INOVANCE







A00 Data code 19011165

Preface

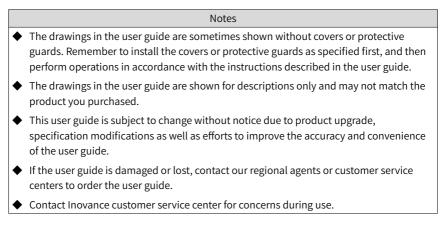
Thank you for purchasing SV820N series servo drives developed by Inovance.

The SV820N series servo drive is a high-performance multi-axis AC servo drive covering a power range of 100 W to 750 W. It supports CANopen and EtherCAT communication protocols and carries necessary communication ports to work with the host controller in achieving a networked operation of multiple servo drives.

The SV820N servo drive offers stiffness level setting, inertia auto-tuning and vibration suppression to simplify the operation process. It allows quiet and stable operations through working with a MS1 series high-response servo motor configured with a 20-bit incremental encoder or a 23-bit multi-turn absolute encoder. The SV820N servo drive aims to implement fast and accurate position control, speed control, and torque control in automation equipment such as semiconductor manufacturing equipment, SMT machines, PCB punching machines, transport machineries, food processing machineries, machine tools, and conveying machineries.

This user guide presents information concerning the product safety, mechanical and electrical installations, and basic commissioning and maintenance instructions. First-time users must read through this manual. If you have any question concerning product functions or performance, contact Inovance for technical support.

This user guide is subject to change without notice due to continuous product improvement.



Unpacking Inspection

Check the following items upon unpacking.

ltems	Description	
Check whether the delivered product is consistent with your order.	The box contains the device you ordered. Confirm the device model according to the nameplates of the servo motor and the servo drive.	
Check whether the product is damaged.	Check whether the overall appearance of the product is intact. If there is any part missing or damaged, contact Inovance or your supplier immediately.	
Check whether the rotating shaft of the servo motor rotates smoothly.	The motor shaft can be rotated manually in normal conditions. Note that the servo motor configured with a brake cannot be rotated manually.	

Revision History

Date	Version	Description
January 2020	A00	First edition

Standards Compliance

■ The SV820N series servo drive has passed the following functional safety certifications.

Functional Safety	Certification Mark	Standards
		IEC/EN 61508
STO (Safety Torque Off)		SN 29500
		EN ISO 13849-1

Contents

Preface	1
Unpacking Inspection	2
Revision History	2
Standards Compliance	2
Safety Instructions	7
Safety Precautions	7
Safety Levels and Definitions	7
Safety Instructions	7
Safety Signs	12
1 Servo System Selection	14
1.1 Nameplate and Model Number	17
1.2 Technical Data	18
1.2.1 Basic Specifications	18
1.2.2 Technical Data of EtherCAT Communication	
1.3 Specifications of the Servo Motor	22
1.3.1 Nameplate and Model Number of the Servo Motor	22
1.3.2 Mechanical Characteristics of the Servo Motor	23
1.3.3 Motor Ratings	23
1.3.4 Motor Overload Characteristics	24
1.3.5 Allowable Radial and Axial Loads of the Motor	25
1.3.6 Electrical Specifications of the Motor with Brake	26
1.3.7 Motor Torque-Speed Characteristics	26
1.4 Servo System Configuration Specifications	28
1.5 Regenerative Resistor Specifications	28
1.6 Cables	28
1.7 Connector Kit	30
1.8 System Configuration	30
2 Installation Instructions	31
2.1 Installation of the Servo Drive	31
2.1.1 Installation Environment	31
2.1.2 Installation Dimensions and Clearances	32
2.1.3 Installation Method	33
2.2 Installation of the Servo Motor	35

2.2.1 Installation Environment	. 35
2.2.2 Installation Precautions	. 35
2.3 Dimension Drawing of MS1H1 Series Servo Motors	. 38
3 Wiring	. 41
3.1 Wiring of the Servo Drive Main Circuit	. 43
3.1.1 Introduction to Main Circuit Terminals	. 43
3.1.2 Wiring Example of the Regenerative Resistor	.44
3.1.3 Recommended Models and Specifications of Main Circuit Cables	. 45
3.1.4 Wiring Example of the Power Supply	.46
3.1.5 Precautions for Main Circuit Wiring	. 47
3.1.6 Specifications of Peripheral Parts of the Main Circuit	. 49
3.2 Connection Between the Servo Drive and Servo Motor	. 49
3.3 Power Cable Connections Between Servo Drive and Motor	. 50
3.3.1 Power Cable Connections for the Motor with Brake	. 50
3.3.2 Power Cable Connections for the Motor Without Brake	. 51
3.4 Encoder Cable Connection	. 52
3.4.1 Connection of Serial Incremental Encoder	. 52
3.4.2 Connection of Absolute Encoder Cables	. 55
3.5 Wiring of Control Signal Terminal CN1 (DI/DO)	. 60
3.5.1 DI Circuits (DI17 as an example)	. 61
3.5.2 DO Circuit (DO1 as an example)	.64
3.6 Wiring of Communication Signals (CN4/CN5)	. 65
3.6.1 Wiring Diagram	. 65
3.6.2 Selection of Communication Cables	.66
3.7 Wiring of Software Tool Communication and Online Upgrade Signals (CN3)	. 67
3.8 Anti-interference Measures for Electrical Wiring	. 68
3.8.1 Anti-interference Wiring Example and Grounding	. 69
3.8.2 Instructions for Use of the Noise Filter	
3.9 Precautions for Use of Cables	. 71
3.10 General Wiring Diagram	. 73
4 Keypad	. 74
4.1 Introduction to the Keypad	. 74
4.2 Keypad Display	. 75
4.3 Parameter Monitoring	. 81
4.4 Parameter Setting	. 90

4.5 User Password	
4.6 Jog	
4.7 DI/DO Function	
5 Troubleshooting	
5.1 Faults and Warnings	
5.2 Communication Faults and Warning Code List	
5.3 Solutions to Faults	
5.4 Solutions to Warnings	
5.5 Solutions to Communication Faults	
6 Trial Run	
6.1 Pre-running Inspection	
6.2 Power-on	
6.3 Jogging Through the Keypad	
6.4 Jogging Through the Software Tool	
6.5 Cyclic Synchronous Position Mode with AM600	
6.6 Commissioning of SV820N with Omron NJ Controller	
6.6.1 Network Configuration Settings	
6.6.2 Communication Data Configuration	155
6.6.3 Program-Controlled Operations	
6.7 Cyclic Synchronous Position Mode and NC Axis Jogging	
6.8 Servo Stop	
6.9 Conversion Factor Setting	
Appendix A List of Object Groups	
Parameter Address Structure	
Object Group 1000h	
Object Group 6000h	196
Object Group 2000h	
SDO transfer abort code	
Appendix B STO Function	
Safety Information and Instructions	
Technical Terms	
Description of STO	
Product Information	
STO Model and Nameplate	

STO Terminals	327
Wiring Diagram	328
Electrical Specifications	328
STO Function Implementation	328
Function Selection	
STO Status Display and EDM Output	
Example of Application Circuits	329
Notes	330
STO Acceptance Test	
STO Maintenance	332

Safety Instructions

Safety Precautions

- 1) Before installing, using, and maintaining this equipment, read the safety information and precautions thoroughly, and comply with them during operations.
- 2) To ensure the safety of humans and equipment, follow the signs on the equipment and all the safety instructions in this user guide.
- 3) "CAUTION", "WARNING", and "DANGER" items in the user guide do not indicate all safety precautions that need to be followed; instead, they just supplement the safety precautions.
- 4) Use this equipment according to the designated environment requirements. Damage caused by improper usage is not covered by warranty.
- 5) Inovance shall take no responsibility for any personal injuries or property damage caused by improper usage.

Safety Levels and Definitions



indicates that failure to comply with the notice will result in severe personal injuries or even death.

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

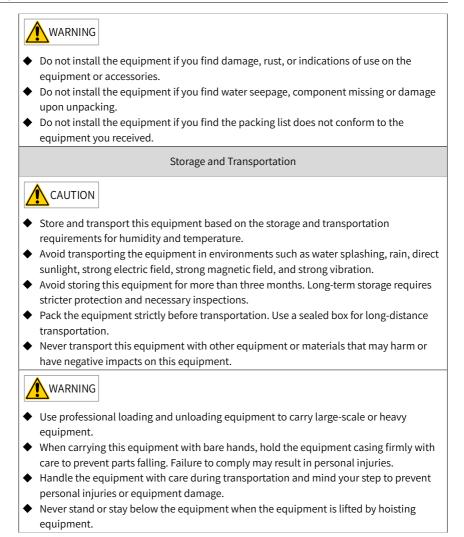
indicates that failure to comply with the notice may result in minor personal injuries or damage to the equipment.

Safety Instructions

Unpacking



- Check whether the packing is intact and whether there is damage, water seepage, damp, and deformation.
- Unpack the package by following the package sequence. Do not hit the package with force.
- Check whether there are damage, rust, or injuries on the surface of the equipment or equipment accessories.
- Check whether the number of packing materials is consistent with the packing list.



Installation

WARNING

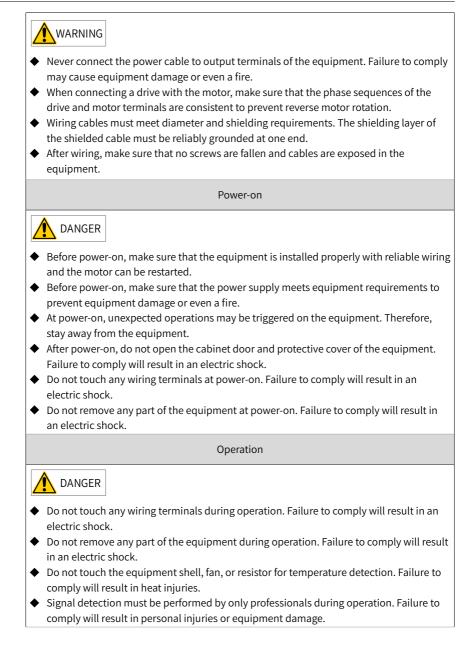
- Thoroughly read the safety instructions and user guide before installation.
- Do not modify this equipment.
- Do not rotate the equipment components or loosen fixed bolts (especially those marked in red) on equipment components.
- Do not install this equipment in places with strong electric or magnetic fields.
- When this equipment is installed in a cabinet or final equipment, protection measures such as a fireproof enclosure, electrical enclosure, or mechanical enclosure must be provided. The IP rating must meet IEC standards and local laws and regulations.

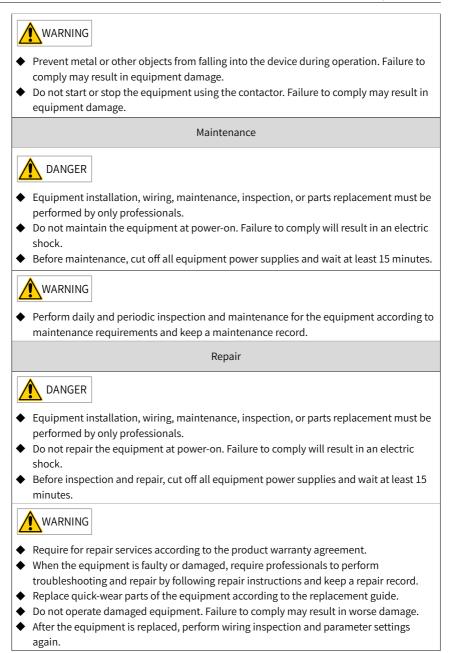
- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
- Installation, wiring, maintenance, inspection, or parts replacement must be performed by only experienced personnel who have been trained with necessary electrical information.
- Installation personnel must be familiar with equipment installation requirements and relevant technical materials.
- Before installing equipment with strong electromagnetic interference, such as a transformer, install an electromagnetic shielding device for this equipment to prevent malfunctions.

Wiring

ANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
- Never perform wiring at power-on. Failure to comply will result in an electric shock.
- Before wiring, cut off all equipment power supplies. Wait at least 15 minutes before further operations because residual voltage exists after power-off.
- Make sure that the equipment is well grounded. Failure to comply will result in an electric shock.
- During wiring, follow the proper electrostatic discharge (ESD) procedures, and wear an antistatic wrist strap. Failure to comply will result in damage to internal equipment circuits.







Safety Signs

Description of safety signs in the user guide



Read the user guide before installation and operation.

Reliably ground the system and equipment.

Danger!

High temperature!

Prevent personal injuries caused by machines.

High voltage!

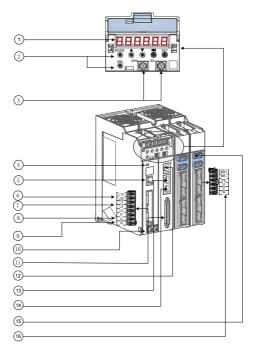
Wait 15 minutes before further operations.

Description of safety signs on the equipment

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

Safety Sign	Description
危险 DANGER	Never fail to connect the Protective Earth(PE) terminal. Read the user guide and follow the safety instructions before use.
高压注意 Hazardous Voltage 高温注意	To prevent the risk of electric shock, do not touch terminals within 15 minutes after cutting off the power supply.
High Temperature	To prevent the risk of burning, do not touch the heatsink when the power supply is ON.

1 Servo System Selection





No.	Name	Function		
1	LED display	Displays the running status and parameter settings of the servo drive		
2	Push buttons	MODE SET SEL Used to save current settings and enter the next menu. Click: Used to change the value of the blinking digit. Hold down: Turning pages when more than 5 digits are displayed Used to decrease the value of the blinking digit. Used to increase the value of the blinking digit. Used to switch between different modes and return to the previous menu. Used to select the axis No		
3	IDH, IDL device node address setting	Reserved		
4	CHARGE indicator (bus voltage indicator)	When this indicator lights up, electric charge may be still present in the internal capacitor even if the main circuit power) supply is switched off. To prevent electric shock, do not touch the power terminals when this indicator lights up.		
5	CN7 (24 V brake power input)	24 V brake power input (If you need to use the brake power supply, input the 24 V power through this terminal.)		

No.	Name	Function
6	L1C, L2C (control circuit power input terminals)	Control circuit 220 VAC power input
7	L1, L2, L3 (main circuit power input terminals)	Main circuit single-phase/three-phase 220 V power input: L1 and L2 terminals are used in single-phase input L1, L2, and L3 terminals are used in three-phase input
8	P, C (terminals for connecting external regenerative resistor)	The external regenerative resistor is connected between P and C. Note that the external regenerative resistor should be purchased separately.
9	P, N (common DC bus terminals)	Used for common DC bus connection when multiple servo drives are connected in parallel.
10	PE (grounding terminal)	Two PEs are connected respectively to the grounding terminals of the servo drive and servo motor.
11	CN1 (control terminal)	Used for DI/DO signals.
12	CN3 (Ethernet connecting terminal)	Ethernet connector port
13	CN4 (EtherCAT output terminal)	EtherCAT port, CN4 (OUT) connected to the next slave
14	CN5 (EtherCAT input terminal)	EtherCAT port, CN5 (IN) connected to the master or the last slave
15	X1, X2 (terminals for connecting encoder)	Connected to motor encoder terminals.
16	X3, X4 (main circuit signal terminal of the drive unit)	BR+, BR-: Brake coils of the motor with brake U, V, W: Connected to U, V and W phases of the servo motor



The motor with brake must be supplied with 24 V power through CN7. The power must be output to the wiring terminal of the brake through BR+ and BR-.

NOTE

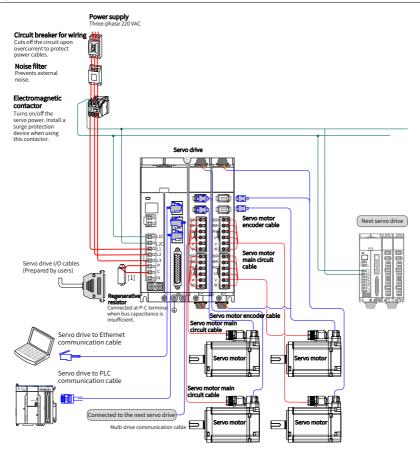


Figure 1-2 Wiring example of the three-phase 220 V system

The servo drive is directly connected to an industrial power supply, with no isolation such as a transformer. To prevent cross electric shock accidents, install a fuse or circuit breaker on the input power supply. The servo drive is not configured with a built-in protective grounding circuit. For the sake of safety, install a residual current device (RCD) to provide protections against overload and short-circuit accidents or install a specialized RCD to protect the grounding cable.

Do not run or stop the motor by using the electromagnetic contactor. As a highinductance device, the motor may generate high voltage instantaneously, which may damage the contactor.

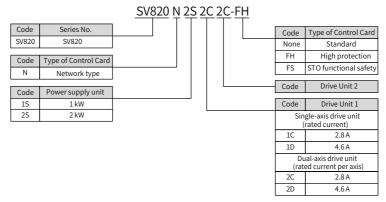
Pay attention to the power capacity when connecting an external control power supply or a 24 VDC power supply, especially when the power supply is used to power up multiple servo drives or brakes. Insufficient power supply will lead to insufficient supply current, resulting in failure of the servo drive or brake. The brake must be powered up by a 24 VDC power supply that matches the motor model and brake requirements. Observe the following precautions during wiring:

1) Connect an external regenerative resistor between terminals P and C when the servo system is in regenerative braking status.

2) CN3 is used to connect the Ethernet. CN4 and CN5 are used to connect the EtherCAT. CN4 is used to connect the next slave, and CN5 is used to connect the master or the last slave.

1.1 Nameplate and Model Number

Model and nameplate of the servo drive



Note: Motors of 400 W (inclusive) are configured with 2C or 1C drive unit.

Figure 1-3 Description of the servo drive model number

Example:

SV820N2S2C2C: SV820 series multi-axis network-type servo system, with power supply unit being 2 kW, drive unit 1 being 2.8 A x 2, and drive unit 2 being 2.8 A*2

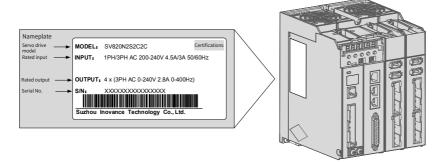


Figure 1-4 Description of the servo drive nameplate

■ Servo Drive Model Selection

Model	Input Power 220 VAC Supply Unit		Axis 1 Output Current	Axis 2 Output Current	Axis 3 Output Current	Axis 4 Output Current
SV820N2S2C2C	Single-phase	2 kW	2.8 A	2.8 A	2.8 A	2.8 A
SV820N2S2C2D	Single-phase ^[1] / Three-phase	2 kW	2.8 A	2.8 A	4.6 A	4.6 A
SV820N1S2C1C	Single-phase	1 kW	2.8 A	2.8 A	2.8 A	NC
SV820N2S2D1D	Single-phase	2 kW	4.6 A	4.6 A	4.6 A	NC
SV820N2S2C1D	Single-phase	2 kW	2.8 A	2.8 A	4.6 A	NC

[1] For SV820N2S2C2D models, derate to 80% of the load ratio upon single-phase 220 V power input.

1.2 Technical Data

1.2.1 Basic Specifications

Item			Description		
	Control mode		220 V single-phase/three-phase full-bridge rectification IGBT PWM control, sine wave current drive mode		
	Feedback		Serial incremental type: 23-bit or 20-bit		
Basics		Operation/ Storage temperature	0°C to 45°C (derating required for ambient temperature higher than 45°C)/–40°C to +70°C		
	Conditions	Operation/ Storage humidity	Below 90% RH (without condensation)		
	for use	Vibration/Impact resistance level	4.9 m/s², 19.6 m/s²		
		IP rating	IP20 (except connecting terminals)		
		Pollution degree	PD2		
		Altitude	Below 1000 m		
Performance	Speed and torque control	Speed control range	1:5500 (The lower limit of the speed control range acts as the condition for non-stop at rated torque load.)		
		Speed loop bandwidth	3000 Hz		
		Torque control accuracy (repetitiveness)	±2%		
		Soft start time	0s to 60s (Acceleration and deceleration can be set separately.)		
	Position control	Positioning time	1 ms to 10 ms		

	ltem		Description	
			24 DIs (shared by multiple axes, with 16 DIs	
			available for high-speed probe function)	
	Digital input	Signal allocation	P-OT (Positive limit switch), N-OT (Negative	
	(DI) signal	change available	limit switch), HomeSwitch (Home switch),	
Input/Output			TouchProbe1 (Touch probe 1)	
signal			TouchProbe2 (Touch probe 2)	
Signat			6 DOs (shared by multiple axes)	
	Digital output	Signal allocation	DO load-carrying capacity: 50 mA	
	(DO) signal	change available	Voltage range: 5 V to 30 V	
	(DO) Signat	enunge available	S-RDY (servo ready), TGON (motor rotation	
			output), WARN (warning), ALM (fault)	
	Overtravel (OT) prevention	Decelerating to stop when P-OT and N-OT	
		, prevention	activated	
			Including protections against overcurrent,	
	Protective functions		overvoltage, undervoltage, overload, main	
			circuit detection error, heatsink overheat,	
			power phase loss, overspeed, encoder error	
			CPU error, and parameter error	
	LED display		Main circuit CHARGE indicator, 6-digit LED	
			display	
			Four notches per axis, two of which are	
			adaptive notches capable of suppressing	
	Vibration suppression		mechanical resonance of 50 Hz to 4000 Hz	
Built-in functions			Filters for suppressing low- (machine stand/	
functions			tip vibration of 1 Hz to 100 Hz), medium-,	
			and high-frequency (mechanical/system vibration of 30 Hz to 1000 Hz) vibration	
			available	
	Communicatio	on protocol	Ethernet, EtherCAT	
			Built-in dynamic brake for emergency	
	Dynamic brake		braking	
			Built-in brake power output	
			The external 24 V power supply must be	
	Brake power s	upply	connected through CN7. The brake coil can	
	-	-	be connected directly to terminals BR+ and	
			BR	
	Others		Gain auto-tuning, fault log, jog	

Precautions for use of the built-in dynamic brake:

- As the dynamic brake allows emergency stop, do not stop the motor by triggering the S-OFF signal. The dynamic brake circuit may act frequently if the motor is started or stopped through ON/OFF control of the power supply or the servo drive, causing deterioration and failure of internal components of the servo drive. Start or stop the servo motor through speed or position references.
- The dynamic brake can be used for emergency stop only. To stop a motor normally, make the motor coast to stop or stop at zero speed. If the dynamic brake is activated in high-speed rotating status, wait for three minutes before performing the next operation (such as power on or run the motor again).
- The dynamic brake can be used when:
 - a) The control power supply is turned off.
 - b) The servo drive is turned off.
 - c) The protection function is activated.
- The dynamic brake can be activated or deactivated through parameter settings during decelerating or after stop when any one of above conditions occurs. When the control power supply is turned off, the dynamic brake acts.
- See the description of H02-08 for setting of dynamic brake functions.



1.2.2 Technical Data of EtherCAT Communication

	Item	Specifications
	Communication protocol	EtherCAT protocol
	Available services	CoE (PDO, SDO)
	Synchronization mode	DC - Distributed clock
	Physical layer	100BASE-TX
Bas	Baud rate	100 Mbit/s (100Base-TX)
ic pe	Duplex mode	Full duplex
rfor	Topological structure	Ring and linear
man	Transmission medium	Shielded Cat 5e or better network cable
Basic performance of EtherCAT slave	Transmission distance	Less than 100 m between two nodes (with proper environment and cables)
the	Number of slaves	65535 by protocol
rCAT	EtherCAT frame length	44 bytes to 1498 bytes
slav	Process data	A maximum of 1486 bytes per Ethernet frame
/e	Synchronous jitter of two slaves	Less than 1 µs
	Refresh time	About 30 μs for 1000 DI/DOs About 100 μs for 100 servo axes Different refresh time for different interfaces
	Communication code error rate	10 ⁻¹⁰ Ethernet standard
Ħ	Number of FMMU units	8
herCAT	Number of storage synchronization management units	8
con	Process data RAM	8 KB
figui	Distributed clock	64-bit
EtherCAT configuration unit	EEPROM capacity	32 Kbit Initialization data written by EtherCAT master

1.3 Specifications of the Servo Motor

1.3.1 Nameplate and Model Number of the Servo Motor

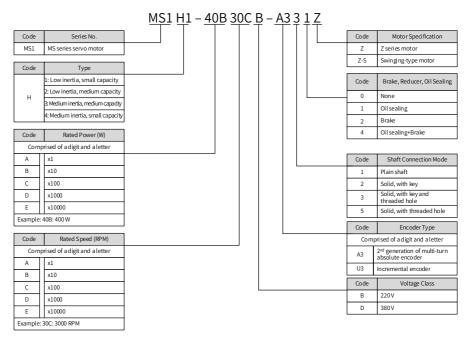


Figure 1-5 Description of the servo motor model number

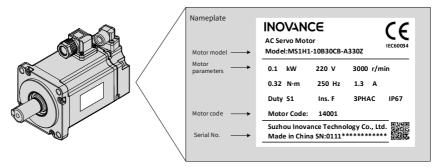


Figure 1-6 Description of the servo motor nameplate



• The preceding information only applies to motors in 40, 60, or 80 frame size.

1.3.2 Mechanical Characteristics of the Servo Motor

Item	Description
Rated time	Continuous
Vibration level	V15
Insulation resistance	500 VDC, above 10 M Ω
Ambient temperature	0°C to 40°C
Excitation mode	Permanent magnetic
Installation mode	Flange
Heat resistance level	Level F
Insulation voltage	1500 VAC, 1 minute (200 V) 1800 VAC, 1 minute (400 V)
IP rating of the enclosure	H1: IP67 (except the shaft opening and connectors) H4: IP67 (except the shaft opening and connectors)
Ambient humidity	20% to 80% (without condensation)
Connection mode	Direct connection
Rotation direction	Rotates counterclockwise (CCW) when viewed from the load side at the forward run command.

1.3.3 Motor Ratings

Model	Rated Output (kW) ^[1]	Rated Torque (N · m)	Max. Torque (N∙m)	Rated Current (Arms)	Max. Current (Arms)	
MS	51H1 (Vn = 300	00 RPM, Vma	k = 6000 RPM)			
MS1H1-05B30CB-****Z(-S)	0.05	0.16	0.56	1.3	4.6	
MS1H1-10B30CB-****Z(-S)	0.1	0.32	1.12	1.3	4.9	
MS1H1-20B30CB-****Z(-S)	0.2	0.64	2.2	1.5	5.6	
MS1H1-40B30CB-****Z(-S)	0.4	1.27	4.5	2.8	10.8	
MS1H1-55B30CB-**** Z(-S)	0.55	1.75	6.13	3.8	15	
MS1H1-75B30CB-****Z(-S)	0.75	2.39	8.4	4.8	19	
MS1H4 (Vn = 3000 RPM, Vmax = 6000 RPM)						
MS1H4-40B30CB-****Z-S	0.4	1.27	4.5	2.8	10.8	
MS1H4-75B30CB-****Z-S	0.75	2.39	8.4	4.8	19	

Model	Rated Speed (RPM)	Max. Speed (RPM)	Torque Para. (N∙m/Arms)	Rotor Inertia (10-4kg m²)	Voltage (V)
N	1S1H1 (Vn = 3	000 RPM, Vm	ax = 6000 RPM)		
MS1H1-05B30CB-****Z-S			0.149	0.026 (0.028) ^[2]	
MS1H1-10B30CB-****Z-S		6000	0.26	0.041 (0.043) ^[2]	
MS1H1-20B30CB-****Z-S	3000		0.46	0.207 (0.220) ^[2]	220
MS1H1-40B30CB-****Z-S			0.51	0.376 (0.390) ^[2]	
MS1H1-55B30CB-**** Z-S			0.48	1.06	
MS1H1-75B30CB-****Z-S			0.53	1.38 $(1.43)^{[2]}$	
Ν	1S1H4 (Vn = 3	000 RPM, Vm	ax = 6000 RPM)		
MS1H4-40B30CB-****Z-S	3000	6000 -	0.51	0.657 (0.667) ^[2]	220
MS1H4-75B30CB-****Z-S	3000		0.53	2 (2.012) ^[2]	220

[1] The motor with oil sealing must be derated by 20% during use.

[2] Values inside the brackets "()" are for the motor with brake.

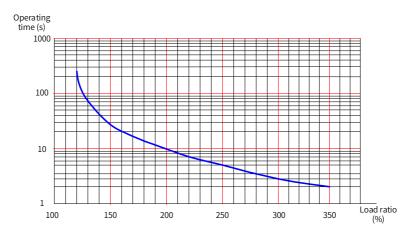


- The items and torque/speed characteristic values listed in the preceding table are obtained in cases where the motor is working with Inovance servo drives and the armature coil temperature is 20° C.
- The characteristic parameter values in preceding table are obtained in cases where the motor is installed with the following heatsink: MS1H1/MS1H4: 250 x 250 x 6 mm (aluminum)

1.3. 4 Motor Overload Characteristics

Load Ratio (%)	Operating Time (s)
120	230
130	80
140	40
150	30
160	20
170	17
180	15
190	12
200	10
210	8.5

Load Ratio (%)	Operating Time (s)
220	7
230	6
240	5.5
250	5
300	3
350	2

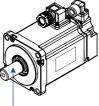


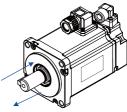


The maximum torque

The maximum torque of models H1 and H4 is 3.5 times the rated torque.

1.3.5 Allowable Radial and Axial Loads of the Motor





Axial load direction A

Radial load direction P

Axial load direction B

Figure 1-8 Radial and axial loads of the motor

Motor Model	Allowable Radial Load (N)	Allowable Axial Load (N)	
MS1H1-05B30CB-****Z-S	78	54	
MS1H1-10B30CB-****Z-S	78	54	

Motor Model	Allowable Radial Load (N)	Allowable Axial Load (N)
MS1H1-20B30CB-****Z-S	245	74
MS1H1-40B30CB-****Z-S	245	74
MS1H1-55B30CB-****Z-S	392	147
MS1H1-75B30CB-****Z-S	392	147
MS1H4-40B30CB-****Z-S	245	74
MS1H4-75B30CB-****Z-S	392	147

1.3.6 Electrical Specifications of the Motor with Brake

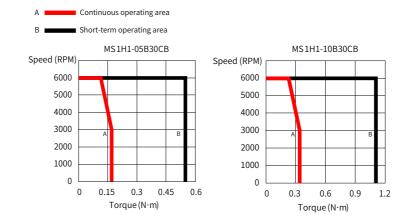
Motor Model	Holding Torque (N·m)	Supplied Voltage (VDC)±10%	Resistance at 20°C (Ω)±10%	Supply Current Range at 20°C (A)±10%	Release Time (ms)	Close Time (ms)
MS1H1-05B/10B	0.3	24	94.4	0.254	≤20	≤ 35
MS1H1-20B/40B	1.5	24	75.79	0.3	≤20	≤ 35
MS1H1-75B	2.5	24	72	0.333	≤20	≤ 60
MS1H4-40B	1.5	24	75.79	0.3	≤20	≤ 50
MS1H4-75B	2.5	24	72	0.333	≤20	≤ 60

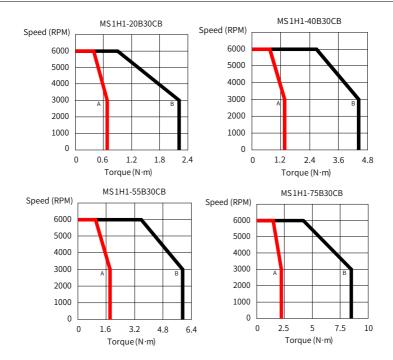


- The brake cannot share the same power supply with other electrical devices. This is to prevent malfunction of the brake due to voltage or current drop caused by other working devices.
- ▶ It is recommended to use cables of 0.5 mm² and above.

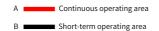
1.3.7 Motor Torque-Speed Characteristics

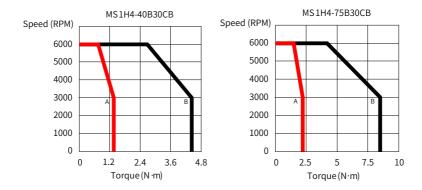
a) MS1H1 (low inertia, small capacity)





b) MS1H4 (medium inertia, small capacity)





1.4 Servo System Configuration Specifications

Rated Speed	Max. Speed	Capacity	Servo Motor Model MS1H		Motor Frame Size	Drive Unit Model SV820N** 🗆 🗆 🗆
		50 W		05B30CB	40	2C, 1C
		100 W	H1 (low inertia, small capacity)	10B30CB	40	2C, 1C
		200 W		20B30CB	60	2C, 1C
		400 W		40B30CB	60	2C, 1C
3000 RPM		550 W		55B30CB	80	2D, 1D
RPM	RPM	750 W		75B30CB	80	2D, 1D
		400 W	H4	40B30CB	60	2C, 1C
	750 W	(medium inertia, small capacity)	75B30CB	80	2D, 1D	

1.5 Regenerative Resistor Specifications

Servo Drive Model			Min. Allowable Resistance (Ω)	Max. Braking Energy Absorbed by the Capacitor (J)
olingie pliase,			40	31
Three-phase 220 V	SV820*2S****	Power supply unit of 2 kW	40	47

1.6 Cables

Table 1-1 Cables for terminal-type (Z) motors with front cable outlet

Cable Name	Cable Model	Cable Length (m)	Outline Drawing of the Cable	
Main circuit	S6-L-M107-3.0	3.0	→ 55±5 mm	
cable (without	S6-L-M107-5.0	5.0		
brake)	S6-L-M107-10.0	10.0	L± 30 mm	
Main circuit	S6-L-B107-3.0	3.0	0 8.0 x30mm	
cable (with	S6-L-B107-5.0	5.0		
brake)	S6-L-B107-10.0	10.0	■L±30 mm	
Absolute	S6-L-P124-3.0	3.0		
encoder	S6-L-P124-5.0	5.0		
cable	S6-L-P124-10.0	10.0	A	

Cable Name	Cable Model	Cable Length (m)	Outline Drawing of the Cable
Incremental	S6-L-P114-3.0	3.0	
encoder	S6-L-P114-3.0	5.0	
cable	S6-L-P114-3.0	10.0	A L±30 mmB

Table 1-2 Cables for terminal-type (Z) motors with rear cable outlet

Cable Name	Cable Model	Cable Length (m)	Outline Drawing of the Cable
Main circuit	S6-L-M108-3.0	3.0	-+-+- 55±5 mm
cable (without	S6-L-M108-5.0	5.0	
brake)	S6-L-M108-10.0	10.0	L±30 mm
Main circuit	S6-L-B108-3.0	3.0	55±5mm
cable (with	S6-L-B108-5.0	5.0	
brake)	S6-L-B108-10.0	10.0	L±30 mm - 200±10 mm -
Absolute	S6-L-P125-3.0	3.0	
encoder	S6-L-P125-5.0	5.0	
cable	S6-L-P125-10.0	10.0	
Incremental	S6-L-P115-3.0	3.0	
encoder	S6-L-P115-3.0	5.0	
cable	S6-L-P115-3.0	10.0	L±30 mm

Table 1-3 Swinging-type motor cable

Cable Name	Cable Model	Cable Length (m)	Outline Drawing of the Cable		
Main circuit	S6-L-M100-3.0	3.0			
cable	S6-L-M100-5.0	5.0			
(without brake)	S6-L-M100-10.0	10.0			
Main circuit	S6-L-B100-3.0	3.0	~		
cable (with	S6-L-B100-5.0	5.0			
brake)	S6-L-B100-10.0	10.0			
Absolute	S6-L-P120-3.0	3.0			
encoder	S6-L-P120-5.0	5.0			
cable	S6-L-P120-10.0	10.0			
Incremental	S6-L-P110-3.0	3.0			
encoder	S6-L-P110-5.0	5.0			
cable	S6-L-P110-10.0	10.0			

1.7 Connector Kit

Item	Connector Kit		
I/O connecting port - CN1	S6-C8 (DB44 connector kit for cable sets of the servo drive)		
Battery kit for absolute encoder	SV82-C4 (connector kit for battery box of the servo drive)		
Swinging-type (Z-S) motor connector	S6-C26 (1394 port connector for encoder, 6-pin connecting terminal for motor power cable/9-pin connecting terminal for encoder cable)		
Cable for parallel EtherCAT communication	S6-L-T04-0.3 (length: 0.3 m, 0.5 m, 1 m, 2 m, 3 m, 5 m, and 10 m) Consult with the cable supplier for customized cable length.		

1.8 System Configuration

■ Configuration of the servo drive

Rated current

Model	Width	Input Current	Output Power	Number of Axes	Single-axis Output Current	Single-axis Max. Current
SV820N2S2C2C	120 mm	4.6 A	1 kW	4	2.8 A	10.1 A

2 Installation Instructions

2.1 Installation of the Servo Drive

2.1.1 Installation Environment

1 Installation location

- Install the servo drive inside a cabinet free from sunlight and rain.
- Install the servo drive in a place that meets the following requirements:
 a) Free from corrosive or inflammable gases and combustible objects, such as hydrogen sulfide, chlorine, anmonia, sulphur gas, chloridize gas, acid, soda and salt
 b) Free from high temperature, humidity, dusts, and metal powders
 c) Free from vibration
- Pollution degree of the installation location: PD2

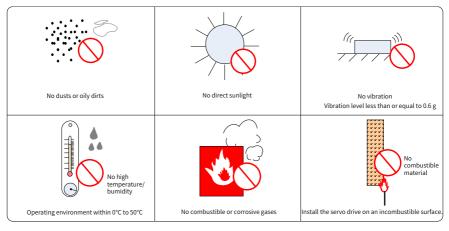


Figure 2-1 Installation Environment

2 Environment conditions

Item	Description			
Ambient temperature	0°C to 55°C (average load ratio not exceeding 80% in an ambient temperature of 40°C to 55°C) (non-freezing)			
Ambient humidity	Below 90% RH (without condensation)			
Storage temperature	–20° C to +85° C (non-freezing)			
Storage humidity	Below 90% RH (without condensation)			
Vibration	Below 4.9 m/s ²			
Shock	Below 19.6 m/s ²			
IP rating	IP20 (except the connecting terminals)			
Altitude	Below 1000 m			

2.1.2 Installation Dimensions and Clearances

1 Dimension drawing (unit: mm)

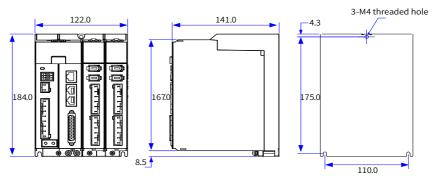


Figure 2-2 Product dimensions

2 Installation clearance (unit: mm)

The servo drive can be installed side by side (with a clearance of at least 2 mm) in one row or two rows, as shown in the following figure. The required minimum clearance between servo drives must be reserved during dual-row installation.

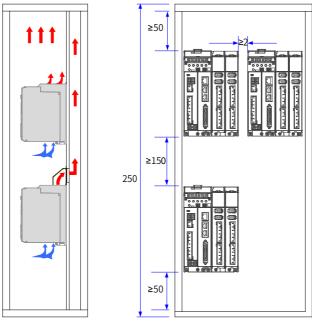


Figure 2-3 Dual-row installation clearance

A multi-axis system requires servo drives to be lined up along the top.

To ensure good heat dissipation and cooling effect, leave enough installation clearance as required by the following figure .

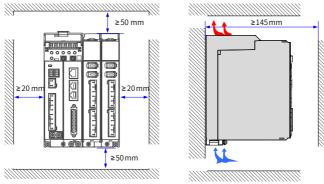


Figure 2-4 Installation clearance

Installation direction: The servo drive must be installed vertically.

2.1.3 Installation Method

The servo drive supports backplate mounting. Use M4 screws to fix the servo drive to the mounting surface through the three mounting holes on the servo drive.

1 Installation method

Mark the position of the threaded holes for installation and drill a screw hole in the base plate for each retaining screw.

The servo drive must be installed on the base plate vertically.

The installation diagram is shown in the following figure.

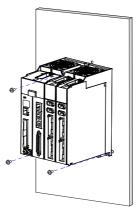


Figure 2-5 Backplate mounting

Recommended installation torque (N · m)

When fixing the servo drive with M4 screws, the recommended torque is 1.2 N · M.

Item	M3	M4	M5	M6	M8	M10	M12
Electrical connection	0.55	1.2	2.8	6	13	25	50

2 Cooling

Ensure the servo drive is installed vertically to the wall. Cool the servo drive down through natural convection or a cooling fan.

As shown in Figure 2-4, leave sufficient space around the servo drive to allow cooling through natural convection or a fan. Install the cooling fan onto the top of the servo drive to avoid excessive temperature rise and maintain an even temperature inside the cabinet.

3 Grounding

The grounding terminal must be grounded properly. Failure to comply may result in electric shock or malfunction due to interference.

4 Routing

Route the cables downwards during wiring (as shown by the following figure). This is to prevent the liquid from flowing into the servo drive along the cable.

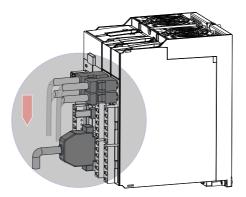


Figure 2-6 Routing direction

2.2 Installation of the Servo Motor

2.2.1 Installation Environment

1 Installation location

- Install the servo motor in a place free from corrosive and inflammable gases and combustible materials, such as the hydrogen sulfide, chlorine, anmonia, sulphur gas, chloridize gas, acid, soda, and salt.
- Use the servo motor with oil sealing when the motor is to be used in a place with grinding fluid, oil mists, iron powders or cuttings.
- Install the servo motor away from heating sources such as a heating stove.
- Do not use the servo motor in an enclosed environment. Working in an enclosed environment will lead to overheat of the servo motor and shorten its service life.
- To ensure proper installation and operation, prevent foreign objects and water from entering the terminals.

2 Environment conditions

Table 2-1 Installation environment

ltem	Description
Ambient temperature	0°C to 40°C (non-freezing)
Ambient humidity	20% to 90% RH (without condensation)
Storage temperature	–20°C to +60°C (maximum temperature: 72 hours at 80°C)
Storage humidity	20% to 90% RH (without condensation)
Vibration	Below 49 m/s ²
Shock	Below 490 m/s ²
IP rating	H1 and H4: IP67 (except the shaft opening and connecting terminals of motor connectors)
Altitude	Below 1000 m (derating required for altitude above 1000 m.)

2.2.2 Installation Precautions

Table 2-2	Installation	precautions
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Item	Description
Rust-proof measures	Wipe up the anti-rust agent applied at the motor shaft extension before installing the servo motor, and then take rust-proof measures.

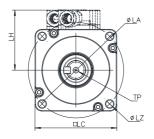
Item	Description
	• Do not strike the shaft extension during installation. Failure to
	comply will damage the encoder.
	• Use the screw hole at the shaft end when mounting a pulley to the
	servo motor shaft with a keyway. To fit the pulley, insert a double-
	end screw into the screw hole of the shaft, put a washer on the
Encoder	coupling end, and then use a nut to push the pulley in.
LICOUEI	 For the motor shaft with a keyway, use the screw hole at the shaft end for installation. For the motor shaft without a keyway, use friction coupling or similar methods.
	♦ When removing the pulley, use a pulley remover to protect the shaft
	against the strong shock from the load.
	 To ensure safety, install a protective cover or similar device on the
	rotary area such as the pulley mounted on the shaft.
	Screw Washer Flange coupling, pulley
	♦ When connecting the servo motor to a machine, use a coupling and
	keep the center of the motor shaft and the machine shaft in the
	same line. When installing the servo motor, make sure the required
	alignment accuracy shown in the following figure is fulfilled. Failure
	to comply will result in vibration that may damage the bearing and
Alignment	encoder.
Alignment	Measure the distance at four difference positions on the circumference. The difference between the maximum and minimum measurements must be less than 0.03 mm.
Installation direction	• The servo motor can be installed horizontally or vertically.

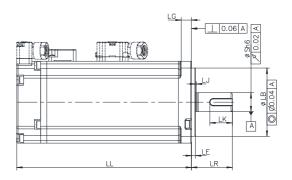
Item	Description					
Measures against oil and liquid	 Do not submerge the motor/cable in water or oil. Check the IP rating of the servo motor in places with water drops (except the shaft opening). Flange face Flange face Shaft opening Refers to the clearance of the shaft extension. Drive shaft Install the motor with its connecting terminals facing downwards (as shown in the following figure) when the motor is to be used in a place with liquid. This is to prevent the liquid from flowing into the motor body along the cable. 					
	 In environments where the shaft opening is exposed to oil drops, use a servo motor with oil sealing. Observe the following requirements when using a servo motor with oil sealing: a) Make sure the oil level is lower than the oil sealing lip during use. b) Prevent oil accumulation on the oil sealing lip when the motor is installed vertically upward. 					
Stress of cables	 Do not bend or apply tension to cables especially the signal cable whose conductor is only 0.2 mm or 0.3 mm in thickness. Do not pull the cables too tight during wiring. 					

Item	Description
Connectors	 Observe the following precautions when connecting the connector: When connecting the connector, make sure there is no foreign matter such as waste or sheet metal inside the connector.
	 Connect the connector to the main circuit side of the servo motor first, and ensure the grounding cable of the main circuit is connected properly. If the connector is connected to the encoder cable side first, the encoder may become faulty due to the potential difference between PEs.
	 Ensure the pins are correctly arranged during wiring.
	 The connectors are made up of resins. Do not strike the connector to prevent damage to the connector.
	When moving the servo motor whose cables are already connected, grasp the servo motor by its body instead of the cables. Failure to comply may damage the connector or break the cables.
	 If flexible cables are used, do not apply stress on cables during wiring. Failure to comply may damage the connector.

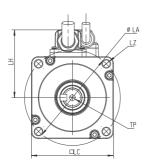
2.3 Dimension Drawing of MS1H1 Series Servo Motors

■ Terminal-type servo motor





Swinging-type servo motor



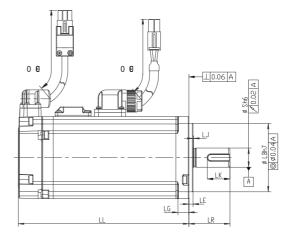






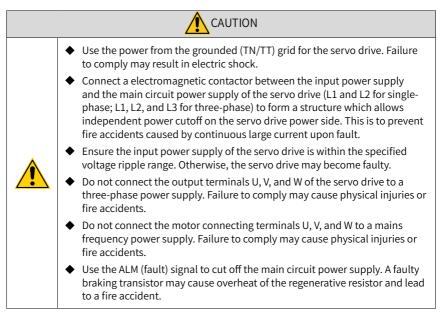
Diagram of shaft end

Diagram of shaft end with key

Motor Type	LL	LC	LR	LA	LZ	LH	LG	LE	LJ
MS1H1-05B30CB-A330Z(-S)	65	40	25±0.5	46	2-ф4.5	34	5	2.5±0.5	0.5±0.35
MS1H1-05B30CB-A332Z(-S)	96	40	25±0.5	46	2-ф4.5	34	5	2.5±0.5	0.5±0.35
MS1H1-10B30CB-A330Z(-S)	77.5	40	25±0.5	46	2-ф4.5	34	5	2.5±0.5	0.5±0.35
MS1H1-10B30CB-A332Z(-S)	109	40	25±0.5	46	2-ф4.5	34	5	2.5±0.5	0.5±0.35
MS1H1-20B30CB-A331Z(-S)	72.5	60	30±0.5	70	4-φ5.5	44	7.5	3±0.5	0.5±0.35
MS1H1-20B30CB-A334Z(-S)	100	60	30±0.5	70	4-φ5.5	44	7.5	3±0.5	0.5±0.35
MS1H1-40B30CB-A331Z(-S)	91	60	30±0.5	70	4-φ5.5	44	7.5	3±0.5	0.5±0.35
MS1H1-40B30CB-A334Z(-S)	119	60	30±0.5	70	4-φ5.5	44	7.5	3±0.5	0.5±0.35
MS1H4-40B30CB-A331Z(-S)	105	60	30±0.5	70	4-φ5.5	44	7.5	3±0.5	0.5±0.35
MS1H4-40B30CB-A334Z(-S)	128	60	30±0.5	70	4-φ5.5	44	7.5	3±0.5	0.5±0.35
MS1H1-55B30CB-A331Z(-S)	96.2	80	35±0.5	90	4-φ7	54	7.7	3±0.5	0.5±0.35
MS1H1-75B30CB-A331Z(-S)	107	80	35±0.5	90	4-φ7	54	7.7	3±0.5	0.5±0.35

Motor Type	LL	LC	LR	LA	LZ		LH	LG	LE	LJ
MS1H1-75B30CB-A334Z(-S)	140	80	35±0.5	90	4-φ	7	54	7.7	3±0.5	0.5±0.35
MS1H1-10C30CB-A331Z(-S)	118.2	80	35±0.5	90	4-φ	7	54	7.7	3±0.5	0.5±0.35
MS1H4-75B30CB-A331Z(-S)	118.5	80	35±0.5	90	4-φ	7	54	7.7	3±0.5	0.5±0.35
MS1H4-75B30CB-A334Z(-S)	148	80	35±0.5	90	4-φ ⁻	7	54	7.7	3±0.5	0.5±0.35
Motor Type	S	LB	TP	LK	КН		KW	W	т	Weight (kg)
MS1H1-05B30CB-A330Z(-S)	8	30	M3 x 6	15.5		0 0.1	3	3	3	/
MS1H1-05B30CB-A332Z(-S)	8	30	M3 x 6	15.5		0 0.1	3	3	3	/
MS1H1-10B30CB-A330Z(-S)	8	30	M3 x 6	15.5		0 0.1	3	3	3	/
MS1H1-10B30CB-A332Z(-S)	8	30	M3 x 6	15.5		0 0.1	3	3	3	/
MS1H1-20B30CB-A331Z(-S)	14	50	M5 x 8	16.5	11 ₋₀		5	5	5	/
MS1H1-20B30CB-A334Z(-S)	14	50	M5 x 8	16.5	11 ⁰		5	5	5	/
MS1H1-40B30CB-A331Z(-S)	14	50	M5 x 8	16.5	11 ⁰		5	5	5	/
MS1H1-40B30CB-A334Z(-S)	14	50	M5 x 8	16.5	11 -C)).1	5	5	5	/
MS1H4-40B30CB-A331Z(-S)	14	50	M5 x 8	16.5	11 ₋₀		5	5	5	/
MS1H4-40B30CB-A334Z(-S)	14	50	M5 x 8	16.5	11 ⁰		5	5	5	/
MS1H1-55B30CB-A331Z(-S)	19	70	M6 x 20	25		0 -0.1	6	6	6	/
MS1H1-75B30CB-A331Z(-S)	19	70	M6 x 20	25		0 -0.1	6	6	6	/
MS1H1-75B30CB-A334Z(-S)	19	70	M6 x 20	25		0 -0.1	6	6	6	/
MS1H1-10C30CB-A331Z(-S)	19	70	M6 x 20	25		0 -0.1	6	6	6	/
MS1H4-75B30CB-A331Z(-S)	19	70	M6 x 20	25		0 -0.1	6	6	6	/
MS1H4-75B30CB-A334Z(-S)	19	70	M6 x 20	25		0 -0.1	6	6	6	/

3 Wiring





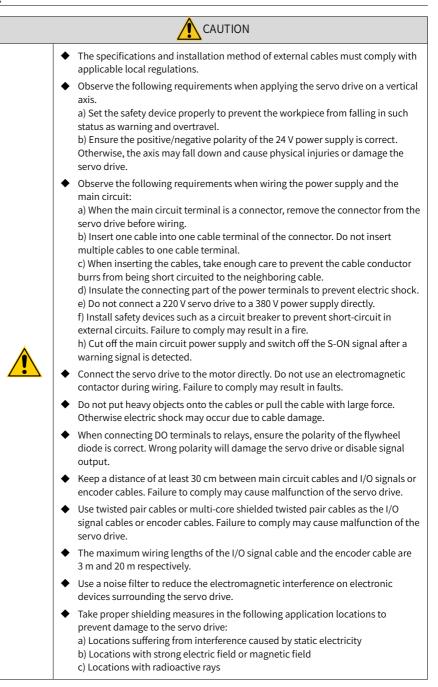


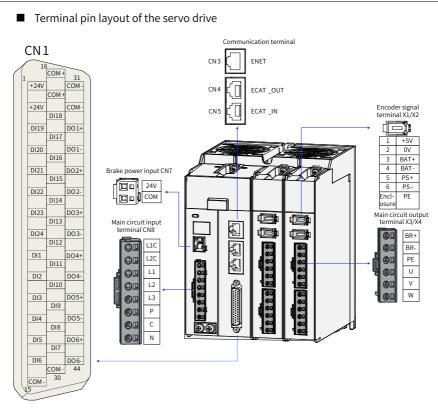
- Connect the PE terminal of the servo drive to the PE terminal of the control cabinet. Failure to comply may cause electric shock.
- Ensure the entire system is grounded. Otherwise, malfunction may occur to the servo drive.





Residual voltage is still present in the internal capacitor after power off, allow for an interval of 15 min before any further operation.







The preceding figure shows the terminal pin layout of the servo drive.

3.1 Wiring of the Servo Drive Main Circuit

3.1.1 Introduction to Main Circuit Terminals

■ Main circuit input terminals of the servo drive



Figure 3-2 Position and layout of main circuit terminals

Terminal Symbol	Terminal Name	Function
L1, L2, L3	Main circuit power input terminals	Single-phase/Three-phase 220 V power input of the main circuit (L1 and L2 used for single-phase input; L1, L2, and L3 used for three-phase input)
L1C, L2C	Control power input terminals	220 VAC power input of the control circuit
P, C	Terminals for connecting external regenerative resistor	When the large-inertia load needs braking for emergency stop, connect an external regenerative resistor between P and C. The external regenerative resistor needs to be purchased separately.
P, N	Common DC bus terminals	Used for common DC bus connection when multiple servo drives are connected in parallel.
PE	Grounding terminal	Two PEs connected respectively to the grounding terminals of the power supply and the servo motor

Table 3-1 Names and functions of main circuit terminals

3.1.2 Wiring Example of the Regenerative Resistor

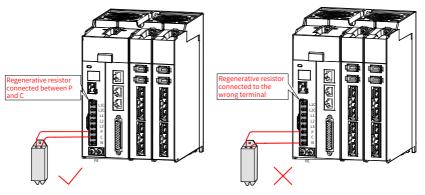


Figure 3-3 Connection of the external regenerative resistor

Observe the following precautions when connecting the external regenerative resistor:

1) Do not connect the external regenerative resistor to the positive pole (P) and negative pole (N) of the bus. Failure to comply will damage the servo drive or cause a fire.

2) Do not select any resistor lower than the minimum allowed resistance. Failure to comply will result in Er.201 (Hardware overcurrent) or damage the servo drive.

3) Before using the servo drive, ensure parameters related to the regenerative resistor (2002-1Ah, 2002-1Bh and 2002-1Ch) are set properly.

4) Install the regenerative resistor on an incombustible object such as metal.

3.1.3 Recommended Models and Specifications of Main Circuit Cables

The following figure shows the connectors of main circuit cables. These connectors will be delivered along with servo drive.

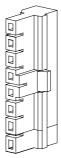


Figure 3-4 Outline drawing of the connector

Table 3-2 Recommended cables and models for the main circuit

	ive Model nase 220 V	Rated Input Current	Recommended Input Power Cable		Rated Output Current	Recommended Output Power Cable		Recommended Grounding Cable	
		(A)	mm ²	AWG	(A)	mm ²	AWG	mm ²	AWG
SV820N	2S2C2C	4.6	2x0.5	20	2.80	2x0.5	20	0.50	20

For requirements on other main circuit cables, see <u>"3.1.5 Precautions for Main Circuit</u> <u>Wiring</u>".

Use the cables listed in the following table for the main circuit.

	Cable Type	Allowable Temperature (°C)
Model	Name	Allowable Temperature (°C)
PVC	General PVC cable	-
IV	PVC cable with rated voltage of 600 V	60
HIV	PVC cable with special heat-resistance capacity	75

Table 3-3 Recommended main circuit cables

For three-cable applications, the relation between the AWG specification and the allowable current is shown in the following table. Note that the values listed in the table cannot be exceeded during use.

AWG Specification	Nominal Cross Sectional Area (mm ²)	Allowable Current at Different Ambient Temperatures (A)				
Specification	Area (IIIIII)	30°C	40°C	50°C		
20	0.519	8	7	6		

Table 3-4 Specifications of three-cable applications

AWG Specification	Nominal Cross Sectional Area (mm ²)	Allowable Current at Different Ambient Temperatures (A)				
	Area (mm ⁻)	30°C	40°C	50°C		
19	0.653	9	8	7		
18	0.823	13	11	9		

3.1.4 Wiring Example of the Power Supply

■ Single-phase 220 V model: SV820N2S2C2C

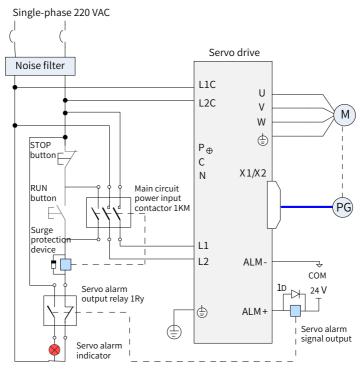


Figure 3-5 Wiring of the main circuit of single-phase 220 V models

• 1KM: Electromagnetic contactor; 1Ry: Relay; 1D: Flywheel diode



The DO is set as alarm output (ALM+/-). When the servo drive alarms, the power supply is cut off automatically. SV820N series servo drives are not configured with built-in regenerative resistors, connect an external regenerative resistor between P and C as needed. ■ Three-phase 220 V model: SV820N2S2C2C

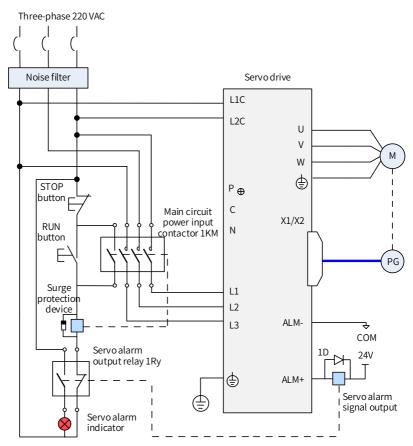


Figure 3-6 Main circuit wiring of three-phase 220 V models



- 1KM: Electromagnetic contactor; 1Ry: Relay; 1D: Flywheel diode
- The DO is set as alarm output (ALM+/-). When the servo drive alarms, the power supply will be cut off automatically and the alarm indicator lights up.

3.1.5 Precautions for Main Circuit Wiring

1) Do not connect the input power cables to the output terminals U, V and W. Failure to comply will damage the servo drive.

2) When cables are bundled in a duct, take current reduction ratio into consideration because of the poor cooling condition.

3) When the temperature inside the cabinet is higher than the temperature limit of the

cable, it is recommended to use a Teflon cable with a larger temperature limit. As the surface of regular cables may be easily hardened and cracked under a low temperature, take thermal insulation measures for cables laid in a low-temperature environment.

4) The bending radius of a cable must be 10 times longer than its outer diameter to prevent the internal conductor from breaking due to long-time bending.

5) Select and use cables with a rated voltage above 600 VAC and rated temperature above 75° C. Under 30° C ambient temperature and normal cooling conditions, the allowable current density of the cable cannot exceed 8 A/mm² when the total current is below 50 A, or 5 A/mm² when the total current is above 50 A. The allowable current value can be adjusted in the case of high ambient temperature or bundled cables. You can calculate the allowable current density (A/mm²) by using the following formula:

Allowable current density = 8 x Reduction coefficient of the current-carrying density of the conductor x Current correction coefficient



Number of Cables in the Duct	Current Reduction Coefficient
Less than 3	0.7
4	0.63
5–6	0.56
7–15	0.49

6) Do not connect the regenerative resistor between DC bus terminals P and N. Failure to comply may cause a fire.

7) Route the power cables and signal cables through different routes at an interval of at least 30 cm to prevent interference.

8) High voltage may be still present in the servo drive even if the power supply is cut off. Do not touch the power terminals within 5 minutes after power-off.

9) Do not turn on/off the power supply frequently. If frequent ON/OFF is needed, make sure the time interval is at least one minute. The capacitor in the main circuit of the servo drive will be charged with a large current for 0.2s upon power on. Turning on/ off the power supply frequently will deteriorate the performance of the main circuit components inside the servo drive.

10) Use a grounding cable with the same cross sectional area as the main circuit cable in general cases, but if the cross sectional area of the main circuit cable is less than 1.6 mm², use a grounding cable with a cross sectional area of 2.0 mm².

11) Ground the servo drive properly.

12) Do not power on the servo drive if any cable becomes loose. Otherwise, a fire accident may occur.

3.1.6 Specifications of Peripheral Parts of the Main Circuit

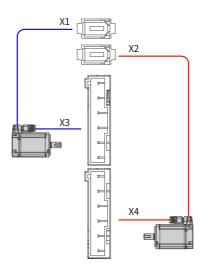
Recommended circuit breaker and electromagnetic contactor

Table 3-5 Recommended models of the circuit breaker and electromagnetic contactor

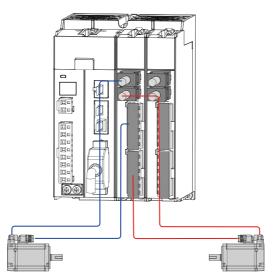
Main Circuit Power Supply	Sonia Driva Madal		ended Circuit eaker	Recommended Contactor		
	Servo Drive Model	Current (A)	Schneider Model	Current (A)	Schneider Model	
Single-phase/ Three-phase 220 V	SV820N1S**** SV820N2S****	6	OSMC32N3C6	9	LC1 D09	

3.2 Connection Between the Servo Drive and Servo Motor

A complete servo drive consists of two drive units with each drive unit supporting two motors. When connecting motors to the drive unit, pay attention to the terminal silkscreen on the drive unit and use correct terminals for wiring (X1 matches X3, and X2 matches X4).



Actual connection diagram



3.3 Power Cable Connections Between Servo Drive and Motor

3.3.1 Power Cable Connections for the Motor with Brake

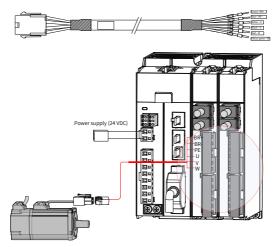


Figure 3-7 Example of the wiring between the servo drive and the motor with brake

Outline Drawing of the Connector	Terminal Pin Layout	Applicable Motor Frame ^[1]
	Black 6-pin connector	40 (Z series) 60 (Z series) 80 (Z series)

Table 3-6 Connectors of power cables on the servo motor side

[1] Motor frame refers to the width of the mounting flange.

Power cable colors are subject to the actual product. The cable colors mentioned in this user guide refer to Inovance cables.

3.3.2 Power Cable Connections for the Motor Without Brake

When the motor without brake is connected to the servo drive, the two brake signal terminals (BR+ and BR-) can be left unconnected, as shown in the following figure.

Other connections are the same as the connection of the motor with brake. See <u>"3.3.1</u> <u>Power Cable Connections for the Motor with Brake"</u> for details.

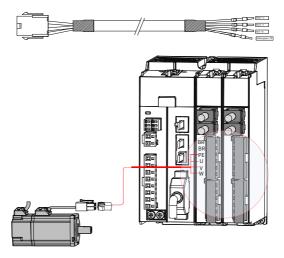


Figure 3-8 Example of the wiring between the servo drive and the motor without brake

3.4 Encoder Cable Connection

3.4.1 Connection of Serial Incremental Encoder

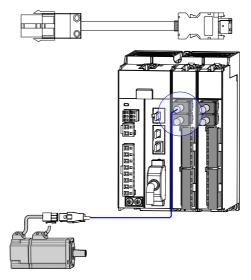


Figure 3-9 Wiring example of encoder signals

The encoder cable colors are subject to the actual product. The cable colors mentioned in this user guide refer to Inovance cables.

Outline Drawing of the Connector	Terminal Pin Layout		
	Pin No.	Signal Name	
	1	+5V	
Viewed from	2	OV	
this side	3	Reserved	
	4	Reserved	
	5	PS+	
	6	PS-	
	Enclosure	PE	
Recommendation: Connector at cable side: Sunchu, IEEE 1 solder type, provided with an enclosure		ble side: Sunchu, IEEE 1394 (6-pin,	

Table 3-7 Connector of 20-bit encoder cables on the servo drive side

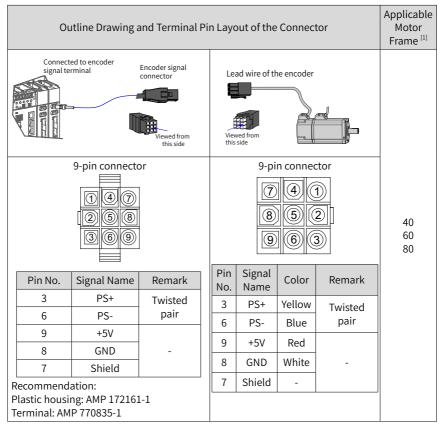


Table 3-8 Connector of 20-bit encoder cables (9-pin connector)

[1] Motor frame refers to the width of the mounting flange.

Table 3-9 Pin connection relation of 20-bit encoder cables

DB9 on the Servo Drive			Motor Side	
Side		Description	9-pin	20-29 Aviation Plug
Signal Name	Pin No.		Pin No.	Pin No.
PS+	5	Serial communication signal (+)	3	А
PS-	6	Serial communication signal (-)	6	В
+5V	1	Encoder +5 V power supply	9	G
GND	2	Encoder +5 V power ground	8	Н
PE	Enclosure	Shield	7	J

Observe the following precautions when wiring the encoder signals:

- 1) Ground the shield of the servo drive and servo motor properly. Failure to comply will result in a false warning.
- 2) Do not connect cables to the "reserved" terminals.
- 3) When determining the length of the encoder cable, take the voltage drop caused by cable resistance and the signal attenuation caused by distributed capacitance into consideration. It is recommended to use shielded twisted pair cables within 10 m. Such cables must be 26AWG or above and comply with UL2464 standard.
- 4) 22AWG to 26AWG cables are recommended for 10B, 20B, 40B, and 75B series motors, and the matching terminal is AMP170359-1. The following table lists diameters for cables of or above 10 m.

Cable Diameter	Ω/km	Allowable Cable Length (m)
26AWG (0.13 mm ²)	143	10.0
25AWG (0.15 mm ²)	89.4	16.0
24AWG (0.21 mm ²)	79.6	18.0
23AWG (0.26 mm ²)	68.5	20.9
22AWG (0.32 mm ²)	54.3	26.4

Figure 3-10 Recommended cables

If the cables above 22AWG are required, contact the sales personnel of Inovance.

3.4.2 Connection of Absolute Encoder Cables

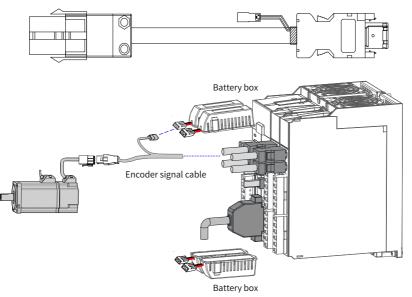


Figure 3-11 Wiring example of absolute encoder signals and the battery box

1 Description of the lead wire color of the battery box

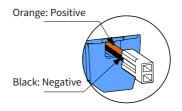


Figure 3-12 Description of the lead wire color of the battery box



Store the battery under required ambient temperature and ensure reliable contact and sufficient electricity. Failure to comply may cause encoder information loss.

2 Specification of absolute encoder cables

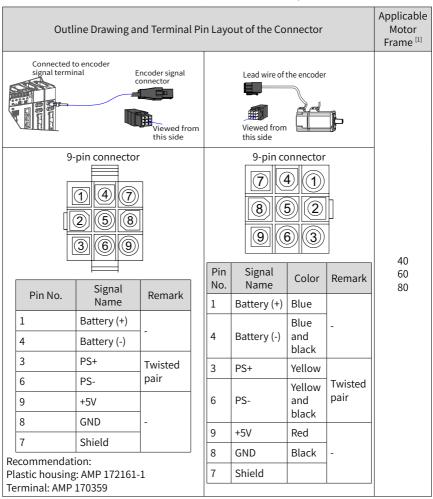


Table 3-10 Connector of 20-bit encoder cables (9-pin connector)

[1] Motor frame refers to the width of the mounting flange.

3 Installation of the absolute encoder battery box

■ The SV82-C4 battery box (optional) contains the following items:

One plastic box

One battery (3.6 V, 2,600 mAh)

Terminal block and crimping terminal

Installing the battery box

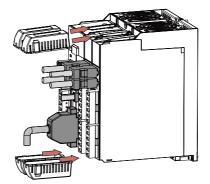


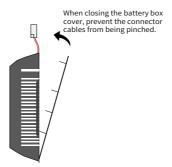
Figure 3-13 Installation of the absolute encoder battery box

Insert the battery box into the corresponding slot in the servo drive. Ensure the battery is inserted securely, without the risk of falling.

Removing the battery box

The battery is exposed to the risk of liquid leakage after a long-time operation. It is recommended to replace the battery every two years. Remove the battery box in steps in reverse to those in the preceding figure.

When closing the battery box cover, prevent the connector cables from being pinched.



Note: Improper use of the battery may result in liquid leakage which corrodes the components or causes battery explosion. Observe the following precautions during use:

- a) Place the battery in the correct +/- polarity.
- b) Leaving a battery that has been used for a long time or is no longer useful inside the device can cause liquid leakage. The electrolyte inside the battery is corrosive and conductive, not only corroding surrounding components but also incurring the danger of short circuit. It is recommended to replace the battery every 2 years.
- c) Do not disassemble the battery because the internal electrolyte may spread out and cause physical injuries.
- d) Do not throw a battery into fire or heat up the battery. Failure to comply may result in an explosion.
- e) Do not short circuit the battery or strip off the battery tube. Prevent terminals (+) and
 (-) of the battery from coming into contact with the metal. Contact with the metal will incur a large current, not only weakening the battery power, but also giving rise to the danger of explosion due to overheating.
- f) This battery is not chargeable.
- g) Dispose of the battery according to local regulations.

4 Selection of the encoder battery

Select an appropriate battery according to the following table.

Dattan			Ratings		
Battery Specification	Item and Unit	Minimum Value	Typical Value	Maximum Value	Condition
	External battery voltage (V)	3.2	3.6	5	In standby mode ^[2]
	Circuit fault voltage (V)	-	2.6	-	In standby mode
Output: 3.6 V, 2500 mAh	Battery warning voltage (V)	2.85	3	3.15	
Recommended manufacturer and model: Shenzhen Jieshun, LS14500		-	2	-	During normal operation ^[1]
	Current consumed by the circuit (µA)	-	10	-	In standby mode, axis at standstill
		-	80	-	In standby mode, axis rotating
	Operation temperature (°C)	0	-	40	Same as that
	Storage temperature (°C)	-20	to	+60	required by the motor

Table 3-11 Description of absolute encoder battery

The preceding data is measured under an ambient temperature of 20°C .

- [1] During normal operation, the absolute encoder supports single-turn or multi-turn data counting and data transmitting/receiving. A well-connected encoder will, upon switch-on of the servo drive power supply, enter normal operation status and transmit/receive data after a delay of 5s. Switching from standby mode to normal operation mode upon power-on requires the motor to rotate at a speed less than 10 RPM. Otherwise, the servo drive may report E3.740 (Encoder interference). In this case, you need to power on the servo drive again.
- [2] Standby mode means the servo drive is not powered on and the absolute encoder can perform multi-turn counting by utilizing external battery power. In this case, the data transmitting/ receiving stops.

5 Design life of the battery

The following calculation only covers the current consumed by the encoder.

Suppose that the servo drive works normally for T1 in a day, the motor rotates for T2 after the servo drive is powered off, and the motor stops rotating for T3 after power off [unit: hour (h)]

Example:

Item	Working Time 1	Working Time 2
Days of working in different operation conditions in 1 year (day)	313	52
T1 (h)	8	0
T2 (h)	0.1	0
T3 (h)	15.9	24

Table 3-12 Design life of an absolute encoder battery

- Capacity consumed in 1 year = (8 h x 2 μA + 0.1 h x 80 μA + 15.9 h x 10 μA) x 313 + (0 h x 2 μA + 0 h x 80 μA +24 h x 10 μA) x 52 ≈ 70 mAH
- Design life of the battery = Battery capacity/Capacity consumed in 1 year = 2600 mAH/70 mAH = 37.1 years

3.5 Wiring of Control Signal Terminal CN1 (DI/DO)

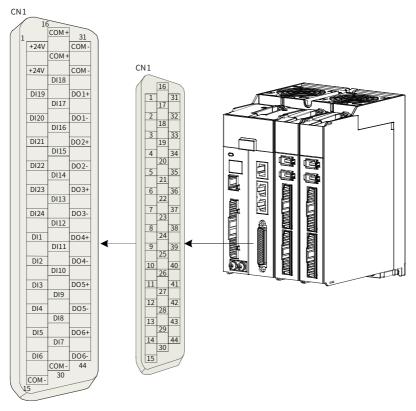


Figure 3-14 Pin layout of control circuit terminal connector

Plastic housing of the plug on cable side: DB25P (SZTDK), black Core: HDB44P male (SZTDK)

It is recommended to use cables of 24AWG to 26AWG.

Signal Name	Pin No.	Description	Signal Name	Pin No.	Description
DI1	9	High-speed DI signal 1	DO1+	33	DO signal 1 (positive)
DI2	10	High-speed DI signal 2	DO1-	34	DO signal 1 (negative)
DI3	11	High-speed DI signal 3	DO2+	35	DO signal 2 (positive)
DI4	12	High-speed DI signal 4	DO2-	36	DO signal 2 (negative)
DI5	13	High-speed DI signal 5	DO3+	37	DO signal 3 (positive)
DI6	14	High-speed DI signal 6	DO3-	38	DO signal 3 (negative)

Table 3-13 Description of DI/DO signals

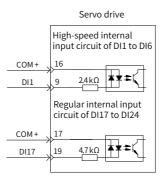
Signal Name	Pin No.	Description	Signal Name	Pin No.	Description
DI7	29	High-speed DI signal 7	DO4+	39	DO signal 4 (positive)
DI8	28	High-speed DI signal 8	DO4-	40	DO signal 4 (negative)
DI9	27	High-speed DI signal 9	DO5+	41	DO signal 5 (positive)
DI10	26	High-speed DI signal 10	DO5-	42	DO signal 5 (negative)
DI11	25	High-speed DI signal 11	DO6+	43	DO signal 6 (positive)
DI12	24	High-speed DI signal 12	DO6-	44	DO signal 6 (negative)
DI13	23	High-speed DI signal 13			
DI14	22	High-speed DI signal 14			
DI15	21	High-speed DI signal 15			
DI16	20	High-speed DI signal 16			
DI17	19	Regular DI signal 17			
DI18	18	Regular DI signal 18			
DI19	3	Regular DI signal 19			
DI20	4	Regular DI signal 20			
DI21	5	Regular DI signal 21			
DI22	6	Regular DI signal 22			
DI23	7	Regular DI signal 23			
DI24	8	Regular DI signal 24			

• DI1 to DI16 are high-speed DIs.

♦ DI17 to DI24 are regular DIs.

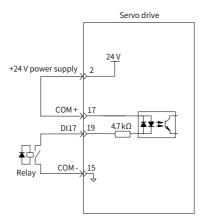
3.5.1 DI Circuits (DI17 as an example)

Circuits of DI1 to DI24 are the same. Resistance of the current-limiting resistor of DI1 to DI6 is 2.4 $k\Omega.$

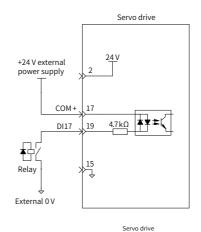


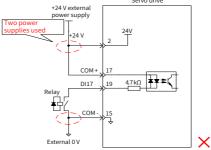
1 Case 1: The host controller provides relay output.

a) For use of an internal 24 V power supply of the servo drive



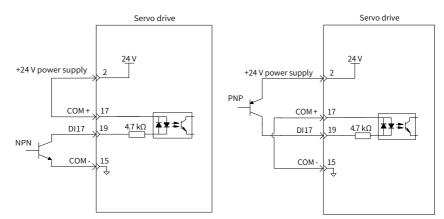
b) For use of an external power supply



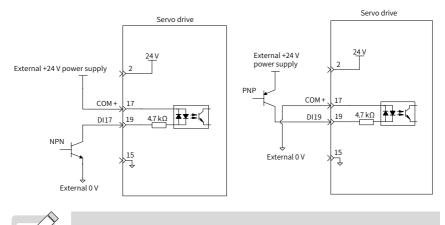


2 Case 2: The host controller provides open-collector output.

For use of an internal 24 V power supply of the servo drive a)



b) For use of an external power supply





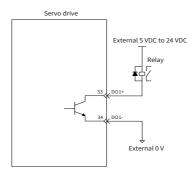
PNP and NPN input cannot be applied in the same circuit.

NOTE

3.5.2 DO Circuit (DO1 as an example)

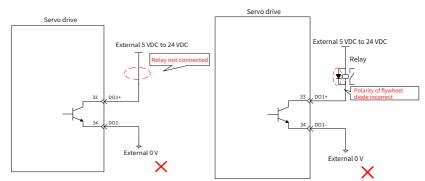
DO1 to DO6 circuits are the same.

1 Case 1: The host controller provides relay input.

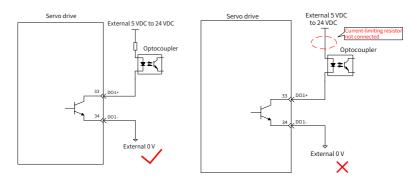




When the host controller provides relay input, a flywheel diode must be installed. Otherwise, the DO terminal may be damaged.



2 Case 2: The host controller provides optocoupler input.





The maximum allowable voltage and current of the optocoupler output circuit inside the servo drive are as follows: Maximum voltage: 30 VDC Maximum current: DC 50 mA

3.6 Wiring of Communication Signals (CN4/CN5)

3.6.1 Wiring Diagram

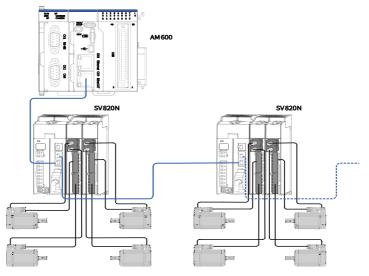


Figure 3-15 Networking topology

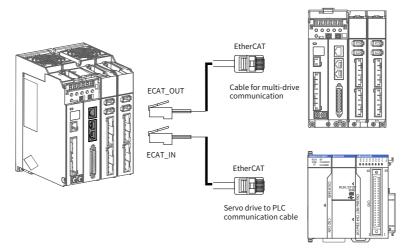


Figure 3-16 Wiring of communication signals

The communication signal connector (CN4 and CN5) is the EtherCAT port connector. CN5 (IN) is connected to the interface line of the master, and CN4 (OUT) is connected to the next slave device.

Pin No.	Signal Name	Description	Terminal Pin Layout
1	TX+	Data transmitting (+)	
2	TX-	Data transmitting (-)	
3	RX+	Data receiving (+)	
4	-	-	
5	-	-	5
6	RX-	Data receiving (-)	6
7	-	-	7
8	-	-	8
Enclosure	PE	Shield	

Table 3-14 Pin definition of communication signal connector

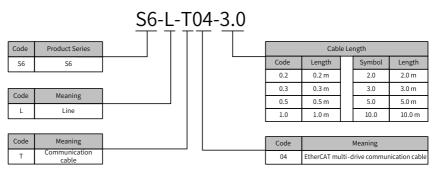
3.6.2 Selection of Communication Cables

Selection Principle

Cable Specification	Supplier
0.2 m to 10 m	Inovance
Above 10 m	Haituo (preferred)

■ Basic information of Inovance EtherCAT communication cables

Cable models are shown in the following figure.



The cable ordering information is shown in the following table.

Article Code	Cable Model	Length (m)
15040261	S6-L-T04-0.3	0.3
15040262	S6-L-T04-3.0	3.0
15041960	S6-L-T04-0.2	0.2

Article Code	Cable Model	Length (m)
15041961	S6-L-T04-0.5	0.5
15041962	S6-L-T04-1.0	1.0
15041963	S6-L-T04-2.0	2.0
15041964	S6-L-T04-5.0	5.0
15041965	S6-L-T04-10.0	10.0

Cables shorter than or equal to 10 m must be purchased from Inovance.

Cables longer than 10 m are preferred to be purchased from Haituo.

Specifications:

Item	Description	
UL certification	UL-compliant	
Cat 5e cable	Cat 5e cable	
Double shielded	Braided shield (coverage: 85%), aluminum foil shield (coverage: 100%)	
Environment adaptability	Ambient temperature: –30°C to +60°C , resistant to industrial oil, corrosive acid and alkali	
EMC test standard	GB/T 24808-2009	

3.7 Wiring of Software Tool Communication and Online Upgrade Signals (CN3)

Terminal layout of Ethernet (CN3)

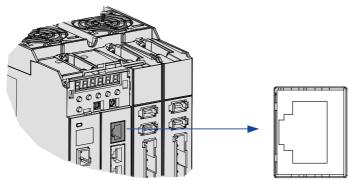


Figure 3-17 Ethernet connector terminal

The pin definition of CN3 (Ethernet connector terminal) is the same as that of CN4/CN5.

Pin No.	Signal Name	Description	Terminal Pin Layout
1	TX+	Data transmitting (+)	
2	TX-	Data transmitting (-)	
3	RX+	Data receiving (+)	2
4	-	-	3
5	-	-	4
6	RX-	Data receiving (-)	5
7	-	-	7
8	-	-	8
Enclosure	PE	Shield	<u>/</u> /

Table 3-15 Pin definition of communication signal connector



Communication cables are the same as the cables for multi-drive communication (S6-L-T04).

3.8 Anti-interference Measures for Electrical Wiring

Take the following measures to suppress interference:

1) Use shielded twisted pair cables less than 3 m for command input or less than 20 m for the encoder.

2) Use a thick cable (above 2.0 mm^2) as the grounding cable.

3) Class D or higher grounding class (grounding resistance below 100 Ω) is recommended.

4) Adopt single-point grounding.

5) Use a noise filter to prevent radio frequency interference. In domestic applications or applications with noise interference, install the noise filter on the input side of the power cable.

6) To prevent malfunction due to electromagnetic interference, take the following measures:

a) Install the host controller and noise filter near the servo drive.

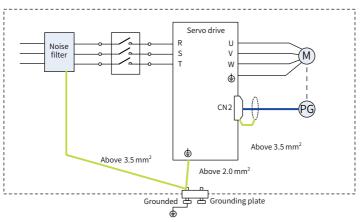
b) Install a surge protection device on the relay, solenoid and electromagnetic contactor coils.

c) The distance between a high-voltage cable and a low-voltage cable must be at least 30 cm. Do not put these cables in the same duct or bundle them together.

d) Do not share the same power supply with an electric welder or an electric discharge machining device. When the servo drive is placed near a high-frequency generator, install a noise filter on the input side of the power cable.

3.8.1 Anti-interference Wiring Example and Grounding

The servo drive uses high-speed switch elements in the main circuit. The noise of such switches may affect the normal operation of the system due to improper wiring or grounding. Therefore, the servo drive must be properly wired and grounded. A noise filter can be added if necessary.



1 Anti-interference wiring example

Figure 3-18 Anti-interference wiring example

- For the grounding cable connected to the enclosure, use a thick cable of at least 3.5 mm².
 Braided copper wires are recommended.
- If a noise filter is used, abide by the precautions described in <u>"3.8.2 Instructions for Use of the</u> <u>Noise Filter</u>".

2 Grounding

To prevent potential electromagnetic interference, perform grounding properly according to the following instructions.

■ Grounding the enclosure of the servo motor

Connect the grounding terminal of the servo motor to the PE terminal of the servo drive, and ground the PE terminal properly to reduce potential magnetic interference.

■ Grounding the shield of the encoder cable

Ground both ends of the shield of the motor encoder cable.

3.8.2 Instructions for Use of the Noise Filter

To prevent interference from power cables and reduce impact of the servo drive to other sensitive devices, install a noise filter on the input side of the power supply according to the magnitude of the input current. In addition, install a noise filter on the power cable of peripheral devices as needed. Abide by the following requirements when installing and wiring the noise filter.

- L1C | | L2C \square R S L1C S 120 R Т AC Noise filter рои AC Noise filter 7 Ъ JL2C L1C L1C L2C AC AC powe Noise Noise filter filter Ļ
- 1 Route the input and output cables of the noise filer through different routes.

Figure 3-19 Separate routing of I/O cables of the noise filter

2 Route the grounding cable and the output cable of the noise filter through different routes.

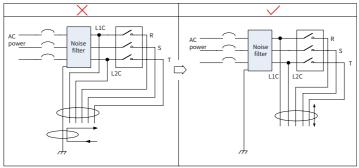


Figure 3-20 Separate routing of the grounding cable and output cable

3 Use a separate grounding cable as short and thick as possible for the noise filter. Do not share the same grounding cable with other grounding devices.

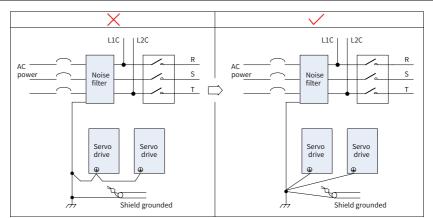


Figure 3-21 Single-point grounding

4 Ground the noise filter installed inside the control cabinet.

If the noise filter and the servo drive are installed in the same control cabinet, fix the noise filter and the servo drive to the same metal plate. Make sure the contact is conductive and ground the metal plate properly.

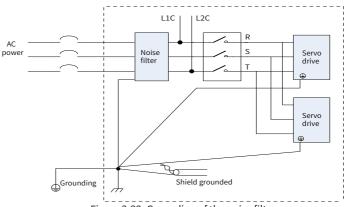


Figure 3-22 Grounding of the noise filter

3.9 Precautions for Use of Cables

1) Do not bend or apply tension to cables. The conductor of a signal cable is only 0.2 mm or 0.3 mm in thickness. Handle the cables carefully to prevent fracture.

2) In cases where cables need to be moved, use flexible cables because regular cables may be easily damaged after being bent for a long time. Cables of small-power servo motors do not fit for drag chains.

3) If a cable drag chain is used, make sure the following requirements are fulfilled:

a) The bending radius of the cable is at least 10 times longer than its outer diameter.

- b) Do not fix or bundle the cables inside the cable drag chain. The cables can be bundled and fixed only at the two fixed ends of the cable drag chain.
- c) Do not wind or twist the cables.
- d) Ensure the space factor inside the cable drag chain is below 60%.
- e) Do not mix cables of great differences in size together. This is to prevent thin cables from being crushed by the thick cables. If you need to use them together, place a separator between them.

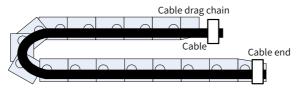


Figure 3-23 Cable drag chain

3.10 General Wiring Diagram

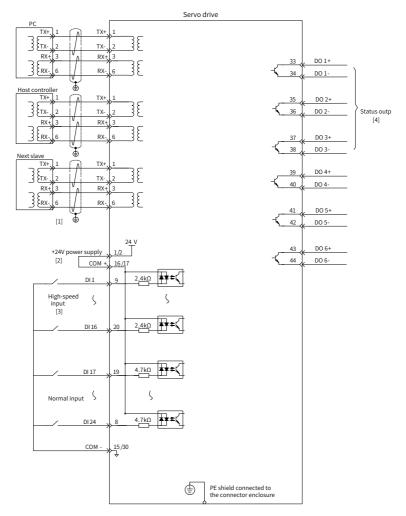
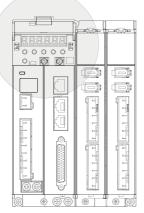


Figure 3-24 General wiring

- [1] Use double-shielded Cat 5e cables for network interfaces. Straight-through and crossover Ethernet cables are allowable.
- [2] The internal +24 V power supply supports a voltage range of 20 V to 28 V and a maximum operation current of 200 mA.
- [3] The high-speed DI terminals DI1 to DI6 must be used according to their functions allocated. If these terminals are used in low-speed applications, increase the set value of internal filter parameters to enhance the anti-interference capacity.
- [4] The DO power supply, ranging from 5 V to 24 V, needs to be prepared by users. The DO terminals support a maximum of 30 VDC voltage and 50 mA current.

4 Keypad

4.1 Introduction to the Keypad



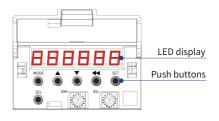


Figure 4-1 Appearance of the keypad

The keypad, which consists of a LED display (six 7-segment LEDs) and six push buttons, is used for display, parameter setting, user password setting and general function execution. When the keypad is used for parameter setting, the push buttons are used for the following purposes.

1 Keypad display area

The six LEDs on the keypad are used to display common status, parameters and the axis No. operated currently.

2 Push buttons

Push Button	Name	Function
MODE	MODE	Used to switch between different modes and return to the previous menu.
	UP	Used to increase the value of the blinking digit.
	DOWN	Used to decrease the value of the blinking digit.
•	SHIFT	Used to shift the blinking digit and view the high digits of the number consisting of more than 5 digits.
SET	ENTER	Used to switch to the next menu and execute commands such as saving parameter values.
SEL	SEL	Used to select specific axis No. and operate on parameters of current axis No

Table 4-1	Functions of	f push buttons
-----------	--------------	----------------

4.2 Keypad Display

Transitional relation between the keypad display and the operation object of the host controller

The mapping relation between the parameter (decimal) displayed by the keypad and the object dictionary operated by the host controller (hexadecimal, "Index" and "Sub-index") is as follows.

Object dictionary index = 0x2000 + Parameter group No.

Object dictionary sub-index = Hexadecimal offset within the parameter group + 1 For example:

Keypad Display	Object Dictionary Operated by the Host Controller
H00-00	2000-01h
H00-01	2000-02h
H01-09	2001-0Ah
H01-10	2001-0Bh
H02-15	2002-10h



The following section only describes the display and parameter settings on the keypad (decimal), which are different from those displayed by the software tool (hexadecimal). Make necessary conversions when performing operations through the software tool on the host controller.

Keypad display during running

The keypad displays the status, parameters, faults, and the monitoring information during running

Status: current servo drive status, such as servo ready or running

Parameter: parameters and their set values

Fault: faults and warnings that occur on the servo drive

Monitoring information: current running parameters of the servo drive

Axis No.: axis No. operated and displayed currently

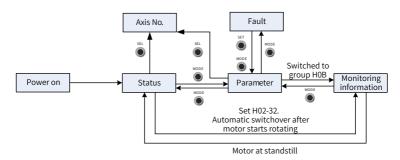


Figure 4-2 Switchover between different types of display

- After power-on, the keypad enters status display mode immediately.
- Press 💿 to switch between different modes, as shown in the preceding figure.

In the status display mode, set H02-32 (Default keypad display) to select the parameters to be monitored. When the motor rotates, the keypad automatically switches to monitoring information display. After the motor stops, the keypad automatically restores to status display.

■ In the parameter display mode, set H02-32 to select the parameter to be pre-monitored, and the keypad will switch to the monitoring display mode immediately.

Once a fault occurs, the keypad immediately enters the fault display mode, and five

LEDs blink simultaneously. Press 💿 to stop the LEDs from blinking, and then press

to switch to the parameter display mode.

1 Display of status (Axis 3)

Display	Name	Display Condition	Meaning
<u>388888</u>	3 Axis No. currently operated	In axis No. selection and parameter display interface (axis No. not displayed in the parameter setting interface)	Parameters displayed on the keypad are parameters of axis 3.

Display	Name	Display Condition	Meaning
(axis No. not displayed in the reset status)	Reset Servo initialization	Upon power-on	The servo drive is in the initialization or reset status. After initialization or reset is done, the servo drive automatically switches to other status.
388888	nr Servo not ready	Servo drive not ready after initialization finished	The main circuit is powered on improperly, and the servo drive cannot run.
388888	ry Servo ready (Ready)	Servo ready	The servo drive is ready to run and waiting for the S-ON signal.
3888888	rn Servo running (run)	S-ON signal activated	The servo drive is in the running status.
<u>388888</u> 38888888	1 to A Control mode		Displays present running mode of the servo drive in hexadecimal digits. 1: Profile position control 3: Profile velocity mode 4: Profile torque mode 6: Homing mode 8: Cyclic synchronous position mode 9: Cyclic synchronous velocity mode A: Cyclic synchronous torque mode
<u>388888</u> <u>388888</u>	1–8 Communication status		Displays the status of the slave EtherCAT state machine in the form of characters. 1: Initializing 2: Pre-running 4: Safe running 8: Running

Display	Name	Display Condition	Meaning
388888	- CN4 connection	EtherCAT output connected successfully	Solid OFF: No communication connection is detected in the physical layer.
388888	- CN5 connection indication	EtherCAT input connected successfully	Solid ON: Communication connection is detected in the physical layer.

2 Display of parameters (Axis 3)

Parameters are divided into 14 groups based on their functions. A parameter can be located quickly based on the group it belongs to. See <u>"Appendix A List of Object Groups"</u> for the parameter table.

■ Parameter group display

Display Name		Description	
HXX.YY		XX: Parameter group No. YY: Parameter No.	

For example, H02-00 is displayed as follows:

Display	Name	Description
3888.88	H02-00	02: Parameter group No. 00: Parameter No.

3 Display of the data in different lengths and the negative numbers

a) Signed number comprised of 4 digits and below or unsigned number comprised of 5 digits and below

Such numbers are displayed by a single page (five digits). For the signed number, the highest bit "-" indicates the negative symbol.

For example, -9999 and 65535 are displayed as follows:



b) Signed number comprised of above 4 digits or unsigned number comprised of above 5 digits

Such numbers are displayed from low to high bits (five digits per page) by several pages:

Present page + Value on present page, as shown in the following figure. Hold down for more than 2s to switch to the next page.

For example, -1073741824 is displayed as follows:

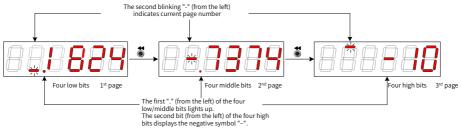


Figure 4-3 Display of "-1073741824"

1073741824 is displayed as follows:

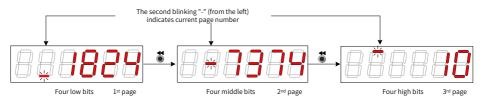


Figure 4-4 Display of "1073741824"

4 Display of decimal points

The segment "." of the ones indicates the decimal point, and this segment does not blink.

Display	Name	Description
88888	Decimal point	100.0

5 Display of parameter settings

Display	Name	Display Condition	Description
388888	Done Parameter setting done	Parameter setting done	The parameter setting is done and stored in the servo drive. The servo drive can then execute other operations.
368888	F.InIt Parameter restored to default setting	Parameter initialization in progress (H02-31 = 1).	The servo drive is in the process of parameter initialization. After parameter initialization is done, switch on the control power supply again.
388888	Error Wrong password	User password (H02-30) applied and wrong password entered	The system indicates the parameter entered is wrong, requiring users to enter the password again.
388888	TunE	One-button tuning enabled	The one-button tuning is in progress.
388888	FAIL	One-button tuning failed	The one-button tuning fails.

6 Display of faults (Axis 3)

- The keypad displays the present or previous faults and warning codes. For troubleshooting, see <u>"5 Troubleshooting</u>".
- When an individual fault or warning occurs, the keypad displays the present fault or warning code immediately. When multiple faults or warnings occur, the keypad displays the code of the highest-level warning.
- Set in H0B-33 (Fault record) the previous faults to be viewed, and set H0B-34 to view the selected fault or warning code.
- Set H02-31 to 2 to clear information about the latest ten faults or warnings stored in the servo drive.

For example, E3.941 is displayed as follows:

Display	Name	Item
] 8 8 8 8 8	Present warning code	E3.: Fault or warning occurs on the servo drive 941: Warning code

7 Display of monitoring information

Group H0B: Displays parameters used for monitoring the running status of the servo drive.

Set H02-32 (Default keypad display). After the servo motor runs properly, the keypad switches from servo status display to parameter display and displays the parameter No. defined by H02-32 in group H0B.

For example, when H02-32 is set to 00, the keypad displays the corresponding value of H0B-00 if the servo motor speed is not 0.

Parameter No.	Name	Unit	Meaning	Example
H0B-00	Actual motor speed	RPM	Displays actual motor speed after round-off in unit of 1 RPM.	Display of 3000 RPM:

4.3 Parameter Monitoring

Group H0B: Displays parameters used for monitoring the running status of the servo drive.

The following table describes the displayed information of group H0B.

Para. No.	Name	Unit	Meaning	Display Example
H0B-00	Actual motor speed		Displays actual motor speed after round-off in unit of 1 RPM.	Display of 3000 RPM: Display of -3000 RPM:

Para. No.	Name	Unit	Meaning	Display Example
H0B-01	Speed reference	RPM	Displays present speed reference of the servo drive.	Display of 3000 RPM: Display of -3000 RPM:
H0B-02	Internal torque reference	0.1%	Displays the percentage of the actual motor output torque to the rated motor torque.	Display of 100.0%:
H0B-03	Monitored DI status	-	Displays the optocoupler status of 24 DIs: Upper LED segment turned on: The optocoupler is switched off (indicated by "1"). Lower LED segment turned on: The optocoupler is switched on (indicated by "0"). The value of H0B-03 read by the software tool is a decimal number.	For example, when the optocoupler of DI1 is ON and that of DI2 to DI24 is OFF: The corresponding binary value is "1111111 1111111 1111110". The value of H0B-03 read by the software tool is 0xFFFFE. Corresponding display: DI5 DI5 DI4 DI3 DI2 DI1DI4 DI12 DI12 DI10 DI9DI14 DI12 DI12 DI10 DI9DI14 DI12 DI12 DI10 DI9DI24 DI22 DI20 DI9 DI17DI24 DI22 DI20 DI9 DI17DI24 DI22 DI20 DI9 DI17

Para. No.	Name	Unit	Meaning	Display Example
H0B-05	Monitored DO status	-	Displays optocoupler status of six DOs: Upper LED segment turned on: The optocoupler is switched off (indicated by "1"). Lower LED segment turned on: The optocoupler is switched on (indicated by "0"). The value of H0B-05 read by the software tool is a decimal number.	For example, when optocoupler of DO1 is ON and that of terminal DO2 to DO6 is OFF: The corresponding binary value is "111110". The value of H0B-05 read by the software tool is 0x3E. Corresponding display:
H0B-07	Absolute position counter (32-bit decimal number)	Reference unit	Displays the absolute position of the motor (reference unit).	Display of 1073741824 referent units:
H0B-09	Mechanical angle	0.1°	Displays the present mechanical angle of the motor.	Display of 360.0° :
H0B-10	Rotation angle (Electrical angle)	0.1°	Displays the present electrical angle of the motor.	Display of 360.0° :

Para. No.	Name	Unit	Meaning	Display Example
H0B-11	Speed corresponding to the position reference	RPM	Displays the speed corresponding to the position reference in an individual control cycle.	Display of 3000 RPM: Display of -3000 RPM:
H0B-12	Average load ratio	0.1%	Displays the percentage of the average load torque to the rated motor torque.	Display of 100.0%:
H0B-15	Encoder position deviation counter (32-bit decimal number)	Encoder unit	Encoder position deviation = Sum of position references (encoder unit) - Sum of pulses fed back by the encoder (encoder unit)	Display of 10000 encoder units:
H0B-17	Feedback pulse counter (32- bit decimal number)	Encoder unit	Counts and displays the servo motor position feedback (encoder unit). Note: When an absolute motor is used, H0B-17 only shows the low 32- bit value of the motor position feedback. To obtain the actual motor position feedback, view H0B-77 (absolute position (low 32 bits) of absolute encoder) and H0B-79 (absolute position (high 32 bits) of absolute encoder).	Display of 1073741824 encoder units: SHIFT SHIFT SHIFT SHIFT SHIFT

Para. No.	Name	Unit	Meaning	Display Example
H0B-19	Total power- on time (32- bit decimal number)	0.1s	Counts and displays the total power-on time of the servo drive.	Display of 429496729.5s:
H0B-24	RMS value of phase current	0.01 A	Displays the RMS value of phase current of the servo drive.	Display of 4.60 A:
H0B-26	Bus voltage	0.1 V	Main circuit DC bus voltage	Display of 311.0 V rectified from 220 VAC:
H0B-27	Power module temperature	° C	Displays the temperature of the power module inside the servo drive.	Display of 27°C :
H0B-33	Fault log	-	Displays the previous faults to be viewed. 0: Present fault 1: Last fault 2: 2nd to last fault 9: 9th to last fault	0: Present fault display:
H0B-34	Fault code of the selected fault	-	Displays the fault code selected by H0B-33. If no fault occurs, H0B-34 is displayed as "E + Axis No.000."	Take axis 3 as an example: If H0B-33 is set to 0, H0B-34 is set to E3.941, the present fault code will be 941. Corresponding display:

Para. No.	Name	Unit	Meaning	Display Example
H0B-35	Time stamp upon occurrence of the selected fault	S	Displays the total operating time of the servo drive when the fault selected by HOB-34 occurs. When no fault occurs, HOB-35 is displayed as "0."	H0B-34 = Er.941, H0B-35 = 107374182.4: Indicates the present fault code is 941 and the total operating time of the servo drive is 107374182.4s when the fault occurs.
H0B-37	Motor speed upon occurrence of the selected fault	RPM	Displays the servo motor speed when the fault selected by H0B-34 occurs. When no fault occurs, the displayed value of H0B-37 is "0".	Display of 3000 RPM:
H0B-38	Motor phase U current upon occurrence of the selected fault	0.01 A	Displays the RMS value of phase U winding current when the fault selected by H0B-34 occurs. When no fault occurs, H0B-38 is displayed as "0".	Display of 4.60 A:
H0B-39	Motor phase V current upon occurrence of the selected fault	0.01 A	Displays the RMS value of phase V winding current when the fault selected by H0B-34 occurs. When no fault occurs, H0B-39 is displayed as "0."	Display of 4.60 A:

4 Keypad

Para. No.	Name	Unit	Meaning	Display Example
H0B-40	Bus voltage upon occurrence of the selected fault	0.1 V	Displays the DC bus voltage of the main circuit when the fault selected by H0B-34 occurs. When no fault occurs, H0B-40 is displayed as "0."	Display of 311.0 V rectified from 220 VAC: Display of 537.0 V rectified from 380 VAC:
H0B-41	Input terminal status upon occurrence of the selected fault	-	Displays the high/low level status of 24 DIs when the fault selected by H0B-34 occurs. The viewing method is the same as that of H0B- 03. When no fault occurs, all the DIs are displayed as low level by H0B-41, and the corresponding hexadecimal value is "0".	In cases where the value of H0B-41 read by the software tool is 0x431: The corresponding binary value is "00000000000000000000000000000000000
H0B-43	Output terminal status upon occurrence of the selected fault	-	Displays the high/low level status of six DOs when the fault selected by H0B-34 occurs. The viewing method is the same as that of H0B- 05. When no fault occurs, all the DOs are displayed as low level by H0B-42, and the corresponding hexadecimal value is "0".	H0B-43 = 3: Corresponding display:

Para. No.	Name	Unit	Meaning	Display Example
H0B-53	Position deviation counter (32-bit decimal number)	Reference unit	Position deviation = Sum of position references (reference unit) - Sum of pulses fed back by the encoder (reference unit)	Display of 10000 reference units:
H0B-55	Actual motor speed	0.1 RPM	Displays the actual motor speed in unit of 0.1 RPM.	Display of 3000.0 RPM:
H0B-57	Control power voltage	0.1 V	Displays the control power DC voltage.	Display of 12.0 V:
H0B-58	Mechanical absolute position (low 32 bits)	Encoder unit	Displays the mechanical absolute position (low 32 bits) when an absolute encoder is used.	Display of 2147483647 encoder units:

Para. No.	Name	Unit	Meaning	Display Example
H0B-60	Mechanical absolute position (high 32 bits)	Encoder unit	Displays the mechanical absolute position (high 32 bits) when an absolute encoder is used.	Display of –1 encoder unit:
H0B-70	Number of absolute encoder revolutions	Rev	Displays the present number of revolutions of an absolute encoder.	Display of 32767:
H0B-71	Single-turn position feedback of absolute encoder	Encoder unit	Displays the single-turn position feedback of an absolute encoder.	Display of 8388607 encoder units:
H0B-77	Absolute encoder position (low 32 bits)	Encoder unit	Displays the absolute position (low 32 bits) of the motor when an absolute encoder is used.	Display of 2147483647 encoder units:
H0B-79	Absolute encoder position (high 32 bits)	Encoder unit	Displays the absolute position (high 32 bits) of the motor when an absolute encoder is used.	Display of -1 encoder unit:

Para. No.	Name	Unit	Meaning	Display Example
H0B-81	Single-turn position feedback of the load in rotation mode (low 32 bits)	Encoder unit	Displays the position feedback of the mechanical load (low 32 bits) when the absolute system works in the rotation mode.	Display of 2147483647 encoder units:
H0B-83	Single-turn position feedback of the load in rotation mode (high 32 bits)	Encoder unit	Displays the position feedback of the mechanical load (high 32 bits) when the absolute system works in the rotation mode.	Display of 1 encoder unit:
H0B-85	Single-turn position of the load in rotation mode	Reference unit	Displays the mechanical absolute position when the absolute system works in the rotation mode.	Display of 1073741824 referent units:

4.4 Parameter Setting

Parameter setting can be performed through the keypad. For details on parameters, see <u>"Appendix A List of Object Groups"</u>. The following figure shows how to change from position control to speed control after power-on.

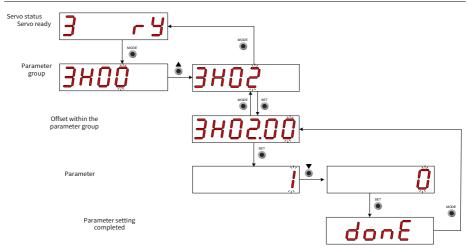


Figure 4-5 Procedures for parameter setting

- MODE: Used to switch the keypad display mode and return to the previous menu.
- "▲"/"▼": Used to increase or decrease the value of the blinking digit.
- " I used to change the blinking digit.

SET": Used to save present settings or switch to the next menu.

When the "Done" interface is displayed after parameter setting is done, press et in return to the parameter group display (interface of "H02-00").

4.5 User Password

After the user password (H02-30) is applied, only the authorized user can perform parameter settings. Other operators can only view the parameter.

1 Setting user password

The following figure shows how to set the password to "00001".

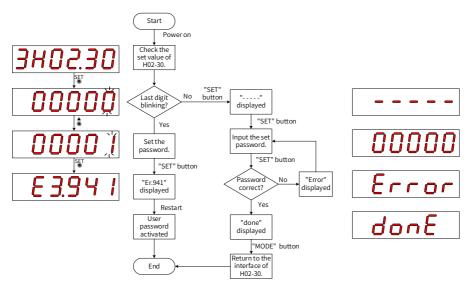


Figure 4-6 Procedures for user password setting

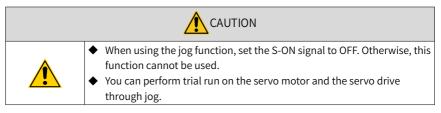


- If the last digit does not blink, the present password is protected. If the last digit blinks, no password is set or the password entered is correct.
- To change the user password, input present password first to authorize the access to parameter setting, and then enter H02-30 again to set a new password according to the procedures in the preceding figure.

2 Canceling User Password

Enter the set user password, and set H02-30 to "00000" to cancel user password.

4.6 Jog



1 Operating method

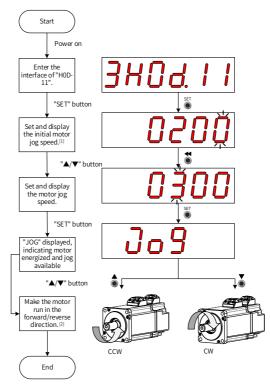


Figure 4-7 Procedures for jog setting



- Press a or to increase or decrease the motor speed during jogging.
 The motor speed will be restored to the initial value if the servo drive exits from the jog function.
- Press a or to make the servo motor rotate in the forward or reverse direction. If you release the button, the servo motor stops running immediately.

2 Exiting from jogging

Press $\textcircled{NODE}{\bullet}$ to exit from jogging status and return to the previous menu.

4.7 DI/DO Function

There are 24 DI signals and 6 DO signals on CN1 of SV820N. Groups H03 (DI function allocation and logic selection) and H04 (DO function allocation and logic selection) can be shared by multiple axes. For all the axes, the DI/DO function can be set and modified through the keypad. If the DI/DO function is modified several times, the final modification prevails.

1 Definition of DI/DO Functions

Code	Name	Function	Description	Remarks			
Des	Description: consisting of three digits, with the first one (from left to right) indicating the axis number and the last two indicating the terminal function						
		Fu	nctions of input signals				
01	S-ON	Servo ON	Invalid: Servo motor disabled in local mode Valid: Servo motor enabled in local mode	The S-ON function is valid in only non-bus control mode. The corresponding terminal logic must be level-triggered.			
14	P-OT	Positive limit switch	Valid: Forward drive inhibited Invalid: Forward drive permitted	When the mechanical movement is beyond the movable range, overtravel prevention will be triggered. The corresponding terminal logic is recommended to be level-triggered.			
15	N-OT	Negative limit switch	Valid: Reverse drive inhibited Invalid: Reverse drive permitted	When the mechanical movement is beyond the movable range, overtravel prevention will be implemented. The corresponding terminal logic is recommended to be level-triggered.			

Code	Name	Function	Description	Remarks
31	HomeSwitch	Home switch	Invalid: Mechanical load beyond the range of home switch Valid: Mechanical load within the range of home switch	The corresponding terminal logic must be set to level- triggered. If the logic is set to 2 (Rising edge-triggered), the servo drive forcibly changes it to 1 (Active high). If the logic is set to 3 (Falling edge-triggered), the servo drive forcibly changes it to 0 (Active low). If the logic is set to 4 (Rising/ Falling edge-triggered), the servo drive forcibly changes it to 0 (Active low).
38	TouchProbe1	Touch probe 1	Invalid: Touch probe not triggered	The touch probe logic is only related to the touch probe
39	TouchProbe2	Touch probe 2	Valid: Touch probe can be triggered	function (60B8h).
		Fun	ctions of output signals	
01	S-RDY	Servo ready	Valid: Servo ready Invalid: Servo not ready	The servo drive is ready to run.
02	TGON	Motor rotating	Invalid: The filtered absolute motor speed is smaller than the set value of H06-16. Valid: The filtered absolute motor speed reaches the set value of H06-16.	-
10	WARN	Warning	Valid: A warning occurs on the servo drive Invalid: No warning occurs on the servo drive or the warning has been reset.	-
11	ALM	Fault	Valid - A fault occurs on the servo drive Invalid - No fault occurs on the servo drive or the fault has been reset.	-

2 DI function setting (H03-02)

Function settings in group H03 require three decimal digits. The first digit is for setting the axis No. and the last two digits are for allocating terminal functions. See the following dashed square in red for details.



4 Keypad

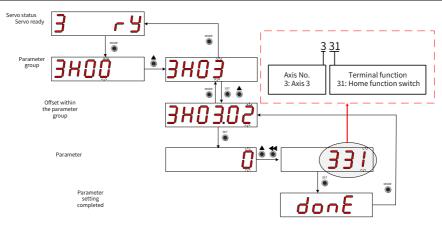


Figure 4-8 Procedures for DI function setting

Example: Set DI1, DI2, DI3 and DI4 as the home signals of four modules respectively. Corresponding parameters can be set to the following values through the software tool or the keypad.

- H0302 = 131
- H0304 = 231
- H0306 = 331
- H0308 = 431

NOTE

Set the DI logic based on the hardware switch used.

3 DO function setting (H04-00)

Function settings of group H04 require three decimal digits. The first digit is for setting the axis No. and last two digits are for allocating terminal functions. See the dashed square in red for details.

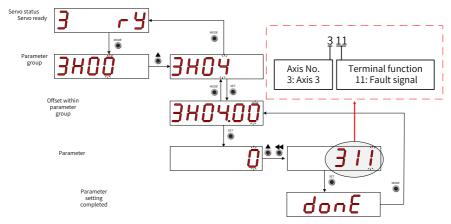


Figure 4-9 Procedures for DO function setting

Example: Set DO1, DO2, DO3 and DO4 as the fault signals of four modules respectively. Corresponding parameters can be set to the following values through the software tool or the keypad.

H0400 = 111

H0402 = 211

H0404 = 311

H0406 = 411



Set the DO logic based on the hardware switch used.

NOTE

5 Troubleshooting

5.1 Faults and Warnings

1 Faults and warning levels

Faults and warnings of the servo drive are divided into three levels based on severity: No. 1 > No. 2 > No. 3. See the following list for details.

No. 1 non-resettable fault

No. 1 resettable fault

No. 2 resettable fault

No. 3 resettable warning

"Resettable" means the keypad stops displaying the fault/warning status once a "Reset signal" is input.

To reset a fault/warning, use one of the following two methods:

Set 200D-02h to 1 (Fault reset).

Set the rising edge of bit7 of the control word 0x6040 through the host controller.

To reset No. 1 and No. 2 faults, switch off the S-ON signal first and then set the DI allocated with fault reset function to ON.

To reset No. 3 warnings, set the DI allocated with the fault reset function to ON.

☆ Related parameters:

Para. No.	Name	Value Range	Function	Setting Condition	Effective Time	Default
200Dh-02h	Fault reset	· ·	Stops fault display when a resettable fault/ warning occurs. Restores to "0: No operation" immediately after fault reset.	At stop	Immediately	0

5.2 Communication Faults and Warning Code List

When the communication or servo drive is abnormal, the SV820 servo drive sends an emergency message to the network, or sends a response abort message when the SDO transmission is abnormal.

1 Fault code list (Axis 3)

Display	Fault Name	Fault Type	Resettable or Not	Fault Range
E3.101	System parameter error	No. 1	No	Servo drive fault
E3.102	Abnormal communication initialization of coprocessor	No. 1	No	Servo drive fault
E3.104	Abnormal communication or interrupt timeout of the coprocessor	No. 1	No	Servo drive fault
E3.105	Internal program error	No. 1	No	Servo drive fault
E3.106	Abnormal communication of the main processor	No. 1	No	Servo drive fault
E3.107	Communication loss of the main processor	No. 1	No	Servo drive fault
E3.108	Parameter storage fault (read/ write)	No. 1	No	Servo drive fault
E3.111	Parameter errors in group 2000h/2001h	No. 1	No	Servo drive fault
E3.120	Mismatch of the product model (no matching motor or servo drive, absolute position parameters and the encoder not match, servo drive and the motor not match, FPGA software incompatible with the encoder)	No. 1	No	Axis fault
E3.121	Invalid S-ON command	No. 2	Yes	Axis fault
E3.122	Mismatch of the absolute position function and the encoder (motor model not match, encoder parameters not match)	No. 1	No	Axis fault
E3.130	DI function setting error	No. 1	Yes	Axis fault
E3.131	DO function setting error	No. 1	Yes	Axis fault
E3.136	Data check error or no parameter stored in the motor ROM	No. 1	No	Axis fault
E3.150	STO signal input protection	No. 1	Yes	Servo drive fault
E3.201	Hardware overcurrent (phase N overcurrent, phase U overcurrent, phase V overcurrent, bus discharge overcurrent)	No. 1	No	Axis or servo drive fault

Display	Fault Name	Fault Type	Resettable or Not	Fault Range
E3.202	Soft start relay fault	No. 1	No	Servo drive fault
E3.206	Switching frequency error	No. 1	Yes	Axis fault
E3.208	FPGA system sampling operation timeout Encoder communication timeout Sigma_Delta modulation fault	No. 1	No	Axis or servo drive fault
E3.210	Output shorted to ground	No. 1	No	Axis fault
E3.220	UVW phase sequence error	No. 1	No	Axis fault
E3.234	Runaway	No. 1	No	Axis fault
E3.400	Main circuit overvoltage	No. 1	Yes	Servo drive fault
E3.410	Main circuit undervoltage	No. 1	Yes	Servo drive fault
E3.420	Main circuit phase loss	No. 2	Yes	Servo drive fault
E3.430	Control power undervoltage	No. 1	No	Servo drive fault
E3.500	Motor overspeed	No. 1	Yes	Axis fault
E3.602	Angle auto-tuning failure	No. 1	Yes	Axis fault
E3.610	Servo drive overload	No. 2	Yes	Axis fault
E3.620	Motor overload	No. 2	Yes	Axis fault
E3.630	Motor rotor locked	No. 2	Yes	Axis fault
E3.650	Heatsink overheat	No. 2	Yes	Axis fault
E3.731	Encoder battery failure	No. 2	Yes	Axis fault
E3.733	Encoder multi-turn counting error	No. 2	Yes	Axis fault
E3.735	Encoder multi-turn counting overflow	No. 2	Yes	Axis fault
E3.740	Encoder interference	No. 1	No	Axis fault
E3.A33	Encoder data read/write error	No. 1	No	Axis fault
E3.B00	Excessive position deviation	No. 2	Yes	Axis fault
E3.B01	Position reference incremental error	No. 2	Yes	Axis fault
E3.B03	Electronic gear ratio over the limit	No. 2	Yes	Axis fault
E3.D09	Software position setting error	No. 2	Yes	Axis fault
E3.D10	Home position setting error	No. 2	Yes	Axis fault
E3.E08	Synchronization loss*	No. 2	Yes	Servo drive fault

Display	Fault Name	Fault Type	Resettable or Not	Fault Range
E3.E09	No synchronization signal*	No. 2	Yes	Servo drive fault
E3.E11	ESI configuration file not programmed*	No. 2	Yes	Servo drive fault
E3.E13	Synchronization cycle setting error*	No. 2	Yes	Servo drive fault
E3.E15	Excessive synchronization cycle*	No. 2	Yes	Servo drive fault

2 Warning code list (Axis 3)

Display	Name	Fault Type	Resettable or Not	Fault Range
E3.601	Homing warning	No. 3	Yes	Axis fault
E3.730	Encoder battery warning	No. 3	Yes	Axis fault
E3.760	Encoder over-temperature	No. 3	Yes	Axis fault
E3.908	IGBT model error	No. 3	No	Axis fault
E3.909	Motor overload	No. 3	Yes	Axis fault
E3.920	Regenerative resistor overload	No. 3	Yes	Servo drive fault
E3.922	Resistance of external regenerative resistor too small	No. 3	Yes	Servo drive fault
E3.939	Motor power cable disconnected	No. 3	Yes	Axis fault
E3.941	Parameter modifications activated at next power-on	No. 3	Yes	Servo drive fault
E3.942	Parameter storage too frequent	No. 3	Yes	Servo drive fault
E3.950	Forward overtravel	No. 3	Yes	Axis fault
E3.952	Reverse overtravel	No. 3	Yes	Axis fault
E3.980	Abnormal encoder algorithm	No. 3	Yes	Axis fault
E3.990	Main circuit power input phase loss	No. 3	Yes	Servo drive fault
E3.998	Homing object dictionary setting error	No. 3	Yes	Axis fault
E3.E20	Ethernet hardware error	No. 3	Yes	Servo drive fault
E3.E21	MAC address not programmed	No. 3	Yes	Servo drive fault
NRD	Servo not ready	-	-	-



The preceding table takes axis 3 as an example. If fault 101 occurs, axes 1, 2, 3, and 4 display E1.101, E2.101, E3.101, and E4.101, respectively. The similar applies to other faults.

5.3 Solutions to Faults

Note: This section takes axis 3 as an example.

■ E3.101: System parameter error

Direct cause:

The total number of parameters changes, which generally occurs after software update.

Parameter values in groups 2002h and above exceed the limit, which generally occurs after software update.

Root Cause	Confirming Method	Solution
	Check whether the voltage drops during control power (L1C, L2C) cutoff or whether instantaneous power failure occurs.	Restore the default settings (2002-20h = 1) and write the parameters again.
1. The control power voltage drops instantaneously.	Measure whether the control power voltage on the non-drive side complies with the following specifications: 220 V servo drive: Effective value: 220 V to 240 V Allowable deviation: -10% to +10% (198 V to 264 V) 380 V servo drive: Effective value: 380 V to 440 V Allowable deviation: -10% to +10% (342 V to 484 V)	Increase the power capacity or replace with a power supply of larger capacity. Restore default settings (2002-20h = 1) and write the parameters again.
2. Instantaneous power failure occurs during parameter storage.	Check whether instantaneous power failure occurs during parameter storage.	Power on the system again, restore default settings (2002-20h = 1) and write the parameters again.
3. The number of write operations within a certain period of time exceeds the limit.	Check whether parameters are updated frequently by the host controller.	Change the write method and write parameters again. If the servo drive is faulty, replace it.
4. The software is updated.	Check whether the software is updated.	Reset the servo drive model and servo motor model, and restore default settings (2002- 20h = 1).
5. The servo drive is faulty.	If the fault persists after several times of restart and parameter initialization, the servo drive is faulty.	Replace the servo drive.

E3.102: Abnormal communication initialization of coprocessor

Direct cause:

Multi-core communication initialization fault occurs or software versions of the CPU cores do not match.

Root Cause	Confirming Method	Solution
1. The software version of FPGA and that of each CPU core do not match.	View the FPGA software version (2001- 03h), CUP0 software version (2001-04h), and CUP1 software version (2001-05h) through the keypad or software tool. Check whether the non-zero numbers of the most significant bits of the software versions are consistent.	Contact Inovance for technical support. Update to the matching FPGA or MCU software.
2. The FPGA is faulty.	The fault persists after several times of restart.	Replace the servo drive.

■ E3.104: Abnormal communication or interrupt timeout of coprocessor

Direct cause:

Interrupt timeout occurs on the coprocessor or FPGA, and cyclic access timeout occurs among coprocessors.

Root Cause	Confirming Method	Solution
1. The FPGA is faulty.		
2. The communication handshake between the FPGA and MCU is abnormal.	The fault persists after the servo drive is powered off and on several times.	Replace the servo drive.
3. Interrupt timeout occurs on the MCU.		

■ E3.105: Internal program error

Direct cause:

The total number of parameters is abnormal during EEPROM read/write operation.

The parameter value range is abnormal, which generally occurs after software update.

Root Cause	Confirming Method	Solution
1. An EEPROM fault occurs.	Check the causes according to the method described in E3.101.	Restore default settings (2002-20h = 1) and power on the servo drive again.
2. The servo drive is faulty.	The fault persists after several times of restart.	Replace the servo drive.

■ E3.106: Abnormal communication handshake of the main processor

To distinguish fault causes, the servo drive displays different internal fault codes under the same fault code. You can view these internal fault codes in 200B-2Eh.

Direct cause:

Access timeout occurs between the HOST and FPGA or between the HOST and coprocessor during power-on initialization.

Root Cause	Confirming Method	Solution
1. The FPGA is faulty.		
2. The communication handshake between the FPGA and the HOST is abnormal.	The fault persists after the servo drive is powered off and on several times.	Replace the servo drive.
3. Access timeout occurs between the HOST and the coprocessor.	powered on and on several times.	
4. The versions of the HOST and the coprocessor do not match.	The fault occurs when the HOST software version (H01-00) is set to 2203.2 and above.	Update the software of the servo drive.

■ E3.107: Main processor communication loss

Direct cause:

Cyclic handshake communication loss occurs between the main processor and the coprocessor.

Root Cause	Confirming Method	Solution
Internal communication failure	The fault persists after the servo drive is powered off and on several times.	Replace the servo drive.

■ E3.108: Parameter storage fault

Direct cause:

Parameter values cannot be written to EEPROM.

Parameter values cannot be read from EEPROM.

Root Cause	Confirming Method	Solution
1. The write operation is abnormal.	Modify a parameter, power on the servo drive again and check	If the modification is not saved and the fault persists
2. The read operation is abnormal.	whether the modification is saved.	after several times of restart, replace the servo drive.

■ E3.111: Abnormal parameters in group 2000h/2001h

Direct cause:

The total number of parameters changes, which generally occurs after software update.

Parameter values in groups 2000 or 2001 exceed the limit, which generally occurs after software update.

Root Cause	Confirming Method	Solution
1. Instantaneous power failure occurs during parameter storage.	Check whether instantaneous power failure occurs during parameter storage.	Set the servo drive model (2001- 0Bh) to a wrong value first and power on again, and then set the servo drive model to a correct value and power on again.
2. Instantaneous power failure occurs during writing serial encoder motor parameters.	Check whether instantaneous power failure occurs during writing serial encoder motor parameters.	Write the parameters of the serial encoder motor through the software tool.
3. The software is updated.	Check whether the software is updated.	Set the servo drive model (2001- 0Bh) to a wrong value first and power on again, and then set the servo drive model to a correct value and power on again.
4. The servo drive is faulty.	If the fault persists even though the servo drive is powered off and on again and steps 1 and 2 are repeated several times, the servo drive is faulty.	Replace the servo drive.

■ E3.120: Mismatch of the product model

Direct cause:

- a) The motor model and the servo drive model do not match.
- b) Parameters are set improperly.
- c) The auto-tuned drive unit model is wrong.

Root Cause	Confirming Method	Solution
1. The product (encoder, motor or servo drive) code does not exist.	200B-2Eh (Internal fault code) = 1120: View the motor nameplate to check whether the motor is suitable. Check whether 2000-01h (Motor code) is set correctly.	Set 2000-01h correctly according to the motor nameplate or replace with a matching motor.
	200B-2Eh = 2120: View the servo drive model in 2001- 0Bh and check whether this model exists according to <u>"1.1 Nameplate</u> and Model Number".	If the servo drive model does not exist, set it correctly according to the servo drive nameplate in section 1.1.
2. The power ratings of the servo motor and servo drive do not match.	200B-2Eh = 3120: View the servo drive model in 2001- 0Bh and the serial encoder motor model in 2000-06h, and check whether they are matching.	Replace the unmatched product according to "1.4 Servo System Configuration Specifications".

Root Cause	Confirming Method	Solution
3. The model of the drive unit is set improperly and does not match the auto- tuned result.	Check whether 2001-0Bh and 2001- 3Fh of the faulty axis are set to the same value.	Set 2001-0Bh and 2001-3Fh to the same value. Replace the drive unit.
4. The FPGA software does not support the motor code.	200B-2Eh = 0x6120 Select the appropriate FPGA software according to 2000-01h.	2001-03 = 0 Supporting the motor code in cases where 2000-01h = 14000/14101 2001-03 = 1 Supporting the motor code in cases where 2000-01h = 14120 Other motor serial numbers are not supported.

■ E3.121: Invalid S-ON command

Direct cause:

A redundant S-ON signal is sent when some auxiliary functions are used.

Root Cause	Confirming Method	Solution
1. When the servo drive is enabled internally, the S-ON signal is switched on through communication.	Check whether the S-ON signal is sent from the host controller when the auxiliary functions (200D-03h, 200D-04h, 200D-0Ch) are used.	Switch off the S-ON signal sent from the host controller.

■ E3.122: Motor mismatch in absolute position mode

Cause	Confirming Method	Solution
1. The motor does not match in the absolute position mode or the motor code is set incorrectly.	View the motor nameplate to check whether the motor carries a multi-turn absolute encoder. Check whether H00-00 (Motor code) is set correctly.	Reset H00-00 (Motor code) according to the motor nameplate or replace by a matching motor.

■ E3.130: DI function setting error

Cause	Confirming Method	Solution
1. The same function is allocated to different DIs.	Check whether 2003-03h, 2003-05h, and 2003-07h to 2003-11h are allocated with the same non-zero DI function No.	Allocate different DI functions to parameters allocated with the same DI function, and restart the control circuit to activate the allocation, or switch off the S-ON signal and send a "RESET" signal to activate the allocation.
2. The DI function setting is wrong.	Check whether the set values of 2003-03h, 2003- 05h, 2003-07h to 2003-11h meet the requirement. Requirement on set values: Axis No. + Supported DI function No.	Set the values again according to the preceding requirement, and restart the control circuit to activate the setting, or switch off the S-ON signal first and send a "RESET" signal to activate the setting.

■ E3.131: DO function setting error

Cause	Confirming Method	Solution
The DO function setting is wrong.	Check whether the set values of 2004-01h (DO1 logic selection) and 2004- 03h (DO2 logic selection) meet the requirement. Requirements on set values: Axis No. + Supported DO function No.	Set the values again according to the preceding requirement, and restart the control circuit to activate the setting, or switch off the S-ON signal first and send a "RESET" signal to activate the setting.

■ E3.136: Data check error or no parameter stored in the motor encoder ROM

Direct cause:

When reading parameters from the encoder ROM, the servo drive detects that no parameters are saved there or parameter values are inconsistent with the agreed values.

Root Cause	Confirming Method	Solution
1. The servo drive model and the motor model do not match.	View the servo drive and servo motor nameplates to check whether the equipment used is the Inovance SV820 series servo drive and servo motor.	Replace by a matching servo drive and servo motor.

Root Cause	Confirming Method	Solution
2. A parameter check error occurs or no parameter is stored in the ROM of the serial incremental encoder.	Check whether the encoder cable provided by Inovance is used. For cable specifications, see <u>"1.4 Servo System Configuration</u> <u>Specifications"</u> . The cable must be connected reliably without scratching, breaking or poor contact. Measure signals PS+, PS-, +5V and GND at both ends of the encoder cable and observe whether signals at both ends are consistent. For the signal definition, see hardware connections.	Use the encoder cable provided by Inovance. Ensure that the cable is connected to the motor securely and tighten the screws on the servo drive side. Use a new encoder cable if necessary. Do not bundle the encoder cables with the power cables (RST, UVW). Route encoder cables and power cables through different routes.
3. The encoder cables are connected improperly or loosely.	Check the encoder cable connections. Check whether the ambient vibration is too large, which loosens the encoder cable and damages the encoder.	Connect the encoder cables according to the correct wiring diagram and ensure the encoder terminals are connected securely.
4. The servo drive is faulty.	The fault persists after the servo drive is restarted.	Replace the servo drive.

■ E3.150: STO input protection

Cause:

The STO input protection applies.

■ E3.201: Overcurrent

Direct cause:

Hardware overcurrent is detected.

Root Cause	Confirming Method	Solution
1. Commands are input simultaneously upon start or the command input is too early.	Check whether a command is input before the keypad displays "ry".	Command sequence: After the keypad displays "ry", switch on the S-ON signal and then input a command. Add reference filter time constant or increase the acceleration/deceleration time if allowed.
2. The motor cables are in poor contact.	Check whether the servo drive power cables and motor cables on the U, V, and W sides of the servo drive are loosened.	Tighten the cables that are loosened or disconnected.

Root Cause	Confirming Method	Solution
3. The motor cables are grounded.	After ensuring the servo drive power cables and motor cables are connected securely, measure whether the insulation resistance between the servo drive UVW sides and the grounding cable (PE) is at $M\Omega$ -level.	Replace the motor if the insulation is poor.
4. The motor UVW cables are short circuited.	Disconnect the motor cables and check whether short-circuit occurs among U, V, and W phases and whether burrs exist on the cable connections.	Connect the motor cables correctly.
5. The motor is burnt down.	Disconnect the motor cables and measure whether the resistance among U, V, and W phases of the motor cable is balanced.	Replace the motor if the resistance is unbalanced.
6. The gain is set improperly and the motor oscillates.	Check whether motor oscillates or generates a sharp noise during motor start and running, or view the current feedback through the software tool.	Carry out gain adjustment.
7. The encoder cable is wired incorrectly, aging, or corroded, or the encoder connector is loosened.	Check whether the encoder cable provided by Inovance is used and whether the cable is aging or corroded, or the connector is loosened. Switch off the S-ON signal, rotate the motor shaft manually, and check whether the value of 200B-12h (electrical angle) changes as the motor rotates.	Re-solder, tighten or replace the encoder cable.
8. The servo drive is faulty.	The fault persists although the motor cables are disconnected and the servo drive is restarted.	Replace the servo drive.
9. Regenerative resistor overcurrent	Check whether resistance of the external regenerative resistor is too small or the regenerative resistor is short-circuited (P and C ends at main circuit input terminal).	Select new resistance value and model of the regenerative resistor. Connect the cables again.

■ E3.202: Soft start relay disconnected

Cause:

The soft start relay is disconnected.

■ E3.206: Switching frequency error

Cause:

The motor control is abnormal.

■ E3.208: FPGA sampling operation timeout

Find the fault cause through internal fault code (200B-2Eh) when E3.208 occurs.

Cause	Confirming Method	Solution
1. Communication timeout occurs on the encoder.	200B-2Eh (Internal fault code) = 2208: The encoder wiring is incorrect. The encoder cables are connected loosely. The encoder cable is too long. The encoder communication suffers from interference. The encoder is faulty.	It is recommended to use the cables provided by Inovance. If a customized encoder cable is used, check whether this cable complies with the specifications and whether it is a shielded twisted pair cable. Check whether the connectors at both ends of the encoder are in good contact and whether any pin retracts. Contact the manufacturer. Route motor cables and encoder cables through different routes Ensure the servo motor and servo drive are grounded properly. Replace the servo motor.
2. Current sampling timeout occurs.	200B-2Eh (Internal fault code) = 3208: Check whether there is large equipment generating interference or there are interference sources such as variable-frequency devices inside the cabinet. The internal current sampling chip is damaged.	Route high-voltage cables and low- voltage cables through different routes. Replace the servo drive.
3. FPGA operation timeout occurs.	200B-2Eh (Internal fault code) = 0208: Determine the fault cause according to preceding causes 1, 2, 3, and 4.	Handle the fault according to solutions to preceding causes 1, 2, 3, and 4.

■ E3.210: Output shorted to ground

Direct cause:

The servo drive detects abnormal motor phase current or bus voltage during self-check upon power-on.

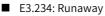
Root Cause	Confirming Method	Solution
1. The servo drive power cables (UVW) are shorted to ground.	Disconnect the motor cables, and measure whether the servo drive power cables (UVW) are shorted to ground (PE).	Re-connect or replace the servo drive power cables.
2. The motor is shorted to ground.	After ensuring the servo drive power cables and motor cables are connected securely, measure whether the insulation resistance between the servo drive UVW sides and the grounding cable (PE) is at $M\Omega$ -level.	Replace the motor.
3. The servo drive is faulty.	Remove the power cables from the servo drive, but the fault persists after the servo drive is powered off and on several times.	Replace the servo drive.

■ E3.220: Wrong UVW phase sequence

Direct cause:

Incorrect UVW phase sequence is detected during angle auto-tuning.

Root Cause	Confirming Method	Solution
The phase sequence of the power cable is incorrect.	Check whether the phase sequence of the power cable is correct.	Change any two phase sequences and perform angle auto-tuning again.



Direct cause:

The torque reference direction is in reverse to the speed feedback direction in the torque control mode.

The speed feedback direction is in reverse to the speed reference direction in the position or speed control mode.

Root Cause	Confirming Method	Solution
1. The UVW phase sequence is incorrect.	Check whether the servo drive power cables are in the same phase sequence as the servo drive UVW cables and motor UVW cables.	Connect the UVW cables according to the correct phase sequence.

Root Cause	Confirming Method	Solution
2. The interference signal causes an error in the initial phase detection of the motor rotor.	The UVW phase sequence is correct, but E3.234 occurs when the servo drive is enabled.	Power on the servo drive again.
3. The encoder model is wrong or the wiring is incorrect.	View the servo drive and servo motor nameplates to check whether the equipment used is the Inovance SV820 series servo drive and 20-bit servo motor.	Replace with a matching servo drive and servo motor. Check the motor model, encoder type, and encoder cable connections.
4. The encoder cable is wired improperly, corroded or connected loosely.	Check whether the encoder cable provided by Inovance is used and whether the cable is aging or corroded, or the connector is loosened. Switch off the S-ON signal, rotate the motor shaft manually, and check whether the value of 200B-12h (electrical angle) changes as the motor rotates.	Re-solder, tighten or replace the encoder cable.

■ E3.400: Main circuit overvoltage

Direct cause:

The DC bus voltage between P and N exceeds the overvoltage threshold.

220 V servo drive: Normal value: 310 V Overvoltage threshold: 420 V

Root Cause	Confirming Method	Solution
1. The voltage input to the main circuit is too high.	Measure whether the input voltage on the main circuit side (RST) complies with the following specifications: 220 V servo drive: Effective value: 220 V to 240 V Allowable deviation: –10% to +10% (198 V to 264 V)	Replace or adjust the power supply according to the specifications.
2. The power supply is unstable or affected by lightning.	Check whether the power supply is unstable, affected by lightning or compliant with the preceding specifications.	Connect a surge protection device and then switch on the power supply. If the fault persists, replace the servo drive.

Root Cause	Confirming Method	Solution
3. The regenerative resistor does not work.	If an external regenerative resistor is used (2002-1Ah = 1/2), measure the resistance between P and C. See <u>"1.5 Regenerative Resistor</u> <u>Specifications"</u> for specifications of the regenerative resistor.	If the resistance is " ∞ " (infinite), the regenerative resistor is internally disconnected. If an external regenerative resistor is used, replace it with a new one. Set 2002-1Bh (Power of external regenerative resistor) and 2002- 1Ch (Resistance of external regenerative resistor) correctly according to the resistor specifications.
4. The resistance of the external regenerative resistor is too large, and energy absorption during braking is insufficient.	Measure the resistance of the external regenerative resistor between P and C. Compare the measured value with the recommended value.	Connect a new external regenerative resistor of recommended resistance between P and C. Set 2002-1Bh (Power of external regenerative resistor) and 2002- 1Ch (Resistance of external regenerative resistor) correctly according to the resistor specifications.
5. The motor is in abrupt acceleration/ deceleration status and the maximum braking energy exceeds the energy absorption value.	Check the acceleration/ deceleration time during running and measure the DC bus voltage between P and N to check whether the voltage exceeds the fault threshold during deceleration.	After ensuring the main circuit voltage input complies with specifications, increase the acceleration/deceleration time properly.
6. The bus voltage sampling value deviates greatly from the measured value.	Check whether 200B-1Bh (Bus voltage) complies with the following specifications: 220 V servo drive: 200B-1Bh > 420 V Measure the DC bus voltage between P and N and check whether the DC bus voltage is smaller than the value of 200B-1Bh.	Contact Inovance for technical support.
7. The servo drive is faulty.	The fault persists after the main circuit is powered off and on several times.	Replace the servo drive.

■ E3.410: Main circuit undervoltage

Direct cause:

The DC bus voltage between P and N is lower than the fault threshold.

220 V servo drive: Normal value: 310 V Overvoltage threshold: 200 V

Root Cause	Confirming Method	Solution
1. The power supply of the main circuit is unstable or power failure occurs.	Measure whether the input voltage of the main circuit cables on the non-drive side and the drive side complies with the following specifications: 220 V servo drive:	
2. Instantaneous power failure occurs.	Effective value: 220 V to 240 V Allowable deviation: –10% to +10% (198 V to 264 V) The voltages of all three phases need to be measured.	Increase the power capacity.
3. The power voltage drops during running.	Monitor the power input voltage and check whether the main circuit power supply is applied to other devices, resulting in insufficient power capacity and voltage dip.	
4. Phase loss occurs because a single-phase power supply is used for a three- phase servo drive.	Check whether the main circuit wiring is correct and reliable, and whether the phase loss fault detection (200A-01h) is hidden.	Replace the cables and connect the main circuit cables properly. Three-phase: L1, L2, L3 Single-phase: L1, L2
5. The servo drive is faulty.	Check whether 200B-1Bh (Bus voltage) complies with the following specifications: 220 V servo drive: 200B-1Bh < 200 V The fault persists after the main circuit is powered off and on several times.	Replace the servo drive.

■ E3.420: Main circuit phase loss

Direct cause:

Phase loss occurs on a three-phase servo drive.

Root Cause	Confirming Method	Solution
1. The three-phase input cables are connected improperly.		Replace the cables and connect the main circuit cables properly.

Root Cause	Confirming Method	Solution
2. A single-phase power supply is used for a three-phase servo drive.	Check the power input specification of the servo drive and the actual input voltage. Measure the main circuit input voltage to check whether it complies with the following specifications:	A three-phase servo drive of 0.75 kW (model: H01- 10 = 5) can be connected to a single-phase power
3. The three-phase power supply is imbalanced or the voltages of the three phases are too low.	220 V servo drive: Effective value: 220 V to 240 V Allowable deviation: -10% to +10% (198 V to 264 V) 380 V servo drive: Effective value: 380 V to 440 V Allowable deviation: -10% to +10% (342 V to 484 V) The voltages of all three phases need to be measured.	supply. If the input voltage fulfills the specifications, set H0A-00 to 2 (Inhibit fault and warning). If the input voltage does not fulfill the specifications, replace or adjust the power capacity according to the specifications.
4. The servo drive is faulty.	The fault persists after the main circuit is powered off and on several times.	Replace the servo drive.

■ E3.430: Control power undervoltage

Direct cause:

Phase loss occurs on the AC input of the control circuit.

Root Cause	Confirming Method	Solution
The AC input of the control circuit is unstable.	Check whether the control power cables are well connected and measure whether the AC input voltage of the control power fulfills specifications.	Re-connect or replace control power cables.

E3.500: Motor overspeed

Direct cause:

The actual speed of the servo motor exceeds the overspeed threshold.

Root Cause	Confirming Method	Solution
1. The UVW phase sequence of the motor cable is incorrect.		Connect the cables according to the correct phase sequence.

Root Cause	Confirming Method	Solution
2. 200A-09h is set improperly.	Check whether the overspeed threshold is smaller than the maximum motor speed needed in actual running. Overspeed threshold = 1.2 times the maximum motor speed (200A-09h = 0). Overspeed threshold = 200A-09h (200A-09h \neq 0, and 200A-09h < 1.2 times the maximum motor speed).	Re-set the overspeed threshold according to mechanical requirements.
3. The input reference exceeds the overspeed threshold.	Check whether the motor speed corresponding to the input reference exceeds the overspeed threshold. Position control mode: In CSP mode, view the gear ratio 6091-01h/6091-02h to check the position reference increment per synchronization cycle and convert it to the speed information. In PP mode, view the gear ratio 6091-01h/6091-02h and check the value of 6081h (Profile velocity). In HM mode, view the gear ratio 6091-01h/6091-02h, and determine the value of 6099-01h and 6099-02h. Speed control mode: View the gear ratio 6091-01h, and the values of 60FFh (Target velocity) and 607Fh (Max profile velocity). Torque control mode: View the value of 607Fh in the torque control mode.	Position control mode: CSP: Decrease the position reference increment per synchronization cycle. The host controller should cover the position ramp when generating references. PP: Decrease the value of 6081h, or increase the acceleration/ deceleration ramp (6083h, 6084h). HM: Decrease the value of 6099- 01h and 6099-02h, or increase the acceleration/deceleration ramp (609Ah). Decrease the gear ratio according to actual conditions. Speed control mode: Decrease the target velocity, speed limit, and gear ratio. In PV mode, increase the speed ramp 6083h and 6084h. In CSV mode, the host controller should cover the velocity ramp. Torque control mode: Set the speed limit to a value smaller than the overspeed threshold.
4. The motor speed overshoot occurs.	Check whether the speed feedback exceeds the overspeed threshold through the software tool.	Adjust the gain or mechanical running conditions.
5. The servo drive is faulty.	The fault persists after the servo drive is powered on again.	Replace the servo drive.

■ E3.602: Angle auto-tuning failure

Direct cause:

Abnormal jitter occurs on the encoder feedback during angle auto-tuning.

Root Cause	Confirming Method	Solution
Encoder feedback data	Check if the encoder communication	Check the encoder
error occurs.	suffers from interference.	cable connections.

■ E3.610: Servo drive overload

Cause:

The servo motor temperature reaches the over-temperature threshold.

■ E3.620: Motor overload

Direct cause:

The servo motor temperature reaches the over-temperature threshold.

Root Cause	Confirming Method	Solution
1. The motor and encoder cables are connected improperly or in poor contact.	Check the wiring among the servo drive, servo motor and encoder according to the correct wiring diagram.	Connect cables according to the correct wiring diagram. It is recommended to use the cables provided by Inovance. When customized cables are used, prepare and connect the cables according to the hardware wiring instructions.
2. The load is too heavy, and the effective torque output by the motor keeps exceeding the rated torque during continuous operation.	Confirm the overload characteristics of the servo drive or motor. Check whether the average load ratio (200B-0DH) is greater than 100.0% for a long time.	Replace with a servo drive of larger capacity and a matching servo motor. Reduce the load and increase the acceleration/deceleration time.
3. The acceleration/ deceleration is too frequent or the load inertia is too large.	Calculate the mechanical inertia ratio or perform inertia auto- tuning. Then view 2008-10h (Load inertia ratio). Confirm the single running cycle during cyclic running.	Increase the acceleration/ deceleration time during single-cycle running.
4. The gain adjustment is improper or the stiffness level is too high.	Check whether the motor vibrates and produces abnormal noise during running.	Adjust the gain again.

Root Cause	Confirming Method	Solution
5. The model of the servo drive or servo motor is set incorrectly.	View the serial encoder motor model in 2000-06h and the servo drive model in 2001-0Bh.	View the servo drive nameplate and set the servo drive model in 2001-0Bh correctly. Use a matching servo motor according to <u>"2.3</u> <u>Dimension Drawing of MS1H1</u> <u>Series Servo Motors"</u> .
6. Locked-rotor occurs due to mechanical factors, resulting in overload during running.	Check the RUN command and the motor speed (200B-01h) through the software tool or the keypad: RUN command in the position control mode: 200B-0Eh (Position reference counter) RUN command in the speed control mode: 200B-02h (Speed reference) RUN command in the torque control mode: 200B-03h (Internal torque reference) Check whether the RUN command is not 0 but the motor speed is 0 in the corresponding mode.	Eliminate the mechanical factors.
7. The servo drive is faulty.	The fault persists after the servo drive is powered off and on again.	Replace the servo drive.

■ E3.630: Locked-rotor over-temperature protection

Direct cause:

The actual motor speed is lower than 10 RPM but the torque reference reaches the limit and such status lasts for the time defined by 200A-21h.

Root Cause	Confirming Method	Solution
1. UVW output phase loss or incorrect phase sequence occurs on the servo drive.	Perform motor trial run without load and check cable connections.	Connect cables again according to the correct wiring diagram or replace the cables.
2. The servo drive UVW cables or the encoder cables are disconnected.	Check the cable connections.	Connect the cables again according to the correct wiring diagram or replace the cables.

Root Cause	Confirming Method	Solution	
3. Locked-rotor occurs due to mechanical factors.	Check the RUN command and the motor speed (200B-01h) through the software tool or keypad: RUN command in the position control mode: 200B-0Eh (Position reference counter) RUN command in the speed control mode: 200B-02h (Speed reference) RUN command in the torque control mode: 200B-03h (Internal torque reference) Check whether the RUN command is not 0 but the motor speed is 0 in the corresponding mode.	Eliminate the mechanical factors.	

■ E3.650: Heatsink over-temperature

Direct cause:

The temperature of the power module is higher than the over-temperature protection threshold.

Root Cause	Confirming Method	Solution
1. The ambient temperature is too high.	Measure the ambient temperature.	Improve the cooling conditions of the servo drive to reduce the ambient temperature.
2. The servo drive is restarted several times to reset the overload fault.	View the fault records (set 200B-22h and view 200B-23h). Check whether an overload fault/ warning (E3.610, E3.620, E3.630, E3.650) occurs.	Change the fault reset method. After overload occurs, wait for 30s before reset. Increase the capacity of the servo drive and servo motor, increase the acceleration/deceleration time and reduce the load.
3. The fan is damaged.	Observe whether the fan works during running.	Replace the servo drive.
4. The installation direction and the clearance reserved for the servo drive is improper.	Check whether the servo drive is installed properly.	Install the servo drive according to the installation requirements.
5. The servo drive is faulty.	The fault persists even though the servo drive is restarted 5 minutes after power-off.	Replace the servo drive.

Root Cause	Confirming Method	Solution
6. The model of the drive unit is set improperly.	The drive unit model of this axis (H01- 10) is to 6000X. The temperature of this axis (H0B-27) under normal ambient environment is 95°C.	Set the drive unit model (H01-10) of this axis to X.

■ E3.731: Encoder battery failure

Direct cause:

The battery voltage of the absolute encoder is lower than 3.0 V.

Root Cause	Confirming Method	Solution
The battery is not connected during power-off.	Check whether the battery is connected during power-off.	Set 200D-15h to 1 to clear the fault.
The battery voltage of the encoder is too low.	Measure the battery voltage.	Replace with a new battery of matching voltage.

■ E3.733: Encoder multi-turn counting error

Direct cause:

The encoder multi-turn counting value is wrong.

Root Cause	Confirming Method	Solution
The encoder is faulty.	Set 200D-15h to 2 to clear the fault, but the fault persists after the serve drive is powered off and on again.	Replace the motor.

■ E3.735: Encoder multi-turn counting overflow

Cause	Confirming Method	Solution
The number of unidirectional revolutions of the absolute encoder exceeds 32767 in linear mode.	continues to run in the	See the operation instructions for the absolute encoder. 1. This fault can be hidden in cases where no multi-turn absolute position is needed but the absolute position during running needs to be recorded. 2. The rotation mode applies to occasions where only the single-turn absolute position needs to be recorded.

E3.740: Encoder interference

Direct cause:

The encoder communication suffers from interference, resulting in communication error.

Root Cause	Confirming Method	Solution
1. The encoder wiring is incorrect.	Check the encoder wiring.	Connect the encoder cables according to the correct wiring diagram.
2. The encoder cable is connected loosely.	Check whether the ambient vibration is too large, which loosens the encoder cable and damages the encoder.	Connect the encoder cables again and ensure the encoder terminals are connected securely.
3. The encoder Z signal suffers from interference.	Check the cable layout on site. Check whether there is large-scale equipment generating interference and whether multiple interference sources such as variable-frequency devices are present inside the cabinet. Make the servo drive stay in "Rdy" status and rotate the motor shaft counterclockwise (CCW) manually and observe whether the value of 200B-12h (Electrical angle) increases/decreases smoothly. Turning one circle corresponds to five 0-360° (applicable to Z series motors). For X series motors, turning one circle corresponds to four 0-360° . If the value of 200B-12h changes abnormally when you rotate the motor shaft, the encoder is faulty. If no alarm occurs during rotating but an alarm is reported during running, interference does exist.	It is recommended to use the cables provided by Inovance. If a customized cable is used, check whether the cable is a shielded twisted pair cable that complies with the specifications. Route motor cables and encoder cables through different routes. Ensure the servo motor and servo drive are well grounded. Check whether plugs at both ends of the encoder are in good contact and whether any pin retracts.
4. The encoder is faulty.	Replace with a new encoder cable. If the fault no longer occurs after cable replacement, it indicates the original encoder cable is damaged. Keep the motor in a certain position, power on the servo drive several times and check the value change of 200B-12h (Electrical angle). The electrical angle deviation should be within ±30° when the motor position does not change.	Replace by a new encoder cable. If the fault persists after encoder cables are replaced, the encoder may be faulty. In this case, replace the servo motor.

E3.A33: Encoder data read/write error

Direct cause:

Internal parameters of the encoder are abnormal.

Rout Cause	Confirming Method	Solution
1. The serial incremental encoder cable is disconnected or loosened.	Check the cable connections.	Check whether encoder cables are connected improperly or whether disconnection or poor contact occurs. Ensure the motor cables and encoder cables are routed through different routes.
2. The read-write operation on serial incremental encoder parameters is abnormal.	If the fault persists after the servo drive is powered off and on several times, the encoder is faulty.	Replace the servo motor.

■ E3.B00: Excessive position deviation

Direct cause:

The position deviation is larger than the value of 6065h in the position control mode.

Root Cause	Confirming Method	Solution
1. UVW output phase loss or incorrect phase sequence occurs on the servo drive.	Perform motor trial run without load and check cable connections.	Connect cables again according to the correct wiring diagram or replace the cables.
2. The servo drive UVW cables or the encoder cables are disconnected.	Check the cable connections.	Re-connect the cables. The servo motor power cables must be connected in the correct phase sequence. Replace all the cables with new cables if necessary and ensure the cables are connected properly.
3. Locked-rotor occurs due to mechanical factors.	Check the RUN command and motor speed (200B-01h) through the software tool or keypad: RUN command in the position control mode: 200B-0Eh (Position reference counter) RUN command in the speed control mode: 200B-02h (Speed reference) RUN command in the torque control mode: 200B-03h (Internal torque reference) Check whether the RUN command is not 0 but the motor speed is 0 in the corresponding mode.	Eliminate the mechanical factors.

- 122 -

Root Cause	Confirming Method	Solution
4. The servo drive gain is too low.	Check the position loop gain and speed loop gain of the servo drive. 1st gain: 2008-01h to 2008-03h 2nd gain: 2008-04h to 2008-06h	Adjust the gain manually or perform gain auto-tuning.
5. The position reference increment is too large.	Position control mode: In CSP mode, view the gear ratio 6091-01h/6091-02h to check the position reference increment per synchronization cycle and convert it to the speed information. In PP mode, view the gear ratio 6091-01h/6091-02h and check the value of 6081h (Profile velocity). In HM mode, view the gear ratio 6091-01h/6091-02h, and determine the value of 6099-01h and 6099- 02h.	CSP: Decrease the position reference increment per synchronization cycle. The host controller should cover the position ramp when generating references. PP: Decrease the value of 6081h, or decrease the acceleration/ deceleration ramp (6083h, 6084h). HM: Decrease 6099-01h and 6099-02h, or decrease the acceleration/deceleration ramp (609Ah). Decrease the gear ratio according to actual conditions.
6. The value of 6065h (Following error window) is too small in relation to the running condition.	Check whether the set value of 6065h is too small.	Increase the value of 6065h.
7. The servo drive or motor is faulty.	Monitor the running waveform through the oscilloscope function in the software tool: position references, position feedback, speed references, torque references	If the position reference is not 0 but the position feedback is always 0, replace the servo drive or motor.

■ E3.B01: Position reference incremental error

Direct cause:

The target position increment in CSP mode is too large.

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Root Cause	Confirming Method	Solution
1. The position reference increment is too large.	Check the target position increment of the adjacent synchronization cycle.	Decrease the position reference speed, or set a certain acceleration/deceleration curve when the host controller profiles the target position.

Root Cause	Confirming Method	Solution
2. The target position is not aligned with the present position before mode switchover.	Check whether mode switchover is performed in the controller software.	Assign the value of present position to the target position before mode switchover.
3. The target position is not aligned with the present position when the servo drive is switching to S-ON status.	Check whether the S-ON operation is performed in the controller software.	Assign the value of present position to the target position when the servo is switching to S-ON status.
4. The target position value is abnormal.	When software or hardware limit is activated, the target position overflows near 2^{31} -1 or - 2^{31} .	When software or hardware limit is activated, the target position must be limited between $[-2^{31}, 2^{31}-1]$.
5. The gear ratio is set improperly.	Check whether 6091-01h and 6091-02h are set improperly. Check whether host controller scaling factors related to the machine and motor encoder are set improperly.	Modify the gear ratio and related scale factors according to actual applications.
6. The model of the motor selected is improper.	Check whether the maximum motor speed is less than the maximum running speed needed.	Select a motor that matches the requirement or reduce the maximum running speed needed.

■ E3.B03: Electronic gear ratio over the limit

Direct cause:

The electronic gear ratio exceeds the limit: (0.001 x Encoder resolution/10000, 4000 x Encoder resolution/10000).

Root cause	Confirming Method	Solution
gear ratio exceeds	Check whether the value of 6091-01h/6091-02h exceeds the preceding range.	Set the gear ratio according to the preceding range.

■ E3.D09: Software position setting error

Direct cause:

The lower limit of the software position is larger than the upper limit.

Root Cause	Confirming Method	Solution
The lower limit of the software position is set to a value larger than the upper limit.	The value of 607D-01 (Min. position limit) is larger than the value of 607D-02 (Max. position limit).	Reset the parameters.

■ E3.D10: Home setting error

Cause	Confirming Method	Solution
1The home offset is beyond the software limit.	The value of 607Ch (Home offset) is beyond the values of 607D-01 (Min. position limit) and 607D-02 (Max. position limit).	Reset the parameters.

5.4 Solutions to Warnings

■ E3.601: Homing warning

Direct cause:

- a) The home is not found within the time defined by 2005-24h during homing.
- b) The home or limit switch is abnormal.

Root Cause	Confirming Method	Solution
1. The home switch is faulty.	There is only high-speed searching but no low-speed searching during homing. After high-speed searching, the servo drive keeps low- speed searching in the reverse direction.	If a hardware DI is used, check whether the DI function is allocated to a certain DI in group 2003h and check the wiring of this DI. Change the DI logic manually and observe the value of 200B-04h (Monitored DI status) to monitor whether the servo drive receives corresponding DI level changes. If the home signal is Z signal and the home signal cannot be found, check the condition of the Z signal.
2. The duration of homing is too short.	Check whether the value of 2005-24h (Duration limit of homing) is too small.	Increase the value of 2005-24h.

Root Cause	Confirming Method	Solution
3. The speed of high-speed searching for home switch is too slow.	Check the distance between the initial homing position and the home switch to see whether the value of 6099- 01h (Speed during search for switch) is too small, resulting in a prolonged searching for home switch.	Increase the value of 6099-01h.
4. The home switch is set improperly.	Check whether the limit signals on both sides are activated simultaneously. Check whether a limit signal is activated simultaneously with the home signal.	Set the position of the hardware switch properly.

■ E3.730 Encoder battery warning

Cause	Confirming Method	Solution
The battery voltage of the absolute encoder is lower than 3.0 V.	,	Use a new battery of matching
encoder is lower than 3.0 v.	voltage.	voltage.

■ E3.908: Abnormal drive unit model

Direct cause:

The model of the drive unit detected is abnormal.

Root Cause	Confirming Method	Solution
1. The model of	H0B45 = 0x3908	Set H01-10 to a proper
the drive unit is set	Check whether the value of H01-10 is	value according to the
improperly (1).	consistent with the drive unit.	value of H01-62.
2. The contact of	H0B45 = 0x2908	Ensure the drive unit
the drive unit is	Check whether the flat cable terminals of	is in good contact with
abnormal.	the drive unit are in good contact.	the baseplate.
3. The version of the drive unit is outdated.	H0B45 = 0x0908: Not all the information in the EEPROM of the drive unit is correct. H0B45 = 0x1908: There is no information in the EEPROM of the drive unit. H0B45 = 0x2908: The communication with EEPROM of the drive unit fails. The fault persists after causes 1 and 2 are removed.	Set H0A-37 to 1 to hide this warning.

Root Cause	Confirming Method	Solution
4. The model of the drive unit is set improperly (2).	H0B45 = 0x4908 This warning occurs only on axis 1: The drive unit model of axis 1 (H01-10) is X. The temperature of axis 1 (H0B-27) under normal ambient temperature is 12°C. This warning occurs to two axes of one drive unit: The drive unit model of axes 1 and 2 are both X. Temperatures of axis 1 and axis 2 under normal ambient temperature are 12°C and above 95°C respectively. The fan operates even though the servo drive is not enabled.	Set the drive unit model (H01-10) of the two axes to 6000X (X is the serial number for general drive unit model).
5. The model of the drive unit is set improperly (3).	H0B45 = 0x4908 The drive unit model of the axis (H01-10) is 6000X. The temperature of the axis (H0B-27) under normal ambient temperature is 12°C.	Set the drive unit model (H01-10) of the axis to X.

■ E3.909: Motor overload

Direct cause:

The temperature of 60Z series motor (200 W and 400 W) reaches the over-temperature threshold.

Root Cause	Confirming Method	Solution
1. The motor cables and encoder cables are connected improperly or in poor contact.	Check the wiring among the servo drive, servo motor and the encoder according to the correct wiring diagram.	Connect cables according to the correct wiring diagram. It is recommended to use the cables provided by Inovance. When customized cables are used, prepare and connect the cables according to the hardware wiring instructions.
2. The load is too heavy, and the effective torque output by the motor keeps exceeding the rated torque during continuous operation.	Check the overload characteristics of the servo drive or motor. Check whether the average load ratio (200B-0Dh) keeps exceeding 100.0%.	Replace with a servo drive of larger capacity and a matching servo motor. Reduce the load and increase the acceleration/deceleration time.
3. The acceleration/ deceleration is too frequent or the load inertia is too large.	Check the mechanical inertia ratio or perform inertia auto- tuning, and view the value of 2008-10h (load inertia ratio). Check the individual running cycle when the servo motor runs cyclically.	Increase the acceleration/ deceleration time.

Root Cause	Confirming Method	Solution
4. The gain is improper or the stiffness level is too high.	Check whether the motor vibrates and generates abnormal noise during running.	Adjust the gain.
5. The model of the servo drive or servo motor is set incorrectly.	View the servo motor model in 2000-06h and the servo drive model in 2001-0Bh.	View the servo drive nameplate and set the servo drive model in 2001-0Bh correctly and use a matching servo motor according to <u>"2.3 Dimension Drawing of</u> <u>MS1H1 Series Servo Motors" on</u> <u>page 38</u> .
6. Locked-rotor occurs due to mechanical factors, resulting in overload during running.	Check the RUN command and motor speed (200B-01h) through the software tool or keypad: RUN command in the position control mode: 200B-0Eh (Position reference counter) RUN command in the speed control mode: 200B-02h (Speed reference) RUN command in the torque control mode: 200B-03h (Internal torque reference) Check whether the value of the RUN command is not 0 or too large but the motor speed is 0 in the corresponding mode.	Eliminate the mechanical factors.
7. The servo drive is faulty.	Power off and on the servo drive again.	Replace the servo drive if the fault persists after the servo drive is powered on again.

■ E3.920: Regenerative resistor overload

Direct cause:

The temperature of the regenerative resistor exceeds the set value.

Root Cause	Confirming Method	Solution
1. The cable of external regenerative resistor is in poor contact, disconnected or	Remove the external regenerative resistor and measure whether its resistance is "∞" (infinite). Measure whether the	Use a new external regenerative resistor. If the resistance measured is the same as the nominal value, connect the regenerative resistor between P and C.
loosened.	resistance between P and C is " ∞ ".	Connect the external regenerative resistor between P and C with a new cable.
2. H02-25 is set improperly.	View the set value of H02-25. Measure the resistance of the external regenerative resistor between P and C, and compare	Set H02-25 correctly. H02-25 = 1 (external, naturally ventilated) H02-25 = 2 (external, forcible air cooling)
3. The resistance of the external regenerative resistor is too large.	it with the value listed in <u>"1.5 Regenerative Resistor</u> <u>Specifications"</u> .	Select a proper regenerative resistor according to the value listed in section 1.5.
4. The value of H02-27 (Resistance of external regenerative resistor) is larger than the resistance of the external regenerative resistor in use.	Check whether the set value of H02-27 is larger than resistance of the external regenerative resistor connected between P and C.	Set H02-27 according to the resistance of the external regenerative resistor in use.
5. The input voltage of the main circuit exceeds the specifications.	Check whether the input voltage of the main circuit on the servo drive side complies with the following specifications: 220 V servo drive: Effective value: 220 V to 240 V Allowable deviation: -10% to +10% (198 V to 264 V) 380 V servo drive: Effective value: 380 V to 440 V Allowable deviation: -10% to +10% (342 V to 484 V)	Replace or adjust the power supply according to the specifications.

Root Cause	Confirming Method	Solution
6. The load moment of inertia is too large.	Perform moment of inertia auto- tuning according to inertia auto- tuning or calculate the total inertia of the machine according to mechanical parameters. Check whether the actual load inertia ratio exceeds 30.	Select an external regenerative resistor of large capacity and set H02–26 to a value consistent with the
7. The motor speed is too high, resulting in an incomplete deceleration within the set time. The motor is in continuous deceleration status in cyclic running.	View the motor speed curve during cyclic running and check whether the motor is in the deceleration status for a long time.	actual resistor power. Select a servo drive with large capacity. Reduce the load if allowed. Increase the acceleration/ deceleration time if allowed.
8. The capacity of the servo drive or the regenerative resistor is insufficient.	View the motor speed curve in an individual cycle and calculate whether the maximum braking energy can be absorbed completely.	Increase the motor running cycle if allowed.
9. The servo drive is faulty.	-	Replace with a new servo drive.

■ E3.922: Resistance of the external regenerative resistor too small

Direct cause:

The value of H02-27 (Resistance of external regenerative resistor) is smaller than the value of H02-21 (Permissible minimum resistance of external regenerative resistor).

Root Cause	Confirming Method	Solution
The resistance of the external regenerative	of the external regenerative resistor between P and C and	If yes, connect an external regenerative resistor that matches the servo drive between P and C, and then set H02-27 according to the actual resistance. If not, set H02-27 according to the actual resistance.

■ E3.939: Motor power cable disconnected

Direct cause:

The actual phase current of the motor is smaller than 10% of the rated current. The actual motor speed is small but the internal torque reference is large.

Root Cause	Confirming Method	Solution
The motor power cable is disconnected.	Check whether the difference between 200B-19h (RMS value of phase current) and 200B-03h (Internal torque reference) exceeds 500%, and whether 200B-01h (Actual motor speed) is smaller than 1/4 of the rated motor speed.	Re-connect the motor power cables. Replace with new cables if necessary.

■ E3.941: Parameter modifications activated at next power-on

Direct cause:

Modifications of some parameters take effect only after servo drive is powered on again. If these parameters are modified, the servo drive reminds users to power on the servo drive again.

Root Cause	Confirming Method	Solution
The parameters you modified are designed to be activated at next power-on.	Check whether parameters you modified are those whose "Effective time" is "Next power-on".	Power on the servo drive again.

■ E3.942: Parameter storage too frequent

Direct cause:

The total number of parameters modified at a time exceeds 200.

Root Cause	Confirming Method	Solution
A great number of parameters are modified and stored frequently in EEPROM (200E-02h = 1).	Check whether parameters are modified frequently from the host controller.	Check the running mode. For parameters that need not be stored in EEPROM, set 200E-02h to 0 before the write operation of the host controller.

■ E3.950: Forward overtravel

Cause	Confirming Method	Solution
The logic of the DI allocated with DI function 14 (FunIN.14: P-OT, positive limit switch) is valid.	Check whether a DI in group 2003h is allocated with DI function 14. Check whether the DI logic of the corresponding bit of 200B-04h (Monitored DI status) is valid.	Check the running mode. On the prerequisite of ensuring safety, send a reverse command or rotate the motor to deactivate the logic of the DI allocated DI function 14.
The position feedback exceeds the positive position limit defined by the software.	The position feedback exceeds the positive position limit defined by the software (607D-02).	Confirm whether the command profile is proper.

■ E3.952: Reverse overtravel

Cause	Confirming Method	Solution
The logic of the DI allocated with DI function 15 (FunIN.15: N-OT, negative limit switch inhibited) is valid.	Check whether a DI in group 2003h is allocated with DI function 15. Check whether the DI logic of the corresponding bit of 200B-04h (Monitored DI status) is valid.	Check the running mode. On the prerequisite of ensuring safety, send a reverse command or rotate the motor to deactivate the logic of DI allocated with DI function 15.
The position feedback exceeds the negative position limit defined by the software.	The position feedback exceeds the negative position limit defined by the software (607D-01).	Confirm whether the command profile is proper.

E3.980: Encoder fault

Direct cause:

An internal fault occurs on the encoder.

Root Cause	Confirming Method	Solution
	If the fault persists after the servo drive is powered off and on several times, the encoder is faulty.	Replace the servo motor.

■ E3.990: Power input phase loss warning

Direct cause:

A three-phase servo drive of 1 kW is allowed to run under a single-phase power supply but the power input phase loss (H0A-00) fault/warning is enabled.

Root Cause	Confirming Method	Solution
When H0A-00 is set to 1 (Enable phase loss fault and warning), a phase loss warning will be reported if a three-phase servo drive of 0.75 kW (H01-02 = 5) allowing single-phase power input is connected to a single-phase power supply.	Check whether the three-phase servo drive is allowed to run under a single- phase power supply.	If the warning persists when a three- phase servo drive is connected to a three-phase power supply, see Er.420 (Main circuit phase loss). If the warning persists when a three- phase servo drive allowing single- phase power input is connected to a single-phase power supply, set H0A-00 (Power input phase loss protection) to 0 (Enable phase loss fault and inhibit phase loss warning).

■ E3.998: Homing object dictionary setting error

Direct cause:

The homing mode (6098h) is set to a value beyond specifications.

Root Cause	Confirming Method	Solution
The set value of object 6098h is not supported.	(hack the set value of object bliggh	Set parameters according to the specifications.

■ E3.E20: Ethernet hardware error

Cause	Confirming Method	Solution
An Ethernet hardware fault occurs.	If the fault persists after the servo drive is powered off and on several times, the Ethernet is faulty.	Replace the servo drive.

■ E3.E21: MAC address not programmed

Cause	Confirming Method	Solution
The MAC address of the servo drive is not programmed.	If the fault persists after the servo drive is powered off and on several times, it indicates the MAC address of the servo drive is not programmed.	Consult with the service personnel of the manufacturer.

5.5 Solutions to Communication Faults

This section describes the solutions to communication faults.

E3.E08: Abnormal switchover of network status

Direct cause:

The synchronization signal of the master is abnormal during synchronous communication.

Root Cause	Confirming Method	Solution
1. During synchronous communication, the slave performs abnormally in data receiving.	Check whether the shielded twisted pair cable is used as the communication cable. Check whether the servo drive is well grounded. Check whether the network port of the servo drive is damaged.	Use the shielded twisted pair cable. Connect the cable according to the wiring instructions. Check the network connection status through the first LED on the keypad.

Root Cause	Confirming Method	Solution
2. During synchronous communication, the master performs abnormally in data transmitting.	The synchronous clock of the host controller is not activated. The synchronous clock error is too large.	Measure the synchronization cycle through an actual oscilloscope or the oscilloscope tool in the software tool. If the synchronization cycle is 0, the synchronous clock of the host controller is not activated. In this case, check whether the network cables connected to each slave come in from the IN port and out from the OUT port. If yes, restart the network. If the network cables are connected in the correct sequence, restart the network directly without the need for prior check. If the synchronization cycle is not 0 and within the permissible fluctuation range (2 μ s) of the servo drive, increase the synchronization loss threshold of the slave (200E-21h).
3. The network switches from OP to non-OP status when the servo drive is enabled.	Check whether the network status switches from OP to non-OP status.	Check the network status switchover program of the host controller.

■ E3.E09: No synchronization signal

Direct cause:

The clock is not configured when the host controller requests for OP.

Root Cause	Confirming Method	Solution
1. The communication synchronous clock is configured improperly, leading to improper master communication configuration.	Replace with another master such as a Beckhoff PLC or an Omron PLC.	Fix the problems in master communication configuration.
2. The IN and OUT ports for EtherCAT communication is connected reversely.	Check whether the IN and OUT ports are connected correctly.	Connect cables to the IN and OUT ports in the correct sequence.

Root Cause	Confirming Method	Solution
3. The controller chip of the slave is damaged.	If the problem persists after the master is changed, measure the synchronization signal generated from the slave controller chip with an oscilloscope. If there is no signal, the slave controller chip is damaged.	Replace the slave controller chip.

■ E3.E11: ESI configuration file not programmed

Direct cause:

The ESI configuration file is not programmed.

Root Cause	Confirming Method	Solution
1. The device configuration file is not programmed.	The slave ID is null when the host controller scans the slave.	Program the device configuration file.
2. The servo drive is faulty.	Check whether the servo drive is faulty.	Replace the servo drive.

■ E3.E13: Synchronization cycle configuration error

Direct cause:

The synchronization cycle is not an integer multiple of the command scheduling cycle after the network switches to the running mode.

Root Cause	Confirming Method	Solution
The synchronization cycle is not an integer multiple of the command scheduling cycle	Check the set value of the synchronization cycle in the controller.	Modify the setting of the synchronization cycle to an integer multiple of the command scheduling cycle. The command scheduling cycle can be calculated through parameters (H01-60 and H01-61).

■ E3.E15: Synchronization cycle error too large

Direct cause:

The error of the controller synchronization cycle is too large.

Root Cause	Confirming Method	Solution
	Measure the synchronization cycle of the controller through the digital oscilloscope or the oscilloscope function in software tool.	Increase the value of 200E-21h.

6 Trial Run

6.1 Pre-running Inspection

Check the following items before operating the servo drive and servo motor.

Checklist before running

Record	No.	Description		
Wiring				
	1	The main circuit power input terminals of the servo drive are connected correctly.		
	2	The motor power cables are connected in the correct phase sequence.		
	3	No short circuit exists in the main circuit power input terminals or the output terminals U, V, W of the servo drive.		
	4	The control signal cables such as the brake and overtravel protection signal cables are connected properly.		
	5	The servo drive and servo motor are grounded reliably.		
	6	The cable tension is within the permissible range.		
	7	The wiring terminals are insulated.		
Environment and Mechanical Conditions				
	 No foreign objects (such as the cable end or metal powder) which may cause short circuit of signal cables and power cables exist inside or outside the servo drive. 			
	The servo drive or external regenerative resistor does not come into contact with flammable objects.			
	3	The servo motor installation and the shaft and mechanical connections are reliable.		
	4	The servo motor and the machine that the servo motor is connected to are ready to run.		

6.2 Power-on

After switching on the power supply, if the bus voltage indicator is in normal status and the keypad displays "reset" \rightarrow "nr" \rightarrow "ry" in sequence, it indicates the servo drive is ready to run and waiting for the S-ON signal to be sent from the host controller.

6.3 Jogging Through the Keypad

The SV820N series servo drive allows you to perform jogging by setting parameters through the keypad. See <u>"4.6 Jog"</u> for details.

6.4 Jogging Through the Software Tool

To perform jogging through the software tool, ensure the corresponding axis is not in EtherCAT control mode.

1 Communication setting

Open the software tool **InoDriveStudio.exe** and perform functions like real-time monitoring, parameter configuration, real-time sampling, single-sampling trigger and emergency stop on the PC through InoDriveShop. The software icon is as follows:



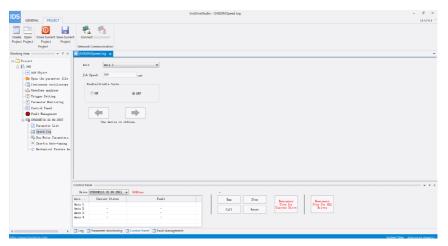
Select the corresponding serial number and baud rate from the Communication Wizard.

Double click the software icon to open the software. Add devices through online scanning or offline mode.

Project Attrik	outes						×
Storage P	osition						1
Proj	ect Name						
Stor	age Path	:\\$V820\\$V8201\					Q
-Connectio Sele		connecting to the	TCP/IP	•			
Add Objec	t						
@ 0n	line Device	Offline Devi	ce				
Online	0	Start Scan S	Stop Scan S	elect All Dese	lect	Hove Up Move Dow	n
Row	Object Name	Object Type	IP Address	Subnet Mask	Gateway	MAC Address	Version
							OK Cancel

2 Jogging

Enter the interface of **Speed JOG**, and execute jogging on 4 axes respectively.



Function Description: The Speed JOG function is mainly used for trial run of the motor speed mode. Select the corresponding axis number in the drop-down box, set the running speed in JOG speed, and set the servo status to S-ON to enable the motor. Next, click and hold down the left arrow button to make the motor run forwardly at the set JOG speed. To stop the motor, release the left arrow button. Similarly, hold down the right arrow button can make the motor run reversely. Set the S-ON status to OFF to disable the motor.

6.5 Cyclic Synchronous Position Mode with AM600

The following description takes Inovance AM600 controller as the master to introduce the communication settings of SV820N series servo drives.

Note: To better fit for SV820N, the software tool of version 1.10 and later is recommended for AM600.

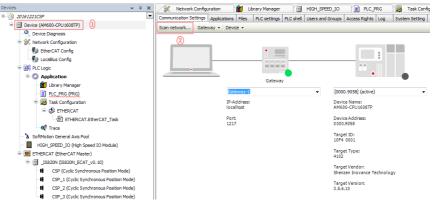
1 Creating a project

Create an AM600 project. Select AM600-CPU1608TP, as shown below.

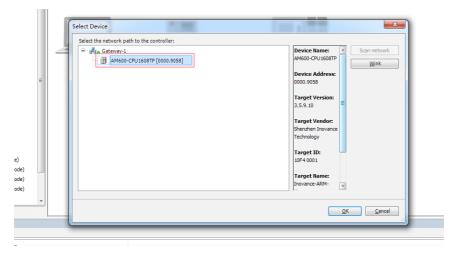
Ble gdit yew Project guild Online Debug Tools	Wuqow Field	
121日日日日日日日日日日日日日日日日日日日日日日日日日日日日日日日日日日日	個・官 團 韓韓 ▶ ■ 目印 왜 왜 좋!ㅎ	
Denkas • 9 X •	Tendad Project Congruent Congruent	
	Lotter Criedante Constant	
POUs Strong Devices	Last bulki O 0 0 0 Prozenolo Curret user (nobody)	

2 Communication setting

Connect the communication cables properly. To set up a normal communication connection, set the IP address of the PC to the same network segment (192.168.1.xxx) as AM600.

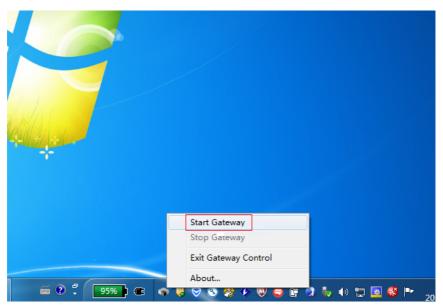


Click Scan network.

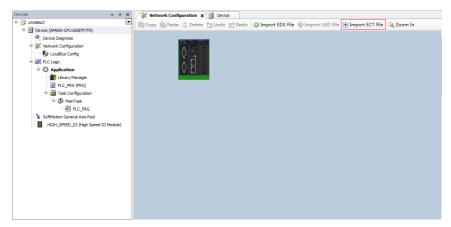


Select the AM600 device scanned. Now the communication connection between PLC and PC is established. Next, configure the device.

Note: If the AM600 device cannot be scanned in InoPro, check whether the CoDeSys gateway is started. If not, start the gateway and perform scanning again. Check whether the CoDeSys gateway in the taskbar at the bottom right of the PC is turned on. If it is in STOP status, click **Start Gateway**.

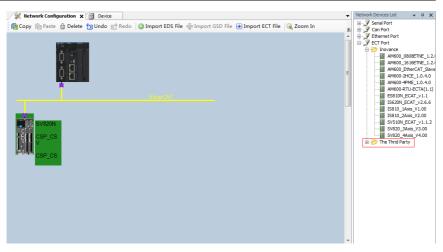


- 3 Adding devices
- a) Add the XML file of SV820N: Click **Import ECT File** in **Network Configuration** to add XML files. Visit the official website of Inovance to download the XML files.



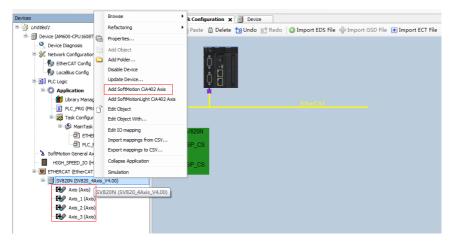
 Perform device configuration on the system: First add the EtherCAT bus, then add the SV820N device. (Directly drag the SV820N_ECAT_V0.10 into the configuration interface.)

X Network Configuration X Device	Network Devices List 🛛 👻 📮 🗙
a Copy a Paste 🔐 Delete 为 Undo 🕜 Redo 💿 Import EDS File 🕂 Import GSD File 🕀 Import ECT File 🔍 Zoom In	E Serial Port
YOW Nobbe Mapple Earlier Modbus Slave Free Protocol YOW Nobbes Master Modbus Slave Free Protocol YOW CANopen Master CANink Master CANink Slave YEthercet Modbus ICP Master Nobbus ICP Slave YEtherCAT Machaster Modbus ICP Slave	Ethernet Port



c) If the software tool version of AM600 is earlier than V1.10, add the four motor axes manually.

Right click the SV820N device option to add four motor axes.



d) Configure EtherCAT master communication parameters: Use the default value and select **eth1** for the network.

Devices 👻 🔻 🛪	🛛 🛞 Network Configuration	Device 🔐 ETHERCAT 🗙	
	General		Ether CAT.
Device Diagnosis Network Configuration	Sync Unit Assignment	EtherCAT NIC Setting	
- 🐏 EtherCAT Config	EtherCAT I/O Mapping	Destination Address (MAC) FF-FF-FF-FF-FF	Enable Redundancy
	Status	Source Address (MAC) 00-00-00-00 Browse Network Name eth1	
Application Ibrary Manager	Information	Select Network by MAC Select Network by Name	
PLC_PRG (PRG) Task Configuration		Distributed Clock Doptions	
🖹 🕸 MainTask		Cycle Time 4000 🗼 µs	
ETHERCAT.EtherCAT_Task PLC_PRG		Sync Offset 0 %	
SoftMotion General Axis Pool HIGH_SPEED_IO (High Speed IO Module)		Sync Window 1 µs	
ETHERCAT (EtherCAT Master)			
SV820N (SV820_4Axis_V4.00) Axis (Axis)			
Axis_1 (Axis)			
Axis_3 (Axis)			

- 4 Configuring PDO Mapping of the slave
- a) Enable expert settings.

Devices 👻 🕂 🗙	Network Configuration	Device ETHERCAT SV820N X
Untitled 1 Device (AM600-CPU 1608TP/TN)	General	Address Additional
Device Diagnosis Wetwork Configuration	Expert Process Data	AutoInc Address 0 + WEnable Expert Settings EtherCAT.
EtherCAT Config	Process Data	Distributed Clock
P II PLC Logic	Startup Parameters	Select DC DC-Synchron 💌
O Application Difference Difference	EoE Settings	✓ Enable 4000 Sync Unit Cycle (µs)
PLC_PRG (PRG)	EtherCAT I/O Mapping	Sync0: Enable Sync 0
😑 🍪 MainTask	Status	Order Sync Unit Cycle x 1 4000 Δ Cycle Time (μs)
- 롄 ETHERCAT_EtherCAT_Task - 롄 PLC_PRG	Information	O User Defined 0 🗼 Shift Time (µs)
SoftMotion General Axis Pool HIGH SPEED IO (High Speed IO Module)		Sync1:
ETHERCAT (EtherCAT Master)		
SV820N (SV820_4Axis_V4.00)		User Defined
Axis_1 (Axis)		Startup checking D Timeouts
Axis_2 (Axis)		▷ DC cyclic unit control: assign to local µC ▷ Watchdog
		Identification
		Oisabled Orfigured Station Alias (AD0 0x0012) Value 1001 ☆
POUs 🗶 Devices		Committee Station was (40.0 exercit) Aging

b) Check the corresponding PDO list. On the PDO configuration interface, process data required by 4-axis CSP mode can be configured. Click SV820N (SV820N_ECAT_v0.10) list.

opert Process Data						
	SM Size Type	PDO List:				
	0 0 Mailbox Out	Index	Size Name	Fla	SM	
ocess Data	1 0 Mailbox In	16#1600	13.0 Outputs	;	2	
	2 52 Outputs	16#1610	13.0 Outputs	5	2	
artup Parameters	3 124 Inputs	16#1620	13.0 Outputs	1	2	
DE Settings		16#1630	13.0 Outputs	1	2	
- Settings		16#1A00	31.0 Inputs		3	
herCAT I/O Mapping		16#1A10	31.0 Inputs		3	
		16#1A20	31.0 Inputs		3	
atus		16#1A30	31.0 Inputs		3	
formation	PDO Assignment (16#1C12):	PD0 Cartent (16#		Move Up 🗣 Move Down		
	✓ 16#1610	Index	Size (Offs Name	Туре	
	✓ 16#1620	16#6040:00	2.0	0.0 CSP_CSV ControlWord	UINT	
	✓ 16#1630	16#6060:00	1.0	2.0 CSP_CSV Modes of Operation	SINT	
		16#607A:00	4.0	3.0 CSP_CSV Target position	DINT	
		16#60B8:00	2.0	7.0 CSP_CSV Touch probe function	UINT	
		16#60FF:00	4.0	9.0 CSP_CSV Target velocity	DINT	
				13.0		
	· · · · · · · · · · · · · · · · · · ·					
	Download	- P				

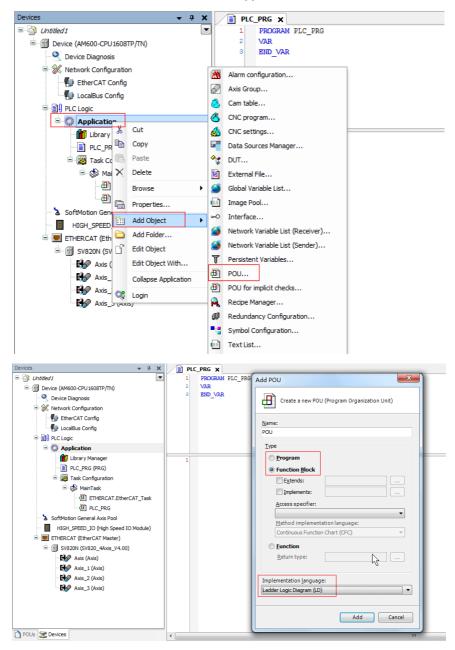
The PDO list configured according to the CSP (Position) + CSV (Velocity) + TP (Touch Probe) mode is as follows.

General	Select the Outputs				Select the Inputs			
	Name	Туре	Index	^	Name	Туре	Index	
Expert Process Data	✓ 16#1600 Outputs				✓ 16#1A00 Inputs			
Process Data	CSP_CSV ControlWord	UINT	16#6040:00		CSP_CSV Error code	UINT	16#603F:00	
	CSP_CSV Modes of Operation	SINT	16#6060:00		CSP_CSV StatusWord	UINT	16#6041:00	
Startup Parameters	CSP_CSV Target position	DINT	16#607A:00		CSP_CSV Modes of Operation Display	SINT	16#6061:00	
	CSP_CSV Touch probe function	UINT	16#60B8:00		CSP_CSV Position actual value	DINT	16#6064:00	
EoE Settings	CSP_CSV Target velocity	DINT	16#60FF:00		CSP_CSV ActualVelocity	DINT	16#606C:00	
EtherCAT I/O Mapping	✓ 16#1610 Outputs				CSP_CSV Touch probe status	UINT	16#60B9:00	
Etherown yo happing	CSP_CSV_1 ControlWord	UINT	16#6840:00		CSP_CSV Touch probe pos1 pos valu	DINT	16#60BA:00	
Status	CSP_CSV_1 Modes of Operation	SINT	16#6860:00		CSP_CSV Touch probe pos2 pos valu	DINT	16#60BC:00	
	CSP_CSV_1 Target position	DINT	16#687A:00		CSP_CSV Following error actual value	DINT	16#60F4:00	
Information	CSP_CSV_1 Touch probe function	UINT	16#68B8:00	=	CSP_CSV Digital inputs	UDINT	16#60FD:00	
	CSP_CSV_1 Target velocity	DINT	16#68FF:00		✓ 16#1A10 Inputs			
	✓ 16#1620 Outputs				CSP_CSV_1 Error code	UINT	16#683F:00	
	CSP_CSV_2 ControlWord	UINT	16#7040:00		CSP_CSV_1 StatusWord	UINT	16#6841:00	
	CSP_CSV_2 Modes of Operation	SINT	16#7060:00		CSP_CSV_1 Modes of Operation Disp	SINT	16#6861:00	
	CSP_CSV_2 Target position	DINT	16#707A:00		CSP_CSV_1 Position actual value	DINT	16#6864:00	
	CSP_CSV_2 Touch probe function	UINT	16#70B8:00		CSP_CSV_1 ActualVelocity	DINT	16#686C:00	
	CSP_CSV_2 Target velocity	DINT	16#70FF:00		CSP_CSV_1 Touch probe status	UINT	16#6889:00	
	✓ 16#1630 Outputs				CSP_CSV_1 Touch probe pos1 pos va	DINT	16#68BA:00	
	CSP_CSV_3 ControlWord	UINT	16#7840:00		CSP_CSV_1 Touch probe pos2 pos va	DINT	16#68BC:00	
	CSP_CSV_3 Modes of Operation	SINT	16#7860:00	_	CSP_CSV_1 Following error actual val	DINT	16#68F4:00	
	CSP_CSVerget position	DINT	16#787A:00		CSP_CSV_1 Digital inputs	UDINT	16#68FD:00	
	CSP CSV 3 Touch probe function	UINT	16#78B8:00	Ŧ	✓ 16#1A20 Inputs			

5 Axis scaling

General Setting	Display Units
icaling	🖲 Pulse 🔘 mm 🔘 um 🔘 nm 🔘 Degree 🔘 In
loming Setting	Offset Distance
lapping	Pulses per motor 16#100000 pulse/rev(1)
Commissioning	NoReducer
M_Drive_ETC_GenericDSP402: I/O Mapping	Working Distance 1 Pulse(2) Pulses(1)
itatus	Pulse=
nformation	O Using Reducer
	Working Distance Per circle 1 Pulse(3) Gear ratio (denominator) 1 (4) Gear ratio (molecular) 1 (5)
	Linear mode Pulses(1) * denominator(4) Pulse= * Offset Distance Working Distance(3)*molecular(5)
	(4)

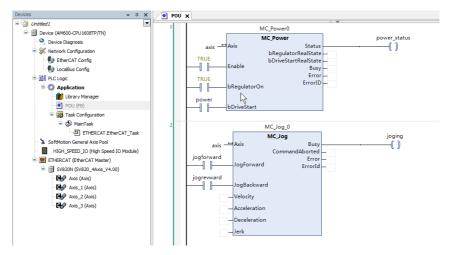
- 6 PLC Program
- a) Add a FB file used for function block edit in Application.



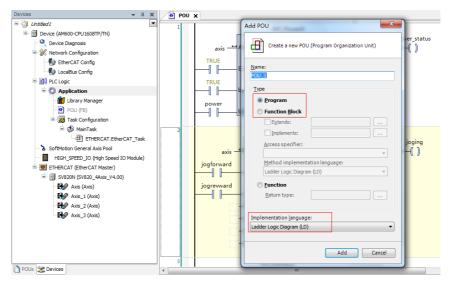
b) Definition part of FB

Devices 👻 🛨 🗙		POU	🗙 🔟 SV820N 🔹 MainTask
🖃 📋 Untitled 1		1	FUNCTION BLOCK POU
Device (AM600-CPU 1608TP/TN)	8	2	VAR_IN_OUT
Q Device Diagnosis		3	axis:AXIS_REF_SM3;
Ketwork Configuration		4	END_VAR
	8	5	VAR_INPUT
EtherCAT Config		6	power:BOOL;
		7	jogforward:BOOL;
🖶 🗐 PLC Logic		8	jogrevward:BOOL;
Application	L .	9	home: BOOL;
Library Manager	1		moveabsolute:BOOL;
	1		reset:BOOL;
		2	pos:LREAL;
🖹 🔣 Task Configuration		3	vel:LREAL; acc:LREAL;
🖃 👹 MainTask		5	dcc:LREAL;
ETHERCAT.EtherCAT_Task		6	END VAR
SoftMotion General Axis Pool	B 1		VAR OUTPUT
	1		power status:BOOL;
HIGH_SPEED_IO (High Speed IO Module)		9	joging:BOOL;
ETHERCAT (EtherCAT Master)		0	home done: BOOL;
🖻 📆 SV820N (SV820_4Axis_V4.00)		1	absmove done: BOOL;
Axis (Axis)	2	2	reset done:BOOL;
Axis 1 (Axis)	2	3	END VAR

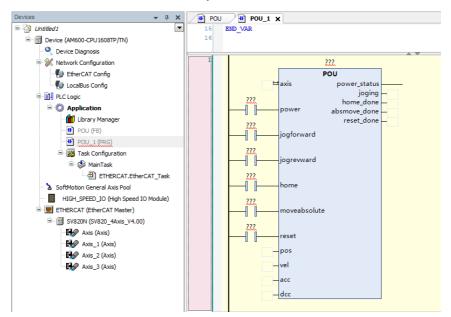




d) Add another POU as shown in step a).

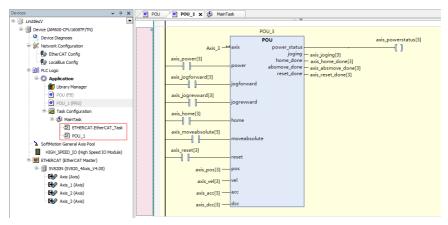


e) Add the FB function block to the newly created POU. Related codes are as follows.

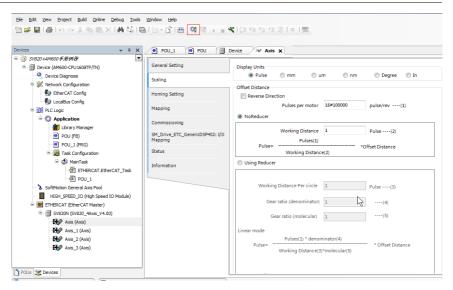


- POU 0 axis_power_status[0] POU power_status -() Axis - axis joging axis_joging[0] home_done - axis_home_done[0] absmove_done - axis_home_done[0] reset_done - axis_reset_done[0] axis_power[0] -0 power axis_jogforward[0] -1 [-jogforward axis_jogrevward[0] ┨┠ jogrevward axis home[0] ٦ŀ home AT_Task axis_moveabsolute[0] -1 Imoveabsolute Module) axis_reset[0] — I Ireset 1 axis_pos[0] pos onous Positi axis_vel[0] - vel axis acc[0] - acc thronous Po axis_acc[0] thronous Po axis_dcc[0] - dcc VAR INPUT POUlace + LREAL thronous Po POU_1 axis power status[1]
- f) Instantiate this FB into four function blocks, and assign them to four axes respectively.

g) After calling this program in the EtherCAT task, you can perform operations like enable, jog, homing, and running in absolute position.



Log onto the PLC to run the bus manually.

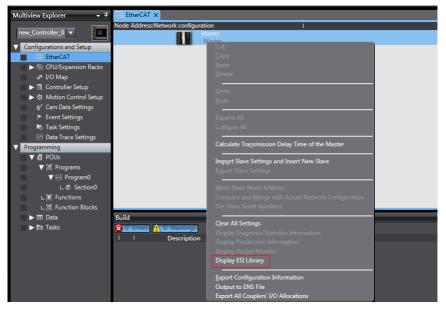


6.6 Commissioning of SV820N with Omron NJ Controller

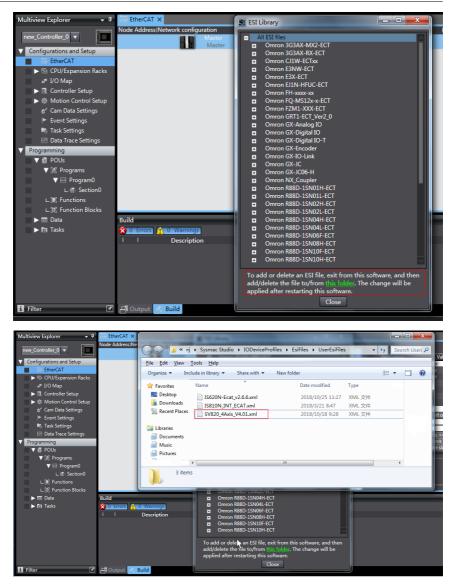
6.6.1 Network Configuration Settings

1 After creating a project, right click the master icon on the EtherCAT device interface to open the menu bar. Click **"Display ESI Library"**.

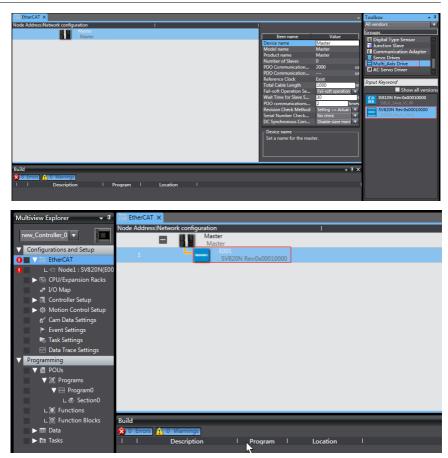
Note: Add the XML files of SV820N (Visit Inovance official website to download XML files).



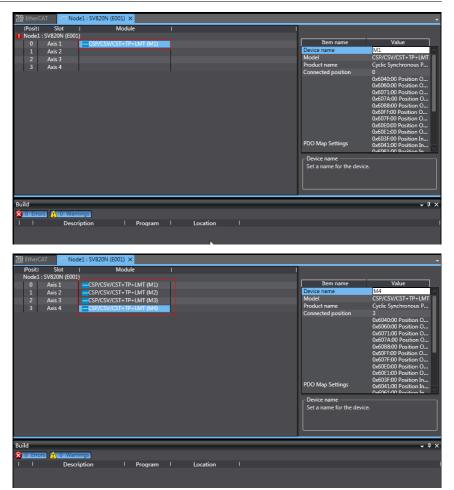
2 In the ESI library list, open the link **"this folder"** below and put the XML files into this folder. Then, exit from Sysmac Studio and open the software again to activate preceding operations.



3 On the upper right of the software, click **"All suppliers"** and select **"Inovance"** in the drop-down menu. Next, double click **"SV820N"** in the device list to add the device to the configuration list. (If the network is already configured, skip to step 4 and use the online upload configuration.)

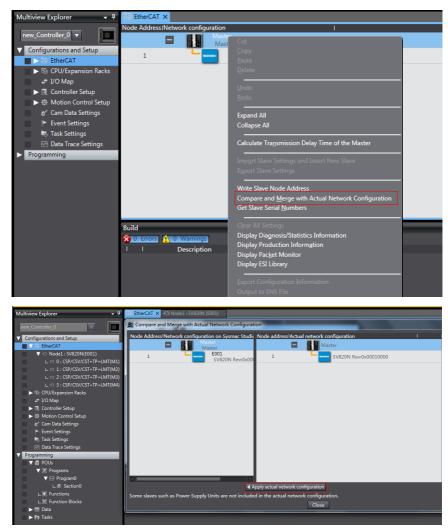


The SV820N is a 4-in-1 servo drive with PDO list pre-planed for easy use of each axis. Select a mode you need from "CSP/CSV+TP, CSP+TP, CST, CSP/CST+TP, CSP/CST/CSV+TP, PP+TP, PP\PV\PT+TP", and the PDO list needed by this mode will be selected by XML files through working with the controller. All the axes in this application example are selected with CSP/CST/CSV+TP mode.



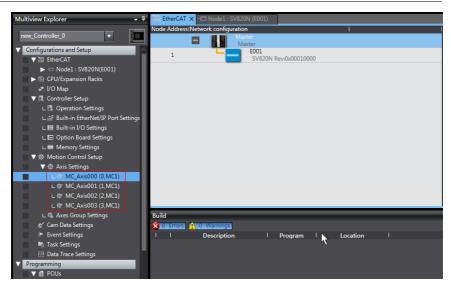
- 4 Set the EtherCAT communication site address through H0E-21 (available only for NJ and not needed by Beckhoff Twincat). Perform a power cycle after setting. For easier configuration management, it is recommended to set the address according to the actual physical connection order.
- 5 Configure the master modification as online mode. Compare and merge with the physical network configuration in the menu bar. Configure the actual physical network to the network configuration of Sysmac software.

6 Trial Run

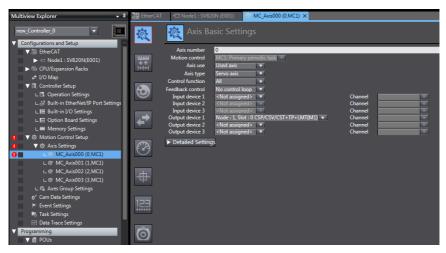


6.6.2 Communication Data Configuration

- 1 Motion control axis setting
- a) Add axis settings in motion control. Double-click MC_Axis000 and configure the SV820N device at the corresponding site in the corresponding interface, as shown in the following figure. MC_Axis000 can be renamed. For example, if it is renamed as "right unwinding", the axis variable "right unwinding" used in the NJ program represents control on this axis.



b) Perform detailed configurations for the axis parameters: All four axes under each slave need to be configured according to the same process. If the number of axes is less than 4, set the value of H02-00 to 255 to hide this axis. The axes in normal use can be configured according to the normal process. The following example shows how to configure one of the axes.



2 Configuration of mapping variables in servo axis communication

Click **Detailed Settings** to expand the parameter configurations. Perform object mapping configuration according to the following figure. The axis configuration needs to be performed manually due to the limit on software tool configurations of Omron.

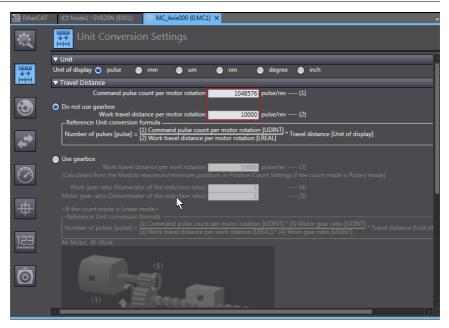
🛱 EtherCAT	- Node1 : SV820N (E001)	00 (0,MC1) ×	
¢,	酸 Axis Basic Settings		
	 Detailed settings 		
1444	Reset to Default		
**	Function Name	Device	Process Data
HHH	 Output (Controller to Device) 		
	★ 1. Controlword	Node : 1, Slot : 0 CSP/CSV/CST+ 💌	6040h-00.0(Position O
	★ 3. Target position	Node : 1, Slot : 0 CSP/CSV/CST+ 🔻	607Ah-00.0(Position O 🔻
	5. Target velocity	Node : 1, Slot : 0 CSP/CSV/CST+ 💌	60FFh-00.0(Position Ot 🔻
	7. Target torque	Node : 1, Slot : 0 CSP/CSV/CST+ 🔻	6071h-00.0(Position O
	9. Max profile Velocity	<not assigned=""></not>	<not assigned=""></not>
	11. Modes of operation	Node : 1, Slot : 0 CSP/CSV/CST+ 🔻	6060h-00.0(Position O
	15. Positive torque limit value	<not assigned=""></not>	<not assigned=""></not>
	16. Negative torque limit value	<not assigned=""></not>	<not assigned=""></not>
	21. Touch probe function	Node : 1, Slot : 0 CSP/CSV/CST+ 🔻	60B8h-00.0(Position O
~	44. Software Switch of Encoder's Input	<not assigned=""></not>	<not assigned=""></not>
	 Input (Device to Controller) 		
\mathbf{S}	★ 22. Statusword	Node : 1, Slot : 0 CSP/CSV/CST+ 🔻	
	★ 23. Position actual value	Node : 1, Slot : 0 CSP/CSV/CST+ 🔻	6064h-00.0(Position In 💌
	24. Velocity actual value	Node : 1, Slot : 0 CSP/CSV/CST+ 🔻	606Ch-00.0(Position In 🔻
⊕ -	25. Torque actual value	Node : 1, Slot : 0 CSP/CSV/CST+ 🔻	6077h-00.0(Position In 💌
Ψ	27. Modes of operation display	Node : 1, Slot : 0 CSP/CSV/CST+ 🔻	6061h-00.0(Position In 🔻
	40. Touch probe status	Node : 1, Slot : 0 CSP/CSV/CST+ 🔻	60B9h-00.0(Position In 💌
	41. Touch probe pos1 pos value	Node : 1, Slot : 0 CSP/CSV/CST+ 🔻	60BAh-00.0(Position In 💌
23	42. Touch probe pos2 pos value	<not assigned=""></not>	
	43. Error code	Node : 1, Slot : 0 CSP/CSV/CST+ ▼	603Fh-00.0(Position In
	45. Status of Encoder's Input Slave	<not assigned=""></not>	<not assigned=""></not>
_	46. Reference Position for csp	<not assigned=""></not>	<not assigned=""></not>
ш.	D' 11		
-	Digital inputs		
	28. Positive limit switch	Node : 1, Slot : 0 CSP/CSV/CST+	
	29. Negative limit switch	Node : 1, Slot : 0 CSP/CSV/CST+	
23	30. Immediate Stop Input	Node : 1, Slot : 0 CSP/CSV/CST+	
	32. Encoder Phase Z Detection	Node : 1, Slot : 0 CSP/CSV/CST+	
	33. Home switch	Node : 1, Slot : 0 CSP/CSV/CST+	
_	37. External Latch Input 1	Node : 1, Slot : 0 CSP/CSV/CST+	
	38. External Latch Input 2	Node : 1, Slot : 0 CSP/CSV/CST+	▼ 60FDh-00.18(Position I ▼

3 Servo axis parameter configuration

Unit conversion setting

Select 8388608 PPR for the SV820N motor and use the default working stroke per revolution.

Such conversion is similar to the electronic gear conversion performed on the host controller, which removes the need for setting the internal conversion ratio.



4 Operation setting

After the electronic gear ratio is set, a warning will be reported if the maximum speed is reached. In this case, reset the parameters.

10000 pulses/s represents 1 R/S (60 RPM) of the servo motor.

Set the maximum speed and jogging speed according to actual conditions. Other parameters can be left unset if there is no special requirement.

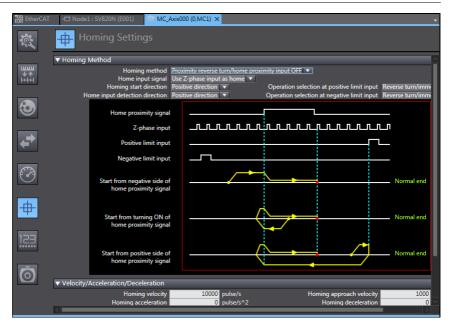
EtherCAT	- Node1 : SV820N (E001)	WC_Axis000 (0,MC1)	×		
ţ,	Operation Settir	ıgs			
	Velocity/Acceleration/Deceler	ation			
	Maximum velocity Start velocity Maximum jog velocity	400000 puls 0 puls 100000 puls	ie/s ie/s	Velocity warning value	0 %
(-)	Maximum acceleration Maximum deceleration	0 puls 0 puls	se/s^2	Acceleration warning value Deceleration warning value	0 % 0 %
	Operation selection at Reversing	Use rapid acceleration/ Deceleration stop	deceleration (b	Blending is changed to Buffered) 🔻	J
	▼ Torque				
₩	Positive torque warning value	0 %		Negative torque warning value	0 %
	▼ Monitor				
Ĩ	In-position range Actual velocity filter time constant	10 puls 0 ms	se.	In-position check time Zero position range	0 ms 10 pulse
+					
123					
Ō					
	K				

5 Homing

Pay attention to the setting of the homing mode as it involves the cooperation between the servo drive and the host controller. Set the homing mode according to the following table.

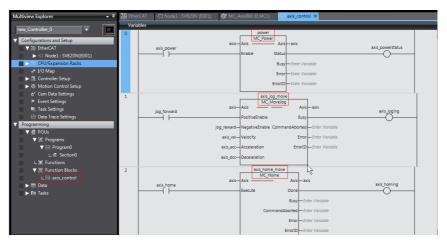
NJ Software Description	Servo Drive Function	Terminal Configuration
Home near signal	Home switch (FUN31)	DI9
External home input	Probe 1 (FUN38)	DI8
Phase Z signal input	Motor encoder phase Z signal	N/A
Positive limit input	P-OT (FUN14)	DI1
Negative limit input	N-OT (FUN15)	DI2

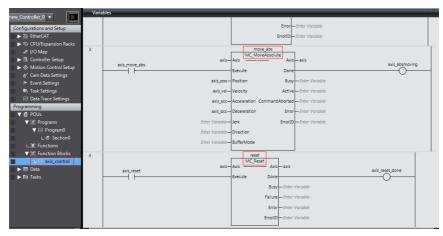
Note: The Z signal and external home switch signal cannot stay active at the same time.



6.6.3 Program-Controlled Operations

After configurations are done, you can control the servo drive operations through the PLC program. To facilitate programming, a packetized function block is used for the convenience of testing. This function block contains MC_power, MC_moveabsolute, MC_jog, MC_home, and MC_reset.





Call the function block in section0, and you can make the shaft rotate through the bus.

new Controller 0 🔻	Variables	
	0 axis_control0	
Configurations and Setup	MC_Axis000—axisaxisaxis	
Programming	axis_power0axis_power axis_powerstatus	
▼		alse)
V 🖳 Programs		1
L Section0	(Faise) jog_reward0—jog_reward axis_homing—axis_homing0 (Fa	alse)
	(False) axis_home0— axis_home axis_absmoving — axis_absmoving0 (Fa	alse)
▼ 🗟 Function Blocks	(False) axis_move_abs0—axis_move_abs axis_reset_done —axis_reset_done0 (Fa	alse)
L Saxis_control	(False) axis_reset0-axis_reset	
Data	(100000) axis_pos0—axis_pos	
Tasks	(100000) axis vel0—axis vel	
	(100000) axis acc—axis acc	
	(100000) axis_dcc0—axis_dcc	
	1 axis_control1	
	MC Axis001 axis MC Axis001	
	axis_power1 axis power axis powerstatus	
	(False) jog_forward1 jog_forward axis_loging1 (Fa	alse)
	(Faise) jog_reward1 jog_reward axis_homing axis_homing1 (Fa	alse)
	(False) axis_home1 axis_home axis_absmoving axis_absmoving (Fa	alse)
	(False) axis_move_abs1= axis_move_abs axis_reset_done = axis_reset_done1 (Fa	alse)
	(False) axis_reset1	

new_Controller_0 Configurations and Setup Programming I POUs	Variable: 2	axis_power2		MC_Axis002	axis_		MC_Axis002	
 ♥ IP Programs ♥ IP Program0 L IS Section0 L IS Functions ♥ IS Function Blocks ♥ IS Function Blocks ♥ ID Data ♥ IT Data 		(=) (1 (1 (1) (1) (1)	(False) (False) (False) (False) 00000) 00000) 00000)	jog_forward2 jog_reward2 axis_home2 uxis_move_abs2 axis_reset2 axis_reset2 axis_pos2 axis_yet2 axis_acc2 axis_dcc2	jog_forward jog_reward axis_home axis_move_abs axis_reset axis_pos axis_vel axis_vel axis_acc	axis_homing axis_absmoving	axis_loging2 axis_homing2 axis_absmoving2 axis_reset_done2	(False) (False) (False) (False)
	3	axis_power3	(False) (False) (False)	MC_Axis003 jog_forward3 jog_reward3 axis_home3	axis axis axis_power jog_forward jog_reward axis_home	axis_powerstatus axis_joging axis_homing axis_absmoving	MC_Axis003 axis_joging3 axis_homing3 axis_absmoving3 axis_reset_done3	(False) (False) (False) (False)

6.7 Cyclic Synchronous Position Mode and NC Axis Jogging

The following takes the Beckhoff TwinCAT master as an example to show how to configure the SV820N servo drive in cyclic synchronous position (CSP) mode.

1 Installing the TwinCAT software

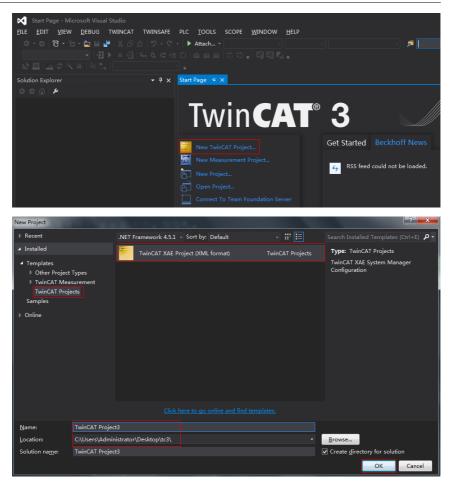
The twinCAT3 software, which can be downloaded from the official website of Beckhoff, supports 32/64-bit WIN7 systems. The following takes the 32-bit WIN7 system as an example.

別の目的100-100-100-100-100-100-100-100-100-100
4 TC31-Full-Setup.3.1.4020.32.exe
🔚 TC31-Full-Setup.3.1.4020.32.zip
vs_intshelladditional.exe
vs_isoshell.exe

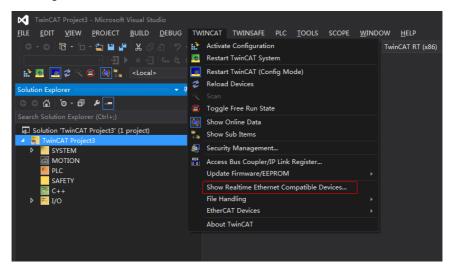
Note:

A Fast Ethernet (FE) card with Intel chip must be used in the case of direct drive by a PC. If the network card of other brands is used, the EtherCAT operation may fail.

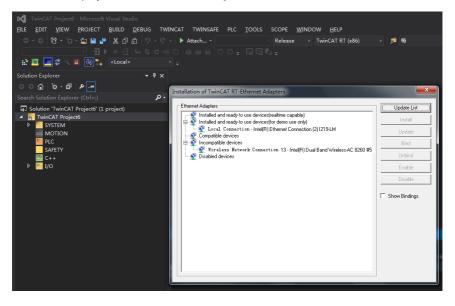
- 2 Copy the EtherCAT configuration file (Ino_MultiAxesDrive_ECAT_V0.10.xml) of SV820N to the TwinCAT installation directory: \TwinCAT\IO\EtherCAT.
- 3 Open Visual studio, and create a New Twincat3 Project.



4 Installing the TwinCAT card drive

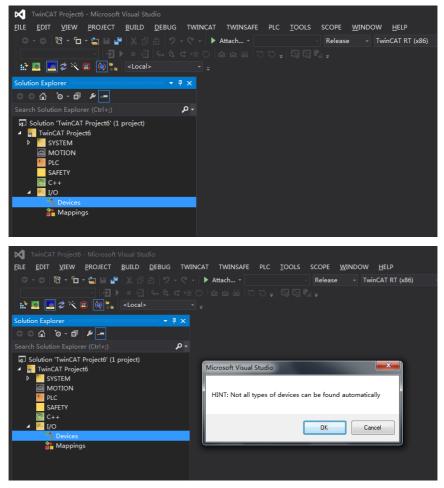


Open **Show Realtime Ethernet Compatible Devices...** in the menu shown in the preceding figure. In the pop-up dialog box shown below, select local network in **Incompatible devices**, and click **Install**. After the installation is done, the network card installed is displayed in **Installed and ready to use devices**.

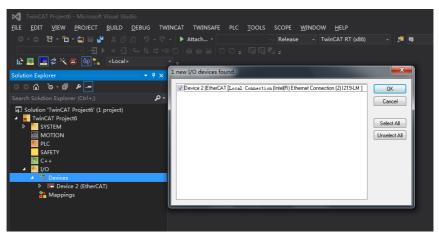


5 Searching for devices

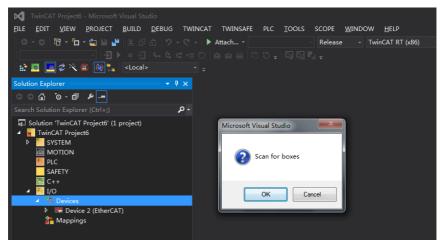
Create a project and start searching for devices. Select " Devices ", and click " 🔌 " as shown in the following figure.



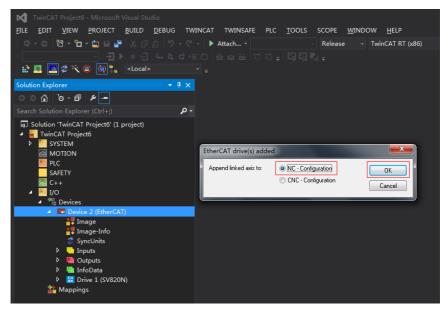
Click OK.



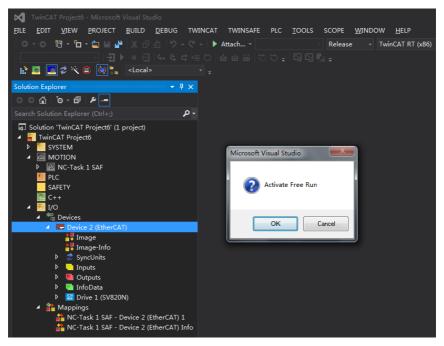
Click OK.



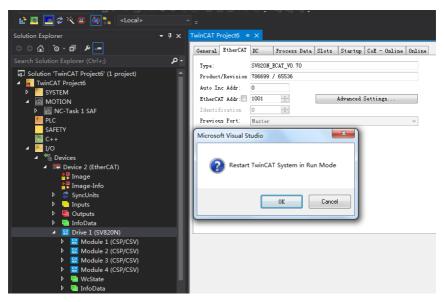
Click OK.



Click OK.



Click Cancel. The device search is completed, as shown in the following figure.



6 Configuring PDO content

Take CSP mode as an example:

- a) Configure RPDO: If 4 axes are used, select 0x1600, 0x1610, 0x1620, and 0x1630
- b) The procedures for configuring RPDO are as follows:

If the servo drive is running in the position mode, configurations need no change. If the servo drive is running in other modes, change the PDO list to fit the running mode. To change the PDO list, right click the **PDO Content** window, click **Delete** to delete the redundant default PDOs, and click **Insert** to add the PDOs needed.

■ 味方実资源管理器(Ctrl+;) ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・	Sync Manager:	PDO List:		-				-
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Axis 1	1 256 MbxIn	0x1600	13.0	Outputs		2	0	
▶ ➡ Axis 2	2 52 Out	0x1A10	31.0	Inputs		3	0	
🕨 🖬 Axis 3	3 124 Inputs	0x1610	13.0	Outputs		2	0	
Axis 4	(2		31.0	Inputs		3	0	
9 PLC	· · · · · · · · · · · · · · · · · · ·	0x1620	13.0	Outputs		2	0	
SAFETY		0x1A30	31.0	Inputs		3	0	
R C++		0x1630	13.0	Outputs		2	0	
₩ C//								
▲ ⁴ Devices	4							
								1
 Device 2 (EtherCAT) 	PDO Assignment (0x1C12):	PDD Conter	t (0x160	0):				_
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🕂 Image-Info	0x1610	0x6040:0	2	0 0.0	ControlWord	UINT		1
🕨 🥏 SyncUnits	▼0x1620	0x6060:0	1.	0 2.0	Modes of Operation	SINT		
🕨 ᅼ Inputs	W0x1630	0x607A:0	3 4.	0 3.0	Target position	DINT		
🕨 🖷 Outputs	(3)	0x60B8:0			Touch probe function	UINT		
InfoData		Ox60FF:0) 4.	0 9.0	Target velocity	DINT		
Orive 1 (SV820N)				1200	Insert			
Module 1 (CSP/CSV + TP)		4	_		inserem ()		1 - I
Module 2 (CSP/CSV + TP)				<u> </u>	Delete			
Module 3 (CSP/CSV + TP)	Download	Predefine	d PDO As	signment	Edit		Y	
Module 4 (CSP/CSV + TP)	🗹 PDO Assignment	Load PDO	info from	a device				1
WeState	🗹 PDO Configuration	Sync Unit			Move Up			á
v == wcstate		Sync Unit	Assignme	enc	Move Down			J

c) The default RPDO list is as follows:

	Size	Type	Flags	Index	Size	e N	ame			Flags	SM	SV	
	256	MbxOut		0x1A00	31.0		nputs			6-	3	0	
	256	MbxIn		0x1600	13.0		utputs				2	0	
	52	0ut		0x1A10	31.0		nputs				3	0	
	124	Inputs		0x1610	13.0		utput				2	0	
		-		0x1A20	31.0		inputs				3	0	
				0x1620	13.0) ()	lutputs 🔰				2	0	
				0x1A30	31.0) I	inputs Def	ault PDO (of avis 1		3	0	
				0x1630	13.0) 0	lutputs				2	0	
۵.	rri maa	t (Ox1C12	► ►	PDO Conte	+ (Ωv	1600)	1						
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	1610				~						Туре	De	13
x	1620			0x6040:0		2.0	0.0 2.0		olWord	:	UINT SINT		
x)	1630			0x6060:0		4.0	2.0		of Operati t position		DINT		
				0x60B8:0		4.0	7.0		probe fund		UINT		
				0x60FF:0		4.0	9.0		t velocity		DINT		
					-		13.0						
-	load			Predefine	_					7			► ▼
n		therCAT	DC I	Predefine Process Data PDO Li	Slot			ne) E - Onli	ne Online	1			
en Sy	eral E	ger:		rocess Data PDO Li	Slot				ne Online	Flags	SM	SU	
s Sy S	eral E nc Mana 3M Si) 25	ger: ze Typ 6 Mbx	e Fla	Process Data PDO Li gs Inde: 0x1A	Slot ist: x	ts S Size 31.0	tartup Co		ne Online		3	0	
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	eral E nc Mana M Si 252 523 12 0 Assig 0x1600 0x1610 0x1620	ger: ze Typ 6 Mbx 6 Mbx 6 Mbx 0 ut 4 Inp	e Fla Dut In uts	Process Data PD0 Li gs Under 0x1A 0x1A<	Slot xx 3 000 0 100 200 200 330 000 0 000 0 000 0 000 0 000 0 000 0 000 0 000 0 000 0 000 0	Size 31.0 13.0 31.0 13.0 31.0 13.0 31.0 13.0 (0x16	tartup Co Name Inputs Outputs Inputs Outputs Inputs Jutputs Jutputs Sutputs Sutputs	E - Onli Defaul fs N. 0 C.	t PDO of axis	Flags 52	3 2 3 2 3 2 3 2 2 7 7	0 0 0 0 0 0 0 0 0	Defe
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) 1	256 256	MbxOut MbxIn		0x1A00 0x1600	31.0 13.0		puts tputs			3 2	0	
2	52	Out		0x1800	31.0		oputs puts			3	0	
3	124	Inputs		0x1610	13.0		tputs			2	0	
				0x1A20	31.0		puts			3	0	
				0x1620	13,0	Out	tputs			2	0	
				0x1A30	31.0	Inj	puts			3	0	
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d) Example: CSP (Position) + CSV (Velocity) + TP (Touch probe)

Configuring TPDO: If four axes are used, select 0x1A00, 0x1A10, 0x1A20, and 0x1A30.

The procedures for configuring RPDO are as follows:

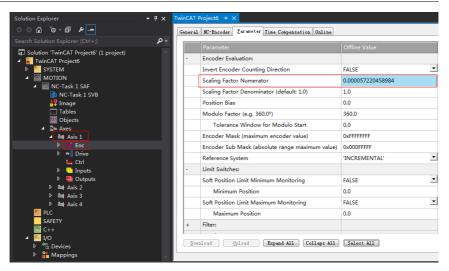
If the servo drive is running in the position mode, configurations need no change. If the servo drive is running in other modes, change the PDO list to fit the running mode.

To change the PDO list, right click the **PDO Content** window, click **Delete** to delete the redundant default PDOs, and click **Insert** to add the PDOs needed.

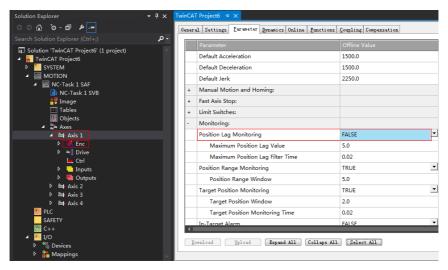
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			_	0x1A20	31.0	Inp	uts			3	0
			$\widehat{1}$	0x1620	13.0	Out	puts			2	0
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The similar process can be applied to 0x1A00, 0x1A10, 0x1A20, and 0x1A30 lists.

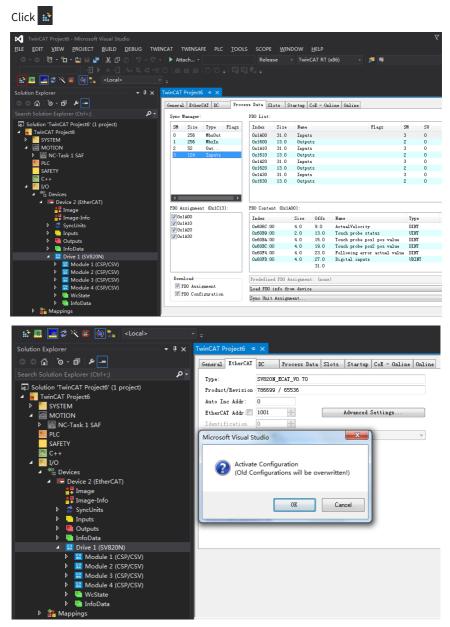
Click **Axis 1** in **Axes**, select **Parameter** and set the scaling parameter of the device axis. In this example, set the displacement unit per revolution to 60 mm, and the value in **Scaling Factor Numerator** is 60/1048576 (same settings as the other axes).



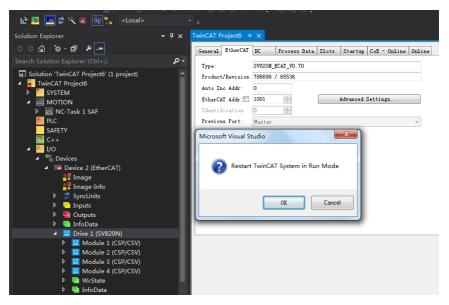
Click **Axis 1** in **Axes**, select **Parameter**, and hide the system deviation temporarily (same as other axes).



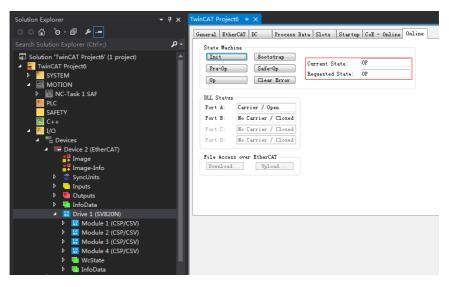
7 Activate the configuration and switch to the running mode.



Click OK.



After clicking **OK**, you can observe through the **Online** interface that the device enters OP status, and the second LED on the servo drive keypad displays "8", and the keypad displays "1_88RY".



- 8 Servo drive controlled through NC axis or PLC
- a) Setting the control type

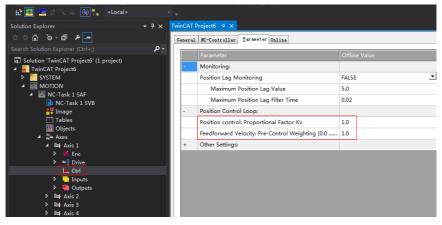
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b) The PID types of the control loop are shown in the following table.

Position loop: servo drive Speed loop: servo drive	Servo drive: position mode	Position Controller P
Position loop: TWinCAT NC Speed loop: servo drive	Servo drive: velocity mode	Position Controller PID (With Ka)

Note: Speed loop can also be performed through TWinCAT NC with the target torque transmitted to the servo drive per cycle. However, this mode is not recommended due to massive additional loads imposed on the CPU and network.

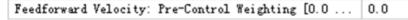
c) Setting control parameters



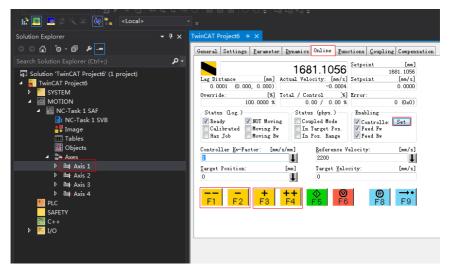
Adjust the position loop proportion based on actual responses.

```
Position control: Proportional Factor Kv 1.0
```

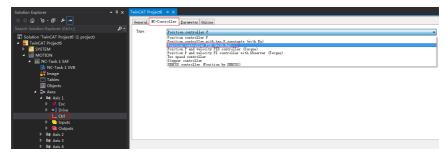
Adjust the speed feedforward coefficient based on actual responses.



- 9 Jogging of NC axis
- a) Click **Set** and a dialog box pops out. Click **All** to enable the servo drive. Perform jogging through F1 to F4.



b) Setting the control type

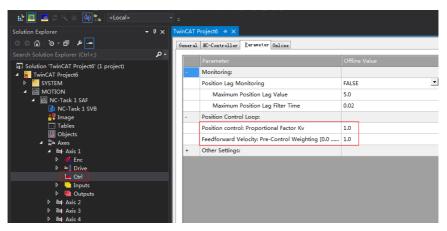


c) PID type of the control loop:

Position loop: servo drive Speed loop: servo drive	Servo drive: position mode	Position Controller P
Position loop: TWinCAT NC Speed loop: servo drive	Servo drive: velocity mode	Position Controller PID (With Ka)

Note: The speed loop can also be performed by TWinCAT NC with the target torque transmitted to the servo drive per cycle. However, such mode is not recommended because of the massive additional load imposed on the CPU and network.

d) Setting control parameters



Adjust the position loop proportion based on actual responses.

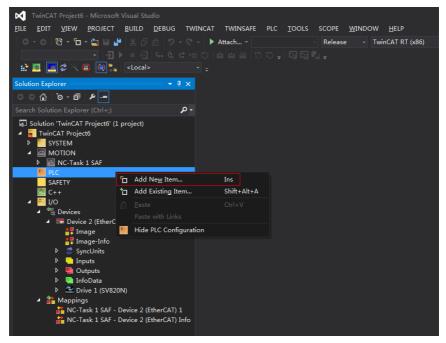
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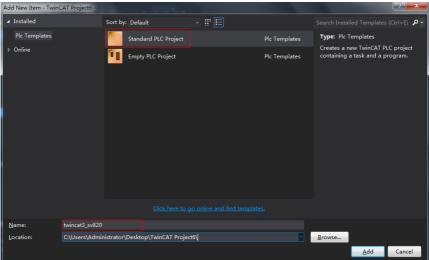
Adjust the speed feedforward coefficient based on actual responses.

Feedforward Velocity: Pre-Control Weighting [0.0	0.0
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10 PLC program

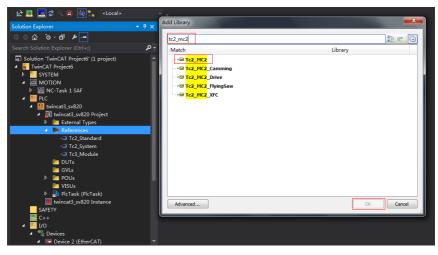
a) Creating a PLC program





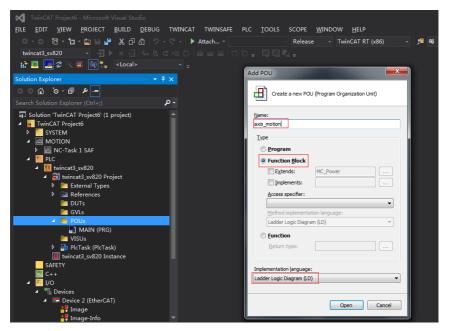
Add a motion control library for easy calling of the motion control function block.

6 Trial Run

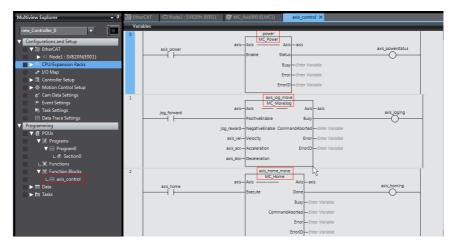


Create a new POU.

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Create a new FB and add **MC_power**, **MC_jog**, **MC_home**, **MC_absolute** and **MC_reset** to FB.



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Task Settings		axis_vel—Velocity Active—Enter Variable
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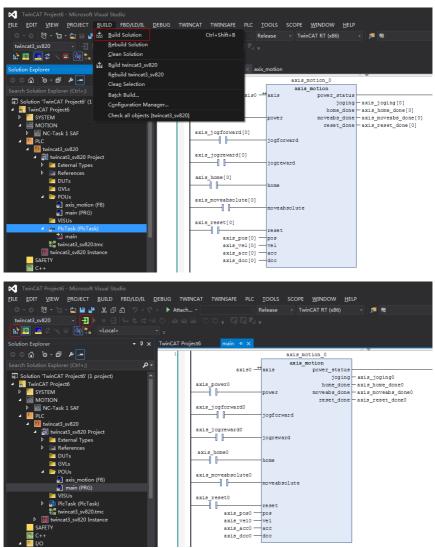
Call axis_motion in main.

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 Device 2 (EtherCAT) 		-	WALK INCLUSIO	

Call the program in **PlcTask**.

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🖌 🔚 Device 2 (EtherCAT)			>

Compile the program. If there is no fault, configuration can be activated, and then log onto the PLC.



Click the arrow indicated by the red box to start the PLC. After the PLC starts running, you can run the servo drive through the bus.

TwinCAT Project6 - Microsoft Visual Studio		
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6.8 Servo Stop

The stop modes can be coast to stop, stop at zero speed, ramp to stop, stop at emergency-stop torque, and DB braking. The stop state can be de-energized state or position lock state.

See the following table for details.

Stop Mode	Description	Feature
Coast to stop	The servo motor is de-energized and decelerates to 0 RPM gradually. The deceleration time is affected by the mechanical inertia and friction.	This mode features smooth deceleration and small mechanical impact, but the deceleration duration is long.
Stop at zero speed	The servo motor takes 0 RPM as the target speed and decelerates immediately from the present speed to 0 RPM and stops.	This mode features quick and fast deceleration, but the mechanical impact is large.
Ramp to stop	The servo drive decelerates smoothly to 0 RPM and stops.	This mode features smooth and controllable deceleration with small mechanical impact.
Stop at emergency torque	The servo drive outputs the reverse braking torque to stop the motor.	This mode features quick and fast deceleration, but the mechanical impact is large.
DB braking	The servo motor works in dynamic braking status.	This mode features quick and fast deceleration, but the mechanical impact is large.

Comparison of five stop modes

Table 6-1	Comparison of three stop Status
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Stop Status	Description
De-energized state	The motor is not energized after stop, and the motor shaft can be rotated freely.

Stop Status	Description
Position lock state	The motor shaft is locked and cannot be rotated freely after the motor stops.
DB state	The motor keeps DB state after stop.

The servo drive stops due to the following causes:

1 Stop at S-ON signal off:

Switch off the S-ON signal through communication, and the servo drive stops according to the stop mode at S-ON off.

☆ Related parameters:

605Ch			le operatio 1 code	on	Setting Condition & Effective Time	Any condition & At stop	Data Structure	-	Data Type	int16
	Access	RW	Mapping	No	Related Mode	All	Data Range	-3 to 1	Default	0

Used to set the deceleration mode of the servo motor from rotating to stop and the servo motor status after stop when the S-ON signal is OFF. Set a proper stop mode according to the mechanical status and running requirement.

After the brake output is enabled, the stop mode at S-ON off is forcibly set to "Stop at zero speed, keeping DB status".

2 Stop at fault:

The stop mode varies with the fault type. See <u>"5 Troubleshooting"</u> for details.

☆ Related parameters:

H02-08	Name	Sto	p mode at fault		Setting Condition & Effective Time	At stop & Immedi- ately	Data Structure	-	Data type	Uint16
2002-09h	Access	RW	RW Mapping		Related	All	Data	0 to	Default	0
			11 0		Mode		Range	2		
Defines the deceleration mode of the servo motor from rotating to stop and the servo motor status after stop at No. 1 fault.					motor					
Value			Stop Mode							
	0		Coast to	Coast to stop, keeping de-energized state						
1		DB stop, keeping de-energized state								
2		DB stop	DB stop, keeping DB state							
After the b			is enable	d, the s	top mode a	t No. 1 fault	is forcibly	set to	o "DB sto	p,

keeping DB state".

605Eh	Name		ult reactio ption code		Setting Condition & Effective Time	Any condition At stop	Data Structure	VAR	Data Type	int16
	Access	RW	Mapping	No	Related Mode	All	Data Range	-5 to 3	Default	2

Defines the deceleration mode of the servo motor from rotating to stop and the servo motor status after stop.

Value	Stop Mode
-5	Stop at zero speed, keeping DB state
-4	Stop at the emergency-stop torque, keeping DB state
-3	Ramp to stop as defined by 6085h, keeping DB state
-2	Ramp to stop as defined by 6084h/609Ah (HM), keeping DB state
-1	DB stop, keeping DB state
0	Coast to stop, keeping de-energized state
1	Ramp to stop as defined by 6084h/609Ah (HM), keeping de-energized state
2	Ramp to stop as defined by 6085h, keeping de-energized state
3	Stop at emergency-stop torque, keeping de-energized state

After the brake output is enabled, the stop mode at No. 2 fault is forcibly set to "Stop at zero speed, keeping DB state".

3 Stop at overtravel:

★ Definitions of terms:

"Overtravel": The distance of the mechanical movement exceeds the designed range of safe movement.

"Stop at overtravel": When the moving part moves beyond the range of safe movement, the limit switch outputs level changes, and the servo drive forces the motor to stop.

☆ Related parameters:

H02-07	Name		p mode at vertravel	:	Setting Condition & Effective Time	At stop Immedi- ately	Data Structure	-	Data type	Uint16	
2002-08h	Access	Mode Range									
	Defines the deceleration mode of the servo motor from rotating to stop and the servo motor status after stop at overtravel.										
Value					Sto	p Mode					
0	Coast	to sto	p, keeping	de	energized s	tate					
1	1 Stop at zero speed, keeping position lock state										
2	2 Stop at zero speed, keeping de-energized state										
When the servo motor drives a vertical axis, set 2002-08h to 1 to lock the motor shaft position											

When the servo motor drives a vertical axis, set 2002-08h to 1 to lock the motor shaft position after overtravel occurs.

After the brake output is enabled, the stop mode at overtravel is forcibly set to "Stop at zero speed, keeping position lock status".

If the servo motor enters overtravel status when driving a vertical axis, the workpiece may fall. To prevent such risk, set 2002-08h (Stop mode at overtravel) to 1 (Stop at zero speed, keeping position lock status). When the workpiece moves linearly, install limit switches to prevent mechanical damage. If the limit switch signal is activated, enter a reverse command to make the motor (workpiece) run in the reverse direction.

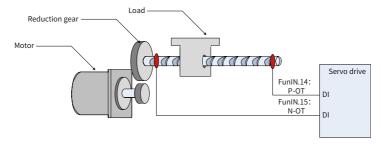


Figure 6-1 Installation of limit switches

To use the limit switch, allocate function 14 (FunIN.14: P-OT, positive limit switch) and function 15 (FunIN.15: N-OT, negative limit switch) to two DI terminals of the servo drive and set the valid logic of the DI terminal. This is to enable the servo drive to receive the level signals input from the limit switch. The servo drive enables or cancels the stop-at-overtravel status based on the DI terminal level status.

Function No.	Name	Function	Description
FunIN.14	P-OT	Positive limit switch	When the mechanical movement is outside the movable range, the overtravel prevention function will be activated. Invalid: Forward drive permitted Valid: Forward drive inhibited
FunIN.15	N-OT	Negative limit switch	When the mechanical movement is outside the movable range, the overtravel prevention function will be activated. Invalid: Reverse drive permitted Valid: Reverse drive inhibited

☆	Related	parameters:
~	netacea	parameters

4 Emergency stop

Auxiliary function: emergency stop

 \precsim Related parameters:

H0D-05	Name	Em	Emergency ston		Setting Condition & Effective Time	During running & Immedi- ately	Data Structure	-	Data type	Uint16
200D-06h	Access	RW	RW Mapping -		Related Mode	-	Data Range	0 to 1	Default	0
Operation	s at eme	erger	ncy stop							
Value					D	escription				
0	No op	No operation								
1	Emer	Emergency stop enabled								
When eme	When emergency stop is enabled, the servo drive immediately stops according to the stop									

When emergency stop is enabled, the servo drive immediately stops according to the stop mode defined by 605Ch.

5 Quick stop

When the bit2 of the control word 6040h (Quick stop) is 0 during servo drive running, the servo drive executes quick stop as defined by 605Ah.

605Ah	Name	Qui	ck stop op code	tion	Setting Condition & Effective Time	Any condition & At stop	Data Structure	VAR	Data Type	int16			
	Access	RW	Mapping	Mapping No Related Mode		All	Data Range	0 to 7	Default	2			
			eleration mode of the servo motor from rotating to stop and the servo motor ck stop.										
Val	ue		Stop Mode										
C)	Coast	Coast to stop, keeping de-energized state										
1		Ramp	to stop as	defi	ned by 6084	h/609Ah (HN	/I), keeping	de-en	ergized sta	ate			
2		Ramp	to stop as	defi	ned by 6085	h, keeping d	e-energize	d state	•				
3	;	Stopa	at emerger	ıcy-s	top torque, l	keeping de-	energized s	tate					
4		N/A											
5	;	Ramp	Ramp to stop as defined by 6084h/609Ah (HM), keeping position lock state										
6	;	Ramp	amp to stop as defined by 6085h, keeping position lock state										
7		Stopa	Stop at emergency-stop torque, keeping position lock state										

6 Halt

When the servo drive is in the running status and the bit8 of the control word 6040h is set to 1 (Halt), a halt command is input and the servo drive performs the halt operation in the mode defined by 605Dh.

605Dh	Name	Stop	o option co	ode	Setting Condition & Effective Time	Any condition & At stop	Data Structure	VAR	Data Type	int16			
	Access	RW	Mapping	No	Related Mode	All	Data Range	1–3	Default	1			
Defines the deceleration mode of the servo motor from rotating to stop and the servo motor status after halt. CSP/CST/CST/PP/HM							notor						
	Value			Stop Mode									
	1			Ramp to stop as defined by 6084h/609Ah (HM), keeping position lock state									
	2		Ramp t	o sto	op as define	d by 6085h	, keeping p	ositio	n lock state				
	3		Stop at	eme	ergency-sto	o torque, ke	eping posi	tion lo	ock state				
Profile	Profile torque mode												
	Value					Stop N	lode						
1/2/3 Ramp to stop as defined by 6087h, keeping position lock state													

6.9 Conversion Factor Setting

6091h: Gear ratio

The gear ratio indicates the motor displacement (in encoder unit) corresponding to the load shaft displacement per reference unit.

The gear ratio is comprised of the numerator 6091-01h and denominator 6091-02h. It determines the proportional relation between the load shaft displacement (in reference unit) and the motor displacement (in encoder unit), as shown below.

Motor displacement = Load shaft displacement x Gear ratio

The motor is connected to the load through the reducer and other mechanical transmission mechanism. The gear ratio is calculated based on such parameters as the mechanical reduction ratio, mechanical dimension, and motor resolution. The calculation formula is as follows.

Gear ratio = $\frac{\text{Motor resolution}}{\text{Load shaft resolution}}$

Index 6091h	Name	Gear Ratio		Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint32
	Access	-	Mapping	Yes	Related Mode	All	Data Range	OD data range	Default

Defines the proportional relation between the load shaft displacement designated by the user and the motor shaft displacement.

The electronic gear ratio must be within the following range:

0.001 x Encoder resolution/10000, 4000 x Encoder resolution/10000

If this range is exceeded, Er.B03 (Electronic gear ratio over the limit) will occur.

The relation between the motor position feedback (in encoder unit) and the load shaft position feedback (in reference unit) is as follows.

Motor position feedback = Load shaft position feedback x Gear ratio

The relation between the motor speed (RPM) and the load shaft speed (reference unit/s) is as follows.

Motor speed (rpm) = –	Load shaft speed x Gear ratio 6091h	- x 60
	Encoder resolution	- 1 00

The relation between the motor acceleration (RPM/ms) and the load shaft speed (reference $unit/s^2$) is as follows.

	Load shaft acceleration			
Motor acceleration = -	x Gear ratio 6091h	v	1000	
	Encoder resolution		60	

Sub- index 0h	Name		er of sub-ind the gear rati		Setting Condition & Effective Time	-	Data Structure	-	Data type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	2

	Name	Мо	Motor resolutions (8 RW Mapping RPDO		Setting Condition & Effective Time	During running & Immedi- ately	Data Structure	-	Data type	Uint32
1h	Access	RW			Related Mode	-	Data Range	0 to 0xFFFFFFF	Default	1

					Setting	During				
Sub	Name	Շե	oft recelu	tions	Condition	running &	Data		Data	11:2+22
index		Name Shaft resol		uons	& Effective	Immedi-	Structure	-	type	Uint32
2h					Time	ately				
20	Accore	s RW Mapping			Related		Data	0 to	Default	1
	Access	RW	Mapping	RPDU	Mode	-	Range	0xFFFFFFFF	Delault	T
The ge	ar ratio	is w	ithin the f	ollowi	ng range: 0.	.001 x Enco	oder resolu	tion/10000 t	o 4000 x	
Encod	Encoder resolution/10000.									
If this	range is	exce	eeded, Er.	B03 (G	ear ratio ov	er the limi	t) will occu	r.		

Taking the ball screw as an example:

Minimum reference unit fc = 1 mm

Lead pB = 10 mm/r

Reduction ratio n = 5:1

Resolution of Inovance 20-bit serial encoder motor P = 1048576 (PPR)

The position factor is calculated as follows:

Position factor:

Position _	Motor resolution P*n					
factor –	РВ					
	1048576 x 5					
= -	10					
	5242880					
= =	10					
=	524288					

Therefore, 6091-1h = 524288, 6091-2h = 1, which means when the load shaft displacement is 1 mm, the motor displacement is 524288.

Reduce the values of 6091-1h and 6091-2h to a point where there is no common divisor, and take the final value.

Appendix A List of Object Groups

Parameter Address Structure

Parameter access address: index+subindex, both are hexadecimal.

The CiA402 protocol establishes the following restrictions on the parameter address:

Index (Hex)	Description
0000-0FFF	Data type description
1000-1FFF	CoE communication object
2000-5FFF	Manufacturer-specific object
6000-9FFF	Sub-protocol object
A000-FFFF	Reserved

The SV820N servo drive carries four drive modules on one axis, and each module supports the same parameters. The parameter address of each module is independent of each other except the CoE communication object (common parameter) of 1000h-1FFFh. However, the following relation exists:

Parameter address (HEX) of Module N = Parameter address (HEX) of Module 1 + $0x800 \times (N - 1)$

For instance:

	Module 1	Module 2	Module 3	Module 4
Manufacturer-specific object: Speed loop gain address	2008-01h	2808-01h	3008-01h	3808-01h
Sub-protocol object: Control word address	6040-00h	6840-00h	7040-00h	7840-00h

Unless otherwise specified, all the parameters descriptions are based on the parameter address description of module 1.

Object Group 1000h

Index (Hex)	Sub- index (Hex)		Access	PDO Mapping	Data Type	Unit	Data Range	Default
1000	00	Device Type	RO	NO	UINT32	-	-	0x00020192
1008	00	Manufacturer device name	RO	NO	-	-	-	SV820N-ECAT
1009	00	Manufacturer hardware version	RO	NO	-	-	-	Dependent on the software version
100A	00	Manufacturer software version	RO	NO	-	-	-	Dependent on the hardware version

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default
	(-)				ID objec	ct	<u> </u>	
	00	Highest sub-index supported	RO	NO	UINT8	-	-	0x04
1018	01	Vendor ID	RO	NO	UINT32	-	-	0x00100000
	02	Product code	RO	NO	UINT32	-	-	0x000C010B
	03	Revision number	RO	NO	UINT32	-	-	0x00010000
				Facto	ry softwar	e vers	ion	
	00	Number of Sync Manager channels	RO	NO	UINT8	-	-	0x04
	01	Communication type of SM0	RO	NO	UINT8	-	-	0x01
1C00	02	Communication type of SM1	RO	NO	UINT8	-	-	0x02
	03	Communication type of SM2	RO	NO	UINT8	-	-	0x03
	04	Communication type of SM3	RO	NO	UINT8	-	-	0x04
				Маррі	ing object	of RPI	001	
		Number of mapped						
	00	application objects in RPDO1	RW	NO	UINT8	-	0 to 0x0A	0x05
	01	1st mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x60400010
	02	2nd mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x60600008
1.000	03	3rd mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x607A0020
1600	04	4th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x60B80010
	05	5th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x60FF0020
	06	6th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	
	07	7th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	-
	08	8th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	-
	09	9th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	-
	0A	10th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	-
		n .		\Mappi	ng object	of RPI	0011	1
	00	Number of mapped objects in RPDO11	RW	NO	UINT8	-	0 to 0x0A	0x05
	01	1st mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x68400010
	02	2nd mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x68600008
	03	3rd mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x687A0020
1610	04	4th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x68B80010
	05	5th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x68FF0020
	06	6th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	-
	07	7th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	-
	08	8th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	-
	09	9th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFF	-
	0A	10th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFF	-
		Number of menner i		марри	ng object (UTRPD	021	
1620	00	Number of mapped objects in RPDO21	RW	NO	UINT8	-	0 to 0x0A	0x05
1020	01	1st mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x70400010
	02	2nd mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x70600008
	03	3rd mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x707A0020

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default
	04	4th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x70B80010
	05	5th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	a) 0xFFFFFFF 0x70B80010 b) 0xFFFFFFF 0x70FF0020 b) 0xFFFFFFF 0xFFFFFFF b) 0xFFFFFFF - c) 0xA 0x05 c) 0xFFFFFFF 0x78400010 c) 0xFFFFFFF 0x78500008 c) 0xFFFFFFF 0x787A0020 c) 0xFFFFFFF 0x78780020 c) 0xFFFFFFF 0x78780020 c) 0xFFFFFFF 0x7878F0020 c) 0xFFFFFFFF - c) 0xFFFFFFFF - c) 0xFFFFFFFF - c) 0xFFFFFFFF - c) 0xOA 0x0A 0x0A 0x0A 0x0A
Index (Hex)	06	6th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	
1620	07	7th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	-
	08	8th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	-
	09	9th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	-
	0A	10th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	-
		1105		Маррі	ng object o	of RPD	0031	J
		Number of mapped						
	00	objects in RPDO31	RW	NO	UINT8	-	0 to 0x0A	0x05
	01	1st mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x78400010
	02	2nd mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	
	03	3rd mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	
1630	04	4th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	
	05	5th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	
	06	6th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	
	07	7th mapping object	RW	NO	UINT32	-		-
	08	8th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	-
	09	9th mapping object	RW	NO	UINT32	-		-
	0A	10th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	-
	0/1	10th mapping object			ing object	of TPI		
		Number of mapped		Марр				
	00	application objects	RW	NO	UINT8	-	0 to 0x0A	ΟνΟΔ
	00	in TPDO1		NO	UNITO		0100000	
	01	1st mapping object	RW	NO	UINT32	_		0v602E0010
	01	2nd mapping object	RW	NO	UINT32	_		
	02	3rd mapping object	RW	NO	UINT32	-		
1A00	04	4th mapping object	RW	NO	UINT32	-		
	05	5th mapping object	RW	NO	UINT32	-		
	06	6th mapping object	RW	NO	UINT32	-		
	07	7th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	
	08	8th mapping object	RW	NO	UINT32	-		
	09	9th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	
	0A	10th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	
	0,1	12000 mapping object		-	ng object o	of TPD		0,001 0 0010
	<u> </u>	Number of mapped						
	00	objects in TPDO11	RW	NO	UINT8	-	0 to 0x0A	0x0A
	01	1st mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x683F0010
	02	2nd mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	
	03	3rd mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	
1A10	04	4th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	
	05	5th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x686C0020
	06	6th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x68B90010
	07	7th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x68BA0020
	08	8th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x68BC0020
	09	9th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x68F40010
	0A	10th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x68FD0010
					ng object o	of TPD		
1A20		Number of mapped			<u> </u>			
2.120	00	objects in TPDO21	RW	NO	UINT8	-	0 to 0x0A	0x0A
	1	00,000 11 11 0021					1	L

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default			
	01	1st mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x703F0010			
	02	2nd mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x70410010			
	03	3rd mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x70610008			
	04	4th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x70640020			
1A20	05	5th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x706C0020			
1420	06	6th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x70B90010			
	07	7th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x70BA0020			
	08	8th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x70BC0020			
	09	9th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x70F40020			
	0A	10th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x70FD0020			
				Маррі	ng object o	of TPD	031				
	00	Number of mapped objects in TPDO31	RW	NO	UINT8	-	0 to 0x0A	0x0A			
	01	1st mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x783F0010			
	02	2nd mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x78410010			
	03	3rd mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x78610008			
1A30	04	4th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x78640020			
	05	5th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x786C0020			
	06	6th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x78B90010			
	07	7th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x78BA0020			
	08	8th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x78BC0020			
	09	9th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x78F40020			
	0A	10th mapping object	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0x78FD0020			
		Sync Manager 2_RPDO Assignment									
	00	Number of assigned RPDOs	RW	NO	UINT8	-	0-0x04	0x04			
	01	Index of object 1 of assigned RPDO	RW	YES	UINT16	-	0 to 0xFFFF	0x1600			
1C12	02	Index of object 2 of assigned RPDO	RW	YES	UINT16	-	0 to 0xFFFF	0x1610			
	03	Index of object 3 of assigned RPDO	RW	YES	UINT16	-	0 to 65535	0x1620			
	04	Index of object 4 of assigned RPDO	RW	YES	UINT16	-	0 to 65535	0x1630			
				Sync Mana	ger 2_TPD	O Ass	ignment				
	00	Number of assigned TPDOs	RW	NO	UINT8	-	0-0x4	0x04			
	01	Index of object 1 of assigned TPDO	RW	YES	UINT16	-	0 to 0xFFFF	0x1A00			
1C13	02	Index of object 2 of assigned TPDO	RW	YES	UINT16	-	0 to 0xFFFF	0x1A10			
	03	Index of object 3 of assigned TPDO	RW	YES	UINT16	-	0 to 65535	0x1A20			
	04	Index of object 4 of assigned TPDO	RW	YES	UINT16	-	0 to 65535	0x1A30			

Index (Hex)	Sub- index (Hex)		Access	PDO Mapping	Data Type	Unit	Data Range	Default
			Syr	nc Manage	r 2 Synchr	onizat	ion Output	
	00	Number of synchronization parameters	RO	NO	UINT8	-	-	0x20
	01	Synchronization type	RO	NO	UINT16	-	-	0x0002
1C32	02	Cycle Time	RO	NO	UINT32	ns	-	0
1052	04	Synchronization types supported	RO	NO	UINT16	-	-	0x0004
	05	Minimum cycle time	RO	NO	UINT32	ns	-	0x000F4240
	06	Calculation and copy time	RO	NO	UINT32	ns	-	-
	09	Delay time	RO	NO	UINT32	ns	-	-
	20	Sync error	RO	NO	BOOL	-	-	-
			Sy	nc Manage	er 2 Synch	roniza	tion Input	1
	00	Number of synchronization parameters	RO	NO	UINT8	-	-	0x20
	01	Synchronization type	RO	NO	UINT16		-	0x0002
1C33	02	Cycle Time	RO	NO	UINT32	ns	-	0
1055	04	Synchronization types supported	RO	NO	UINT16	-	-	0x0004
	05	Minimum cycle time	RO	NO	UINT32	ns	-	0x000F4240
	06	Calculation and copy time	RO	NO	UINT32	ns	-	-
	09	Delay time	RO	NO	UINT32	ns	-	-
	20	Sync error	RO	NO	BOOL	-	-	-

Object Group 6000h

Object group 6000h contains DSP402 objects supported.

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
603F	00	Error code	RO	TPDO	UINT16	-	-	-	-	-
6040	00	Control word	RW	RPDO	UINT16	-	0 to 0xFFFF	0	During running	Immedi- ately
6041	00	Status word	RO	TPDO	UINT16	-	-	-	-	-
605A	00	Quick stop option code	RW	NO	INT16	-	0-0x07	0x02	During running	At stop
605C	00	Disable operation option code	RW	NO	INT16	-	0xFFFD to 0x0001	0	During running	At stop
605D	00	Stop option code	RW	NO	INT16	-	0x01 to 0x03	0x01	During running	At stop
605E	00	Fault reaction option code	RW	NO	INT16	-	0xFFFB to 0x02	0x02	During running	At stop
6060	00	Modes of operation	RW	RPDO	INT8	-	0 to 0x0A	0	During running	Immedi- ately
6061	00	Modes of operation display	RO	TPDO	INT8	-	-	-	-	-
6062	00	Position demand value	RO	TPDO	INT32	Position unit	-	-	-	-
6063	00	Position actual value*	RO	TPDO	INT32	Encoder unit	-	-	-	-
6064	00	Position actual value	RO	TPDO	INT32	Position unit	-	-	-	-
6065	00	Following error window	RW	RPDO	UINT32	Position unit	0 to 0xFFFFFFFF	0x00300000	During running	Immedi- ately
6066	00	Following error time out	RW	RPDO	UINT32	ms	0 to 0xFFFF	0	During running	Immedi- ately
6067	00	Position window	RW	RPDO	UINT32	Position unit	0 to 0xFFFFFFFF	0x000002DE	During running	Immedi- ately
6068	00	Position window time	RW	RPDO	UINT16	ms	0 to 0xFFFF	0	During running	Immedi- ately
606C	00	Velocity actual value	RO	TPDO	INT32	Velocity unit/s	-	-	-	-
606D	00	Velocity window	RW	RPDO	UINT16	RPM	0 to 0xFFFF	0x0A	During running	Immedi- ately
606E	00	Velocity window time	RW	RPDO	UINT16	ms	0 to 0xFFFF	0	During running	Immedi- ately
606F	00	Velocity threshold	RW	RPDO	UINT16	RPM	0 to 0xFFFF	0x0A	During running	Immedi- ately
6070	00	Velocity threshold time	RW	RPDO	UINT16	ms	0 to 0xFFFF	0	During running	Immedi- ately
6071	00	Target torque	RW	RPDO	INT16	0.1%	0xF060-0x0FA0	0	During running	Immedi- ately
6072	00	Max. torque	RW	RPDO	UINT16	0.1%	0-0x0FA0	0x0BB8	During running	Immedi- ately

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
6074	00	Torque demand value	RO	TPDO	INT16	0.1%	-	0	-	-
6077	00	Torque actual value	RO	TPDO	INT16	0.1%	-	0	-	-
607A	00	Target position	RW	RPDO	INT32	Position unit	0x80000000 to 0x7FFFFFFF	0	During running	Immedi- ately
607C	00	Home offset	RW	RPDO	INT32	Position unit	0x80000000 to 0x7FFFFFF	0	During running	Immedi- ately
				Softw	are posit	ion limit				
607D	00	Highest sub-index supported	RO	NO	UINT8	-	-	0x02	-	-
	01	Min. position limit	RW	RPDO	INT32	Position unit	0x80000000 to 0x7FFFFFF	0x80000000	During running	Immedi- ately
	02	Max. position limit	RW	RPDO	INT32	Position unit	0x80000000 to 0x7FFFFFF	0x7FFFFFFF	During running	Immedi- ately
607E	00	Polarity	RW	RPDO	UINT8	-	0-0xFF	0	During running	Immedi- ately
607F	00	Max. profile velocity	RW	RPDO	UINT32	Velocity unit/s	0 to 0xFFFFFFFF	0x06400000	During running	Immedi- ately
6081	00	Profile velocity	RW	RPDO	UINT32	Velocity unit	0 to 0xFFFFFFFF	0	During running	Immedi- ately
6083	00	Profile acceleration	RW	RPDO	UINT32	Acceleration unit/s ²	0 to 0xFFFFFFFF	0x0A6AAAAA	During running	Immedi- ately
6084	00	Profile deceleration	RW	RPDO	UINT32	Acceleration unit/s ²	0 to 0xFFFFFFFF	0x0A6AAAAA	During running	Immedi- ately
6085	00	Quick stop deceleration	RW	RPDO	UINT32	User- defined acceleration unit	0 to 0xFFFFFFFF	0x7FFFFFFF	During running	Immedi- ately
6086	00	Motion profile type	RW	RPDO	INT16	-	0x8000 to 0x7FFF	0	During running	Immedi- ately
6087	00	Torque slope	RW	RPDO	UINT32	0.1%/s	0 to 0xFFFFFFFF	0xFFFFFFFF	During running	Immedi- ately
			r	r		Gear ratio			r	
6091	00	Highest sub-index supported	RO	NO	UINT8	Uint8	-	0x02	-	-
0051	01	Motor revolutions	RW	RPDO	UINT32	-	0 to 0xFFFFFFFF	1	During running	Immedi- ately
	02	Shaft revolutions	RW	RPDO	UINT32	-	1-0xFFFFFFFF	1	During running	Immedi- ately
6098	00	Homing method	RW	RPDO	INT8	-	0x01 to 0x023	0x01	During running	Immedi- ately
						Homing spee	ds			
	00	Highest sub-index supported	RO	NO	UINT8	-	-	0x02	-	-
6099	01	Speed during search for switch	RW	RPDO	UINT32	Velocity unit/s	0 to 0xFFFFFFFF	0x001AAAAB	During running	Immedi- ately
	02	Speed during search for zero	RW	RPDO	UINT32	Velocity unit/s	0 to 0xFFFFFFF	0x0002AAAB	During running	Immedi- ately

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
609A	00	Homing acceleration	RW	RPDO	UINT32	Acceleration unit/s ²	0 to 0xFFFFFFFF	0x0A6AAAAA	During running	Immedi- ately
60B0h	00	Position offset	RW	RPDO	INT32	Position unit	0x80000000 to 0x7FFFFFFF	0	During running	Immedi- ately
60B1h	00	Velocity offset	RW	RPDO	INT32	Velocity unit/s	0x80000000 to 0x7FFFFFF	0	During running	Immedi- ately
60B2h	00	Torque offset	RW	RPDO	INT16	0.1%	0xF060-0x0FA0	0	During running	Immedi- ately
60B8h	00	Touch probe function	RW	RPDO	UINT16	-	0 to 0xFFFF	0	During running	Immedi- ately
60B9h	00	Touch probe status	RW	RPDO	UINT16	-	-	0	-	-
60BAh	00	Touch probe 1 positive edge	RW	RPDO	INT32	Position unit	-	0	-	-
60BBh	00	Touch probe 1 negative edge	RW	RPDO	INT32	Position unit	-	0	-	-
60BCh	00	Touch probe 2 positive edge	RW	RPDO	INT32	Position unit	-	0	-	-
60BDh	00	Touch probe 2 negative edge	RW	RPDO	INT32	Position unit	-	0	-	-
60D5h	0x00	Touch probe 1 positive edge counter	RO	RPDO	UINT16	-	-	0	-	-
60D6h	0x00	Touch probe 1 negative edge counter	RO	RPDO	UINT16	-	-	0	-	-
60D7h	0x00	Touch probe 2 positive edge counter	RO	RPDO	UINT16	-	-	0	-	-
60D8h	0x00	Touch probe 2 negative edge counter	RO	RPDO	UINT16	-	-	0	-	-
60E0h	00	Positive torque limit value	RW	RPDO	UINT16	0.1%	0-0x0FA0	0x0BB8	During running	Immedi- ately
60E1h	00	Negative torque limit value	RW	RPDO	UINT16	0.1%	0-0x0FA0	0x0BB8	During running	Immedi- ately
		1			Suppo	orted homing	method			
	00	Highest sub-index supported	RO	NO	UINT8	-	-	0x1F	-	-
	01	1st supported homing method	RO	NO	UINT16	-	-	0x0301	-	-
60E3h	02	2nd supported homing method	RO	NO	UINT16	-	-	0x0302	-	-
	03	3rd supported homing method	RO	NO	UINT16	-	-	0x0303	-	-
	04	4th supported homing method	RO	NO	UINT16	-	-	0x0304	-	-

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
	05	5th supported homing method	RO	NO	UINT16	-	-	0x0305	-	-
	06	6th supported homing method	RO	NO	UINT16	-	-	0x0306	-	-
	07	7th supported homing method	RO	NO	UINT16	-	-	0x0307	-	-
	08	8th supported homing method	RO	NO	UINT16	-	-	0x0308	-	-
	09	9th supported homing method	RO	NO	UINT16	-	-	0x0309	-	-
	0A	10th supported homing method	RO	NO	UINT16	-	-	0x030A	-	-
	0B	11th supported homing method	RO	NO	UINT16	-	-	0x030B	-	-
	0C	12th supported homing method	RO	NO	UINT16	-	-	0x030C	-	-
60E3h	0D	13th supported homing method	RO	NO	UINT16	-	-	0x030D	-	-
	0E	14th supported homing method	RO	NO	UINT16	-	-	0x030E	-	-
	0F	15th supported homing method	RO	NO	UINT16	-	-	0x030Fh	-	-
	10	16th supported homing method	RO	NO	UINT16	-	-	0x0310	-	-
-	11	17th supported homing method	RO	NO	UINT16	-	-	0x0311	-	-
	12	18th supported homing method	RO	NO	UINT16	-	-	0x0312	-	-
	13	19th supported homing method	RO	NO	UINT16	-	-	0x0313	-	-

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
	14	20th supported homing method	RO	NO	UINT16	-	-	0x0314	-	-
	15	21th supported homing method	RO	NO	UINT16	-	-	0x0315	-	-
	16	22th supported homing method	RO	NO	UINT16	-	-	0x0316	-	-
	17	23th supported homing method	RO	NO	UINT16	-	-	0x0317	-	-
	18	24th supported homing method	RO	NO	UINT16	-	-	0x0318	-	-
60E3h	19	25th supported homing method	RO	NO	UINT16	-	-	0x0319	-	-
OUESII	1A	26th supported homing method	RO	NO	UINT16	-	-	0x031A	-	-
	1B	27th supported homing method	RO	NO	UINT16	-	-	0x031B	-	-
	1C	28th supported homing method	RO	NO	UINT16	-	-	0x031C	-	-
	1D	29th supported homing method	RO	NO	UINT16	-	-	0x031D	-	-
	1E	30th supported homing method	RO	NO	UINT16	-	-	0x031E	-	-
	1F	31th supported homing method	RO	NO	UINT16	-	-	0x031F	-	-
60E6h	00	Encoder increments for the additional position	RW	NO	UINT16	-	0-1	0	During running	Immedi- ately
60F4h	00	Following error actual value	RO	RPDO	INT32	Position unit	-	-	-	-

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
60FCh	00	Position demand value	RO	TPDO	INT32	Encoder unit	-	-	-	-
60FDh	00	Digital inputs	RO	RPDO	UINT32	-	-	-	-	-
						Digital outpu	ts			
	00	DO status	RO	NO	UINT8	-	-	0x02	-	-
60FEh	01	Physical outputs	RW	RPDO	UINT32	-	0 to 0xFFFFFFFF	0	During running	Immedi- ately
	02	Output mask	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0	During running	Immedi- ately
60FFh	00	Target velocity	RW	RPDO	INT32	Velocity unit/s	0x80000000 to 0x7FFFFFF	0	During running	Immedi- ately
6502h	00	Supported drive modes	RO	NO	UINT32	-	-	0x000003AD	-	-

Index (hex)	Sub- index (hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
683F	00	Error code	RO	TPDO	UINT16	-	-	-	-	-
6840	00		RW	RPDO	UINT16	-	0 to 0xFFFF	0	During running	Immedi- ately
6841	00	Status word	RO	TPDO	UINT16	-	-	-	-	-
685A	00	Quick stop option code	RW	NO	INT16	-	0-0x07	0x02	During running	At stop
685C	00	Disable operation option code	RW	NO	INT16	-	0-0x01	0	During running	At stop
685D	00	Stop option code	RW	NO	INT16	-	0x01 to 0x03	0x01	During running	At stop
685E	00	Fault reaction option code	RW	NO	INT16	-	0-0x02	0x02	During running	At stop
6860	00	Modes of operation	RW	RPDO	INT8	-	0 to 0x0A	0	During running	Immedi- ately
6861	00	Modes of operation display	RO	TPDO	INT8	-	-	-	-	-
6862	00	Position demand value	RO	TPDO	INT32	Position unit	-	-	-	-
6863	00	Position actual value	RO	TPDO	INT32	Encoder unit	-	-	-	-
6864	00	Position actual value	RO	TPDO	INT32	Position unit	-	-	-	-
6865	00	Following error window	RW	RPDO	UINT32	Position unit	0 to 0xFFFFFFFF	0x00300000	During running	Immedi- ately
6866	00	Following error time out	RW	RPDO	UINT32	ms	0 to 0xFFFF	0	During running	Immedi- ately
6867	00	Position window	RW	RPDO	UINT32	Reference unit	0 to 0xFFFFFFFF	0x000002DE	During running	Immedi- ately
6868	00	Position window time	RW	RPDO	UINT16	ms	0 to 0xFFFF	0	During running	Immedi- ately
686C	00	Velocity actual value	RO	TPDO	INT32	Velocity unit/s	-	-	-	-

Index (hex)	Sub- index (hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
686D	00	Velocity window	RW	RPDO	UINT16	RPM	0 to 0xFFFF	0x0A	During running	Immedi- ately
686E	00	Velocity window time	RW	RPDO	UINT16	ms	0 to 0xFFFF	0	During running	Immedi- ately
606F	00	Velocity threshold	RW	RPDO	UINT16	RPM	0 to 0xFFFF	0x0A	During running	Immedi- ately
6870	00	Velocity threshold time	RW	RPDO	UINT16	ms	0 to 0xFFFF	0	During running	Immedi- ately
6871	00	Target torque	RW	RPDO	INT16	0.1%	0xF448 to 0x0BB8	0	During running	Immedi- ately
6872	00	Max. torque	RW	RPDO	UINT16	0.1%	0-0x0BB8	0x0BB8	During running	Immedi- ately
6874	00	Torque demand value	RO	TPDO	INT16	0.1%	-	0	-	-
6877	00	Torque actual value	RO	TPDO	INT16	0.1%	-	0	-	-
687A	00	Target position	RW	RPDO	INT32	Reference unit	0x80000000 to 0x7FFFFFF	0	During running	Immedi- ately
687C	00	Home offset	RW	RPDO	INT32	Reference unit	0x80000000 to 0x7FFFFFF	0	During running	Immedi- ately
				S	oftware pos	sition limit		•	- 0	
687D	00	Highest sub-index supported	RO	NO	UINT8	-	-	0x02	-	-
0010	01	Min. position limit	RW	RPDO	INT32	Reference unit	0x80000000 to 0x7FFFFFF	0×80000000	During running	Immedi- ately
	02	Max. position limit	RW	RPDO	INT32	Reference unit	0x80000000 to 0x7FFFFFF	0x7FFFFFFF	During running	Immedi- ately
687E	00	Polarity	RW	RPDO	UINT8	-	0-0xFF	0	During running	Immedi- ately
687F	00	Max. profile velocity	RW	RPDO	UINT32	Velocity unit/s	0 to 0xFFFFFFFF	0x06400000	During running	Immedi- ately
6881	00	Profile velocity	RW	RPDO	UINT32	User- defined velocity unit	0 to 0xFFFFFFFF	0	During running	Immedi- ately
6883	00	Profile acceleration	RW	RPDO	UINT32	Acceleration unit/s ²	0 to 0xFFFFFFFF	0x682AAAA6	During running	Immedi- ately
6884	00	Profile deceleration	RW	RPDO	UINT32	Acceleration unit/s ²	0 to 0xFFFFFFFF	0x682AAAA6	During running	Immedi- ately
6885	00	Quick stop deceleration	RW	RPDO	UINT32	User- defined acceleration unit	0 to 0xFFFFFFFF	0xAD9C71C0	During running	Immedi- ately
6886	00	Motion profile type	RW	RPDO	INT16	-	0x8000 to 0x7FFF	0	During running	Immedi- ately
6887	00	Torque slope	RW	RPDO	UINT32	0.1%/s	0 to 0xFFFFFFFF	0xFFFFFFFF	During running	Immedi- ately
						Gear rati	0	-		
6891	00	Highest sub-index supported	RO	NO	UINT8	Uint8	-	0x02	-	-
0031	01	Motor revolutions	RW	RPDO	UINT32	-	0 to 0xFFFFFFFF	20-bit encoder: 1 23-bit encoder: 8	During running	Immedi- ately

	Sub-									
Index (hex)	index (hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
6891	02	Shaft	RW	RPDO	UINT32	_	1-0xFFFFFFFF	1	During	Immedi-
0091	02	revolutions	RVV	KPD0	0111132	-	1-0XFFFFFFF	1	running	ately
6898	00	Homing method	RW	RPDO	INT8	-	0x01 to 0x023	0x01	During running	Immedi- ately
						Homing spe	eds			
		Highest								
	00	sub-index supported	RO	NO	UINT8	-	-	0x02	-	-
6899	01	Speed during search for	RW	RPDO	UINT32	Velocity	0 to 0xFFFFFFFF	0x001AAAAB	During	Immedi-
		switch				unit/s			running	ately
	02	Speed during search for zero	RW	RPDO	UINT32	Velocity unit/s	0 to 0xFFFFFFFF	0x0002AAAB	During running	Immedi- ately
689A	00	Homing acceleration	RW	RPDO	UINT32	Acceleration unit/s ²	0 to 0xFFFFFFFF	0x682AAAA6	During running	Immedi- ately
68B0h	00	Position offset	RW	RPDO	INT32	Position	0x80000000 to 0x7FFFFFF	0	During	Immedi-
		Velocity				unit Velocity	0x80000000 to		running During	ately Immedi-
68B1h	00	offset	RW	RPDO	INT32	unit/s	0x7FFFFFFF	0	running	ately
68B2h	00	Torque offset	RW	RPDO	INT16	0.1%	0xF448 to 0x0BB8	0	During running	Immedi- ately
68B8h	00	Touch probe function	RW	RPDO	UINT16	-	0 to 0xFFFF	0	During running	Immedi- ately
68B9h	00	Touch probe status	RW	RPDO	UINT16	-	-	0	-	-
68BAh	00	Touch probe 1 positive edge	RW	RPDO	INT32	Position unit	-	0	-	-
68BBh	00	Touch probe 1 negative edge	RW	RPDO	INT32	Position unit	-	0	-	-
68BCh	00	Touch probe 2 positive edge	RW	RPDO	INT32	Position unit	-	0	-	-
68BDh	00	Touch probe 2 negative edge	RW	RPDO	INT32	Position unit	-	0	-	-
68D5h	0x00	Touch probe 1 positive edge counter	RO	RPDO	UINT16	-	-	0	-	-
68D6h	0x00	Touch probe 1 negative edge counter	RO	RPDO	UINT16	-	-	0	-	-
68D7h	0x00	Touch probe 2 positive edge counter	RO	RPDO	UINT16	-	-	0	-	-
68D8h	0x00	Touch probe 2 negative edge counter	RO	RPDO	UINT16	-	-	0	-	-
68E0h	00	Positive torque limit value	RW	RPDO	UINT16	0.1%	0-0x0BB8	0x0BB8	During running	Immedi- ately
68E1h	00	Negative torque limit value	RW	RPDO	UINT16	0.1%	0-0x0BB8	0x0BB8	During running	Immedi- ately

Index (hex)	Sub- index (hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
	(110,4)				Supr	l ported homin	g mothod			
	00	Highest sub-index supported	RO	NO	UINT8	-	-	0x1F	-	-
	01	1st supported homing method	RO	NO	UINT16	-	-	0x0301	-	-
	02	2nd supported homing method	RO	NO	UINT16	-	-	0x0302	-	-
	03	3rd supported homing method	RO	NO	UINT16	-	-	0x0303	-	-
	04	4th supported homing method	RO	NO	UINT16	-	-	0x0304	-	-
	05	5th supported homing method	RO	NO	UINT16	-	-	0x0305	-	-
	06	6th supported homing method	RO	NO	UINT16	-	-	0x0306	-	-
68E3h	07	7th supported homing method	RO	NO	UINT16	-	-	0x0307	-	-
	08	8th supported homing method	RO	NO	UINT16	-	-	0x0308	-	-
	09	9th supported homing method	RO	NO	UINT16	-	-	0x0309	-	-
	0A	10th supported homing method	RO	NO	UINT16	-	-	0x030A	-	-
	0B	11th supported homing method	RO	NO	UINT16	-	-	0x030B	-	-
	0C	12th supported homing method	RO	NO	UINT16	-	-	0x030C	-	-
	0D	13th supported homing method	RO	NO	UINT16	-	-	0x030D	-	-

Index (hex)	Sub- index (hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
	0E	14th supported homing method	RO	NO	UINT16	-	-	0x030E	-	-
	0F	15th supported homing method	RO	NO	UINT16	-	-	0x030Fh	-	-
	10	16th supported homing method	RO	NO	UINT16	-	-	0x0310	-	-
	11	17th supported homing method	RO	NO	UINT16	-	-	0x0311	-	-
	12	18th supported homing method	RO	NO	UINT16	-	-	0x0312	-	-
	13	19th supported homing method	RO	NO	UINT16	-	-	0x0313	-	-
68E3h	14	20th supported homing method	RO	NO	UINT16	-	-	0x0314	-	-
00E311	15	21th supported homing method	RO	NO	UINT16	-	-	0x0315	-	-
	16	22th supported homing method	RO	NO	UINT16	-	-	0x0316	-	-
	17	23th supported homing method	RO	NO	UINT16	-	-	0x0317	-	-
	18	24th supported homing method	RO	NO	UINT16	-	-	0x0318	-	-
	19	25th supported homing method	RO	NO	UINT16	-	-	0x0319	-	-
	1A	26th supported homing method	RO	NO	UINT16	-	-	0x031A	-	-
	1B	27th supported homing method	RO	NO	UINT16	-	-	0x031B	-	-

Index (hex)	Sub- index (hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
		28th supported homing method	RO	NO	UINT16	-	-	0x031C	-	-
68E3h		29th supported homing method	RO	NO	UINT16	-	-	0x031D	-	-
00E311		homing method	RO	NO	UINT16	-	-	0x031E	-	-
		31th supported homing method	RO	NO	UINT16	-	-	0x031F	-	-
68E6h		Encoder increments for the additional position	RW	NO	UINT16	-	0-1	0	During running	Immedi- ately
68F4h	00	Following error actual value	RO	RPDO	INT32	Position unit	-	-	-	-
68FCh		value	RO	TPDO	INT32	Encoder unit	-	-	-	-
68FDh	00	Digital inputs	RO	RPDO	UINT32	-	-	-	-	-
						Digital outp	outs			
	00		RO	NO	UINT8	-	-	0x02	-	-
68FEh	01	Physical outputs	RW	RPDO	UINT32	-	0 to 0xFFFFFFFF	0	During running	Immedi- ately
	02		RW	NO	UINT32	-	0 to 0xFFFFFFFF	0	During running	Immedi- ately
68FFh	00	Target velocity	RW	RPDO	INT32	Velocity unit/s	0x80000000 to 0x7FFFFFF	0	During running	Immedi- ately

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
703F	00	Error code	RO	TPDO	UINT16	-	-	-	-	-
7040	00	Control word	RW	RPDO	UINT16	-	0 to 0xFFFF	0	During running	Immedi- ately
7041	00	Status word	RO	TPDO	UINT16	-	-	-	-	-
705A	00	Quick stop option code	RW	NO	INT16	-	0-0x07	0x02	During running	At stop
705C	00	Disable operation option code	RW	NO	INT16	-	0-0x01	0	During running	At stop
705D	00	Stop option code	RW	NO	INT16	-	0x01 to 0x03	0x01	During running	At stop
705E	00	Fault reaction option code	RW	NO	INT16	-	0-0x02	0x02	During running	At stop
7060	00	Modes of operation	RW	RPDO	INT8	-	0 to 0x0A	0	During running	Immedi- ately

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
7061	00	Modes of operation display	RO	TPDO	INT8	-	-	-	-	-
7062	00	Position demand value	RO	TPDO	INT32	Position unit	-	-	-	-
7063	00	Position actual value*	RO	TPDO	INT32	Encoder unit	-	-	-	-
7064	00	Position actual value	RO	TPDO	INT32	Position unit	-	-	-	-
7065	00	Following error window	RW	RPDO	UINT32	Position unit	0 to 0xFFFFFFFF	0x00300000	During running	Immedi- ately
7066	00	Following error time out	RW	RPDO	UINT32	ms	0 to 0xFFFF	0	During running	Immedi- ately
7067	00	Position window	RW	RPDO	UINT32	Position unit	0 to 0xFFFFFFFF	0x000002DE	During running	Immedi- ately
7068	00	Position window time	RW	RPDO	UINT16	ms	0 to 0xFFFF	0	During running	Immedi- ately
706C	00	Velocity actual value	RO	TPDO	INT32	Velocity unit/s	-	-	-	-
706D	00	Velocity window	RW	RPDO	UINT16	RPM	0 to 0xFFFF	0x0A	During running	Immedi- ately
706E	00	Velocity window time	RW	RPDO	UINT16	ms	0 to 0xFFFF	0	During running	Immedi- ately
706F	00	Velocity threshold	RW	RPDO	UINT16	RPM	0 to 0xFFFF	0x0A	During running	Immedi- ately
7070	00	Velocity threshold time	RW	RPDO	UINT16	ms	0 to 0xFFFF	0	During running	Immedi- ately
7071	00	Target torque	RW	RPDO	INT16	0.1%	0xF448 to 0x0BB8	0	During running	Immedi- ately
7072	00	Max. torque	RW	RPDO	UINT16	0.1%	0-0x0BB8	0x0BB8	During running	Immedi- ately
7074	00	Torque demand value	RO	TPDO	INT16	0.1%	-	0	-	-
7077	00	Torque actual value	RO	TPDO	INT16	0.1%	-	0	-	-
707A	00	Target position	RW	RPDO	INT32	Position unit	0x80000000 to 0x7FFFFFF	0	During running	Immedi- ately
707C	00	Home offset	RW	RPDO	INT32	Position unit	0x80000000 to 0x7FFFFFF	0	During running	Immedi- ately
				So	oftware po	sition limit		1		
	00	Highest sub-index supported	RO	NO	UINT8	-	-	0x02	-	-
707D	01	Min. position limit	RW	RPDO	INT32	Position unit	0x80000000 to 0x7FFFFFF	0x80000000	During running	Immedi- ately
	02	Max. position limit	RW	RPDO	INT32	Position unit	0x80000000 to 0x7FFFFFF	0x7FFFFFFF	During running	Immedi- ately
707E	00	Polarity	RW	RPDO	UINT8	-	0-0xFF	0	During running	Immedi- ately

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
707F	00	Max. profile velocity	RW	RPDO	UINT32	Velocity unit/s	0 to 0xFFFFFFFF	0x06400000	During running	Immedi- ately
7081	00	Profile velocity	RW	RPDO	UINT32	User -defined velocity unit	0 to 0xFFFFFFFF	0	During running	Immedi- ately
7083	00	Profile acceleration	RW	RPDO	UINT32	Acceleration unit/s ²	0 to 0xFFFFFFFF	0x682AAAA6	During running	Immedi- ately
7084	00	Profile deceleration	RW	RPDO	UINT32	Acceleration unit/s ²	0 to 0xFFFFFFFF	0x682AAAA6	During running	Immedi- ately
6085	00	Quick stop deceleration	RW	RPDO	UINT32	User -defined acceleration unit	0 to 0xFFFFFFFF	0xAD9C71C0	During running	Immedi- ately
7086	00	Motion profile type	RW	RPDO	INT16	-	0x8000 to 0x7FFF	0	During running	Immedi- ately
7087	00	Torque slope	RW	RPDO	UINT32	0.1%/s	0 to 0xFFFFFFFF	0xFFFFFFF	During running	Immedi- ately
			1	0		Gear ratio)	1		
	00	Highest sub-index supported	RO	NO	UINT8	Uint8	-	0x02	-	-
7091	01	Motor revolutions	RW	RPDO	UINT32	-	0 to 0xFFFFFFFF	20-bit encoder: 1 23-bit encoder: 8	During running	Immedi- ately
	02	Shaft revolutions	RW	RPDO	UINT32	-	1-0xFFFFFFFF	1	During running	Immedi- ately
7098	00	Homing method	RW	RPDO	INT8	-	0x01 to 0x023	0x01	During running	Immedi- ately
						Homing spe	eds			
	00	Highest sub-index supported	RO	NO	UINT8	-	-	0x02	-	-
7099	01	Speed during search for switch	RW	RPDO	UINT32	Velocity unit/s	0 to 0xFFFFFFFF	0x001AAAAB	During running	Immedi- ately
	02	Speed during search for zero	RW	RPDO	UINT32	Velocity unit/s	0 to 0xFFFFFFF	0x0002AAAB	During running	Immedi- ately
709A	00	Homing acceleration	RW	RPDO	UINT32	Acceleration unit/s2	0 to 0xFFFFFFFF	0x682AAAA6	During running	Immedi- ately
70B0h	00	Position offset	RW	RPDO	INT32	Position unit	0x80000000 to 0x7FFFFFF	0	During running	Immedi- ately
70B1h	00	Velocity offset	RW	RPDO	INT32	Velocity unit/s	0x80000000 to 0x7FFFFFF	0	During running	Immedi- ately
70B2h	00	Torque offset	RW	RPDO	INT16	0.1%	0xF448 to 0x0BB8	0	During running	Immedi- ately
70B8h	00	Touch probe function	RW	RPDO	UINT16	-	0 to 0xFFFF	0	During running	Immedi- ately
70B9h	00	Touch probe status	RW	RPDO	UINT16	-	-	0	-	-
70BAh	00	Touch probe 1 positive edge	RW	RPDO	INT32	Position unit	-	0	-	-

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
70BBh	00	Touch probe 1 negative edge	RW	RPDO	INT32	Position unit	-	0	-	-
70BCh	00	Touch probe 2 positive edge	RW	RPDO	INT32	Position unit	-	0	-	-
70BDh	00	Touch probe 2 negative edge	RW	RPDO	INT32	Position unit	-	0	-	-
70D5h	0x00	Touch probe 1 positive edge counter	RO	RPDO	UINT16	-	-	0	-	-
70D6h	0x00	Touch probe 1 negative edge counter	RO	RPDO	UINT16	-	-	0	-	-
70D7h	0x00	Touch probe 2 positive edge counter	RO	RPDO	UINT16	-	-	0	-	-
70D8h	0x00	Touch probe 2 negative edge counter	RO	RPDO	UINT16	-	-	0	-	-
70E0h	00	Positive torque limit value	RW	RPDO	UINT16	0.1%	0-0x0BB8	0x0BB8	During running	Immedi- ately
70E1h	00	Negative torque limit value	RW	RPDO	UINT16	0.1%	0-0x0BB8	0x0BB8	During running	Immedi- ately
					Supp	orted homin	g method			
	00	Highest sub-index supported	RO	NO	UINT8	-	-	0x1F	-	-
	01	1st supported homing method	RO	NO	UINT16	-	-	0x0301	-	-
70E3h	02	2nd supported homing method	RO	NO	UINT16	-	-	0x0302	-	-
TUESI	03	3rd supported homing method	RO	NO	UINT16	-	-	0x0303	-	-
	04	4th supported homing method	RO	NO	UINT16	-	-	0x0304	-	-
	05	5th supported homing method	RO	NO	UINT16	-	-	0x0305	-	-

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
	06	6th supported homing method	RO	NO	UINT16	-	-	0x0306	-	-
	07	7th supported homing method	RO	NO	UINT16	-	-	0x0307	-	-
	08	8th supported homing method	RO	NO	UINT16	-	-	0x0308	-	-
	09	9th supported homing method	RO	NO	UINT16	-	-	0x0309	-	-
	0A	10th supported homing method	RO	NO	UINT16	-	-	0x030A	-	-
	0B	11th supported homing method	RO	NO	UINT16	-	-	0x030B	-	-
70E3h	0C	12th supported homing method	RO	NO	UINT16	-	-	0x030C	-	-
	0D	13th supported homing method	RO	NO	UINT16	-	-	0x030D	-	-
	0E	14th supported homing method	RO	NO	UINT16	-	-	0x030E	-	-
	OF	15th supported homing method	RO	NO	UINT16	-	-	0x030Fh	-	-
	10	16th supported homing method	RO	NO	UINT16	-	-	0x0310	-	-
	11	17th supported homing method	RO	NO	UINT16	-	-	0x0311	-	-
	12	18th supported homing method	RO	NO	UINT16	-	-	0x0312	-	-
	13	19th supported homing method	RO	NO	UINT16	-	-	0x0313	-	-

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
	14	20th supported homing method	RO	NO	UINT16	-	-	0x0314	-	-
	15	21th supported homing method	RO	NO	UINT16	-	-	0x0315	-	-
	16	22th supported homing method	RO	NO	UINT16	-	-	0x0316	-	-
	17	23th supported homing method	RO	NO	UINT16	-	-	0x0317	-	-
	18	24th supported homing method	RO	NO	UINT16	-	-	0x0318	-	-
70E3h	19	25th supported homing method	RO	NO	UINT16	-	-	0x0319	-	-
	1A	26th supported homing method	RO	NO	UINT16	-	-	0x031A	-	-
	1B	27th supported homing method	RO	NO	UINT16	-	-	0x031B	-	-
	1C	28th supported homing method	RO	NO	UINT16	-	-	0x031C	-	-
	1D	29th supported homing method	RO	NO	UINT16	-	-	0x031D	-	-
	1E	30th supported homing method	RO	NO	UINT16	-	-	0x031E	-	-
	1F	31th supported homing method	RO	NO	UINT16	-	-	0x031F	-	-
70E6h	00	Encoder increments for the additional position	RW	NO	UINT16	-	0-1	0	During running	Immedi- ately
70F4h	00	Following error actual value	RO	RPDO	INT32	Position unit	-	-	-	-

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
70FCh		Position demand value	RO	TPDO	INT32	Encoder unit	-	-	-	-
70FDh	1 ()()	Digital inputs	RO	RPDO	UINT32	-	-	-	-	-
						Digital outp	uts			
	00	DO status	RO	NO	UINT8	-	-	0x02	-	-
70FEh	01	Physical outputs	RW	RPDO	UINT32	-	0 to 0xFFFFFFFF	0	During running	Immedi- ately
	02	Output mask	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0	During running	Immedi- ately
70FFh	00	Target velocity	RW	RPDO	INT 32		0x80000000 to 0x7FFFFFF	0	During running	Immedi- ately

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
783F	00	Error code	RO	TPDO	UINT16	-	-	-	-	-
7840	00	Control word	RW	RPDO	UINT16	-	0 to 0xFFFF	0	During running	Immedi- ately
7841	00	Status word	RO	TPDO	UINT16	-	-	-	-	-
785A	00	Quick stop option code	RW	NO	INT16	-	0-0x07	0x02	During running	At stop
785C	00	Disable operation option code	RW	NO	INT16	-	0-0x01	0	During running	At stop
785D	00	Stop option code	RW	NO	INT16	-	0x01 to 0x03	0x01	During running	At stop
785E	00	Fault reaction option code	RW	NO	INT16	-	0-0x02	0x02	During running	At stop
7860	00	Modes of operation	RW	RPDO	INT8	-	0 to 0x0A	0	During running	Immedi- ately
7861	00	Modes of operation display	RO	TPDO	INT8	-	-	-	-	-
7862	00	Position demand value	RO	TPDO	INT32	Position unit	-	-	-	-
7863	00	Position actual value*	RO	TPDO	INT32	Encoder unit	-	-	-	-
7864	00	Position actual value	RO	TPDO	INT32	Position unit	-	-	-	-
7865	00	Following error window	RW	RPDO	UINT32	Position unit	0 to 0xFFFFFFFF	0x00300000	During running	Immedi- ately
7866	00	Following error time out	RW	RPDO	UINT32	ms	0 to 0xFFFF	0	During running	Immedi- ately
7867	00	Position window	RW	RPDO	UINT32	Position unit	0 to 0xFFFFFFFF	0x000002DE	During running	Immedi- ately
7868	00	Position window time	RW	RPDO	UINT16	ms	0 to 0xFFFF	0	During running	Immedi- ately

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
786C	00	Velocity actual value	RO	TPDO	INT32	Velocity unit/ s	-	-	-	-
786D	00	Velocity window	RW	RPDO	UINT16	RPM	0 to 0xFFFF	0x0A	During running	Immedi- ately
786E	00	Velocity window time	RW	RPDO	UINT16	ms	0 to 0xFFFF	0	During running	Immedi- ately
706F	00	Velocity threshold	RW	RPDO	UINT16	RPM	0 to 0xFFFF	0x0A	During running	Immedi- ately
7870	00	Velocity threshold time	RW	RPDO	UINT16	ms	0 to 0xFFFF	0	During running	Immedi- ately
7871	00	Target torque	RW	RPDO	INT16	0.1%	0xF448 to 0x0BB8	0	During running	Immedi- ately
7872	00	Max. torque	RW	RPDO	UINT16	0.1%	0-0x0BB8	0x0BB8	During running	Immedi- ately
7874	00	Torque demand value	RO	TPDO	INT16	0.1%	-	0	-	-
7877	00	Torque actual value	RO	TPDO	INT16	0.1%	-	0	-	-
787A	00	Target position	RW	RPDO	INT32	Position unit	0x80000000 to 0x7FFFFFF	0	During running	Immedi- ately
787C	00	Home offset	RW	RPDO	INT32	Position unit	0x80000000 to 0x7FFFFFF	0	During running	Immedi- ately
				S	oftware posi	tion limit				
	00	Highest sub-index supported	RO	NO	UINT8	-	-	0x02	-	-
787D	01	Min. position limit	RW	RPDO	INT32	Position unit	0x80000000 to 0x7FFFFFF	0x80000000	During running	Immedi- ately
	02	Max. position limit	RW	RPDO	INT32	Position unit	0x80000000 to 0x7FFFFFF	0x7FFFFFFF	During running	Immedi- ately
787E	00	Polarity	RW	RPDO	UINT8	-	0-0xFF	0	During running	Immedi- ately
787F	00	Max. profile velocity	RW	RPDO	UINT32	Velocity unit/ s	0 to 0xFFFFFFFF	0x06400000	During running	Immedi- ately
7881	00	Profile velocity	RW	RPDO	UINT32	User-defined velocity unit	0 to 0xFFFFFFFF	0	During running	Immedi- ately
7883	00	Profile acceleration	RW	RPDO	UINT32	Acceleration unit/s ²	0 to 0xFFFFFFFF	0x682AAAA6	During running	Immedi- ately
7884	00	Profile deceleration	RW	RPDO	UINT32	Acceleration unit/s ²	0 to 0xFFFFFFFF	0x682AAAA6	During running	Immedi- ately
7885	00	Quick stop deceleration	RW	RPDO	UINT32	User-defined acceleration unit	0 to 0xFFFFFFFF	0xAD9C71C0	During running	Immedi- ately
7886	00	Motion profile type	RW	RPDO	INT16	-	0x8000 to 0x7FFF	0	During running	Immedi- ately
7887	00	Torque slope	RW	RPDO	UINT32	0.1%/s	0 to 0xFFFFFFFF	0xFFFFFFFF	During running	Immedi- ately
						Gear ratio				
7891	00	Highest sub-index supported	RO	NO	UINT8	Uint8	-	0x02	-	-
	01	Motor revolutions	RW	RPDO	UINT32	-	0 to 0xFFFFFFFF	20-bit encoder: 1 23-bit encoder: 8		Immedi- ately

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
7891	02	Shaft revolutions	RW	RPDO	UINT32	-	1-0xFFFFFFFF	1	running	Immedi- ately
7898	00	Homing method	RW	RPDO	INT8	-	0x01 to 0x023	0x01	During running	Immedi- ately
						Homing speed	S			
	00	Highest sub-index supported	RO	NO	UINT8	-	-	0x02	-	-
7899	01	Speed during search for switch	RW	RPDO	UINT32	Velocity unit/ s	0 to 0xFFFFFFFF	0x001AAAAB	During running	Immedi- ately
	02	Speed during search for zero	RW	RPDO	UINT32	Velocity unit/ s	0 to 0xFFFFFFFF	0x0002AAAB	During running	Immedi- ately
789A	00	Homing acceleration	RW	RPDO	UINT32	Acceleration unit/s ²	0 to 0xFFFFFFFF	0x682AAAA6	During running	Immedi- ately
78B0h	00	Position offset	RW	RPDO	INT32	Position unit	0x80000000 to 0x7FFFFFF	0	During running	Immedi- ately
78B1h	00	Velocity offset	RW	RPDO	INT32	Velocity unit/ s	0x80000000 to 0x7FFFFFF	0	During	Immedi- ately
78B2h	00	Torque offset	RW	RPDO	INT16	0.1%	0xF448 to 0x0BB8	0	During running	Immedi- ately
78B8h	00	Touch probe function	RW	RPDO	UINT16	-	0 to 0xFFFF	0	During running	Immedi- ately
78B9h	00	Touch probe status	RW	RPDO	UINT16	-	-	0	-	-
78BAh	00	Touch probe 1 positive edge	RW	RPDO	INT32	Position unit	-	0	-	-
78BBh	00	Touch probe 1 negative edge	RW	RPDO	INT32	Position unit	-	0	-	-
78BCh	00	Touch probe 2 positive edge	RW	RPDO	INT32	Position unit	-	0	-	-
78BDh	00	Touch probe 2 negative edge	RW	RPDO	INT32	Position unit	-	0	-	-
78D5h	0x00	Touch probe 1 positive edge counter	RO	RPDO	UINT16	-	-	0	-	-
78D6h	0x00	Touch probe 1 negative edge counter	RO	RPDO	UINT16	-	-	0	-	-
78D7h	0x00	Touch probe 2 positive edge counter	RO	RPDO	UINT16	-	-	0	-	-
78D8h	0x00	Touch probe 2 negative edge counter	RO	RPDO	UINT16	-	-	0	-	-

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
78E0h	00	Positive torque limit value	RW	RPDO	UINT16	0.1%	0-0x0BB8	0x0BB8	During running	Immedi- ately
78E1h	00	Negative torque limit value	RW	RPDO	UINT16	0.1%	0-0x0BB8	0x0BB8	During running	Immedi- ately
				Sup	ported hom	ing method	1	1		
	00	Highest sub-index supported	RO	NO	UINT8	-	-	0x1F	-	-
	01	1st supported homing method	RO	NO	UINT16	-	-	0x0301	-	-
	02	2nd supported homing method	RO	NO	UINT16	-	-	0x0302	-	-
	03	3rd supported homing method	RO	NO	UINT16	-	-	0x0303	-	-
	04	4th supported homing method	RO	NO	UINT16	-	-	0x0304	-	-
	05	5th supported homing method	RO	NO	UINT16	-	-	0x0305	-	-
78E3h	06	6th supported homing method	RO	NO	UINT16	-	-	0x0306	-	-
	07	7th supported homing method	RO	NO	UINT16	-	-	0x0307	-	-
	08	8th supported homing method	RO	NO	UINT16	-	-	0x0308	-	-
	09	9th supported homing method	RO	NO	UINT16	-	-	0x0309	-	-
	0A	10th supported homing method	RO	NO	UINT16	-	-	0x030A	-	-
	0B	11th supported homing method	RO	NO	UINT16	-	-	0x030B	-	-
	0C	12th supported homing method	RO	NO	UINT16	-	-	0x030C	-	-

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
	0D	13th supported homing method	RO	NO	UINT16	-	-	0x030D	-	-
	0E	14th supported homing method	RO	NO	UINT16	-	-	0x030E	-	-
	0F	15th supported homing method	RO	NO	UINT16	-	-	0x030Fh	-	-
	10	16th supported homing method	RO	NO	UINT16	-	-	0x0310	-	-
	11	17th supported homing method	RO	NO	UINT16	-	-	0x0311	-	-
	12	18th supported homing method	RO	NO	UINT16	-	-	0x0312	-	-
78E3h	13	19th supported homing method	RO	NO	UINT16	-	-	0x0313	-	-
78E3N	14	20th supported homing method	RO	NO	UINT16	-	-	0x0314	-	-
	15	21th supported homing method	RO	NO	UINT16	-	-	0x0315	-	-
	16	22th supported homing method	RO	NO	UINT16	-	-	0x0316	-	-
	17	23th supported homing method	RO	NO	UINT16	-	-	0x0317	-	-
	18	24th	NO	UINT16	-	-	0x0318	-	-	
	19	25th supported homing method	RO	NO	UINT16	-	-	0x0319	-	-
	1A	26th supported homing method	RO	NO	UINT16	-	-	0x031A	-	-

Index (Hex)	Sub- index (Hex)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
	1B	27th supported homing method	RO	NO	UINT16	-	-	0x031B	-	-
	1C	28th supported homing method	RO	NO	UINT16	-	-	0x031C	-	-
78E3h	1D	29th supported homing method	RO	NO	UINT16	-	-	0x031D	-	-
	1E	30th supported homing method	RO	NO	UINT16	-	-	0x031E	-	-
	1F	31th supported homing method	RO	NO	UINT16	-	-	0x031F	-	-
78E6h	00	Encoder increments for the additional position	RW	NO	UINT16	-	0-1	0	During running	Immedi- ately
78F4h	00	Following error actual value	RO	RPDO	INT32	Position unit	-	-	-	-
78FCh	00	Position demand value	RO	TPDO	INT32	Encoder unit	-	-	-	-
78FDh	00	Digital inputs	RO	RPDO	UINT32	-	-	-	-	-
						Digital output	s			
	00	DO status	RO	NO	UINT8	-	-	0x02	-	-
78FEh	01	Physical outputs	RW	RPDO	UINT32	-	0 to 0xFFFFFFFF	0	During running	Immedi- ately
	02	Output mask	RW	NO	UINT32	-	0 to 0xFFFFFFFF	0	During running	Immedi- ately
78FFh	00	Target velocity	RW	RPDO	INT32	Velocity unit/ s	0x80000000 to 0x7FFFFFF	0	During running	Immedi- ately

Object Group 2000h

Parameters of axis 1

Pa	ira. Gro	oup								
He	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index		1				Unit		Condition	Time
0.040	Code	No.		20005/1100.0	A Matau Davara					
				2000h/H00 Serv	o Motor Parame	ters	1		1	Mariat
	01h	H00-00	Motor code		0 to 65535	14000	1	16 bits	At stop	Next power-on
	03h	H00-02	Customized motor code		0 to 0xFFFFFFFF	0	1	32 bits	-	-
	05h	H00-04	Encoder version No.		0 to 65535	0	0.1	16 bits	-	-
	06h	H00-05	Serial encoder motor code		0 to 65535	0	1	16 bits	-	-
	09h	ноо-о8	Serial encoder type		0 to 65535	0	1	16 bits	At stop	Next power-on
	0Ah	ноо-оэ	Rated voltage	0: 220 V 1: 380 V	0 to 1	0	1	16 bits	At stop	Next power-on
	0Bh	H00-10	Rated power		1 to 65535	75	0.01 kW	16 bits	At stop	Next power-on
	0Ch	H00-11	Rated current		1 to 65535	470	0.01 A	16 bits	At stop	Next power-on
	0Dh	H00-12	Rated torque		10 to 65535	239	0.01 N m	16 bits	At stop	Next power-on
	0Eh	H00-13	Maximum torque		10 to 65535	716	0.01 N m	16 bits	At stop	Next power-on
	0Fh	H00-14	Rated speed		100 to 6000	3000	1 RPM	16 bits	At stop	Next power-on
2000	10h	H00-15	Maximum motor speed		100 to 6000	6000	1 RPM	16 bits	At stop	Next power-on
	11h	H00-16	Moment of inertia		1 to 65535	130	0.01 kgcm ²	16 bits	At stop	Next power-on
	12h	H00-17	Number of pole pairs of PMSM		2 to 360	5	1	16 bits	At stop	Next power-on
	13h	H00-18	Stator resistance		1 to 65535	500	0.001 Ω	16 bits	At stop	Next power-on
	14h	H00-19	Stator inductance Lq		1 to 65535	327	0.01 mH	16 bits	At stop	Next power-on
	15h	H00-20	Stator inductance Ld		1 to 65535	387	0.01 mH	16 bits	At stop	Next power-on
	16h	H00-21	Linear back EMF coefficient		1 to 65535	3330	0.01 mV/ RPM	16 bits	At stop	Next power-on
	17h	H00-22	Torque coefficient Kt		1 to 65535	51	0.01 N m/ Arms	16 bits	At stop	Next power-on
	18h	H00-23	Electrical constant Te		1 to 65535	654	0.01 ms	16 bits	At stop	Next power-on
	19h	H00-24	Mechanical constant Tm		1 to 65535	24	0.01 ms	16 bits	At stop	Next power-on
	1Dh	H00-28	Position offset of absolute encoder		0 to 4294967295	8192	1	32 bits	At stop	Next power-on

Pa	ra. Gro	oup								
He		Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
C	Index	Para.	Name	Description	value Range	Delault	Unit	width	Condition	Time
Group	Code	No.								
	1Fh	H00-30	Encoder selection (Hex)	19: Inovance 20-bit serial encoder	0 to 0x0FFF	0x0013	1	16 bits	At stop	Next power-on
	20h	H00-31	PPR of encoder		1 to 1073741824	8388608	1 PPR	32 bits	At stop	Next power-on
2000	22h	H00-33	Electrical angle of Z signal		0 to 3600	1800	0.1°	16 bits	At stop	Next power-on
	26h	H00-37	Absolute encoder function setting bit		0 to 0xFFFF	0	1	16 bits	At stop	Next power-on
			Joetting bit	2001h/H01: Ser	vo Drive Parame	ters				
	01h	H01-00	MCU software version		0 to 65535	0	0.1	16 bits	-	-
	02h	H01-01	FPGA software version		0 to 65535	0	0.1	16 bits	-	-
	03h	H01-02	FPGA customized No.		0 to 65535	0	0.1	16 bits	-	-
	04h	H01-03	CPU0 software version No.		0 to 65535	0	0.1	16 bits	-	-
	05h	H01-04	CPU1 software version No.		0 to 65535	0	0.1	16 bits	-	-
	08h	H01-07	Software test version No.		0 to 65535	0	0.01	16 bits	-	-
	0Bh	H01-10	Drive unit series number	3: S2R8 5: S4R8 60002: S1R6 hardware (customized) 60003: S2R8 hardware (customized) 60005: S4R8 hardware (customized)	0 to 65535	3	1	16 bits	At stop	Next power-on
2001	0Ch	H01-11	Voltage class of the drive unit		0 to 65535	220	1 V	16 bits	-	-
	0Dh	H01-12	Rated power of the drive unit		0 to 1073741824	40	0.01 kW	32 bits	-	-
	0Fh	H01-14	Maximum output power of the drive unit		0 to 1073741824	40	0.01 kW	32 bits	-	-
	11h	H01-16	Rated output current of the drive unit		0 to 1073741824	280	0.01 A	32 bits	-	-
	13h	H01-18	Maximum output current of the drive unit		0 to 1073741824	1010	0.01 A	32 bits	-	-
	15h	H01-20	Carrier frequency		4000 to 20000	8000	1 Hz	16 bits	At stop	Next power-on
	16h	H01-21	Dead zone time		1 to 2000	200	0.01 µs	16 bits	At stop	Next power-on

Pa	ra. Gro	oup								
He		Dec.	Name	Description	Value Dange	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	Value Range		Unit	width	Condition	Time
Group	Code	No.								
			D-axis							
			coupling						During	Immedi-
	17h	H01-22	voltage		0 to 60000	500	0.1%	16 bits	running	ately
			compensation							
			coefficient Q-axis							
			back EMF						During	Immedi-
	18h	H01-23	compensation		0 to 60000	500	0.1%	16 bits	running	ately
			coefficient							
	19h	H01-24	D-axis current		0 to 20000	500	1 Hz	16 bits	During	Immedi-
	1311	1101 24	loop gain		0 10 20000	500	1112	10 0103	running	ately
			D-axis current							
	1Ah	H01-25	loop integral compensation		1 to 10000	100	0.01	16 bits	During running	Immedi- ately
			factor						running	atety
			Current							
			sampling	0: Extraction rate 32						
	1Bh	H01-26	Sinc3 filter	1: Extraction rate 64	0 to 3	0	1	16 bits	At stop	Next
			data extraction	2: Extraction rate 128 3: Extraction rate 256						power-on
			rate	3: Extraction rate 256						
	1Ch	H01-27	Q-axis current		0 to 20000	500	1 Hz	16 bits	During	Immedi-
	1011	1101 21	loop gain		0.0020000	500	1112	10 5105	running	ately
			Q-axis current						During	terrar a di
	1Dh	H01-28	loop integral compensation		1 to 10000	100	0.01	16 bits	During running	Immedi- ately
			factor						running	atery
			Q-axis							
2001			coupling						During	Immedi-
2001	1Eh	H01-29	voltage		0 to 60000	500	0.1%	16 bits	During running	ately
			compensation						running	acciy
			coefficient							Maria
	1Fh	H01-30	Bus voltage gain tuning		500 to 1500	1000	0.1%	16 bits	At stop	Next power-on
			Minimum							power-on
			turn-on time							
	20h	H01-31	of bootstrap		0 to 200	50	0.1 µs	16 bits	At stop	Next
			circuit lower							power-on
			bridge							
	21h	H01-32	Relative gain		1 to 65535	32768	1	16 bits	At stop	Next
			of UV sampling IGBT over-							power-on
	23h	H01-34	temperature		0 to 1500	950	0.1°C	16 bits	During	Immedi-
			threshold						running	ately
	25h	H01-36	Current sensor		0 to 999999	2083	0.01 A	32 bits	At stop	Next
	2511	1101-50	range		010333333	2005	0.01 A	52 0103	Лізтор	power-on
			FPGA phase							Neut
	27h	H01-38	current protection		0 to 1000	900	0.1%	16 bits	At stop	Next
			threshold							power-on
			DC bus							
	201-		overvoltage		0 +- 2000	420	1.1	10.62		
	29h	H01-40	protection		0 to 2000	420	1 V	16 bits	-	-
			threshold							
			DC bus voltage							Immedi-
	2Ah	H01-41	discharge		0 to 2000	380	1 V	16 bits	At stop	ately
			threshold	L						,

Pa	ra. Gro	oup								
He		Dec.		D			Min.		Change	Effective
	ndex.	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	2Bh	H01-42	DC bus undervoltage threshold		0 to 2000	200	1 V	16 bits	At stop	Immedi- ately
	2Ch	H01-43	Power supply unit series No.	1: 1 kW 2: 2 kW	1 to 2	1	1	16 bits	At stop	Next power-on
	2Dh	H01-44	Output power of the power supply unit		0 to 1073741824	100	0.01 kW	32 bits	-	-
	2Fh	H01-46	Maximum output power of the power supply unit		0 to 1073741824	150	0.01 kW	32 bits	-	-
	31h	H01-48	Rated output current of the power supply unit		0 to 1073741824	320	0.01 A	32 bits	-	-
	33h	H01-50	Over- temperature threshold of the power supply module		0 to 1500	800	0.1°C	16 bits	During running	Immedi- ately
	35h	H01-52	D-axis proportional		0 to 20000	2000	1 Hz	16 bits	During running	Immedi- ately
2001	36h	H01-53	D-axis integral gain in performance priority mode		1 to 10000	100	0.01	16 bits	During running	Immedi- ately
	37h	H01-54	Q-axis proportional gain in performance priority mode		0 to 20000	2000	1 Hz	16 bits	During running	Immedi- ately
	38h	H01-55	Q-axis integral gain in performance priority mode		1 to 10000	100	0.01	16 bits	During running	Immedi- ately
	39h	H01-56	Current loop low- pass cutoff frequency		0 to 65535	11000	1 Hz	16 bits	At stop	Next power-on
	3Ah	H01-57	Maximum output current of the power supply unit		0 to 1073741824	480	0.01 A	32 bits	-	-
	3Ch	H01-59	Serial encoder data transmission compensation time		0 to 2000	0	0.001 μs	16 bits	At stop	Next power-on
	3Dh	H01-60	FPGA scheduling frequency selection	0: 32 kHz 1: 16 kHz	0 to 1	1	1	16 bits	At stop	Next power-on

Pa	ra. Gro	oup								
He		Dec.	Name	Description	Value Denge	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	width	Condition	Time
Group	Code	No.								
			Command	0: 4 kHz						
	3Eh	H01-61	scheduling	1: 2 kHz	0 to 2	2	1	16 bits	At stop	Next
	5611	1101 01	frequency	2: 1 kHz	0102	2	1	10 5105	710 5100	power-on
2001			selection							
	48h	H01-71	Voltage class of the power		0 to 65535	220	1 V	16 bits		
	4011	H01-11	supply unit		0 10 05555	220	1 1	TODICS	-	-
			supply unit	2002h/H02 Basic	Control Paramo	tors				
							1	1		
				0: Speed mode						
			Constant in a da	1: Position mode						Immedi-
	01h	H02-00	selection	2: Torque mode 9: EtherCAT mode	0 to 255	9	1	16 bits	At stop	ately
			selection	255: This axis is not						atery
				used.						
				0: Incremental mode						
			Absolute	1: Absolute position						
	02h	H02-01		linear mode	0 to 2	0	1	16 bits	At stop	Next
	02		selection	2: Absolute position	0 10 2	ľ	1	10 5.00	710 500 5	power-on
				rotation mode						
				0: CCW direction as the						
	03h	H02-02	Rotation	forward direction	0 to 1	0	1	16 bits	At stop	Next
	0.511	1102 02	direction	1: CW direction as the	0101	0	1	10 0103	AUSTOP	power-on
				forward direction						
				0: Coast to stop, keeping de-energized						
				state						
				1: Stop at zero speed,						
	08h	H02-07	Stop mode at	keeping position lock	0 to 2	1	1	16 bits	At stop	Immedi-
			overtravel	state						ately
				2: Stop at zero speed,						
2002				keeping de-energized						
				state						
				0: Coast to stop,						
				keeping de-energized						
	09h	H02-08	Stop mode at	state 1: DB Stop, keeping de-	0 to 2	0	1	16 bits	At stop	Immedi-
	0911	HUZ-06	No.1 fault	energized state	0102	0	1	TODICS	ALSLOP	ately
				2: DB Stop, keeping DB						
				state						
			Delay from							
			brake						During	Immedi-
	0Ah	H02-09	output ON		0 to 500	250	1 ms	16 bits	running	ately
			to command							utety
			received							
			Delay from brake output						During	Immedi-
	0Bh	H02-10	OFF to motor		50 to 1000	150	1 ms	16 bits	running	ately
			de-energized						, anning	ucciy
			Motor speed							
			threshold at						During	Immedi-
	0Ch	H02-11	brake output		20-3000	30	1 RPM	16 bits	During running	ately
			OFF in rotation						running	acety
			state							

Pa	ira. Gro	מטכ								
He		Dec.					Min.		Change	Effective
	Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
			Delay from							
			S-ON OFF to						During	Immedi-
	0Dh	H02-12	brake output		1 to 1000	500	1 ms	16 bits	running	ately
			OFF in rotation						rannig	utery
			state							
			Morning	0: Output warning information						
	10h	LI02 15	Warning display on the	Immediately	0 to 1	0	1	16 bits	At stop	Immedi-
	1011	HUZ-13	keypad	1: Not output warning	0101	0	1	TODICS	ALSIOP	ately
			keypau	information						
				0: OFF						Immedi-
	11h	H02-16	Brake switch	1: ON	0 to 1	0	1	16 bits	At stop	ately
			D	1.0N						atery
			Permissible							
	1.04	1102.21	minimum		1 +- 1000	40	1Ω	10 1.34		
	16h	H02-21	resistance of		1 to 1000	40	10	16 bits	-	-
			regenerative resistor							
			Heat							
			dissipation							Immedi-
	19h	H02-24	coefficient of		10 to 100	30	0.01%	16 bits	At stop	ately
			the resistor							,
				1: External, naturally						
			Regenerative	ventilated						
2002	1Ah	H02-25	resistor	2: External, forced air	1 to 3	3	1	16 bits	At stop	Immedi-
			selection	cooling						ately
				3: No regenerative resistor needed						
			Power of	resistor needed						
			external							Immedi-
	1Bh	H02-26	regenerative		1 to 65535	40	1 kW	16 bits	At stop	ately
			resistor							,
			Resistance							
	1Ch	H02-27	of external		1 to 1000	50	10	16 bits	At stop	Immedi-
	1CII	1102 21	regenerative		1 (0 1000	50	1 32	10 0103	Acstop	ately
			resistor						. ·	
	1Fh	H02-30	User password		0 to 65535	0	1	16 bits	During running	Immedi- ately
				0: No operation					running	ately
			System	1: Restore default						Immedi-
	20h	H02-31	parameter	settings	0 to 2	0	1	16 bits	At stop	ately
			initialization	2: Clear fault records						-
			Selection of						During	Immedi-
	21h	H02-32	parameters in		0 to 99	50	1	16 bits	running	ately
	<u> </u>		group H0B							
	241	1102.25	Keypad		0 += 20		1	10 14	During	Immedi-
	24h	н02-35	data refresh freguency		0 to 20	0	1 Hz	16 bits	running	ately
			Factory						During	Immedi-
	2Ah	H02-41	password		0 to 65535	0	1	16 bits	running	ately
			1233311010	1		I			ranning	ucciy

Pa	ra. Gro	oup								
He		Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	value Range	Delault	Unit	width	Condition	Time
Group	Code	No.								
			F	2003h/H03 Termi	nal Input Param	eters			1	
	03h	H03-02	DI1 function selection	Consisting of three digits, with the first one (from left to right) indicating the axis number and the last two indicating the function. The last two digits are defined as follows: 0: No definition 01: S-ON 14: Positive limit switch 15: Negative limit switch 31: Home switch 38: Touch probe 1 39: Touch probe 2	0 to 65535	0	1	16 bits	During running	At stop
	04h	H03-03	DI1 logic selection	0: Active low 1: Active high 2: Rising edge-triggered 3: Falling edge- triggered 4: Rising/Falling edge- triggered	0 to 4	0	1	16 bits	During running	At stop
2003	05h	H03-04	DI2 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	06h	H03-05	DI2 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	07h	H03-06	DI3 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	08h	H03-07	DI3 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	09h	H03-08	DI4 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Ah	H03-09	DI4 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	0Bh	H03-10	DI5 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Ch	H03-11	DI5 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	0Dh	H03-12	DI6 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Eh	H03-13	DI6 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop

Pa	ira. Gro	oup								
He		Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index	Para.	Name	Description	value Kalige	Delault	Unit	width	Condition	Time
Group	Code 0Fh	No. H03-14	DI7 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	10h	H03-15	DI7 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	11h	H03-16	DI8 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	12h	H03-17	DI8 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	13h	H03-18	DI9 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	14h	H03-19	DI9 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	15h	H03-20	DI10 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	16h	H03-21	DI10 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	17h	H03-22	DI11 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
2003	18h	H03-23	DI11 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	19h	H03-24	DI12 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	1Ah	H03-25	DI12 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	1Bh	H03-26	DI13 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	1Ch	H03-27	DI13 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	1Dh	H03-28	DI14 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	1Eh	H03-29	DI14 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	1Fh	H03-30	DI15 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	20h	H03-31	DI15 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	21h	H03-32	DI16 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop

Pa	ıra. Gro	oup								
He	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index		Nume	Description	value nunge	Delutit	Unit	- maan	Condition	Time
	Code	No.		0 to 4						
	22h	H03-33	DI16 logic selection	See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	23h	H03-34	DI17 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	24h	H03-35	DI17 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	25h	H03-36	DI18 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	26h	H03-37	DI18 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	27h	H03-38	DI19 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	28h	H03-39	DI19 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	29h	H03-40	DI20 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
2003	2Ah	H03-41	DI20 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	2Bh	H03-42	DI21 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	2Ch	H03-43	DI21 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	2Dh	H03-44	DI22 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	2Eh	H03-45	DI22 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	2Fh	H03-46	DI23 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	30h	H03-47	DI23 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	31h	H03-48	DI24 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	32h	H03-49	DI24 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop

Pa	ra. Gro	oup								
He	x.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index						Unit		Condition	Time
	Code	No.		2004h/H04 Termir	l nal Output Paran	l neters	<u> </u>			
	01h	H04-00	DO1 function selection	20040/10/04 Termin Consisting of three digits, with the first one (from left to right) indicating the axis number and the last two indicating the terminal function. The last two digits are defined as follows: 0: No definition 01: Servo ready 02: Motor rotating 10: Warning 11: Fault	0 to 65535	0	1	16 bits	During running	At stop
2004	02h	H04-01	DO1 logic selection	0: Output low (L) level upon valid logic (optocoupler ON) 1: Output high (H) level upon valid logic (optocoupler OFF)	0 to 1	0	1	16 bits	During running	At stop
2004	03h	H04-02	DO2 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	04h	H04-03	DO2 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
	5h	H04-04	DO3 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	6h	H04-05	DO3 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
	7h	H04-06	DO4 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	8h	H04-07	DO4 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
	9h	H04-08	DO5 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Ah	H04-09	DO5 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
2004	0Bh	H04-10	DO6 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Ch	H04-11	DO6 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
				2005h/H05 Positio	on Control paran	neters				
2005	05h	H05-04	First-order low-pass filter time constant		0 to 65535	0	0.1 ms	16 bits	At stop	Immedi- ately

Pa	ra. Gro	auc								
He		Dec.					Min.		Change	Effective
	ndex	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	07h		Moving average filter time constant		0 to 1280	0	0.1 ms	16 bits	At stop	Immedi- ately
	14h	H05-19	Speed feedforward control	0: No speed feedforward 1: Internal speed feedforward 2: 60B1 used as speed feedforward	0 to 2	1	1	16 bits	At stop	Immedi- ately
	24h	H05-35	Duration limit of homing		0 to 65535	50000	0.01s	16 bits	During running	Immedi- ately
	2Fh	H05-46	Position offset in absolute position linear mode (low 32 bits)		0 to 4294967295	0	1	32 bits	At stop	Next power-on
2005	31h	H05-48	Position offset in absolute position linear mode (high 32 bits)		-2147483648 to +2147483647	0	1	32 bits	At stop	Next power-on
	33h	H05-50	Mechanical gear ratio (numerator)		1 to 65535	1	1	16 bits	At stop	Immedi- ately
	34h	H05-51	Mechanical gear ratio (denominator)		1 to 65535	1	1	16 bits	At stop	Immedi- ately
	35h	H05-52	Pulses per load revolution in absolute position rotation mode (low 32 bits)		0 to 4294967295	0	1 p	32 bits	At stop	Immedi- ately
	37h	H05-54	Pulses per load revolution in absolute position rotation mode (high 32 bits)		0 to 128	0	1 p	32 bits	At stop	Immedi- ately
				2006h/H06 Speed	d Control Parame	eters				
	03h	H06-02	Speed reference source	0: Keypad 1: Multi-speed reference	0 to 1	0	1	16 bits	At stop	Immedi- ately
	04h	H06-03	Speed reference		-6000 to +6000	200	1 RPM	16 bits	During running	Immedi- ately
2006	06h	H06-05	Acceleration ramp time of speed reference		0 to 65535	0	1 RPM	16 bits	During running	Immedi- ately
	07h	H06-06	Deceleration ramp time of speed reference		0 to 65535	0	1 RPM	16 bits	During running	Immedi- ately

Pa	ra. Gro	oup								
He		Dec.					Min.		Change	Effective
-	n. Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	09h	H06-08	Forward speed		0 to 6000	6000	1 RPM	16 bits	During	Immedi-
			limit Reverse speed						running During	ately Immedi-
	0Ah	H06-09	limit		0 to 6000	6000	1 RPM	16 bits	running	ately
				0: No torque					Turring	atery
			-	feedforward						
	0Ch	1106 11	Torque feedforward	1: Internal torque	0 to 2	1	1	16 bits	During	Immedi-
2006	UCII	100-11	control	feedforward	0102	1	1	TODICS	running	ately
			control	2: 60B2 used as external						
				torque feedforward						
		1100 10	Acceleration		0. 05505	1.0		1011	During	Immedi-
	0Dh	H06-12	ramp time of jog speed		0 to 65535	10	1 ms	16 bits	running	ately
			Motor speed						During	Immedi-
	11h	H06-16	threshold		0 to 1000	20	1 RPM	16 bits	running	ately
				2007h/H07 Torqu	e Control Param	eters				
			Torque	200111/1101 10144			1			
			reference						During	Immedi-
	04h	H07-03	set through		-4000 to +4000	0	0.1%	16 bits	running	ately
			keypad						0	,
			Torque				0.01		During	Immedi-
	06h	H07-05	reference filter		0 to 3000	79	ms	16 bits	running	ately
			time constant				1113		Turring	atery
	0.71		2nd torque				0.01		During	Immedi-
	07h	H07-06	reference filter		0 to 3000	79	ms	16 bits	running	ately
			time constant Internal							
	0Ah	H07-09	forward		0 to 4000	3000	0.1%	16 bits	During	Immedi-
			torque limit						running	ately
			Internal						During	Immedi-
	0Bh	H07-10	reverse torque		0 to 4000	3000	0.1%	16 bits	During running	ately
			limit						<u> </u>	-
	10h	H07-15	Emergency		0 to 4000	1000	0.1%	16 bits	During	Immedi-
-			stop torque Internal speed						running	ately
2007	14h	H07-19	limit in torque		0 to 6000	3000	1 RPM	16 bits	During	Immedi-
2001	1	1101 15	control		0 10 0000	5000	1.00	10 5105	running	ately
			Internal							
	156	H07-20	reverse speed		0 to 6000	3000	1 RPM	16 bits	During	Immedi-
	15h		limit in torque		0 to 6000	5000	TKPM	10 DILS	running	ately
			control							
			Reference							
	16h	H07-21	value for		0 to 4000	0	0.1%	16 bits	During	Immedi-
			torque						running	ately
			reached Torque output							
			when torque							
	17h	H07-22	reached DO		0 to 4000	200	0.1%	16 bits	During	Immedi-
			signal turned						running	ately
			on							
			Torque output							
			when torque						During	Immedi-
	18h	H07-23	reached DO		0 to 4000	100	0.1%	16 bits	running	ately
			signal turned						8	
			off							

Pa	ra. Gro	oup								
He		Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	value Range	Delault	Unit	width	Condition	Time
Group	Code	No.								
2007	27h	H07-38	Torque reference filter selection	0: First-order low-pass filter 1: Biquad low-pass filter	0 to 1	0	1	16 bits	During running	Immedi- ately
	28h	H07-39	Attenuation ratio of biquad low-pass filter		0 to 50	0	1	16 bits	At stop	Immedi- ately
				2008h/H08 0	Gain Parameters					
	01h	H08-00	Speed loop gain		1 to 20000	250	0.1 Hz	16 bits	During running	Immedi- ately
	02h	H08-01	Speed loop integral time constant		15 to 51200	3183	0.01 ms	16 bits	During running	Immedi- ately
	03h	H08-02	Position loop gain		0 to 20000	400	0.1 Hz	16 bits	During running	Immedi- ately
	04h	H08-03	2nd speed loop gain		1 to 20000	400	0.1 Hz	16 bits	During running	Immedi- ately
	05h	H08-04	2nd speed loop integral time constant		15 to 51200	2000	0.01 ms	16 bits	During running	Immedi- ately
	06h	H08-05	2nd position loop gain		0 to 20000	640	0.1 Hz	16 bits	During running	Immedi- ately
	09h	H08-08	2nd gain mode	0: Fixed at the 1st gain, P/PI switchover performed through bit26 of 60FE 1: Switchover between the 1st gain and 2nd gain activated based on the condition defined by H08-09	0 to 1	1	1	16 bits	During running	Immedi- ately
2008	0Ah	H08-09		0: Fixed at the 1st gain (PS) 2: Torque reference value too large (PS) 3: Speed reference value too large (PS) 4: Speed reference change rate too large (PS) 5: Threshold of speed reference (PS) 6: Position deviation too large (P) 7: Position reference available (P) 8: Positioning unfinished (P) 9: Actual speed (P) 10: Position reference + Actual speed (P)	0 to 10	0	1	16 bits	During running	Immedi- ately
	0Bh	H08-10	Gain switchover delay		0 to 10000	50	0.1 ms	16 bits	During running	Immedi- ately

Pa	ira. Gro	oup								
He	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index	Para.	Hume	Description	value nunge	Delaute	Unit	maan	Condition	Time
oroup	Code	No.	<u> </u>							
	0.Ch	1100 11	Gain switchover		0 to 20000	50	1	16 bits	During	Immedi-
	UCH	H08-11	level		0 10 20000	50		10 DILS	running	ately
			Gain							
	0Dh	H08-12	switchover		0 to 20000	30	1	16 bits	During	Immedi-
			hysteresis						running	ately
			Position gain						During	Immedi-
	0Eh	H08-13	switchover		0 to 10000	30	0.1 ms	16 bits	running	ately
			time							,
	10h	H08-15	Load inertia		0 to 12000	100	0.01	16 bits	During	Immedi-
			ratio Speed						running	ately
			feedforward				0.01		During	Immedi-
	13h	H08-18	filter time		0 to 6400	50	ms	16 bits	running	ately
			constant				1115		Turring	atery
			Speed							
	14h	H08-19	feedforward		0 to 1000	0	0.1%	16 bits	During	Immedi-
			gain						running	ately
			Torque							
	15h	H08-20	feedforward		0 to 6400	50	0.01	16 bits	During	Immedi-
	1011	1100 20	filter time		0 10 0 100	50	ms	10 5105	running	ately
			constant							
	16h	1100 21	Torque feedforward		0 to 2000	0	0.1%	16 bits	During	Immedi-
2008	100	H08-21	gain		0 to 2000	0	0.1%	16 DIts	running	ately
			gan	0: Average filtering						
				of speed feedback						
				inhibited						
				1: 2 times of average						
				filtering of speed						
				feedback						
			Speed	2: 4 times of average						Immedi-
	17h	H08-22		filtering of speed	0 to 4	0	1	16 bits	At stop	ately
			selection	feedback						utety
				3:8 times of average						
				filtering of speed feedback						
				4: 16 times of average						
				filtering of speed						
				feedback						
			Cutoff		1					
			frequency		1				Duri	
	18h	H08-23	of speed		100 to 4000	4000	1 Hz	16 bits	During	Immedi-
			feedback low-		1				running	ately
			pass filter							
	19h	H08-24	PDFF control		0 to 1000	1000	0.1%	16 bits	During	Immedi-
			coefficient						running	ately

Pa	ra. Gro	oup								
He		Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
<u> </u>	Index	Para.	Name	Description	value Range		Unit	width	Condition	Time
Group	Code	No.								
		-		2009h/H09 Gain au	uto-tuning paran	neters				
	01h	Н09-00	Gain auto- tuning mode	0: Disabled, gain parameters adjusted manually 1: Standard gain auto- tuning mode, gain parameters adjusted automatically based on the stiffness level 2: Positioning mode, gain parameters adjusted automatically based on the stiffness level 3: Gain auto-tuning with friction compensation 4: Positioning mode with friction compensation	0 to 4	0	1	16 bits	During running	Immedi- ately
	02h	H09-01	Stiffness level		0 to 31	12	1	16 bits	During running	Immedi- ately
2009	03h	H09-02	Adaptive notch mode	0: Adaptive notch no longer updated 1: One adaptive notch activated (3rd notch) 2: Two adaptive notches activated (3rd and 4th notches) 3: Resonance point tested only (displayed in H09-24) 4: Adaptive notch cleared, parameters of 3rd and 4th notches restored to default values	0 to 4	0	1	16 bits	During running	Immedi- ately
	04h	H09-03	Online inertia auto-tuning mode	0: Online auto-tuning disabled 1: Online auto-tuning enabled, changing slowly 2: Online auto-tuning enabled, changing normally 3: Online auto-tuning enabled, changing quickly	0 to 3	0	1	16 bits	During running	Immedi- ately
	05h	H09-04	Low-frequency resonance suppression mode	0: Manually set parameters of low- frequency resonance suppression filter 1: Automatically set parameters of low- frequency resonance suppression filter	0 to 1	0	1	16 bits	During running	Immedi- ately

Pa	ira. Gro	oup								
He		Dec.	Norra	Deseriation	Value Deve	Default	Min.	14/1-1-1-	Change	Effective
	Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	ooue		Offline inertia	0: Positive and negative						
	06h	H09-05	auto-tuning	-	0 to 1	0	1	16 bits	At stop	Immedi-
			mode	1: JOG mode						ately
			Maximum							
	071		speed of		100. 1000	500	1.0014	101.1		Immedi-
	07h	H09-06	inertia auto-		100 to 1000	500	1 RPM	16 bits	At stop	ately
			tuning							
			Time							
			constant for							
			accelerating to							Immedi-
	08h	H09-07	the maximum		20 to 800	125	1 ms	16 bits	At stop	ately
			speed during							atery
			inertia auto-							
			tuning							
	0.01-		Inertia auto-		F0 +- 10000	000	1	10 1.44	A	Immedi-
	09h	H09-08	tuning interval		50 to 10000	800	1 ms	16 bits	At stop	ately
			Number							
			of motor							
	0Ah	н09-09	revolutions		0 to 65535	0	0.01	16 bits	-	-
			per inertia			-				
			auto-tuning							
			Frequency of						During	Immedi-
	0Dh	H09-12	the 1st notch		50 to 4000	4000	1 Hz	16 bits	running	ately
	0Eh	H09-13	Width level of		0 to 20	2	1	16 bits	During	Immedi-
	ULII	1103-13	the 1st notch		0 10 20	2	1	10 DILS	running	ately
2009	0Fh	H09-14	Depth level of		0 to 99	0	1	16 bits	During	Immedi-
			the 1st notch			-	-		running	ately
	10h	H09-15	Frequency of		50 to 4000	4000	1 Hz	16 bits	During	Immedi-
			the 2nd notch Width level of						running During	ately Immedi-
	11h	H09-16	the 2nd notch		0 to 20	2	1	16 bits	running	ately
			Depth level of						During	Immedi-
	12h	H09-17	the 2nd notch		0 to 99	0	1	16 bits	running	ately
			Frequency of						During	Immedi-
	13h	H09-18	the 3rd notch		50 to 4000	4000	1 Hz	16 bits	running	ately
	14h	H09-19	Width level of		0 to 20	2	1	16 bits	During	Immedi-
	1411	H09-19	the 3rd notch		01020	2	1	10 DILS	running	ately
	15h	H09-20	Depth level of		0 to 99	0	1	16 bits	During	Immedi-
		1105 20	the 3rd notch		0.0000	0	1	10 5105	running	ately
	16h	H09-21	Frequency of		50 to 4000	4000	1 Hz	16 bits	During	Immedi-
			the 4th notch						running	ately
	17h	H09-22	Width level of		0 to 20	2	1	16 bits	During	Immedi-
			the 4th notch Depth level of						running	ately Immedi-
	18h	H09-23	the 4th notch		0 to 99	0	1	16 bits	During running	ately
			Auto-tuned		<u> </u>		<u> </u>		running	atery
	19h	H09-24	resonance		0 to 2000	0	1 Hz	16 bits	_	-
			frequency			-				
			Torque							
	1.51	1100.00	disturbance		1000+ 1000		0.10/	1010	During	Immedi-
	1Fh	H09-30	compensation		-1000 to +1000	U	0.1%	16 bits	running	ately
			gain							

Pa	ra. Gro	oup								
He	x.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	value kange	Delault	Unit	width	Condition	Time
Group	Code	No.								
	20h	H09-31	Filter time constant of torque disturbance observer		0 to 2500	50	0.01 ms	16 bits	During running	Immedi- ately
	21h	H09-32	Constant torque compensation value		-1000 to +1000	0	0.1%	16 bits	During running	Immedi- ately
2009	22h	H09-33	Forward friction compensation value		-1000 to +1000	0	0.1%	16 bits	During running	Immedi- ately
	23h	H09-34	Reverse friction compensation value		-1000 to +1000	0	0.1%	16 bits	During running	Immedi- ately
	27h	H09-38	Frequency of low-frequency resonance		10 to 1000	1000	0.1 Hz	16 bits	During running	Immedi- ately
	28h	H09-39	Low-frequency resonance frequency filter		0 to 10	2	1	16 bits	At stop	Immedi- ately
				200Ah/H0A Fault and	d Protection Para	ameters				
	01h	H0A-00		0: Enable phase loss fault and inhibit phase loss warning 1: Enable phase loss fault and warning 2: Inhibit phase loss fault and warning	0 to 2	0	1	16 bits	During running	Immedi- ately
200A	02h	H0A-01	Absolute position limit	0: Disable absolute position limit 1: Enable absolute position limit 2: Enable absolute position limit after homing	0 to 2	0	1	16 bits	At stop	Immedi- ately
2004	04h	H0A-03	Power-off memory selection	0: Disable power-off memory 1: Enable power-off memory 2: Disable power- off memory and hide control power undervoltage fault	0 to 2	0	1	16 bits	During running	Immedi- ately
	05h	H0A-04	Motor overload protection gain		50 to 300	100	1	16 bits	At stop	Immedi- ately
	07h	H0A-06	Motor overload level		0 to 400	0	1	16 bits	At stop	Immedi- ately

Pa	ıra. Gro	auo								
He		Dec.					Min.		Change	Effective
пе	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	Para. No.								
		H0A-07	UVW phase sequence auto-tuning selection	0: Not perform UVW phase sequence auto- tuning during angle auto-tuning 1: Perform UVW phase sequence auto-tuning during angle auto- tuning	0 to 1	1	1	16 bits	During running	Immedi- ately
	09h	H0A-08	Overspeed threshold		0 to 10000	0	1 RPM	16 bits	During running	ately
	0Dh	H0A-12	Runaway protection	0: Disable 1: Enable	0 to 1	1	1	16 bits	During running	Immedi- ately
	0Eh	H0A-13	Initial angle auto-tuning mode	0: Auto-tuning with Z signal 1: Jog auto-tuning without Z signal 2: Auto-tuning of voltage input 3: Angle auto-tuning of voltage input with Z signal	0 to 3	0	1	16 bits	At stop	Immedi- ately
	10h	H0A-15	Motor rotation threshold		1 to 1000	5	1 RPM	16 bits	During running	Immedi- ately
200A	11h	H0A-16	Threshold for low-frequency resonance position deviation		1 to 1000	5	1 p	16 bits	During running	Immedi- ately
	14h	H0A-19	Filter time constant of touch probe 1		0 to 630	200	1 µs	16 bits	During running	Immedi- ately
	15h	H0A-20	Filter time constant of touch probe 2		0 to 630	200	1 µs	16 bits	During running	Immedi- ately
	17h	H0A-22	Sigma_Delta filter time		0 to 3	1	1	16 bits	At stop	Next power-on
	18h	H0A-23	TZ signal filter time		0 to 31	15	125 ns	16 bits	At stop	Next power-on
	1Ah	H0A-25	Filter time constant of displayed speed feedback		0 to 5000	50	1 ms	16 bits	At stop	Immedi- ately
	1Bh	H0A-26	Motor overload selection	0: Not hide motor overload warning (Er.909) and fault (Er.620) 1: Hide motor overload warning (Er.909) and fault (Er.620)	0 to 1	0	1	16 bits	At stop	Immedi- ately
	21h	H0A-32	Time window of locked rotor over- temperature protection		10 to 65535	200	1 ms	16 bits	During running	Immedi- ately

Pa	ra. Gro	oup								
He	x.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
_	Index	Para.	Name	Description	value Range	Delault	Unit	width	Condition	Time
Group	Code	No.								
	22h	H0A-33	Locked rotor over- temperature protection	0: Shielded 1: Enabled	0 to 1	1	1	16 bits	During running	Immedi- ately
200A	25h	H0A-36	Encoder multi- turn overflow fault	0: Not hide 1: Hide	0 to 1	0	1	16 bits	At stop	Immedi- ately
	26h	H0A-37	Inverter card model identification	0: Not hide 1: Hide	0 to 1	0	1	16 bits	At stop	Immedi- ately
				200Bh/H0B Mor	nitoring Paramet	ers				
	01h	H0B-00	Actual motor speed		-9999 to +9999	0	1 RPM	16 bits	-	-
	02h	H0B-01	Speed reference		-9999 to +9999	0	1 RPM	16 bits	-	-
	03h	H0B-02	Internal torque reference		-4000 to +4000	0	0.1%	16 bits	-	-
	04h	H0B-03	Monitored DI status		0 to 0x00FFFFFF	0	1	32 bits	-	-
	06h	H0B-05	Monitored DO status Absolute		0 to 0xFFFF -2147483648	0	1	16 bits	-	-
	08h	H0B-07	position counter		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	0Ah	H0B-09	Mechanical angle		0 to 3600	0	0.1°	16 bits	-	-
	0Bh	H0B-10	Electrical angle		0 to 3600	0	0.1°	16 bits	-	-
	0Dh	H0B-12	Average load ratio		0 to 65535	0	0.1%	16 bits	-	-
200B	10h	H0B-15	Position following deviation (encoder unit)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	12h	H0B-17	Feedback pulse counter		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	14h	H0B-19	Total power- on time		0 to 4294967295	0	0.1s	32 bits	-	-
		H0B-24	RMS value of phase current		0 to 65535	0	0.01 A	32 bits	-	-
	1Bh	H0B-26	Bus voltage		0 to 65535	0	0.1 V	16 bits	-	-
	1Ch	H0B-27	Power module temperature		0 to 65535	0	1°C	16 bits	-	-
	1Dh	H0B-28	Absolute encoder fault information given by FPGA		0 to 0xFFFF	0	1	16 bits	-	-
	1Eh	H0B-29	System status information given by FPGA		0 to 0xFFFF	0	1	16 bits	-	-

Pa	ra. Gro	oup								
He	x.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
	Index		Name	Description	value Range	Default	Unit	width	Condition	Time
Group	Code	No.								
			System fault							
	1Fh	H0B-30	information		0 to 0xFFFF	0	1	16 bits	-	-
			given by FPGA							
	20h	H0B-31	Encoder fault		0 to 0xFFFF	0	1	16 bits	-	-
	-		information						During	Immedi-
	22h	H0B-33	Fault log		0 to 9	0	1	16 bits	During running	ately
			Fault code of							
	23h	H0B-34	the selected		0 to 0xFFFF	0	1	16 bits	-	-
			fault							
			Time stamp							
			upon		0 to					
	24h	H0B-35	occurrence of		4294967295	0	0.1s	32 bits	-	-
			the selected							
			fault Motor							
			speed upon							
	JCh		occurrence of		-9999 to +9999	0	1 RPM	16 bits		
	2011	по <u>в-</u> зт	the selected		-9999 10 +9999	0		TODICS	-	-
			fault							
			Motor phase U							
			current upon							
	27h	H0B-38	occurrence of		-32768 to	0	0.01 A	16 bits	-	-
			the selected		+32767					
200B			fault							
			Motor phase V							
			current upon		-32768 to					
	28h	H0B-39	occurrence of		+32767	0	0.01 A	16 bits	-	-
			the selected		132101					
			fault							
			Bus voltage							
	201		upon		0. 05505		0.1.1	101.1		
	29h	H0B-40	occurrence of		0 to 65535	0	0.1 V	16 bits	-	-
			the selected fault							
			Input terminal							
			status upon							
	24h	H0B-41	occurrence of		0 to	0	1	32 bits	_	_
	27.01	1100 11	the selected		0x00FFFFFF		1 ⁻	52 5105		
			fault							
			Output							
			terminal							
	2Ch	H0B-43	status upon		0 to 0xFFFF	0	1	16 bits		
	201	100-43	occurrence of			0	1	TODICS	-	-
			the selected							
			fault							
	2Eh	H0B-45	Internal fault		0 to 0xFFFF	0	1	16 bits	_	-
			code							

Pa	ra. Gro	oup								
He		Dec.					Min.		Change	Effective
	n. Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
			Absolute encoder fault information given by FPGA upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	30h	H0B-47	System status information given by FPGA upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	31h	H0B-48	System fault information given by FPGA upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	_	-
200B	32h	H0B-49	Encoder fault information upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	34h	H0B-51	Internal fault code upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	36h	H0B-53	Position following deviation (reference unit)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	38h	H0B-55	Actual motor speed		-60000 to +60000	0	0.1 RPM	32 bits	-	-
	3Ah	H0B-57	Control power voltage		0 to 65535	0	0.1 V	16 bits	-	-
	3Bh	H0B-58	Mechanical absolute position (low 32 bits)		0 to 4294967295	0	1 p	32 bits	-	-
	3Dh	H0B-60	Mechanical absolute position (high 32 bits)		-2147483648 to +2147483647	0	1 p	32 bits	=	-
	47h	H0B-70	Number of absolute encoder revolutions		0 to 65535	0	1	16 bits	-	-

Pa	ira. Gro	oup								
He		Dec.	Nama	Description	Malua Dan	Default	Min.	14/2 - 14/	Change	Effective
	Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	48h	H0B-71	Position of the absolute encoder within one turn		0 to 2147483647	0	1 p	32 bits	-	-
	4Eh	H0B-77	Encoder position (low 32 bits)		0 to 4294967295	0	1 p	32 bits	-	-
	50h	H0B-79	Encoder position (high 32 bits)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	52h	H0B-81	Single-turn position of the rotating load (low 32 bits)		0 to 4294967295	0	1 p	32 bits	-	-
200B	54h	H0B-83	Single-turn position of the rotating load (high 32 bits)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	56h	H0B-85	Single-turn position of the rotating load (reference unit)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	5Bh	H0B-90	Group No. of the abnormal parameter		0 to 0xFFFF	0	1	16 bits	-	-
	5Ch	H0B-91	Offset of the abnormal parameter within the group		0 to 65535	0	1	16 bits	-	-
			Bioth	200Dh/H0D Auxilia	ry Function Para	meters	1	1	L	
200D	02h	H0D-01	Fault reset	0: No operation 1: Fault reset	0 to 1	0	1	16 bits	During running	Immedi- ately
	04h	H0D-03	Encoder initial angle auto- tuning	0: No operation 1: Enable	0 to 1	0	1	16 bits	At stop	Immedi- ately
	05h	H0D-04	Encoder ROM read/write	0: No operation 1: Write ROM 2: Read ROM	0 to 2	0	1	16 bits	At stop	Immedi- ately
	06h	H0D-05	Emergency stop	0: No operation 1: Emergency stop	0 to 1	0	1	16 bits	During running	Immedi- ately
200D	0Dh	H0D-12	UV phase current balance correction	0: Disabled 1: Enabled	0 to 1	0	1	16 bits	At stop	Immedi- ately
	15h	H0D-20	Absolute encoder reset selection	0: No operation 1: Reset the fault 2: Reset the fault and multi-turn data	0 to 2	0	1	16 bits	At stop	Immedi- ately
	18h	H0D-23	Brake action selection	0: Brake closed 1: Brake released	0 to 1	0	1	16 bits	At stop	Immedi- ately

Pa	ra. Gro	auc								
He		Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	value Range	Delault	Unit	width	Condition	Time
Group	Code	No.								
		1		200Eh/H0E Comm	unication Param	neters	1	1		
	01h	H0E-00	Node address		1 to 127	1	1	16 bits	During running	Immedi- ately
	02h	H0E-01	Save objects written through communication to EEPROM	0: Not save 1: Save parameters written through communication to EEPROM 2: Save object dictionaries written through communication to EEPROM. 3: Save parameters and object dictionaries written through communication to	0 to 3	3	1	16 bits	During	ately Immedi- ately
				EEPROM						
	03h	H0E-02	Axis address		1 to 127	1	1	16 bits	-	-
	09h	H0E-08	Servo node address selection	0: Node address determined by H0E-00 1: Node address determined by DIP switch 1	0 to 1	0	1	16 bits	During running	Immedi- ately
200E	0Bh	H0E-10	CAN communication mode	0: N/A 1: CANopen 2: CANlink	0 to 2	1	1	16 bits	During running	Immedi- ately
	0Ch	H0E-11	CAN baud rate	0: 20 K 1: 50 K 2: 100 K 3: 125 K 4: 250 K 5: 500 K 6: 1 M	0 to 6	5	1	16 bits	During running	Immedi- ately
	0Dh	H0E-12	Number of CAN frames received per unit time		0 to 65535	0	1	16 bits	-	-
	0Eh	H0E-13	Maximum CAN reception errors per unit time		0 to 255	0	1	16 bits	-	-
	0Fh	H0E-14	Maximum CAN transmission errors per unit time		0 to 255	0	1	16 bits	-	-
	10h	H0E-15	CAN bus disconnection times per unit time		0 to 65535	0	1	16 bits	-	-
	11h	H0E-16	CAN configuration mode		0 to 1	0	1	16 bits	During running	Immedi- ately

Pa	ra. Gro	oup								
He	x.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index Code	Para. No.	Marrie	Description	value Kange	Delaute	Unit	width	Condition	Time
	15h	H0E-20	EtherCAT slave name		0 to 65535	0	1	16 bits	-	-
	16h	H0E-21	EtherCAT slave alias		0 to 65535	0	1	16 bits	At stop	Immedi- ately
	17h	H0E-22	Number of synchronization interrupts allowed by EtherCAT		1 to 20	9	1	16 bits	During running	Immedi- ately
	18h	H0E-23	EtherCAT synchronization detection mode	0: Standard mode 1: Surplus mode	0 to 1	0	1	16 bits	During running	Immedi- ately
	19h	H0E-24	Synchronization loss count		0 to 65535	0	1	16 bits	-	-
	1Ah	H0E-25	Maximum error value and invalid frames of EtherCAT port 0 per unit time		0 to 0xFFFF	0	1	16 bits	-	-
	1Bh	H0E-26	Maximum error value and invalid frames of EtherCAT port 1 per unit time		0 to 0xFFFF	0	1	16 bits	-	-
200E	1Ch	H0E-27	Maximum transfer error of EtherCAT port per unit time		0 to 0xFFFF	0	1	16 bits	-	-
	1Dh	H0E-28	Maximum EtherCAT data frame processing unit error per unit time		0 to 0x0255	0	1	16 bits	-	-
	1Eh	H0E-29	Maximum link loss of EtherCAT port 0 per unit time		0 to 0xFFFF	0	1	16 bits	-	-
	1Fh	H0E-30	EtherCAT master type		0 to 3	2	1	16 bits	At stop	Immedi- ately
	20h	H0E-31	EtherCAT synchronization mode		0 to 2	1	1	16 bits	At stop	Next power-on
	21h	H0E-32	EtherCAT synchronization error threshold		0 to 4000	3000	ns	16 bits	At stop	Immedi- ately
	22h		EtherCAT state machine status		0 to 8	0	1	16 bits	-	-

Pa	ira. Gro	oup								
He		Dec.					Min.		Change	Effective
	Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
			Excessive							
			position							
	23h	H0E-34	reference		1 to 7	3	1	16 bits	During	Immedi-
	2311	HUE-34	increment		1107	3	1	TODICS	running	ately
			count in CSP							
			mode							
	24h	H0E-35	EtherCAT		0 to 0xFFFF	0	1	16 bits	-	-
			status code	0: Disabled					During	Immedi-
	29h	H0E-40	EOE selection	1: Enabled	0 to 1	0	1	16 bits	During running	ately
			Most							
	2Ah	H0E-41	significant		0 to 255	0	1	16 bits	During	Immedi-
	2/11	1101-41	byte of EOE IP		0 10 233		1 [±]	10 0103	running	ately
			address							
			Second most						During	ton on a st
	2Bh	H0E-42	significant byte of EOE IP		0 to 255	0	1	16 bits	During running	Immedi- ately
			address						running	atery
	<u> </u>		Second least							
			significant						During	Immedi-
	2Ch	H0E-43	byte of EOE IP		0 to 255	0	1	16 bits	running	ately
			address						Ŭ	,
			Least							
	2Dh	H0E-44	significant		0 to 255	0	1	16 bits	During	Immedi-
	2011		byte of EOE IP		0 10 200		1 ⁻	10 5105	running	ately
	<u> </u>		address							
200E			Most significant						During	Immedi-
	2Eh	H0E-45	byte of EOE		0 to 255	0	1	16 bits	running	ately
			subnet mask						Turring	atery
			Second most							
	254	1105 40	significant		0 +- 255	0	1	10 1.4	During	Immedi-
	2Fh	H0E-46	byte of EOE		0 to 255	0	1	16 bits	running	ately
			subnet mask							
			Second least							
	30h	H0E-47	significant		0 to 255	0	1	16 bits	During	Immedi-
			byte of EOE						running	ately
			subnet mask Least							
			significant						During	Immedi-
	31h	H0E-48	byte of EOE		0 to 255	0	1	16 bits	running	ately
			subnet mask							utety
			Most							
	32h	H0E-49	significant		0 to 255	0	1	16 bits	During	Immedi-
	J211	102-49	byte of default		0 10 200	ľ	 ⁺	TODICS	running	ately
	L		EOE gateway							
			Second most						Duri	1 mar 10
	33h	H0E-50	significant		0 to 255	0	1	16 bits	During	Immedi-
			byte of default EOE gateway						running	ately
			Second least							
			significant						During	Immedi-
	34h	H0E-51	byte of default		0 to 255	0	1	16 bits	running	ately
			EOE gateway							,
					•					

Pa	ra. Gro	oup								
He		Dec.					Min.		Change	Effective
- 1	ndex		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	ooue		Least							
	251		significant		0.055			101.1	During	Immedi-
	35h	H0E-52	byte of default		0 to 255	0	1	16 bits	running	ately
			EOE gateway						_	-
			Most							
	36h	H0E-53	significant		0 to 0x00FF	0	1	16 bits	_	-
	5011		byte of MAC		0 10 00011		1	10 5105		
			used by EOE							
	271		2nd byte of		0. 0.00FF			101.1		
	37h	H0E-54	MAC used by		0 to 0x00FF	0	1	16 bits	-	-
			EOE 3rd byte of							
	38h	LINE 55	MAC used by		0 to 0x00FF	0	1	16 bits	-	
	2011		EOE		0 10 000011		1	10 DILS	-	-
			4th byte of							
	39h	H0E-56	MAC used by		0 to 0x00FF	0	1	16 bits	-	-
			EOE			-	[
			5th byte of							
	3Ah	H0E-57	MAC used by		0 to 0x00FF	0	1	16 bits	-	-
			EOE							
			Least							
	3Bh	H0E-58	significant		0 to 0x00FF	0	1	16 bits	_	_
	5011		byte of MAC		0 10 00011		1	10 5105		
			used by EOE							
			Automatic						. .	
	3Dh	H0E-60	Ethernet IP address	0: Disabled	0 to 1	0	1	16 bits	During	Immedi-
200E			identification	1: Enabled					running	ately
			Most							
			significant							
	3Eh	H0E-61			0 to 255	192	1	16 bits	During	Immedi-
	02		Ethernet IP		0 10 200	102	1	10 5.05	running	ately
			address							
			Second most							
			significant						During	Immedi-
	3Fh	H0E-62	byte of		0 to 255	168	1	16 bits	During running	ately
			Ethernet IP						running	atery
			address							
			Second least							
			significant						During	Immedi-
	40h	H0E-63			0 to 255	0	1	16 bits	running	ately
			Ethernet IP address							-
			address Least							
			significant							
	41h	H0E-64			0 to 255	2	1	16 bits	During	Immedi-
			Ethernet IP		200	[[running	ately
			address							
			Most							
			significant						During	Immedi-
	42h	H0E-65	byte of		0 to 255	255	1	16 bits	During running	ately
			Ethernet						running	atery
			subnet mask							

Pa	ra. Gro	oup								
He		Dec.					Min.	1.1	Change	Effective
	Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
			Second most significant							
	43h	H0E-66			0 to 255	255	1	16 bits	During	Immedi-
			Ethernet				-		running	ately
			subnet mask							
			Second least							
			significant						During	Immedi-
	44h	H0E-67	byte of		0 to 255	255	1	16 bits	running	ately
			Ethernet						Turring	atery
			subnet mask							
			Least							
			significant						During	Immedi-
	45h	H0E-68			0 to 255	0	1	16 bits	running	ately
			Ethernet							
			subnet mask							
			Most							
	46h		significant byte of default		0 to 255	192	1	16 bits	During	Immedi-
	4011	HUE-09	Ethernet		0 10 255	192	1 ¹	10 DILS	running	ately
			gateway							
			Second most							
			significant							
	47h	H0F-70	byte of default		0 to 255	168	1	16 bits	During	Immedi-
			Ethernet				-		running	ately
			gateway							
			Second least							
			significant						During	Immedi-
	48h	H0E-71	byte of default		0 to 255	0	1	16 bits	During	ately
200E			Ethernet						running	atery
			gateway							
			Least							
			significant						During	Immedi-
	49h	H0E-72	byte of default		0 to 255	1	1	16 bits	running	ately
			Ethernet							
			gateway							
	51h	H0E-80	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	0 to 9	9	1	16 bits	During running	Immedi- ately
	52h	H0E-81	Modbus data format	8: 57600 bps 9: 115200 bps 0: No parity, 2 stop bits (8-N-2) 1: Even parity, 1 stop bit (8-E-1) 2: Odd parity, 1 stop bit (8-O-1) 3: No parity, 1 stop bit (8-N-1)	0 to 3	3	1	16 bits	During running	Immedi- ately

Pa	ara. Gro	oup								
He	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index						Unit		Condition	Time
	Code	No.								
			Modbus						During	Immedi-
	53h	H0E-82	response		0 to 20	0	1	16 bits	running	ately
			delay						Turring	atery
			Modbus						During	Immedi-
	54h	H0E-83	communication		0 to 600	0	1	16 bits		
			timeout						running	ately
	5Bh	H0E-90	Modbus		0 +- 05525		0.01	16 bits		
		HUE-90	version No.		0 to 65535	0	0.01	10 DILS	-	-
	5Ch	H0E-91	CANopen		0 to 65535	0	0.01	16 bits	_	
200E	SCI	H0E-91	version No.		0 10 05555	0	0.01	TO DICS	-	-
200E	5Dh	H0E-92	CANlink		0 to 65535	0	0.01	16 bits		
	5011	HUE-92	version No.		0 10 65555	0	0.01	10 DILS	-	-
	C.C.L.	H0E-93	EtherCAT COE		0 +- 05525		0.01	10 1.44		
	5Eh	HUE-93	version No.		0 to 65535	0	0.01	16 bits	-	-
	C.C.L.	H0E-94	EtherCAT EOE		0 +- 05525		0.01	10 1.44		
	5Fh	HUE-94	version No.		0 to 65535	0	0.01	16 bits	-	-
	60h	H0E-95	Ethernet		0 +- 05525		0.01	10 1.44		
	60h	HUE-95	version No.		0 to 65535	0	0.01	16 bits	-	-
	C11	1105.00	XML version		0. 05505		0.01	1010		
	61h	H0E-96	No.	-	0 to 65535	0	0.01	16 bits	-	-

Parameters of axis 2

P	ara. Gro	oup								
He	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width		Effective
Group	Index Code	Para. No.			Ŭ		Unit		Condition	Time
				2800h/H00 Servo	Motor Parameter	s		·		
	01h	H00-00	Motor code		0 to 65535	14000	1	16 bits	At stop	Next power- on
	03h	H00-02	Customized motor code		0 to 0xFFFFFFFF	0	1	32 bits	-	-
	05h	H00-04	Encoder version No.		0 to 65535	0	0.1	16 bits	-	-
	06h	H00-05	Serial encoder motor code		0 to 65535	0	1	16 bits	-	-
	09h	H00-08	Serial encoder type		0 to 65535	0	1	16 bits	At stop	Next power- on
2800	0Ah	H00-09	Rated voltage	0: 220 V 1: 380 V	0 to 1	0	1	16 bits	At stop	Next power- on
	0Bh	H00-10	Rated power		1 to 65535	75	0.01 kW	16 bits	At stop	Next power- on
	0Ch	H00-11	Rated current		1 to 65535	470	0.01 A	16 bits	At stop	Next power- on
	0Dh	H00-12	Rated torque		10 to 65535	239	0.01 N m	16 bits	At stop	Next power- on
	0Eh	H00-13	Maximum torque		10 to 65535	716	0.01 N m	16 bits	At stop	Next power- on

Hex. Dec. Name Description Value Range Default Min. Unit Width Width Change Condition Effective Time Group Index Para. No. No. </th <th>P</th> <th>ara. Gro</th> <th>oup</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	P	ara. Gro	oup								
Index Code Para. No. Image: Code of the code	He	ex.	Dec.	Namo	Description	Value Pango	Dofault	Min.	Width		
Code No. Next Next 0Ph H00-14 Rated speed 100 to 6000 3000 1 RPM 16 bits At stop power- on 10h H00-15 Maximum motor speed 100 to 6000 6000 1 RPM 16 bits At stop Next power- on 11h H00-15 Mornet of inertia 1 to 65535 130 0.01 kgcm ² 16 bits At stop Next power- on 12h H00-18 Stator inductance Lq 1 to 65535 500 0.010 16 bits At stop Next power- on 13h H00-18 Stator inductance Lq 1 to 65535 327 0.01 mH 16 bits At stop Next power- on 15h H00-20 Stator inductance Ld 1 to 65535 337 0.01 mH 16 bits At stop power- on 16h H00-20 Electrical coefficient 1 to 65535 3330 mV/ resistance Next power- on Next power- on 17h H00-22 Electrical constant Te 1 to 65535 51 Nm <td>C</td> <td>Index</td> <td>Para.</td> <td>Name</td> <td>Description</td> <td>value Range</td> <td>Delault</td> <td>Unit</td> <td>width</td> <td>Condition</td> <td>Time</td>	C	Index	Para.	Name	Description	value Range	Delault	Unit	width	Condition	Time
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26h H00-37 encoder function setting bit 0 to 0xFFFF 0 1 16 bits At stop Next power- on 2801 01h H01-00 MCU software version 0 to 65535 0 0.1 16 bits - - 2801 02h H01-01 FPGA software 0 to 65535 0 0.1 16 bits - -				-							
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2801 01n H01-00 version 0 to 65535 0 0.1 16 bits - - 2801 02b H01-01 FPGA software 0 to 65535 0 0.1 16 bits - -			1	14011 6	2801h/H01: Serv	o Drive Parameter	S	1			
2801 02b H01-01 FPGA software 0 to 65535 0 0.1 16 bits		01h	H01-00			0 to 65535	0	0.1	16 bits	-	-
	2801										
		02h	H01-01	version		0 to 65535	0	0.1	16 bits	-	-

P	ara. Gro	oup								
	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	value kange	Default	Unit	wiath	Condition	Time
Group	Code	No.								
	03h	H01-02	FPGA customized No.		0 to 65535	0	0.1	16 bits	-	-
	04h	H01-03	CPU0 software version No.		0 to 65535	0	0.1	16 bits	-	-
	05h	H01-04	CPU1 software version No.		0 to 65535	0	0.1	16 bits	-	-
	08h	H01-07	Software test version No.		0 to 65535	0	0.01	16 bits	-	-
	0Bh	H01-10	Drive unit series number	3: S2R8 5: S5R5	0 to 65535	3	1	16 bits	At stop	Next power- on
	0Ch	H01-11	Voltage class of the drive unit		0 to 65535	220	1 V	16 bits	-	-
	0Dh	H01-12	Rated power of the drive unit		0 to 1073741824	40	0.01 kW	32 bits	-	-
	0Fh	H01-14	Maximum output power of the drive unit		0 to 1073741824	40	0.01 kW	32 bits	-	-
	11h	H01-16	Rated output current of the drive unit		0 to 1073741824	280	0.01 A	32 bits	-	-
2801	13h	H01-18	Maximum output current of the drive unit		0 to 1073741824	1010	0.01 A	32 bits	-	-
	15h	H01-20	Carrier frequency		4000 to 20000	8000	1 Hz	16 bits	At stop	Next power- on
	16h	H01-21	Dead zone time		1 to 2000	200	0.01 µs	16 bits	At stop	Next power- on
	17h	H01-22	D-axis coupling voltage compensation coefficient		0 to 60000	500	0.1%	16 bits	During running	Immedi- ately
	18h	H01-23	Q-axis back EMF compensation coefficient		0 to 60000	500	0.1%	16 bits	During running	Immedi- ately
	19h	H01-24	D-axis current loop gain		0 to 20000	500	1 Hz	16 bits	During running	Immedi- ately
	1Ah	H01-25	D-axis current loop integral compensation factor		1 to 10000	100	0.01	16 bits	During running	Immedi- ately
	1Bh	H01-26	Current sampling Sinc3 filter data extraction rate	0: Extraction rate 32 1: Extraction rate 64 2: Extraction rate 128 3: Extraction rate 256	0 to 3	0	1	16 bits	At stop	Next power- on

P	ara. Gro	oup								
	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index Code	Para. No.	Name	Description	value Range	Delault	Unit	width	Condition	Time
	1Ch	H01-27	Q-axis current loop gain		0 to 20000	500	1 Hz	16 bits	During running	Immedi- ately
	1Dh	H01-28	Q-axis current loop integral compensation factor		1 to 10000	100	0.01	16 bits	During running	Immedi- ately
	1Eh	H01-29	Q-axis coupling voltage compensation coefficient		0 to 60000	500	0.1%	16 bits	During running	Immedi- ately
	1Fh	H01-30	Bus voltage gain tuning		500 to 1500	1000	0.1%	16 bits	At stop	Next power- on
	20h	H01-31	Minimum turn-on time of bootstrap circuit lower bridge		0 to 200	50	0.1 µs	16 bits	At stop	Next power- on
	21h	H01-32	Relative gain of UV sampling		1 to 65535	32768	1	16 bits	At stop	Next power- on
	23h	H01-34	IGBT over- temperature threshold		0 to 1500	950	0.1°C	16 bits	During running	Immedi- ately
2001	25h	H01-36	Current sensor range		0 to 999999	2083	0.01 A	32 bits	At stop	Next power- on
2801	27h	H01-38	FPGA phase current protection threshold		0 to 1000	900	0.1%	16 bits	At stop	Next power- on
	29h	H01-40	DC bus overvoltage protection threshold		0 to 2000	420	1 V	16 bits	-	-
	2Ah	H01-41	DC bus voltage discharge threshold		0 to 2000	380	1 V	16 bits	At stop	Immedi- ately
	2Bh	H01-42	DC bus undervoltage threshold		0 to 2000	200	1 V	16 bits	At stop	Immedi- ately
	2Ch	H01-43	Power supply unit series No.	1: 1 kW 2: 2 kW	1 to 2	1	1	16 bits	At stop	Next power- on
	2Dh	H01-44	Output power of the power supply unit		0 to 1073741824	100	0.01 kW	32 bits	-	-
	2Fh	H01-46	Maximum output power of the power supply unit		0 to 1073741824	150	0.01 kW	32 bits	-	-
	31h	H01-48	Rated output current of the power supply unit		0 to 1073741824	320	0.01 A	32 bits	-	-

Pa	ara. Gro	oup								
He	ex.	Dec.	Nomo	Description	Value Dange	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	width	Condition	Time
Group	Code	No.								
	33h	H01-50	Over- temperature threshold of the power supply module		0 to 1500	800	0.1°C	16 bits	During running	Immedi- ately
	35h	H01-52	performance priority mode		0 to 20000	2000	1 Hz	16 bits	During running	Immedi- ately
	36h	H01-53	D-axis integral gain in performance priority mode		1 to 10000	100	0.01	16 bits	During running	Immedi- ately
	37h	H01-54	Q-axis proportional gain in performance priority mode		0 to 20000	2000	1 Hz	16 bits	During running	Immedi- ately
2801	38h	H01-55	Q-axis integral gain in performance priority mode		1 to 10000	100	0.01	16 bits	During running	Immedi- ately
2001	39h	H01-56	Current loop low- pass cutoff frequency		0 to 65535	11000	1 Hz	16 bits	At stop	Next power- on
	3Ah	H01-57	Maximum output current of the power supply unit		0 to 1073741824	480	0.01 A	32 bits	-	-
	3Ch	H01-59	Serial encoder data transmission compensation time		0 to 2000	0	0.001 μs	16 bits	At stop	Next power- on
	3Dh	H01-60	FPGA scheduling frequency selection	0: 32 kHz 1: 16 kHz	0 to 1	1	1	16 bits	At stop	Next power- on
	3Eh	H01-61	Command scheduling frequency selection	0: 4 kHz 1: 2 kHz 2: 1 kHz	0 to 2	2	1	16 bits	At stop	Next power- on
	48h	H01-71	Voltage class of the power supply unit		0 to 65535	220	1 V	16 bits	-	-
				2802h/H02 Basic	Control Parameter	rs				
2802	01h	H02-00	Control mode selection	0: Speed mode 1: Position mode 2: Torque mode 9: EtherCAT mode 255: This axis is not used.	0 to 255	9	1	16 bits	At stop	Immedi- ately

P	ara. Gro	oup								
	ex.	Dec.	Nama	Description	Value Dange	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	width	Condition	Time
Group	Code	No.								
	02h	H02-01	Absolute system selection	0: Incremental mode 1: Absolute position linear mode 2: Absolute position rotation mode	0 to 2	0	1	16 bits	At stop	Next power- on
	03h	H02-02	Rotation direction	0: CCW direction as the forward direction 1: CW direction as the forward direction	0 to 1	0	1	16 bits	At stop	Next power- on
	08h	H02-07	Stop mode at overtravel	0: Coast to stop, keeping de-energized state 1: Stop at zero speed, keeping position lock state 2: Stop at zero speed, keeping de-energized state	0 to 2	1	1	16 bits	At stop	Immedi- ately
	09h	H02-08	Stop mode at No. 1 fault	0: Coast to stop, keeping de-energized state 1: DB Stop, keeping de-energized state 2: DB Stop, keeping DB state	0 to 2	0	1	16 bits	At stop	Immedi- ately
2802	0Ah	H02-09	Delay from brake output ON to command received		0 to 500	250	1 ms	16 bits	During running	Immedi- ately
	0Bh	H02-10	Delay from brake output OFF to motor de-energized		50 to 1000	150	1 ms	16 bits	During running	Immedi- ately
	0Ch	H02-11	Motor speed threshold at brake output OFF in rotation state		20 to 3000	30	1 RPM	16 bits	During running	Immedi- ately
	0Dh	H02-12	Delay from S-ON OFF to brake output OFF in rotation state		1 to 1000	500	1 ms	16 bits	During running	Immedi- ately
	10h	H02-15	Warning display on the keypad	0: Output warning information Immediately 1: Not output warning information	0 to 1	0	1	16 bits	At stop	Immedi- ately
	11h	H02-16	Brake switch	0: OFF 1: ON	0 to 1	0	1	16 bits	At stop	Immedi- ately

Para. Group										
Hex.		Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index	Para.	Hume	Description	value nunge	Delaute	Unit	maan	Condition	Time
Group	Code	No.	Damaiasihla							
2802	16h	H02-21	Permissible minimum resistance of the regenerative resistor		1 to 1000	40	1Ω	16 bits	-	-
	19h	H02-24	Heat dissipation coefficient of the resistor		10 to 100	30	0.01%	16 bits	At stop	Immedi- ately
	1Ah	H02-25	Regenerative resistor selection	1: External, naturally ventilated 2: External, forced air cooling 3: No regenerative resistor needed	1 to 3	3	1	16 bits	At stop	Immedi- ately
	1Bh	H02-26	Power of external regenerative resistor		1 to 65535	40	1 kW	16 bits	At stop	Immedi- ately
	1Ch	H02-27	Resistance of external regenerative resistor		1 to 1000	50	1Ω	16 bits	At stop	Immedi- ately
	1Fh	H02-30	User password		0 to 65535	0	1	16 bits	During running	Immedi- ately
	20h	H02-31	System parameter initialization	0: No operation 1: Restore default settings 2: Clear fault records	0 to 2	0	1	16 bits	At stop	Immedi- ately
	21h	H02-32	Selection of parameters in group H0B		0 to 99	50	1	16 bits	During running	Immedi- ately
	24h	H02-35	Keypad data refresh frequency		0 to 20	0	1 Hz	16 bits	During running	Immedi- ately
	2Ah	H02-41	Factory		0 to 65535	0	1	16 bits	During	Immedi-
			password	2002h/U02 T					running	ately
			1	2803h/H03 Termin Consisting of three	at input Paramete	15				
2803	03h	H03-02	DI1 function selection	digits, with the first one (from left to right) indicating the axis number and the last two indicating the terminal function. The last two digits are defined as follows: 0: No definition 01: S-ON 14: Positive limit switch 15: Negative limit switch 31: Home switch 38: Touch probe 1 39: Touch probe 2	0 to 65535	0	1	16 bits	During running	At stop

Р	ara. Gro	oup								
H	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index	Para.		Description	value hange	Delutit	Unit		Condition	Time
	Ode 04h	No.	DI1 logic selection	0: Active low 1: Active high 2: Rising edge- triggered 3: Falling edge- triggered 4: Rising/Falling edge- triggered	0 to 4	0	1	16 bits	During running	At stop
	05h	H03-04	DI2 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	06h	H03-05	DI2 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	07h	H03-06	DI3 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	08h	H03-07	DI3 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	09h	H03-08	DI4 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Ah	H03-09	DI4 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
2803	0Bh	H03-10	DI5 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Ch	H03-11	DI5 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	0Dh	H03-12	DI6 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Eh	H03-13	DI6 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	0Fh	H03-14	DI7 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	10h	H03-15	DI7 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	11h	H03-16	DI8 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	12h	H03-17	DI8 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	13h	H03-18	DI9 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	14h	H03-19	DI9 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop

P	ara. Gro	oup								
	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width		Effective
Group	Index	Para.	Name	Description	value Kalige	Delauti	Unit	width	Condition	Time
	Code 15h	No. H03-20	DI10 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	16h	H03-21	DI10 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	17h	H03-22	DI11 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	18h	H03-23	DI11 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	19h	H03-24	DI12 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	1Ah	H03-25	DI12 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	1Bh	H03-26	DI13 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	1Ch	H03-27	DI13 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	1Dh	H03-28	DI14 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
2803	1Eh	H03-29	DI14 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	1Fh	H03-30	DI15 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	20h	H03-31	DI15 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	21h	H03-32	DI16 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	22h	H03-33	DI16 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	23h	H03-34	DI17 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	24h	H03-35	DI17 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	25h	H03-36	DI18 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	26h	H03-37	DI18 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	27h	H03-38	DI19 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop

P	ara. Gro	oup								
	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width		Effective
Group	Index	Para.	Name	Description	value nange	Delaute	Unit	Width	Condition	Time
oroup	Code	No.		0 to 4						
	28h	H03-39	DI19 logic selection	See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	29h	H03-40	DI20 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	2Ah	H03-41	DI20 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	2Bh	H03-42	DI21 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	2Ch	H03-43	DI21 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
2803	2Dh	H03-44	DI22 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	2Eh	H03-45	DI22 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	2Fh	H03-46	DI23 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	30h	H03-47	DI23 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	31h	H03-48	DI24 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	32h	H03-49	DI24 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
				2804h/H04 Termina	al Output Parame	ters				
2804	01h	H04-00	DO1 function selection	Consisting of three digits, with the first one (from left to right) indicating the axis number and the last two indicating the terminal function. The last two digits are defined as follows: 0: No definition 01: Servo ready 02: Motor rotating 10: Warning 11: Fault	0 to 65535	0	1	16 bits	During running	At stop
	02h	H04-01	DO1 logic selection	0: Output low (L) level upon valid logic (optocoupler ON) 1: Output high (H) level upon valid logic (optocoupler OFF)	0 to 1	0	1	16 bits	During running	At stop

P	ara. Gro	oup								
	≘x.	Dec.	Nama	Description	Malua Dana	Defeult	Min.	14/2 - 14/	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	03h	H04-02	DO2 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	04h	H04-03	DO2 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
	5h	H04-04	DO3 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	6h	H04-05	DO3 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
2804	7h	H04-06	DO4 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	8h	H04-07	DO4 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
	9h	H04-08	DO5 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Ah	H04-09	DO5 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
	0Bh	H04-10	DO6 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Ch	H04-11	DO6 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
				2805h/H05 Positio	n Control Paramet	ers				
	05h	H05-04	First-order low-pass filter time constant		0 to 65535	0	0.1 ms	16 bits	At stop	Immedi- ately
	07h	H05-06	Moving average filter time constant		0 to 1280	0	0.1 ms	16 bits	At stop	Immedi- ately
2005	14h	H05-19	Speed feedforward control	0: No speed feedforward 1: Internal speed feedforward 2: 60B1 used as speed feedforward	0 to 2	1	1	16 bits	At stop	Immedi- ately
2805	24h	H05-35	Duration limit of homing		0 to 65535	50000	0.01s	16 bits	During running	Immedi- ately
	2Fh	H05-46	Position offset in absolute position linear mode (low 32 bits)		0 to 4294967295	0	1	32 bits	At stop	Next power- on
	31h	H05-48	Position offset in absolute position linear mode (high 32 bits)		-2147483648 to +2147483647	0	1	32 bits	At stop	Next power- on

Pa	ara. Gro	oup								
He	ex.	Dec.	Name	Description	Value Bango	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	width	Condition	Time
Group	Code	No.								
			Mechanical							
	33h	H05-50	gear ratio		1 to 65535	1	1	16 bits	At stop	Immedi-
			(numerator)							ately
			Mechanical							Immedi-
	34h	H05-51	gear ratio		1 to 65535	1	1	16 bits	At stop	ately
			(denominator)							atery
			Pulses							
			per load							
			revolution							Immedi-
2805	35h	H05-52	in absolute		0 to 4294967295	0	1p	32 bits	At stop	ately
2005			position							utery
			rotation mode							
			(low 32 bits)							
			Pulses							
			per load							
			revolution							Immedi-
	37h	H05-54	in absolute		0 to 128	0	1p	32 bits	At stop	ately
			position							atery
			rotation mode							
			(high 32 bits)							
				2806h/H06 Speed	Control Paramete	rs				
			Speed	0: Keypad						Immedi-
	03h	H06-02	reference	1: Multi-speed	0 to 1	0	1	16 bits	At stop	ately
			source	reference						,
	04h	H06-03	Speed		-6000 to +6000	200	1 RPM	16 bits	During	Immedi-
			reference						running	ately
			Acceleration						. .	
	06h	H06-05	ramp time		0 to 65535	0	1 RPM	16 bits	During	Immedi-
			of speed						running	ately
			reference							
			Deceleration						Duning	
	07h	H06-06	ramp time		0 to 65535	0	1 RPM	16 bits	During	Immedi-
			of speed						running	ately
			reference Forward						During	Immedi-
2806	09h	H06-08	speed limit		0 to 6000	6000	1 RPM	16 bits	During running	ately
2806			Reverse speed						During	Immedi-
	0Ah	H06-09	limit		0 to 6000	6000	1 RPM	16 bits	running	ately
				0: No torque						utety
				feedforward						
			Torque	1: Internal torque						
	0Ch	H06-11	feedforward	feedforward	0 to 2	1	1	16 bits	During	Immedi-
			control	2: 60B2 used as					running	ately
				external torque						
				feedforward						
			Acceleration						During	Immedi-
	0Dh	H06-12	ramp time of		0 to 65535	10	1 ms	16 bits	0	ately
			jog speed						running	-
	11h	H06-16	Motor speed		0 to 1000	20	1 RPM	16 bits	During	Immedi-
			threshold	20071 // 27 7		-			running	ately
		1	T	2807h/H07 Torque	e Control Paramete	ers	1			1
			Torque						During	Imama el:
2807	04h	H07-03	reference		-3000 to +3000	0	0.1%	16 bits	During	Immedi-
			set through						running	ately
			keypad							

Pa	ara. Gro	oup								
He	ex.	Dec.	Name	Description	Value Bange	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	width	Condition	Time
Group	Code	No.								
			Torque				0.01		During	Immedi-
	06h	H07-05	reference filter		0 to 3000	79	ms	16 bits	During	1 1
			time constant				ms		running	ately
			2nd torque				0.01		During	Immedi-
	07h	H07-06	reference filter		0 to 3000	79	ms	16 bits	running	ately
			time constant				ms		running	ately
			Internal						During	Immedi-
	0Ah	H07-09	forward		0 to 3000	3000	0.1%	16 bits	running	ately
			torque limit						Turring	atery
			Internal						During	Immedi-
	0Bh	H07-10	reverse torque		0 to 3000	3000	0.1%	16 bits	running	ately
			limit							-
	10h	H07-15	Emergency		0 to 3000	1000	0.1%	16 bits	During	Immedi-
			stop torque						running	ately
	1.41-	1107 10	Internal speed		0.4- 0000	2000	1 004	16 bits	During	Immedi-
	14h	H07-19	limit in torque		0 to 6000	3000	1 RPM		running	ately
2807			control Internal							
2807			reverse speed						During	Immedi-
	15h	H07-20	limit in torque		0 to 6000	3000	1 RPM	16 bits	running	ately
			control						running	atery
			Reference							
			value for						During	Immedi-
	16h	H07-21	torque		0 to 3000	0	0.1%	16 bits	running	ately
			reached							
			Torque output							
			when torque						Duning	
	17h	H07-22	reached DO		0 to 3000	200	0.1%	16 bits	During	Immedi-
			signal turned						running	ately
			on							
			Torque output							
			when torque						During	Immedi-
	18h	H07-23	reached DO		0 to 3000	100	0.1%	16 bits	running	ately
			signal turned						running	atery
			off							
		r		2808h/H08 G	ain Parameters					
	01h	H08-00	Speed loop		1 to 20000	250	01H7	16 bits	During	Immedi-
	0111	100-00	gain		1 10 20000	2.50	0.1 112		running	ately
			Speed loop				0.01		During	Immedi-
	02h	H08-01	integral time		15 to 51200	3183	ms	16 bits	running	ately
			constant				1113			,
	03h	H08-02	Position loop		0 to 20000	400	0.1 Hz	16 bits	During	Immedi-
2808			gain		5 10 20000				running	ately
	04h	H08-03	2nd speed		1 to 20000	400	0.1 Hz	16 bits	During	Immedi-
			loop gain						running	ately
	05h	H08-04	2nd speed		15 to 51000	2000	0.01	16 bits	During	Immedi-
	USN	108-04	loop integral		15 to 51200	2000	ms	TP DICS	running	ately
			time constant 2nd position						During	Immedi-
	06h	H08-05	loop gain		0 to 20000	640	0.1 Hz	16 bits	running	ately
L	1	1	hooh Paul			1	1	I	running	atery

P	ara. Gro	oup								
He		Dec.	Nama	Description	Value Dance	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	width	Condition	Time
Group	Code	No.								
	09h	H08-08	2nd gain mode	0: Fixed at the 1st gain, P/PI switchover performed through bit26 of 60FE 1: Switchover between the 1st gain and 2nd gain activated based on the condition defined by H08-09	0 to 1	1	1	16 bits	During running	Immedi- ately
2808	0Ah	H08-09	Gain switchover condition	0: Fixed at the 1st gain (PS) 2: Torque reference value too large (PS) 3: Speed reference value too large (PS) 4: Speed reference change rate too large (PS) 5: Threshold of speed reference (PS) 6: Position deviation too large (P) 7: Position reference available (P) 8: Positioning unfinished (P) 9: Actual speed (P) 10: Position reference + Actual speed (P)	0 to 10	0	1	16 bits	During running	Immedi- ately
	0Bh	H08-10	Gain switchover delay		0 to 10000	50	0.1 ms	16 bits	During running	Immedi- ately
	0Ch	H08-11	Gain switchover level		0 to 20000	50	1	16 bits	During running	Immedi- ately
	0Dh	H08-12	Gain switchover hysteresis		0 to 20000	30	1	16 bits	During running	Immedi- ately
	0Eh	H08-13	Position gain switchover time		0 to 10000	30	0.1 ms	16 bits	During running	Immedi- ately
	10h	H08-15	Load inertia ratio		0 to 12000	100	0.01	16 bits	During running	Immedi- ately
	13h	H08-18	Speed feedforward filter time constant		0 to 6400	50	0.01 ms	16 bits	During running	Immedi- ately
	14h	H08-19	Speed feedforward gain		0 to 1000	0	0.1%	16 bits	During running	Immedi- ately
	15h	H08-20	Torque feedforward filter time constant		0 to 6400	50	0.01 ms	16 bits	During running	Immedi- ately

Pa	ara. Gro	oup								
He	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width		Effective
Group	Index	Para.		beschption	ratue nange	Denduite	Unit		Condition	Time
	Code 16h	No. H08-21	Torque feedforward gain		0 to 2000	0	0.1%	16 bits	During running	Immedi- ately
2808	17h	H08-22	Speed feedback filter selection	0: Average filtering of speed feedback inhibited 1: 2 times of average filtering of speed feedback 2: 4 times of average filtering of speed feedback 3: 8 times of average filtering of speed feedback 4: 16 times of average filtering of speed feedback	0 to 4	0	1	16 bits	At stop	Immedi- ately
	18h	H08-23	Cutoff frequency of speed feedback low- pass filter		100 to 4000	4000	1 Hz	16 bits	During running	Immedi- ately
	19h	H08-24	PDFF control coefficient		0 to 1000	1000	0.1%	16 bits	During running	Immedi- ately
				2809h/H09 Gain au	to-tuning Paramet	ters	-			
	01h	H09-00	Gain auto- tuning mode	0: Disabled, gain parameters adjusted manually 1: Standard gain auto- tuning mode, gain parameters adjusted automatically based on the stiffness level 2: Positioning mode, gain parameters adjusted automatically based on set stiffness level	0 to 2	0	1	16 bits	During running	Immedi- ately
2809	02h	H09-01	Stiffness level		0 to 31	12	1	16 bits	During running	Immedi- ately
	03h	H09-02	Adaptive notch mode	0: Adaptive notch no longer updated 1: One adaptive notch activated (3rd notch) 2: Two adaptive notches activated (3rd and 4th notches) 3: Resonance point tested only (displayed in H09-24) 4: Adaptive notch cleared, parameters of 3rd and 4th notches restored to default values	0 to 4	0	1	16 bits	During running	Immedi- ately

Appendix A List of Object Groups

P	ara. Gro	oup								
	ex.	Dec.	Namo	Description	Value Pance	Dofault	Min.	Width	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	wiath	Condition	Time
Group	Code	No.								
	04h	H09-03	Online inertia auto-tuning mode	0: Online auto-tuning disabled 1: Online auto-tuning enabled, changing slowly 2: Online auto-tuning enabled, changing normally 3: Online auto-tuning enabled, changing quickly	0 to 3	0	1	16 bits	During running	Immedi- ately
	05h	H09-04	Low- frequency resonance suppression mode	0: Manually set parameters of low- frequency resonance suppression filter 1: Automatically set parameters of low- frequency resonance suppression filter	0 to 1	0	1	16 bits	During running	Immedi- ately
	06h	H09-05	Offline inertia auto-tuning mode	0: Positive and negative triangular wave mode 1: JOG mode	0 to 1	0	1	16 bits	At stop	Immedi- ately
	07h	H09-06	Maximum speed of inertia auto- tuning		100 to 1000	500	1 RPM	16 bits	At stop	Immedi- ately
2809	08h	H09-07	Time constant for accelerating to the maximum speed during inertia auto- tuning		20 to 800	125	1 ms	16 bits	At stop	Immedi- ately
	09h	H09-08	Inertia auto- tuning interval		50 to 10000	800	1 ms	16 bits	At stop	Immedi- ately
	0Ah	H09-09	Number of motor revolutions per inertia auto-tuning		0 to 65535	0	0.01	16 bits	-	-
	0Dh	H09-12	Frequency of the 1st notch		50 to 4000	4000	1 Hz	16 bits	During running	Immedi- ately
	0Eh	H09-13	Width level of the 1st notch		0 to 20	2	1	16 bits	During running	Immedi- ately
	0Fh	H09-14	Depth level of the 1st notch		0 to 99	0	1	16 bits	During running	Immedi- ately
	10h	H09-15	Frequency of the 2nd notch		50 to 4000	4000	1 Hz	16 bits	During running	Immedi- ately
	11h	H09-16	Width level of the 2nd notch		0 to 20	2	1	16 bits	During running	Immedi- ately
	12h	H09-17	Depth level of the 2nd notch		0 to 99	0	1	16 bits	During running	Immedi- ately
	13h	H09-18	Frequency of the 3rd notch		50 to 4000	4000	1 Hz	16 bits	During running	Immedi- ately

P	ara. Gro	oup								
	ex.	Dec.	Name	Description	Value Dange	Default	Min.	Width	Change	Effective
Group	Index Code	Para. No.	Name	Description	Value Range	Delaut	Unit	wath	Condition	Time
	14h	H09-19	Width level of the 3rd notch		0 to 20	2	1	16 bits	During running	Immedi- ately
	15h	H09-20	Depth level of the 3rd notch		0 to 99	0	1	16 bits	During running	Immedi- ately
	16h	H09-21	Frequency of the 4th notch		50 to 4000	4000	1 Hz	16 bits	During running	Immedi- ately
	17h	H09-22	Width level of the 4th notch		0 to 20	2	1	16 bits	During running	Immedi- ately
	18h	H09-23	Depth level of the 4th notch		0 to 99	0	1	16 bits	During running	Immedi- ately
	19h	H09-24	Auto-tuned resonance frequency		0 to 2000	0	1 Hz	16 bits	-	-
	1Fh	H09-30	Torque disturbance compensation gain		-1000 to +1000	0	0.1%	16 bits	During running	Immedi- ately
2809	20h	H09-31	Filter time constant of torque disturbance observer		0 to 2500	50	0.01 ms	16 bits	During running	Immedi- ately
	21h	H09-32	Constant torque compensation value		-1000 to +1000	0	0.1%	16 bits	During running	Immedi- ately
	22h	H09-33	Forward friction compensation value		-1000 to +1000	0	0.1%	16 bits	During running	Immedi- ately
	23h	H09-34	Reverse friction compensation value		-1000 to +1000	0	0.1%	16 bits	During running	Immedi- ately
	27h	H09-38	Frequency of low-frequency resonance		10 to 1000	1000	0.1 Hz	16 bits	During running	Immedi- ately
	28h	H09-39	Low- frequency resonance frequency filter		0 to 10	2	1	16 bits	At stop	Immedi- ately
				280Ah/H0A Fault and	Protection Param	eters				
	01h	H0A-00	Power input phase loss protection	0: Enable phase loss fault and inhibit phase loss warning 1: Enable phase loss fault and warning 2: Inhibit phase loss fault and warning	0 to 2	0	1	16 bits	During running	Immedi- ately
280A	02h	H0A-01	Absolute position limit	0: Disable absolute position limit 1: Enable absolute position limit 2: Enable absolute position limit after homing	0 to 2	0	1	16 bits	At stop	Immedi- ately

P	ara. Gro	oup								
	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index	Para.	Name	Description	value Nalige	Delautt	Unit	Width	Condition	Time
Group	Code	No.								
	04h	H0A-03	Power-off memory selection Motor	0: Disable power-off memory 1: Enable power-off memory 2: Disable power- off memory and hide control power undervoltage fault	0 to 2	0	1	16 bits	During running	Immedi- ately
	05h	H0A-04	overload protection gain		50 to 300	100	1	16 bits	At stop	Immedi- ately
	07h	H0A-06	Motor overload level		0 to 400	0	1	16 bits	At stop	Immedi- ately
	08h	H0A-07	UVW phase sequence auto-tuning selection	0: Not perform UVW phase sequence auto- tuning during angle auto-tuning 1: Perform UVW phase sequence auto-tuning during angle auto- tuning	0 to 1	1	1	16 bits	During running	Immedi- ately
	09h	H0A-08	Overspeed threshold		0 to 10000	0	1 RPM	16 bits	During running	Immedi- ately
	0Dh	H0A-12	Runaway protection selection	0: Disable 1: Enable	0 to 1	1	1	16 bits	During running	Immedi- ately
280A	0Eh	H0A-13	Initial angle auto-tuning mode	0: Auto-tuning with Z signal 1: Jog auto-tuning without Z signal 2: Auto-tuning of voltage input 3: Angle auto-tuning of voltage input with Z signal	0 to 3	0	1	16 bits	At stop	Immedi- ately
	10h	H0A-15	Motor rotation threshold	0	1 to 1000	5	1 RPM	16 bits	During running	Immedi- ately
	11h	H0A-16	Threshold for low-frequency resonance position deviation		1 to 1000	5	1 p	16 bits	During	Immedi- ately
	14h	H0A-19	Filter time constant of touch probe 1		0 to 630	200	1 µs	16 bits	During running	Immedi- ately
	15h	H0A-20	Filter time constant of touch probe 2		0 to 630	200	1 µs	16 bits	During running	Immedi- ately
	16h	H0A-21	STO function switch	0: Enable STO function 1: Hide STO function	0 to 1	0	1	16 bits	At stop	Next power- on
	17h	H0A-22	Sigma_Delta filter time		0 to 3	1	1	16 bits	At stop	Next power- on

P	ara. Gro	oup								
	ex.	Dec.	Nama	Description	Value Panga	Dofault	Min.	Width	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	width	Condition	Time
Group	Code	No.								
	18h	H0A-23	TZ signal filter time		0 to 31	15	125 ns	16 bits	At stop	Next power- on
	1Ah	H0A-25	Filter time constant of displayed speed feedback		0 to 5000	50	1 ms	16 bits	At stop	Immedi- ately
280A	1Bh	H0A-26	Motor overload selection	0: Not hide motor overload warning (Er.909) and fault (Er.620) 1: Hide motor overload warning (Er.909) and fault (Er.620)	0 to 1	0	1	16 bits	At stop	Immedi- ately
	21h	H0A-32	Time window of locked rotor over- temperature protection		10 to 65535	200	1 ms	16 bits	During running	Immedi- ately
	22h	H0A-33	Locked rotor over- temperature protection	0: Shielded 1: Enabled	0 to 1	1	1	16 bits	During running	Immedi- ately
	25h	H0A-36	Encoder multi- turn overflow fault	0: Not hide 1: Hide	0 to 1	0	1	16 bits	At stop	Immedi- ately
				280Bh/H0B Mo	nitor Parameters	-				
	01h	H0B-00	Actual motor speed		-9999 to +9999	0	1 RPM	16 bits	-	-
	02h	H0B-01	Speed reference		-9999 to +9999	0	1 RPM	16 bits	-	-
	03h	H0B-02	Internal torque reference		-3000 to +3000	0	0.1%	16 bits	-	-
	04h	H0B-03	Monitored DI status		0 to 0x00FFFFFF	0	1	32 bits	-	-
	06h	H0B-05	Monitored DO status		0 to 0xFFFF	0	1	16 bits	-	-
280B	08h	H0B-07	Absolute position counter		-2147483648 to +2147483647	0	1 p	32 bits	-	-
2000	0Ah	H0B-09	Mechanical angle		0 to 3600	0	0.1°	16 bits	-	-
	0Bh	H0B-10	Electrical angle		0 to 3600	0	0.1°	16 bits	-	-
	0Dh	H0B-12	Average load ratio		0 to 65535	0	0.1%	16 bits	-	-
	10h	H0B-15	Position following deviation (encoder unit)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	12h	H0B-17	Feedback pulse counter		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	14h	H0B-19	Total power- on time		0 to 4294967295	0	0.1s	32 bits	-	-

Pa	ara. Gro	oup								
He		Dec.	Norse	Deseriation	Value Davas	Default	Min.	14/1-1+1	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	19h	H0B-24	RMS value of		0 to 65535	0	0.01 A	32 bits	_	_
	-		phase current			-				
	1Bh	H0B-26	Bus voltage		0 to 65535	0	0.1 V	16 bits	-	-
	1Ch	H0B-27	Power module		0 to 65535	0	1°C	16 bits	-	-
			temperature Absolute							
			encoder fault							
	1Dh	H0B-28	information		0 to 0xFFFF	0	1	16 bits	-	-
			given by FPGA							
			System status							
	1Eh	H0B-29	information		0 to 0xFFFF	0	1	16 bits	-	-
			given by FPGA							
			System fault							
	1Fh	H0B-30	information		0 to 0xFFFF	0	1	16 bits	-	-
			given by FPGA							
	20h	H0B-31	Encoder fault		0 to 0xFFFF	0	1	16 bits	-	_
	2011	1100-51	information		0 10 0 1111	0	-	10 0103		
	22h	H0B-33	Fault log		0 to 9	0	1	16 bits	During running	Immedi-
			Fault code of						running	ately
	23h	H0B-34	the selected		0 to 0xFFFF	0	1	16 bits	_	-
	2311	1100 34	fault		0 10 0 1111	0	1			
			Time stamp							
			upon							
	24h	H0B-35	occurrence of		0 to 4294967295	0	0.1s	32 bits	-	-
280B			the selected							
2000			fault							
			Motor							
			speed upon							
	26h	H0B-37	occurrence of		-9999 to +9999	0	1 RPM	16 bits	-	-
			the selected							
			fault							
			Motor phase U							
	276	1100 20	current upon occurrence of		22700 +- 122707	0	0.01.4	16 bits		
	27h	H0B-38			-32768 to +32767	0	0.01 A	16 Dits	-	-
			the selected fault							
			Motor phase V							
			current upon							
	28h	H0B-30	occurrence of		-32768 to +32767	0	0.01 4	16 bits	_	_
	2011	1100-55	the selected		52100 10 - 52101	0	0.01 A			
			fault							
			Bus voltage							
			upon							
	29h	H0B-40	occurrence of		0 to 65535	0	0.1 V	16 bits	-	-
			the selected							
			fault							
			Input terminal							
			status upon							
	2Ah	H0B-41	occurrence of		0 to 0x00FFFFFF	0	1	32 bits	-	-
			the selected							
			fault							

P	ara. Gro	oup								
	ex.	Dec.	News	Description	Value Dana	Default	Min.	14/: -1+1	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	2Ch	H0B-43	Output terminal status upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	2Eh	H0B-45	Internal fault code		0 to 0xFFFF	0	1	16 bits	-	-
	2Fh	H0B-46	Absolute encoder fault information given by FPGA upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	30h	H0B-47	System status information given by FPGA upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
280B	31h	H0B-48	System fault information given by FPGA upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	32h	H0B-49	Encoder fault information upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	34h	H0B-51	Internal fault code upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	36h		Position following deviation (reference unit)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	38h	H0B-55	Actual motor speed		-60000 to +60000	0	0.1 RPM	32 bits	-	-
	3Ah	H0B-57	Bus voltage of the control power		0 to 65535	0	0.1 V	16 bits	-	-
	3Bh	H0B-58	Mechanical absolute position (low 32 bits)		0 to 4294967295	0	1 p	32 bits	-	-

Pa	ara. Gro	oup								
He	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width		Effective
	Index	Para.	Name	Description	value Kalige	Delault	Unit	Width	Condition	Time
Group	Code	No.								
			Mechanical absolute		-2147483648 to		_			
	3Dh	H0B-60	position (high		+2147483647	0	1 p	32 bits	-	-
			32 bits)							
			Number of							
	47h	H0B-70	absolute		0 to 65535	0	1	16 bits	-	-
			encoder			-	_			
			revolutions Position of							
			the absolute							
	48h		encoder		0 to 2147483647	0	1 p	32 bits		
	4011	HUD-11	within one		0102147465047	0	тр	JSZ DILS	-	-
			turn							
			Encoder							
	4Eh	H0B-77	position (low		0 to 4294967295	0	1 p	32 bits	-	-
			32 bits)							
			Encoder		-2147483648 to					
	50h	H0B-79	position (high		+2147483647	0	1 p	32 bits	-	-
			32 bits)		*2141403041					
280B			Single-turn							
	52h	H0B-81	position of the		0 to 4294967295	0	1p	32 bits	-	-
			rotating load							
			(low 32 bits) Single-turn							
			position of the		-2147483648 to					
	54h	H0B-83	rotating load		+2147483647	0	1 p	32 bits	-	-
			(high 32 bits)							
			Single-turn							
			position of the		-2147483648 to					
	56h	H0B-85	rotating load		+2147483647	0	1 p	32 bits	-	-
			(reference		12141403041					
			unit)							
	CD-		Group No. of			0	1	10 1.44	_	
	5Bh	H0B-90	the abnormal parameter		0 to 0xFFFF	0	1	16 bits	-	-
			Offset of the							
			abnormal							
	5Ch	H0B-91	parameter		0 to 65535	0	1	16 bits	-	-
			within the							
			group							
				280Dh/H0D Auxiliar	y Function Parame	eters				
			_	0: No operation					During	Immedi-
	02h	H0D-01	Fault reset	1: Fault reset	0 to 1	0	1	16 bits	running	ately
			Encoder initial							,
	04h	H0D-03	angle auto-	0: No operation	0 to 1	0	1	16 bits	At stop	Immedi-
	0 111		tuning	1: Enabled	0.01	, , , , , , , , , , , , , , , , , , ,	-	100103		ately
280D				0. No operation						
	05h	H0D-04	Encoder ROM	0: No operation 1: Write ROM	0 to 2	0	1	16 bits	At stop	Immedi-
	0.011	100-04	read/write	2: Read ROM	0.02	U	T	TODICS	ni siop	ately
	06h	H0D-05	Emergency	0: No operation	0 to 1	0	1	16 bits	During	Immedi-
	0011	100-05	stop	1: Emergency stop	0.01	v	T	TODICS	running	ately
								-	L	

P	ara. Gro	oup								
He	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width		Effective
Group	Index	Para.	- Name	Description	value nange	Delaute	Unit	widen	Condition	Time
Group	Code	No.	UV phase							
280D	0Dh	H0D-12	curront	0: Disable 1: Enable	0 to 1	0	1	16 bits	At stop	Immedi- ately
	15h	H0D-20	Absolute encoder reset selection	0: No operation 1: Reset the fault 2: Reset the fault and multi-turn data	0 to 2	0	1	16 bits	At stop	Immedi- ately
				280Eh/H0E Communica	tion Function Par	ameters				
	01h	H0E-00	Node address		1 to 127	1	1	16 bits	During running	Immedi- ately
	02h	H0E-01		0: Not save 1: Save parameters written through communication to EEPROM 2: Save object dictionaries written through communication to EEPROM. 3: Save parameters and object dictionaries written through communication to EEPROM	0 to 3	3	1	16 bits	During running	Immedi- ately
	03h	H0E-02	Axis address		1 to 127	1	1	16 bits	-	-
280E	09h	H0E-08	Servo node address selection	0: Node address determined by H0E-00 1: Node address determined by DIP switch 1	0 to 1	0	1	16 bits	During running	Immedi- ately
	0Bh	H0E-10	CAN communication mode	0: N/A 1: CANopen 2: CANlink	0 to 2	1	1	16 bits	During running	Immedi- ately
	0Ch	H0E-11	CAN baud rate	0: 20 K 1: 50 K 2: 100 K 3: 125 K 4: 250 K 5: 500 K 6: 1 M	0 to 6	5	1	16 bits	During running	Immedi- ately
	0Dh	H0E-12	Number of CAN frames received per unit time		0 to 65535	0	1	16 bits	-	-
	0Eh	H0E-13	Maximum CAN reception errors per unit time		0 to 255	0	1	16 bits	-	-

P	ara. Gro	oup								
	ex.	Dec.	News	Description		Defeuite	Min.	Width	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	width	Condition	Time
Group	Code	No.								
	0Fh	H0E-14	Maximum CAN transmission errors per unit time		0 to 255	0	1	16 bits	-	-
	10h	H0E-15	CAN bus disconnection times per unit time		0 to 65535	0	1	16 bits	-	-
	11h	H0E-16	CAN configuration mode		0 to 1	0	1	16 bits	During running	Immedi- ately
	15h	H0E-20	EtherCAT slave name		0 to 65535	0	1	16 bits	-	-
	16h	H0E-21	EtherCAT slave alias		0 to 65535	0	1	16 bits	At stop	Immedi- ately
	17h	H0E-22	Number of synchronization interrupts allowed by EtherCAT		1 to 20	9	1	16 bits	During running	Immedi- ately
	18h	H0E-23	EtherCAT synchronization detection mode	0: Standard mode 1: Surplus mode	0 to 1	0	1	16 bits	During running	Immedi- ately
	19h	H0E-24	Synchronization loss count		0 to 65535	0	1	16 bits	-	-
280E	1Ah	H0E-25	Maximum error value and invalid frames of EtherCAT port 0 per unit time		0 to 0xFFFF	0	1	16 bits	-	-
	1Bh	H0E-26	Maximum error value and invalid frames of EtherCAT port 1 per unit time		0 to 0xFFFF	0	1	16 bits	-	-
	1Ch	H0E-27	Maximum transfer error of EtherCAT port per unit time		0 to 0xFFFF	0	1	16 bits	-	-
	1Dh	H0E-28	Maximum EtherCAT data frame processing unit error per unit time		0 to 0x0255	0	1	16 bits	-	-
	1Eh	H0E-29	Maximum link loss of EtherCAT port 0 per unit time		0 to 0xFFFF	0	1	16 bits	-	-
	1Fh	H0E-30	EtherCAT master type		0 to 3	2	1	16 bits	At stop	Immedi- ately

Pa	ara. Gro	oup								
He	ex.	Dec.	Name	Description	Value Panga	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	width	Condition	Time
Group	Code	No.								
			EtherCAT							Next
	20h	H0E-31	synchronization		0 to 2	1	1	16 bits	At stop	power-
			mode							on
			EtherCAT							Immedi-
	21h	H0E-32	synchronization		0 to 2000	500	1	16 bits	At stop	ately
			error threshold							
	22h	1105 22	EtherCAT state machine		0 to 8	0	1	16 bits		_
	22n	HUE-33	state machine status		0 to 8	0	1	16 DIts	-	-
			Excessive							
			position							
			reference						During	Immedi-
	23h	H0E-34	increment		0 to 7	1	1	16 bits	running	ately
			count in CSP							
			mode							
				0: Disable EOE					During	Immedi-
	29h	H0E-40	EOE selection	1: Enable EOE	0 to 1	0	1	16 bits	running	ately
			Most							
	241	1105 41	significant		0.000	_		1011	During	Immedi-
	2Ah	H0E-41	byte of EOE IP		0 to 255	0	1	16 bits	running	ately
			address							
			Second most							
	2Bh	H0E-42	significant		0 to 255	0	1	16 bits	During	Immedi-
	2011		byte of EOE IP		0 10 200	Ŭ	-	10 5.00	running	ately
			address Second least							
280E			significant						During	Immedi-
2001	2Ch	H0E-43	byte of EOE IP		0 to 255	0	1	16 bits	During running	ately
			address						running	atery
			Least							
			significant						During	Immedi-
	2Dh	H0E-44	byte of EOE IP		0 to 255	0	1	16 bits	running	ately
			address						. 0	
			Most							
	2Eh	H0E-45	significant		0 to 255	0	1	16 bits	During	Immedi-
	ZEII	HUE-4J	byte of EOE		0 10 255	0	1	10 DILS	running	ately
			subnet mask							
			Second most							
	2Fh	H0E-46	significant		0 to 255	0	1	16 bits	During	Immedi-
			byte of EOE						running	ately
			subnet mask Second least							
			significant						During	Immedi-
	30h	H0E-47	byte of EOE		0 to 255	0	1	16 bits	running	ately
			subnet mask						running	acciy
			Least							
	211		significant		0.0055			1.0.1	During	Immedi-
	31h	H0E-48	byte of EOE		0 to 255	0	1	16 bits	running	ately
			subnet mask							
			Most							
	32h	H0E-49	significant		0 to 255	0	1	16 bits	During	Immedi-
	5211	102 49	byte of default		0.00200		-	10 0103	running	ately
			EOE gateway							

P	ara. Gro	oup								
	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index	Para.	Name	Description	value Kalige	Delault	Unit	width	Condition	Time
Group	Code	No.								
	33h	H0E-50	Second most significant byte of default EOE gateway		0 to 255	0	1	16 bits	During running	Immedi- ately
	34h	H0E-51	Second least significant byte of default EOE gateway		0 to 255	0	1	16 bits	During running	Immedi- ately
	35h	H0E-52	Least significant byte of default EOE gateway		0 to 255	0	1	16 bits	During running	Immedi- ately
	36h	H0E-53	Most significant byte of MAC used by EOE		0 to 0x00FF	0	1	16 bits	-	-
	37h	H0E-54	2nd byte of MAC used by EOE		0 to 0x00FF	0	1	16 bits	-	-
	38h	H0E-55	3rd byte of MAC used by EOE		0 to 0x00FF	0	1	16 bits	-	-
	39h	H0E-56	4th byte of MAC used by EOE		0 to 0x00FF	0	1	16 bits	-	-
280E	3Ah	H0E-57	5th byte of MAC used by EOE		0 to 0x00FF	0	1	16 bits	-	-
280E	3Bh	H0E-58	Least significant byte of MAC used by EOE		0 to 0x00FF	0	1	16 bits	-	-
	3Dh	H0E-60	Automatic Ethernet IP address identification	0: Disabled 1: Enabled	0 to 1	0	1	16 bits	During running	Immedi- ately
	3Eh	H0E-61	Most significant byte of Ethernet IP address		0 to 255	192	1	16 bits	During running	Immedi- ately
	3Fh	H0E-62	Second most significant byte of Ethernet IP address		0 to 255	168	1	16 bits	During running	Immedi- ately
	40h	H0E-63	Ethernet IP address		0 to 255	0	1	16 bits	During running	Immedi- ately
	41h	H0E-64	Least significant byte of Ethernet IP address		0 to 255	2	1	16 bits	During running	Immedi- ately

Pa	ara. Gro	oup								
H	ex.	Dec.	1				Min.		Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	
Group	Code	No.								
	Code	INO.	Most							
			significant							
	42h	H0E-65	byte of		0 to 255	255	1	16 bits	During	Immedi-
	7211	HOL 03	Ethernet		0 10 255	255	1	10 0103	running	ately
			subnet mask							
			Second most							
			significant							
	43h		byte of		0 to 255	255	1	16 bits	During	Immedi-
	4311	HUE-00	Ethernet		010233	255	1	10 DILS	running	ately
			subnet mask							
			Second least							
			significant							
	44h		byte of		0 to 255	255	1	16 bits	During	Immedi-
	4411	HUE-01	Ethernet		010233	255	1	10 DILS	running	ately
			subnet mask Least							
			significant							
	45h		byte of		0 to 255	0	1	16 bits	During	Immedi-
	450	HUE-00			0 10 255	0	1	10 DILS	running	ately
			Ethernet						0	
			subnet mask							
			Most							
	4.61	1105 00	significant		0.055	100		16 bits	During	Immedi-
	46h	HUE-69	byte of default		0 to 255	192	1	16 DIts	running	ately
			Ethernet						0	
			gateway							
280E			Second most							
	471	1105 70	significant		0.0000	1.00		1011	During	Immedi-
	47h	H0E-70	byte of default		0 to 255	168	1	16 bits	running	ately
			Ethernet						0	
			gateway							
			Second least							
			significant						During	Immedi-
	48h	H0E-71	byte of default		0 to 255	0	1	16 bits	running	ately
			Ethernet						Ŭ	
			gateway							
			Least							
	401	1105 70	significant		0.4- 255			10.1.1	During	Immedi-
	49h	HUE-72	byte of default		0 to 255	1	1	16 bits	running	ately
			Ethernet						Ŭ	
			gateway							
				0: 300 bps						
				1: 600 bps						
				2: 1200 bps						
				3: 2400 bps						
	51h	H0E-80		4: 4800 bps	0 to 9	9	1	16 bits	During	Immedi-
	2111		rate	5: 9600 bps	0.000	,	- ⁻	10 0103	running	ately
				6: 19200 bps						
				7: 38400 bps						
				8: 57600 bps						
				9: 115200 bps						
										· · · · · · · · · · · · · · · · · · ·

Р	ara. Gro	oup								
H	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width		Effective
Group	Index	Para.					Unit		Condition	Time
	<u>Code</u> 52h	No.	Modbus data format	0: No parity, 2 stop bits (8-N-2) 1: Even parity, 1 stop bit (8-E-1) 2: Odd parity, 1 stop bit (8-O-1) 3: No parity, 1 stop bit (8-N-1)	0 to 3	3	1	16 bits	During running	Immedi- ately
	53h	H0E-82	Modbus response delay	(0-11-1)	0 to 20	0	1	16 bits	During running	Immedi- ately
280E	54h	H0E-83	Modbus communication timeout		0 to 600	0	1	16 bits	During running	Immedi- ately
	5Bh	H0E-90	Modbus version No.		0 to 65535	0	0.01	16 bits	-	-
	5Ch	H0E-91	CANopen version No.		0 to 65535	0	0.01	16 bits	-	-
	5Dh	H0E-92	CANlink version No.		0 to 65535	0	0.01	16 bits	-	-
	5Eh	H0E-93	EtherCAT COE version No.		0 to 65535	0	0.01	16 bits	-	-
	5Fh	H0E-94	EtherCAT EOE version No.		0 to 65535	0	0.01	16 bits	-	-
	60h	H0E-95	Ethernet version No.		0 to 65535	0	0.01	16 bits	-	-

Parameters of axis 3

Para	meter	Group								
He	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index						Unit		Condition	Time
	Code	No.		3000h/H00 Serv	o Motor Paramete	ers				
										Next
	01h	ноо-оо	Motor code		0 to 65535	14000	1	16 bits	At stop	power-
										on
	03h	H00-02	Customized motor code		0 to 0xFFFFFFFF	0	1	32 bits	-	-
	05h	H00-04	Encoder version No.		0 to 65535	0	0.1	16 bits	-	-
	06h	H00-05	Serial encoder motor code		0 to 65535	0	1	16 bits	-	-
3000	09h	H00-08	Serial encoder type		0 to 65535	0	1	16 bits	At stop	Next power-
										on
				0: 220 V	a. 4					Next
	0Ah	H00-09	Rated voltage	1: 380 V	0 to 1	0	1	16 bits	At stop	power- on
										Next
	0Bh	H00-10	Rated power		1 to 65535	75	0.01 kW	16 bits	At stop	power-
							KVV			on
										Next
	0Ch	H00-11	Rated current		1 to 65535	470	0.01 A	16 bits	At stop	power-
										on

Parar	meter	Group								
He		Dec.					Min.	1.1	Change	Effective
	Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
							0.01 N			Next
	0Dh	H00-12	Rated torque		10 to 65535	239	m	16 bits	At stop	power-
										on
		100 12	M		10 +- 65525	710	0.01 N	16 bits	At -t	Next
	0Eh	H00-13	Maximum torque		10 to 65535	716	m	16 DIts	At stop	power- on
										Next
	0Fh	H00-14	Rated speed		100 to 6000	3000	1 RPM	16 bits	At stop	power-
			•							on
			Maximum motor							Next
	10h	H00-15	speed		100 to 6000	6000	1 RPM	16 bits	At stop	power-
			opeeu							on
	11h	H00 16	Moment of inertia		1 to 65535	130	0.01	16 bits	At stop	Next power-
	1111	1100-10	Moment of mertia		1 (0 05555	150	kgcm ²	10 DILS	Acstop	on
										Next
	12h	H00-17	Number of pole		2 to 360	5	1	16 bits	At stop	power-
			pairs of PMSM							on
							0.001			Next
	13h	H00-18	Stator resistance		1 to 65535	500	Ω	16 bits	At stop	power-
										on
	14h	H00-19	Stator inductance		1 to 65525	327	0.01	16 bits	At stop	Next
	140	H00-19	Lq		1 to 65535	521	mH	10 DILS	At stop	power- on
										Next
	15h	H00-20	Stator inductance		1 to 65535	387	0.01	16 bits	At stop	power-
3000			Ld				mH			on
3000			Linear back EMF				0.01			Next
	16h	H00-21	coefficient		1 to 65535	3330	mV/	16 bits	At stop	power-
							RPM 0.01			on Next
	17h	H00-22	Torque coefficient		1 to 65535	51		16 bits	At stop	power-
	1111	1100-22	Kt		1 (0 05555	51	Arms	10 DILS	Acstop	on
										Next
	18h	H00-23	Electrical constant Te		1 to 65535	654	0.01	16 bits	At stop	power-
			le				ms			on
			Mechanical				0.01			Next
	19h	H00-24	constant Tm		1 to 65535	24	ms	16 bits	At stop	power-
										on Next
	1Dh	H00-28	Position offset of		0 to	8192	1	32 bits	At stop	power-
	1011	1100 20	absolute encoder		4294967295	0152	1	52 0105	/ Stop	on
			F	10.1						Next
	1Fh	H00-30	Encoder selection	19: Inovance 20- bit serial encoder	0 to 0x0FFF	0x0013	1	16 bits	At stop	power-
			(Hex)	bit serial encoder						on
					1 to					Next
	20h	H00-31	PPR of encoder		1073741824	8388608	1 PPR	32 bits	At stop	power-
					<u> </u>		-			on Next
	22h	H00-33	Electrical angle of Z		0 to 3600	1800	0.1°	16 bits	At stop	power-
	''		signal		0.00000	1000				on
			Abaaluta crossela							Next
	26h	H00-37	Absolute encoder function setting bit		0 to 0xFFFF	0	1	16 bits	At stop	power-
			initial setting bit							on

Para	meter	Group								
He		Dec.					Min.	1.1	Change	Effective
_	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
				3001h/H01: Serv	o Drive Paramete	ers				
	01h	H01-00	MCU software version		0 to 65535	0	0.1	16 bits	-	-
	02h	H01-01	FPGA software version		0 to 65535	0	0.1	16 bits	-	-
	03h	H01-02	FPGA customized No.		0 to 65535	0	0.1	16 bits	-	-
	04h	H01-03	CPU0 software version No.		0 to 65535	0	0.1	16 bits	-	-
	05h	H01-04	CPU1 software version No.		0 to 65535	0	0.1	16 bits	-	-
	08h	H01-07	Software test version No.		0 to 65535	0	0.01	16 bits	-	-
	0Bh	H01-10	Drive unit series number	3: S2R8 5: S5R5	0 to 65535	3	1	16 bits	At stop	Next power- on
	0Ch	H01-11	Voltage class of the drive unit		0 to 65535	220	1 V	16 bits	-	-
	0Dh	H01-12	Rated power of the drive unit		0 to 1073741824	40	0.01 kW	32 bits	-	-
	0Fh	H01-14	Maximum output power of the drive unit		0 to 1073741824	40	0.01 kW	32 bits	-	-
	11h	H01-16	Rated output current of the drive unit		0 to 1073741824	280	0.01 A	32 bits	-	-
3001	13h	H01-18	Maximum output current of the drive unit		0 to 1073741824	1010	0.01 A	32 bits	-	-
5001	15h	H01-20	Carrier frequency		4000 to 20000	8000	1 Hz	16 bits	At stop	Next power- on
	16h	H01-21	Dead zone time		1 to 2000	200	0.01 μs	16 bits	At stop	Next power- on
	17h	H01-22	D-axis coupling voltage compensation coefficient		0 to 60000	500	0.1%	16 bits	During running	Immedi- ately
	18h	H01-23	Q-axis back EMF compensation coefficient		0 to 60000	500	0.1%	16 bits	During running	Immedi- ately
	19h	H01-24	D-axis current loop gain		0 to 20000	500	1 Hz	16 bits	During running	Immedi- ately
	1Ah	H01-25	D-axis current loop integral compensation factor		1 to 10000	100	0.01	16 bits	During running	Immedi- ately
	1Bh	H01-26	Current sampling Sinc3 filter data extraction rate	0: Extraction rate 32 1: Extraction rate 64 2: Extraction rate 128 3: Extraction rate 256	0 to 3	0	1	16 bits	At stop	Next power- on

Para	meter	Group								
He		Dec.					Min.		Change	Effective
	Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
		H01-27	Q-axis current loop		0 to 20000	500	1 Hz	16 bits	During	Immedi-
	ICII	H01-27	gain		0 10 20000	500	INZ	TODICS	running	ately
			Q-axis current							
	1Dh	H01-28	loop integral		1 to 10000	100	0.01	16 bits	During	Immedi-
			compensation factor						running	ately
			Q-axis coupling							
	156	H01-29	voltage		0 to 60000	500	0.1%	16 bits	During	Immedi-
	1Eh	101-29	compensation		0.000000	500	0.1%	10 DILS	running	ately
			coefficient							
	1Fh	H01-30	Bus voltage gain		500 to 1500	1000	0.1%	16 bits	At stop	Next power-
	TLU	101-30	tuning		500 10 1500	1000	0.1%	10 DILS	ALSIOP	on
			Minimum turn-on							Next
	20h	H01-31	time of bootstrap		0 to 200	50	0.1 µs	16 bits	At stop	power-
			circuit lower bridge							on
	211	1101 22	Relative gain of UV		1 +- 65525	22700		10 6 44	At	Next
	21h	H01-32	sampling		1 to 65535	32768	1	16 bits	At stop	power- on
			IGBT over-							
	23h	H01-34	temperature		0 to 1500	950	0.1°C	16 bits	During	Immedi-
			threshold						running	ately
	0.51		Current sensor							Next
	25h	H01-36	range		0 to 999999	2083	0.01 A	32 bits	At stop	power- on
			FPGA phase							Next
	27h	H01-38	current protection		0 to 1000	900	0.1%	16 bits	At stop	power-
3001			threshold							on
0001			DC bus overvoltage							
	29h	H01-40	protection threshold		0 to 2000	420	1 V	16 bits	-	-
			DC bus voltage							Immedi-
	2Ah	H01-41	discharge threshold		0 to 2000	380	1 V	16 bits	At stop	ately
			DC bus							Immedi-
	2Bh	H01-42	undervoltage		0 to 2000	200	1 V	16 bits	At stop	ately
			threshold							Next
	2Ch	H01-43	Power supply unit	1: 1 kW	1 to 2	1	1	16 bits	At stop	power-
			series No.	2: 2 kW		_	_			on
	2Dh	H01-44	Output power of the		0 to	100	0.01	32 bits	-	-
	2011		power supply unit		1073741824	100	kW	02 0100		
	2Fh	H01 46	Maximum output power of the power		0 to	150	0.01	32 bits		
	2111	1101-40	supply unit		1073741824	150	kW	52 0105	-	-
			Rated output		0 to					
	31h	H01-48	current of the power		0 to 1073741824	320	0.01 A	32 bits	-	-
			supply unit		1015141824					
	33h	LI01 50	Over-temperature threshold of the		0 to 1500	800	0.1%	16 bits	During	Immedi-
	5511	101-30	power module		0 10 1300	800	0.1 C	10 DILS	running	ately
			D-axis proportional						Duri	lana P
	35h	H01-52	gain in performance		0 to 20000	2000	1 Hz	16 bits	During running	Immedi- ately
			priority mode						running	ately
	201-	1101 53	D-axis integral gain		1 to 10000	100	0.01	10 6:4-	During	Immedi-
	36h	01-23	in performance priority mode		1 to 10000	100	0.01	16 bits	running	ately
			Ipriority mode						1	

Parar	neter	Group								
He		Dec.	News	Description	Value Dan	Default	Min.	MC dela	Change	Effective
	Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code									
			Q-axis proportional						During	Immedi-
	37h	H01-54	gain in performance		0 to 20000	2000	1 Hz	16 bits	running	ately
			priority mode							
	38h		Q-axis integral gain in performance		1 to 10000	100	0.01	16 bits	During	Immedi-
	2011	1101-33	priority mode		1 (0 10000	100	0.01	TODICS	running	ately
			Current loop							Next
	39h	H01-56	low-pass cutoff		0 to 65535	11000	1 Hz	16 bits	At stop	power-
			frequency							on
			Maximum output		0 to					
	3Ah	H01-57	current of the power		1073741824	480	0.01 A	32 bits	-	-
3001			supply unit Serial encoder							Next
	3Ch	H01-59	data transmission		0 to 2000	0	0.001	16 bits	At stop	power-
	0.011		compensation time		0.00.2000	, i i i i i i i i i i i i i i i i i i i	μs	10 5100	/ Cocop	on
			FPGA scheduling	0: 32 kHz						Next
	3Dh	H01-60	frequency selection		0 to 1	1	1	16 bits	At stop	power-
			inequency selection	1. 10 KHZ						on
			Command	0: 4 kHz						Next
	3Eh	H01-61	scheduling	1: 2 kHz	0 to 2	2	1	16 bits	At stop	power-
			frequency selection	2: 1 kHz						on
	48h	H01-71	Voltage class of the		0.4- 05525	220	1.1/	10 1.44		
	48N	H01-71	power supply unit		0 to 65535	220	1 V	16 bits	-	-
				3002h/H02 Basic	Control Paramet	ters				
				0: Speed mode						
				1: Position mode						
	01h	H02-00	Control mode	2: Torque mode	0 to 255	9	1	16 bits	At stop	Immedi-
			selection	9: EtherCAT mode		-	_			ately
				255: This axis is not used.						
				0: Incremental						
				mode						
				1: Absolute						
	0.21-	H02-01	Absolute system	position linear	04-2	0	1	10 1.44	At	Next
	02h	H02-01	selection	mode	0 to 2	0	1	16 bits	At stop	power- on
				2: Absolute						011
				position rotation						
				mode 0: CCW direction						
3002				as the forward						
				direction						Next
	03h	H02-02	Rotation direction	1: CW direction	0 to 1	0	1	16 bits	At stop	power-
				as the forward						on
				direction						
				0: Coast to stop,						
				keeping de-						
				energized state 1: Stop at zero						
			Stop mode at	speed, keeping						Immedi-
	08h	H02-07	overtravel	position lock state	0 to 2	1	1	16 bits	At stop	ately
				2: Stop at zero						,
				speed, keeping						
				de-energized						
				state						

Para	meter	Group								
He		Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
	Index		iname	Description	value Range	Delault	Unit	width	Condition	Time
Group	Code	No.								
	09h	H02-08	Stop mode at No.1 fault	0: Coast to stop, keeping de- energized state 1: DB Stop, keeping de- energized state 2: DB Stop, keeping DB state	0 to 2	0	1	16 bits	At stop	Immedi- ately
	0Ah	H02-09	Delay from brake output ON to command received		0 to 500	250	1 ms	16 bits	During running	Immedi- ately
	0Bh	H02-10	Delay from brake output OFF to motor de-energized		50 to 1000	150	1 ms	16 bits	During running	Immedi- ately
	0Ch	H02-11	Motor speed threshold at brake output OFF in rotational state		20 to 3000	30	1 RPM	16 bits	During running	Immedi- ately
	0Dh	H02-12	Delay from S-ON OFF to brake output OFF in rotational state		1 to 1000	500	1 ms	16 bits	During running	Immedi- ately
3002	10h	H02-15	Warning display on the keypad	0: Output warning information Immediately 1: Not output warning information	0 to 1	0	1	16 bits	At stop	Immedi- ately
	11h	H02-16	Brake switch	0: OFF 1: ON	0 to 1	0	1	16 bits	At stop	Immedi- ately
	16h	H02-21	Permissible minimum resistance of the regenerative resistor		1 to 1000	40	1Ω	16 bits	-	-
	19h	H02-24	Heat dissipation coefficient of the resistor		10 to 100	30	0.01%	16 bits	At stop	Immedi- ately
	1Ah	H02-25	Regenerative resistor selection	1: External resistor, naturally ventilated 2: External resistor, forced air cooling 3: Capacitor, no regenerative resistor needed	1 to 3	3	1	16 bits	At stop	Immedi- ately
	1Bh	H02-26	Power of external regenerative resistor		1 to 65535	40	1 kW	16 bits	At stop	Immedi- ately
	1Ch	H02-27	Resistance of external regenerative resistor		1 to 1000	50	1Ω	16 bits	At stop	Immedi- ately
	1Fh	H02-30	User password		0 to 65535	0	1	16 bits	During running	Immedi- ately

Para	neter	Group								
He		Dec.	Namo	Description	Value Denge	Default	Min.	Width	Change	Effective
	Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	20h	H02-31	System parameter initialization	0: No operation 1: Restore default settings 2: Clear fault records	0 to 2	0	1	16 bits	At stop	Immedi- ately
3002	21h	H02-32	Selection of parameters in group H0B		0 to 99	50	1	16 bits	During running	Immedi- ately
	24h	H02-35	Keypad data refresh frequency		0 to 20	0	1 Hz	16 bits	During running	Immedi- ately
	2Ah	H02-41	Factory password		0 to 65535	0	1	16 bits	During running	Immedi- ately
				3003h/H03 Termi	nal Input Parame	ters			· · · · ·	
				Consisting of						
3003	03h	H03-02	DI1 function selection	three digits, with the first one (from left to right) indicating the axis number and the last two indicating the terminal function. The last two digits are defined as follows: 0: No definition 01: S-ON 14: Positive limit switch 15: Negative limit switch 31: Home switch 38: Touch probe 1 39: Touch probe 2	0 to 65535	0	1	16 bits	During running	At stop
	04h	H03-03	DI1 logic selection	0: Active low 1: Active high 2: Rising edge- triggered 3: Falling edge- triggered 4: Rising/Falling edge-triggered	0 to 4	0	1	16 bits	During running	At stop
	05h	H03-04	DI2 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	06h	H03-05	DI2 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	07h	H03-06	DI3 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop

Para	neter	Group								
He		Dec.	Name	Description	Value Denge	Default	Min.	Width	Change	Effective
	Index		Name	Description	Value Range	Default	Unit	width	Condition	Time
Group	Code	No.								
	08h	H03-07	DI3 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	09h	H03-08	DI4 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Ah	H03-09	DI4 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	0Bh	H03-10	DI5 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Ch	H03-11	DI5 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	0Dh	H03-12	DI6 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
3003	0Eh	H03-13	DI6 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
3003	0Fh	H03-14	DI7 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	10h	H03-15	DI7 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	11h	H03-16	DI8 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	12h	H03-17	DI8 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	13h	H03-18	DI9 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	14h	H03-19	DI9 terminal logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	15h	H03-20	DI10 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop

Para	meter	Group								
He		Dec.	Name	Description	Value Denge	Default	Min.	Width	Change	Effective
	Index		Name	Description	Value Range	Default	Unit	width	Condition	Time
Group	Code	No.								
	16h	H03-21	DI10 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	17h	H03-22	DI11 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	18h	H03-23	DI11 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	19h	H03-24	DI12 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	1Ah	H03-25	DI12 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	1Bh	H03-26	DI13 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
3003	1Ch	H03-27	DI13 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
5005	1Dh	H03-28	DI14 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	1Eh	H03-29	DI14 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	1Fh	H03-30	DI15 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	20h	H03-31	DI15 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	21h	H03-32	DI16 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	22h	H03-33	DI16 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	23h	H03-34	DI17 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop

Para	neter	Group								
He		Dec.	Name	Description	Value Denge	Default	Min.	Width	Change	Effective
	Index		Name	Description	Value Range	Default	Unit	width	Condition	Time
Group	Code	No.								
	24h	H03-35	DI17 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	25h	H03-36	DI18 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	26h	H03-37	DI18 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	27h	H03-38	DI19 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	28h	H03-39	DI19 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	29h	H03-40	DI20 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
3003	2Ah	H03-41	DI20 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
3003	2Bh	H03-42	DI21 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	2Ch	H03-43	DI21 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	2Dh	H03-44	DI22 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	2Eh	H03-45	DI22 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	2Fh	H03-46	DI23 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	30h	H03-47	DI23 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	31h	H03-48	DI24 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop

Para	neter	Group								
He		Dec.					Min.		Change	Effective
пе	Index		Name	Description	Value Range	Default	Unit	Width	Condition	
Group	Code	No.								
3003		H03-49	DI24 terminal logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
				3004h/H04 Termin	al Output Param	eters				
				Consisting of						
	01h	H04-00	DO1 function selection	three digits, with the first one (from left to right) indicating the axis number and the last two indicating the terminal function. The last two digits are defined as follows: 0: No definition 01: Servo ready 02: Motor rotating 10: Warning 11: Fault	0 to 65535	0	1	16 bits	During running	At stop
3004	02h	H04-01	DO1 logic selection	0: Output low (L) level upon valid logic (optocoupler ON) 1: Output high (H) level upon valid logic (optocoupler OFF)	0 to 1	0	1	16 bits	During running	At stop
	03h	H04-02	DO2 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	04h	H04-03	DO2 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
	5h	H04-04	DO3 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	6h	H04-05	DO3 terminal logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
	7h	H04-06	DO4 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	8h	H04-07	DO4 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop

Para	meter	Group								
He		Dec.					Min.		Change	Effective
	Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	9h	H04-08	DO5 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
3004	0Ah	H04-09	DO5 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
3004	0Bh	H04-10	DO6 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Ch	H04-11	DO6 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
				3005h/H05 Positio	on Control Paramo	eters				
	05h	H05-04	First-order low-pass filter time constant		0 to 65535	0	0.1 ms	16 bits	At stop	Immedi- ately
	07h	H05-06	Moving average filter time constant		0 to 1280	0	0.1 ms	16 bits	At stop	Immedi- ately
	14h	H05-19	Speed feedforward control	0: No speed feedforward 1: Internal speed feedforward 2: 60B1 used as speed feedforward	0 to 2	1	1	16 bits	At stop	Immedi- ately
	24h	H05-35	Duration limit of homing		0 to 65535	50000	0.01s	16 bits	During running	Immedi- ately
	2Fh	H05-46	Position offset in absolute position linear mode (low 32 bits)		0 to 4294967295	0	1	32 bits	At stop	Next power- on
3005	31h	H05-48	Position offset in absolute position linear mode (high 32 bits)		-2147483648 to +2147483647	0	1	32 bits	At stop	Next power- on
	33h	H05-50	Mechanical gear ratio (numerator)		1 to 65535	1	1	16 bits	At stop	Immedi- ately
	34h	H05-51	Mechanical gear ratio (denominator)		1 to 65535	1	1	16 bits	At stop	Immedi- ately
	35h	H05-52	Pulses per load revolution in absolute position rotation mode (low 32 bits)		0 to 4294967295	0	1 p	32 bits	At stop	Immedi- ately
	37h	H05-54	Pulses per load revolution in absolute position rotation mode (high 32 bits)		0 to 128	0	1 p	32 bits	At stop	Immedi- ately

Parar	neter (Group								
He		Dec.		D			Min.		Change	Effective
	n. Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	couc	110.	I	3006h/H06 Speed	d Control Parame	ters		I	1	
			Canad reference	0: Keypad						Immodi
	03h	H06-02	Speed reference source	1: Multi-speed	0 to 1	0	1	16 bits	At stop	Immedi-
3006			source	reference						ately
	04h	H06-03	Speed reference		-6000 to +6000	200	1 RPM	16 bits	During	Immedi-
			Acceleration ramp						running	ately
	06h	H06-05	time of speed		0 to 65535	0		16 bits	During	Immedi-
	0011	1100-05	reference		0 10 05555	0		10 0103	running	ately
			Deceleration ramp						During	Lanua a di
	07h	H06-06	time of speed		0 to 65535	0	1 RPM	16 bits	During	Immedi-
			reference						running	ately
	09h	H06-08	Forward speed limit		0 to 6000	6000	1 RPM	16 bits	During	Immedi-
									running	ately
	0Ah	H06-09	Reverse speed limit		0 to 6000	6000	1 RPM	16 bits	During	Immedi-
3006				0: No torque					running	ately
5000				feedforward						
				1: Internal torque						
	0Ch	H06-11	Torque feedforward	feedforward	0 to 2	1	1	16 bits	During	Immedi-
			control	2: 60B2 used as					running	ately
				external torque						
				feedforward						
	0Dh	H06-12	Acceleration ramp		0 to 65535	10	1 ms	16 bits	During	Immedi-
			time of jog speed Motor speed						running	ately
	11h	H06-16	threshold		0 to 1000	20	1 RPM	16 bits	During running	Immedi- ately
			lineshold	3007h/H07 Torqu	e Control Parame	eters			Turining	atery
	0.41		Torque reference	,.			0.10/	101.11	During	Immedi-
	04h	H07-03	set through keypad		-3000 to +3000	0	0.1%	16 bits	running	ately
	06h	H07-05	Torque reference		0 to 3000	79	0.01	16 bits	During	Immedi-
	0011	1107-05	filter time constant		0 10 3000	15	ms	10 DILS	running	ately
	0.71		2nd torque			=0	0.01		During	Immedi-
	07h	H07-06	reference filter time		0 to 3000	79	ms	16 bits	running	ately
			constant Internal forward						During	Immedi-
	0Ah	H07-09	torque limit		0 to 3000	3000	0.1%	16 bits	running	ately
3007			Internal reverse						During	Immedi-
	0Bh	H07-10	torque limit		0 to 3000	3000	0.1%	16 bits	running	ately
	10h	H07-15	Emergency stop		0 to 3000	1000	0.1%	16 bits	During	Immedi-
	1011	1107-13	torque		0.00.5000	1000	0.170	10 DILS	running	ately
	14h	H07-19	Internal speed limit		0 to 6000	3000	1 004	16 bits	During	Immedi-
	140	H07-19	in torque control		0.00000	3000	TRPM	TO DILS	running	ately
			Internal reverse						Duri	1
	15h	H07-20	speed limit in		0 to 6000	3000	1 RPM	16 bits	During	Immedi- ately
			torque control						running	
	16h	H07-21	Reference value for		0 to 3000	0	0.1%	16 bits	During	Immedi-
			torque reached				0.1/0		running	ately
	17h	LU07 22	Torque output when		0 to 2000	200	0.1%	16 bits	During	Immedi-
3007	τ/Π	r107-22	torque reached DO signal turned on		0 to 3000	200	0.1%	TO DICS	running	ately
			Torque output when							
	18h	H07-23	torque reached DO		0 to 3000	100	0.1%	16 bits	During	Immedi-
			signal turned off						running	ately

Parat	neter	Group								
		· ·					Min.		Change	Effective
He		Dec.	Name	Description	Value Range	Default	Unit	Width	Condition	
Group	Index Code	Para. No.								
	couc	110.	I	3008h/H08 0	Gain Parameters	1	1	1	1	L
						0.50			During	Immedi-
	01h	H08-00	Speed loop gain		1 to 20000	250	0.1 Hz	16 bits	running	ately
	02h	H08-01	Speed loop integral		15 to 51200	3183	0.01	16 bits	During	Immedi-
	02.11		time constant		10 10 01200	0100	ms	10 5105	running During	ately Immedi-
	03h	H08-02	Position loop gain		0 to 20000	400	0.1 Hz	16 bits	running	ately
	04h		2nd speed loop gain		1 to 20000	400	0147	16 bits	During	Immedi-
	0411	поо-оз			1 to 20000	400	0.1 HZ	TO DICS	running	ately
	05h		2nd speed loop integral time		15 to 51200	2000	0.01	16 bits	During	Immedi-
	0311	100-04	constant		13 (0 31200	2000	ms	TO DICS	running	ately
	06h	H08-05	2nd position loop		0 to 20000	640	0.1.1	16 bits	During	Immedi-
	060	HU8-U5	gain		01020000	640	0.1 HZ	16 DILS	running	ately
				0: Fixed at the						
				1st gain, P/ PI switchover						
				performed						
				through bit26 of						
	09h		2nd gain mode	60FE	0 to 1	1	1	16 bits	During	Immedi-
	0.511	1100-00	2nd gain mode	1: Switchover	0.01	1	1	10 DILS	running	ately
				between the 1st						
				gain and 2nd gain						
				activated based on the condition						
				defined by H08-09						
				0: Fixed at the 1st						
3008				gain (PS)						
				2: Torque						
				reference value too large (PS)						
				3: Speed						
				reference value						
				too large (PS)						
				4: Speed						
				reference change						
				rate too large (PS)						
			Gain switchover	5: Threshold of speed reference					During	Immedi-
	0Ah	H08-09	condition	(PS)	0 to 10	0	1	16 bits	running	ately
				6: Position						
				deviation too						
				large (P)						
				7: Position						
				reference available (P)						
				8: Positioning						
				unfinished (P)						
				9: Actual speed (P)						
				10: Position						
				reference + Actual						
			Gain switchover	speed (P)					During	Immedi-
	0Bh	H08-10	delay		0 to 10000	50	0.1 ms	16 bits	running	ately
							-			accij

Para	meter	Group								
He		Dec.		Descripti	Malua D	Def li	Min.	14/2 -1 - 1	Change	Effective
	Index		Name	Description	Value Range	Default	Unit	Width	Condition	
Group	Code	No.								
		H08-11	Gain switchover		0 to 20000	50	1	16 bits	During	Immedi-
			level				-	10 5100	running	ately
	0Dh	H08-12	Gain switchover hysteresis		0 to 20000	30	1	16 bits	During running	Immedi- ately
	0.51	1100 10	Position gain		0.1. 10000	20	0.1	101.1	During	Immedi-
	0Eh	H08-13	switchover time		0 to 10000	30	0.1 ms	16 bits	running	ately
	10h	H08-15	Load inertia ratio		0 to 12000	100	0.01	16 bits	During	Immedi-
			Speed feedforward				0.01		running During	ately Immedi-
	13h	H08-18	filter time constant		0 to 6400	50	ms	16 bits	running	ately
	14h	H08-19	Speed feedforward		0 to 1000	0		16 bits	During	Immedi-
	1411	H00-13	gain		0101000	0		TODICS	running	ately
	15h	H08-20	Torque feedforward		0 to 6400	50	0.01	16 bits	During	Immedi-
			filter time constant				ms		running	ately
	16h	H08-21	Torque feedforward gain		0 to 2000	0	0.1%	16 bits	During running	Immedi- ately
3008	17h 18h 19h	H08-22 H08-23 H08-24	Speed feedback filter selection Cutoff frequency of speed feedback low-pass filter PDFF control coefficient	0: Average filtering of speed feedback inhibited 1: 2 times of average filtering of speed feedback 2: 4 times of average filtering of speed feedback 3: 8 times of average filtering of speed feedback 4: 16 times of average filtering of speed feedback	0 to 4 100 to 4000 0 to 1000	0 4000 1000		16 bits 16 bits 16 bits	At stop During running During running	Immedi- ately Immedi- ately Immedi- ately
			coemeient	3009h/H09 Gain Au	uto-tuning Param	eters		1	running	atery
3009	01h	H09-00	Gain auto-tuning mode	0: Disabled, gain parameters adjusted manually 1: Standard gain auto-tuning mode, gain parameters adjusted automatically based on the stiffness level 2: Positioning mode, gain parameters adjusted automatically based on the stiffness level	0 to 2	0	1	16 bits	During	Immedi- ately

Para	neter	Group								
Parameter Group Hex. Dec.		· ·		Descripti			Min.		Change	Effective
Group	Index Code		Name	Description	Value Range	Default	Unit	Width	Condition	Time
	02h		Stiffness level		0 to 31	12	1	16 bits	During running	Immedi- ately
3009	03h	H09-02	Adaptive notch mode	0: Adaptive notch no longer updated 1: One adaptive notch activated (3rd notch) 2: Two adaptive notches activated (3rd and 4th notches) 3: Resonance point tested only (displayed in H09- 24) 4: Adaptive notch cleared, parameters of 3rd and 4th notches restored to default values	0 to 4	0	1	16 bits	During running	Immedi- ately
	04h	H09-03	Online inertia auto- tuning mode	0: Online auto- tuning disabled 1: Online auto- tuning enabled, changing slowly 2: Online auto- tuning enabled, changing normally 3: Online auto- tuning enabled, changing quickly	0 to 3	0	1	16 bits	During running	Immedi- ately
	05h	H09-04	Low-frequency resonance suppression mode	0: Manually set parameters of low-frequency resonance suppression filter 1: Automatically set parameters of low-frequency resonance suppression filter	0 to 1	0	1	16 bits	During running	Immedi- ately
	06h	H09-05	Offline inertia auto- tuning mode	0: Positive and negative triangular wave mode 1: JOG mode	0 to 1	0	1	16 bits	At stop	Immedi- ately
	07h	H09-06	Maximum speed of inertia auto-tuning		100 to 1000	500	1 RPM	16 bits	At stop	Immedi- ately
	08h	H09-07	Time constant for accelerating to the maximum speed during inertia auto- tuning		20 to 800	125	1 ms	16 bits	At stop	Immedi- ately

Parar	meter (Group								
He	x.	Dec.	Nama	Description	Value Davia	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	couc	110.	Inortio outo tuning							Immedi-
	09h	H09-08	Inertia auto-tuning		50 to 10000	800	1 ms	16 bits	At stop	
			interval							ately
			Number of motor							
	0Ah	H09-09	revolutions per		0 to 65535	0	0.01	16 bits	-	-
			inertia auto-tuning							
	0Dh	H09-12	Frequency of the 1st		50 to 4000	4000	1 Hz	16 bits	During	Immedi-
			notch Width level of the						running	ately
	0Eh	H09-13			0 to 20	2	1	16 bits	During	Immedi-
			1st notch						running	ately
	0Fh	H09-14	Depth level of the 1st notch		0 to 99	0	1	16 bits	During running	Immedi-
			Frequency of the						During	ately Immedi-
	10h	H09-15	2nd notch		50 to 4000	4000	1 Hz	16 bits	running	ately
			Width level of the						During	Immedi-
	11h	H09-16	2nd notch		0 to 20	2	1	16 bits	running	ately
			Depth level of the						During	Immedi-
	12h	H09-17	2nd notch		0 to 99	0	1	16 bits	running	ately
	4.01		Frequency of the		50. 1000				During	Immedi-
	13h	H09-18	3rd notch		50 to 4000	4000	1 Hz	16 bits	running	ately
	1.41-	H09-19	Width level of the		0 += 20	2	1	16 bits	During	Immedi-
	14h	H09-19	3rd notch		0 to 20	2	1	16 DIts	running	ately
	15h	H09-20	Depth level of the		0 to 99	0	1	16 bits	During	Immedi-
	1311	1109-20	3rd notch		01033	0	1	10 0105	running	ately
	16h	H09-21	Frequency of the		50 to 4000	4000	1 Hz	16 bits	During	Immedi-
3009	1011	1105 21	4th notch		50 10 1000	1000	1112	10 0103	running	ately
	17h	H09-22	Width level of the		0 to 20	2	1	16 bits	During	Immedi-
			4th notch				_		running	ately
	18h	H09-23	Depth level of the		0 to 99	0	1	16 bits	During	Immedi-
			4th notch Auto-tuned						running	ately
	19h	1100 24	resonance		0 to 2000	0	1 Hz	16 bits		
	190	HU9-24			0 10 2000	0		10 DILS	-	-
			frequency Torque disturbance						During	Immedi-
	1Fh	H09-30	compensation gain		-1000 to +1000	0	0.1%	16 bits	running	ately
			Filter time						runnig	atery
			constant of torque				0.01		During	Immedi-
	20h	H09-31	disturbance		0 to 2500	50	ms	16 bits	running	ately
			observer						10000	utety
			Constant torque						During	Immedi-
	21h	H09-32	compensation value		-1000 to +1000	0	0.1%	16 bits	running	ately
	221-	H09-33	Forward friction		1000 +- 11000	0	0.1%	10 1.4	During	Immedi-
	22h	H09-33	compensation value		-1000 to +1000	0	0.1%	16 bits	running	ately
	23h	H09-34	Reverse friction		-1000 to +1000	0	0.1%	16 bits	During	Immedi-
	2311	109-34	compensation value		-1000 10 +1000	U	0.1%	TODICS	running	ately
			Frequency of						During	Immedi-
	27h	H09-38	low-frequency		10 to 1000	1000	0.1 Hz	16 bits	running	ately
			resonance						- uning	ucciy
			Low-frequency							Immedi-
	28h		resonance		0 to 10	2	1	16 bits	At stop	ately
			frequency filter							

Para	neter	Group								
He		Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index	Para.	indifie	Description	value Nalige	Delautt	Unit	width	Condition	Time
Group	Code	No.								
			3	00Ah/H0A Fault and 0: Enable phase	Protection Para	meters	1	[1	
	01h	H0A-00	Power input phase loss protection	loss fault and inhibit phase loss warning 1: Enable phase loss fault and warning 2: Inhibit phase loss fault and warning	0 to 2	0	1	16 bits	During running	Immedi- ately
	02h	H0A-01	Absolute position limit	0: Disable absolute position limit 1: Enable absolute position limit 2: Enable absolute position limit after homing	0 to 2	0	1	16 bits	At stop	Immedi- ately
	04h	H0A-03	Power-off memory selection	0: Disable power- off memory 1: Enable power- off memory 2: Disable power- off memory and hide control power undervoltage fault	0 to 2	0	1	16 bits	During running	Immedi- ately
300A	05h	H0A-04	Motor overload protection gain		50 to 300	100	1	16 bits	At stop	Immedi- ately
	07h	H0A-06	Motor overload level		0 to 400	0	1	16 bits	At stop	Immedi-
	08h	H0A-07	UVW phase sequence auto- tuning selection	0: Not perform UVW phase sequence auto- tuning during angle auto-tuning 1: Perform UVW phase sequence auto-tuning during angle auto-tuning	0 to 1	1	1	16 bits	During running	ately Immedi- ately
	09h	H0A-08	Overspeed threshold		0 to 10000	0	1 RPM	16 bits	During running	Immedi- ately
	0Dh	H0A-12	Runaway protection selection	0: Disable 1: Enable	0 to 1	1	1	16 bits	During running	Immedi- ately
	0Eh	H0A-13	Initial angle auto- tuning mode	0: Auto-tuning with Z signal 1: Jog auto-tuning without Z signal 2: Auto-tuning of voltage input 3: Angle auto- tuning of voltage input with Z signal	0 to 3	0	1	16 bits	At stop	Immedi- ately

Parar	neter	Group								
He		Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index		Indifie	Description	value Kalige	Delault	Unit	width	Condition	Time
	<u>Code</u> 10h	No. H0A-15	Motor rotation threshold		1 to 1000	5	1 RPM	16 bits	During running	Immedi- ately
	11h	H0A-16	Threshold for low-frequency resonance position deviation		1 to 1000	5	1 p	16 bits	During running	Immedi- ately
	14h	H0A-19	Filter time constant of touch probe 1		0 to 630	200	1 µs	16 bits	During running	Immedi- ately
	15h	H0A-20	Filter time constant of touch probe 2		0 to 630	200	1 µs	16 bits	During running	Immedi- ately
	16h	H0A-21	STO function switch	0: Enable STO function 1: Hide STO function	0 to 1	0	1	16 bits	At stop	Next power- on
	17h	H0A-22	Sigma_Delta filter time		0 to 3	1	1	16 bits	At stop	Next power- on
	18h	H0A-23	TZ signal filter time		0 to 31	15	125 ns	16 bits	At stop	Next power- on
300A	1Ah	H0A-25	Filter time constant of displayed speed feedback		0 to 5000	50	1 ms	16 bits	At stop	Immedi- ately
	1Bh	H0A-26	Motor overload selection	0: Show motor overload warning (Er.909) and fault (Er.620) 1: Hide motor overload warning (Er.909) and fault (Er.620)	0 to 1	0	1	16 bits	At stop	Immedi- ately
	21h	H0A-32	Time window of locked rotor over-temperature protection		10 to 65535	200	1 ms	16 bits	During running	Immedi- ately
	22h	H0A-33	Locked rotor over- temperature protection	0: Shielded 1: Enabled	0 to 1	1	1	16 bits	During running	Immedi- ately
	25h	H0A-36	Encoder multi-turn overflow fault	0: Not hide 1: Hide	0 to 1	0	1	16 bits	At stop	Immedi- ately
				300Bh/H0B M	onitor Parameters	s				
			Actual motor speed		-9999 to +9999	0		16 bits	-	-
	02h	H0B-01	Speed reference		-9999 to +9999	0	1 RPM	16 bits	-	-
	03h	H0B-02	Internal torque reference		-3000 to +3000	0	0.1%	16 bits	-	-
	04h	H0B-03	Monitored DI status		0 to 0x00FFFFFF	0	1	32 bits	-	-
300B	06h	H0B-05	Monitored DO status		0 to 0xFFFF	0	1	16 bits	-	-
	08h	H0B-07	Absolute position counter		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	0Ah	H0B-09	Mechanical angle		0 to 3600	0	0.1°	16 bits	-	-
	0Bh	H0B-10	Electrical angle		0 to 3600	0	0.1°	16 bits	-	-
	0Dh	H0B-12	Average load ratio		0 to 65535	0	0.1%	16 bits	-	-

Para	meter	Group								
He		Dec.					Min.		Change	Effective
пе	Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
			Position following deviation (encoder unit)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	12h	H0B-17	Feedback pulse counter		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	14h	H0B-19	Total power-on time		0 to 4294967295	0	0.1s	32 bits	-	-
	19h	H0B-24	RMS value of phase current		0 to 65535	0	0.01 A	32 bits	-	-
	1Bh	H0B-26	Bus voltage		0 to 65535	0	0.1 V	16 bits	-	-
	1Ch	H0B-27	Power module temperature		0 to 65535	0	1°C	16 bits	-	-
	1Dh	H0B-28	Absolute encoder fault information given by FPGA		0 to 0xFFFF	0	1	16 bits	-	-
	1Eh	H0B-29	System status information given by FPGA		0 to 0xFFFF	0	1	16 bits	-	-
	1Fh	H0B-30	System fault information given by FPGA		0 to 0xFFFF	0	1	16 bits	-	-
	20h	H0B-31	Encoder fault information		0 to 0xFFFF	0	1	16 bits	-	-
	22h	H0B-33	Fault log		0 to 9	0	1	16 bits	During running	Immedi- ately
	23h	H0B-34	Fault code of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
300B	24h	H0B-35	Time stamp upon occurrence of the selected fault		0 to 4294967295	0	0.1s	32 bits	-	-
	26h	H0B-37	Motor speed upon occurrence of the selected fault		-9999 to +9999	0	1 RPM	16 bits	-	-
	27h	H0B-38	Motor phase U current upon occurrence of the selected fault		-32768 to +32767	0	0.01 A	16 bits	-	-
	28h	H0B-39	Motor phase V current upon occurrence of the selected fault		-32768 to +32767	0	0.01 A	16 bits	-	-
	29h	H0B-40	Bus voltage upon occurrence of the selected fault		0 to 65535	0	0.1 V	16 bits	-	-
	2Ah	H0B-41	occurrence of the selected fault		0 to 0x00FFFFF	0	1	32 bits	-	-
			Output terminal status upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	2Eh	H0B-45	Internal fault code		0 to 0xFFFF	0	1	16 bits	-	-
	2Fh	H0B-46	Absolute encoder fault information given by FPGA upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-

Para	meter	Group								
He		Dec.					Min.		Change	Effective
	Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
			System status information given by FPGA upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	31h	H0B-48	System fault System fault information given by FPGA upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	32h	H0B-49	Encoder fault information upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	34h	H0B-51	Internal fault code upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	36h	H0B-53	Position following deviation (reference unit)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	38h	H0B-55	Actual motor speed		-60000 to +60000	0	0.1 RPM	32 bits	-	-
	3Ah	H0B-57	Bus voltage of the control power		0 to 65535	0	0.1 V	16 bits	-	-
	3Bh	H0B-58	Mechanical absolute position (low 32 bits)		0 to 4294967295	0	1 p	32 bits	-	-
300B	3Dh	H0B-60	Mechanical absolute position (high 32 bits)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	47h	H0B-70	Number of absolute encoder revolutions		0 to 65535	0	1	16 bits	-	-
	48h	H0B-71	Position of the absolute encoder within one turn		0 to 2147483647	0	1 p	32 bits	-	-
	4Eh	H0B-77	Encoder position (low 32 bits)		0 to 4294967295	0	1 p	32 bits	-	-
	50h	H0B-79	Encoder position (high 32 bits)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	52h	H0B-81	Single-turn position of the rotating load (low 32 bits)		0 to 4294967295	0	1 p	32 bits	-	-
	54h	H0B-83	Single-turn position of the rotating load (high 32 bits)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	56h	H0B-85	Single-turn position of the rotating load (reference unit)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	5Bh	H0B-90	Group No. of the abnormal parameter		0 to 0xFFFF	0	1	16 bits	-	-
	5Ch	H0B-91	Offset of the abnormal parameter within the group		0 to 65535	0	1	16 bits	-	-

Parar	neter	Group								
He		Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index		indific	Description	value Nalige	Delaute	Unit	Width	Condition	Time
0.049	Code	No.		300Dh/H0D Auxiliar	v Eurotion Daran	otors				
					y FUNCTION Paran	lielers				
	02h	H0D- 01	Fault reset	0: No operation 1: Fault reset	0 to 1	0	1	16 bits	During running	Immedi- ately
300D	04h	H0D- 03	Encoder initial angle auto-tuning	0: No operation 1: Enable	0 to 1	0	1	16 bits	At stop	Immedi- ately
	05h	H0D- 04	Encoder ROM read/ write	0: No operation 1: Write ROM 2: Read ROM	0 to 2	0	1	16 bits	At stop	Immedi- ately
	06h	H0D- 05	Emergency stop	0: No operation 1: Emergency stop	0 to 1	0	1	16 bits	During running	Immedi- ately
300D	0Dh	H0D- 12	UV phase current balance correction	0: Disable 1: Enable	0 to 1	0	1	16 bits	At stop	Immedi- ately
	15h	H0D- 20	Absolute encoder reset selection	0: No operation 1: Reset the fault 2: Reset the fault and multi-turn data	0 to 2	0	1	16 bits	At stop	Immedi- ately
			300	Eh/H0E Communica	ation Function Pa	rameters				
	01h	H0E-00	Node address		1 to 127	1	1	16 bits	During running	Immedi- ately
300E		H0E-01	Save objects written through communication to EEPROM	0: Not save 1: Save parameters written through communication to EEPROM 2: Save object dictionaries written through communication to EEPROM. 3: Save parameters and object dictionaries written through communication to EEPROM	0 to 3	3	1	16 bits	During running	Immedi- ately
	03h	H0E-02	Axis address		1 to 127	1	1	16 bits	-	-
	09h	H0E-08	Servo node address selection	0: Node address determined by H0E-00 1: Node address determined by DIP switch 1	0 to 1	0	1	16 bits	During running	Immedi- ately
	0Bh	H0E-10	CAN communication mode	0: N/A 1: CANopen 2: CANlink	0 to 2	1	1	16 bits	During running	Immedi- ately

Para	meter	Group								
He		Dec.		.			Min.		Change	Effective
	Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
			CAN baud rate	0: 20 K 1: 50 K 2: 100 K 3: 125 K 4: 250 K 5: 500 K 6: 1 M	0 to 6	5	1	16 bits	During running	Immedi- ately
	0Dh	H0E-12	Number of CAN frames received per unit time		0 to 65535	0	1	16 bits	-	-
	0Eh	H0E-13	Maximum CAN reception errors per unit time		0 to 255	0	1	16 bits	-	-
	0Fh	H0E-14	Maximum CAN transmission errors per unit time		0 to 255	0	1	16 bits	-	-
	10h	H0E-15	CAN bus disconnection times per unit time		0 to 65535	0	1	16 bits	-	-
	11h	H0E-16	CAN configuration mode		0 to 1	0	1	16 bits	During running	Immedi- ately
	15h	H0E-20	EtherCAT slave name		0 to 65535	0	1	16 bits	-	-
	16h	H0E-21	EtherCAT slave alias		0 to 65535	0	1	16 bits	At stop	Immedi- ately
300E	17h	H0E-22	Number of synchronization interrupts allowed by EtherCAT		1 to 20	9	1	16 bits	During running	Immedi- ately
	18h	H0E-23	EtherCAT synchronization detection mode	0: Standard mode 1: Surplus mode	0 to 1	0	1	16 bits	During running	Immedi- ately
	19h	H0E-24	Synchronization loss count		0 to 65535	0	1	16 bits	-	-
	1Ah	H0E-25	Maximum error value and invalid frames of EtherCAT port 0 per unit time		0 to 0xFFFF	0	1	16 bits	-	-
	1Bh	H0E-26	Maximum error value and invalid frames of EtherCAT port 1 per unit time		0 to 0xFFFF	0	1	16 bits	-	-
	1Ch	H0E-27	Maximum transfer error of EtherCAT port per unit time		0 to 0xFFFF	0	1	16 bits	-	-
	1Dh	H0E-28	Maximum EtherCAT data frame processing unit error per unit time		0 to 0x0255	0	1	16 bits	-	-
	1Eh	H0E-29	Maximum link loss of EtherCAT port 0 per unit time		0 to 0xFFFF	0	1	16 bits	-	-
	1Fh	H0E-30	EtherCAT master type		0 to 3	2	1	16 bits	At stop	Immedi- ately

Para	meter	Group								
He		Dec.		_			Min.		Change	Effective
	Index		Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	couc	110.	EtherCAT							Next
	20h	H0E-31	synchronization		0 to 2	1	1	16 bits	At stop	power-
			mode							on
			EtherCAT							Immedi-
	21h	H0E-32	synchronization		0 to 2000	500	1	16 bits	At stop	ately
			error threshold							
	22h	H0E-33	EtherCAT state machine status		0 to 8	0	1	16 bits	-	-
			Excessive position							
	23h	H0E-34	reference increment		0 to 7	1	1	16 bits	During	Immedi-
			count in CSP mode			_	-		running	ately
	201		505 I .:	0: Disable EOE	0.1	_		1011	During	Immedi-
	29h	H0E-40	EOE selection	1: Enable EOE	0 to 1	0	1	16 bits	running	ately
			Most significant						During	Immedi-
	2Ah	H0E-41	byte of EOE IP		0 to 255	0	1	16 bits	During running	ately
			address						running	atery
			Second most			_			During	Immedi-
	2Bh	H0E-42	significant byte of		0 to 255	0	1	16 bits	running	ately
			EOE IP address Second least						-	-
	2Ch	H0F-43	significant byte of		0 to 255	0	1	16 bits	During	Immedi-
	2011		EOE IP address		0 10 255	0	1	10 0103	running	ately
			Least significant							
	2Dh	H0E-44	byte of EOE IP		0 to 255	0	1	16 bits	During	Immedi-
			address						running	ately
			Most significant			_			During	Immedi-
	2Eh	H0E-45	byte of EOE subnet		0 to 255	0	1	16 bits	running	ately
300E			mask Second most							
	2Fh	H0F-46	significant byte of		0 to 255	0	1	16 bits	During	Immedi-
	2		EOE subnet mask		0 10 200	Ŭ	1	10 5105	running	ately
			Second least						During	terrar a alt
	30h	H0E-47	significant byte of		0 to 255	0	1	16 bits	During running	Immedi- ately
			EOE subnet mask						running	atery
			Least significant			_			During	Immedi-
	31h	H0E-48	byte of EOE subnet		0 to 255	0	1	16 bits	running	ately
			mask Most significant						-	
	32h	H0F-49	byte of default EOE		0 to 255	0	1	16 bits	During	Immedi-
			gateway				-		running	ately
			Second most							
	33h		significant byte		0 to 255	0	1	16 bits	During	Immedi-
	5511		of default EOE		0 10 255	0	1	TO DICS	running	ately
			gateway							
			Second least						During	Immedi-
	34h	H0E-51	significant byte of default EOE		0 to 255	0	1	16 bits	running	ately
			gateway							atery
			Least significant		1				- ·	
	35h	H0E-52	byte of default EOE		0 to 255	0	1	16 bits	During	Immedi-
			gateway						running	ately
			Most significant							
	36h	H0E-53	byte of MAC used by		0 to 0x00FF	0	1	16 bits	-	-
			EOE							
	37h	H0E-54	2nd byte of MAC used by EOE		0 to 0x00FF	0	1	16 bits	-	-
			used by EUE	1		1		1	1	

Parar	meter	Group								
		<u> </u>					Min.		Change	Effective
He		Dec.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Index Code	Para. No.								· ····c
	38h	H0E-55	3rd byte of MAC		0 to 0x00FF	0	1	16 bits	_	
	3011	1102-33	used by EOE		01000000	0	1	10 0105		
	39h	H0E-56	4th byte of MAC		0 to 0x00FF	0	1	16 bits	-	-
	5511	1102 30	used by EOE				-	10 5105		
	3Ah	H0E-57	5th byte of MAC used by EOE		0 to 0x00FF	0	1	16 bits	-	-
			Least significant							
	3Bh	H0F-58	byte of MAC used by		0 to 0x00FF	0	1	16 bits	-	-
	5011	1102 30	EOE			Ŭ	-	10 0103		
			Automatic Ethernet	0.0: 11.1						
	3Dh	H0E-60	IP address	0: Disabled	0 to 1	0	1	16 bits	During	Immedi-
			identification	1: Enabled					running	ately
			Most significant						During	Immedi-
	3Eh	H0E-61	byte of Ethernet IP		0 to 255	192	1	16 bits	running	ately
			address						Turning	atery
	0.51		Second most						During	Immedi-
	3Fh	H0E-62	significant byte of		0 to 255	168	1	16 bits	running	ately
			Ethernet IP address							
	40h	1105 62	Second least significant byte of		0 to 255	0	1	16 bits	During	Immedi-
	4011	HUE-03	Ethernet IP address		010255	0	1	10 DILS	running	ately
			Least significant							
	41h	H0F-64	byte of Ethernet IP		0 to 255	2	1	16 bits	During	Immedi-
			address		0.00 200	-	-	10 5.00	running	ately
			Most significant						During	tan an all
	42h	H0E-65	byte of Ethernet		0 to 255	255	1	16 bits	During	Immedi-
300E			subnet mask						running	ately
			Second most							
	43h	H0E-66	significant byte of		0 to 255	255	1	16 bits	During	Immedi-
	1511	1102 00	Ethernet subnet		010233	200	-	10 5105	running	ately
			mask							
			Second least							
	44h	H0E-67	significant byte of		0 to 255	255	1	16 bits	During	Immedi-
			Ethernet subnet						running	ately
			mask Least significant							
	45h	HOF-68	byte of Ethernet		0 to 255	0	1	16 bits	During	Immedi-
	1511	1102 00	subnet mask		010233	Ŭ	-	10 5105	running	ately
			Most significant						. ·	
	46h	H0E-69	byte of default		0 to 255	192	1	16 bits	During	Immedi-
			Ethernet gateway						running	ately
			Second most							
	47h	H0F-70	significant byte of		0 to 255	168	1	16 bits	During	Immedi-
	7/11	IIUE IU	uelautt Ethernet		010233	100	1	10 0103	running	ately
			gateway							
			Second least						During	العدينية
	48h	H0E-71	significant byte of		0 to 255	0	1	16 bits	During	Immedi-
			default Ethernet						running	ately
			gateway Least significant							
	49h	H0F-72	byte of default		0 to 255	1	1	16 bits	During	Immedi-
	1,711	102-12	Ethernet gateway		0 10 233	-	1	10 0105	running	ately
			Leavennet gateway	1	1	I		1	1	

Para	meter (Group								
He	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index				0		Unit		Condition	Time
	Code	No.		0: 300 bps						
	51h	H0E-80	Modbus baud rate	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	0 to 9	9	1	16 bits	During running	Immedi- ately
300E	52h	H0E-81	Modbus data format	0: No parity, 2 stop bits (8-N-2) 1: Even parity, 1 stop bit (8-E-1) 2: Odd parity, 1 stop bit (8-O-1) 3: No parity, 1 stop bit (8-N-1)	0 to 3	3	1	16 bits	During running	Immedi- ately
	53h	HUF-87	Modbus response delay		0 to 20	0	1	16 bits	During running	Immedi- ately
	54h	H0E-83	Modbus communication timeout		0 to 600	0	1	16 bits	During running	Immedi- ately
	5Bh	H0E-90	Modbus version No.		0 to 65535	0	0.01	16 bits	-	-
	5Ch	H0E-91	CANopen version No.		0 to 65535	0	0.01	16 bits	-	-
	5Dh	H0E-92	CANlink version No.		0 to 65535	0	0.01	16 bits	-	-
	5Eh	H0E-93	EtherCAT COE version No.		0 to 65535	0	0.01	16 bits	-	-
	5Fh	H0E-94	EtherCAT EOE version No.		0 to 65535	0	0.01	16 bits	-	-
	60h	H0E-95	Ethernet version No.		0 to 65535	0	0.01	16 bits	-	-

Parameters of axis 4

Para	meter (Group								
He	ex.	Dec.	Name	Description	Value Range	Default	Min. Unit	Width	Change Condition	Effective Time
Group	Index	Para.					Unit		Condition	Time
	Code	No.		 3800b/H00 Servic	Motor Paramete	rc				
								16		Next
	01h	H00-00	Motor code		0 to 65535	14000	1	bits	At stop	power-on
	03h	H00-02	Customized motor		0 to 0xFFFFFFFF	0	1	32		
	0311	H00-02	code			0	1	bits	-	-
	05h	H00-04	Encoder version No.		0 to 65535	0	0.1	16	-	-
3800			Serial encoder motor					bits 16		
	06h	H00-05	code		0 to 65535	0	1	bits	-	-
	09h	H00-08	Serial encoder type		0 to 65535	0	1	16	At stop	Next
	0511	1100-00	Scharcheoder type		0.00.000000	U	-	bits	AUSTOP	power-on
	0Ah	H00-09	Rated voltage	0: 220 V	0 to 1	0	1	16	At stop	Next
	UAIT	100-03	naicu voitage	1: 380 V	0.01	0	1	bits	At stop	power-on

Para	meter (Group								
He	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index Code	Para. No.		beschption	ratae nange	benduite	Unit		Condition	Time
	0Bh		Rated power		1 to 65535	75	0.01 kW	16 bits	At stop	Next power-on
	0Ch	H00-11	Rated current		1 to 65535	470	0.01 A	16 bits	At stop	Next power-on
	0Dh	H00-12	Rated torque		10 to 65535	239	0.01 N m	16 bits	At stop	Next power-on
	0Eh	H00-13	Maximum torque		10 to 65535	716	0.01 N m	16 bits	At stop	Next power-on
	0Fh	H00-14	Rated speed		100 to 6000	3000	1 RPM	16 bits	At stop	Next power-on
	10h	H00-15	Maximum motor speed		100 to 6000	6000	1 RPM	16 bits	At stop	Next power-on
	11h	H00-16	Moment of inertia		1 to 65535	130	0.01 kgcm ²	16 bits	At stop	Next power-on
	12h	H00-17	Number of pole pairs of PMSM		2 to 360	5	1	16 bits	At stop	Next power-on
	13h	H00-18	Stator resistance		1 to 65535	500	0.001 Ω	16 bits	At stop	Next power-on
	14h	H00-19	Stator inductance Lq		1 to 65535	327	0.01 mH	16 bits	At stop	Next power-on
3800	15h	H00-20	Stator inductance Ld		1 to 65535	387	0.01 mH	16 bits	At stop	Next power-on
	16h	H00-21	Linear back EMF coefficient		1 to 65535	3330	0.01 mV/ RPM	16 bits	At stop	Next power-on
	17h	H00-22	Torque coefficient Kt		1 to 65535	51	0.01 N m/Arms	16 bits	At stop	Next power-on
	18h	H00-23	Electrical constant Te		1 to 65535	654	0.01 ms	16 bits	At stop	Next power-on
	19h	H00-24	Mechanical constant Tm		1 to 65535	24	0.01 ms	16 bits	At stop	Next power-on
	1Dh	H00-28	Position offset of absolute encoder		0 to 4294967295	8192	1	32 bits	At stop	Next power-on
	1Fh	H00-30	Encoder selection (Hex)	19: Inovance 20-bit serial encoder	0 to 0x0FFF	0x0013	1	16 bits	At stop	Next power-on
	20h	H00-31	PPR of encoder		1 to 1073741824	8388608	1 PPR	32 bits	At stop	Next power-on
	22h	H00-33	Electrical angle of Z signal		0 to 3600	1800	0.1°	16 bits	At stop	Next power-on
	26h	H00-37	Absolute encoder function setting bit		0 to 0xFFFF	0	1	16 bits	At stop	Next power-on
	_		:	3801h/H01: Serve	o Drive Paramete	ers				
	01h	H01-00	MCU software version		0 to 65535	0	0.1	16 bits	-	-
	02h	H01-01	FPGA software version		0 to 65535	0	0.1	16 bits	-	-
3801	03h	H01-02	FPGA customized No.		0 to 65535	0	0.1	16 bits	-	-
5501	04h	H01-03	CPU0 software version No.		0 to 65535	0	0.1	16 bits	-	-
	05h	H01-04	CPU1 software version No.		0 to 65535	0	0.1	16 bits	-	-
	08h	H01-07	Software test version No.		0 to 65535	0	0.01	16 bits	-	-

Para	meter	Group								
He		· · ·					Min.		Change	Effective
He	Index	Dec. Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	0Bh	H01-10	Drive unit series	3: S2R8	0 to 65535	3	1	16	A + - +	Next
	OBU	H01-10	number	5: S5R5	0 to 65535	3	1	bits	At stop	power-on
	0Ch	H01-11	Voltage class of the		0 to 65535	220	1 V	16	_	
	UCII	H01-11	drive unit			220	1 V	bits	-	-
	0Dh	H01-12	Rated power of the		0 to	40	0.01 kW	32	-	-
			drive unit Maximum output		1073741824			bits		
	0Fh	H01-14	power of the drive		0 to	40	0.01 kW	32	-	-
		-	unit		1073741824			bits		
	11h	H01-16	Rated output current		0 to	280	0.01 A	32	_	_
	1111	1101-10	of the drive unit		1073741824	200	0.01 A	bits	-	_
	101		Maximum output		0 to	1010	0.01.0	32		
	13h	H01-18	current of the drive unit		1073741824	1010	0.01 A	bits	-	-
								16		Next
	15h	H01-20	Carrier frequency		4000 to 20000	8000	1 Hz	bits	At stop	power-on
	16h	H01-21	Dead zone time		1 to 2000	200	0.01 µs	16	At stop	Next
	1011	1101 21			110 2000	200	0.01 µ5	bits	710 510 9	power-on
	17h	1101 22	D-axis coupling		0 to 60000	500	0.1%	16	During	Immedi-
	1/11	HU1-22	voltage compensation coefficient		01060000	500	0.1%	bits	running	ately
			Q-axis back EMF						- ·	
	18h	H01-23	compensation		0 to 60000	500	0.1%	16 bits	During running	Immedi-
			coefficient							ately
	19h	H01-24	D-axis current loop		0 to 20000	500	1 Hz	16	During	Immedi-
			gain D-axis current					bits	running	ately
	1Ah	H01-25	loop integral		1 to 10000	100	0.01	16	During	Immedi-
3801			compensation factor					bits	running	ately
				0: Extraction						
				rate 32						
			Current sampling	1: Extraction rate 64				16		Next
	1Bh	H01-26	Sinc3 filter data	2: Extraction	0 to 3	0	1	bits	At stop	power-on
			extraction rate	rate 128				bitts		power on
				3: Extraction						
				rate 256						
	1Ch	H01-27	Q-axis current loop		0 to 20000	500	1 Hz	16	During	Immedi-
			gain Q-axis current					bits	running	ately
	1Dh	H01-28	loop integral		1 to 10000	100	0.01	16	During	Immedi-
			compensation factor					bits	running	ately
			Q-axis coupling					16	During	Immedi-
	1Eh	H01-29	voltage compensation		0 to 60000	500	0.1%	bits	running	ately
			coefficient Bus voltage gain					16		Next
	1Fh	H01-30	tuning		500 to 1500	1000	0.1%	bits	At stop	power-on
			Minimum turn-on					16		Next
	20h	H01-31	time of bootstrap		0 to 200	50	0.1 µs	bits	At stop	power-on
			circuit lower bridge							
	21h	H01-32	Relative gain of UV		1 to 65535	32768	1	16 bitc	At stop	Next
			sampling IGBT over-					bits		power-on
	23h	H01-34	temperature		0 to 1500	950	0.1°C	16	During	Immedi-
			threshold					bits	running	ately
	25h	H01-36	Current sensor range		0 to 999999	2083	0.01 A	32	At stop	Next
			l l l l l l l l l l l l l l l l l l l					bits		power-on

Para	meter	Group								
	=x.	Dec.					Min.		Change	Effective
116	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	27h	H01-38	FPGA phase current		0 to 1000	900	0.1%	16	At stop	Next
			protection threshold DC bus overvoltage					bits 16		power-on
	29h	H01-40	protection threshold		0 to 2000	420	1 V	bits	-	-
	2Ah	H01-41	DC bus voltage discharge threshold		0 to 2000	380	1 V	16 bits	At stop	Immedi- ately
	2Bh	H01-42	DC bus undervoltage		0 to 2000	200	1 V	16	At stop	Immedi-
			threshold					bits		ately
	2Ch	H01-43	Power supply unit	1: 1 kW	1 to 2	1	1	16	At stop	Next
			series No.	2: 2 kW		_	_	bits		power-on
	2Dh	H01-44	Output power of the		0 to	100	0.01 kW	32	_	_
	2011	1101 11	power supply unit		1073741824	100	0.01 1.11	bits		
	254	1101 40	Maximum output		0 to	150	0.01 kW	32		
	2Fh	H01-46	power of the power supply unit		1073741824	150	0.01 KW	bits	-	-
			Rated output current							
	31h	H01-48	of the power supply		0 to	320	0.01 A	32	-	-
			unit		1073741824			bits		
			Over-temperature					16	During	Immedi-
	33h	H01-50	threshold of the		0 to 1500	800	0.1°C	bits	running	ately
			power module					5103	runnig	atery
	0.51		D-axis proportional					16	During	Immedi-
	35h	H01-52	gain in performance priority mode		0 to 20000	2000	1 Hz	bits	running	ately
3801			D-axis integral gain in							
5001	36h	H01-53	performance priority		1 to 10000	100	0.01	16	During	Immedi-
			mode					bits	running	ately
			Q-axis proportional					16	During	Immedi-
	37h	H01-54	gain in performance		0 to 20000	2000	1 Hz	bits	running	ately
			priority mode					bitto	runnig	utety
	38h	1101 55	Q-axis integral gain in		1 +- 10000	100	0.01	16	During	Immedi-
	380	H01-55	performance priority mode		1 to 10000	100	0.01	bits	running	ately
			Current loop low-pass					16		Next
	39h	H01-56	cutoff frequency		0 to 65535	11000	1 Hz	bits	At stop	power-on
			Maximum output		0 to			32		
	3Ah	H01-57	current of the power		1073741824	480	0.01 A	52 bits	-	-
			supply unit		1075741024			DILS		
	26		Serial encoder				0.001	16		Next
	3Ch	H01-59	data transmission		0 to 2000	0	μs	bits	At stop	power-on
			compensation time				-			
	3Dh	H01-60	FPGA scheduling	0: 32 kHz	0 to 1	1	1	16	At stop	Next
			frequency selection	1: 16 kHz				bits		power-on
				0: 4 kHz						
	3Eh	H01-61	Command scheduling	1: 2 kHz	0 to 2	2	1	16	At stop	Next
			frequency selection	2: 1 kHz				bits	'	power-on
			Voltage class of the					16		
	48h	H01-71	power supply unit		0 to 65535	220	1 V	bits	-	-
	L		in the supply unit	l	1					L

Para	meter	Group								
He		Dec.		.			Min.		Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
				3802h/H02 Basic (Control Paramete	ers				
				0: Speed mode						
				1: Position						
				mode						
	01h	H02-00	Control mode	2: Torque mode	0 to 255	9	1	16	At stop	Immedi-
	0111	H02-00	selection	9: EtherCAT	010233	9	1	bits	ALSLOP	ately
				mode						
				255: This axis is						
				not used. 0: Incremental						
				mode						
				1: Absolute						
			Absolute system	position linear				16		Next
	02h	H02-01	selection	mode	0 to 2	0	1	bits	At stop	power-on
				2: Absolute						
				position						
				rotation mode						
				0: CCW						
				direction as						
	03h	1102.02	Datation divertion	the forward	0 +- 1	0	1	16	A + - +	Next
	0511	HUZ-UZ	Rotation direction	direction 1: CW direction	0 to 1		1	bits	At stop	power-on
				as the forward						
				direction						
				0: Coast to stop,						
				keeping de-						
				energized state						
3802				1: Stop at zero						
			Stop mode at	speed, keeping				16		Immedi-
	08h	H02-07	overtravel	position lock	0 to 2	1	1	bits	At stop	ately
				state 2: Stop at zero						
				speed, keeping						
				de-energized						
				state						
				0: Coast to stop,						
				keeping de-						
				energized state						
			Stop mode at No.1	1: DB Stop,				16		Immedi-
	09h	H02-08	fault	keeping de-	0 to 2	0	1	bits	At stop	ately
				energized state						-
				2: DB Stop, keeping DB						
				state						
			Delay from brake					16	During	Immedi-
	0Ah	H02-09	output ON to		0 to 500	250	1 ms	bits	running	ately
			command received					0103	- uning	atery
	0.51		Delay from brake		F0 / 2000	1.50		16	During	Immedi-
	0Bh	H02-10	output OFF to motor		50 to 1000	150	1 ms	bits	running	ately
			de-energized Motor speed							-
			threshold at brake					16	During	Immedi-
	0Ch	H02-11	output OFF in		20 to 3000	30	1 RPM	bits	running	ately
			rotational state							

Para	meter (Group								
	ex.	Dec.	Name	Description	Value Dange	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	wiath	Condition	Time
Group	Code	No.								
	0Dh	H02-12	Delay from S-ON OFF to brake output OFF in rotational state		1 to 1000	500	1 ms	16 bits	During running	Immedi- ately
	10h	H02-15	Warning display on the keypad	0: Output warning information Immediately 1: Not output warning information	0 to 1	0	1	16 bits	At stop	Immedi- ately
	11h	H02-16	Brake switch	0: OFF 1: ON	0 to 1	0	1	16 bits	At stop	Immedi- ately
	16h	H02-21	Permissible minimum resistance of the regenerative resistor		1 to 1000	40	1Ω	16 bits	-	-
	19h	H02-24	Heat dissipation coefficient of the resistor		10 to 100	30	0.01%	16 bits	At stop	Immedi- ately
3802	1Ah	H02-25	Regenerative resistor selection	1: External resistor, naturally ventilated 2: External resistor, forced air cooling 3: Capacitor, no regenerative resistor needed	1 to 3	3	1	16 bits	At stop	Immedi- ately
	1Bh	H02-26	Power of external regenerative resistor		1 to 65535	40	1 kW	16 bits	At stop	Immedi- ately
	1Ch	H02-27	Resistance of external regenerative resistor		1 to 1000	50	1Ω	16 bits	At stop	Immedi- ately
	1Fh	H02-30	User password		0 to 65535	0	1	16 bits	During running	Immedi- ately
	20h	H02-31	System parameter initialization	0: No operation 1: Restore default settings 2: Clear fault records	0 to 2	0	1	16 bits	At stop	Immedi- ately
	21h	H02-32	Selection of parameters in group H0B		0 to 99	50	1	16 bits	During running	Immedi- ately
	24h	H02-35	Keypad data refresh frequency		0 to 20	0	1 Hz	16 bits	During running	Immedi- ately
	2Ah	H02-41	Factory password		0 to 65535	0	1	16 bits	During running	Immedi- ately

Para	meter	Group								
	= =	Dec.					Min.		Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	couc	110.	38	803h/H03 Termin	al Input Paramet	ers	I			
				Consisting of	•					
	03h	H03-02	DI1 function selection	three digits, with the first one (from left to right) indicating the axis number and the last two indicating the terminal function. The last two digits are defined as follows: 0: No definition 01: S-ON 14: Positive	0 to 65535	0	1	16 bits	During running	At stop
				limit switch 15: Negative limit switch 31: Home switch 38: Touch probe 1 39: Touch probe 2						
3803	04h	H03-03	D11 logic selection	0: Active low 1: Active high 2: Rising edge- triggered 3: Falling edge- triggered 4: Rising/Falling edge-triggered	0 to 4	0	1	16 bits	During running	At stop
	05h	H03-04	DI2 function selection	of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	06h	H03-05	DI2 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	07h	H03-06	DI3 function selection	of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	08h	H03-07	DI3 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop

Para	meter	Group								
	ex.	Dec.		.			Min.	1.1	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	09h		DI4 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Ah	H03-09	DI4 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	0Bh	H03-10	DI5 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Ch	H03-11	DI5 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	0Dh	H03-12	DI6 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
3803	0Eh	H03-13	DI6 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	0Fh	H03-14	DI7 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	10h	H03-15	DI7 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	11h	H03-16	DI8 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	12h	H03-17	DI8 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	13h	H03-18	DI9 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop

Para	meter	Group								
	ex.	Dec.		Deseriet	Malua D	Def 1	Min.	14/5 111	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	14h		DI9 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	15h	H03-20	DI10 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	16h	H03-21	DI10 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	17h	H03-22	DI11 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	18h	H03-23	DI11 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
3803	19h	H03-24	DI12 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	1Ah	H03-25	DI12 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	1Bh	H03-26	DI13 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	1Ch	H03-27	DI13 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	1Dh	H03-28	DI14 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	1Eh	H03-29	DI14 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop

Para	meter	Group								
	ex.	Dec.		Deserieti	Malua D	D-C I	Min.	14/2 111	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	1Fh	H03-30	DI15 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	20h	H03-31	DI15 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	21h	H03-32	DI16 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	22h	H03-33	DI16 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	23h	H03-34	DI17 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
3803	24h	H03-35	DI17 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	25h	H03-36	DI18 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	26h	H03-37	DI18 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	27h	H03-38	DI19 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	28h	H03-39	DI19 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	29h	H03-40	DI20 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop

Para	meter	Group								
He	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
-	Index	Para.	Name	Description	value Ralige	Delautt	Unit	width	Condition	Time
Group	Code	No.								
	2Ah	H03-41	DI20 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	2Bh	H03-42	DI21 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	2Ch	H03-43	DI21 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	2Dh	H03-44	DI22 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
3803	2Eh	H03-45	DI22 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	2Fh	H03-46	DI23 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	30h	H03-47	DI23 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop
	31h	H03-48	DI24 function selection	0 to 39 See the description of H03-02 for details.	0 to 65535	0	1	16 bits	During running	At stop
	32h	H03-49	DI24 logic selection	0 to 4 See the description of H03-03 for details.	0 to 4	0	1	16 bits	During running	At stop

Appendix A List of Object Groups

Para	meter	Group								
	ex.	Dec.	Name	Description	Value Dange	Default	Min.	Width	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	width	Condition	Time
Group	Code	No.								
			38	304h/H04 Termina	l Output Parame	eters				
				Consisting of						
				three digits, with the first						
				one (from left to						
				right) indicating						
				the axis number						
				and the last						
				two indicating						
			DO1 function	the terminal				16	During	
	01h	H04-00	selection	function. The	0 to 65535	0	1	bits	running	At stop
			beteetion	last two digits				Ditto		
				are defined as						
				follows:						
				0: No definition 01: Servo ready						
				02: Motor						
				rotating						
				10: Warning						
				11: Fault						
				0: Output low						
				(L) level upon						
				valid logic (optocoupler						
				ON)				16	During	
3804	02h	H04-01	DO1 logic selection	1: Output high	0 to 1	0	1	bits	running	At stop
				(H) level upon						
				valid logic						
				(optocoupler						
				OFF)						
				0 to 11 See the						
	03h	H04-02	DO2 function	description	0 to 65535	0	1	16	During	At stop
	0.511	1104 02	selection	of H04-00 for	010000000		1	bits	running	AUSTOP
				details.						
				0 to 1						
				See the				16	During	
	04h	H04-03	DO2 logic selection	description	0 to 1	0	1	bits	running	At stop
				of H04-01 for details.					Ű	
				0 to 11						
				See the				1.0		
	5h	H04-04	DO3 function selection	description	0 to 65535	0	1	16 bits	During running	At stop
			Selection	of H04-00 for				DILS	unning	
		ļ		details.						
				0 to 1						
	6h	H04 05	DO3 logic selection	See the description	0 to 1	0	1	16	During	At stop
	011	104-05	DOS IUBIC SELECTION	of H04-01 for	0.01		*	bits	running	ALSIOP
				details.						
			1			I	1	1		

Para	meter	Group								
He		Dec.	Name	Description	Value Pange	Default	Min.	Width	Change	Effective
	Index	Para.	ivanie	Description	Value Range	Deladit	Unit	whath	Condition	Time
Group	Code	No.								
	7h	H04-06	DO4 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	8h	H04-07	DO4 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
3804	9h	H04-08	DO5 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
3804	0Ah	H04-09	DO5 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
	0Bh	H04-10	DO6 function selection	0 to 11 See the description of H04-00 for details.	0 to 65535	0	1	16 bits	During running	At stop
	0Ch	H04-11	DO6 logic selection	0 to 1 See the description of H04-01 for details.	0 to 1	0	1	16 bits	During running	At stop
			38	05h/H05 Position	n Control Parame	ters	,			
	05h	H05-04	First-order low-pass filter time constant		0 to 65535	0	0.1 ms	16 bits	At stop	Immedi- ately
	07h	H05-06	Moving average filter time constant		0 to 1280	0	0.1 ms	16 bits	At stop	Immedi- ately
3805	14h	H05-19	Speed feedforward control	0: No speed feedforward 1: Internal speed feedforward 2: 60B1 used as speed feedforward	0 to 2	1	1	16 bits	At stop	Immedi- ately
5005	24h	H05-35	Duration limit of homing		0 to 65535	50000	0.01s	16 bits	During running	Immedi- ately
	2Fh	H05-46	Position offset in absolute position linear mode (low 32 bits)		0 to 4294967295	0	1	32 bits	At stop	Next power-on
	31h	H05-48	Position offset in absolute position linear mode (high 32 bits)		-2147483648 to +2147483647	0	1	32 bits	At stop	Next power-on
	33h	H05-50	Mechanical gear ratio (numerator)		1 to 65535	1	1	16 bits	At stop	Immedi- ately

Para	meter	Group								
	ex.	Dec.	Nama	Description		Defeult	Min.	14/: -I+I-	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	34h	H05-51	Mechanical gear ratio (denominator)		1 to 65535	1	1	16 bits	At stop	Immedi- ately
3805	35h	H05-52	Pulses per load revolution in absolute position rotation mode (low 32 bits)		0 to 4294967295	0	1 p	32 bits	At stop	Immedi- ately
	37h	H05-54	Pulses per load revolution in absolute position rotation mode (high 32 bits)		0 to 128	0	1 p	32 bits	At stop	Immedi- ately
			3	806h/H06 Speed	Control Paramet	ers				
	03h	H06-02	Speed reference source	0: Keypad 1: Multi-speed reference	0 to 1	0	1	16 bits	At stop	Immedi- ately
	04h	H06-03	Speed reference		-6000 to +6000	200	1 RPM	16 bits	During running	Immedi- ately
	06h	H06-05	Acceleration ramp time of speed reference		0 to 65535	0	1 RPM	16 bits	During running	Immedi- ately
	07h	H06-06	Deceleration ramp time of speed reference		0 to 65535	0	1 RPM	16 bits	During running	Immedi- ately
	09h	H06-08	Forward speed limit		0 to 6000	6000	1 RPM	16 bits	During running	Immedi- ately
3806	0Ah	H06-09	Reverse speed limit		0 to 6000	6000	1 RPM	16 bits	During running	Immedi- ately
	0Ch	H06-11	Torque feedforward control	0: No torque feedforward 1: Internal torque feedforward 2: 60B2 used as external torque feedforward	0 to 2	1	1	16 bits	During	Immedi- ately
	0Dh	H06-12	Acceleration ramp time of jog speed		0 to 65535	10	1 ms	16 bits	During running	Immedi- ately
	11h	H06-16	Motor speed threshold		0 to 1000	20	1 RPM	16 bits	During running	Immedi- ately
				307h/H07 Torque	Control Paramet	ers				
	04h	H07-03	Torque reference set through the keypad		-3000 to +3000	0	0.1%	16 bits	During running	Immedi- ately
	06h	H07-05	Torque reference filter time constant		0 to 3000	79	0.01 ms	16 bits	During	Immedi- ately
	07h	H07-06	2nd torque reference filter time constant		0 to 3000	79	0.01 ms	16 bits	During running	Immedi- ately
3807	0Ah	H07-09	Internal forward torgue limit		0 to 3000	3000	0.1%	16 bits	During running	Immedi- ately
	0Bh	H07-10	Internal reverse torque limit		0 to 3000	3000	0.1%	16 bits	During	Immedi- ately
	10h	H07-15	Emergency stop torque		0 to 3000	1000	0.1%	16 bits	During	Immedi- ately
	14h	H07-19	Internal speed limit in torque control		0 to 6000	3000	1 RPM	16 bits	During running	Immedi- ately

Para	meter	Group								
He	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index Code	Para. No.	Marrie	Description	value Nalige	Delaute	Unit	widen	Condition	Time
	15h	H07-20	Internal reverse speed limit in torque control		0 to 6000	3000	1 RPM	16 bits	During running	Immedi- ately
	16h	H07-21	Reference value for torque reached		0 to 3000	0	0.1%	16 bits	During running	Immedi- ately
3807	17h	H07-22	Torque output when torque reached DO signal turned on		0 to 3000	200	0.1%	16 bits	During running	Immedi- ately
	18h	H07-23	Torque output when torque reached DO signal turned off		0 to 3000	100	0.1%	16 bits	During running	Immedi- ately
				3808h/H08 G	ain Parameters					
	01h	H08-00	Speed loop gain		1 to 20000	250	0.1 Hz	16 bits	During running	Immedi- ately
	02h	H08-01	Speed loop integral time constant		15 to 51200	3183	0.01 ms	16 bits	During running	Immedi- ately
	03h	H08-02	Position loop gain		0 to 20000	400	0.1 Hz	16 bits	During running	Immedi- ately
	04h	H08-03	2nd speed loop gain		1 to 20000	400	0.1 Hz	16 bits	During running	Immedi- ately
	05h	H08-04	2nd speed loop integral time constant		15 to 51200	2000	0.01 ms	16 bits	During running	Immedi- ately
	06h	H08-05	2nd position loop gain		0 to 20000	640	0.1 Hz	16 bits	During running	Immedi- ately
3808	09h	H08-08	2nd gain mode	0: Fixed at the 1st gain, P/ PI switchover performed through bit26 of 60FE 1: Switchover between the 1st gain and 2nd gain activated based on the condition defined by H08- 09	0 to 1	1	1	16 bits	During running	Immedi- ately

Para	meter (Group								
	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
C	Index	Para.	Indifie	Description	value Nalige	Delautt	Unit	width	Condition	Time
Group	Code	No.								
3808	0Ah	H08-09	Gain switchover condition	0: Fixed at the 1st gain (PS) 2: Torque reference value too large (PS) 3: Speed reference value too large (PS) 4: Speed reference change rate too large (PS) 5: Threshold of speed reference (PS) 6: Position deviation too large (P) 7: Position reference available (P) 9: Actual speed (P) 10: Position reference + Actual speed (P)	0 to 10	0	1	16 bits	During running	Immedi- ately
	0Bh	H08-10	Gain switchover delay		0 to 10000	50	0.1 ms	16 bits	During running	Immedi- ately
	0Ch	H08-11	Gain switchover level		0 to 20000	50	1	16 bits	During running	Immedi- ately
	0Dh	H08-12	Gain switchover hysteresis		0 to 20000	30	1	16 bits	During	Immedi- ately
	0Eh	H08-13	Position gain switchover time		0 to 10000	30	0.1 ms	16 bits	During	Immedi- ately
	10h	H08-15	Load inertia ratio		0 to 12000	100	0.01	16 bits	During running	Immedi- ately
	13h	H08-18	Speed feedforward filter time constant		0 to 6400	50	0.01 ms	16 bits	During	Immedi- ately
	14h	H08-19	Speed feedforward gain		0 to 1000	0	0.1%	16 bits	During	Immedi- ately
	15h	H08-20	Torque feedforward filter time constant		0 to 6400	50	0.01 ms	16 bits	During running	Immedi- ately
	16h	H08-21	Torque feedforward gain		0 to 2000	0	0.1%	16 bits	During running	Immedi- ately

Para	meter	Group								
He	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index	Para.					Unit		Condition	Time
0.040	Code	No.								
3808	17h	H08-22	selection	0: Average filtering of speed feedback inhibited 1: 2 times of average filtering of speed feedback 2: 4 times of average filtering of speed feedback 3: 8 times of average filtering of speed feedback 4: 16 times of average filtering of speed feedback	0 to 4	0	1	16 bits	At stop	Immedi- ately
	18h	H08-23	Cutoff frequency of speed feedback low- pass filter		100 to 4000	4000	1 Hz	16 bits	During running	Immedi- ately
	19h	H08-24	PDFF control		0 to 1000	1000	0.1%	16	During	Immedi-
	1311	1100-24	coefficient				0.190	bits	running	ately
			38	09h/H09 Gain Aut	o-tuning Parame	eters				
3809	01h	H09-00	Gain auto-tuning mode	0: Disabled, gain parameters adjusted manually 1: Standard gain auto- tuning mode, gain parameters adjusted automatically based on the stiffness level 2: Positioning mode, gain parameters adjusted automatically based on the stiffness level	0 to 2	0	1	16 bits	During running	Immedi- ately
	02h	H09-01	Stiffness level		0 to 31	12	1	16 bits	During running	Immedi- ately

Para	meter (Group								
He		Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index	Para.	ivanic	Description	value nange	Delaute	Unit	Widdin	Condition	Time
Group	Code	No.		0: Adaptive						
	03h	H09-02	Adaptive notch mode	notch no longer updated 1: One adaptive notch activated (3rd notch) 2: Two adaptive notches activated (3rd and 4th notches) 3: Resonance point tested only (displayed in H09-24) 4: Adaptive notch cleared, parameters of 3rd and 4th notches restored to default values	0 to 4	0	1	16 bits	During running	Immedi- ately
3809	04h	H09-03	Online inertia auto- tuning mode	0: Online auto- tuning disabled 1: Online auto- tuning enabled, changing slowly 2: Online auto- tuning enabled, changing normally 3: Online auto- tuning enabled, changing quickly	0 to 3	0	1	16 bits	During running	Immedi- ately
	05h	H09-04	Low-frequency resonance suppression mode	0: Manually set parameters of low-frequency resonance suppression filter 1: Automatically set parameters of low- frequency resonance suppression filter	0 to 1	0	1	16 bits	During running	Immedi- ately
	06h	H09-05	Offline inertia auto- tuning mode	0: Positive and negative triangular wave mode 1: JOG mode	0 to 1	0	1	16 bits	At stop	Immedi- ately

Para	meter	Group								
	ex.	Dec.	Nama	Description	Value Deres	Default	Min.	الداء ا	Change	Effective
Group	Index Code	Para. No.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
	07h	H09-06	Maximum speed of inertia auto-tuning		100 to 1000	500	1 RPM	16 bits	At stop	Immedi- ately
	08h	H09-07	Time constant for accelerating to the maximum speed during inertia auto- tuning		20 to 800	125	1 ms	16 bits	At stop	Immedi- ately
	09h	H09-08	Inertia auto-tuning interval		50 to 10000	800	1 ms	16 bits	At stop	Immedi- ately
	0Ah	H09-09	Number of motor revolutions per inertia auto-tuning		0 to 65535	0	0.01	16 bits	-	-
	0Dh	H09-12	Frequency of the 1st notch		50 to 4000	4000	1 Hz	16 bits	During running	Immedi- ately
	0Eh	H09-13	Width level of the 1st notch		0 to 20	2	1	16 bits	During running	Immedi- ately
	0Fh	H09-14	Depth level of the 1st notch		0 to 99	0	1	16 bits	During running	Immedi- ately
	10h	H09-15	Frequency of the 2nd notch		50 to 4000	4000	1 Hz	16 bits	During running	Immedi- ately
	11h	H09-16	Width level of the 2nd notch		0 to 20	2	1	16 bits	During running	Immedi- ately
	12h	H09-17	Depth level of the 2nd notch		0 to 99	0	1	16 bits	During running	Immedi- ately
	13h	H09-18	Frequency of the 3rd notch		50 to 4000	4000	1 Hz	16 bits	During running	Immedi- ately
3809	14h	H09-19	Width level of the 3rd notch		0 to 20	2	1	16 bits	During running	Immedi- ately
	15h	H09-20	Depth level of the 3rd notch		0 to 99	0	1	16 bits	During running	Immedi- ately
	16h	H09-21	Frequency of the 4th notch		50 to 4000	4000	1 Hz	16 bits	During running	Immedi- ately
	17h	H09-22	Width level of the 4th notch		0 to 20	2	1	16 bits	During running	Immedi- ately
	18h	H09-23	Depth level of the 4th notch		0 to 99	0	1	16 bits	During running	Immedi- ately
	19h	H09-24	Auto-tuned resonance frequency		0 to 2000	0	1 Hz	16 bits	-	-
	1Fh	H09-30	Torque disturbance compensation gain		-1000 to +1000	0	0.1%	16 bits	During running	Immedi- ately
	20h	H09-31	Filter time constant of torque disturbance observer		0 to 2500	50	0.01 ms	16 bits	During running	Immedi- ately
	21h	H09-32	Constant torque compensation value		-1000 to +1000	0	0.1%	16 bits	During running	Immedi- ately
	22h	H09-33	Forward friction compensation value		-1000 to +1000	0	0.1%	16 bits	During running	Immedi- ately
	23h	H09-34	Reverse friction compensation value		-1000 to +1000	0	0.1%	16 bits	During running	Immedi- ately
	27h	H09-38	Frequency of low- frequency resonance		10 to 1000	1000	0.1 Hz	16 bits	During running	Immedi- ately
	28h	H09-39	Low-frequency resonance frequency filter		0 to 10	2	1	16 bits	At stop	Immedi- ately

Appendix A List of Object Groups

Para	meter	Group								
	ex.	Dec.	Nama	Description	Value Deres	Default	Min.	Mi alti	Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
			3804	h/H0A Fault and	Protection Parar	neters				
				0: Enable phase						
				loss fault and						
				inhibit phase						
			Power input phase	loss warning 1: Enable phase				16	During	Immedi-
	01h	H0A-00	loss protection	loss fault and	0 to 2	0	1	bits	running	ately
			ioss protection	warning				0103	rannig	utery
				2: Inhibit phase						
				loss fault and						
				warning						
				0: Disable						
				absolute position limit						
				1: Enable						
			Absolute position	absolute				16		Immedi-
	02h	H0A-01	limit	position limit	0 to 2	0	1	bits	At stop	ately
				2: Enable						-
				absolute						
				position limit						
				after homing 0: Disable						
				power-off						
				memory						
				1: Enable						
				power-off						
380A			Power-off memory	memory				16	During	Immedi-
	04h	H0A-03	selection	2: Disable	0 to 2	0	1	bits	running	ately
				power-off						,
				memory and hide						
				control power						
				undervoltage						
				fault						
	05h	H0A-04	Motor overload		50 to 300	100	1	16	At stop	Immedi-
			protection gain					bits 16		ately Immedi-
	07h	H0A-06	Motor overload level		0 to 400	0	1	bits	At stop	ately
				0: Not perform						
				UVW phase						
				sequence auto-						
				tuning during						
			UVW phase sequence	angle auto- tuning				16	During	Immedi-
	08h	H0A-07	auto-tuning selection	1: Perform	0 to 1	1	1	bits	running	ately
			acto turning selection	UVW phase						uccy
				sequence auto-						
				tuning during						
				angle auto-						
				tuning				16	During	Immedi-
	09h	H0A-08	Overspeed threshold		0 to 10000	0	1 RPM	16 bits	During running	ately
			1					DILS	l running	atery

Para	meter	Group								
	ex.	Dec.		D	N.L. D		Min.		Change	Effective
Group	Index Code	Para. No.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
	0Dh	H0A-12	Runaway protection selection	0: Disabled 1: Enabled	0 to 1	1	1	16 bits	During running	Immedi- ately
	0Eh	H0A-13	tuning mode	0: Auto-tuning with Z signal 1: Jog auto- tuning without Z signal 2: Auto-tuning of voltage input 3: Angle auto- tuning of voltage input with Z signal	0 to 3	0	1	16 bits	At stop	Immedi- ately
	10h	H0A-15	Motor rotation threshold		1 to 1000	5	1 RPM	16 bits	During running	Immedi- ately
	11h	H0A-16	Threshold for low- frequency resonance position deviation		1 to 1000	5	1 p	16 bits	During	Immedi- ately
	14h	H0A-19	Filter time constant of touch probe 1		0 to 630	200	1 µs	16 bits	During running	Immedi- ately
	15h	H0A-20	Filter time constant of touch probe 2		0 to 630	200	1 µs	16 bits	During running	Immedi- ately
380A	16h	H0A-21	STO function switch	0: Enable STO function 1: Hide STO function	0 to 1	0	1	16 bits	At stop	Next power-on
JOUA	17h	H0A-22	Sigma_Delta filter time		0 to 3	1	1	16 bits	At stop	Next power-on
	18h	H0A-23	TZ signal filter time		0 to 31	15	125 ns	16 bits	At stop	Next power-on
	1Ah	H0A-25	Filter time constant of displayed speed feedback		0 to 5000	50	1 ms	16 bits	At stop	Immedi- ately
	1Bh	H0A-26	selection	0: Show motor overload warning (Er.909) and fault (Er.620) 1: Hide motor overload warning (Er.909) and fault (Er.620)	0 to 1	0	1	16 bits	At stop	Immedi- ately
	21h	H0A-32	Time window of locked rotor over- temperature protection	· ·	10 to 65535	200	1 ms	16 bits	During running	Immedi- ately
	22h	H0A-33	Locked rotor over- temperature protection	0: Shielded 1: Enabled	0 to 1	1	1	16 bits	During running	Immedi- ately
	25h	H0A-36	Encoder multi-turn overflow fault	0: Not hide 1: Hide	0 to 1	0	1	16 bits	At stop	Immedi- ately

Para	meter	Group								
	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index	Para.	Indifie	Description	value Kalige	Delautt	Unit	Width	Condition	Time
Group	Code	No.								
	[[380BU/HOR WO	nitor Parameters			16		
	01h	H0B-00	Actual motor speed		-9999 to +9999	0	1 RPM	bits	-	-
	02h	H0B-01	Speed reference		-9999 to +9999	0	1 RPM	16 bits	-	-
	03h	H0B-02	Internal torque reference		-3000 to +3000	0	0.1%	16 bits	-	-
	04h	H0B-03	Monitored DI status		0 to 0x00FFFFFF	0	1	32 bits	-	-
	06h	H0B-05	Monitored DO status		0 to 0xFFFF	0	1	16 bits	-	-
	08h	H0B-07	Absolute position counter		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	0Ah	H0B-09	Mechanical angle		0 to 3600	0	0.1°	16 bits	-	-
	0Bh	H0B-10	Electrical angle		0 to 3600	0	0.1°	16 bits	-	-
	0Dh	H0B-12	Average load ratio		0 to 65535	0	0.1%	16 bits	-	-
	10h	H0B-15	Position following deviation (encoder unit)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	12h	H0B-17	Feedback pulse counter		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	14h	H0B-19	Total power-on time		0 to 4294967295	0	0.1s	32 bits	-	-
	19h	H0B-24	RMS value of phase current		0 to 65535	0	0.01 A	32 bits	-	-
380B	1Bh	H0B-26	Bus voltage		0 to 65535	0	0.1 V	16 bits	-	-
	1Ch	H0B-27	Power module temperature		0 to 65535	0	1°C	16 bits	-	-
	1Dh	H0B-28	Absolute encoder fault information given by FPGA		0 to 0xFFFF	0	1	16 bits	-	-
	1Eh	H0B-29	System status information given by FPGA		0 to 0xFFFF	0	1	16 bits	-	-
	1Fh	H0B-30	System fault information given by FPGA		0 to 0xFFFF	0	1	16 bits	-	-
	20h	H0B-31	Encoder fault information		0 to 0xFFFF	0	1	16 bits	-	-
	22h	H0B-33	Fault log		0 to 9	0	1	16 bits	During running	Immedi- ately
	23h	H0B-34	selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	24h	H0B-35	Time stamp upon occurrence of the selected fault		0 to 4294967295	0	0.1s	32 bits	-	-
	26h	H0B-37	Motor speed upon occurrence of the selected fault		-9999 to +9999	0	1 RPM	16 bits	-	-
	27h	H0B-38	Motor phase U current upon occurrence of the selected fault		-32768 to +32767	0	0.01 A	16 bits	-	-

Para	meter	Group								
	ex.	Dec.					Min.		Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
	28h		Motor phase V current upon occurrence of		-32768 to +32767	0	0.01 A	16 bits	-	-
			the selected fault Bus voltage upon					16		
	29h	H0B-40	occurrence of the selected fault Input terminal status		0 to 65535	0	0.1 V	bits	-	-
	2Ah	H0B-41	upon occurrence of the selected fault		0 to 0x00FFFFFF	0	1	32 bits	-	-
	2Ch	H0B-43	Output terminal status upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	2Eh	H0B-45	Internal fault code		0 to 0xFFFF	0	1	16 bits	-	-
	2Fh	H0B-46	Absolute encoder fault information given by FPGA upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	30h	H0B-47	System status information generated by FPGA upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
380B	31h	H0B-48	System fault information given by FPGA upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	32h	H0B-49	Encoder fault information upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	34h	H0B-51	Internal fault code upon occurrence of the selected fault		0 to 0xFFFF	0	1	16 bits	-	-
	36h	H0B-53	Position following deviation (reference unit)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	38h	H0B-55	Actual motor speed		-60000 to +60000	0	0.1 RPM	32 bits	-	-
	3Ah	H0B-57	Bus voltage of the control power		0 to 65535	0	0.1 V	16 bits	-	-
	3Bh	H0B-58	Mechanical absolute position (low 32 bits)		0 to 4294967295	0	1 p	32 bits 32	-	-
	3Dh	H0B-60	Mechanical absolute position (high 32 bits) Number of absolute		-2147483648 to +2147483647	0	1 p	32 bits 16	-	-
	47h	H0B-70	encoder revolutions		0 to 65535	0	1	bits	-	-
	48h	H0B-71	absolute encoder within one turn		0 to 2147483647	0	1 p	32 bits	-	-
	4Eh	H0B-77	Encoder position (low 32 bits)		0 to 4294967295	0	1 p	32 bits	-	-
	50h	H0B-79	Encoder position (high 32 bits)		-2147483648 to +2147483647	0	1 p	32 bits	-	-

Para	meter	Group								
	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
6	Index	Para.	INdifie	Description	value kange	Delault	Unit	width	Condition	Time
Group	Code	No.								
	52h	H0B-81	Single-turn position of the rotating load (low 32 bits)		0 to 4294967295	0	1 p	32 bits	-	-
	54h	H0B-83	Single-turn position of the rotating load (high 32 bits)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
380B	56h	H0B-85	Single-turn position of the rotating load (reference unit)		-2147483648 to +2147483647	0	1 p	32 bits	-	-
	5Bh	H0B-90	Group No. of the abnormal parameter		0 to 0xFFFF	0	1	16 bits	-	-
	5Ch	H0B-91	Offset of the abnormal parameter within the group		0 to 65535	0	1	16 bits	-	-
			380	Dh/H0D Auxiliary	/ Function Param	eters				
	02h	H0D-01	Fault reset	0: No operation 1: Fault reset	0 to 1	0	1	16 bits	During running	Immedi- ately
	04h	H0D-03	Encoder initial angle auto-tuning	0: No operation 1: Enabled	0 to 1	0	1	16 bits	At stop	Immedi- ately
	05h	H0D-04	Encoder ROM read/ write	0: No operation 1: Write ROM 2: Read ROM	0 to 2	0	1	16 bits	At stop	Immedi- ately
380D	06h	H0D-05	Emergency stop	0: No operation 1: Emergency stop	0 to 1	0	1	16 bits	During running	Immedi- ately
	0Dh	H0D-12	UV phase current balance correction	0: Disabled 1: Enabled	0 to 1	0	1	16 bits	At stop	Immedi- ately
	15h	H0D-20	Absolute encoder reset selection	0: No operation 1: Reset the fault 2: Reset the fault and multi- turn data	0 to 2	0	1	16 bits	At stop	Immedi- ately
			38	0Eh/H0E Commu	inication Parame	ters				
380E	01h	H0E-00	Node address		1 to 127	1	1	16 bits	During running	Immedi- ately
380E	02h	H0E-01	Save objects written through communication to EEPROM	0: Not save 1: Save parameters written through communication to EEPROM 2: Save object dictionaries written through communication to EEPROM. 3: Save parameters and object dictionaries written through communication to EEPROM	0 to 3	3	1	16 bits	During running	Immedi- ately

Para	meter	Group								
	ex.	Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index Code	Para. No.	Indine	Description	value kange	Delault	Unit	width	Condition	Time
	03h	H0E-02	Axis address		1 to 127	1	1	16 bits	-	-
	09h	H0E-08	Servo node address selection	0: Node address determined by H0E-00 1: Node address determined by DIP switch 1	0 to 1	0	1	16 bits	During running	Immedi- ately
	0Bh	H0E-10	CAN communication mode	0: N/A 1: CANopen 2: CANlink	0 to 2	1	1	16 bits	During running	Immedi- ately
	0Ch	H0E-11	CAN baud rate	0: 20 K 1: 50 K 2: 100 K 3: 125 K 4: 250 K 5: 500 K 6: 1 M	0 to 6	5	1	16 bits	During running	Immedi- ately
	0Dh	H0E-12	Number of CAN frames received per unit time		0 to 65535	0	1	16 bits	-	-
	0Eh	H0E-13	Maximum CAN reception errors per unit time		0 to 255	0	1	16 bits	-	-
380E	0Fh	H0E-14	Maximum CAN transmission errors per unit time		0 to 255	0	1	16 bits	-	-
	10h	H0E-15	CAN bus disconnection times per unit time		0 to 65535	0	1	16 bits	-	-
	11h	H0E-16	CAN configuration mode		0 to 1	0	1	16 bits	During running	Immedi- ately
	15h	H0E-20	EtherCAT slave name		0 to 65535	0	1	16 bits	-	-
	16h	H0E-21	EtherCAT slave alias		0 to 65535	0	1	16 bits	At stop	Immedi- ately
	17h	H0E-22	Number of synchronization interrupts allowed by EtherCAT		1 to 20	9	1	16 bits	During running	Immedi- ately
	18h	H0E-23	EtherCAT synchronization detection mode	0: Standard mode 1: Surplus mode	0 to 1	0	1	16 bits	During running	Immedi- ately
	19h	H0E-24	Synchronization loss count		0 to 65535	0	1	16 bits	-	-
	1Ah	H0E-25	Maximum error value and invalid frames of EtherCAT port 0 per unit time		0 to 0xFFFF	0	1	16 bits	-	-
	1Bh	H0E-26	Maximum error value and invalid frames of EtherCAT port 1 per unit time		0 to 0xFFFF	0	1	16 bits	-	-

Para	meter	Group								
	ex.	Dec.		.			Min.		Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.								
			Maximum transfer					16		
	1Ch	H0E-27	error of EtherCAT port		0 to 0xFFFF	0	1	bits	-	-
			per unit time					DILS		
			Maximum EtherCAT							
	1Dh	H0E-28	data frame processing		0 to 0x0255	0	1	16	-	-
			unit error per unit time					bits		
			Maximum link loss of							
	1Eh	H0E-29	EtherCAT port 0 per		0 to 0xFFFF	0	1	16	-	-
			unit time					bits		
	1Fh	1105 20	Ethor CAT mostor tuno		0 to 3	2	1	16	At at a m	Immedi-
	TEU	HUE-30	EtherCAT master type		0105	2	1	bits	At stop	ately
	20h	H0E-31	EtherCAT		0 to 2	1	1	16	At stop	Next
	2011	TIOL-31	synchronization mode		0102	1	1	bits	Лізіор	power-on
			EtherCAT					16		Immedi-
	21h	H0E-32	synchronization error threshold		0 to 2000	500	1	bits	At stop	ately
			EtherCAT state					16		-
	22h	H0E-33	machine status		0 to 8	0	1	bits	-	-
			Excessive position						. ·	
	23h	H0E-34	reference increment		0 to 7	1	1	16 bits	During	Immedi-
			count in CSP mode					DITS	running	ately
	29h		EOE selection	0: Disable EOE	0 to 1	0	1	16	During	Immedi-
	2311	1102-40	LOL Selection	1: Enable EOE	0101	0	1	bits	running	ately
	2Ah	H0E-41	Most significant byte		0 to 255	0	1	16	During	Immedi-
			of EOE IP address			-	-	bits	running	ately
	2Bh	LINE 42	Second most significant byte of EOE		0 to 255	0	1	16	During	Immedi-
380E	ZDII	HUE-42	IP address		010233		1	bits	running	ately
			Second least						- ·	
	2Ch	H0E-43	significant byte of EOE		0 to 255	0	1	16	During	Immedi-
			IP address					bits	running	ately
	2Dh	H0E-44	Least significant byte		0 to 255	0	1	16	During	Immedi-
			of EOE IP address		0.00 200	, in the second	-	bits	running	ately
	2Eh	H0E-45	Most significant byte of EOE subnet mask		0 to 255	0	1	16 bits	During running	Immedi- ately
			Second most						<u>v</u>	
	2Fh	H0E-46	significant byte of EOE		0 to 255	0	1	16	During	Immedi-
			subnet mask					bits	running	ately
			Second least					16	During	Immedi-
	30h	H0E-47	significant byte of EOE		0 to 255	0	1	bits	running	ately
			subnet mask							,
	31h	H0E-48	Least significant byte		0 to 255	0	1	16	During	Immedi-
			of EOE subnet mask Most significant					bits	running	ately
	32h	H0E-49	byte of default EOE		0 to 255	0	1	16	During	Immedi-
			gateway		112200			bits	running	ately
			Second most					16	During	Immedi-
	33h	H0E-50	significant byte of		0 to 255	0	1	bits	During running	ately
			default EOE gateway					5103	- anning	ucciy
	24		Second least		0 44 255			16	During	Immedi-
	34h	HUE-51	significant byte of default EOE gateway		0 to 255	0	1	bits	running	ately
			Least significant							
	35h	H0E-52	byte of default EOE		0 to 255	0	1	16	During	Immedi-
			gateway					bits	running	ately
					·					

Parameter Group		Group								
Hex. Dec.		Dec					Min.		Change	Effective
	Index	Para.	Name	Description	Value Range	Default	Unit	Width	Condition	Time
Group	Code	No.					onne		condition	
			Most significant byte		0.1 0.0055			16		
	36h	H0E-53	of MAC used by EOE		0 to 0x00FF	0	1	bits	-	-
	37h	H0E-54	2nd byte of MAC used		0 to 0x00FF	0	1	16		
	5/11	HUE-54	by EOE		0 10 0X00FF	0	1	bits	-	-
	38h 39h	H0E-55	3rd byte of MAC used		0 to 0x00FF	0	1	16	_	_
		1102 33	by EOE		0 10 00011		1	bits		
		H0E-56	4th byte of MAC used		0 to 0x00FF	0	1	16	-	-
			by EOE			-		bits		
	3Ah	H0E-57	5th byte of MAC used		0 to 0x00FF	0	1	16 bits	-	-
			by EOE							
	3Bh	H0E-58	Least significant byte		0 to 0x00FF	0	1	16 bits	-	-
			of MAC used by EOE							
	3Dh	H0E-60	Automatic Ethernet IP		0 to 1	0	1	16	During	Immedi-
	JUII	TIOL-00	address identification	1: Enabled	0.01		1	bits	running	ately
			Most significant byte					16	During	Immedi-
	3Eh	H0E-61	of Ethernet IP address		0 to 255	192	1	bits	running	ately
								Dita	Turning	atery
			Second most		0.1.055		68 1	16	During	Immedi-
	3Fh	H0E-62	significant byte of		0 to 255	168		bits	running	ately
			Ethernet IP address Second least							
	40h 41h	H0E-63 H0E-64	significant byte of		0 to 255	0	1	16	During	Immedi-
			Ethernet IP address					bits	running	ately
			Least significant byte					16	During	Immedi-
			of Ethernet IP address		0 to 255	2	1	bits	running	ately
380E			Most significant byte					16		
	42h	H0E-65	of Ethernet subnet		0 to 255	255	1		During	Immedi-
			mask					bits	running	ately
			Second most		0 to 255 255		16	During	Immedi-	
	43h	H0E-66	significant byte of			255	1	bits	running	ately
			Ethernet subnet mask							ucciy
	44h		Second least		0.055		1	16 bits	During running	Immedi- ately
		H0E-67	significant byte of		0 to 255	255				
			Ethernet subnet mask Least significant byte							
	45h	H0E-68	of Ethernet subnet		0 to 255	0	1	16	During	Immedi-
			mask		0 10 200			bits	running	ately
	46h	6h H0E-69	Most significant byte			192	2 1	16 bits	During running	Immedi- ately
			of default Ethernet		0 to 255					
			gateway							
			Second most							
	47h	h H0E-70	significant byte of		0 to 255	168	3 1	16 bits	During running	Immedi- ately
			default Ethernet		0 to 255					
			gateway							
	48h	n H0E-71	Second least		0 to 255	0	1	16 bits		
			significant byte of						During running	Immedi- ately
			default Ethernet							
			gateway							
	401-	1105 70	Least significant byte		0 to 255		1	16	During	Immedi-
	49h	HUE-12	of default Ethernet		0 to 255	1	1	bits	running	ately
		I	gateway	1	L			1		

Appendix A List of Object Groups

Parameter Group		Group								
Hex. Dec.		Dec.	Name	Description	Value Range	Default	Min.	Width	Change	Effective
Group	Index Code	Para. No.				benduite	Unit		Condition	Time
380E	51h	H0E-80	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	0 to 9	9	1	16 bits	During running	Immedi- ately
	52h	H0E-81	Modbus data format	0: No parity, 2 stop bits (8-N-2) 1: Even parity, 1 stop bit (8-E-1) 2: Odd parity, 1 stop bit (8-O-1) 3: No parity, 1 stop bit (8-N-1)	0 to 3	3	1	16 bits	During running	Immedi- ately
	53h	H0E-82	Modbus response delay		0 to 20	0	1	16 bits	During running	Immedi- ately
	54h		Modbus communication timeout		0 to 600	0	1	16 bits	During running	Immedi- ately
	5Bh	H0E-90	Modbus version No.		0 to 65535	0	0.01	16 bits	-	-
	5Ch	H0E-91	CANopen version No.		0 to 65535	0	0.01	16 bits	-	-
	5Dh	H0E-92	CANlink version No.		0 to 65535	0	0.01	16 bits	-	-
	5Eh	H0E-93	EtherCAT COE version No.		0 to 65535	0	0.01	16 bits	-	-
	5Fh	H0E-94	EtherCAT EOE version No.		0 to 65535	0	0.01	16 bits	-	-
	60h	H0E-95	Ethernet version No.		0 to 65535	0	0.01	16 bits	-	-

SDO transfer abort code

Abort Code	Description
0503 0000	Trigger bits not alternated
0504 0000	SDO protocol timeout
0504 0001	Client/server command word invalid or unknown
0504 0005	Memory overflow
0601 0000	Access to objects not supported
0601 0001	Attempt to read a write-only object
0601 0002	Attempt to write a read-only object
0602 0000	Object not existed in the object dictionary
0604 0041	Object cannot be mapped to PDO
0604 0042	Number and length of mapped objects exceed the PDO length
0604 to 0043	General parameters incompatible
0604 0047	General device content incompatible
0606 0000	Access to object fails due to a hardware error
0607 0010	Data type and service parameter length not match
0607 0012	Data type not match and service parameter too long
0607 0013	Data type not match and service parameter too short
0609 0011	Sub-index not existed
0609 0030	Invalid parameter value
0609 0031	Parameter value entered too large
0609 0032	Parameter value entered too small
0609 0036	Maximum value smaller than the minimum value
0800 0000	General error
0800 to 0020	Data cannot be transmitted or stored to the application
0800 to 0021	Data cannot be transmitted or stored to the application due to local control
0800 to 0022	Data cannot be transmitted or stored to the application due to current device status
0800 to 0023	Object dictionary error occurs or object dictionary not existed
0800 to 0024	Value not existed

Appendix B STO Function

Safety Information and Instructions

CAUTION

- High attention is required for electrical installation and at the system design to avoid hazards either in normal operation or in the event of equipment malfunction.
- System installation, commissioning and maintenance must be carried out by personnel who have the necessary training and experience. They must read the operating instructions and this safety information.

Technical Terms

Abbreviations	Terms	Description
STO	Safe Torque Off	Safety Torque Off The servo drive output will be cut off safely when STO is activated, preventing the servo drive from generating any torque that may incur hazards.
EDM	External Device Monitor	External Device Monitor An EDM signal will be sent to the external device monitor when STO is activated.

Description of STO

The SV820N series servo drive is integrated with Safe Torque Off (STO) function that complies with IEC 61800-5-2:2016. The STO function disables the control voltage of the power semiconductors on the drive output end, preventing the servo drive from generating torque at the motor shaft.

STO function prevents the movement of the motor by two redundant external hardware signals: STO1 and STO2 that block the PWM signals to the power layer of the servo drive. These two +24VDC signals must be active to ensure normal operations of the servo drive. If either one or both signals are set to low level, the PWM signals will be blocked within 20 ms. Such a delay (from controller informed to PWM signal blocked) enables the controller to stop all the shafts. The STO mechanism is built into the servo drive so that the motor will not act in any foreseeable cases (failure or damage).

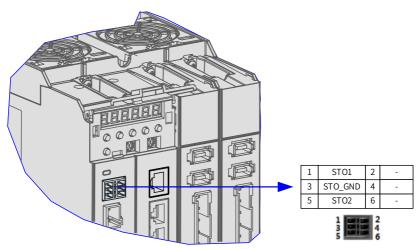
If there is no input of one or two +24 VDC "STO Enable" signals, STO will be enabled to stop the servo drive from starting. In this case, the servo drive will not be enabled by failure of one component or all the three components. The servo drive therefore can be used as a final actuator in a machinery safety application to prevent unexpected motor operations, typically as part of an interlock system to replace traditional layout of contactors with auxiliary cross-checking contacts.

Product Information

STO Model and Nameplate

See "1.1 Nameplate and Model Number" for the STO model and nameplate

STO Terminals

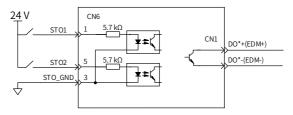


Terminal	PIN	Signal Name	Description		
	1	STO1	Signal input of STO channel 1 of axis 1 to axis 4		
	3	STO_GND	Reference ground of STO signal		
CN6	5	STO2	Signal input of STO channel 2 of axis 1 to axis 4		
CINO	2	STO3	Signal input of STO channel 1 of axis 5 to axis 8		
	4	STO_GND	Reference ground of STO signal		
	6	STO4	Signal input of STO channel 2 of axis 5 to axis 8		
CN1	-	EDM+	Manitar signal for detecting affet (function foult		
CNI	-	EDM-	Monitor signal for detecting safety function fault		



• To use the EDM signal, select the EDM function in the corresponding DO function of CN1.

Wiring Diagram



Electrical Specifications

STO Input Signal						
Voltage range of the 24 V power supply	24 V±15%					
Minimum voltage at high status	15 V					
Maximum voltage at low status	3 V (or open circuit)					
Input current	Less than 20 mA per channel					
Cal	oles					
Category	Low-voltage single-shielded twisted pair					
Maximum size	0.8 mm ² (18AWG)					
Minimum size	0.3 mm ² (28AWG)					
Maximum length	25 m between the STO inputs and the operating contact					
STO activation delay						
Activation delay	< 15 ms					

STO Function Implementation

Function Selection

1 Axis selection for STO function

The SV820N is a multi-axis servo drive featuring four STO input channels: STO1, STO2, STO3, and STO4.

STO1 and STO2 are used for functional safety of axis 1 to axis 4 through cutting off the torque of one axis or all the axes simultaneously. STO3 and STO4 are used for functional safety of axis 5 to axis 8.

2 EDM output terminal selection

Set DO3 (H04-04 = 132) as the DO terminal of STO EDM, and the corresponding DO output is the EDM signal.

STO Status Display and EDM Output

Signal Status	STO1 Input Status	STO2 Input Status	EDM	Display Status
	Н	Н	OFF	-
Logic	Н	L	OFF	Er.150
Logic	L	Н	OFF	Er.150
	L	L	ON	Er.150

Example of Application Circuits

Compared with traditional functional safety mode that uses two separated STO enabling inputs, the STO function features an additional advantage: it can be used to disable a highly-integrated servo drive.

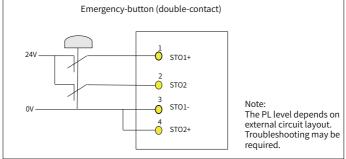
Both inputs must be provided with STO voltage input to enable the servo drive. If one or two channels changed to 0 V, the servo drive output will be disabled completely.

The stop function can be divided into different categories based on EN 60204/A1:2009. The STO can also be used in applications requiring highly-reliable disabling operation.

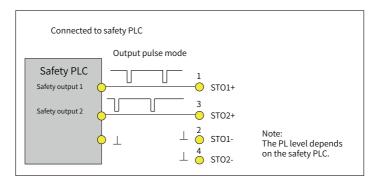
For example, a contactor latch circuit can be used for start/stop to avoid non-safety related injuries caused by unexpected start. The Stop Category 0 and Stop Category 1 can be integrated into SV820N servo drives through proper safety control devices.

According to IEC 61800-5-2:2016, the same safety functions are called Safe Stop 0 and Safe Stop 1.

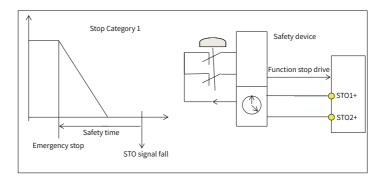
Example 1: Direct stop, Stop Category 1, Safe Stop 1



Example 2: Internal 24 VDC power supply, Stop Category 0/1, Safe Stop 0/1



■ Example 3: External safety timer, Stop Category 1, Safe Stop 1



Notes

The STO function is not intended as a replacement for an Emergency Stop function (E-stop). Therefore maintenance work on electrical parts of the servo drive or motor can only be carried out after isolating the drive system from the main supply.

Depending on the standards and requirements for a particular application, it may be possible to use STO as an integral part of an E-stop system. However, its main purpose is for use in a dedicated safety control arrangement whose purpose is to prevent any hazard from occurring, without the use of an E-stop.

An E-stop is often provided in a machine to allow for unexpected situations where an operator sees a hazard and can take action to prevent an accident.

The design requirement for an E-stop differs from that of a safety interlock. Generally, the E-stop is required to be independent from any complex or intelligent control. It may use purely electromechanical devices to either disconnect the power or initiate a controlled rapid stop through other means such as dynamic or regenerative braking.



In the use of permanent-magnet motors, reluctance motors and salient-pole induction motors, in spite of the activation of the STO function, a possible (although highly unlikely) failure mode is for two power devices in the drive circuit to conduct incorrectly. The drive system can produce an alignment torque which maximally rotates the motor shaft by 180° electrical for a permanent-magnet motor, or 90° electrical for a salient-pole induction motor or reluctance motor. This possible failure mode must be allowed for in the machine system design.



- Max. motor shaft rotate = 360° /Motor poles number
- ◆ The design of safety-related systems requires specialist knowledge. To ensure that a complete control system is safe, it is necessary for the whole system to be designed according to recognized safety principles. The use of individual sub-systems such as drives with Safe Torque Off functions, which are intended for safety-related applications, does not in itself ensure that the complete system is safe.

STO Acceptance Test

The acceptance test must be performed:

- At initial start-up of the safety function
- After any changes related to the safety function (wiring, components, settings, and so on)
- After any maintenance work related to the safety function

The acceptance test of the safety function must be carried out by an authorized person with expertise and knowledge of the safety function. The test must be documented and signed by the authorized person.

Signed acceptance test reports must be stored in the logbook of the machine. The report shall include documentation of start-up activities and test results, references to failure reports and resolution of failures. Any new acceptance tests performed due to changes or maintenance shall be logged into the logbook.

- ActionResultEnsure that the drive can be run and stopped freely during commissioning.Stop the drive (if running), switch the input power off and isolate the drive
from the power line by a disconnecter.Check the STO circuit connections against the circuit diagram.Check that the shield of the STO input cable is grounded to the drive frame.
- Start up checklist

Action	Result
Close the disconnecter and switch the power on.	
Test the STO signal #1 when the motor is stopped: Give a stop command for the drive (if running) and wait until the motor shaft is at standstill. Awake the STO function by de-energizing (low state or open-circuit) the STO input signal #1 and give a start command for the drive. Ensure that the motor stays standstill and the keypad displays "Er.150".	
Energize the STO input signal #1, restart the servo drive and check whether the motor runs normally.	
Test the STO signal #2 when the motor is stopped: Give a stop command for the drive (if running) and wait until the motor shaft is at standstill. Awake the STO function by de-energizing (low state or open-circuit) the STO input signal #2 and give a start command for the drive. Ensure that the motor stays at standstill and the keypad displays "Er.150".	
Energize the STO input signal #2, restart the drive and check that the motor runs normally.	
Test the STO channel #1 when the motor is running: Start the drive and ensure the motor is running. Awake the STO function by de-energizing (low state or open-circuit) the STO input signal #1. Ensure that the motor stops and the drive trips. Reset the fault and try to start the drive. Ensure that the motor stays standstill and the keypad displays "Er.150".	
Energize the STO input signal #1. Restart the drive and check that the motor runs normally.	
Test the STO channel #2 when the motor is running: Start the drive and ensure the motor is running. Awake the STO function by de-energizing (low state or open-circuit) the STO input signal #2. Ensure that the motor stops and the drive trips. Reset the fault and try to start the drive. Ensure that the motor stays standstill and the keypad displays "Er.150".	
Energize the STO input signal #2. Restart the drive and check that the motor runs normally.	
Document and sign the acceptance test report which verifies that the safety function is safe and accepted to operation.	

STO Maintenance

1) Incorporate the STO operation test described in <u>"STO Acceptance Test"</u> to the routine maintenance program of the drive.

If the drive stays in the STO state, in spite of the two energized STO input signals, try to:

■ Check the STO terminal of the drive.

- Check the two STO signal voltages on the STO terminal side.
- If the STO signal voltage is not between 24 V±15%, check the power supply of the safety equipment (such as safety sensor and safety relay), check all the STO related connections.
- 2) The servo drive must be powered off and on again once per 3 months to perform the power-on diagnostic. Wait until the keypad displays "rdy" before you power off or operate the servo drive.

Shenzhen Inovance Technology Co., Ltd.

Add.: Building E, Hongwei Industry Park, Liuxian Road, Baocheng No. 70 Zone, Bao'an District, Shenzhen Tel: +86-755-2979 9595 Fax: +86-755-2961 9897 Service Hotline: 400-777-1260 http://www.inovance.com

Suzhou Inovance Technology Co., Ltd.

Add.: No. 16 Youxiang Road, Yuexi Town, Wuzhong District, Suzhou 215104, P.R. China Tel: +86-512-6637 6666 Fax: +86-512-6285 6720 Service Hotline: 400-777-1260 http: //www.inovance.com



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