The system runs normally within the restricted range.	
7: Run at limited current		
8: Run at limited torque		
9: Display warning	The system only generates warnings, while system running is not affected.	Warning
11: Not detected	The system does not generate warnings.	Normal

Note

- Fault display code: It is the fault code prompted upon a system fault, for example, ERR15 external fault 1.
- Fault level change is not applicable to every fault. The system automatically determines the allowed maximum value according to different fault levels.

List of faults with changeable levels

Fault Code	Fault Code Name	Fault Sub code	Fault Subcode Name	Default Level	Highest Level	Lowest Level
11	Motor overload	2	Motor overload pre-warning	9: Display warning	9: Display warning	11: Not detected
12	Input phase loss	1	Drive input phase loss	1: Coast to stop	1: Coast to stop	11: Not detected

Fault Code	Fault Code Name	Fault Sub code	Fault Subcode Name	Default Level	Highest Level	Lowest Level
15	External faults	1	External fault 1	1: Coast to stop	1: Coast to stop	9: Display warning
		2	External fault 2	1: Coast to stop	1: Coast to stop	9: Display warning
16	Onboard Modbus RTU fault	1	Modbus RTU communication timeout	1: Coast to stop	1: Coast to stop	11: Not detected
27	User-defined faults	1	User-defined fault 1	1: Coast to stop	1: Coast to stop	9: Display warning
		2	User-defined fault 2	1: Coast to stop	1: Coast to stop	9: Display warning
		3	User-defined fault 3	1: Coast to stop	1: Coast to stop	9: Display warning
		4	User-defined fault 4	1: Coast to stop	1: Coast to stop	9: Display warning
31	PID fault	1	PID feedback loss	1: Coast to stop	1: Coast to stop	9: Display warning
45	Extension module exception	13	Communication card offline of fieldbus adapter A	1: Coast to stop	1: Coast to stop	9: Display warning
		14	Communication card offline of fieldbus adapter B	1: Coast to stop	1: Coast to stop	9: Display warning
47	STO activation	1	STO status activation	9: Display warning	9: Display warning	11: Not detected
48	Motor temperature exception	1	Motor detection 1 over-temperature	1: Coast to stop	1: Coast to stop	9: Display warning
		2	Motor detection 1 over-temperature warning	9: Display warning	9: Display warning	11: Not detected
		3	Motor detection 2 over-temperature	1: Coast to stop	1: Coast to stop	9: Display warning
		4	Motor detection 2 over-temperature warning	9: Display warning	9: Display warning	11: Not detected
		5	Motor detection 3 over-temperature	1: Coast to stop	1: Coast to stop	9: Display warning
		6	Motor detection 3 over-temperature warning	9: Display warning	9: Display warning	11: Not detected
50	Built-in memory exception	2	Black box storage timeout	1: Coast to stop	1: Coast to stop	11: Not detected
		3	FLASH memory exception	9: Display warning	9: Display warning	11: Not detected
51	RTC exception	1	Insufficient power supply for RTC unit	9: Display warning	9: Display warning	11: Not detected
		2	RTC read/write timeout (reserved)	9: Display warning	1: Coast to stop	11: Not detected
		3	RTC time error	9: Display warning	9: Display warning	11: Not detected
59	Module low-temperature	5	Measured module temperature too low	9: Display warning	1: Coast to stop	11: Not detected

Fault Code	Fault Code Name	Fault Sub code	Fault Subcode Name	Default Level	Highest Level	Lowest Level
63	External alarms	4	OFF2/OFF3 active	9: Display warning	1: Coast to stop	11: Not detected
		5	AI1 temperature detection exception	9: Display warning	1: Coast to stop	11: Not detected
65	Parameter processing exception	1	Factory defaults restoration interrupted	1: Coast to stop	1: Coast to stop	11: Not detected
		3	Parameter cache capacity exceeded	1: Coast to stop	1: Coast to stop	11: Not detected
67	Communication card exception of fieldbus adapter A	1	External bus timeout of adapter A	1: Coast to stop	1: Coast to stop	11: Not detected
		2	Incorrect setting of communication parameter (address or baud rate) for adapter A	1: Coast to stop	1: Coast to stop	11: Not detected
		3	Bus address conflict of adapter A	1: Coast to stop	1: Coast to stop	11: Not detected
		4	PROFIBUS DP communication PZD1 data check error of adapter A	1: Coast to stop	1: Coast to stop	11: Not detected
		6	Mismatch between PDO transmission length and configuration length of adapter A	1: Coast to stop	1: Coast to stop	11: Not detected
		7	EtherCAT EEPROM load error of adapter A	1: Coast to stop	1: Coast to stop	11: Not detected
		8	Communication card initialization error of adapter A	1: Coast to stop	1: Coast to stop	11: Not detected
		9	EtherCAT master switchover error of adapter A	1: Coast to stop	1: Coast to stop	11: Not detected
		15	Check error in data received by communication card of adapter A	1: Coast to stop	1: Coast to stop	11: Not detected
		16	Check error in data sent by communication card of adapter A	1: Coast to stop	1: Coast to stop	11: Not detected

Fault Code	Fault Code Name	Fault Sub code	Fault Subcode Name	Default Level	Highest Level	Lowest Level
68	Communication card exception of fieldbus adapter B	1	External bus timeout of adapter B	1: Coast to stop	1: Coast to stop	11: Not detected
		2	Incorrect setting of communication parameter (address or baud rate) for adapter B	1: Coast to stop	1: Coast to stop	11: Not detected
		3	Bus address conflict of adapter B	1: Coast to stop	1: Coast to stop	11: Not detected
		4	PROFIBUS DP communication PZD1 data check error of adapter B	1: Coast to stop	1: Coast to stop	11: Not detected
		6	Mismatch between PDO transmission length and configuration length of adapter B	1: Coast to stop	1: Coast to stop	11: Not detected
		7	EtherCAT EEPROM load error of adapter B	1: Coast to stop	1: Coast to stop	11: Not detected
		8	Communication card initialization error of adapter B	1: Coast to stop	1: Coast to stop	11: Not detected
		9	EtherCAT master switchover error of adapter B	1: Coast to stop	1: Coast to stop	11: Not detected
		15	Check error in data received by communication card of adapter B	1: Coast to stop	1: Coast to stop	11: Not detected
		16	Check error in data sent by communication card of adapter B	1: Coast to stop	1: Coast to stop	11: Not detected
80	Fan fault	1	Drive fan fault	1: Coast to stop	1: Coast to stop	11: Not detected
83	InoLink communication abnormal	1	InoLink address conflict	1: Coast to stop	1: Coast to stop	11: Not detected
		2	InoLink communication offline	1: Coast to stop	1: Coast to stop	11: Not detected
		3	Timeout of receiving specified node data by InoLink	1: Coast to stop	1: Coast to stop	11: Not detected
		4	InoLink data receiving node address being the local address	9: Display warning	9: Display warning	11: Not detected
		5	InoLink bus load rate too high	9: Display warning	9: Display warning	11: Not detected
117	AC drive pre-overload	1	AC drive pre-overload	9: Display warning	9: Display warning	11: Not detected
169	Auto fault restart exception	2	Auto fault restart activated	9: Display warning	9: Display warning	11: Not detected
172	Module pre-overtemperature	4	Drive over-temperature warning	9: Display warning	9: Display warning	11: Not detected

Fault Code	Fault Code Name	Fault Sub code	Fault Subcode Name	Default Level	Highest Level	Lowest Level
174	AI input disconnection	3	AI1 disconnection	9: Display warning	1: Coast to stop	11: Not detected
		4	AI2 disconnection	9: Display warning	1: Coast to stop	11: Not detected

Auto reset

In specific application scenarios, the system can be set to allow a limited number of attempts in auto resetting upon a fault to ensure continuous working. The system allows setting of the fault reset interval (Tr), number of reset attempts (ResetNum), time (Ts) for clearing reset attempts, and 10 non-auto resettable fault codes.

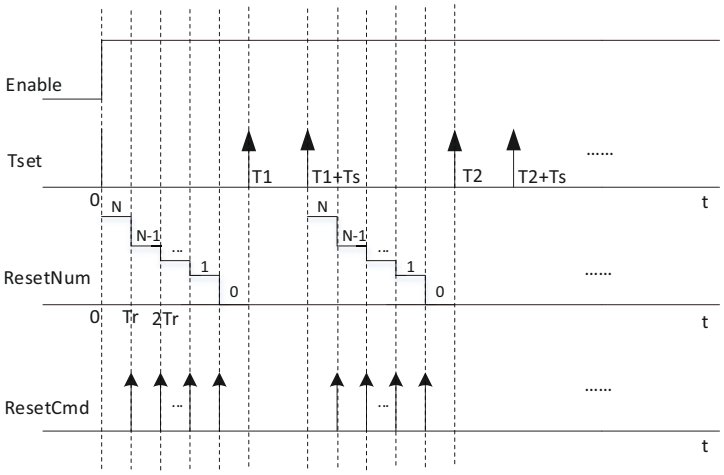
Tr: Upon a system fault, reset commands (ResetCmd) are generated at an interval of Tr.

ResetNum: indicates the number of auto reset attempts. Upon generation of each reset command (ResetCmd), the remaining number of auto reset attempts becomes ResetCmd – 1. When the remaining number of auto reset attempts reaches 0, the auto fault reset function of the system is disabled.

Ts: indicates the time for resetting the number of reset attempts. After Ts elapses, the remaining number of reset attempts is restored to the original value of ResetNum.

Non-auto resettable fault code: When the system fault list contains non-auto resettable fault codes, the system will not generate auto reset commands. In this case, users must manually reset the faults. The following table lists the details.

Para.	Name	Value	Remarks
H0-20	Auto fault reset	0: Disable 1: Enable	Enable
H0-19	Time for clearing reset attempts	0.0s to 6553.5s	Tset
H0-22	Interval of reset attempts	0.0s to 600.0s	Tr
H0-21	Fault reset attempts	0 to 100	ResetNum
H0-25	Code of non-resettable exception 1	Fault display code	-
H0-26	Subcode of non-resettable exception 1	Fault display subcode	-
...	...	...	-



Note

The Enable signal is valid when the auto fault reset function is enabled and ResetNum is set to a value other than 0.

7.2 User-defined External Faults and Alarms

External faults

H0-00 and H0-01 provide two ways to trigger user-defined external faults and block AC drive output upon faults. Users can select a bit connector from U0-00 to U4-99 and U10-00 to U14-99 as the user-defined fault trigger source. When the status bit is 0, the system runs as normal. When the status bit is 1, the external fault ERR15-1 or ERR15-2 is triggered.

External alarms

H0-05 and H0-06 provide two ways to trigger user-defined external alarms. When an alarm is triggered, the AC drive continues running. Users can select a bit connector from U0-00 to U4-99 and U10-00 to U14-99 as the user-defined alarm trigger source. When the status bit is 0, the system runs as normal. When the status bit is 1, the external alarm ERR63-1 or ERR63-2 is triggered.

User-defined faults

H0-10 and H0-13 provide four ways to trigger user-defined faults and block AC drive output upon faults. Users can select a bit connector from U0-00 to U4-99 and U10-00 to U14-99 as the user-defined fault trigger source. When the status bit is 0, the system runs as normal. When the status bit is 1, the external fault ERR27-1, ERR27-2, ERR27-3, or ERR27-4 is triggered.

User-defined alarms

H0-15 and H0-18 provide four ways to trigger user-defined alarms. When an alarm is triggered, the AC drive continues running. Users can select a bit connector from U0-00 to U4-99 and U10-00 to U14-99 as the user-defined alarm trigger source. When the status bit is 0, the system runs as normal. When the status bit is 1, the user-defined alarm ERR28-1, ERR28-2, ERR28-3, or ERR28-4 is triggered.

7.3 User-defined Exception Words

Group H10 contains two sets of user-defined fault words, including fault word 1 from H10-00 to H10-31 and fault word 2 from H10-32 to H10-64. Users can set fault codes and fault subcodes through group H10. When the faults occurring on the AC drive are the same as the fault codes and subcodes set by users, the fault word bits of U5-48 to U5-49 are high. When the fault subcodes are set to 0 (all fault subcodes), if the code of the faults that occur are the same as the fault codes set by users, the corresponding fault word bits are high.

For example, when H10-00 is set to 15 and H10-01 is set to 1, bit00 of U5-48 indicates the fault state (ERR15-1) of external fault 1. Set H0-00 to 1 to manually activate external fault 1 ERR15-1. Then, U5-48 is displayed as 0x0001. Set H0-00 to 0 to cancel the source of triggering external fault 1 ERR15-1. Then, U5-48 is still displayed as 0x0001. U5-48 can be displayed as 0x0000 only after reset upon fault. The faults that have occurred still can be indicated before reset when the fault trigger signal is inactive.

Para.	Name	Description	Reference
H10-00	Fault word 1-Bit00 code	Fault code that can be set by users	0 to 65535
H10-01	Fault word 1-Bit00 subcode	Fault subcode that can be set by users	0 to 65535
...	...	...	...
H10-30	Fault word 1-Bit15 code	Fault code that can be set by users	0 to 65535
H10-31	Fault word 1-Bit15 subcode	Fault subcode that can be set by users	0 to 65535
H10-32	Fault word 2-Bit00 code	Fault code that can be set by users	0 to 65535
H10-33	Fault word 2-Bit00 subcode	Fault subcode that can be set by users	0 to 65535
...	...	...	...
H10-62	Fault word 2-Bit15 code	Fault code that can be set by users	0 to 65535
H10-63	Fault word 2-Bit15 subcode	Fault subcode that can be set by users	0 to 65535
U5-48	User-defined fault word 1	Corresponding to H10-00 to H10-31	-
U5-49	User-defined fault word 2	Corresponding to H10-32 to H10-63	-

7.4 Troubleshooting for Common Problems

7.4.1 Switch-on Blocking and Ready to Run

- Switch-on blocking and ready to run are two states for the system, which are indicated by S4 and S7, respectively.
- When the system is in the switch-on blocking or ready to run state for a long time, it is generally because signal states such as OFF1, OFF2, OFF3, or running permission are not normal. For example, OFF2 and OFF3 signal activation causes the switch-on-blocking state of the system.

- Check A0-30 exception prompt types to quickly find the fault causes. The following table lists the fault prompt types.

Para.	Value	Description	Remarks
A0-30 exception prompt type	0	None	Normal
	1	The OFF1 or jog start/stop command is not reset, causing switch-on blocking.	Switch-on blocking: The command for the current control channel is activated.
	2	OFF2 is activated, causing the switch-on-blocking state.	
	3	OFF3 is activated, causing the switch-on-blocking state.	
	4	The running permission is 0, causing the ready to run state.	Ready to run: The command for the current control channel is activated.
	9	STO1/STO2 is activated.	Switch-on blocking: STO1 or STO2 is activated.
	18	Performance running is not permitted, causing the switch-on-blocking state.	Switch-on blocking: The drive is not ready.
	19	The hibernation function is enabled, causing the ready-to-switch-on state.	Ready to switch on: The hibernation function is activated and the device is in hibernation.
	20	The device is operated by parameters, causing the switch-on-blocking state.	Switch-on blocking: Parameter backup or download is activated.

Note

The system may encounter exceptions of various categories or from different sources at the same time. Locate and resolve the exceptions one by one as prompted.

7.4.2 Locked-rotor Fault

The ERR93-1 fault indicating locked-rotor on motors is a protective measure to judge motor control faults. It can prevent motors from being pulled down when the motor output torque cannot overcome the load torque.

Motor locked-rotor detection signals are sourced from U1-51 (excessive speed deviation of motor) by default. When U1-51 becomes active, locked-rotor detection is activated. In some application scenarios, motors are required to work in locked-rotor mode. For example, some applications need motors to run in speed mode but need to adjust the motor torque limit for torque control. In such applications, set E8-48 to 0 to manually disable locked-rotor detection.

For example, take-up machines on cold rolling lines typically need to work in torque mode. In this case, output torque can be controlled by setting speed control and torque limit. However, typically, the actual motor speed is not equal to the speed reference. The actual motor speed may even be 0 during tension establishment. In this case, disable locked-rotor detection or set E8-49 (locked-rotor speed reference) to a sufficient value.

7.4.3 Parameter Setting Errors

In case of conflicts between parameters set by users, MD580 restricts the internal values to ensure proper functioning of the system. In addition, alarm 46-1 is reported to prompt users of parameter input errors. The system working status may be different from the expected status.

U5-92 indicates the causes of parameter setting errors. When no error occurs, [U5-92] is 0. The following table lists the parameter settings.

Parameter Value	Description
0	Parameter settings are correct.
1	The DC bus undervoltage threshold conflicts with the overvoltage threshold.
2	The SOP-20 UP/DOWN change rate parameter is set incorrectly.
3	The motor speed parameter is set incorrectly.
4	The skip band parameter is set incorrectly.
5	The motor temperature parameter is set incorrectly.
6	The AI curve parameter is set incorrectly.
7	The AO curve parameter is set incorrectly.
8	The HDI curve parameter is set incorrectly.
9	The HDO curve parameter is set incorrectly.
10	The multi-point curve module A is set incorrectly.
11	The multi-point curve module B is set incorrectly.
12	The multi-point V/f curve is set incorrectly.
13	The motor-driven potentiometer parameter is set incorrectly.
14	The limiter block parameter is set incorrectly.
15	The PID parameter is set incorrectly.
16	The current wakeup frequency is less than the hibernation frequency.
17	For the synchronous motor type, the control mode is set to V/f, which is actually SVC.
18	The upper frequency for the active switchover from FVC to SVC is less than the lower frequency.
19	The slot number of the communication card selected for fieldbus adapter A is not set.
20	The slot number of the communication card selected for fieldbus adapter B is not set.

7.4.4 Pre-charge Fault

During MD580 startup, if the state machine enters the S6 pre-charge state but the bus voltage detected within the continuous pre-charge duration is too low, the pre-charge fault ERR9-3 will be reported.

If A6-00 (power supply unit control) is disabled, the pre-charge duration is 3s and cannot be changed. If A6-00 is enabled, the pre-charge duration depends on the power supply unit control starting time specified by A6-01.

Therefore, ensure that the bus voltage reaches the normal value range within the pre-charge duration.

In addition, within the pre-charge duration, you can set A6-02 for an additional condition and A6-03 for the minimum duration of the additional condition. In this case, the system proceeds with further operations only when the bus voltage is normal and the additional condition is met. Otherwise, failure protection is triggered when the pre-charge duration is reached.

7.5 Faults and Maintenance

7.5.1 Motor Control Error

7.5.1.1 Motor Locked-rotor

Para.	Name	Reference
E8-48	Motor locked-rotor detection	0: Disable 1: Enable Other: B connector
E8-49	Motor locked-rotor speed reference	0.0% to 100.0%
E8-50	Motor locked-rotor detection time	0.00s to 65.00s

When [E8-48] is 1, if the torque reaches the torque limit and the feedback speed remains lower than the threshold specified in E8-49 for a period of time longer than the time specified by E8-50, the motor locked-rotor fault (93-1) is triggered.

For possible causes and troubleshooting, see the following table.

Possible Cause	Solution
The torque limit is active and the running speed is very low in the case of process cooperation.	Disable the motor locked-rotor fault detection function.
The torque limit is inappropriate.	Check whether E2-20 to E2-29 are set correctly, especially when communication setting is enabled.
The load is too heavy.	Check the motor load.
Motor parameters are set incorrectly.	Check whether the motor parameters are set correctly.
Encoder exception occurs.	1. Check whether the encoder is properly connected. 2. Check whether the encoder is damaged. 3. Check whether the encoder parameters are set correctly.
Motor auto-tuning is not performed.	Set motor parameters correctly, and carry out motor parameter auto-tuning.
Output phase loss or output disconnection occurs.	1. Check whether the motor connection is reliable. 2. Check whether the contactor on the motor side is disconnected.
The motor is directly started when it is still rotating or an incorrect speed is detected upon flying start.	Set the start mode to flying start and adjust the flying start parameters.
Other causes	Get technical support.

7.5.1.2 Current Control Exception

Para.	Name	Reference
E8-55	Current control exception detection	0: Disable 1: Enable
E8-56	Current control exception detection threshold	10.0% to 80.0%
E8-57	Current control exception detection time	0 ms to 500 ms

When [E8-55] is 1, if the deviation between the feedback and reference of torque current or exciting current exceeds the current exception detection threshold (E8-56) for a period of time longer than the time specified by E8-57, the current control exception (93-3) is triggered.

For possible causes and troubleshooting, see the following table.

Possible Cause	Solution
Motor disconnection	1. Check whether a phase of the motor is disconnected. 2. Check whether the contactor on the motor side is connected properly.
The encoder is disconnected or the encoder signal interference is serious.	Check the wiring of the encoder and handle the encoder interference.
The motor parameter setting is incorrect.	Set the motor parameters correctly and perform auto-tuning on all motor parameters.
Other causes	Get technical support.

7.5.2 Motor Overload Protection

Para.	Name	Reference
E8-00	Motor overload software protection selection	0: Disable 1: Enable
E8-01	Motor overload software protection gain	0.20 to 10.00
E8-02	Motor overload pre-warning coefficient	50% to 100%

E8-00 = 0: The motor has no overload protection function. Therefore, the motor may be damaged due to over-temperature. It is recommended that a thermal relay be installed to connect the drive and the motor.

E8-00 = 1: The AC drive determines whether the motor is overloaded according to the inverse time delay curve. The following figure shows the default inverse time delay curve of the motor.

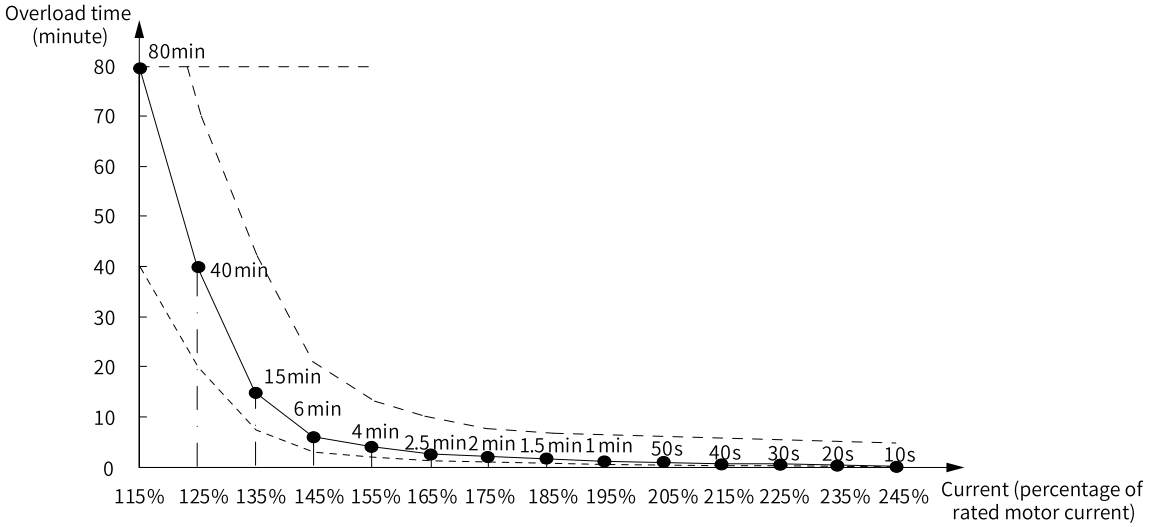


Figure 7-1 Inverse time delay curve of motor overload protection

The upper time limit for motor overload protection is 80 minutes, and the lower limit is 10s. However, the default motor overload curve may not match the actual motor overload characteristics. Set E8-01 (motor overload software protection gain) to adjust the overload curve. As shown in the preceding figure, at the same current, the actual overload protection time is the time on the default curve multiplied by the motor overload software protection gain.

For example, to ensure that the motor reports overload after running 22 minutes at 130% current, the calculation method is as follows:

According to the motor overload curve, the overload time for motor current 125% and 135% is 40 minutes and 15 minutes, respectively. Therefore, by default, 27.5 minutes for the overload of 130% rated motor current is calculated as follows:

$$40 + (40 – 15)/(125\% – 135\%) \times (130\% – 125\%) = 27.5 \text{ min}$$

Therefore, the motor needs to report overload after running 22 minutes at 130% current. The motor overload software protection gain is calculated as follows:

$$E8\text{-}01 = 22/27.5 = 80\%$$

Note

Properly set E8-01 based on the actual overload capacity of motors. An excessively large value of the parameter may prevent the drive from reporting ERR11-1 in time, causing damage to motors due to over-temperature.

The motor overload pre-warning coefficient is used by the drive to provide the alarm signal in advance before the motor overload fault occurs. A smaller coefficient means earlier provision of the alarm signal. If the coefficient is 100%, the pre-load alarm is provided at the same time as the overload fault occurs.

For example, if the motor needs to report overload after running 22 minutes at 130% current, E8-01 is 80% according to the preceding formulas. If E8-02 is set to 80% in this case, when the motor runs for 17.6 minutes (80% x 22 min) continuously at 130% current, U2-55 indicating the motor pre-overload status changes to 1.

7.6 Fault List

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
1	Hard ware fault	1	Current detection circuit abnormality	Coast to stop	Coast to stop	Coast to stop	Power-off and restart	1. The zero drift of three-phase output current is too large. Check whether the three-phase output current U7-25/U7-26/U7-27 is non-zero upon stop.	1. Check whether the three-phase output Hall sensor is normal.
								2. The Hall sensor is disconnected. Check whether the three-phase output current U7-25/U7-26/U7-27 is further greater than 0 upon stop.	2. Replace the power module.
								3. Other causes	3. Contact the agent or Inovance for technical support.
		3	EEPROM parameter storage timeout	Coast to stop	Coast to stop	Coast to stop	Power-off and restart	1. The EEPROM chip is damaged.	1. Replace the control board.
								2. The peripheral cable of the EEPROM is abnormal.	2. Contact the agent or Inovance for technical support.
		4	EEPROM of the I/O expansion card abnormal	Coast to stop	Coast to stop	Coast to stop	Power-off and restart	1. The EEPROM chip is damaged.	1. Replace the I/O expansion card.
								2. The peripheral cable of the EEPROM is abnormal.	2. Contact the agent or Inovance for technical support.
		8	EEPROM read operation timeout	Coast to stop	Coast to stop	Coast to stop	Power-off and restart	1. The EEPROM chip is damaged.	1. Replace the control board.
								2. The peripheral cable of the EEPROM is abnormal.	2. Contact the agent or Inovance for technical support.
		9	EEPROM write operation timeout	Coast to stop	Coast to stop	Coast to stop	Power-off and restart	1. The EEPROM chip is damaged.	1. Replace the control board.
								2. The peripheral cable of the EEPROM is abnormal.	2. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
2	Overcurrent	1	Hardware overcurrent	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The U/V/W output circuit of the AC drive is grounded or short circuited, or the braking resistor is short circuited.	1. Eliminate periphery faults and check whether the motor, output contactor, or braking resistor is short circuited.
								The control method is FVC or SVC, and the motor is started without parameter auto-tuning.	2. Set motor parameters correctly according to the motor nameplate, and run the motor after completing auto-tuning of motor parameters.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
2	Overcurrent	1	Hardware overcurrent	Coast to stop	Coast to stop	Coast to stop	Manual reset	3. The acceleration/ deceleration time is too short.	3. Set appropriate acceleration/deceleration time.
								4. The customized torque boost value is not appropriate.	4. Set the torque boost parameters properly.
								5. The V/f curve is not appropriate.	5. Set the V/f curve correctly.
								6. The motor is started when it is rotating.	6. Select flying start or start the motor after it stops.
								7. The power rating of the drive is low.	7. Select the drive with a proper power rating.
								8. The DC bus voltage is too low.	8. Adjust the DC bus voltage to the normal range.
								9. Motor parameters are set incorrectly.	9. Set the motor parameters correctly.
								10. The periphery circuits are abnormal.	10. Check the fault history. If the current upon the fault is below the overcurrent threshold, check for interference sources.
								11. Other causes	11. If no other interference sources exist, check for driver board or Hall device problems.
									12. Contact the agent or Inovance for technical support.
		2	Software overcurrent	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. A4-18 (software overcurrent threshold) is set improperly.	1. Set A4-18 properly.
		3	Braking transistor software overcurrent	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The braking transistor output current exceeds the limit.	1. Check the connection of the braking resistor and whether the resistance is appropriate.
		5	Instantaneous overcurrent of synchronous motor	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. E8-23 (threshold for output current exceeding instantaneous overcurrent) is set improperly.	1. Set the parameter properly.
									2. Check the output for short circuit.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
5	DC overvoltage	1	High DC bus voltage	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The DC bus voltage is too high.	1. Adjust the DC bus voltage to the normal range.
								2. The DC bus overvoltage threshold is inappropriate.	2. Set A4-25 and A4-26 properly.
								3. The generating working condition occurs, and no braking unit is installed or an improper braking resistor model is selected.	3. Install a braking unit or select a proper braking resistor.
								4. An improper drive voltage class is selected.	4. Select an appropriate AC drive model with a matching voltage class.
								5. The AC drive model is incorrectly set.	5. In the V/f control mode, check whether the overvoltage suppression (E9-20) is enabled and whether the E9-21 to E9-24 parameters are properly set.
								6. The overvoltage suppression parameters are set improperly.	6. In the vector control mode, check whether the E9-12 parameter is enabled and whether the E9-13 parameter is set too small.
								7. The DC bus voltage correction coefficient is inappropriate.	7. Check and ensure that the DC voltage sampling gain (A3-15) is set properly.
5	DC overvoltage	1	High DC bus voltage	Coast to stop	Coast to stop	Coast to stop	Manual reset	8. The speed loop parameters are set improperly in the vector control mode.	8. Use the IDS to check whether the overshoot of actual motor speed during acceleration is large and generating overvoltage is caused during speed callback. Set the speed loop parameters properly to reduce the overshoot.
								9. Output is short-circuited to ground.	9. Check whether U/V/W output is short-circuited to ground.
								10. Other causes	10. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
9	DC under voltage	1	Low DC bus voltage	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The DC bus voltage is too low.	1. Adjust the DC bus voltage to the normal range.
								2. The DC bus undervoltage threshold is inappropriate.	2. Check U5-78 and ensure that the preset DC bus undervoltage threshold is set properly.
								3. An improper drive voltage class is selected.	3. Set A4-23 and A4-24 properly.
								4. The AC drive model is incorrectly set.	4. Select an appropriate AC drive model with a matching voltage class.
								5. The undervoltage suppression parameters are inappropriate.	5. Check whether E9-00 is enabled and whether E9-01 to E9-07 are set properly.
								6. The DC bus voltage correction coefficient is inappropriate.	6. Check and ensure that the DC voltage sampling gain (A3-15) is set properly.
9	DC under voltage	1	Low DC bus voltage	Coast to stop	Coast to stop	Coast to stop	Manual reset	7. The pre-charge resistor, drive board, or control board is abnormal.	7. Contact the agent or Inovance for technical support.
								8. The DC bus voltage is incorrectly displayed.	-
		2	Low voltage fault	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The input voltage is too low for a long time.	1. Ensure that the input voltage is normal.
								2. The load inertia is too small to maintain the DC bus voltage.	2. Set the frequency threshold E9-09 properly.
								3. The set frequency threshold E9-09 is too high.	-

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
9	DC under voltage	3	Pre-drive timeout	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The DC bus voltage is too low.	1. Adjust the DC bus voltage to the normal range.
								2. The DC bus undervoltage threshold is inappropriate.	2. Check U5-78 and ensure that the preset DC bus undervoltage threshold is set properly.
								3. An improper drive voltage class is selected.	3. Set A4-23 and A4-24 properly.
								4. The AC drive model is incorrectly set.	4. Select an appropriate AC drive model with a matching voltage class.
								5. The undervoltage suppression parameters are inappropriate.	5. Check whether E9-00 is enabled and whether E9-01 to E9-07 are set properly.
								6. The drive is started before the DC bus voltage buffering is completed.	6. Start the drive when the DC bus voltage is normal.
9	DC under voltage	3	Pre-drive timeout	Coast to stop	Coast to stop	Coast to stop	Manual reset	7. The DC bus input contactor is controlled by the drive. The power supply unit control (A6-00) is disabled, or A6-01 is set to a too short time.	7. Ensure that power supply unit control (A6-00) is enabled.
								8. The DC bus voltage correction coefficient is inappropriate.	8. Set the pre-drive timeout time (A6-01) properly.
								9. The pre-charge resistor, drive board, or control board is abnormal.	9. Check and ensure that the DC voltage sampling gain (A3-15) is set properly.
								10. The DC bus voltage is incorrectly displayed.	10. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
10	Drive overload	1	Drive overload	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The load is too heavy.	1. Set appropriate acceleration/deceleration time.
								2. The power rating of the drive is low.	2. Select the drive with a proper power rating.
								3. Motor parameters are set incorrectly.	3. Check the load.
								4. The torque boost value is set improperly in the V/f control mode.	4. Select flying start.
								5. The motor is stalled.	5. Check the motor and mechanical conditions.
								6. The overload mode (A4-23) is selected improperly.	6. Reduce the load or check the motor and mechanical conditions.
								7. Other causes	7. Adjust the bus voltage to the normal range.
								-	8. Contact the agent or Inovance for technical support.
		2	Pulse-by-pulse current limit fault	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The acceleration/ deceleration time is set to a too small value.	1. Reduce the load or replace the motor with one with greater power.
								2. The power rating of the drive is low.	2. Check the motor and mechanical conditions.
								3. Load is suddenly increased during running.	3. Ensure that E8-01 is set properly.
								4. The motor is directly started when it is rotating.	4. Contact the agent or Inovance for technical support.
								5. The output is short-circuited.	-
								6. The load is too large or the motor is stalled.	-
								7. The bus voltage is too low.	-
								8. Other causes	-

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
11	Motor overload	1	Motor overload fault	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The load is too heavy.	1. Reduce the load or replace the motor with one with greater power.
								2. The motor is stalled.	2. Check the motor and mechanical conditions.
								3. The motor overload protection gain is inappropriate.	3. Ensure that E8-01 is set properly.
								4. Other causes	4. Contact the agent or Inovance for technical support.
		2	Motor overload warning	Display warning	Display warning	Not detected	Auto reset	1. The load is too heavy.	1. Reduce the load or replace the motor with one with greater power.
								2. The motor is stalled.	2. Check the motor and mechanical conditions.
								3. The motor overload protection gain is inappropriate.	3. Ensure that E8-01 is set properly.
11	Motor overload	2	Motor overload warning	Display warning	Display warning	Not detected	Auto reset	4. The motor overload protection warning coefficient is inappropriate.	4. Ensure that E8-02 is set properly.
								5. Other causes	5. Contact the agent or Inovance for technical support.
12	Input phase loss exists.	1	Drive input phase loss	Coast to stop	Coast to stop	Not detected	Manual reset	1. The input R/S/T is disconnected or the connection is unreliable.	-
								2. Other causes	1. Check whether the input R/S/T connection is normal.
									2. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
13	Output phase loss occurs.	5	Drive output phase loss	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The motor U/V/W is disconnected or the connection is unreliable.	1. Check whether the motor U/V/W connection is normal.
								2. The output contactor is not closed or is faulty.	2. Check whether the output contactor is closed properly.
								3. The motor three-phase winding is faulty.	3. Replace the motor.
								4. Other causes	4. Contact the agent or Inovance for technical support.
14	Drive overtemperature	5	Power supply unit overtemperature	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The temperature of the power supply unit exceeds the overtemperature threshold.	1. Check the temperature detection circuit of the power supply unit. 2. Reduce the ambient temperature. 3. Reduce the load ratio.
		6	Drive overtemperature	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The ambient temperature is high. 2. The air filter is blocked. 3. The fan is damaged. 4. The thermistor of the module is faulty. 5. The module is damaged.	1. Reduce the ambient temperature. 2. Clean the air filter. 3. Replace the damaged fan. 4. Contact the agent or Inovance for technical support.
15	External fault	1	External fault 1	Coast to stop	Coast to stop	Display warning	Manual reset	1. H0-00 is set incorrectly.	1. Set H0-00 to 0.
								2. The setting source of H0-00 is active.	2. Set H0-00 correctly.
								-	3. Check whether the setting source is active.
		2	External fault 2	Coast to stop	Coast to stop	Display warning	Manual reset	1. H0-01 is set incorrectly.	1. Set H0-01 to 0.
								2. The setting source of H0-01 is active.	2. Set H0-01 correctly.
								-	3. Check whether the setting source is active.
16	Communication fault	1	Onboard Modbus RTU communication abnormal	Coast to stop	Coast to stop	Not detected	Manual reset	1. The host controller is not working properly.	1. Check the connection for communication.
								2. The connection for communication is faulty.	2. Set the communication parameters correctly.
								3. Communication parameters in group n1 is incorrectly set.	-

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
19	Auto-tuning fault	1	Motor auto-tuning timeout	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The motor is not connected.	1. Check whether the motor is connected properly.
								2. Output phase loss occurs.	2. Check whether the output contactor is connected properly.
								3. Basic motor parameters are set incorrectly.	3. Check whether the motor is connected properly.
								4. The power rating of the drive is low.	4. Check whether the output contactor is connected properly.
19	Auto-tuning fault	1	Motor auto-tuning timeout	Coast to stop	Coast to stop	Coast to stop	Manual reset	5. Other causes	5. Set basic parameters of the motor correctly according to the motor nameplate.
								-	6. Select a drive with a proper power rating.
								-	7. Contact the agent or Inovance for technical support.
		2	Motor auto-tuning disconnection	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The auto-tuning process is interrupted.	1. Ensure that the start/stop control word during the motor auto-tuning is normal.
								2. Faults occur during auto-tuning.	2. Troubleshoot problems based on fault reports.
								3. The auto-tuning process is interrupted by normal operations.	3. Reset to clear the fault.
		3	Dynamic auto-tuning in the brake apply state	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. In the brake apply state, dynamic auto-tuning is performed.	1. Disconnect the motor shaft from the brake, disable brake apply (L1-00), and then perform dynamic auto-tuning.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
20	Encoder abnormality	1	Encoder disconnection (hardware detection)	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The encoder is damaged.	1. Replace the encoder.
								2. The encoder power supply is faulty.	2. Check whether the power cord of the encoder is properly connected.
								3. The encoder connection is faulty.	3. Check whether the AB connection of the encoder is correct.
								4. The encoder disconnection detection setting is faulty.	4. Check whether the encoder connection is reliable.
								5. Other causes	5. Ensure that n5-10 is set correctly.
								-	6. Contact the agent or Inovance for technical support.
20	Encoder abnormality	2	Encoder parameter error	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The encoder PPR is set incorrectly.	1. Set the encoder PPR correctly.
								2. An encoder abnormality occurs.	2. Replace the encoder.
								3. Other causes	3. Contact the agent or Inovance for technical support.
		3	The encoder Z signal suffers from interference.	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The Z signal is interfered when the synchronous motor is equipped with the ABZ encoder in the closed-loop control mode. 2. The encoder power supply is faulty. 3. The encoder connection is faulty. 4. Other causes	1. Replace the encoder. 2. Check whether the power cord of the encoder is properly connected. 3. Check whether the ABZ connection of the encoder is correct. 4. Check whether the encoder connection is reliable. 5. Check that the zero point position angle of the encoder is correct. 6. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
20	Encoder abnormality	4	Communication disconnection between the encoder card and the main control board	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The wiring between the encoder card and the control board is loose. 2. An encoder card abnormality occurs. 3. The encoder card is not grounded properly. 4. Other causes	1. Check the wiring and grounding. 2. Replace the encoder card. 3. Contact the agent or Inovance for technical support.
		5	Encoder disconnection (software detection)	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The encoder is damaged.	1. Replace the encoder.
								2. The encoder power supply is faulty.	2. Check whether the power cord of the encoder is properly connected.
20	Encoder abnormality	5	Encoder disconnection (software detection)	Coast to stop	Coast to stop	Coast to stop	Manual reset	3. The encoder connection is faulty.	3. Check whether the AB connection of the encoder is correct.
								4. Other causes	4. Check whether the encoder connection is reliable.
								-	5. Contact the agent or Inovance for technical support.
		6	Internal communication abnormality of the encoder card	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The encoder card is damaged. 2. The encoder card power supply is faulty. 3. The encoder card connection is faulty. 4. Other causes	1. Replace the encoder card. 2. Check whether the encoder connection is reliable. 3. Contact the agent or Inovance for technical support.
		7	The types of encoder 1 and encoder 2 are incorrectly set.	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The detection modules corresponding to the encoder types set for encoder 1 and encoder 2 are different. 2. The encoder type that takes effect is determined by d0-12 (speed feedback encoder). 3. Other causes	1. Ensure that the detection modules corresponding to the encoder types set for encoder 1 and encoder 2 are the same. For example, if n5-02 for encoder 1 is set to 4 (sin-cos encoder), n6-02 for encoder 2 must be set to 4 or 5. 2. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
20	Encoder abnormality	8	Handshaking message timeout between the encoder card and the main control board	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The wiring between the encoder card and the control board is loose. 2. An encoder card abnormality occurs. 3. The encoder card is not grounded properly. 4. The encoder card type does not match the actual type. 5. Other causes	1. Check the wiring and grounding. 2. Replace the encoder card. 3. Set n5-02 and n6-02 properly. 4. Contact the agent or Inovance for technical support.
		9	The SSI encoder is disconnected.	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The wiring and grounding between the SSI encoder and the detection card are loose. 2. The encoder is damaged. 3. The encoder card is damaged. 4. Other causes	1. Check the wiring and grounding. 2. Replace the encoder card. 3. Contact the agent or Inovance for technical support.
		10	FVC switch to SVC	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. When the device is running in the FVC mode, the FVC mode is switched to the SVC mode because an encoder feedback abnormality occurs.	1. Check the encoder and the wiring of the encoder. 2. Switch to the SVC mode when possible.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
20	Encoder abnormality	11	The encoder (not the speed feedback encoder) is disconnected.	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. If the encoder does not need to run, set n5-00 to "Disable." 2. The encoder is damaged. 3. The encoder power supply is faulty. 4. The encoder connection is faulty. 5. Other causes	1. Replace the encoder. 2. Check whether the power cord of the encoder is properly connected. 3. Check whether the ABZ connection of the encoder is correct. 4. Check whether the encoder connection is reliable. 5. Check that the zero point position angle of the encoder is correct. 6. Contact the agent or Inovance for technical support.
		13	Speed feedback encoder disabled in FVC mode	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. In the FVC mode, the encoder module corresponding to the speed feedback encoder set by d0-12 is not enabled.	1. Set n5-00 or n6-00 to "Enable" according to actual conditions.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
20	Encoder exception	14	The types of encoder 1 and encoder 2 are set to the same. However, parameters of encoder 1 and encoder 2 are set differently.	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The types of encoder 1 and encoder 2 are set to the same. However, parameters of encoder 1 and encoder 2 are set differently.	1. Set n5-00 for encoder 1 or n6-00 for encoder 2 according to actual conditions. 2. Set the encoder parameters correctly.
		15	Encoder Z signal lost	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The Z signal is lost. 2. The encoder power supply is faulty. 3. The encoder connection is faulty. 4. Other causes	1. Replace the encoder. 2. Check whether the power cord of the encoder is properly connected. 3. Check whether the ABZ connection of the encoder is correct. 4. Check whether the encoder connection is reliable. 5. Check that the zero point position angle of the encoder is correct. 6. Contact the agent or Inovance for technical support.
22	Abnormal auto-tuning result	1	Abnormal motor auto-tuning result	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. Basic motor parameters are set incorrectly.	1. Set basic parameters of the motor correctly according to the motor nameplate.
								2. The motor is loaded during auto-tuning.	2. Ensure that the motor is not loaded before auto-tuning.
								3. The model parameter is set incorrectly.	3. Contact the agent or Inovance for technical support.
								4. Other causes	-
		2	The encoder PPR is set incorrectly.	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The speed feedback value detected during dynamic auto-tuning is inconsistent with the speed reference command.	1. Check that the encoder pulses per revolution is set correctly.
		3	Encoder Z signal lost	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The Z signal is not obtained during auto-tuning of the synchronous motor.	1. Check the connection of the encoder Z signal.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
23	Short circuit to ground	1	Overcurrent detected during motor-to-ground short circuit detection	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The motor is shorted to the ground.	1. Check the motor connection.
								2. The output is shorted to the ground.	2. Replace the motor.
								3. The IGBT fails.	3. Check the output circuit connection.
								4. Other causes	4. Contact the agent or Inovance for technical support.
24	Inter-phase short circuit occurs on the motor.	1	Overcurrent detected during motor inter-phase short circuit detection	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The motor encounters inter-phase short circuit.	1. Check whether the motor is faulty.
								2. The output circuit encounters short circuit on two of the U/V/W phases.	2. Replace the motor.
								3. The IGBT fails.	3. Check whether short circuit occurs on the output circuit.
								4. Other causes	4. Contact the agent or Inovance for technical support.
27	User-defined fault	1	User-defined fault 1	Coast to stop	Coast to stop	Display warning	Manual reset	1. H0-10 is set incorrectly.	1. Set H0-10 to 0.
								2. The setting source of H0-10 is active.	2. Set H0-10 to a correct value.
								-	3. Check whether the setting source is active.
		2	User-defined fault 2	Coast to stop	Coast to stop	Display warning	Manual reset	1. H0-11 is set incorrectly.	1. Set H0-11 to 0.
								2. The setting source of H0-11 is active.	2. Set H0-11 to a correct value.
								-	3. Check whether the setting source is active.
27	User-defined fault	3	User-defined fault 3	Coast to stop	Coast to stop	Display warning	Manual reset	1. H0-12 is set incorrectly.	1. Set H0-12 to 0.
								2. The setting source of H0-12 is active.	2. Set H0-12 to a correct value.
								-	3. Check whether the setting source is active.
		4	User-defined fault 4	Coast to stop	Coast to stop	Display warning	Manual reset	1. H0-13 is set incorrectly.	1. Set H0-13 to 0.
								2. The setting source of H0-13 is active.	2. Set H0-13 to a correct value.
								-	3. Check whether the setting source is active.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
28	User-defined alarm	1	User-defined alarm 1	Display warning	Coast to stop	Coast to stop	Auto reset	1. H0-15 is set incorrectly.	1. Set H0-15 to 0.
								2. The setting source of H0-15 is active.	2. Set H0-15 to a correct value.
								-	3. Check whether the setting source is active.
		2	User-defined alarm 2	Display warning	Coast to stop	Coast to stop	Auto reset	1. H0-16 is set incorrectly.	1. Set H0-16 to 0.
								2. The setting source of H0-16 is active.	2. Set H0-16 to a correct value.
								-	3. Check whether the setting source is active.
		3	User-defined alarm 3	Display warning	Coast to stop	Coast to stop	Auto reset	1. H0-17 is set incorrectly.	1. Set H0-17 to 0.
								2. The setting source of H0-17 is active.	2. Set H0-17 to a correct value.
								-	3. Check whether the setting source is active.
		4	User-defined alarm 4	Display warning	Coast to stop	Coast to stop	Auto reset	1. H0-18 is set incorrectly.	1. Set H0-18 to 0.
								2. The setting source of H0-18 is active.	2. Set H0-18 to a correct value.
								-	3. Check whether the setting source is active.
31	PID fault	1	PID feedback loss	Coast to stop	Coast to stop	Display warning	Manual reset	1. The PID feedback value is abnormal or is set incorrectly.	1. Check the PID feedback.
								2. The PID feedback error detection value is inappropriate.	2. Check that the PID feedback source is set properly.
								3. The PID feedback fluctuates greatly, and the set PID feedback error detection time is too short.	3. Check and ensure that the feedback error detection threshold L4-56 is set properly.
								-	4. Check whether the PID feedback fluctuates greatly, check the feedback signal for interference, and troubleshoot feedback signal source exceptions.
								-	5. Properly increase the PID feedback error detection threshold (L4-56).

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
41	IGBT fault	1	Phase-U IGBT fault	Coast to stop	Coast to stop	Coast to stop	Manual reset	Phase-U IGBT overcurrent or short circuit occurs. Phase-U IGBT drive power supply undervoltage occurs.	1. Check whether the IGBT is damaged. 2. Check whether the IGBT drive power supply is abnormal.
		2	Phase-V IGBT fault	Coast to stop	Coast to stop	Coast to stop	Manual reset	Phase-V IGBT overcurrent or short circuit occurs. Phase-V IGBT drive power supply undervoltage occurs.	1. Check whether the IGBT is damaged. 2. Check whether the IGBT drive power supply is abnormal.
		3	Phase-W IGBT fault	Coast to stop	Coast to stop	Coast to stop	Manual reset	Phase-W IGBT overcurrent or short circuit occurs. Phase-W IGBT drive power supply undervoltage occurs.	1. Check whether the IGBT is damaged. 2. Check whether the IGBT drive power supply is abnormal.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
41	IGBT fault	4	IGBT fault	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The IGBT is shorted. 2. The U/V/W output circuit of the AC drive is grounded or short circuited, or the braking resistor is short circuited. 3. The control method is FVC or SVC, and the motor is started without parameter auto-tuning. 4. The acceleration/ deceleration time is too short. 5. The manual torque boost value is not appropriate. 6. The V/f curve is improper. 7. The motor is started when it is rotating. 8. The power rating of the drive is low. 9. The DC bus voltage is too low. 10. Motor parameters are set incorrectly. 11. The periphery circuits are abnormal. 12. Other causes	1. Check whether the IGBT is damaged. 2. Eliminate periphery faults and check whether the motor, output contactor, or braking resistor is short circuited. 3. Set motor parameters correctly according to the motor nameplate, and run the motor after completing auto-tuning of motor parameters. 4. Set appropriate acceleration/deceleration time. 5. Set appropriate torque boost parameters. 6. Set the V/f curve correctly. 7. Select flying start or start the motor after it stops. 8. Select the drive with a proper power rating. 9. Adjust the DC bus voltage to the normal range. 10. Set the motor parameters correctly. 11. Check the fault history. If the current upon the fault is below the overcurrent threshold, check for interference sources. 12. If no interference source exists, the drive board or Hall sensor may be faulty 13. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
42	Excessive speed deviation of motor	1	Excessive speed deviation of motor	Display warning	Display warning	Display warning	Auto reset	1. The acceleration/ deceleration time is so short that the motor cannot follow the motor speed reference.	1. Set appropriate acceleration/deceleration time.
								2. The load is too large or the motor is stalled.	2. Try to carry out feedforward compensation for the acceleration rate.
								3. The detection threshold for excessive deviation (E8-09) is too low or the detection time for excessive deviation (E8-10) is too short.	3. Check the load and reduce the load or select an appropriate applicable drive.
								4. The speed loop PI parameter value is low in the vector control mode.	4. Check the motor and mechanical drive.
								5. The encoder parameters are set incorrectly.	5. Set E8-09 and E8-10 properly.
								-	6. Enhance the speed loop PI parameter.
								-	7. Set encoder parameters properly.
43	Motor over speed	1	Motor overspeed	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The motor is driven to run by external force.	1. Check the actual load of the motor.
43	Motor over speed	1	Motor overspeed	Coast to stop	Coast to stop	Coast to stop	Manual reset	2. For gravity load applications, the torque limit is set improperly and the load is accelerated by the self gravity.	2. Check whether the torque limit is set properly.
								3. For gravity load applications, the drive power rating is too low to drive the load properly.	3. Select the drive with a proper power rating.
								4. The motor control is faulty.	4. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
45	Expansion module abnormality	7	Conflict between slot addresses of bus adapters A and B	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The slot numbers of two communication modules conflict with each other.	1. Check whether the slot numbers of the communication cards are set correctly.
								2. The bus adapters A and B specify the same communication module.	2. Check the communication module type.
		13	Communication card offline of bus adapter A	Coast to stop	Coast to stop	Display warning	Manual reset	1. An incorrect communication card slot is selected.	1. Re-install the expansion card.
								2. The card ID is not set for the customized communication card.	2. Reset the parameter correctly.
								3. No program is set for the communication card.	3. Check whether the communication card is damaged or lacks of program.
								4. The communication card is faulty.	
		14	Communication card offline of bus adapter B	Coast to stop	Coast to stop	Display warning	Manual reset	1. An incorrect communication card slot is selected.	1. Re-install the expansion card.
								2. The card ID is not set for the customized communication card.	2. Reset the parameter correctly.
								3. No program is set for the communication card.	3. Check whether the communication card is damaged or lacks of program.
								4. The communication card is faulty.	-
46	Parameter setting alarm	1	Parameters are set incorrectly.	Display warning	Display warning	Display warning	Auto reset	For the specific cause, see parameter U5-92.	-

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
47	STO activation	1	STO activated	Display warning	Display warning	Not detected	Auto reset	STO1 and STO2 are activated simultaneously.	1. Check STO1 and STO2 for 24 VDC input. 2. Ensure that the positive and negative poles of the 24 VDC input for STO1 or STO2 are connected correctly. 3. Contact the agent or Inovance for technical support.
		2	STO1F	Coast to stop	Coast to stop	Coast to stop	Manual reset	STO1 is activated and STO2 is normal.	1. Check STO1 and STO2 for 24 VDC input. 2. Ensure that the positive and negative poles of the 24 VDC input for STO1 or STO2 are connected correctly. 3. Contact the agent or Inovance for technical support.
		3	STO2F	Coast to stop	Display warning	Coast to stop	Manual reset	STO1 is activated and STO2 is normal.	1. Check STO1 and STO2 for 24 VDC input. 2. Ensure that the positive and negative poles of the 24 VDC input for STO1 or STO2 are connected correctly. 3. Contact the agent or Inovance for technical support.
		4	STO power supply fault	Coast to stop	Display warning	Coast to stop	Manual reset	The STO power supply voltage is abnormal.	1. Check whether power supply is normal. 2. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
47	STO activation	5	STO pulse self-test error	Coast to stop	Display warning	Coast to stop	Manual reset	An STO L pulse optocoupler self-test error occurs.	1. Check whether power supply is normal. 2. Contact the agent or Inovance for technical support.
		6	STO buffer self-check abnormality	Coast to stop	Display warning	Coast to stop	Manual reset	STO buffer self-check abnormality	1. Check whether power supply is normal. 2. Contact the agent or Inovance for technical support.
		7	STO RAM self-check abnormality	Coast to stop	Display warning	Coast to stop	Manual reset	STO RAM self-check abnormality	1. Check whether power supply is normal. 2. Contact the agent or Inovance for technical support.
		8	STO flash self-test error	Coast to stop	Display warning	Coast to stop	Manual reset	STO flash self-check abnormality	1. Check whether power supply is normal. 2. Contact the agent or Inovance for technical support.
48	Motor temperature abnormality	1	Overheat reported by motor temperature sensor 1	Coast to stop	Coast to stop	Display warning	Manual reset	1. The actual temperature of the motor is high and a motor heat dissipation abnormality occurs.	1. Take measures for better dissipation of the motor.
								2. After the motor temperature detection is enabled, an incorrect type of motor temperature sensor is selected.	2. Set the correct type of temperature sensor.
								3. After the motor temperature detection is enabled, the temperature sensor connection is unreliable.	3. Ensure stable cable connection of the temperature sensor.
								4. The motor overtemperature threshold is too low.	4. Set an appropriate motor overtemperature threshold.
								5. The temperature detection module is faulty.	5. Get technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
48	Motor temperature abnormality	2	Overheat warning reported by motor temperature sensor 1	Display warning	Display warning	Not detected	Auto reset	1. The actual temperature of the motor is high and a motor heat dissipation abnormality occurs.	1. Take measures for better dissipation of the motor.
								2. After the motor temperature detection is enabled, an incorrect type of motor temperature sensor is selected.	2. Set the correct type of temperature sensor.
								3. After the motor temperature detection is enabled, the temperature sensor connection is unreliable.	3. Ensure stable cable connection of the temperature sensor.
								4. The motor overtemperature warning threshold is too low.	4. Set an appropriate motor overtemperature warning threshold.
								5. The temperature detection module is faulty.	5. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
48	Motor temperature abnormality	3	Overheat reported by motor temperature sensor 2	Coast to stop	Coast to stop	Display warning	Manual reset	1. The actual temperature of the motor is high and a motor heat dissipation abnormality occurs.	1. Take measures for better dissipation of the motor.
								2. After the motor temperature detection is enabled, an incorrect type of motor temperature sensor is selected.	2. Set the correct type of temperature sensor.
								3. After the motor temperature detection is enabled, the temperature sensor connection is unreliable.	3. Ensure stable cable connection of the temperature sensor.
								4. The motor overtemperature threshold is too low.	4. Set an appropriate motor overtemperature threshold.
								5. The temperature detection module is faulty.	5. Contact the agent or Inovance for technical support.
		4	Overheat warning reported by motor temperature sensor 2	Display warning	Display warning	Not detected	Auto reset	1. The actual temperature of the motor is high and a motor heat dissipation abnormality occurs.	1. Take measures for better dissipation of the motor.
								2. After the motor temperature detection is enabled, an incorrect type of motor temperature sensor is selected.	2. Set the correct type of temperature sensor.
48	Motor temperature exception	4	Overheat warning reported by motor temperature sensor 2	Display warning	Display warning	Not detected	Auto reset	3. After the motor temperature detection is enabled, the temperature sensor connection is unreliable.	3. Ensure stable cable connection of the temperature sensor.
								4. The motor overtemperature warning threshold is too low.	4. Set an appropriate motor overtemperature warning threshold.
								5. The temperature detection module is faulty.	5. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
48	Motor temperature exception	5	Overheat reported by motor temperature sensor 3	Coast to stop	Coast to stop	Display warning	Manual reset	1. The actual temperature of the motor is high and a motor heat dissipation abnormality occurs.	1. Take measures for better dissipation of the motor.
								2. After the motor temperature detection is enabled, an incorrect type of motor temperature sensor is selected.	2. Set the correct type of temperature sensor.
								3. After the motor temperature detection is enabled, the temperature sensor connection is unreliable.	3. Ensure stable cable connection of the temperature sensor.
								4. The motor overtemperature threshold is too low.	4. Set an appropriate motor overtemperature threshold.
								5. The temperature detection module is faulty.	5. Contact the agent or Inovance for technical support.
48	Motor temperature exception	6	Overheat warning reported by motor temperature sensor 3	Display warning	Display warning	Not detected	Auto reset	1. The actual temperature of the motor is high and a motor heat dissipation abnormality occurs.	1. Enhance motor heat dissipation measures.
								2. After the motor temperature detection is enabled, an incorrect type of motor temperature sensor is selected.	2. Set the correct type of temperature sensor.
								3. After the motor temperature detection is enabled, the temperature sensor connection is unreliable.	3. Ensure stable cable connection of the temperature sensor.
								4. The motor overtemperature warning threshold is too low.	4. Set an appropriate motor overtemperature warning threshold.
								5. The temperature detection module is faulty.	5. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
48	Motor temperature exception	7	Motor overtemperature detected by HSMT-10	Coast to stop	Coast to stop	Not detected	Manual reset	1. The actual temperature of the motor is high, and the thermal dissipation of the motor is abnormal. 2. The temperature sensor is disconnected. 3. The temperature detection module HSMT-10 is abnormal.	1. Take measures for better dissipation of the motor. 2. Check and ensure that the temperature sensor wiring is reliable. 3. Contact the agent or Inovance for technical support.
		8	Reserved	-	-	-	-	-	-
		9	Short circuit in the circuit detected by HSMT-10	Coast to stop	Coast to stop	Not detected	Manual reset	1. A short circuit fault is detected in the temperature sampling circuit of the HSMT-10 detection module.	1. Ensure stable cable connection of the temperature sensor. 2. Contact the agent or Inovance for technical support.
50	Built-in memory abnormality	2	Black box storage timeout	Coast to stop	Coast to stop	Not detected	Manual reset	1. The flash memory is abnormal.	Contact the agent or Inovance for technical support.
								2. Other causes	
		3	FLASH memory abnormality	Display warning	Coast to stop	Not detected	Auto reset	1. The flash memory is abnormal.	Contact the agent or Inovance for technical support.
								2. Other causes	
51	RTC abnormality	1	Low RTC battery power	Display warning	Display warning	Not detected	Auto reset	1. The RTC battery power is low.	1. Replace the RTC battery.
								2. The module is faulty.	2. Contact the agent or Inovance for technical support.
		2	RTC read/write timeout (reserved)	Display warning	Coast to stop	Not detected	Auto reset	1. The RTC clock chip is abnormal.	1. Contact the agent or Inovance for technical support.
								2. The peripheral cable of the RTC is abnormal.	-
51	RTC abnormality	3	RTC time error	Display warning	Display warning	Not detected	Auto reset	1. The RTC clock chip is abnormal.	1. Contact the agent or Inovance for technical support.
								2. Other causes	-

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
52	Local control abnormality	1	IDS communication error	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The operating panel is disconnected from the PC where the IDS is installed.	1. Check whether the cable is connected securely.
								2. The connection between the operating panel and the drive is unreliable or disconnected.	2. Check whether the connection is reliable.
								3. Interference exists.	3. Check whether the circuit is routed properly, and add magnetic rings to prevent interference.
		2	Operating panel communication fault	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The operating panel is used to control multiple cascaded devices. When the panel is used to start one device, another device may be switched.	1. After using the operating panel to control the current device, disable switchover to other devices.
								2. The connection between the operating panel and the drive is unreliable or disconnected.	2. Set A10-05 to 0 to disable detection on operating panel communication disconnection.
								3. Interference exists.	3. Check whether the connection is reliable.
								-	4. Check and ensure that the cable is routed reasonably, and install the magnetic ring to eliminate interference.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
59	Low module temperature	4	Low power supply unit temperature	Coast to stop	Coast to stop	Not detected	Manual reset	1. The ambient temperature is too low. 2. The low temperature warning threshold (A4-36) is too high. 3. The thermistor is abnormal.	1. Raise the ambient temperature. 2. Set the low temperature warning threshold (A4-36) properly. 3. Contact the agent or Inovance for technical support.
		5	Measured module temperature too low	Display warning	Coast to stop	Not detected	Auto reset	1. The ambient temperature is too low.	1. Raise the ambient temperature.
								2. The low-temperature warning threshold (A4-31) is too high.	2. Set an appropriate low-temperature warning threshold (A4-31).
								3. The thermistor of the module is faulty.	3. Contact the agent or Inovance for technical support.
								4. The module is damaged.	4. Contact the agent or Inovance for technical support.
61	Flying start failure	2	Flying start time too long	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. Motor parameters are set improperly.	1. Set basic parameters of the motor correctly, and carry out auto-tuning for the motor parameters again.
								2. The flying start timeout interval is inappropriate.	2. Set E7-07 and E7-08 properly.
								3. Flying start is abnormal.	3. Contact the agent or Inovance for technical support.
63	External alarm	1	External alarm 1	Display warning	Display warning	Display warning	Auto reset	1. H0-05 is set incorrectly.	1. Set H0-05 to 0.
								2. The setting source of H0-05 is active.	2. Set H0-05 to a correct value.
								-	3. Check whether the setting source is active.
		2	External alarm 2	Display warning	Display warning	Display warning	Auto reset	1. H0-06 is set incorrectly.	1. Set H0-06 to 0.
								2. The setting source of H0-06 is active.	2. Set H0-06 to a correct value.
								-	3. Check whether the setting source is active.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
63	External alarm	4	OFF2/OFF3 activation	Display warning	Coast to stop	Not detected	Auto reset	1. OFF2/OFF3 is not selected on the control panel of the InoDriveStudio.	1. Select OFF2 and OFF3 on the control panel of the InoDriveStudio.
								2. When the drive is controlled by InoDriveStudio, sources 2 and 3 of OFF2 for the selected control channel, and sources 2 and 3 of OFF3 for the selected control channel are activated.	2. Check whether sources 2 and 3 of OFF2 for the selected control channel, and sources 2 and 3 of OFF3 for the selected control channel are activated.
								3. When the control channel is used to send start/stop commands, OFF2 or OFF3 of the selected control channel is activated.	3. Check if OFF2 or OFF3 is activated in the start/stop control word and other control words.
		5	AI1 abnormality when used for temperature detection	Display warning	Coast to stop	Not detected	Auto reset	1. When AI1 is used for temperature detection, the input voltage over AI1 exceeds ±6 V.	1. Check and ensure that AI1 has no abnormal voltage input.
65	Parameter processing abnormality	1	Abnormal interruption during factory settings restoration	Coast to stop	Coast to stop	Not detected	Manual reset	1. The drive is powered off when parameters are being restored or fault records are being cleared.	1. Restore parameters to clear the fault.
								2. Other causes	2. Contact the agent or Inovance for technical support.
		2	Abnormal interruption during parameter copy by SOP-20	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. An abnormal interruption occurs during parameter copy by SOP-20. Some parameters are not copied, and values of other parameters have taken effect.	1. Restore parameters to default settings.
								-	2. Copy parameters through the SOP-20 again.
								-	3. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
65	Parameter processing abnormality	3	Parameter cache capacity exceeded	Coast to stop	Coast to stop	Not detected	Manual reset	1. Large numbers of parameters are saved to the EEPROM, leading to insufficient parameter cache capacity.	1. Avoid duplicate parameters to be written.
								-	2. Contact the agent or Inovance for technical support.
		5	Abnormal interruption during motor parameter group copy	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. Unexpected power-off occurs during motor parameter group copy.	1. Re-copy the motor parameter group or restore all parameters.
								2. The internal memory is faulty.	2. Change the control board of the drive.
								3. The parameter write operations are too frequent.	3. Prevent frequent parameter write operations.
								-	4. Contact the agent or Inovance for technical support.
65	Parameter processing abnormality	6	Parameter copy by SOP-20 not completed	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. An abnormal interruption occurs during parameter download by SOP-20. Some parameters are not downloaded, and values of the downloaded parameters have not taken effect.	1. Reset to clear the fault.
								-	2. Power off and then power on the drive.
								-	3. Contact the agent or Inovance for technical support.
		7	Abnormal interruption of parameter backup to internal memory	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. An abnormal interruption occurs during parameter restoration from the internal memory.	1. Back up the parameters again or restore all parameters to default.
								2. The internal memory is faulty.	2. Change the control board of the drive.
								-	3. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
67	Communication card abnormality of bus adapter A	1	Adapter A external bus timeout	Coast to stop	Coast to stop	Not detected	Manual reset	1. The communication between the communication card and the host controller times out.	Check the connection between the communication card and the host controller.
								2. The communication card is offline.	-
		2	Incorrect settings of communication parameters (address or baud rate) for adapter A	Coast to stop	Coast to stop	Not detected	Manual reset	The address or baud rate is set incorrectly.	Check and set the communication address or baud rate.
		3	Bus address conflict of adapter A	Coast to stop	Coast to stop	Not detected	Manual reset	The address settings of slave stations conflict with each other.	Reset the slave addresses.
67	Communication card abnormality of bus adapter A	4	PZD1 data CRC error for DP communication of adapter A	Coast to stop	Coast to stop	Not detected	Manual reset	1. The check bit (n16-10) of input PZD1 is set improperly.	1. Set the check bit of input PZD1 properly.
								2. The host controller does not send the PZD1 check bit normally.	2. Correct the host controller program to ensure that the PZD1 check bit is normal.
								3. Other causes	3. Contact the agent or Inovance for technical support.
		5	DP configuration error of adapter A	Coast to stop	Coast to stop	Not detected	Manual reset	The DP communication configuration is incorrect.	Check the DP communication setting.
		6	Mismatch between PDO transmission length and configured length of adapter A	Coast to stop	Coast to stop	Not detected	Manual reset	The process data length is different from the set length.	Check the DP communication setting.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
67	Communication card abnormality of bus adapter A	7	EtherCAT EEPROM loading error of adapter A	Coast to stop	Coast to stop	Not detected	Manual reset	The EtherCAT card encounters an EEPROM loading error.	1. Perform the EEPROM write operation again.
								-	2. Contact the agent or Inovance for technical support.
		8	Communication card initialization error of adapter A	Coast to stop	Coast to stop	Not detected	Manual reset	An abnormality occurs when communication parameters of the communication card are being initialized.	Check the initialized parameters.
		9	EtherCAT master switchover error of adapter A	Coast to stop	Coast to stop	Not detected	Manual reset	The master station switchover fails.	Switchover fails due to incorrect slave configurations.
								-	Reconfigure the slave according to the ESC error feedback and then switch the status.
67	Communication card abnormality of bus adapter A	10	Sync signal error of adapter A	Coast to stop	Coast to stop	Not detected	Manual reset	The synchronization signal loss rate exceeds the limit.	1. Check the master station real-time performance.
								-	2. Check the communication network to reduce interference.
		11	Abnormality of adapter A PDI synchronization signal	Coast to stop	Coast to stop	Not detected	Manual reset	The synchronization signal loss rate exceeds the limit.	1. Check the master station real-time performance.
								-	2. Check the communication network to reduce interference.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
67	Abnormality of communication card of bus adapter A	14	EtherNet/IP communication error of adapter A	Coast to stop	Coast to stop	Not detected	Manual reset	Fault codes and fault causes: 82: An error occurs on the Ethernet hardware. 83: The MAC address is not programmed. 84: IP address conflict 85: LINK loss	Solutions: 82: Contact Inovance or the agent for technical support. 83: Contact Inovance or the agent for technical support. 84: Check and ensure that the device has been assigned with a unique IP address. 85. Check whether the network cable is connected properly.
		15	Check error in data received by communication card of adapter A	Coast to stop	Coast to stop	Not detected	Manual reset	The number of CRC errors in data transmitted by the bus adapter reaches the threshold.	1. Modify the CRC error threshold.
								-	2. Contact the agent or Inovance for technical support.
		16	Check error in data sent by communication card of adapter A	Coast to stop	Coast to stop	Not detected	Manual reset	The number of CRC errors in data received by the bus adapter reaches the threshold.	1. Modify the CRC error threshold.
								-	2. Contact the agent or Inovance for technical support.
68	Communication card abnormality of bus adapter B	1	Adapter B external bus timeout	Coast to stop	Coast to stop	Not detected	Manual reset	1. The communication between the communication card and the host controller times out.	Check the connection between the communication card and the host controller.
								2. The communication card is offline.	-
		2	Incorrect settings of communication parameters (address or baud rate) for adapter B	Coast to stop	Coast to stop	Not detected	Manual reset	The address or baud rate is set incorrectly.	Check and set the communication address or baud rate.
		3	Bus address conflict of adapter B	Coast to stop	Coast to stop	Not detected	Manual reset	The address settings of slave stations conflict with each other.	Reset the slave addresses.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
68	Communication card abnormality of bus adapter B	4	PZD1 data CRC error of adapter B DP communication	Coast to stop	Coast to stop	Not detected	Manual reset	1. The check bit (n16-10) of input PZD1 is set improperly.	1. Set the check bit of input PZD1 properly.
								2. The host controller does not send the PZD1 check bit normally.	2. Correct the host controller program to ensure that the PZD1 check bit is normal.
								3. Other causes	3. Contact the agent or Inovance for technical support.
		5	DP configuration error of adapter B	Coast to stop	Coast to stop	Not detected	Manual reset	The DP communication configuration is incorrect.	Check the DP communication settings.
		6	Mismatch between PDO transmission length and configured length of adapter B	Coast to stop	Coast to stop	Not detected	Manual reset	The process data length is different from the set length.	Check the DP communication settings.
68	Communication card abnormality of bus adapter B	7	EtherCAT EEPROM loading error of adapter B	Coast to stop	Coast to stop	Not detected	Manual reset	The EtherCAT card encounters an EEPROM loading error.	1. Perform the EEPROM write operation again.
								-	2. Contact the agent or Inovance for technical support.
		8	Communication card initialization error of adapter B	Coast to stop	Coast to stop	Not detected	Manual reset	An abnormality occurs when communication parameters of the communication card are being initialized.	Check the initialized parameters.
		9	EtherCAT master switchover error of adapter B	Coast to stop	Coast to stop	Not detected	Manual reset	The master station switchover fails.	Switchover fails due to incorrect slave configurations.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
68	Communication card abnormality of bus adapter B	9	EtherCAT master switchover error of adapter B	Coast to stop	Coast to stop	Not detected	Manual reset	-	Reconfigure the slave according to the ESC error feedback and then switch the status.
		10	Sync signal error of adapter B	Coast to stop	Coast to stop	Not detected	Manual reset	The synchronization signal loss rate exceeds the limit.	1. Check the master station real-time performance.
								-	2. Check the communication network to reduce interference.
		11	Abnormality of adapter B PDI synchronization signal	Coast to stop	Coast to stop	Not detected	Manual reset	The synchronization signal loss rate exceeds the limit.	1. Check the master station real-time performance.
								-	2. Check the communication network to reduce interference.
		14	EtherNet/IP communication error of adapter B	Coast to stop	Coast to stop	Not detected	Manual reset	Fault codes and fault causes: 82: An error occurs on the Ethernet hardware. 83: The MAC address is not programmed. 84: IP address conflict 85: LINK loss	Solutions: 82: Contact Inovance or the agent for technical support. 83: Contact Inovance or the agent for technical support. 84: Check and ensure that the device has been assigned with a unique IP address. 85. Check whether the network cable is connected properly.
68	Communication card abnormality of bus adapter B	15	Check error in data received by communication card of adapter B	Coast to stop	Coast to stop	Not detected	Manual reset	The number of CRC errors in data transmitted by the bus adapter reaches the threshold.	1. Modify the CRC error threshold.
								-	2. Contact the agent or Inovance for technical support.
		16	Check error in data sent by communication card of adapter B	Coast to stop	Coast to stop	Not detected	Manual reset	The number of CRC errors in data received by the bus adapter reaches the threshold.	1. Modify the CRC error threshold.
								-	2. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
74	Braking unit error	4	Braking IGBT shoot through	Coast to stop	Coast to stop	Coast to stop	Manual reset	The braking IGBT is damaged or shorted.	1. Check whether the braking transistor is damaged. 2. Check whether the braking IGBT is shorted. 3. Contact the agent or Inovance for technical support.
		8	Braking resistor overload	Coast to stop	Coast to stop	Coast to stop	Manual reset	The braking resistor continuously outputs large current for a certain period.	1. Check whether the braking resistor is appropriate. 2. Check whether the braking resistor is connected properly. 3. Contact the agent or Inovance for technical support.
80	Fan fault	1	Drive fan fault	Display warning	Coast to stop	Not detected	Auto reset	Fan feedback is abnormal. The fan power supply is abnormal.	Check whether the power supply of the fan is normal. Check whether the fan operates properly. Contact the agent or Inovance for technical support.
82	DC pre-charge error	1	Pre-charge resistor fault	Coast to stop	Coast to stop	Coast to stop	Manual reset	The pre-charge resistor circuit is abnormal. The thyristor drive is abnormal. The thyristor is damaged.	Check whether pre-charge resistor circuit is normal. Check whether the thyristor is normal. Contact the agent or Inovance for technical support.
		2	Pre-charge contactor feedback abnormality	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The pre-charge contactor is damaged.	1. Replace the pre-charge contactor.
								2. The module is faulty.	2. Contact the agent or Inovance for technical support.
								3. Other causes	3. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
82	DC pre-charge error	3	Frequent operations of pre-charge contactor	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The DC bus voltage fluctuates abnormally.	1. Check the front rectifier for input phase loss.
								2. The fault is caused by manual operations.	2. Check whether the module is faulty.
								3. Other causes	3. Avoid repeated power-on/ power-off operations in a short duration.
								-	4. Contact the agent or Inovance for technical support.
83	InoLink communication abnormal	1	InoLink address conflict	Coast to stop	Coast to stop	Not detected	Manual reset	1. Duplicate node addresses exist on the InoLink network.	1. Set a unique address to each InoLink node.
		2	InoLink communication offline	Coast to stop	Coast to stop	Not detected	Manual reset	1. InoLink wiring is abnormal or disconnected.	1. Check and ensure that CANH/CANL is connected correctly.
								2. The termination resistor is abnormal.	2. Check and ensure that the CAN link is connected properly.
								3. Other causes	3. Check and ensure that the DIP switch of the termination resistor is normal.
								-	4. Contact the agent or Inovance for technical support.
83	InoLink communication abnormal	3	Timeout of receiving specified node data by InoLink	Coast to stop	Coast to stop	Not detected	Manual reset	1. The specified node is offline.	1. Check whether the connection is correct.
								2. The address of the specified node does not exist.	2. Check whether the node address is correct.
								3. Data of the specified node is not configured for transmission.	3. Check whether the data of the specified node is configured for transmission.
								4. Because the InoLink network load rate is too high, the data cannot be sent.	4. Ensure that n0-7 is set correctly.
								5. The termination resistor is abnormal.	5. Increase the communication baud rate. The maximum baud rate is 1 Mbps.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
83	InoLink communication abnormal	3	Timeout of receiving specified node data by InoLink	Coast to stop	Coast to stop	Not detected	Manual reset	6. Other causes	6. Reduce the number of InoLink nodes.
								-	7. Reduce the amount of data sent by each node.
								-	8. Check and ensure that the InoLink network termination resistor is configured properly.
								-	9. Contact the agent or Inovance for technical support.
83	InoLink communication abnormal	4	Local address as the target address for the InoLink to receive data	Display warning	Coast to stop	Not detected	Auto reset	1. The specified node address for receiving data is set incorrectly.	1. Set the node address for receiving data correctly.
								2. The local address is inappropriate.	2. Set the local address correctly.
		5	InoLink bus load rate too high	Display warning	Coast to stop	Not detected	Auto reset	1. There are too many InoLink communication nodes.	1. Reduce the number of InoLink nodes.
								2. The InoLink communication node sends large amount of data.	2. Set n0-7 (transmission mode of data 5 to 8) to 0 (indicating that the data is not sent).
								3. The InoLink communication node sends data at a short interval.	3. Set n0-7 (transmission mode of data 5 to 8) to 2 (indicating that the data is transmitted at an interval of 16 ms).
84	Brake control abnormality	1	Brake apply failed	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The brake feedback circuit is faulty or disconnected.	1. Check the brake feedback circuit.
								2. An improper brake function is selected.	2. When there is no brake feedback signal, set L1-00 to 1.
								3. The brake release feedback signal source is set incorrectly.	3. Ensure that L1-03 is set correctly.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
84	Brake control exception	2	Brake closing failed	Coast to stop	Coast to stop	Display warning	Manual reset	1. The brake feedback circuit is faulty or disconnected.	1. Check the brake feedback circuit.
								2. An improper brake function is selected.	2. When there is no brake feedback signal, set L1-00 to 1.
								3. The brake release feedback signal source is set incorrectly.	3. Ensure that L1-03 is set correctly.
		3	Brake verification failure	Coast to stop	Coast to stop	Not detected	Manual reset	1. During brake verification, the torque cannot reach the set value. 2. Brake verification is not allowed when the V/f control mode is selected.	1. Ensure that the brake is normally closed. 2. Ensure that the motor parameters are configured correctly and the cable is properly connected. 3. Check for wear of the brake. 4. If the control mode is V/f, disable brake verification (L1-35 = 0).
		4	Brake verification failure	Coast to stop	Coast to stop	Not detected	Manual reset	1. The encoder is displaced.	1. Ensure that the brake is normally closed. 2. Check for wear of the brake.
		5	Automatic start upon brake failure for protection	Display warning	Display warning	Not detected	Automatic reset	1. The encoder pulse change exceeds the judgment threshold at stop. Protection for brake is activated automatically. Floating at zero speed is maintained and the stop command is not responded. Re-send the running command, set the speed, slowly lower down the device to a safe area, and then power off the drive.	1. Check for wear of the brake. 2. If you do not want to enable the function, disable the function (L1-32 = 0)

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
85	Internal fault	1	Internal data exchange abnormality	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The software internal execution is faulty.	1. Power on the AC drive again.
								2. Other causes	2. Contact the agent or Inovance for technical support.
		2	Data exchange abnormality	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The program is upgraded.	1. Power on the AC drive again.
								2. The drive control board is faulty.	2. Contact the agent or Inovance for technical support.
								3. Other causes	-
		5	Carrier interruption abnormality	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The software internal execution is faulty.	1. Power on the AC drive again.
								2. The drive control board is faulty.	2. Replace the control board.
								3. Other causes	2. Contact the agent or Inovance for technical support.
88	Model parameter abnormality	2	Model setting error (voltage class)	Coast to stop	Coast to stop	Coast to stop	Manual reset	The 400 V model is set to the 690 V model. The 690 V model is set to the 400 V model. Other causes	Identify the model and set A3-00 to the correct model. Contact Inovance for technical support.
		3	Model hardware ID reading failure	Coast to stop	Coast to stop	Coast to stop	Manual reset	The drive control board is faulty. Other causes	Power off and then power on the device again. Contact the agent or Inovance for technical support.
88	Model parameter abnormality	4	Inconsistent models	Coast to stop	Coast to stop	Coast to stop	Manual reset	The function software and the performance software of the control board do not match. Other causes	Upgrade the function software and performance software of the control board correctly. Check whether any incorrect upgrade file is selected during the upgrade. Check and ensure that both the function software and the performance software are upgraded. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
93	Motor control abnormal	1	Motor locked-rotor fault	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The load is too heavy.	1. Confirm the motor load.
								2. Motor parameters are set improperly.	2. Check whether the motor parameters are correctly set.
								3. The PG card is not installed or the encoder is abnormal.	3. Check and ensure that the PG card or encoder is connected properly.
								4. Motor parameter auto-tuning is not performed.	4. Check whether the encoder is damaged.
								5. Output phase loss or output disconnection occurs.	5. Check whether the encoder parameters are set correctly.
								6. Other causes	6. Set motor parameters correctly, and carry out auto-tuning for the motor parameters.
								-	7. Check whether the motor cable is connected securely.
								-	8. Check whether the contactor on the motor side is open.
								-	9. Contact the agent or Inovance for technical support.
		3	Current control abnormal	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The PG card is not installed or the encoder is abnormal.	1. Check and ensure that the PG card or encoder is connected properly.
								2. Output phase loss occurs.	2. Check whether the encoder is damaged.
								3. Other causes	3. Check whether the encoder parameters are set correctly.
								-	4. Check whether the motor cable is connected securely.
								-	5. Check whether the contactor on the motor side is connected properly.
								-	6. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
100	Fault information	1	Fault information causing abnormalities	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. The function software and the performance software of the control board do not match.	1. Upgrade the function software and performance software of the control board correctly.
								2. The software internal execution is faulty.	2. Check whether any incorrect upgrade file is selected during the upgrade.
								3. Other causes	3. Check and ensure that both the function software and the performance software are upgraded.
								-	4. Power on the drive again.
								-	5. Contact the agent or Inovance for technical support.
		4	Interactive data abnormality	Coast to stop	Coast to stop	Not detected	Manual reset	1. The software internal execution is faulty.	1. Power on the AC drive again.
								2. Other causes	2. Contact the agent or Inovance for technical support.
117	AC drive pre-overload	1	AC drive pre-overload	Display warning	Display warning	Not detected	Auto reset	1. The load is too heavy.	1. Reduce the load.
								2. The power rating of the drive is low.	2. Select the drive with a proper power rating.
117	AC drive pre-overload	1	AC drive pre-overload	Display warning	Display warning	Not detected	Auto reset	3. Motor parameters are set incorrectly.	3. Set the motor parameter correctly.
								4. The torque boost value is set improperly in the V/f control mode.	4. Set the torque boost parameter properly.
								5. The motor is stalled.	5. Check the motor and mechanical conditions.
								6. The overload mode (A4-23) is selected improperly.	6. Set proper working modes according to actual load conditions. For details about how to select overload modes, see the corresponding chapters in the software guide.
								7. Other causes	7. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
169	Auto fault restart abnormality	1	Auto reset failure	Coast to stop	Coast to stop	Coast to stop	Manual reset	1. Some faults are not allowed for automatic reset.	1. Check and ensure that parameters for faults that are not allowed for automatic reset are set properly.
								2. The maximum number of automatic fault reset times has reached.	2. Reset the number of automatic fault reset times.
		2	Automatic restart upon a fault activated	Display warning	Display warning	Not detected	Auto reset	1. The automatic fault reset function and the automatic restart function are enabled.	1. The fault is used to indicate that the function is enabled. Set H1-43 to disable the function if required.
172	Module pre-overtemperature	4	Drive over-temperature warning	Display warning	Display warning	Not detected	Auto reset	1. The air filter is blocked.	1. Clean the air filter.
								2. The fan is faulty.	2. Check the fan.
								3. The ambient temperature is high.	3. Lower down the ambient temperature.
								4. The over-temperature warning threshold is too large.	4. Set an appropriate warning threshold.
								5. The module is faulty.	5. Contact the agent or Inovance for technical support.
174	AI input disconnection	1	I/O expansion card communication disconnection	Display warning	Coast to stop	Not detected	Automatic reset	1. The wiring between the I/O expansion card and the control board is loose.	1. Check whether the connection is reliable.
								2. The I/O expansion card is abnormal.	2. Contact the agent or Inovance for technical support.
								3. The control board is faulty.	-
								4. Interference exists during communication.	-

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
174	AI input disconnection	3	AI1 disconnection	Display warning	Coast to stop	Not detected	Auto reset	1. AI1 is disconnected.	1. Check and ensure that AI1 is connected.
								2. The AI1 signal type is set incorrectly.	2. Check whether the voltage signal type is set to 4 mA to 20 mA.
								3. The detection threshold is too high.	3. Check whether the signal type of 0 mA to 20 mA is set to 4 mA to 20 mA.
								4. The AI1 correction factor is set improperly.	4. Set a proper detection threshold.
								5. The control board is faulty.	5. Check and ensure that the correction factor in group F15 is set properly.
								-	6. Contact the agent or Inovance for technical support.
174	AI input disconnection	4	AI2 disconnection	Display warning	Coast to stop	Not detected	Auto reset	1. AI2 is disconnected.	1. Check and ensure that AI2 is connected.
								2. The AI2 signal type is set incorrectly.	2. Check whether the voltage signal type is set to 4 mA to 20 mA.
								3. The detection threshold is too high.	3. Check whether the signal type of 0 mA to 20 mA is set to 4 mA to 20 mA.
		4	AI2 disconnection	Display warning	Coast to stop	Not detected	Auto reset	4. The AI2 correction factor is set improperly.	4. Set a proper detection threshold.
								5. The control board is faulty.	5. Check and ensure that the correction factor in group F15 is set properly.
								-	6. Contact the agent or Inovance for technical support.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
174	AI input disconnection	5	AI1 input value limit exceeded	Not detected	Coast to stop	Not detected	Auto reset	The input value F2-00 of AI1 is smaller than the minimum value (F2-08) or greater than the maximum value (F2-10). The AI monitoring function (F2-36) is activated. The AI1-related judgment conditions F2-37 (AI monitoring activation condition selection) and F2-38 (AI monitoring control channel selection) are valid.	Ensure that the actual input value does not exceed the limit. If you do not want to enable the fault, set F2-36 (AI monitoring function) to 0 Contact the agent or Inovance for technical support.
		6	AI2 input value limit exceeded	Not detected	Coast to stop	Not detected	Auto reset	The input value F2-02 of AI2 is smaller than the minimum value (F2-12) or greater than the maximum value (F2-14). The AI monitoring function (F2-36) is activated. The AI2-related judgment conditions F2-37 (AI monitoring activation condition selection) and F2-38 (AI monitoring control channel selection) are valid.	Ensure that the actual input value does not exceed the limit. If you do not want to enable the fault, set F2-36 (AI monitoring function) to 0 Contact the agent or Inovance for technical support.
174	AI input disconnection	7	AI3 (expansion terminal) disconnection	Display warning	Coast to stop	Not detected	Automatic reset	1. AI3 is disconnected.	1. Check and ensure that AI3 is connected.
								2. The AI3 signal type is set incorrectly.	2. Set an appropriate detection threshold.
								3. The detection threshold is too high.	3. Check whether the correction coefficient in group F15 is set properly.
								4. The AI3 correction factor is set improperly.	4. Contact the agent or Inovance for technical support.
								5. The expansion I/O board is faulty.	-

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
174	AI input disconnection	8	AI4 (expansion terminal) disconnection	Display warning	Coast to stop	Not detected	Automatic reset	1. AI4 is disconnected.	1. Check and ensure that AI4 is connected.
								2. The AI4 signal type is set incorrectly.	2. Set an appropriate detection threshold.
								3. The detection threshold is too high.	3. Check whether the correction coefficient in group F15 is set properly.
								4. The AI4 correction factor is set improperly.	4. Contact the agent or Inovance for technical support.
								5. The expansion I/O board is faulty.	-
187	Position control fault	1	Excessive position deviation	Coast to stop	Coast to stop	Coast to stop	Manual reset	The difference between the feedback position and the set position exceeds the deviation threshold set by software.	Modify the corresponding configuration parameter, for example, the deviation threshold or detection time.
		2	Home search timeout	Coast to stop	Coast to stop	Coast to stop	Manual reset	The home search operation exceeds the set time.	1. Check the home search mode. 2. Check the proximity switch signal. 3. Check the running direction.
187	Position control fault	3	Positioning completion timeout	Coast to stop	Coast to stop	Coast to stop	Manual reset	The set position is unchanged, but the actual position is out of the allowed range after a specific period elapses.	1. Check whether the parameter settings are properly. 2. Check whether the transmission is stuck or the torque is insufficient.
		4	Position feedback encoder disconnection	Coast to stop	Coast to stop	Coast to stop	Manual reset	In the position control mode, encoder disconnection is detected by hardware.	Check the position feedback encoder and wiring.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
188	Position control warning	1	Home point invalid during operation in the positioning control mode	Display warning	Coast to stop	Not detected	Automatic reset	The home point is invalid during operation in the positioning control mode.	Perform home point reset to ensure that the home point is valid.
		2	Home point invalid during positioning interruption	Display warning	Coast to stop	Not detected	Automatic reset	The home point is invalid during positioning interruption.	Perform home point reset to ensure that the home point is valid.
		3	Proximity switches 1 and 2 active at the same time	Display warning	Coast to stop	Not detected	Automatic reset	Proximity switches 1 and 2 are too close to each other.	Keep a certain distance between proximity switches 1 and 2.
		4	Signal loss of proximity switch 1	Display warning	Coast to stop	Not detected	Automatic reset	The proximity switch 1 signal is lost. It is not detected during motion.	Check the proximity switch position and signal cable.
		5	Signal loss of proximity switch 2	Display warning	Coast to stop	Not detected	Automatic reset	The proximity switch 2 signal is lost. It is not detected during motion.	Check the proximity switch position and signal cable.
188	Position control warning	6	Excessive position deviation of proximity switch 1	Display warning	Coast to stop	Not detected	Automatic reset	The deviation between the detection position of proximity switch 1 and the set position exceeds the set range.	Check the proximity switch position and signal cable.
		7	Excessive position deviation of proximity switch 2	Display warning	Coast to stop	Not detected	Automatic reset	The deviation between the detection position of proximity switch 2 and the set position exceeds the set range.	Check the proximity switch position and signal cable.
		8	Position setpoint overlimit	Display warning	Coast to stop	Not detected	Automatic reset	The positioning control position setpoint is out of the forward/reverse software limit range.	Reset the parameter properly.

Fault Code	Fault Name	Fault sub code	Fault Subcode Name	Default Fault Level	Highest Fault Level	Lowest Fault Level	Reset Method	Cause	Solution
189	Limit activation alarm	1	Forward hardware limit 1 activated	Display warning	Coast to stop	Not detected	Automatic reset	The forward limit switch signal 1 is activated.	Check whether the limit switch signal and parameter settings are correct, or check for reverse running disconnection.
		2	Reverse hardware limit 1 activated	Display warning	Coast to stop	Not detected	Automatic reset	The reverse limit switch signal 1 is activated.	Check whether the limit switch signal and parameter settings are correct, or check for reverse running disconnection.
		3	Forward software limit switch activated	Display warning	Coast to stop	Not detected	Automatic reset	The current position value (U29-00) is greater than the forward software limit setpoint (o17-62).	Check whether parameter settings are correct, or check for reverse running disconnection.
		4	Reverse software limit switch activated	Display warning	Coast to stop	Not detected	Automatic reset	The current position value (U29-00) is lower than the reverse software limit setpoint (o17-63).	Check whether parameter settings are correct, or check for reverse running disconnection.
		5	Forward hardware limit 2 activated	Display warning	Coast to stop	Not detected	Automatic reset	The forward limit switch signal 2 is activated.	Check whether the limit switch signal and parameter settings are correct, or check for reverse running disconnection.
		6	Reverse hardware limit 2 activated	Display warning	Coast to stop	Not detected	Automatic reset	The reverse limit switch signal 2 is activated.	Check whether the limit switch signal and parameter settings are correct, or check for reverse running disconnection.

8 Terms and Abbreviations

Term	Description
MDKE-10	An LED operating panel used with MD580 series products
SOP-20-880	A smart operating panel used with MD580 series products
InoDriveStudio	A PC software commissioning tool used with MD580 series products
IDS	Abbreviation of InoDriveStudio
AI	Analog input
AO	Analog output
DI	Digital input
DO	Digital output
RO	Digital output with relay output
HDI	High-speed digital input
HDO	High-speed digital output
OFF1	A start/stop command corresponding to bit0 of control word 1. The rising edge corresponds to the start command, whereas the low-level input corresponds to the stop command.
OFF2	An emergency stop command, corresponding to bit1 of control word 1, that can immediately become active in any state. The high-level input allows the drive to run, whereas the low-level input blocks IGBT output.
OFF3	A quick stop command, corresponding to bit2 of control word 1, that can immediately become active in any state. The high-level input allows the drive to run, whereas the low-level input forces the drive to decelerate to stop according to OFF3 deceleration time and then blocks IGBT output.
Operation enable	A command corresponding to bit3 of control word 1 and determined after the start (OFF1) command becomes active. The high-level input allows the drive to enter the running state and enables IGBT output, whereas the low-level input locks the drive in operation ready state and blocks IGBT output.
Connector	A special read-only parameter, which records MD580 running data. Its value can be read through its reference source parameter, and its data change waveform can be recorded by the oscilloscope.
Bit connector	A connector parameter that records only one bit of data, the value of which is 0 or 1
B connector	Bit connector
Word connector	A connector parameter that records a piece of analog data
K connector	Word connector
Reference source parameter	A special parameter that is assigned, as a number, to a connector parameter to read the numerical value of the connector parameter for MD580 control.
Bit reference source parameter	A reference source parameter that is used to read a bit connector and outputs one bit of data
Word reference source parameter	A reference source parameter that is used to read a word connector and outputs an analog numerical value
Terminal start/ stop module	A set of common ways of using terminals to control drive start/stop
Motor-driven potentiometer	Virtual potentiometer output implemented by software. Its value can be adjusted by using the increase/ decrease command of the C7-05/C7-06 motor-driven potentiometers.

Note

"Word" and "bit" mentioned in this guide, for example, in "word connector", "bit connector", and "control word", indicate the length of data. "Bit" represents 1-bit data, the value of which can be 0 or 1. "Word" represents 16-bit data, the range of which can be 0 to 65535 (unsigned) or –32768 to +32767 (signed).

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