INOVANCE

SV660N Series Servo Drive
Communication Guide

Data code 19011435 A01

Preface

Overview

The SV660N series high-performance AC servo drive covers a power range from 50 W to 7.5 kW. It supports EtherCAT communication protocol and carries Ethernet communication interfaces to work with the host controller for a networked operation of multiple servo drives.

The SV660N series servo drive supports stiffness level setting, inertia auto-tuning and vibration suppression to simplify the operation process. It allows a quiet and stable operation together with an MS1 series high-response servo motor with low or medium inertia and a 23-bit single-turn or multi-turn absolute encoder.

The SV660N series servo drive aims to implement fast and accurate control in automation equipment such as semi-conductor manufacturing equipment, chip mounters, PCB punching machines, handling machineries, food processing machineries, machine tools, and transmission machineries.

This guide presents commissioning process, parameters, and solutions to faults and warnings, including the keypad, and software tool, and commissioning procedure.

More Documents

Name	Data Code
SV660N Series Servo Drive Selection Guide	19011431
SV660N Series Servo Drive Hardware Guide	19011432
SV660N Series Servo Drive Commissioning Guide	19011433
SV660N Series Servo Drive Function Guide	19011434

Revision History

Date of Revision	Version	Revision
October 2020	A00	First release
January 2021	A01	Minor corrections

Document Acquisition

This guide is not delivered along with the product. To download the PDF version, visit *http://en.inovance.cn/support/download.html*.

Table of Contents

Fundamental Safety Instructions

Safety Precautions

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

Safety Levels and Definitions

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

General Safety Instructions

- Drawings in the guide are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions.
- The drawings in the guide are shown for illustration only and may be different from the product you purchased.

Unpacking

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

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

Storage and Transportation

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

- Handle the equipment with care during transportation and mind your steps to prevent personal injuries or equipment damage.
- When carrying the equipment with bare hands, hold the equipment casing firmly with care to prevent parts from falling. Failure to comply may result in personal injuries.
- Store and transport the equipment based on the storage and transportation requirements. Failure to comply will result in equipment damage.
- Avoid storing or transporting the equipment in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing the equipment for more than three months. Long-term storage requires stricter protection and necessary inspections.
- Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
- Never transport the equipment with other equipment or materials that may harm or have negative impacts on this equipment.

Installation

- The equipment must be operated only by professionals with electrical knowledge.

WARNING

- Read through the guide and safety instructions before installation.
- Do not install this equipment in places with strong electric or magnetic fields.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in an electric shock.
- When installing the equipment in a closed environment (such as a cabinet or casing), use a cooling device (such as a fan or air conditioner) to cool the environment down to the required temperature. Failure to comply may result in equipment over-temperature or a fire.
- Do not retrofit the equipment.
- Do not fiddle with the bolts used to fix equipment components or the bolts marked in red.
- When the equipment is installed in a cabinet or final assembly, a fireproof enclosure providing both electrical and mechanical protections must be provided. The IP rating must meet IEC standards and local laws and regulations.
- Before installing devices with strong electromagnetic interference, such as a transformer, install a shielding device for the equipment to prevent malfunction.
- Install the equipment onto an incombustible object such as a metal. Keep the equipment away from combustible objects. Failure to comply will result in a fire.

CAUTION

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

Wiring

DANGER

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

WARNING

- Do not connect the input power supply to the output end of the equipment. Failure to comply will result in equipment damage or even a fire.
- When connecting a drive to the motor, check that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor rotation.
- Cables used for wiring must meet cross sectional area and shielding requirements. The shield of the cable must be reliably grounded at one end.
- Fix the terminal screws with the tightening torque specified in the user guide. Improper tightening torque may overheat or damage the connecting part, resulting in a fire.
- After wiring is done, check that all cables are connected properly and no screws, washers or exposed cables are left inside the equipment. Failure to comply may result in an electric shock or equipment damage.

CAUTION

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

Power-on

DANGER

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

WARNING

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

Operation

DANGER

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

WARNING

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

Maintenance

DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Do not maintain the equipment with power ON. Failure to comply will result in an electric shock.
- Before maintenance, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
- In case of a permanent magnet motor, do not touch the motor terminals immediately after power-off because the motor terminals will generate induced voltage during rotation even after the equipment power supply is off. Failure to comply will result in an electric shock.

WARNING

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

Repair

DANGER

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

WARNING

- When the fuse is blown or the circuit breaker or earth leakage current breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply may result in death, personal injuries or equipment damage.
- When the equipment is faulty or damaged, the troubleshooting and repair work must be performed by professionals that follow the repair instructions, with repair records kept properly.
- Replace quick-wear parts of the equipment according to the replacement instructions.
- Do not use damaged equipment. Failure to comply may result in death, personal injuries, or severe equipment damage.
- After the equipment is replaced, check the wiring and set parameters again.

Disposal

WARNING

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

Safety Labels

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

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

1 Product Information

1.1 Nameplate and Model Number of the Servo Drive

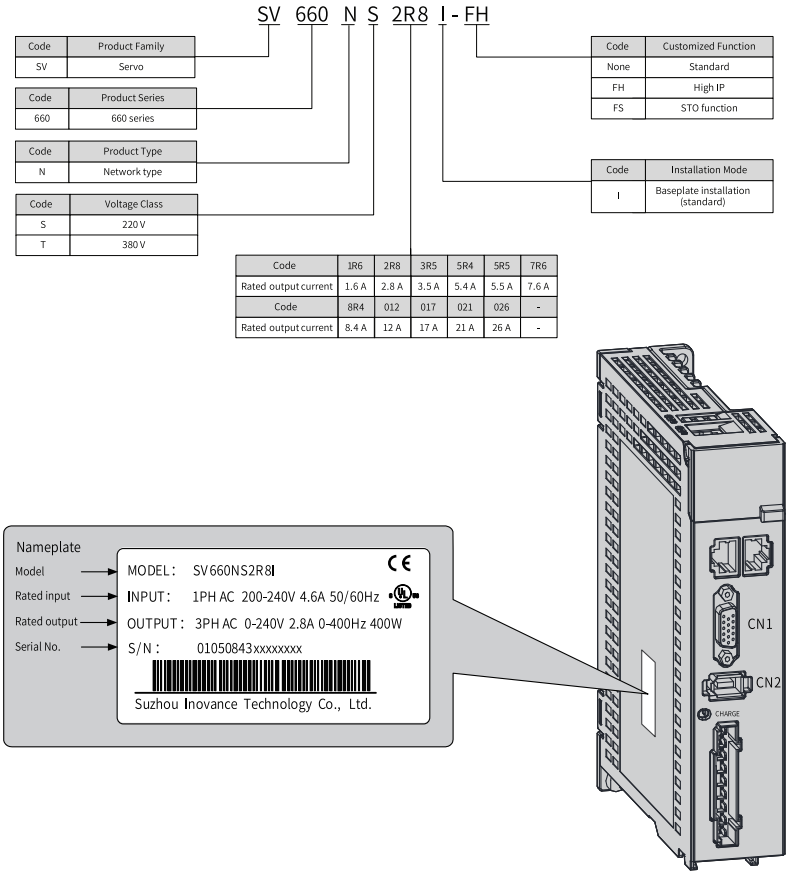
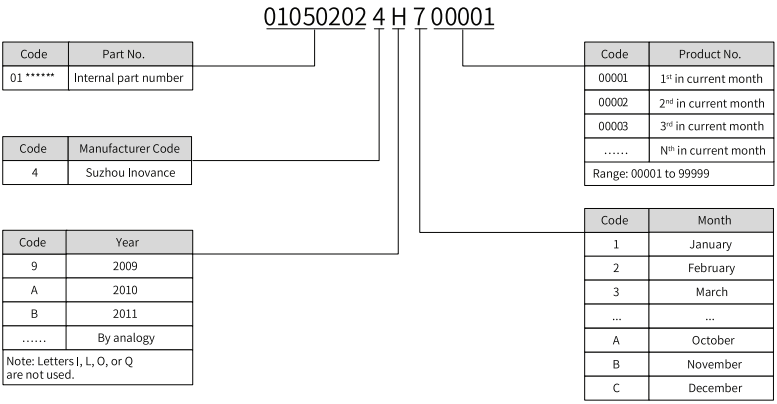


Figure 1-1 Nameplate and model number of the servo drive



Example: The serial number 010502024H700001 indicates the servo drive is manufatured in July 2017.

Figure 1-2 Encryption of the production serial number

1.2 Technical Data of EtherCAT Communication

Item		Specifications
Basic performance of EtherCAT slave	Communication protocol	EtherCAT protocol
	Available services	CoE (PDO, SDO)
	Synchronization mode	DC - Distributed clock
	Physical layer	100BASE-TX
	Baud rate	100 Mbit/s (100Base-TX)
	Duplex mode	Full duplex
	Topology	Ring and linear
	Transmission medium	Shielded cables of Cat 5e or higher
	Transmission distance	Less than 100 m between two nodes (with proper environment and cables)
	Number of slaves	Up to 65535 by protocol, not exceeding 100 in actual use
	EtherCAT frame length	44 bytes to 1498 bytes
	Process data	A maximum of 1486 bytes per Ethernet frame
	Synchronous jitter of two slaves	< 1 us
	Update time	About 30 μs for 1000 DI/DOs About 100 μs for 100 servo axes Define different update time for different interfaces.
	Communication code error rate	10^{-10} Ethernet standard
EtherCAT configuration unit	Number of FMMU units	8
	Number of storage synchronization management units	8
	Process data RAM	8 kB
	Distributed clock	64 bits
	EEPROM capacity	32 kbit

2 EtherCAT Communication

2.1 Wiring

2.1.1 Description of EtherCAT Communication Terminals (CN3 & CN4)

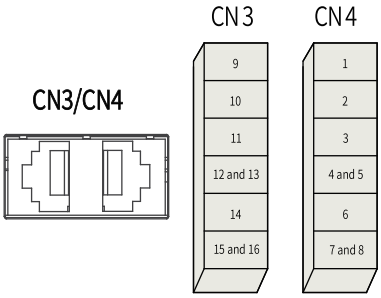


Table 2–1 EtherCAT communication terminal pins

Pin No.	Name	Description
1	TD+	Transmit data (+)
2	TD-	Transmit data (-)
3	RD+	Receive data (+)
4 and 5	-	-
6	RD-	Receive data (-)
7 and 8	-	-
9	TD+	Transmit data (+)
10	TD-	Transmit data (-)
11	RD+	Receive data (+)
12 and 13	-	-
14	RD-	Receive data (-)
15 and 16	-	-

2.1.2 Connection of EtherCAT Communication Signals (CN3 and CN4)

2.1.2.1

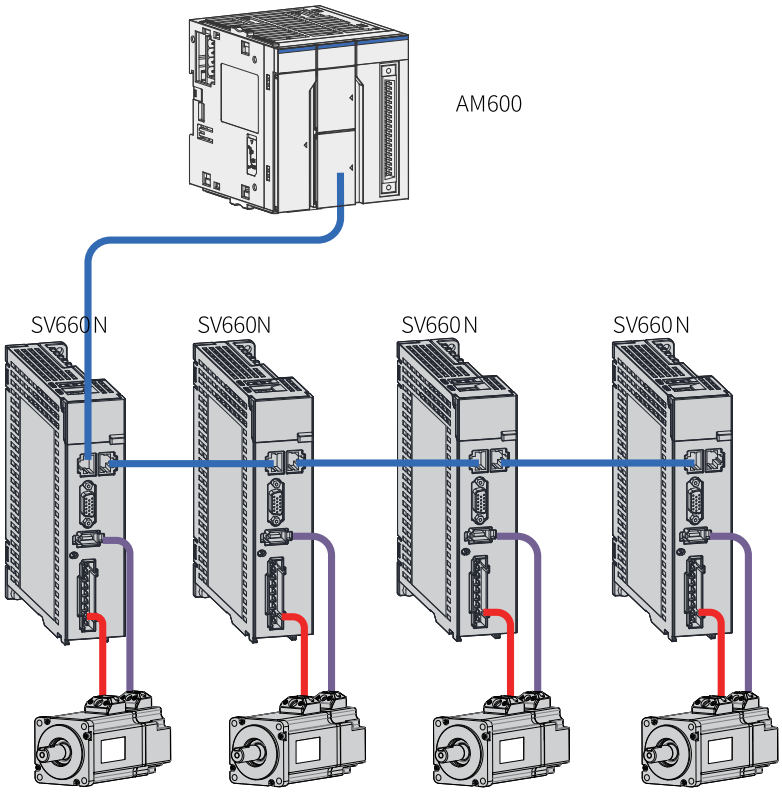


Figure 2-1 Network topology

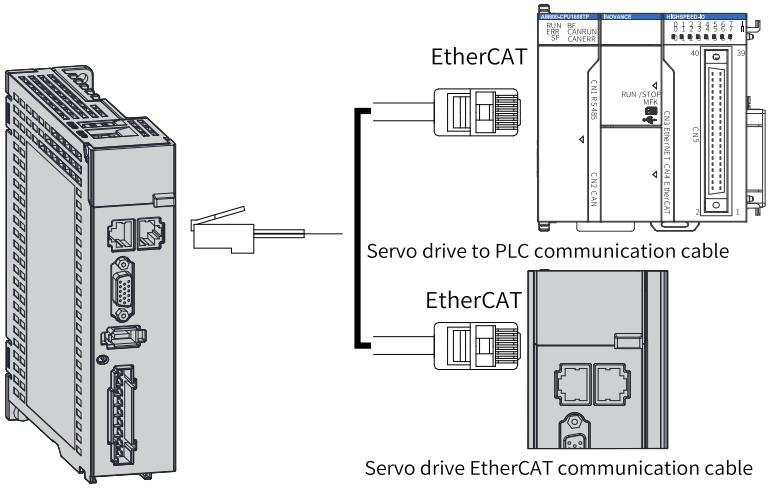


Figure 2-2 Wiring of communication cables

CN3 and CN4 are EtherCAT connectors. Connect CN3 (IN) to the communication port of the master and CN4 (OUT) to the next slave. For assignment of CN3/CN4 terminal pins, see *"2.1.1 Description of EtherCAT Communication Terminals (CN3 & CN4)" on page 13*.

Communication cable selection

Table 2–2 Instructions for communication cable selection

Cable Length	Price	Supplier
0.2 m to 10 m	See *"Table 2–3 Information for ordering the communication cable" on page 16*.	Inovance, Haituo and others
More than 10 m	The cable price is added by RMB 5 for every additional 1 m based on the price of S6-L-T04-10.0. The cable price is also related to the magnitude of the order.	

Note

Cable selection is subject to the instructions provided by the cable supplier.
See "Instructions for purchasing servo encoder cables/power cables" in Inovance business system.

Table 2–3 Information for ordering the communication cable

Material 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
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 are ordered from suppliers including Haituo (the cable price is added by RMB 5 for every additional 1 m based on the price of S6-L-T04-10.0. The cable price is also related to the magnitude of the order).

Note

The head of the dual-port network terminal cannot be too thick, otherwise, interference may occur. The recommended thickness is 2.4 mm, as shown below.

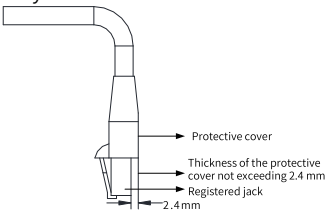


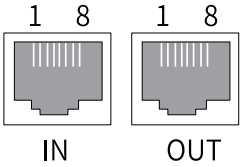
Table 2–4 Specifications

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

Basic features

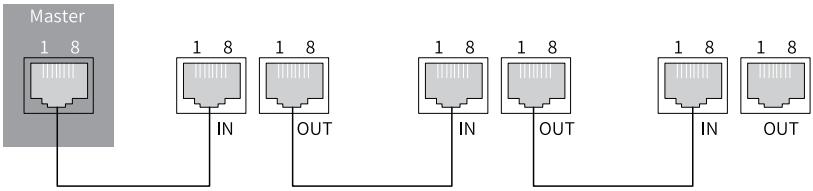
- Interfaces

EtherCAT cables are connected to the network ports (IN and OUT) equipped with metal shield. The electrical characteristics comply with standards IEEE 802.3 and ISO 8877.

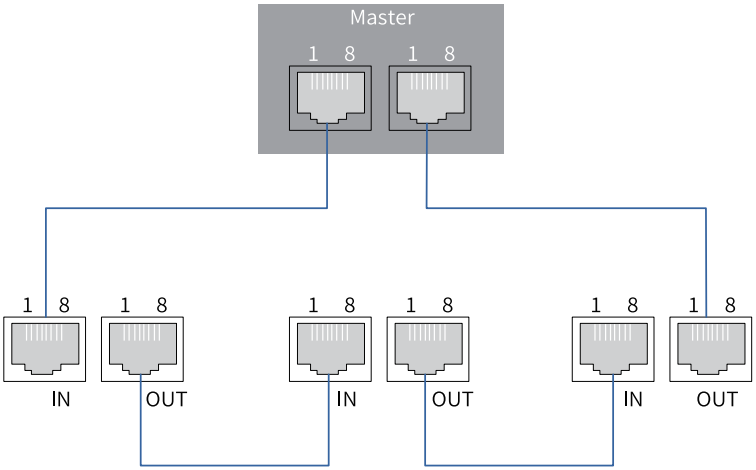


Pin	Assignment	Description
1	TX+	Transmit data (+)
2	TX-	Transmit data (-)
3	RX+	Receive data (+)
4	NULL	Not connected
5	NULL	Not connected
6	RX-	Receive data (-)
7	NULL	Not connected
8	NULL	Not connected

- Topology
  The communication topology of EtherCAT is flexible without any limit, as shown in the following figures. The SV660N series servo drive carries IN and OUT ports.
- Linear topology



- Redundancy ring topology



Note

When using the redundant ring, set H0E-36 (EtherCAT AL enhanced link) to 1 (Enable), then power on the servo drive again.

- Communication cable
  The EtherCAT communication cable must be Ethernet Category 5 (100BASE-TX) network cable or high-strength shielded network cable. The network cables used for the servo drive must also be shielded, with cable length not exceeding 100 m. The shielded network cable enhances the anti-interference capacity of the system.
- EMC standard
  The servo drive complies with the following standards: IEC 61800-3:2004/A1:2011 (Adjustable speed electrical power drive systems—part 3:EMC requirements and specific test methods) and GB/T12668.3.
- Introduction to CiA402 control

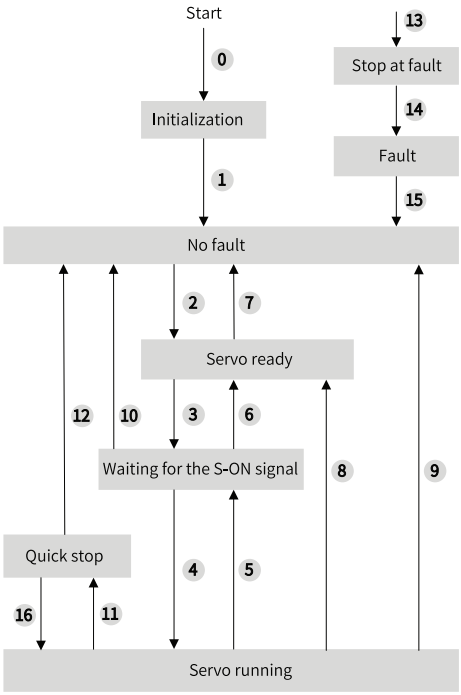


Figure 2-3 CiA402 state machine switchover

To make the servo drive run in the designated state, observe the process stipulated in the standard 402 protocol when operating the SV660N servo drive.

See the following table for descriptions of different status.

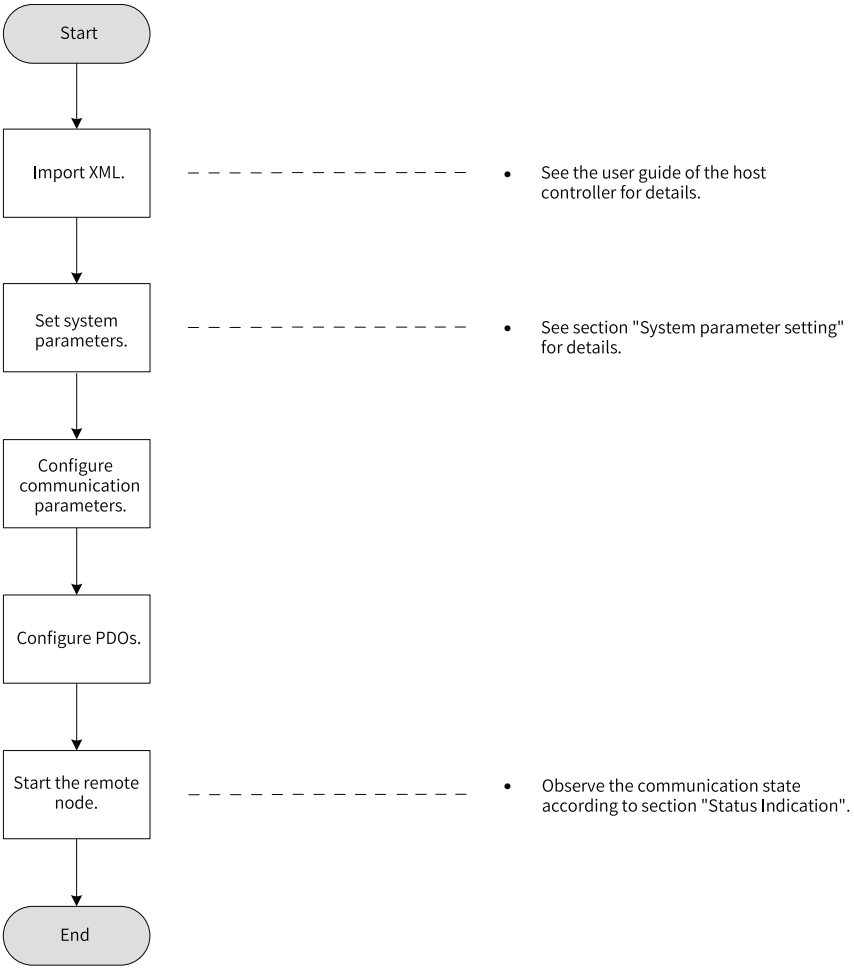
Status	Description
Initialization	Initialization of the servo drive and internal self-check are done. Parameters cannot be set. Drive functions cannot be executed.
No fault	No fault exists in the servo drive or the fault has been cleared. Parameters can be set.
Servo ready	The servo drive is ready to run. Parameters can be set.
Waiting for the S-ON signal	The servo drive is waiting for the S-ON signal. Parameters can be set.
Servo running	The servo drive is running properly and a certain operation mode is enabled. The motor is energized and starts rotating when the speed reference is not 0. Only parameters whose "Effective time" is "During running" can be set.

Status	Description
Quick stop	The quick stop function is activated and the servo drive is in the process of quick stop. Only parameters whose "Effective time" is "During running" can be set.
Stop at fault	A fault occurs and the servo drive is in the process of stop. Only parameters whose "Effective time" is "During running" can be set.
Fault	The process of stop-at-fault is done and all the drive functions are inhibited. Parameters can be edited for the convenience of troubleshooting.

2.2 Communication Configuration

2.2.1 Overview of EtherCAT Protocol

EtherCAT is an industrial Ethernet-based fieldbus system that features high performance, low cost, easy use and flexible topology. It is applicable to applications requiring ultra-high speed I/O network. EtherCAT adopts standard Ethernet physical layer with twisted pairs or optical fibers (100Base-TX or 100Base-FX) used as the transmission media.



An EtherCAT system includes the master and the slave. The master requires a common network adapter, and the slave requires a special slave control chip, such as ET1100, ET1200, and FPGA.

EtherCAT can process data at the I/O layer without sub-bus or gateway delay.

- One system covers all devices, including I/O devices, sensors, actuators, drives, and displays.
- Transmission rate: 2 x 100 Mbit/s (high-speed Ethernet, full duplex mode).
- Synchronization: synchronization jitter < 1 μs (number of nodes up to 300, cable length within 120 m)
- Update time:

256 DI/DOs: 11 μs

1000 DI/DOs distributed in 100 nodes: 30 μs = 0.03 ms

200 AI/AOs (16-bit): 50 μs, sampling rate: 20 kHz

100 servo axes (8 bytes IN + 8 bytes OUT for each): 100 μs = 0.1 ms

12000 DI/DOs: 350 μs

To support more types of devices and applications, EtherCAT establishes the following application protocols:

- CANopen over EtherCAT (CoE)
- Safety over EtherCAT (SoE, compliant with IEC 61800-7-204)
- Ethernet over EtherCAT (EoE)
- File over EtherCAT (FoE)

The slave only needs to support the most suitable application protocol.

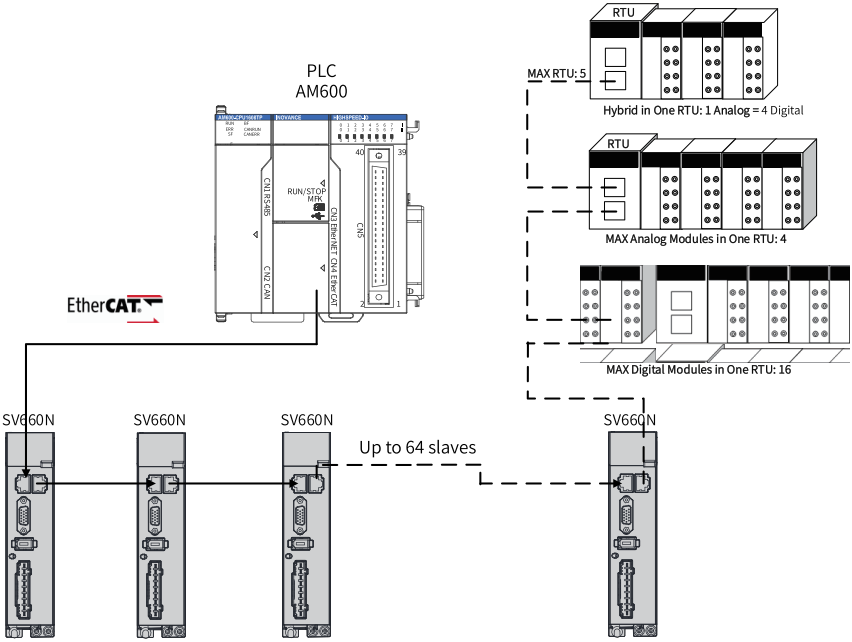


Figure 2-4 EtherCAT networking

Note

EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

2.2.2 System Parameter Setting

Parameter address structure

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

CiA402 establishes the following restrictions on the parameter address:

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

System parameter setting

Set related parameters to allow the SV660N servo drive to be connected to the EtherCAT fieldbus network.

Index	Sub-index	Name	Value Range	Default
2002	01h	Control mode	0: Speed control mode 1: Position control mode 2: Torque control mode 9: EtherCAT mode	9
200E	02h	Save objects written through communication to EEPROM	0: Neither parameters nor object dictionaries written through communication saved to EEPROM 1: Only parameters written through communication saved to EEPROM 2: Only object dictionaries written through communication saved to EEPROM 3: Both parameters and object dictionaries written through communication saved to EEPROM	3
200E	16	EtherCAT slave alias	0 to 65535	0

Note

Before saving parameters to EEPROM, set 200E-02h to a proper value. Otherwise, parameters will be restored to default values at next power-on.

2.2.3 Specifications of EtherCAT Communication

Item		Specifications
Communication protocol		IEC 61158 Type 12, IEC 61800-7 CiA 402 drive profile
Application layer	SDO	SDO request, SDO response
	PDO	Variable PDO mapping
	CiA402	Profile position mode (PP)
		Profile velocity mode (PV)
		Profile torque mode (PT)
		Homing mode (HM)
		Cyclic synchronous position mode (CSP)
		Cyclic synchronous velocity mode (CSV)
		Cyclic synchronous torque mode (CST)
Physical layer	Transmission protocol	100BASE-TX (IEEE802.3)
	Maximum distance	100 m
	Interface	RJ45 x 2 (INT, OUT)

2.2.4 Structure of EtherCAT Communication

Multiple kinds of application protocols are available for EtherCAT communication. The IEC 61800-7 (CiA 402)-CANopen motion control profile is used for SV660N series servo drives. The following figure shows the EtherCAT communication structure at CANopen application layer.

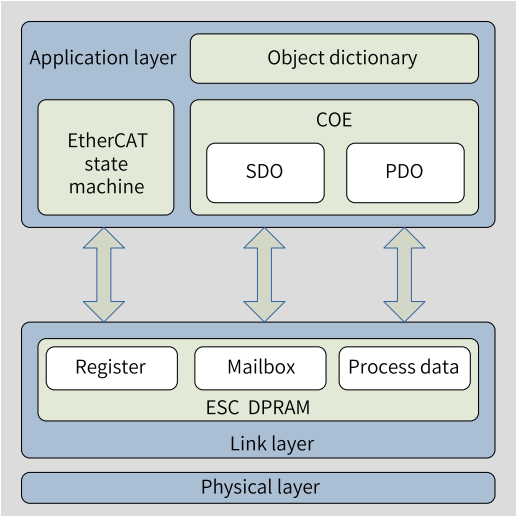


Figure 2-5 EtherCAT communication structure at CANopen application layer

The object dictionary in the application layer includes communication parameters, application program data and PDO mapping data. The process data object (PDO) includes the real-time data generated during operation, which is read and written cyclically. In the SDO mailbox communication, some communication objects and PDO objects are being accessed and edited non-cyclically.

2.2.5 Communication State Machine

The following figure shows the status transition diagram of EtherCAT state machine.

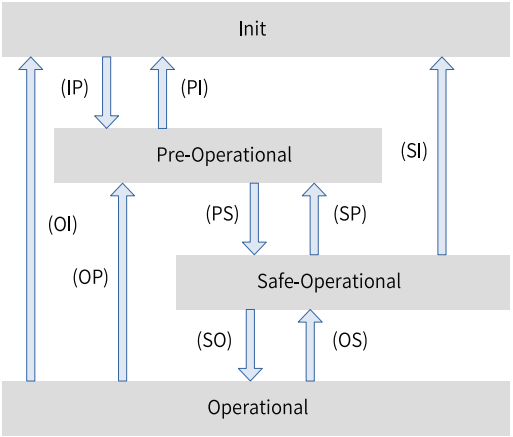


Figure 2-6 EtherCAT state machine

The EtherCAT state machine must support the following four states and coordinate the states between the master and slave application program during initialization and operation.

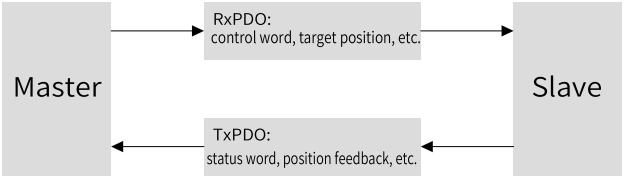
- These four states are Init (I), Pre-Operational (P), Safe-Operational (S), and Operational (O).

Transition from "Init" to "Operational" must be in the sequence of "Init → Pre-Operational → Safe-Operational → Operational". Transition from "Operational" to "Init" can be done with certain states skipped. The following table lists the state transition and the initialization process.

State	SDO	RPDO	TPDO	Description
Init (I)	No	No	No	Communication initialization; No communication in the application layer, EtherCAT slave controller (ESC) register can only be read/written by the master
IP	No	No	No	Slave address configured by the master; Mailbox channel configured; Distributed clock (DC) configured; Request for Pre-Operational state
Pre-Operational (P)	Yes	No	No	Mailbox data communication in the application layer (SDO)
PS	Yes	No	No	SDO initialization process data mapping used by the master; Sync Manager channel used during process data communication configured by the master; FMMU configured by the master; Request for Safe-Operational state
Safe-Operational (S)	Yes	No	Yes	SDO, TPDO, and distributed clock mode available
SO	Yes	No	Yes	Valid output data sent by the master; Request for Safe-Operational state
Operational (O)	Yes	Yes	Yes	Normal operational state; Both the input and output valid ; Mailbox communication still available

2.2.6 Process Data

The real-time data transmission of EtherCAT is achieved through PDO. PDOs can be divided into RPDOs (Receive PDO) and TPDOs (Transmit PDO) based on the data transmission direction. RPDOs transmit the master data to the slave, and TPDOs returns the slave data to the master.



The SV660N series servo drive allows users to assign the PDO list and define the PDO mapping objects.

PDO mapping

PDO mapping is used to establish the mapping relation between the object dictionary and the PDO. 1600h...17FFh are RPDOs, and 1A00h... 1BFFh are TPDOs. The SV660N series servo drive provides six RPDOs and five TPDOs, as listed in the following table.

RPDO (6)	1600h	Variable mapping
	1701h... 1705h	Fixed mapping
TPDO (5)	1A00h	Variable mapping
	1B01h... 0x1B04h	Fixed mapping

Fixed PDO mapping

SV660N provides five fixed RPDOs and four fixed TPDOs.

The following table lists the typical instances of RPDOs and TPDOs.

Control Mode	PP/CSP
1701h (Outputs)	Mapping objects (4 mapping objects, 12 bytes)
	6040h (Control word) 607Ah (Target position) 60B8h (Touch probe function) 60FEh sub-index 1 (Physical outputs)
1B01h (Inputs)	Mapping objects (9 mapping objects, 28 bytes)
	603Fh (Error code) 6041h (Status word) 6064h (Position actual value) 6077h (Torque actual value) 60F4 (Following error actual value) 60B9 (Touch probe status) 60BA (Touch probe 1 positive edge) 60BC (Touch probe 2 positive edge) 60FD (Digital inputs)

Control Mode	PP/PV/PT/CSP/CSV/CST
1702h (Outputs)	Mapping objects (7 mapping objects, 19 bytes)
	6040h (Control word) 607Ah (Target position) 60FFh (Target velocity) 6071h (Target torque) 6060h (Modes of operation) 60B8h (Touch probe function) 607Fh (Max. profile velocity)
1B02h (Inputs)	Mapping objects (9 mapping objects, 25 bytes)
	603Fh (Error code) 6041h (Status word) 6064h (Position actual value) 6077h (Torque actual value) 6061h (Modes of operation display) 60B9 (Touch probe status) 60BA (Touch probe 1 positive edge) 60BC (Touch probe 2 positive edge) 60FD (Digital inputs)

Control Mode	PP/PV/CSP/CSV
1703h (Outputs)	Mapping objects (7 mapping objects, 17 bytes)
	6040h (Control word) 607Ah (Target position) 60FFh (Target velocity) 6060h (Modes of operation) 60B8h (Touch probe function) 60E0h (Positive torque limit value) 60E1h (Negative torque limit value)
1B03h (Inputs)	Mapping objects (10 mapping objects, 29 bytes)
	603Fh (Error code) 6041h (Status word) 6064h (Position actual value) 6077h (Torque actual value) 60F4 (Following error actual value) 6061h (Modes of operation display) 60B9 (Touch probe status) 60BA (Touch probe 1 positive edge) 60BC (Touch probe 2 positive edge) 60FD (Digital inputs)

Control Mode	PP/PV/PT/CSP/CSV/CST
1704h (Outputs)	Mapping objects (9 mapping objects, 23 bytes)
	6040h (Control word) 607Ah (Target position) 60FFh (Target velocity) 6071h (Target torque) 6060h (Modes of operation) 60B8h (Touch probe function) 607Fh (Max. profile velocity) 60E0h (Positive torque limit value) 60E1h (Negative torque limit value)
1B02h (Inputs)	Mapping objects (9 mapping objects, 25 bytes)
	603Fh (Error code) 6041h (Status word) 6064h (Position actual value) 6077h (Torque actual value) 6061h (Modes of operation display) 60B9 (Touch probe status) 60BA (Touch probe 1 positive edge) 60BC (Touch probe 2 positive edge) 60FD (Digital inputs)

Control Mode	PP/PV/CSP/CSV
1705h (Outputs)	Mapping objects (8 mapping objects, 19 bytes)
	6040h (Control word) 607Ah (Target position) 60FFh (Target velocity) 6060h (Modes of operation) 60B8h (Touch probe function) 60E0h (Positive torque limit value) 60E1h (Negative torque limit value) 60B2h (Torque offset)
1B04h (Inputs)	Mapping objects (10 mapping objects, 29 bytes)
	603Fh (Error code) 6041h (Status word) 6064h (Position actual value) 6077h (Torque actual value) 6061h (Modes of operation display) 60F4 (Following error actual value) 60B9 (Touch probe status) 60BA (Touch probe 1 positive edge) 60BC (Touch probe 2 positive edge) 606C (Velocity actual value)

Variable PDO mapping

SV660N provides one variable RPDO and one variable TPDO.

Variable PDO	Index	Max. Number of Mapping Objects	Max. Length of the Byte	Default Mapping Object
RPDO1	1600h	10	40	6040h (Control word) 607Ah (Target position) 60B8 (Touch probe function)
TPDO1	1A00h	10	40	603F (Error code) 6041h (Status word) 6064h (Position actual value) 60BC (Touch probe 2 positive edge) 60B9 (Touch probe status) 60BA (Touch probe 1 positive edge) 60FD (Digital inputs)

Sync Manager PDO assignment

The process data can contain multiple PDO mapping data objects during cyclic EtherCAT data communication. The CoE protocol defines the PDO mapping object list of the Sync Manager using data objects 0x1C10 to 0x1C2F. Multiple PDOs can be mapped to different sub-indexes. The SV660N series servo drive supports assignment of one RPDO and one TPDO, as described in the following table.

Index	Sub-index	Description
0x1C12	01h	One of 0x1600 and 0x1701...0x1705 selected as the RPDO to be used
0x1C13	01h	One of 0x1A00 and 0x1B01...0x1B04 selected as the TPDO to be used

PDO configuration

PDO mapping parameters contain indicators of the process data for PDOs, including the index, sub-index and mapping object length. The sub-index 0 indicates the number (N) of mapping objects in the PDO, and the maximum length of each PDO is 4 x N bytes. One or multiple objects can be mapped simultaneously. Sub-indexes 1 to N indicate the mapping content, as defined below:

Bit	31	...	16	15	...	8	7	...	0
Meaning	Index			Sub-index			Object length		

The index and sub-index together define the position of an object in the object dictionary. The object length indicates the bit length of the object in hexadecimal, as shown below:

Object Length	Bit Length
08h	8 bits
10h	16 bits
20h	32 bits

For example, the mapping parameter of the 16-bit control word 6040h-00 is 60400010h.

- Observe the following procedure for PDO mapping:

  1. Configure the mapping group of PDO.

     a. Clear the original mapping group. Write 0 to sub-index 00h of 1C12h (or 1C13h) to clear the original mapping group.
     b. Write the PDO mapping group. Write the mapping group according to application needs. Pre-write the values of 1600h/1701h...1705h to 1C12h and the values of 1A00h/1B01h...1B04h to 1C13h. Note: Only 1600h and 1A00h are configurable mapping groups.
     c. Write the number of the mapping objects in the PDO mapping group to sub-index 0 of 1C12h (or 0x1C13h).

  2. Configure the mapping objects of PDO.

     a. Clear the original mapping objects. Write 0 to sub-index 00h of 1600h (or 1A00h) to clear the original mapping objects.
     b. Write the PDO mapping content. Write the mapping content to sub-index 1...10 of the mapping parameter based on object parameter definitions in the XML file. Only mappable objects can be configured as PDO mapping content.
     c. Write the total number of mapping objects. Write the number of mapping objects in step b to sub-index 0.

Note

- Configure the PDO only when the EtherCAT state machine is in Pre-operation state ("2" displayed on the keypad). Otherwise, an error will be reported.
- Do not save the PDO configuration parameters to EEPROM. Configure the mapping objects again each time upon power-on. Otherwise, the mapping objects are the default parameters of the servo drive.

An SDO fault code will be returned during the following operations:

- Modify PDO parameters in status other than pre-operational.
- Write a value outside the range of 1600/1701...1705 to 1C12h. Write a value outside the range of 1A00/1B01...1B04 to 1C13h.

2.2.7 Service Data Object (SDO)

The EtherCAT SDO is used to transfer non-cyclic data, such as communication parameter configuration and servo drive parameter configuration. The CoE service types of EtherCAT include:

- Emergency message

- SDO request
- SDO response
- TxPDO
- RxPDO
- Remote TxPDO transmission request
- Remote RxPDO transmission request
- SDO message

The SV660N supports SDO request and SDO response.

2.2.8 Distributed Clock (DC)

The DC enables all EtherCAT devices to use the same system time and allows synchronous execution of slave tasks. A slave can generate synchronous signals according to the synchronized system time. The SV660N series servo drive supports the DC synchronization mode only. The synchronization cycle is determined by SYNC0. The cycle range varies with the operation mode.

Note

- The SYNC signal can be used to synchronize all the salves with an error less than 1 μs. The master must synchronize all the slaves to the same clock and continues doing so during operation to prevent clock skew caused by difference in the crystal oscillator. This is usually done by synchronizing the 0x910 register in ESC.
- SYNC starting time = 0x990 register (with ESC) - 0x920
  Note that the DC mode (0x981 = 0x03) can be enabled only after 0x910 reaches the starting time. If the starting time of SYNC is set improperly, the 0x134 status register of ESC will report the error code of 0x2D.

2.2.9 Status Indication

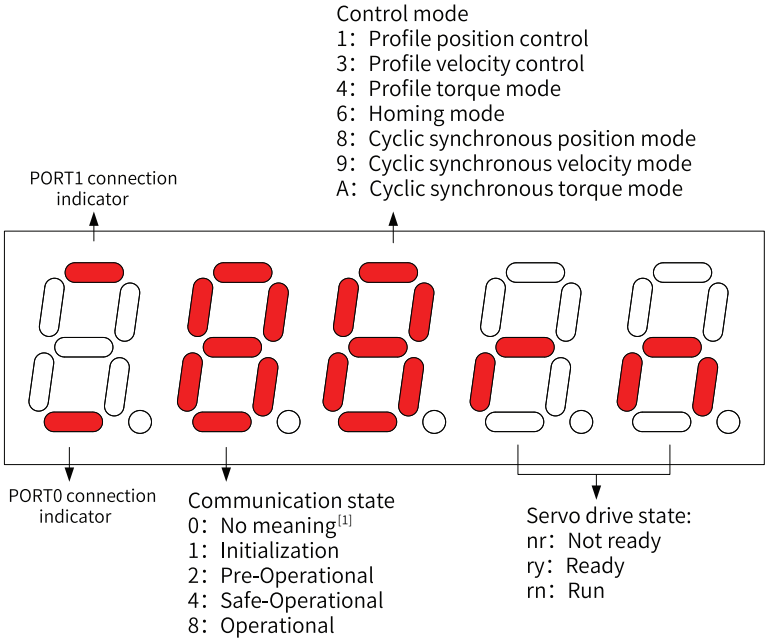


Figure 2-7 Status indication

If the value 0 is displayed, it indicates no value is written or the value 0 is written to 0x6060h, or H02-00 is set to 0, 1, and 2.

Communication connection

The connection status of the two RJ45 ports are indicated by "-" on the upper and lower part of the first LED on the keypad. The upper "-" indicates the status of PORT1, and the lower "-" indicates the status of PORT0.

Solid OFF: No communication connection is detected in the physical layer.

Solid ON: Communication connection is detected in the physical layer.

Communication status

The 2nd LED indicates the status of the EtherCAT state machine of the slave in the form of characters, as described in the following table.

State of EtherCAT state machine

State	SDO	RPDO	TPDO	Description	Display
Initialization	No	No	No	Communication initialization	1: Solid ON
Pre-operational	Yes	No	No	Network configuration initialized SDO available	2: LED blinking at an interval of 400 ms
Safe-operational	Yes	No	Yes	SDO, TPDO, and distributed clock mode available	4: LED blinking at an interval of 1200 ms (ON for 200 ms and OFF for 1000 ms)
Operational	Yes	Yes	Yes	Normal operational state	8: Solid ON

Display of operation modes

The 3rd LED indicates the operation mode of the servo drive in hexadecimal without blinking, as described in the following table.

Modes of operation (6060h)	Display
1: Profile position mode	1
3: Profile velocity mode	3
4: Profile torque mode	4
6: Homing mode	6
8: Cyclic synchronous position mode	8
9: Cyclic synchronous velocity mode	9
10: Cyclic synchronous torque mode	A

Display of servo status

The 4th and 5th LEDs indicate the status of the slave (servo drive) in the form of characters, as described in the following table.

State	Description	Display
Reset	Initialization	reset
Not ready	Initialization is done. The control circuit is switched on but the main circuit is not switched on. (Not ready)	nr

State	Description	Display
Ready	The main circuit is switched on, but the S-ON signal is inactive. (Ready)	ry The character "y" blinks when the motor speed is not 0 RPM. When the communication layer is in the pre-operational or safe-operational state, the blinking frequency is the same as that of characters "2" or "4" (see "Communication status" in the previous page for details). When the communication layer is in Init or Operational state, the blinking frequency is 2 Hz.
Run	The S-ON signal is active and the motor is energized. (Run)	rn The letter "n" blinks when the motor speed is not 0 RPM. When the communication layer is in the pre-operational or safe-operational state, the blinking frequency is the same as that of characters "2" or "4" (see "Communication status" in the previous page for details). When the communication layer is in Init or Operational state, the blinking frequency is 2 Hz.

2.3 Troubleshooting

2.3.1 List of Fault and Warning Codes

List of fault codes

Fault Code	Display	Fault Name	Fault Type	Resettable	Fault Range	Error Code (603Fh)	Aux. Code (203Fh)
E101	E101.0	System parameter error	No. 1	No	Servo drive fault	0x6320	0x01010101
	E101.1	Parameter error in group 2000h/2001h	No. 1	No	Servo drive fault	0x6320	0x11010101
	E101.2	Address error in read/write after total number of parameters changes	No. 1	No	Servo drive fault	0x6320	0x21010101
E102	E102.0	Logic configuration fault	No. 1	No	Servo drive fault	0x7500	0x01020102
	E102.8	Software version mismatch	No. 1	No	Servo drive fault	0x7500	0x81020102

Fault Code	Display	Fault Name	Fault Type	Resettable	Fault Range	Error Code (603Fh)	Aux. Code (203Fh)
E104	E104.1	MCU operation timeout	No. 1	No	Servo drive fault	0x7500	0x11040104
	E104.2	Current loop operation timeout	No. 1	No	Servo drive fault	0x7500	0x21040104
	E104.4	Command update timeout	No. 1	No	Servo drive fault	0x7500	0x41040104
E108	E108.0	Parameter write error	No. 2	Yes	Servo drive fault	0x5530	0x01080108
	E108.1	Parameter read error	No. 2	Yes	Servo drive fault	0x5530	0x11080108
	E108.2	Invalid check on data written in EEPROM	No. 2	Yes	Servo drive fault	0x5530	0x21080108
	E108.3	Invalid check on data read in EEPROM	No. 2	Yes	Servo drive fault	0x5530	0x31080108
E120	E120.0	Unknown encoder type	No. 1	No	Axis fault	0x7122	0x01200120
	E120.1	Unknown motor model	No. 1	No	Axis fault	0x7122	0x11200120
	E120.2	Unknown drive model	No. 1	No	Axis fault	0x7122	0x21200120
	E120.5	Motor and drive current mismatch	No. 1	No	Axis fault	0x7122	0x51200120
	E120.6	FPGA and motor model mismatch	No. 1	No	Axis fault	0x7122	0x61200120
E122	E122.0	Multi-turn absolute encoder setting error	No. 2	Yes	Axis fault	0x6320	0x01220122
	E122.1	Different DIs assigned with the same function	No. 2	Yes	Axis fault	0x6320	0x11220122
	E122.2	Different DOs assigned with the same function	No. 2	Yes	Servo drive fault	0x6320	0x21220122
	E122.3	Upper limit in the rotation mode invalid	No. 2	Yes	Axis fault	0x6320	0x31220122
E136	E136.0	Encoder parameter error	No. 1	No	Axis fault	0x7305	0x01360136
	E136.1	Encoder communication error	No. 1	No	Axis fault	0x7305	0x11360136
E140	E140.0	Encryption chip check fault	No. 1	No	Servo drive fault	0x0140	0x01400140
	E140.1	Encryption chip check failure	No. 1	No	Servo drive fault	-	-

Fault Code	Display	Fault Name	Fault Type	Resettable	Fault Range	Error Code (603Fh)	Aux. Code (203Fh)
E150	E150.0	STO signal input protection	No. 1	Yes	Servo drive fault	0x0150	0x01500150
	E150.1	STO signal input error	No. 1	Yes	Servo drive fault	0x0150	0x11500150
	E150.2	Buffer 5 V supply voltage error	No. 1	Yes	Servo drive fault	0x0150	0x21500150
	E150.3	STO upstream optocoupler detection failure	No. 1	Yes	Servo drive fault	0x0150	0x31500150
	E150.4	PWM Buffer detection failure	No. 1	Yes	Servo drive fault	0x0150	0x41500150
E201	E201.0	Phase-P overcurrent	No. 1	No	Servo drive fault	0x2312	0x02010201
	E201.1	Phase-U overcurrent	No. 1	No	Axis fault	0x2312	0x12010201
	E201.2	Phase-V overcurrent	No. 1	No	Axis fault	0x2312	0x22010201
	E201.4	Phase-N overcurrent	No. 1	No	Servo drive fault	0x2312	0x42010201
E208	E208.0	MCU position reference updated frequently	No. 1	Yes	Axis fault	0x0208	0x02080208
	E208.2	Encoder communication timeout	No. 1	Yes	Axis fault	0x0208	0x22080208
	E208.3	Current sampling fault	No. 1	Yes	Axis fault	0x0208	0x32080208
	E208.4	FPGA current loop operation timeout	No. 1	Yes	Axis fault	0x0208	0x42080208
E210	E210.0	Output short-circuited to ground	No. 1	No	Axis fault	0x2330	0x02100210
E234	E234.0	Runaway protection	No. 1	No	Axis fault	0x0234	0x02340234
E400	E400.0	Main circuit overvoltage	No. 1	Yes	Servo drive fault	0x3210	0x04000400
E410	E410.0	Main circuit undervoltage	No. 1	Yes	Servo drive fault	0x3220	0x04100410
E420	E420.0	Phase loss	No. 2	Yes	Servo drive fault	0x3130	0x04200420
E430	E430.0	Control power supply undervoltage	No. 2	Yes	Servo drive fault	0x3120	0x04300430
E500	E500.0	Motor overspeed	No. 1	Yes	Axis fault	0x8400	0x05000500
	E500.1	Speed feedback overflow	No. 1	Yes	Axis fault	0x8400	0x15000500
	E500.2	FPGA position feedback pulse overspeed	No. 1	Yes	Axis fault	-	0x25000500

Fault Code	Display	Fault Name	Fault Type	Resettable	Fault Range	Error Code (603Fh)	Aux. Code (203Fh)
E602	E602.0	Angle auto-tuning error	No. 1	Yes	Axis fault	0x0602	0x06020602
	E602.2	Wrong U/V/W phase sequence detected in angle auto-tuning	No. 1	Yes	Axis fault	0x0602	0x26020602
E605	E605.0	Motor speed upon S-ON too high	No. 1	Yes	Axis fault	0x8400	0x06050605
E620	E620.0	Motor overload	No. 1	Yes	Axis fault	0x3230	0x06200620
E630	E630.0	Motor stalled	No. 1	Yes	Axis fault	0x7121	0x06300630
E640	E640.0	IGBT over-temperature	No. 1	Yes	Axis fault	0x4210	0x06400640
	E640.1	Flywheel diode over-temperature	No. 1	Yes	Axis fault	-	0x06050605
E650	E650.0	Heatsink over-temperature	No. 1	Yes	Axis fault	0x4210	0x06500650
E660	E660.0	Air-cooled motor over-temperature	No. 1	Yes	Axis fault	0x4210	0x06600660
E661	E661.0	Auto-tuned gains too low	No. 2	Yes	Axis fault	0x4210	0x06610661
E731	E731.0	Encoder battery failure	No. 2	Yes	Axis fault	0x0661	0x07310731
E733	E733.0	Encoder multi-turn counting error	No. 2	Yes	Axis fault	0x7305	0x07330733
E735	E735.0	Encoder multi-turn counting overflow	No. 2	Yes	Axis fault	0x7305	0x07350735
E740	E740.2	Absolute encoder error	No. 1	No	Axis fault	0x7305	0x27400740
	E740.3	Absolute encoder single-turn calculation error	No. 1	No	Axis fault	0x7305	0x37400740
	E740.6	Encoder write error	No. 1	No	Axis fault	0x7305	0x67400740
E755	E755.0	Nikon encoder communication fault	No. 1	No	Axis fault	-	0x07550755
E765	E765.0	Nikon encoder out of limit	No. 1	No	Axis fault	-	0x07650765
E760	E760.0	Encoder over-temperature	No. 2	Yes	Axis fault	0x4210	0x07600760
EA33	EA33.0	Encoder read/write check error	No. 1	No	Axis fault	0x7305	0x0A330A33
EB00	EB00.0	Position deviation too large	No. 2	Yes	Axis fault	0x8611	0x0B000B00
	EB00.1	Position deviation overflow	No. 2	Yes	Axis fault	0x8611	0x1B000B00

Fault Code	Display	Fault Name	Fault Type	Resettable	Fault Range	Error Code (603Fh)	Aux. Code (203Fh)
EB01	EB01.1	Individual position reference increment too large	No. 2	Yes	Axis fault	0x6320	0x1B010B01
	EB01.2	Position reference increment too large continuously	No. 2	Yes	Axis fault	0x6320	0x2B010B01
	EB01.3	Command overflow	No. 2	Yes	Axis fault	0x6320	0x3B010B01
	EB01.4	Target position beyond upper/lower limit	No. 2	Yes	Axis fault	0x6320	0x4B010B01
EE08	EE08.0	Synchronization (SYNC) signal loss	No. 2	Yes	Axis fault	0x0FFF	0x0E080E08
	EE08.1	Status switchover error	No. 2	Yes	Axis fault	0x0FFF	0x1E080E08
	EE08.2	IRQ loss	No. 2	Yes	Axis fault	0x0FFF	0x2E080E08
	EE08.3	Network cable connected improperly	No. 2	Yes	Axis fault	0x0FFF	0x3E080E08
	EE08.4	Data frame loss protection error	No. 2	Yes	Axis fault	0x0FFF	0x4E080E08
	EE08.5	Data frame transfer error	No. 2	Yes	Axis fault	0x0FFF	0x5E080E08
	EE08.6	Data update timeout	No. 2	Yes	Axis fault	0x0FFF	0x6E080E08
EE09	EE09.0	Software position limit setting error	No. 2	Yes	Axis fault	0x6320	0x0E090E09
	EE09.1	Home setting error	No. 2	Yes	Axis fault	0x6320	0x1E090E09
	EE09.2	Gear ratio beyond the limit	No. 2	Yes	Axis fault	0x6320	0x2E090E09
	EE09.3	No synchronization signal	No. 2	Yes	Axis fault	0x6320	0x3E090E09
	EE09.5	PDO mapping beyond the limit	No. 2	Yes	Axis fault	0x6320	0x5E090E09
EE11	EE11.0	ESI check error	No. 2	Yes	Servo drive fault	0x5530	0x0E110E11
	EE11.1	EEPROM read error	No. 2	Yes	Servo drive fault	0x5530	0x1E110E11
	EE11.2	EEPROM update failure	No. 2	Yes	Servo drive fault	0x5530	0x2E110E11
EE12	EE12.0	EtherCAT external device error	No. 1	No	Servo drive fault	0x0E12	0x0E120E12
EE13	EE13.0	Synchronization cycle setting error	No. 2	Yes	Servo drive fault	0x6320	0x0E130E13
EE15	EE15.0	Synchronization cycle error too large	No. 2	Yes	Servo drive fault	0x0E15	0x0E150E15

List of warning codes

Warning Code	Display	Name	Fault Type	Resettable	Fault Range	Error Code (603Fh)	Aux. Code (203Fh)
E121	E121.0	S-ON command invalid	No. 3	Yes	Warning	0x0121	0x01210121
E600	E600.0	Inertia auto-tuning failure	No. 3	Yes	Warning	0x0600	0x06000600
E601	E601.0	Homing warning	No. 3	Yes	Warning	0x0601	0x06010601
	E601.1	Homing switch error	No. 3	Yes	Warning	0x0601	0x16010601
	E601.2	Homing method setting error	No. 3	Yes	Warning	0x6320	0x2601E602
E730	E730.0	Encoder battery warning	No. 3	Yes	Warning	0x7305	0x07300730
E900	E900.0	Emergency stop	No. 3	Yes	Warning	0x0900	0x09000900
E902	E902.0	DI setting invalid	No. 3	Yes	Warning	0x6320	0x09020902
	E902.1	DO setting invalid	No. 3	Yes	Warning	0x0902	0x19020902
	E902.2	Invalid setting for torque reach	No. 3	Yes	Warning	0x0902	0x29020902
E908	E908.0	Model identification failure	No. 3	Yes	Warning	0x0908	0x09080908
E909	E909.0	Motor overload	No. 3	Yes	Warning	0x3230	0x09090909
E920	E920.0	Regenerative resistor overload	No. 3	Yes	Warning	0x3210	0x09200920
E922	E922.0	Resistance of external regenerative resistor too small	No. 3	Yes	Warning	0x6320	0x09220922
E924	E924.0	Regenerative transistor over-temperature	No. 3	Yes	Warning	0x3230	0x09240924
E941	E941.0	Parameter modifications activated at next power-on	No. 3	Yes	Warning	0x6320	0x09410941
E942	E942.0	Parameters saved frequently	No. 3	Yes	Warning	0x7600	0x09420942
E950	E950.0	Forward overtravel	No. 3	Yes	Warning	0x5443	0x09500950
E952	E952.0	Reverse overtravel	No. 3	Yes	Warning	0x5444	0x09520952
EA41	EA41.0	Torque fluctuation compensation failure	No. 3	Yes	Warning	0x0A41	0x0A410A41
E902	E902.3	Homing method setting error	No. 3	Yes	Warning	0x6320	0x4E090E09

2.3.2 Solutions to Communication Faults

This section describes solutions to communication faults. For solutions to the servo drive faults, see the preceding sections.

- EE08.0: Synchronization (SYNC) signal loss
  Cause:

  The SYNC signal is turned off when the EtherCAT network is in the OP state.

Cause	Confirming Method	Solution
The SYNC signal is not generated due to hardware errors.	Check whether the SYNC signal cycle is 0 using the oscilloscope in the software tool.	Replace the servo drive. Contact Inovance for maintenance.

- EE08.1: Network status switchover error
  Cause:

  When the servo drive is enabled, the EtherCAT network status switches from OP to other status.

Cause	Confirming Method	Solution
This fault is caused by mal-operation of the master or the operator.	Check whether the master switches the network status when the servo drive is enabled.	Check the network status switchover program of the host controller.

- EE08.2: IRQ loss
  Cause:
  - For servo drives with H01-00 (MCU software version) = 902.0 or earlier, causes for IRQ loss include all the causes for EE08.0...EE08.6 without differentiation.
  - For servo drives with H01-00 (MCU software version) = 902.1 or later, causes for IRQ loss are further differentiated and categorized into different faults, which means EE08.2 will no longer be reported.
- EE08.3: Network cable connected improperly
  Cause:

  The network cable of the servo drive is connected improperly. (The low 16 bits of H0E-29 represent the number of IN port loss events. The high 16 bits of H0E-29 represent the number of OUT port loss events.)

Cause	Confirming Method	Solution
The physical connection of the data link is unstable or the process data is lost due to plug-in/ plug-out of the network cable.	Check: 1) whether the network cable of the servo drive is connected securely. 2) whether strong vibration occurs on site. 3) whether the network cable is plugged in or out. 4) whether the network cable provided by Inovance is used.	Check the connection of the network port through the value change of H0E-29. Replace with a new network cable.

- EE08.4 Data frame loss protection error
  Cause:

  The PDO data is corrupted due to EMC interference or inferior network cable.

Cause	Confirming Method	Solution
The data is lost due to EMC interference, poor quality of the network cable or improper connection.	Check whether the high 16 bits of H0E-25 have values that are increased.	• Check whether the servo drive is grounded properly and rectify the EMC problem. • Check whether the network cable used is the one designated by Inovance. • Check whether the network cable is connected properly.

- EE08.5: Data frame transfer error
  Cause:

  As error data frames are generated from the upstream slave, the downstream slave receives invalid data frames.

Cause	Confirming Method	Solution
The upstream slave detects that the data frame has been corrupted and marked, which is then transferred to the downstream slave, leading to a warning event.	Check whether a processing unit error occurs due to transfer error (H0E-27) or invalid frames (H0E-28) upon occurrence of the fault, and check whether no counting is performed in RX-ERR of Port0.	Check the upstream slave to locate the fault cause.

- EE08.6: Data update timeout
  Cause:

  The slave is in the OP status and does not receive the data frame in a long time.

Cause	Confirming Method	Solution
The data frame is lost or aborted in the upstream slave or the master performance is not up to standard.	Check through the software tool whether the phase difference between SYNC and IRQ exceeds the value of H0E-22 multiplied by the communication cycle.	• Check whether the operating load of the master CPU is excessive. Increase the communication time or set H0E-22 to a high value. • Check whether link loss occurs on the upstream slave.

- EE11.0: ESI check error
  Cause:

  The attempt to load the XML file fails during EtherCAT communication.

Cause	Confirming Method	Solution
1. The XML file is programmed in the EEPROM. 2. The XML file in the EEPROM is modified unexpectedly.	Check whether the XML version displayed in H0E-96 is normal.	Program the XML file.

- EE11.1: EEPROM read failure
  Cause:

  The EEPROM communication of external EtherCAT devices fails.

Cause	Confirming Method	Solution
The EtherCAT data in the EEPROM cannot be read	This fault persists after the servo drive is powered off and on several times.	Replace the servo drive.

- EE11.2: EEPROM update failure
  Cause:

  The communication is normal but the message in the EEPROM is wrong or lost.

Cause	Confirming Method	Solution
The EtherCAT data in the EEPROM cannot be updated.	This fault persists after the servo drive is powered off and on several times.	Replace the servo drive.

- EE12.0: EtherCAT external device error
  Cause:

  The EtherCAT network cannot be initialized.

Cause	Confirming Method	Solution
1. The FPGA firmware is not programmed.	Check whether 2001-02h is 09xx.Y.	Program the FPGA firmware.
2. The servo drive is faulty.	The servo drive is faulty.	Replace the servo drive.

- EE13.0: Synchronization cycle setting error
  Cause:

  The synchronization cycle is not an integer multiple of 125 μs or 250 μs after the network switches to the OP mode.

Cause	Confirming Method	Solution
The synchronization cycle is not an integer multiple of 125 μs or 250 μs.	Check the setting of the synchronization cycle in the controller.	Set the synchronization cycle to an integer multiple of 125 μs or 250 μs.

- EE15.0: Synchronization cycle error too large
  Cause:

  The synchronization cycle error exceeds the threshold.

Cause	Confirming Method	Solution
The synchronization cycle error of the controller is too large.	• Measure the synchronization cycle of the controller using a digital oscilloscope or the oscilloscope tool in the software tool.	Increase the value of 200E-21h.

2.3.3 SDO Transfer Abort Code

Abort Code	Function
0503 0000	Toggle bit not altered
0504 0000	SDO protocol timed out
0504 0001	Client/Server command specifier not valid or unknown
0504 0005	Out of memory
0601 0000	Unsupported access to an object
0601 0001	Attempt to read a write only object
0601 0002	Attempt to write a read only object
0602 0000	Object does not exist in the object dictionary
0604 0041	Object cannot be mapped to the PDO
0604 0042	The number and length of the objects to be mapped would exceed PDO length
0604 0043	General parameter incompatibility reason
0604 0047	General internal incompatibility in the device

Abort Code	Function
0606 0000	Access failed due to an hardware error
0607 0010	Data type does not match, length of service parameter does not match
0607 0012	Data type does not match, length of service parameter too high
0607 0013	Data type does not match, length of service parameter too low
0609 0011	Sub-index does not exist
0609 0030	Invalid value for parameter
0609 0031	Value of parameter written too high
0609 0032	Value of parameter written too low
0609 0036	Maximum value is less than minimum value
0800 0000	General error
0800 0020	Data cannot be transferred or stored to the application
0800 0021	Data cannot be transferred or stored to the application because of local control
0800 0022	Data cannot be transferred or stored to the application because of the present device state
0800 0023	Object dictionary dynamic generation fails or no object dictionary is present
0800 0024	No data available

2.4 List of Parameters

2.4.1 Parameter Groups

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

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

Index (Hex)	Description
0001h–0FFFh	Data type description
1000h–1FFFh	CoE communication object
2000h–5FFFh	Manufacturer-specific object
6000h–9FFFh	Profile object
A000h–FFFFh	Reserved

2.4.2 Parameter Group 1000h

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default
1000	0	Device type	RO	No	Uint32	-	-	0x00020192
1008	0	Manufacturer device name	RO	No	-	-	-	SV660N-ECAT
1009	0	Manufacturer hardware version	RO	No	-	-	-	Software version dependent
100A	0	Manufacturer software version	RO	No	-	-	-	Hardware version dependent
1018	Identity object							
	0	Number of entries	RO	No	Uint8	-	-	0x04
	1	Vendor ID	RO	No	Uint32	-	-	0x00100000
	2	Product code	RO	No	Uint32	-	-	0x000C010D
	3	Revision number	RO	No	Uint32	-	-	0x00010001
	4	Serial number	RO	No	Uint32	-	-	0x00000000
1C00	Sync Manager communication type							
	0	Number of SYNC Manager channels	RO	No	Uint8	-	-	0x04
	1	SM0 communication type	RO	No	Uint8	-	-	0x01
	2	SM1 communication type	RO	No	Uint8	-	-	0x02
	3	SM2 communication type	RO	No	Uint8	-	-	0x03
	4	SM3 communication type	RO	No	Uint8	-	-	0x04

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default
1600	1st Receive PDO mapping							
	0	Number of mapped objects in RPDO1	RW	No	Uint8	-	0 to 0x0A	0x03
	1	1st mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	0x60400010
	2	2nd mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	0x60600008
	3	3rd mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	0x60 B80010
	4	4th mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	-
	5	5th mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	-
	6	6th mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	-
	7	7th mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	-
	8	8th mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	-
	9	9th mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	-
	0A	10th mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	-
1701	258th Receive PDO mapping							
	0	Number of mapped objects in RPDO258	RO	No	Uint8	-	-	0x04
	1	1st mapped object	RO	No	Uint32	-	-	0x60400010
	2	2nd mapped object	RO	No	Uint32	-	-	0x607 A0020
	3	3rd mapped object	RO	No	Uint32	-	-	0x60 B80010
	4	4th mapped object	RO	No	Uint32	-	-	0x60F E0120

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default
1702	259th Receive PDO mapping							
	0	Number of mapped objects in RPDO259	RO	No	Uint8	-	-	0x07
	1	1st mapped object	RO	No	Uint32	-	-	0x60400010
	2	2nd mapped object	RO	No	Uint32	-	-	0x607 A0020
	3	3rd mapped object	RO	No	Uint32	-	-	0x60FF0020
	4	4th mapped object	RO	No	Uint32	-	-	0x60710010
	5	5th mapped object	RO	No	Uint32	-	-	0x60600008
	6	6th mapped object	RO	No	Uint32	-	-	0x60 B80010
	7	7th mapped object	RO	No	Uint32	-	-	0x607F0020
1703	260th Receive PDO mapping							
	0	Number of mapped objects in RPDO260	RO	No	Uint8	-	-	0x07
	1	1st mapped object	RO	No	Uint32	-	-	0x60400010
	2	2nd mapped object	RO	No	Uint32	-	-	0x607 A0020
	3	3rd mapped object	RO	No	Uint32	-	-	0x60FF0020
	4	4th mapped object	RO	No	Uint32	-	-	0x60600008
	5	5th mapped object	RO	No	Uint32	-	-	0x60 B80010
	6	6th mapped object	RO	No	Uint32	-	-	0x60 E00010
	7	7th mapped object	RO	No	Uint32	-	-	0x60 E10010

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default
1704	261st Receive PDO mapping							
	0	Number of mapped objects in RPDO261	RO	No	Uint8	-	-	0x09
	1	1st mapped object	RO	No	Uint32	-	-	0x60400010
	2	2nd mapped object	RO	No	Uint32	-	-	0x607 A0020
	3	3rd mapped object	RO	No	Uint32	-	-	0x60FF0020
	4	4th mapped object	RO	No	Uint32	-	-	0x60710010
	5	5th mapped object	RO	No	Uint32	-	-	0x60600008
	6	6th mapped object	RO	No	Uint32	-	-	0x60 B80010
	7	7th mapped object	RO	No	Uint32	-	-	0x607F0020
	8	8th mapped object	RO	No	Uint32	-	-	0x60 E00010
	9	9th mapped object	RO	No	Uint32	-	-	0x60 E10010
1705	262nd Receive PDO mapping							
	0	Number of mapped objects in RPDO262	RW	No	Uint8	-	-	0x08
	1	1st mapped object	RW	No	Uint32	-	-	0x60400010
	2	2nd mapped object	RW	No	Uint32	-	-	0x607 A0020
	3	3rd mapped object	RW	No	Uint32	-	-	0x60FF0020
	4	4th mapped object	RW	No	Uint32	-	-	0x60600008
	5	5th mapped object	RW	No	Uint32	-	-	0x60 B80010
	6	6th mapped object	RW	No	Uint32	-	-	0x60 E00010
	7	7th mapped object	RW	No	Uint32	-	-	0x60 E10010
	8	8th mapped object	RW	No	Uint32	-	-	0x60 B20010

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default
1A00	1st Transmit PDO mapping							
	0	Number of mapped objects in TPDO1	RW	No	Uint8	-	0 to 0x0A	0x07
	1	1st mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	0x60410010
	2	2nd mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	0x60640020
	3	3rd mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	0x60 B90010
	4	4th mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	0x60B A0020
	5	5th mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	0x60B C0020
	6	6th mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	0x603F0010
	7	7th mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	0x60F D0010
	8	8th mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	-
	9	9th mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	-
	0A	10th mapped object	RW	No	Uint32	-	0 to 0xFFFFFFFF	-

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default
1B01	258th Transmit PDO mapping							
	0	Number of mapped objects in TPDO258	RO	No	Uint8	-	-	0x09
	1	1st mapped object	RO	No	Uint32	-	-	0x603F0010
	2	2nd mapped object	RO	No	Uint32	-	-	0x60410010
	3	3rd mapped object	RO	No	Uint32	-	-	0x60640020
	4	4th mapped object	RO	No	Uint32	-	-	0x60770010
	5	5th mapped object	RO	No	Uint32	-	-	0x60F40020
	6	6th mapped object	RO	No	Uint32	-	-	0x60 B90010
	7	7th mapped object	RO	No	Uint32	-	-	0x60B A0020
	8	8th mapped object	RO	No	Uint32	-	-	0x60B C0020
	9	9th mapped object	RO	No	Uint32	-	-	0x60F D0010

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default
1B02	259th Transmit PDO mapping							
	0	Number of mapped objects in TPDO259	RO	No	Uint8	-	-	0x09
	1	1st mapped object	RO	No	Uint32	-	-	0x603F0010
	2	2nd mapped object	RO	No	Uint32	-	-	0x60410010
	3	3rd mapped object	RO	No	Uint32	-	-	0x60640020
	4	4th mapped object	RO	No	Uint32	-	-	0x60770010
	5	5th mapped object	RO	No	Uint32	-	-	0x60610008
	6	6th mapped object	RO	No	Uint32	-	-	0x60 B90010
	7	7th mapped object	RO	No	Uint32	-	-	0x60B A0020
	8	8th mapped object	RO	No	Uint32	-	-	0x60B C0020
	9	9th mapped object	RO	No	Uint32	-	-	0x60F D0010

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default
1B03	260th Transmit PDO mapping							
	0	Number of mapped objects in TPDO260	RO	No	Uint8	-	-	0x0A
	1	1st mapped object	RO	No	Uint32	-	-	0x603F0010
	2	2nd mapped object	RO	No	Uint32	-	-	0x60410010
	3	3rd mapped object	RO	No	Uint32	-	-	0x60640020
	4	4th mapped object	RO	No	Uint32	-	-	0x60770010
	5	5th mapped object	RO	No	Uint32	-	-	0x60F40020
	6	6th mapped object	RO	No	Uint32	-	-	0x60610008
	7	7th mapped object	RO	No	Uint32	-	-	0x60 B90010
	8	8th mapped object	RO	No	Uint32	-	-	0x60B A0020
	9	9th mapped object	RO	No	Uint32	-	-	0x60B C0020
	0A	10th mapped object	RO	No	Uint32	-	-	0x60F D0010

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default
1B04	261st Transmit PDO mapping							
	0	Number of mapped objects in TPDO261	RO	No	Uint8	-	-	0x0A
	1	1st mapped object	RO	No	Uint32	-	-	0x603F0010
	2	2nd mapped object	RO	No	Uint32	-	-	0x60410010
	3	3rd mapped object	RO	No	Uint32	-	-	0x60640020
	4	4th mapped object	RO	No	Uint32	-	-	0x60770010
	5	5th mapped object	RO	No	Uint32	-	-	0x60610008
	6	6th mapped object	RO	No	Uint32	-	-	0x60F40020
	7	7th mapped object	RO	No	Uint32	-	-	0x60 B90010
	8	8th mapped object	RO	No	Uint32	-	-	0x60B A0020
	9	9th mapped object	RO	No	Uint32	-	-	0x60B C0020
	0A	10th mapped object	RO	No	Uint32	-	-	0x606 C0020
1C12	Sync Manager 2_RPDO assignment							
	0	Number of assigned RPDOs	RW	No	Uint8	-	0 to 0x1	0x01
	1	Index of assigned RPDO	RW	Yes	Uint16	-	0 to 0xFFFF	0x1701
1C13	Sync Manager 2_TPDO assignment							
	0	Number of assigned TPDOs	RW	No	Uint8	-	0 to 0x1	0x01
	1	Index of assigned TPDO	RW	Yes	Uint16	-	0 to 0xFFFF	0x1B01

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default
1C32	Sync Manager 2 output parameters							
	0	Number of synchronization parameters	RO	No	Uint8	-	-	0x20
	1	Synchronization type	RO	No	Uint16	-	-	0x0002
	2	Cycle time	RO	No	Uint32	ns	-	0
	4	Synchronization types supported	RO	No	Uint16	-	-	0x0004
	5	Minimum cycle time	RO	No	Uint32	ns	-	0x0003 D090
	6	Calc and copy time	RO	No	Uint32	ns	-	-
	9	Delay time	RO	No	Uint32	ns	-	-
	20	Sync error	RO	No	BOOL	-	-	-
1C33	Sync Manager 2 input parameters							
	0	Number of synchronization parameters	RO	No	Uint8	-	-	0x20
	1	Synchronization type	RO	No	Uint16		-	0x0002
	2	Cycle time	RO	No	Uint32	ns	-	0
	4	Synchronization types supported	RO	No	Uint16	-	-	0x0004
	5	Minimum cycle time	RO	No	Uint32	ns	-	0x0003 D090
	6	Calc and copy time	RO	No	Uint32	ns	-	-
	9	Delay time	RO	No	Uint32	ns	-	-
	20	Sync error	RO	No	BOOL	-	-	-

2.4.3 Parameter Group 2000h

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
2000h/H00: Servo motor parameters									
01h	H00-00	Motor code	-	0 to 65535	14101	-	16 bits	At stop	Next power-on
03h	H00-02	Customized no.	-	0 to (2^{32} - 1)	0	-	32 bits	-	-

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
05h	H00-04	Encoder version	-	0 to 6553.5	0	-	16 bits	-	-
06h	H00-05	Serial-type motor code	-	0 to 65535	0	-	16 bits	-	-
07h	H00-06	FPGA customized No.	-	0 to 655.35	0	-	16 bits	-	-
08h	H00-07	STO version	-	0 to 655.35	0	-	16 bits	-	-
09h	H00-08	Serial encoder type	-	0 to 65535	0	-	16 bits	-	-
2001h/H01: Servo drive parameters									
01h	H01-00	MCU software version	-	0 to 6553.5	0	-	16 bits	-	-
02h	H01-01	FPGA software version	-	0 to 6553.5	0	-	16 bits	-	-
0Bh	H01-10	Servo drive model	2: 1R6 3: S2R8 5: S5R5 60005: S6R6 6: S7R6 7: S012 10001: T3R5 10002: T5R4 10003: T8R4 10004: T012 10005: T017 10006: T021 10007: T026	0 to 65535	3	-	16 bits	At stop	Next power-on
0Ch	H01-11	DC-AC voltage class	-	0 to 65535	220	V	16 bits	-	-
0Dh	H01-12	Rated power of the servo drive	-	0 to 1073741824	0.4	kW	32 bits	-	-
0Fh	H01-14	Max. output power of the servo drive	-	0 to 1073741824	0.4	kW	32 bits	-	-
11h	H01-16	Rated output current of the servo drive	-	0 to 1073741824	2.8	A	32 bits	-	-
13h	H01-18	Max. output current of the servo drive	-	0 to 1073741824	10.1	A	32 bits	-	-
29h	H01-40	DC bus overvoltage protection threshold	-	0 to 2000	420	V	16 bits	-	-
2002h/H02: Basic control parameters									

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
01h	H02-00	Control mode	0: Speed control mode 1: Position control mode 2: Torque control mode 9: EtherCAT mode	0 to 9	9	-	16 bits	At stop	At once
02h	H02-01	Absolute system selection	0: Incremental mode 1: Absolute position linear mode 2: Absolute position rotation mode 3: Absolute position linear mode (encoder overflow not detected) 4: Absolute position single-turn mode	0 to 4	0	-	16 bits	At stop	Next power-on
03h	H02-02	Direction of rotation	0: CCW as the forward direction 1: CW as the forward direction	0 to 1	0	-	16 bits	At stop	Next power-on
06h	H02-05	Stop mode at S-ON OFF	-3: Stop at zero speed, keeping dynamic braking status -2: Ramp to stop as defined by 6084h/609Ah, keeping dynamic braking status -1: Dynamic braking stop, keeping dynamic braking status 0: Coast to stop, keeping de-energized status 1: Ramp to stop as defined by 6084h/609Ah, keeping de-energized status	-3 to +1	0	-	16 bits	At stop	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
07h	H02-06	Stop mode at No. 2 fault	-5: Stop at zero speed, keeping dynamic braking status -4: Stop at the emergency-stop torque, keeping dynamic braking status -3: Ramp to stop as defined by 6085h, keeping dynamic braking status -2: Ramp to stop as defined by 6084h/ 609Ah, keeping dynamic braking status -1: Dynamic braking stop, keeping dynamic braking status 0: Coast to stop, keeping de-energized status 1: Ramp to stop as defined by 6084h/ 609Ah, keeping de-energized status 2: Ramp to stop as defined by 6085h, keeping de-energized status 3: Stop at emergency-stop torque, keeping de-energized status	-5 to +3	2	-	16 bits	At stop	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
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 status 3: Ramp to stop as defined by 6085h, keeping de-energized status 4: Ramp to stop as defined by 6085h, keeping position lock status 5: Dynamic braking stop, keeping de-energized status 6: Dynamic braking stop, keeping dynamic braking status 7: Not responding to overtravel (with warning displayed only)	0 to 7	1	-	16 bits	At stop	At once
09h	H02-08	Stop mode at No. 1 fault	0: Coast to stop, keeping de-energized state 1: Dynamic braking stop, keeping de-energized status 2: Dynamic braking stop, keeping dynamic braking status	0 to 2	2	-	16 bits	At stop	At once
0Ah	H02-09	Delay from brake (BK) output ON to command received	-	0 to 500	250	ms	16 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
0Bh	H02-10	Delay from brake (BK) output OFF to motor de-energized	-	50 to 1000	150	ms	16 bits	During running	At once
0Ch	H02-11	Speed threshold at brake (BK) output OFF in the rotation state	-	20 to 3000	30	RPM	16 bits	During running	At once
0Dh	H02-12	Delay from S-ON OFF to brake (BK) output OFF in the rotation state	-	1 to 1000	500	ms	16 bits	During running	At once
10h	H02-15	Warning display on the keypad	0: Warning information outputted immediately 1: Warning information not outputted	0 to 1	0	-	16 bits	During running	At once
11h	H02-16	Brake enable switch	0: Disable 1: Enable	0 to 1	1	-	16 bits	During running	At once
15h	H02-20	Dynamic brake relay coil ON delay	-	30 to 30000	30	ms	16 bits	During running	At once
16h	H02-21	Permissible minimum resistance of the regenerative resistor	-	1 to 1000	40	Ω	16 bits	-	-
17h	H02-22	Power of built-in regenerative resistor	-	0 to 65535	0	W	16 bits	-	-
18h	H02-23	Resistance of built-in regenerative resistor	-	0 to 65535	0	Ω	16 bits	-	-
19h	H02-24	Resistor heat dissipation coefficient	-	10 to 100	30	%	16 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
1Ah	H02-25	Regenerative resistor type	0: Built-in 1: External, natural cooling 2: External, forced air cooling 3: No resistor needed, braking energy absorbed by the capacitor	0 to 3	3	-	16 bits	During running	At once
1Bh	H02-26	Power of external regenerative resistor	-	1 to 65535	40	W	16 bits	During running	At once
1Ch	H02-27	Resistance of external regenerative resistor	-	15 to 1000	50	Ω	16 bits	During running	At once
1Fh	H02-30	User password	-	0 to 65535	0	-	16 bits	During running	At once
20h	H02-31	System parameter initialization	0: No operation 1: Restore default settings 2: Clear fault log	0 to 2	0	-	16 bits	At stop	At once
21h	H02-32	Selection of parameters in group H0B	-	0 to 99	50	-	16 bits	During running	At once
24h	H02-35	Keypad data update frequency	-	0 to 20	0	Hz	16 bits	During running	At once
2Ah	H02-41	Factory password	-	0 to 65535	0	-	16 bits	During running	At once
2003h/H03: Terminal input parameters									
03h	H03-02	DI1 function	0: No assignment 1: Servo ON 2: Fault reset 14: Positive limit switch 15: Negative limit switch 31: Home switch 34: Emergency stop 38: Touch probe 1 39: Touch probe 2	0 to 40	14	-	16 bits	During running	At once
04h	H03-03	DI1 logic	0: NO 1: NC	0 to 1	0	-	16 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
05h	H03-04	DI2 function	0 to 39 See the description of H03-02 for details.	0 to 40	15	-	16 bits	During running	At once
06h	H03-05	DI2 logic	0 to 1 See the description of H03-03 for details.	0 to 1	0	-	16 bits	During running	At once
07h	H03-06	DI3 function	0 to 39 See the description of H03-02 for details.	0 to 40	31	-	16 bits	During running	At once
08h	H03-07	DI3 logic	0 to 1 See the description of H03-03 for details.	0 to 1	0	-	16 bits	During running	At once
09h	H03-08	DI4 function	0 to 39 See the description of H03-02 for details.	0 to 40	39	-	16 bits	During running	At once
0Ah	H03-09	DI4 logic	0 to 1 See the description of H03-03 for details.	0 to 1	0	-	16 bits	During running	At once
0Bh	H03-10	DI5 function	0 to 39 See the description of H03-02 for details.	0 to 40	38	-	16 bits	During running	At once
0Ch	H03-11	DI5 logic	0 to 1 See the description of H03-03 for details.	0 to 1	0	-	16 bits	During running	At once
3Dh	H03-60	DI1 filter time		0 to 500	0.5	ms	16 bits	During running	At once
3Eh	H03-61	DI2 filter time		0 to 500	0.5	ms	16 bits	During running	At once
3Fh	H03-62	DI3 filter time		0 to 500	0.5	ms	16 bits	During running	At once
40h	H03-63	DI4 filter time		0 to 500	0.5	ms	16 bits	During running	At once
41h	H03-64	DI5 filter time		0 to 500	0.5	ms	16 bits	During running	At once
2004h/H04: Terminal output parameters									

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
01h	H04-00	DO1 function	0: No assignment 1: Servo ready 2: Motor rotating 9: Brake (BK) output 10: Warning 11: Fault 25: Comparison output 31: EtherCAT forced output 32: EDM safety state	0 to 32	1	-	16 bits	During running	At once
02h	H04-01	DO1 logic	0: NO 1: NC	0 to 1	0	-	16 bits	During running	At once
03h	H04-02	DO2 function	0 to 32 See the description of H04-00 for details.	0 to 32	11	-	16 bits	During running	At once
04h	H04-03	DO2 logic	0 to 1 See the description of H04-01 for details.	0 to 1	0	-	16 bits	During running	At once
05h	H04-04	DO3 function	0 to 32 See the description of H04-00 for details.	0 to 32	9	-	16 bits	During running	At once
06h	H04-05	DO3 logic	0 to 1 See the description of H04-01 for details.	0 to 1	0	-	16 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
18h	H04-23	EtherCAT forced DO logic in non-OP status	0: Status of DO1, DO2, and DO3 unchanged in the non-OP status 1: No output in DO1 and status of others unchanged in the non-OP status 2: No output in DO2 and status of others unchanged in the non-OP status 3: No output in DO1 or DO2 and status of others unchanged in the non-OP status 4: No output in DO3 and status of others unchanged in the non-OP status 5: No output in DO1 or DO3 and status of others unchanged in the non-OP status 6: No output in DO2 or DO3 and status of others unchanged in the non-OP status 7: No output in DO1, DO2, or DO3 in the non-OP status	0 to 7	0	-	16 bits	During running	At once
2005h/H05: Position control parameters									
05h	H05-04	First-order low-pass filter time constant	-	0 to 6553.5	0	ms	16 bits	At stop	At once
06h	H05-05	Moving average filter time constant 1	-	0 to 1000	0	ms	16 bits	At stop	At once
07h	H05-06	Moving average filter time constant 2	-	0 to 128	0	ms	16 bits	At stop	At once
08h	H05-07	Numerator of electronic gear ratio	-	0 to 4294967295	1	1	32 bits	During running	At once
0Ah	H05-09	Denominator of electronic gear ratio	-	0 to 4294967295	1	1	32 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
14h	H05-19	Speed feedforward control	0: No speed feedforward 1: Internal speed feedforward 2: 60B1 used as speed feedforward 3: Zero phase control	0 to 3	1	-	16 bits	At stop	At once
15h	H05-20	Condition for COIN (positioning completed) signal output	0: Position deviation = Filtered position reference - Position feedback	0 to 3	0	-	16 bits	At stop	At once
1F	H05-30	Homing function	0: Disable 6: Current position as the home	0, 6	0	-	16 bits	During running	At once
24h	H05-35	Homing time limit	-	0 to 6553.5	5000	s	16 bits	During running	At once
25h	H05-36	Local home offset	-	-1073741824 to +1073741824	0	-	32 bits	During running	At once
2Fh	H05-46	Position deviation in absolute position linear mode (low 32 bits)	-	-2^{31} to $+(2^{31} - 1)$	0	-	32 bits	At stop	Next power-on
31h	H05-48	Position deviation in absolute position linear mode (high 32 bits)	-	-2^{31} to $+(2^{31} - 1)$	0	-	32 bits	At stop	Next power-on
33h	H05-50	Numerator of mechanical gear ratio	-	1 to 65535	1	-	16 bits	At stop	At once
34h	H05-51	Denominator of mechanical gear ratio	-	1 to 65535	1	-	16 bits	At stop	At once
35h	H05-52	Pulses per load revolution in absolute position rotation mode (low 32 bits)	-	0 to $(2^{32} - 1)$	0	1 p	32 bits	At stop	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
37h	H05-54	Pulses per load revolution in absolute position rotation mode (high 32 bits)	-	0 to (2^{32} - 1)	0	1 p	32 bits	At stop	At once
2006h/H06: Speed control parameters									
04h	H06-03	Speed reference	-	-6000 to +6000	200	RPM	16 bits	During running	At once
06h	H06-05	Acceleration ramp time of speed reference	-	0 to 65535	0	RPM	16 bits	During running	At once
07h	H06-06	Deceleration ramp time of speed reference	-	0 to 65535	0	RPM	16 bits	During running	At once
09h	H06-08	Forward speed limit	-	0 to 6000	6000	RPM	16 bits	During running	At once
0Ah	H06-09	Reverse speed limit	-	0 to 6000	6000	RPM	16 bits	During running	At once
0Bh	H06-10	Deceleration unit in emergency stop	0: x 1 1: x 10 2: x 100	0 to 2	0	-	16 bits	At stop	At once
0Ch	H06-11	Torque feedforward control	0: No torque feedforward 1: Internal torque feedforward 2: 60B2h used as external torque feedforward	0 to 2	1	-	16 bits	During running	At once
0Dh	H06-12	Acceleration ramp time of jog speed	-	0 to 65535	10	ms	16 bits	During running	At once
0Eh	H06-13	Speed feedforward smoothing filter	-	0 to 2000	0	us	16 bits	During running	At once
11h	H06-16	Threshold of TGON (motor rotation) signal	-	0 to 1000	20	RPM	16 bits	During running	At once
1Dh	H06-28	Cogging torque compensation selection	0: No 1: Yes	0 to 1	1	-	16 bits	During running	At once
2007h/H07: Torque control parameters									

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
04h	H07-03	Torque reference set through keypad	-	-400.0 to +400.0	0	%	16 bits	During running	At once
06h	H07-05	Torque reference filter time constant 1	-	0 to 30.00	0.2	ms	16 bits	During running	At once
07h	H07-06	Torque reference filter time constant 2	-	0 to 30.00	0.27	ms	16 bits	During running	At once
0Ah	H07-09	Forward internal torque limit	-	0 to 400.0	350	%	16 bits	During running	At once
0Bh	H07-10	Reverse internal torque limit	-	0 to 400.0	350	%	16 bits	During running	At once
10h	H07-15	Emergency-stop torque	-	0 to 400.0	100	%	16 bits	During running	At once
14h	H07-19	Internal speed limit in torque control	-	0 to 6000	3000	RPM	16 bits	During running	At once
15h	H07-20	Negative internal speed limit in torque control	-	0 to 6000	3000	RPM	16 bits	During running	At once
16h	H07-21	Reference value for torque reach	-	0 to 400.0	0	%	16 bits	During running	At once
17h	H07-22	Torque output value when DO signal for torque reach turned on	-	0 to 400.0	20	%	16 bits	During running	At once
18h	H07-23	Torque output value when DO signal for torque reach turned off	-	0 to 400.0	10	%	16 bits	During running	At once
19h	H07-24	Depth of field-weakening	-	60 to 115	115	%	16 bits	During running	At once
1Ah	H07-25	Max. permissible demagnetizing current	-	1 to 200	100	%	16 bits	During running	At once
1Bh	H07-26	Field-weakening selection	0: Disable 1: Enable	0 to 1	0	-	16 bits	At stop	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
1Ch	H07-27	Field-weakening gain	-	0.001 to 1.000	0.03	-	16 bits	During running	At once
25h	H07-36	Time constant of low-pass filter 2	-	0 to 10.00	0	ms	16 bits	During running	At once
26h	H07-37	Torque reference filter selection	0: First-order filter 1: Biquad filter	0 to 1	0	-	16 bits	During running	At once
27h	H07-38	Biquad filter attenuation ratio	-	0 to 50	16	-	16 bits	At stop	At once
2008h/H08: Gain parameters									
01h	H08-00	Speed loop gain	-	0.1 to 2000	39	Hz	16 bits	During running	At once
02h	H08-01	Speed loop integral time constant	-	0.15 to 512	20.51	ms	16 bits	During running	At once
03h	H08-02	Position loop gain	-	0.1 to 2000	55.7	Hz	16 bits	During running	At once
04h	H08-03	2nd speed loop gain	-	0.1 to 2000	75	Hz	16 bits	During running	At once
05h	H08-04	2nd speed loop integral time constant	-	0.15 to 512	10.61	ms	16 bits	During running	At once
06h	H08-05	2nd position loop gain	-	0.1 to 2000	120	Hz	16 bits	During running	At once
09h	H08-08	2nd gain mode setting	0: Fixed to the 1st gain set, P/PI switched by bit26 of 60FE 1:Switched between the 1st gain set and 2nd gain set as defined by H08-09	0 to 1	1	-	16 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
0Ah	H08-09	Gain switchover condition	0: Fixed to the 1st gain set (PS) 1: Switched by bit26 of 60FE 2: Torque reference too large (PS) 3: Speed reference too large (PS) 4: Speed reference change rate too large (PS) 5: Speed reference high/low-speed threshold (PS) 6: Position deviation too large (P) 7: Position reference available (P) 8: Positioning completed (P) 9: Actual speed (P) 10: Position reference+Actual speed (P)	0 to 10	0	-	16 bits	During running	At once
0Bh	H08-10	Gain switchover delay	-	0 to 1000	5	ms	16 bits	During running	At once
0Ch	H08-11	Gain switchover level	-	0 to 20000	50	-	16 bits	During running	At once
0Dh	H08-12	Gain switchover dead time	-	0 to 20000	30	-	16 bits	During running	At once
0Eh	H08-13	Position gain switchover time	-	0 to 1000	3	ms	16 bits	During running	At once
10h	H08-15	Load moment of inertia ratio	-	0 to 120	3	-	16 bits	During running	At once
12h	H08-17	Zero phase delay	-	0 to 4	0	ms	16 bits	During running	At once
13h	H08-18	Speed feedforward filter time constant	-	0 to 64	0.5	ms	16 bits	During running	At once
14h	H08-19	Speed feedforward gain	-	0 to 100	0	%	16 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
15h	H08-20	Torque feedforward filter time constant	-	0 to 64	0.5	ms	16 bits	During running	At once
16h	H08-21	Torque feedforward gain	-	0 to 300	0	%	16 bits	During running	At once
17h	H08-22	Speed feedback filtering option	0: Inhibited 1: Two times 2: Four times 3: Eight times 4: Sixteen times	0 to 4	0	-	16 bits	At stop	At once
18h	H08-23	Cutoff frequency of speed feedback low-pass filter	-	100 to 8000	8000	Hz	16 bits	During running	At once
19h	H08-24	PDFF control coefficient	-	0 to 200	100	%	16 bits	During running	At once
1Ch	H08-27	Speed observer cutoff frequency	-	50 to 600	170	Hz	16 bits	During running	At once
1Dh	H08-28	Speed observer inertia correction coefficient	-	1 to 1600	100	%	16 bits	During running	At once
1Eh	H08-29	Speed observer filter time	-	0 to 10	0.8	ms	16 bits	During running	At once
1Fh	H08-30	Disturbance compensation time	-	0 to 100	0.2	ms	16 bits	During running	At once
20h	H08-31	Disturbance cutoff frequency	-	10 to 4000	600	Hz	16 bits	During running	At once
21h	H08-32	Disturbance compensation gain	-	0 to 100	0	%	16 bits	During running	At once
22h	H08-33	Disturbance observer inertia correction coefficient	-	0 to 1600	100	%	16 bits	During running	At once
26h	H08-37	Phase modulation for medium-frequency jitter suppression 2	-	-90 to +90	0	°	16 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
27h	H08-38	Frequency of medium-frequency jitter suppression 2	-	0 to 1000	0	Hz	16 bits	During running	At once
28h	H08-39	Compensation gain of medium-frequency jitter suppression 2	-	0 to 300	0	%	16 bits	During running	At once
29h	H08-40	Speed observer selection	0: Disable 1: Enable	0 to 1	0	-	16 bits	During running	At once
2Bh	H08-42	Model control selection	0: Disable 1: Enable	0 to 1	0	-	16 bits	During running	At once
2Ch	H08-43	Model gain	-	0.1 to 2000	40	-	16 bits	During running	At once
2Fh	H08-46	Feedforward value	-	0 to 102.4	95	-	16 bits	During running	At once
36h	H08-53	Medium- and low-frequency jitter suppression frequency 3	-	0 to 300	0	Hz	16 bits	During running	At once
37h	H08-54	Medium- and low-frequency jitter suppression compensation 3	-	0 to 200	0	%	16 bits	During running	At once
39h	H08-56	Medium- and low-frequency jitter suppression phase modulation 3	-	0 to 600	100	%	16 bits	During running	At once
3Ch	H08-59	Medium- and low-frequency jitter suppression frequency 4	-	0 to 300	0	Hz	16 bits	During running	At once
3Dh	H08-60	Medium- and low-frequency jitter suppression compensation 4	-	0 to 200	0	%	16 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
3Eh	H08-61	Medium- and low-frequency jitter suppression phase modulation 4	-	0 to 600	100	%	16 bits	During running	At once
3Fh	H08-62	Position loop integral time constant	-	0.15 to 512	512	-	16 bits	During running	At once
40h	H08-63	2nd position loop integral time constant	-	0.15 to 512	512	-	16 bits	During running	At once
41h	H08-64	Speed observer feedback source	0: Disable 1: Enable	0 to 1	0	-	16 bits	During running	At once
49h	H08-72	Viscous friction of zero deviation control	-	0 to 100	0	-	16 bits	During running	At once
4Ah	H08-73	Forward coulomb friction of zero deviation control	-	0 to 100	0	-	16 bits	During running	At once
4Bh	H08-74	Reverse coulomb friction of zero deviation control	-	-100 to 0	0	-	16 bits	During running	At once
4Ch	H08-75	Friction compensation selection of zero deviation control	0: Disable 1: Enable	0 to 1	0	-	16 bits	During running	At once
4Dh	H08-76	Acceleration compensation factor of zero deviation control	-	0 to 900	0	-	16 bits	During running	At once
4Eh	H08-77	Static friction of zero deviation control	-	0 to 100	0	-	16 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
4Fh	H08-78	Transition speed between coulomb friction and viscous friction of zero deviation control	-	0 to 100	0	-	16 bits	During running	At once
50h	H08-79	Initial torque shock of zero deviation control	-	0 to 100	0	-	16 bits	During running	At once
51h	H08-80	Friction compensation delay of zero deviation control	-	0 to 1000	20	-	16 bits	During running	At once
2009h/H09: Gain auto-tuning parameters									
01h	H09-00	Gain auto-tuning mode	0: Invalid, gain parameters tuned manually 1: Valid, gain parameters tuned automatically based on the stiffness level 2: Positioning mode, gain parameters tuned automatically based on the stiffness level 3: Interpolation mode + Inertia auto-tuning 4: Normal mode + Inertia auto-tuning 6: Quick positioning mode + Inertia auto-tuning	0 to 7	4	-	16 bits	During running	At once
02h	H09-01	Stiffness level	-	0 to 41	15	-	16 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
03h	H09-02	Adaptive notch mode	0: Adaptive notch not 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, values of the 3rd and 4th notches restored to default settings	0 to 4	3	-	16 bits	During running	At once
04h	H09-03	Online inertia auto-tuning mode	0: Disabled 1: Enabled, changing slowing 2: Enabled, changing normally 3: Enabled, changing quickly	0 to 3	2	-	16 bits	During running	At once
06h	H09-05	Offline inertia auto-tuning mode	0: Bidirectional 1: Unidirectional	0 to 1	0	-	16 bits	At stop	At once
07h	H09-06	Maximum speed of inertia auto-tuning	-	100 to 1000	500	RPM	16 bits	At stop	At once
08h	H09-07	Time constant for accelerating to the max. speed during inertia auto-tuning	-	20 to 800	125	ms	16 bits	At stop	At once
09h	H09-08	Waiting time after an individual inertia auto-tuning	-	50 to 10000	800	ms	16 bits	At stop	At once
0Ah	H09-09	Number of motor revolutions per inertia auto-tuning	-	0 to 100	1	-	16 bits	-	-

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
0Ch	H09-11	Vibration threshold	-	0 to 100	5	%	16 bits	During running	At once
0Dh	H09-12	Frequency of the 1st notch	-	50 to 8000	8000	Hz	16 bits	During running	At once
0Eh	H09-13	Width level of the 1st notch	-	0 to 20	2	-	16 bits	During running	At once
0Fh	H09-14	Depth level of the 1st notch	-	0 to 99	0	-	16 bits	During running	At once
10h	H09-15	Frequency of the 2nd notch	-	50 to 8000	8000	Hz	16 bits	During running	At once
11h	H09-16	Width level of the 2nd notch	-	0 to 20	2	-	16 bits	During running	At once
12h	H09-17	Depth level of the 2nd notch	-	0 to 99	0	-	16 bits	During running	At once
13h	H09-18	Frequency of the 3rd notch	-	50 to 8000	8000	1 Hz	16 bits	During running	At once
14h	H09-19	Width level of the 3rd notch	-	0 to 20	2	-	16 bits	During running	At once
15h	H09-20	Depth level of the 3rd notch	-	0 to 99	0	-	16 bits	During running	At once
16h	H09-21	Frequency of the 4th notch	-	50 to 8000	8000	1 Hz	16 bits	During running	At once
17h	H09-22	Width level of the 4th notch	-	0 to 20	2	-	16 bits	During running	At once
18h	H09-23	Depth level of the 4th notch	-	0 to 99	0	-	16 bits	During running	At once
19h	H09-24	Auto-tuned resonance frequency	-	0 to 5000	0	Hz	16 bits	-	-
1Fh	H09-30	Tension fluctuation compensation gain	-	-100 to +100	0	-	16 bits	-	-
20h	H09-31	Tension fluctuation compensation filter time	-	0 to 25	0.5	-	16 bits	-	-
21h	H09-32	Gravity compensation value	-	0 to 100	0	%	16 bits	During running	At once
22h	H09-33	Forward friction compensation value	-	0 to 100	0	%	16 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
23h	H09-34	Reverse friction compensation value	-	-100 to 0	0	%	16 bits	During running	At once
24h	H09-35	Friction compensation speed	-	0 to 20	2	-	16 bits	During running	At once
25h	H09-36	Friction compensation speed	0x00: Slow mode + Speed reference 0x01: Slow mode + Model speed 0x02: Slow mode + Speed feedback 0x10: Quick mode + Speed reference 0x11: Quick mode + Model speed 0x12: Quick mode + Speed feedback	0 to 19	0	-	16 bits	During running	At once
26h	H09-37	Vibration monitoring time	-	0 to 65535	1200	-	16	During running	At once
27h	H09-38	Frequency of low-frequency resonance suppression 1 at the mechanical end	-	1 to 100	100	Hz	16 bits	During running	At once
28h	H09-39	Low-frequency resonance suppression 1 at the mechanical end	-	0 to 3	2	-	16 bits	At stop	At once
2Ah	H09-41	Frequency of the 5th notch	-	50 to 8000	8000	Hz	16 bits	During running	At once
2Bh	H09-42	Width level of the 5th notch	-	0 to 20	2	-	16 bits	At stop	At once
2Ch	H09-43	Depth level of the 5th notch	-	0 to 99	0	-	16 bits	At stop	At once
2Dh	H09-44	Frequency of low-frequency resonance suppression 2 at mechanical load end	-	0 to 200	0	-	16 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
2Eh	H09-45	Responsiveness of low-frequency resonance suppression 2 at the mechanical load end	-	0.01 to 10	1	-	16 bits	During running	At once
30h	H09-47	Width of low-frequency resonance suppression 2 at mechanical load end	-	0 to 2	100	-	16 bits	During running	At once
32h	H09-49	Frequency of low-frequency resonance suppression 3 at mechanical load end	-	0 to 2000	0	-	16 bits	During running	At once
33h	H09-50	Responsiveness of low-frequency resonance suppression 3 at mechanical load end	-	0.01 to 10	1	-	16 bits	During running	At once
35h	H09-52	Width of low-frequency resonance suppression 3 at mechanical load end	-	0 to 2	1	-	16 bits	During running	At once
39h	H09-56	STune mode setting	-	0 to 4	4	-	16 bits	During running	At once
3Ah	H09-57	STune resonance suppression switchover frequency	-	0 to 4000	900	Hz	16 bits	During running	At once
3Bh	H09-58	STune resonance suppression reset selection	0: Disable 1: Enable	0 to 1	0	-	16 bits	During running	At once
200Ah/H0A: Fault and protection parameters									

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
01h	H0A-00	Power input phase loss protection	0: Phase loss fault detected 1: Phase loss fault not detected 3: Power loss detection enabled Note: In the common bus mode, set 200A-01h to 1. Otherwise, the servo drive cannot enter "rdy" state after power-on.	0 to 3	0	-	16 bits	During running	At once
02h	H0A-01	Absolute position limit	0: Disable 1: Enable 2: Enabled after homing	0 to 2	0	-	16 bits	At stop	At once
05h	H0A-04	Motor overload protection gain	-	50 to 300	100	-	16 bits	At stop	At once
09h	H0A-08	Overspeed threshold	-	0 to 20000	0	RPM	16 bits	During running	At once
0Bh	H0A-10	Threshold of excessive local position deviation	-	0 to (2^{32} - 1)	25185824	-	16 bits	During running	At once
0Dh	H0A-12	Runaway protection	0: Disable 1: Enable	0 to 1	1	-	16 bits	During running	At once
13h	H0A-18	IGBT over-temperature threshold	-	120 to 175	135	℃	16 bits	During running	At once
14h	H0A-19	Filter time constant of touch probe 1	-	0 to 6.3	2	us	16 bits	During running	At once
15h	H0A-20	Filter time constant of touch probe 2	-	0 to 6.3	2	us	16 bits	During running	At once
16h	H0A-21	STO function display selection	0: Display STO status 1: Display STO fault	0 to 1	0	-	16 bits	During running	At once
18h	H0A-23	TZ signal filter time	-	0 to 31	15	25 ns	16 bits	At stop	Next power-on
1Ah	H0A-25	Filter time constant of speed feedback display value	-	0 to 5000	50	ms	16 bits	At stop	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
1Bh	H0A-26	Motor overload detection	0: Enable 1: Hide motor overload warning (E909.0) and motor overload fault (E620.0)	0 to 1	0	-	16 bits	At stop	At once
1Ch	H0A-27	Motor rotation DO speed filter time	-	0 to 5000	50	ms	16 bits	During running	At once
21h	H0A-32	Motor stall over-temperature protection time window	-	10 to 65535	200	ms	16 bits	During running	At once
22h	H0A-33	Motor stall over-temperature detection	0: Hide 1: Enable	0 to 1	1	-	16 bits	During running	At once
25h	H0A-36	Encoder multi-turn overflow fault selection	0: Not hide 1: Hide	0 to 1	0	-	16 bits	During running	At once
29h	H0A-40	Overtravel compensation switch	0: Enable 1: Disable	0 to 1	0	-	16 bits	At stop	At once
32h	H0A-49	Regenerative transistor over-temperature threshold	-	100 to 175	115	℃	16 bits	During running	At once
33h	H0A-50	Encoder communication fault tolerance threshold	-	0 to 31	3	-	16 bits	During running	At once
34h	H0A-51	Phase loss detection filter times	-	3 to 36	20	55 ms	16 bits	During running	At once
35h	H0A-52	Encoder over-temperature threshold	-	0 to 175	0	℃	16 bits	During running	At once
38h	H0A-55	Runaway current threshold	-	100 to 400	200	%	16 bits	During running	At once
39h	H0A-56	Overload fault reset delay	-	0 to 60000	10000	ms	16 bits	During running	At once
3Ah	H0A-57	Runaway speed threshold	-	1 to 1000	50	RPM	16 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
3Bh	H0A-58	Runaway speed filter time	-	0.1 to 100	2	ms	16 bits	During running	Next power-on
3Ch	H0A-59	Runaway protection detection time	-	10 to 1000	30	ms	16 bits	During running	At once
47h	H0A-70	Overspeed threshold 2	-	0 to 20000	0	RPM	16 bits	During running	At once
48h	H0A-71	MS1 motor overload curve switchover	0: New overload curve 1: Old overload curve 2: Disable voltage discharge upon power failure 3: Old overload curve and disable voltage discharge upon power failure	0 to 3	0		16 bits	During running	At once
49h	H0A-72	Maximum stop time of ramp-to-stop	-	0 to 65535	10000	ms	16 bits	At stop	At once
4Ah	H0A-73	STO 24 V disconnection filter time	-	0 to 5	5	ms	16 bits	During running	At once
4Bh	H0A-74	Fault tolerance filter time of two STO channels	-	0 to 10	10	ms	16 bits	During running	At once
4Ch	H0A-75	Servo OFF delay after STO triggered	-	0 to 25	20	ms	16 bits	During running	At once
200Bh/H0B: Monitoring parameters									
01h	H0B-00	Motor speed actual value	-	-32767 to +32767	0	RPM	16 bits	-	-
02h	H0B-01	Speed reference	-	-32767 to +32767	0	RPM	16 bits	-	-
03h	H0B-02	Internal torque reference	-	-500 to +500	0	%	16 bits	-	-
04h	H0B-03	Monitored DI status	-	0 to 65535	0	-	16 bits	-	-
06h	H0B-05	Monitored DO status	-	0 to 65535	0	-	16 bits	-	-

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
08h	H0B-07	Absolute position counter	-	-2^{31} to $+(2^{31}-1)$	0	1 p	32 bits	-	-
0Ah	H0B-09	Mechanical angle	-	0 to 360	0	°	16 bits	-	-
0Bh	H0B-10	Electrical angle	-	0 to 360	0	°	16 bits	-	-
0Dh	H0B-12	Average load rate	-	0 to 800	0	%	16 bits	-	-
10h	H0B-15	Position following error (encoder unit)	-	-2147483648 to +2147483647	0	p	32 bits	-	-
12h	H0B-17	Feedback pulse counter	-	-2147483648 to +2147483647	0	p	32 bits	-	-
14h	H0B-19	Total power-on time	-	0 to 429496729.5	0	s	32 bits	-	-
19h	H0B-24	RMS value of phase current	-	0 to 6553.5	0	A	32 bits	-	-
1Bh	H0B-26	Bus voltage	-	0 to 6553.5	0	V	16 bits	-	-
1Ch	H0B-27	Power module temperature	-	-20 to +200	0	℃	16 bits	-	-
1Dh	H0B-28	Absolute encoder fault information given by FPGA	-	0 to 65535	0	-	16 bits	-	-
1Eh	H0B-29	Axis status information given by FPGA	-	0 to 65535	0	-	16 bits	-	-
1Fh	H0B-30	Axis fault information given by FPGA	-	0 to 65535	0	-	16 bits	-	-
20h	H0B-31	Encoder fault information	-	0 to 65535	0	-	16 bits	-	-
22h	H0B-33	Fault log	0: Present fault 1: Last fault 2: 2nd to last fault 3: 3rd to last fault 4: 4th to last fault 5: 5th to last fault 6: 6th to last fault 7: 7th to last fault 8: 8th to last fault 9: 9th to last fault	0 to 9	0	-	16 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
23h	H0B-34	Fault code of the selected fault	-	0 to 65535	0	-	16 bits	-	-
24h	H0B-35	Time stamp upon occurrence of the selected fault	-	0 to 429496729.5	0	s	32 bits	-	-
26h	H0B-37	Motor speed upon occurrence of the selected fault	-	-32767 to +32767	0	RPM	16 bits	-	-
27h	H0B-38	Motor phase U current upon occurrence of the selected fault	-	-3276.7 to +3276.7	0	A	16 bits	-	-
28h	H0B-39	Motor phase V current upon occurrence of the selected fault	-	-3276.7 to +3276.7	0	A	16 bits	-	-
29h	H0B-40	Bus voltage upon occurrence of the selected fault	-	0 to 6553.5	0	V	16 bits	-	-
2Ah	H0B-41	DI status upon occurrence of the selected fault	-	0 to 65535	0	-	16 bits	-	-
2Ch	H0B-43	DO status upon occurrence of the selected fault	-	0 to 65535	0	-	16 bits	-	-
2Eh	H0B-45	Internal fault code	-	0 to 65535	0	-	16 bits	-	-
2Fh	H0B-46	Absolute encoder fault information given by FPGA upon occurrence of the selected fault	-	0 to 65535	0	-	16 bits	-	-

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
30h	H0B-47	System status information given by FPGA upon occurrence of the selected fault	-	0 to 65535	0	-	16 bits	-	-
31h	H0B-48	System fault information given by FPGA upon occurrence of the selected fault	-	0 to 65535	0	-	16 bits	-	-
32h	H0B-49	Encoder fault information upon occurrence of the selected fault	-	0 to 65535	0	-	16 bits	-	-
34h	H0B-51	Internal fault code upon occurrence of the selected fault	-	0 to 65535	0	-	16 bits	-	-
36h	H0B-53	Position following error (reference unit)	-	-2^{31} to $+(2^{31} - 1)$	0	p	32 bits	-	-
38h	H0B-55	Motor speed actual value	-	-6000 to +6000	0	RPM	32 bits	-	-
3Ah	H0B-57	Bus voltage of the control circuit	-	0 to 6553.5	0	V	16 bits	-	-
3Bh	H0B-58	Mechanical absolute position (low 32 bits)	-	0 to 2^{32}	0	p	32 bits	-	-
3Dh	H0B-60	Mechanical absolute position (high 32 bits)	-	-2^{31} to $+(2^{31} - 1)$	0	p	32 bits	-	-

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
40h	H0B-63	NotRdy state	0: None 1: Control circuit power supply error (H0B-57) 2: Phase loss detection error 3: Main circuit power supply detection error (including short-circuited to ground error) 4: Other servo faults 5: Short-circuited to ground detection not done	0 to 5	0	-	16 bits	-	-
43h	H0B-66	Encoder temperature	-	-100 to +200	0	℃	16 bits	-	-
44h	H0B-67	Load rate of regenerative transistor	-	0 to 200	0	%	16 bits	-	-
47h	H0B-70	Number of revolutions fed back by the absolute encoder	-	0 to 65535	0	Rev	16 bits	-	-
48h	H0B-71	Single-turn position feedback of the absolute encoder	-	0 to (2^{31} - 1)	0	p	32 bits	-	-
4Bh	H0B-74	System fault information given by FPGA	-	0 to 65535	0	-	16 bits	-	-
4Eh	H0B-77	Position feedback of the absolute encoder (low 32 bits)	-	-2^{31} to +(2^{31} - 1)	0	p	32 bits	-	-
50h	H0B-79	Position feedback of the absolute encoder (high 32 bits)	-	-2^{31} to +(2^{31} - 1)	0	p	32 bits	-	-

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
52h	H0B-81	Single-turn position of the rotating load (low 32 bits)	-	0 to (2^{32} - 1)	0	p	32 bits	-	-
54h	H0B-83	Single-turn position of the rotating load (high 32 bits)	-	-2^{31} to +(2^{31} - 1)	0	p	32 bits	-	-
56h	H0B-85	Single-turn position of the rotating load (reference unit)	-	-2^{31} to +(2^{31} - 1)	0	p	32 bits	-	-
5Bh	H0B-90	Group No. of the abnormal parameter	-	0 to 65535	0	-	16 bits	-	-
5Ch	H0B-91	Offset of the abnormal parameter within the parameter group	-	0 to 65535	0	-	16 bits	-	-
200Dh/H0D: Auxiliary function parameters									
01h	H0D-00	Software reset	0: No operation 1: Enable	0 to 1	0	-	16 bits	At stop	At once
02h	H0D-01	Fault reset	0: No operation 1: Enable	0 to 1	0	-	16 bits	At stop	At once
03h	H0D-02	Offline inertia auto-tuning selection	0: Disable 1: Enable	0 to 1	0	-	16 bits	At stop	At once
04h	H0D-03	Encoder initial angle auto-tuning	0: No operation 1: Enable	0 to 1	0	-	16 bits	At stop	At once
05h	H0D-04	Read/write in encoder ROM	0: No operation 1: Write ROM 2: Read ROM	0 to 2	0	-	16 bits	At stop	At once
06h	H0D-05	Emergency stop	0: No operation 1: Enable	0 to 1	0	-	16 bits	During running	At once
0Ch	H0D-12	Phase U/V current balance correction	0: Disable 1: Enable	0 to 1	0	-	16 bits	At stop	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
12h	H0D-17	Forced DI/DO enable switch	0: No operation 1: Forced DI enabled, forced DO disabled 2: Forced DI disabled, forced DO enabled 3: Forced DI and DO enabled 4: EtherCAT forced DO enabled	0 to 4	0	-	16 bits	During running	At once
13h	H0D-18	Forced DI value	-	0 to 31	0	-	16 bits	During running	At once
14h	H0D-19	Forced DO value	-	0 to 7	0	-	16 bits	During running	At once
15h	H0D-20	Absolute encoder reset selection	0: No operation 1: Reset encoder fault 2: Reset encoder fault and multi-turn data	0 to 2	0	-	16 bits	At stop	At once
200Eh/H0E: Auxiliary function parameters									
01h	H0E-00	Node address	-	0 to 127	1	-	16 bits	During running	At once
02h	H0E-01	Save objects written through communication to EEPROM	0: Parameters and object dictionaries written through communication not saved to EEPROM 1: Only parameters written through communication saved to EEPROM 2: Only object dictionaries written through communication saved to EEPROM 3: Parameters and object dictionaries written through communication saved to EEPROM	0 to 3	3	-	16 bits	During running	At once
15h	H0E-20	EtherCAT slave name	-	0 to 65535	0	-	16 bits	-	-
16h	H0E-21	EtherCAT slave alias	-	0 to 65535	0	-	16 bits	At stop	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
17h	H0E-22	Number of synchronous loss events allowed by EtherCAT	-	1 to 20	8	-	16 bits	During running	At once
18h	H0E-23	EtherCAT station alias from EEPROM	-	0 to 65535	0	-	16 bits	During running	At once
19h	H0E-24	Number of SYNC loss events	-	0 to 65535	0	-	16 bits	-	-
1Ah	H0E-25	Max. error value and invalid frames of EtherCAT port 0 per unit time	-	0 to 65535	0	-	16 bits	-	-
1Bh	H0E-26	Max. error value and invalid frames of EtherCAT port 1 per unit time	-	0 to 65535	0	-	16 bits	-	-
1Ch	H0E-27	Max. transfer error of EtherCAT port per unit time	-	0 to 65535	0	-	16 bits	-	-
1Dh	H0E-28	Max. EtherCAT data frame processing unit error per unit time	-	0–255	0	-	16 bits	-	-
1Eh	H0E-29	Max. link loss value of EtherCAT port 0 per unit time	-	0 to 65535	0	-	16 bits	-	-
20h	H0E-31	EtherCAT synchronization mode setting	-	0 to 2	1	-	16 bits	At stop	Next power-on
21h	H0E-32	EtherCAT synchronization error threshold	-	0 to 4000	3000	us	16 bits	At stop	At once
22h	H0E-33	EtherCAT state machine status and port connection status	-	0 to 65535	0	-	16 bits	-	-

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
23h	H0E-34	Number of excessive position reference increment events in CSP mode	-	0 to 7	1	-	16 bits	During running	At once
24h	H0E-35	AL fault code	-	0 to 65535	0	-	16 bits	-	-
25h	H0E-36	EtherCAT AL enhanced link selection	0: Disable 1: Enable	0 to 1	0	-	16 bits	During running	Next power-on
26h	H0E-37	EtherCAT XML reset selection	0: Disable 1: Enable	0 to 1	0	-	16 bits	During running	Next power-on
51h	H0E-80	Modbus baud rate	9: 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 10: 230400 bps	0 to 10	9	-	16 bits	During running	At once
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	-	16 bits	During running	At once
53h	H0E-82	Modbus response delay	-	0 to 20	0	ms	16 bits	During running	At once
54h	H0E-83	Modbus communication timeout	-	0 to 600	0	ms	16 bits	During running	At once
5Bh	H0E-90	Modbus version	-	0 to 655.35	0	-	16 bits	-	-
5Eh	H0E-93	EtherCAT COE version	-	0 to 655.35	0	-	16 bits	-	-
61h	H0E-96	XML version	-	0 to 655.35	0	-	16 bits	-	-
2018h/H18: Position comparison output									

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
01h	H18-00	Position comparison output selection	0: Disable 1: Enable (rising edge-triggered)	-	0	-	16 bits	During running	At once
03h	H18-02	Position comparison resolution	0: 24-bit 1: 23-bit 2: 22-bit 3: 21-bit 4: 20-bit 5: 19-bit 6: 18-bit 7: 17-bit	-	1	-	16 bits	During running	At once
04h	H18-03	Position comparison mode	0: Individual comparison 1: Cyclic comparison	-	0	-	16 bits	During running	At once
05h	H18-04	Current position as zero	0: Disable 1: Enable (rising edge-triggered)	-	0	-	16 bits	During running	At once
06h	H18-05	Position comparison output width	-	-	0	0.1 ms	16 bits	During running	At once
08h	H18-07	Start point of position comparison	-	-	0	-	16 bits	During running	At once
09h	H18-08	End point of position comparison	-	-	0	-	16 bits	During running	At once
0Ah	H18-09	Current status of position comparison	-	-	0	-	16 bits	Unedita ble	At once
0Bh	H18-10	Real-time position of position comparison	-	-	0	-	32 bits	Unedita ble	At once
0Dh	H18-12	Zero offset of position comparison	-	-	0	-	32 bits	During running	At once
2019h/H19: Target position parameters									
01h	H19-00	Target value of position comparison 1	-	-	0	-	32 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
03h	H19-02	Attribute value of position comparison 1	0: Skip this point 1: Output DO active signal if current position changes from "less than" to "more than" the comparison point 2: Output DO active signal if current position changes from "more than" to "less than" the comparison point 3: Output DO active signal in both situations	-	0	-	16 bits	During running	At once
04h	H19-03	Target value of position comparison 2	-	-	0	-	32 bits	During running	At once
06h	H19-05	Attribute value of position comparison 2	0: Skip this point 1: Output DO active signal if current position changes from "less than" to "more than" the comparison point 2: Output DO active signal if current position changes from "more than" to "less than" the comparison point 3: Output DO active signal in both situations	-	0	-	16 bits	During running	At once
07h	H19-06	Target value of position comparison 3	-	-	0	-	32 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
09h	H19-08	Attribute value of position comparison 3	0: Skip this point 1: Output DO active signal if current position changes from "less than" to "more than" the comparison point 2: Output DO active signal if current position changes from "more than" to "less than" the comparison point 3: Output DO active signal in both situations	-	0	-	16 bits	During running	At once
0Ah	H19-09	Target value of position comparison 4	-	-	0	-	32 bits	During running	At once
0Ch	H19-11	Attribute value of position comparison 4	0: Skip this point 1: Output DO active signal if current position changes from "less than" to "more than" the comparison point 2: Output DO active signal if current position changes from "more than" to "less than" the comparison point 3: Output DO active signal in both situations	-	0	-	16 bits	During running	At once
0Dh	H19-12	Target value of position comparison 5	-	-	0	-	32 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
0Fh	H19-14	Attribute value of position comparison 5	0: Skip this point 1: Output DO active signal if current position changes from "less than" to "more than" the comparison point 2: Output DO active signal if current position changes from "more than" to "less than" the comparison point 3: Output DO active signal in both situations	-	0	-	16 bits	During running	At once
10h	H19-15	Target value of position comparison 6	-	-	0	-	32 bits	During running	At once
12h	H19-17	Attribute value of position comparison 6	0: Skip this point 1: Output DO active signal if current position changes from "less than" to "more than" the comparison point 2: Output DO active signal if current position changes from "more than" to "less than" the comparison point 3: Output DO active signal in both situations	-	0	-	16 bits	During running	At once
13h	H19-18	Target value of position comparison 7	-	-	0	-	32 bits	During running	At once

Para. Group		Name	Description	Value Range	Default	Unit	Data Type	Change Condition	Effective Time
HEX	DEC								
Index	Para.								
15h	H19-20	Attribute value of position comparison 7	0: Skip this point 1: Output DO active signal if current position changes from "less than" to "more than" the comparison point 2: Output DO active signal if current position changes from "more than" to "less than" the comparison point 3: Output DO active signal in both situations	-	0	-	16 bits	During running	At once
16h	H19-21	Target value of position comparison 8	-	-	0	-	32 bits	During running	At once
18h	H19-23	Attribute value of position comparison 8	0: Skip this point 1: Output DO active signal if current position changes from "less than" to "more than" the comparison point 2: Output DO active signal if current position changes from "more than" to "less than" the comparison point 3: Output DO active signal in both situations	-	0	-	16 bits	During running	At once

2.4.4 Parameter Group 6000h

The parameter group 6000h contains objects supported by the servo drive in DSP402 device profile.

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
603Fh	0	Error code	RO	TPDO	Uint 16	-	-	-	-	-
6040h	0	Control word	RW	RPDO	Uint 16	-	0 to 65535	0	During running	At once
6041h	0	Status word	RO	TPDO	Uint 16	-	-	-	-	-
605Ah	0	Quick stop option code	RW	No	int 16	-	0 to 7	2	During running	At stop
605Ch	0	Disable operation option code	RW	No	int 16	-	-4 to +1	0	During running	At stop
605Dh	0	Stop option code	RW	No	int 16	-	1 to 3	1	During running	At stop
605Eh	0	Fault reaction option code	RW	No	int 16	-	-5 to +3	2	During running	At stop
6060h	0	Modes of operation	RW	RPDO	int 8	-	0 to 10	0	During running	At once
6061h	0	Modes of operation display	RO	TPDO	int 8	-	-	-	-	-
6062h	0	Position demand value	RO	TPDO	int 32	Reference unit	-	-	-	-
6063h	0	Position actual value*	RO	TPDO	int 32	Encoder unit	-	-	-	-
6064h	0	Position actual value	RO	TPDO	int 32	Reference unit	-	-	-	-
6065h	0	Following error window	RW	RPDO	Uint 32	Reference unit	0 to $(2^{32} - 1)$	0	During running	At once
6066h	0	Following error time out	RW	RPDO	Uint 16	ms	0 to 65535	0	During running	At once
6067h	0	Position window	RW	RPDO	Uint 32	Reference unit	0 to $(2^{32} - 1)$	734	During running	At once
6068h	0	Position window time	RW	RPDO	Uint 16	ms	0 to 65535	0	During running	At once
606Ch	0	Velocity actual value	RO	TPDO	int 32	Reference unit/s	-	-	-	-
606Dh	0	Velocity window	RW	RPDO	Uint 16	RPM	0 to 65535	10	During running	At once

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
606Eh	0	Velocity window time	RW	RPDO	Uint 16	ms	0 to 65535	0	During running	At once
606Fh	0	Velocity threshold	RW	RPDO	Uint 16	RPM	0 to 65535	10	During running	At once
6070h	0	Velocity threshold time	RW	RPDO	Uint 16	ms	0 to 65535	0	During running	At once
6071h	0	Target torque	RW	RPDO	int 16	0.1%	-4000 to +4000	0	During running	At once
6072h	0	Max. torque	RW	RPDO	Uint 16	0.1%	0 to 4000	3500	During running	At once
6074h	0	Torque demand value	RO	TPDO	int 16	0.1%	-	0	-	-
6077h	0	Torque actual value	RO	TPDO	int 16	0.1%	-	0	-	-
607Ah	0	Target position	RW	RPDO	int 32	Reference unit	-2^{31} to $+(2^{31}-1)$	0	During running	At once
607Ch	0	Home offset	RW	RPDO	int 32	Reference unit	-2^{31} to $+(2^{31}-1)$	0	During running	At once
607D	Software position limit									
	0	Highest sub-index supported	RO	No	Uint 8	-	-	0x02	-	-
	1	Min. position limit	RW	RPDO	int 32	Reference unit	-2^{31} to $+(2^{31}-1)$	-2^{31}	During running	At once
	2	Max. position limit	RW	RPDO	int 32	Reference unit	-2^{31} to $+(2^{31}-1)$	$2^{31}-1$	During running	At once
607Eh	0	Polarity	RW	RPDO	Uint 8	-	0–255	0	During running	At once
607Fh	0	Max. profile velocity	RW	RPDO	Uint 32	Reference unit/s	0 to $(2^{32}-1)$	104857600	During running	At once
6081h	0	Profile velocity	RW	RPDO	Uint 32	User-defined velocity unit	0 to $(2^{32}-1)$	1747627	During running	At once
6083h	0	Profile acceleration	RW	RPDO	Uint 32	Reference unit/s^2	0 to $(2^{32}-1)$	174762666	During running	At once
6084h	0	Profile deceleration	RW	RPDO	Uint 32	Reference unit/s^2	0 to $(2^{32}-1)$	174762666	During running	At once
6085h	0	Quick stop deceleration	RW	RPDO	Uint 32	Reference unit/s^2	0 to $(2^{32}-1)$	$2^{31}-1$	During running	At once

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
6086h	0	Motion profile type	RW	RPDO	int 16	-	-32767 to +32767	0	During running	At once
6087h	0	Torque slope	RW	RPDO	Uint 32	0.1%/s	0 to (2^{32} - 1)	2^{32} - 1	During running	At once
6091h	Gear ratio									
	0	Highest sub-index supported	RO	No	Uint 8	Uint 8	-	0x02	-	-
	1	Motor revolutions	RW	RPDO	Uint 32	-	0 to (2^{32} - 1)	1	During running	At once
	2	Shaft revolutions	RW	RPDO	Uint 32	-	1 to (2^{32} - 1)	1	During running	At once
6098h	0	Homing method	RW	RPDO	int 8	-	-2 to +35	1	During running	At once
6099h	Homing speeds									
	0	Highest sub-index supported	RO	No	Uint 8	-	-	2	-	-
	1	Speed during search for switch	RW	RPDO	Uint 32	Reference unit/s	0 to (2^{32} - 1)	1747627	During running	At once
	2	Speed during search for zero	RW	RPDO	Uint 32	Reference unit/s	10 to (2^{32} - 1)	174763	During running	At once
609Ah	0	Homing acceleration	RW	RPDO	Uint 32	Reference unit/s^2	0 to (2^{32} - 1)	1747626667	During running	At once
60B0h	0	Position offset	RW	RPDO	int 32	Reference unit	-2^{31} to +(2^{31} - 1)	0	During running	At once
60B1h	0	Velocity offset	RW	RPDO	int 32	Reference unit/s	-2^{31} to +(2^{31} - 1)	0	During running	At once
60B2h	0	Torque offset	RW	RPDO	int 16	0.10%	-4000 to +4000	0	During running	At once
60B8h	0	Touch probe function	RW	RPDO	Uint 16	-	0 to 65535	0	During running	At once
60B9h	0	Touch probe status	RW	TPDO	Uint 16	-	-	0	-	-
60BAh	0	Touch probe 1 positive edge	RW	TPDO	int 32	Reference unit	-	0	-	-
60BBh	0	Touch probe 1 negative edge	RW	TPDO	int 32	Reference unit	-	0	-	-

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
60BCh	0	Touch probe 2 positive edge	RW	TPDO	int 32	Reference unit	-	0	-	-
60BDh	0	Touch probe 2 negative edge	RW	TPDO	int 32	Reference unit	-	0	-	-
60C5h	0	Max. acceleration	RW	RPDO	Uint 32	User-defined acceleration unit	0 to 2^{32} - 1	2^{31} - 1	During running	At once
60C6h	0	Max. deceleration	RW	RPDO	Uint 32	User-defined acceleration unit	0 to 2^{32} - 1	2^{31} - 1	During running	At once
60D5h	0	Touch probe 1 positive edge counter	RO	TPDO	Uint 16	-	-	0	-	-
60D6h	0	Touch probe 1 negative edge counter	RO	TPDO	Uint 16	-	-	0	-	-
60D7h	0	Touch probe 2 positive edge counter	RO	TPDO	Uint 16	-	-	0	-	-
60D8h	0	Touch probe 2 negative edge counter	RO	TPDO	Uint 16	-	-	0	-	-
60E0h	0	Positive torque limit value	RW	RPDO	Uint 16	0.1%	0 to 4000	3500	During running	At once
60E1h	0	Negative torque limit value	RW	RPDO	Uint 16	0.1%	0 to 4000	3500	During running	At once

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
60E3h	Supported homing method									
	0	Highest sub-index supported	RO	No	Uint 8	-	-	31	-	-
	1	1st supported homing method	RO	No	Uint 16	-	-	769	-	-
	2	2nd supported homing method	RO	No	Uint 16	-	-	770	-	-
	3	3rd supported homing method	RO	No	Uint 16	-	-	771	-	-
	4	4th supported homing method	RO	No	Uint 16	-	-	772	-	-

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
60E3h	5	5th supported homing method	RO	No	Uint 16	-	-	773	-	-
	6	6th supported homing method	RO	No	Uint 16	-	-	774	-	-
	7	7th supported homing method	RO	No	Uint 16	-	-	775	-	-
	8	8th supported homing method	RO	No	Uint 16	-	-	776	-	-
	9	9th supported homing method	RO	No	Uint 16	-	-	777	-	-
	A	10th supported homing method	RO	No	Uint 16	-	-	778	-	-
	B	11th supported homing method	RO	No	Uint 16	-	-	779	-	-
	C	12th supported homing method	RO	No	Uint 16	-	-	780	-	-
	D	13th supported homing method	RO	No	Uint 16	-	-	781	-	-
	E	14th supported homing method	RO	No	Uint 16	-	-	782	-	-

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
60E3h	F	15th supported homing method	RO	No	Uint 16	-	-	783	-	-
	10	16th supported homing method	RO	No	Uint 16	-	-	784	-	-
	11	17th supported homing method	RO	No	Uint 16	-	-	785	-	-
	12	18th supported homing method	RO	No	Uint 16	-	-	786	-	-
	13	19th supported homing method	RO	No	Uint 16	-	-	787	-	-
	14	20th supported homing method	RO	No	Uint 16	-	-	788	-	-
	15	21th supported homing method	RO	No	Uint 16	-	-	789	-	-
	16	22th supported homing method	RO	No	Uint 16	-	-	790	-	-
	17	23th supported homing method	RO	No	Uint 16	-	-	791	-	-
	18	24th supported homing method	RO	No	Uint 16	-	-	792	-	-

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
60E3h	19	25th supported homing method	RO	No	Uint 16	-	-	793	-	-
	1A	26th supported homing method	RO	No	Uint 16	-	-	794	-	-
	1B	27th supported homing method	RO	No	Uint 16	-	-	795	-	-
	1C	28th supported homing method	RO	No	Uint 16	-	-	796	-	-
	1D	29th supported homing method	RO	No	Uint 16	-	-	797	-	-
	1E	30th supported homing method	RO	No	Uint 16	-	-	798	-	-
	1F	31th supported homing method	RO	No	Uint 16	-	-	799	-	-
60E6h	0	Actual position calculation mode	RW	No	Uint 16	-	0 to 1	0	During running	At once
60F4h	0	Following error actual value	RO	TPDO	int 32	Reference unit	-	-	-	-
60FCh	0	Position demand value*	RO	TPDO	int 32	Encoder unit	-	-	-	-
60FDh	0	Digital inputs	RO	TPDO	Uint 32	-	-	-	-	-
60FEh	Digital outputs									
	0	DO state	RO	No	Uint 8	-	-	2	-	-
	1	Physical outputs	RW	RPDO	Uint 32	-	0 to 2^{32} - 1	0	During running	At once
	2	Bitmask	RW	No	Uint 32	-	0 to 2^{32} - 1	0	During running	At once

Index (HEX)	Sub-index (HEX)	Name	Access	PDO Mapping	Data Type	Unit	Data Range	Default	Change Condition	Effective Time
60FFh	0	Target velocity	RW	RPDO	int 32	Reference unit/s	-2^{31} - 1 to $+(2^{31}$ - 1)	0	During running	At once
6502h	0	Supported drive modes	RO	No	Uint 32	-	-	941	-	-

2.5 Description of Parameters

2.5.1 Classification of Object Dictionary

The object dictionary is the most important part in device specifications. It is an ordered set of parameters and variables that include device descriptions and all parameters of device network status. A group of objects can be accessed in an ordered and pre-defined way through the network.

The CANopen protocol adopts the object dictionary with 16-bit indexes and 8-bit sub-indexes. The structure of the object dictionary is shown in the following table.

Index	Object
0	Not used
0001h–001Fh	Static data types (standard data types, such as Boolean and Integer16)
0020h–003Fh	Complex data types (predefined structure consisting of simple types, such as PDOCommPar and SDOParmeter)
0040h–005Fh	Manufacturer-specific complex data types
0060h–007Fh	Device profile-specific static data types
0080h–009Fh	Device profile-specific complex data types
00A0h–0FFFh	Reserved
1000h–1FFFh	Communication profile area (such as the device type, error register, and number of supported PDOs)
2000h–5FFFh	Manufacturer-specific profile area (such as parameter mapping)
6000h–9FFFh	Standardized device profile area (for example, CiA402 protocol)
A000h–FFFFh	Reserved

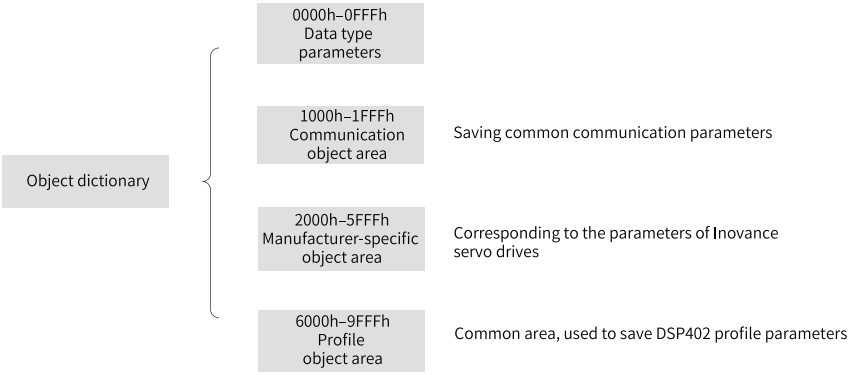


Figure 2-8 Structure of CANopen object dictionary

Objects in SV660N include the following attributes: index, sub-index, data structure, data type, access, mapping, setting condition & effective time, related mode, data range, and default

★Definitions of terms

Position of the object dictionary in the parameter list is specified by the "Index" and "Sub-index".

- "Index": This field (in hexadecimal) specifies the position of the same type of objects in the object dictionary.
- "Sub-index": This field specifies the offset of each object under the same index.

The mapping relation between the parameter and the object dictionary is as follows:

- Object dictionary index = 0x2000 + Parameter group number
- Object dictionary sub-index = Hexadecimal offset within the parameter group + 1

For example, parameter H02-10 is mapped to object 2002-0Bh (H02-07).

Objects in the object dictionary are described based on types.

For example, 607Dh, which limits the software position, describes the minimum and maximum position limits as defined below:

Index	Sub-index	Name	Meaning
607Dh	00h	Number of entries	Defines the number of object data (exclusive of the sub-index 00h).
607Dh	01h	Min. position limit	Defines the minimum position limit (absolute position mode).
607Dh	02h	Max. position limit	Defines the maximum position limit (absolute position mode).

"Data Structure": See the following table for details.

Table 2–5 Description for "Data Structure"

Type	Meaning	DS301 Value
VAR	Single simple value, including data types Int8, Uint16, and String	7
ARR	Data block of the same type	8
REC	Data block of different types	9

"Data Type": See the following table for details.

Table 2–6 Description for "Data Type"

Data Type	Value Range	Data Length	DS301 Value
Int8	-128 to +127	1 byte	2
Int16	-32768 to +32767	2 bytes	3
Int32	-2147483648 to +2147483647	4 bytes	4
Uint8	0 to 255	1 byte	5
Uint16	0 to 65535	2 bytes	6
Uint32	0 to 4294967295	4 bytes	7
String	ASCII	-	9

"Access": See the following table for details.

Table 2–7 Description for "Access"

Access	Description
RW	Read/Write
WO	Write-only
RO	Read-only
CONST	Constant, read-only

"Mapping": See the following table for details.

Table 2–8 Description for "Mapping"

Mapping	Description
No	Cannot be mapped to PDO
RPDO	Can be used as RPDO
TPDO	Can be used as TPDO

"Setting Condition & Effective Time": See the following table for details.

Table 2–9 Description for "Setting Condition & Effective Time"

Setting Condition	Description
At stop	The parameter can be edited only when the servo drive is not in the operational state.
During running	The parameter can be edited when the servo drive is in any state.
At once	The change in the parameter value is activated at once.
At stop	The change in the parameter value is activated after the servo drive is not in the operational state.
Next power-on	The change in the parameter value is activated at next power-on. Note: The servo drive reports E941 when the value of the parameter whose "Effective Time" is "Next power-on" is changed.

"Related Mode": See the following table for details.

Table 2–10 Description for "Related Mode"

Related Mode	Description
-	The parameter is not related to the control mode.
All	The parameter is related to all the control modes.
PP/PV/PT/HM/CSP/CSV/CST	The parameter is related to specific control modes.

"Data Range": Indicates the upper and lower limits of writable parameters.

If the value of a parameter modified through SDO exceeds the data range, the servo drive returns a SDO transmission abort code to deactivate the modification.

If the value of a parameter is modified through PDO, the servo drive does not check the validity of the value.

"Default": Indicates the default value of the parameter.

2.5.2 Communication Parameters (Group 1000h)

Index 1000h	Name	Device type					Data Structure	VAR	Data Type	Int32
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	0x00020192
Defines the CoE device profile type.										

Index 1008h	Name	Manufacturer device name					Data Structure	-	Data Type	-
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	SV660-ECAT
Defines the manufacturer device name.										

Index 1009h	Name	Manufacturer hardware version					Data Structure	-	Data Type	-
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	Dependent on the hardware version of the drive.
Defines the hardware version of the manufacturer device.										

Index 100Ah	Name	Manufacturer software version					Data Structure	-	Data Type	-
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	Dependent on the software version of the drive.
Defines the software version of the manufacturer device.										

Index 1018h	Name	Identity object					Data Structure	REC	Data Type	OD data type
	Access	RO	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the device information.										

Sub-index 00h	Name	Number of entries					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	4	Default	4

Sub-index 01h	Name	Vendor ID					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	0x00100000
Defines the series number of the drive.										

Sub-index 02h	Name	Product code					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	786696
Defines the internal code of the drive.										

Sub-index 03h	Name	Revision number					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	65537
Defines the software update record number of the drive.										

Index 1C00h	Name	Sync Manager communication type					Data Structure	REC	Data Type	OD data type
	Access	RO	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the communication type of the Sync Manager.										

Sub-index 00h	Name	Number of Sync Manger channels					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	4	Default	4

Sub-index 01h	Name	SM0 communication type					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	0x01
SM0 communication type : mailbox write										

Sub-index 02h	Name	SM1 communication type					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	0x02
SM1 communication type : mailbox read										

Sub-index 03h	Name	SM2 communication type					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	0x03
SM2 Communication type: process data output										

Sub-index 04h	Name	SM3 communication type					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	0x04
SM3 communication type: process data input										

Index 1600h	Name	1st Receive PDO mapping					Data Structure	REC	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the mapped objects of RPDO1.										

Sub-index 00h	Name	Number of mapped objects in RPDO1					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 10	Default	3

Sub-index 01h	Name	1st mapped object					Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60400010

Sub-index 02h	Name	2nd mapped object					Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	607A0020

Sub-index 03h	Name	3rd mapped object					Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60B80020

Sub-index 04h to 0Ah	Name	4th to 10th mapped objects					Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	All	Data Range	0 to 4294967295	Default	-

Index 1701h	Name	258th Receive PDO mapping					Data Structure	REC	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the mapped object of RPDO258										

Sub-index 00h	Name	Number of mapped objects in RPDO258					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	4

Sub-index 01h	Name	1st mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60400010

Sub-index 02h	Name	2nd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	607A0020

Sub-index 03h	Name	3rd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60B80010

Sub-index 04h	Name	4th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60FE0120

Index 1702h	Name	259th Receive PDO mapping					Data Structure	REC	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the mapped object of RPDO259.										

Sub-index 00h	Name	Number of mapped objects in RPDO259					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	7

Sub-index 01h	Name	1st mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60400010

Sub-index 02h	Name	2nd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	607A0020

Sub-index 03h	Name	3rd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60FF0020

Sub-index 04h	Name	4th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	All	Data Range	0 to 4294967295	Default	60710010

Sub-index 05h	Name	5th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60600008

Sub-index 06h	Name	6th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60B80010

Sub-index 07h	Name	7th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	607F0020

Index 1703h	Name	260th Receive PDO mapping					Data Structure	REC	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the mapped object of RPDO260.										

Sub-index 00h	Name	Number of mapped objects in RPDO260					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	7

Sub-index 01h	Name	1st mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60400010

Sub-index 02h	Name	2nd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	607A0020

Sub-index 03h	Name	3rd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60FF0020

Sub-index 04h	Name	4th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60600008

Sub-index 05h	Name	5th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60B80010

Sub-index 06h	Name	6th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60E00010

Sub-index 07h	Name	7th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60E10010

Index 1704h	Name	261st Receive PDO mapping					Data Structure	REC	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the mapped object of RPDO261.										

Sub-index 01h	Name	1st mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60400010

Sub-index 02h	Name	2nd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	607A0020

Sub-index 03h	Name	3rd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60FF0020

Sub-index 04h	Name	4th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60710010

Sub-index 05h	Name	5th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60600008

Sub-index 06h	Name	6th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60B80010

Sub-index 07h	Name	7th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	607F0020

Sub-index 08h	Name	8th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60E00010

Sub-index 09h	Name	9th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60E10010

Index 1705h	Name	262nd Receive PDO mapping					Data Structure	REC	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the mapped object of RPDO262.										

Sub-index 00h	Name	Number of mapped objects in RPDO262					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	8

Sub-index 01h	Name	1st mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60400010

Sub-index 02h	Name	2nd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	607A0020

Sub-index 03h	Name	3rd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60FF0020

Sub-index 04h	Name	4th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60600008

Sub-index 05h	Name	5th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60B80010

Sub-index 06h	Name	6th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60E00010

Sub-index 07h	Name	7th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60E10010

Sub-index 08h	Name	8th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60B20010

Index 1A00h	Name	1st Transmit PDO mapping					Data Structure	REC	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the mapped object of TPDO1.										

Sub-index 00h	Name	Number of mapped objects in TPDO1					Data Structure	-	Data Type	Uint8
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 10	Default	7

Sub-index 01h	Name	1st mapped object					Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60400010

Sub-index 02h	Name	2nd mapped object					Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60640020

Sub-index 03h	Name	3rd mapped object					Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60B90010

Sub-index 04h	Name	4th mapped object					Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60BA0020

Sub-index 05h	Name	5th mapped object					Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60BC0020

Sub-index 06h	Name	6th mapped object					Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	603F0010

Sub-index 07h	Name	7th mapped object					Data Structure	-	Data Type	Uint32
	Access	RW	Map ping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60FD0020

Sub-index 08h	Name	8th mapped object					Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	-

Sub-index 09h	Name	9th mapped object					Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	-

Sub-index 10h	Name	10th mapped object					Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	-

Index 1B01h	Name	258th Transmit PDO mapping					Data Structure	REC	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the mapped object of TPDO258.										

Sub-index 00h	Name	Number of mapped objects in TPDO258					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	8

Sub-index 01h	Name	1st mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	603F0010

Sub-index 02h	Name	2nd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60410010

Sub-index 03h	Name	3rd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60640020

Sub-index 04h	Name	4th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60770010

Sub-index 05h	Name	5th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60F40020

Sub-index 06h	Name	6th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60B90010

Sub-index 07h	Name	7th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60BA0020

Sub-index 08h	Name	8th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60FD0020

Index 1B02h	Name	259th Transmit PDO mapping					Data Structure	REC	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the mapped object of TPDO259.										

Sub-index 00h	Name	Number of mapped objects in TPDO259					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	9

Sub-index 01h	Name	1st mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	603F0010

Sub-index 02h	Name	2nd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60410010

Sub-index 03h	Name	3rd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60640020

Sub-index 04h	Name	4th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60770010

Sub-index 05h	Name	5th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60610008

Sub-index 06h	Name	6th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60B90010

Sub-index 07h	Name	7th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60B A0020

Sub-index 08h	Name	8th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60B C0020

Sub-index 09h	Name	9th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	,. 60FD0020

Index 1B03h	Name	260th Transmit PDO mapping					Data Structure	REC	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the mapped object of TPDO260.										

Sub-index 00h	Name	Number of mapped objects in TPDO260					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	10

Sub-index 01h	Name	1st mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	603F0010

Sub-index 02h	Name	2nd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60410010

Sub-index 03h	Name	3rd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60640020

Sub-index 04h	Name	4th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60770010

Sub-index 05h	Name	5th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60F40020

Sub-index 06h	Name	6th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60610008

Sub-index 07h	Name	7th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60B90010

Sub-index 08h	Name	8th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60B A0020

Sub-index 09h	Name	9th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60BC0020

Sub-index 0Ah	Name	10th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60FD0020

Index 1B04h	Name	261st Transmit PDO mapping					Data Structure	REC	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the mapped object of TPDO261.										

Sub-index 00h	Name	Number of mapped objects in TPDO261					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	0

Sub-index 01h	Name	1st mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	603F0010

Sub-index 02h	Name	2nd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60410010

Sub-index 03h	Name	3rd mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60640020

Sub-index 04h	Name	4th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60770010

Sub-index 05h	Name	5th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60610008

Sub-index 06h	Name	6th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60F40020

Sub-index 07h	Name	7th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60B90010

Sub-index 08h	Name	8th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60BA0020

Sub-index 09h	Name	9th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	60BC0020

Sub-index 0Ah	Name	10th mapped object					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 4294967295	Default	606C0020

Index 1C12h	Name	Sync Manager 2 RPDO assignment					Data Structure	ARR	Data Type	Uint16
	Access	RW	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the index of the object assigned.										

Sub-index 00h	Name	Number of assigned RPDOs					Data Structure	-	Data Type	Uint8
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 1	Default	1

Sub-index 01h	Name	Index of assigned RPDO					Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	-	Data Range	0 to 65535	Default	5889

Defines the index of the object assigned.
Observe the following procedure:
1. Perform conofiguration only when the EtherCAT state machine is in the pre-operational ("P" displayed on the keypad) state.
2. There is no need to set 1C12h in cases where the assigned RPDO is selected through the twinCAT host controller software. In other cases, assign the PDO according to the following procedure.
- Step 1: Write 0 to 1C12-00h.
- Step 2: Write RPDOx (1600/1701...1705) to be used to 1C12-01h.
- Step 3: If an index among 1701...1705 is used as RPDO and the mapped object cannot be modified, go to step 5. If 1600 is used as RPDO, write the value 0 to the sub-index 00h of RPDOx, and write mapped objects to 01h...0Ah. Then, go to step 4.
- Step 4: After the mapped objects in 1600 are written, write the number of mapped objects to 1600-00h.
- Step 5. Write 1 to 1C12-00h.

Index 1C13h	Name	Sync Manager 2 TPDO assignment					Data Structure	ARR	Data Type	Uint16
	Access	RW	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value

Defines the index of the object assigned.

Sub-index 00h	Name	Number of assigned TPDOs					Data Structure	-	Data Type	Uint8
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 1	Default	1

Sub-index 01h	Name	Index of assigned TPDO					Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	-	Data Range	0 to 65535	Default	5889

Defines the index of the object assigned.
Observe the following procedure:
1. Perform configuration only when the EtherCAT state machine is in the pre-operational ("P" displayed on the keypad) state.
2. There is no need to set 1C12h in cases where the assigned TPDO is selected through the twinCAT host controller software. In other cases, assign the PDO according to the following procedure.
- Step 1: Write 0 to 1C13-00h.
- Step 2: Write the TPDOx (1A00/1B01...1B04) to be used to 1C13-01h.
- Step 3: If an index among 1B01...1B04 is used as TPDO and the mapped object cannot be modified, go to step 5. If 1A00 is used as TPDO, write the value 0 to the sub-index 00h of 1A00, and write mapped objects to 01h...0Ah. Then, go to step 4.
- Step 4: After the mapped objects in 1A00h are written, write the number of mapped objects to 1A00-00h.
- Step 5: Write 1 to 1C13-00h.

Index 1C32h	Name	Sync Manager 2 output parameters					Data Structure	REC	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the output parameters of Sync Manager 2.										

Sub-index 00h	Name	Number of synchronization parameters					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	32

Sub-index 01h	Name	Synchronization type					Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	2
"0x0002" indicates the distributed clock synchronization mode 0 (DC Sync mode 0).										

Sub-index 02h	Name	Cycle time (unit: ns)					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	0
Defines the cycle of DC Sync 0.										

Sub-index 04h	Name	Synchronization types supported					Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	4
Defines the type of the distributed clock. "0x0004" indicates the distributed clock synchronization mode 0 (DC Sync mode 0).										

Sub-index 05h	Name	Minimum cycle time					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	125000
Defines the minimum synchronization cycle (unit: ns) supported by the slave.										

Note

The minimum cycle time supported by SV660N is 125000 ns. The network cannot enter the OP state if the actual cycle time is less than 125000 ns.

Sub-index 06h	Name	Calc and copy time (unit: ns)					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	-
Defines the time for the microprocessor to copy data from Sync Manager to local.										

Sub-index 09h	Name	Delay time (unit: ns)					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	-

Sub-index 20h	Name	Sync error					Data Structure	-	Data Type	BOOL
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	-
Indicates whether the synchronization error occurs. True: Synchronization active and synchronization error not occurred False: Synchronization inactive and synchronization error occurred										

Index 1C33h	Name	Sync Manager 2 input parameters					Data Structure	REC	Data Type	OD data type
	Access	RO	Mapping	No	Related Mode	-	Data Range	OD data range	Default	OD default value
Defines the input parameters of Sync Manager 2.										

Sub-index 00h	Name	Number of synchronization parameters					Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	32

Sub-index 01h	Name	Synchronization type					Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	2
"0x0002" indicates the distributed clock synchronization mode 0 (DC Sync mode 0).										

Sub-index 02h	Name	Cycle time (unit: ns)					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	-
Defines the synchronization cycle of DC Sync 0.										

Sub-index 04h	Name	Synchronization types supported					Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	4
Defines the type of the distributed clock. "0x0004" indicates the distributed clock synchronization mode 0 (DC Sync mode 0).										

Sub-index 05h	Name	Minimum cycle time					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	125000
Defines the minimum synchronization cycle (unit: ns) supported by the slave.										

Note

The minimum cycle time supported by SV660N is 125000 ns. The network cannot enter the OP state if the actual cycle time is less than 125000 ns.

Sub-index 06h	Name	Calc and copy time (unit: ns)					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	-
Defines the time for the microprocessor to copy data from Sync Manager to local.										

Sub-index 09h	Name	Delay time (unit: ns)					Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	-

Sub-index 20h	Name	Sync error					Data Structure	-	Data Type	BOOL
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	-
Indicates whether the synchronization error occurs. True: Synchronization active and synchronization error not occurred False: Synchronization inactive and synchronization error occurred										

2.5.3 Manufacturer-specific Parameters (Group 2000h)

2.5.3.1 Group 2000h: Servo Motor Parameters

Index 2000h	Name	Servo motor parameters			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint16
	Access	-	Mapping	Yes	Related Mode	-	Data Range	OD Data Range	Default	OD Default Value
Defines servo motor parameters.										

Sub-index 00h	Name	Number of entries			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	6

Sub-index 01h	Name	Motor code			Setting Condition & Effective Time	At stop Next power-on	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	14101

Defines the code of the servo motor.
The SV660N series servo drive is intended to be used with a serial-type motor. The motor code is fixed to "14XXX". See 2000-06h for details on serial-type motor models.

Setpoint	Motor code	Remarks
14000	Inovance motor equipped with a 20-bit encoder	-
14101	Inovance motor equipped with a 23-bit absolute encoder	For details on the absolute encoder, See section "Introduction to the Absolute Encoder System" in SV660N Series Servo Drive Function Guide.

Setting the motor code to a wrong value will lead to E120.1 (Unknown motor model).

Sub-index 03h	Name	Customized No.			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to (2^{32} - 1)	Default	0

Displays customized software No. in hexadecimal (XXX.YY).
XXX: Fixed No. for customized software
YY: Upgrade record No. for customized software

Sub-index 05h	Name	Encoder version			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 6553.5	Default	0
Displays the encoder software version in the format of 2XXX.Y, with one decimal place.										

Sub-index 06h	Name	Serial-type motor model			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0
Displays the code of the serial-type motor, which is determined by the motor model and unmodifiable.										

Sub-index 07h	Name	FPGA customized No.			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 655.35	Default	0

Sub-index 08h	Name	STO version			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 655.35	Default	0

Sub-index 09h	Name	Serial encoder type			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0

2.5.3.2 Group 2001h: Servo Drive Parameters

Index 2001h	Name	Servo drive parameters			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint16
	Access	-	Mapping	Yes	Related Mode	-	Data Range	OD Data Range	Default	OD Default Value
Defines parameters of the servo drive.										

Sub-index 00h	Name	Number of entries			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	32

Sub-index 01h	Name	MCU software version			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0
Displays the MCU software version. The display format is XXXX.Y, with one decimal place.										

Sub-index 02h	Name	FPGA software version			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0
Displays the FPGA software version. The display format is XXXX.Y, with one decimal place.										

Sub-index 0Bh	Name	Servo drive model			Setting Condition & Effective Time	At stop Next power-on	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0

Defines the servo drive model.

SV660N series servo drive models are listed in the following table.

Setpoint	Servo Drive Model	Remarks
2	S1R6	Rated power of the servo drive: 0.2 kW Power supply of the main circuit: Single-phase 220 V
3	S2R8	Rated power of the servo drive: 0.4 kW Power supply of the main circuit: Single-phase 220 V
5	S5R5	Rated power of the servo drive: 0.75 kW Power supply of the main circuit: Single-phase 220 V
6	S7R6	Rated power of the servo drive: 1.0 kW Power supply of the main circuit: Single-phase/Three-phase 220 V [1]
7	S012	Rated power of the servo drive: 1.5 kW Power supply of the main circuit: Single-phase/Three-phase 220 V [1]
10001	T3R5	Rated power of the servo drive: 1.0 kW Power supply of the main circuit: Three-phase 380 V
10002	T5R4	Rated power of the servo drive: 1.5 kW Power supply of the main circuit: Three-phase 380 V
10003	T8R4	Rated power of the servo drive: 2.0 kW Power supply of the main circuit: Three-phase 380 V
10004	T012	Rated power of the servo drive: 3.0 kW Power supply of the main circuit: Three-phase 380 V
10005	T017	Rated power of the servo drive: 5.0 kW Power supply of the main circuit: Three-phase 380 V
10006	T021	Rated power of the servo drive: 6.0 kW Power supply of the main circuit: Three-phase 380 V
10007	T026	Rated power of the servo drive: 7.5 kW Power supply of the main circuit: Three-phase 380 V

If the voltage input to the main circuit of the servo drive does not comply with the preceding specifications, E420.0 (Main circuit phase loss) occurs.

[1]: The main circuit of the servo drive supports single-phase 220 V power supplies without derating.

Sub-index 0Ch	Name	DC-AC voltage class			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	220

Sub-index 0Dh	Name	Rated power of the servo drive			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 1073741824	Default	0.4

Sub-index 0Fh	Name	Max. output power of the servo drive			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 1073741824	Default	0.4

Sub-index 11h	Name	Rated output current of the servo drive			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 1073741824	Default	2.8

Sub-index 13h	Name	Max. output current of the servo drive			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 1073741824	Default	10.1

Sub-index 29h	Name	DC bus overvoltage protection threshold			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 2000	Default	420

2.5.3.3 Group 2002h: Basic Control Parameters

Index 2002h	Name	Basic control parameters			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint16
	Access	-	Mapping	Yes	Related Mode	-	Data Range	OD Data Range	Default	OD Default Value
Defines basic control parameters.										

Sub-index 00h	Name	Number of entries			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	36

Sub-index 01h	Name	Control mode			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 9	Default	9

Defines the control mode of the servo drive.

When the servo drive is in the EtherCAT bus control mode, bit 9 of the status word 6041h is set to 1.

For the operation modes of the servo drive, see Chapter "Basic Functions" in SV660N Series Servo Drive Function Guide.

Setpoint	Description
0	Speed control mode
1	Position control mode
2	Torque control mode
9	EtherCAT mode

Sub-index 02h	Name	Absolute encoder system selection			Setting Condition & Effective Time	At stop & Next power-on	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 4	Default	0

Defines the mode of the absolute encoder system.

Setpoint	Absolute encoder system selection	Remarks
0	Incremental position mode	The encoder is used as a serial incremental encoder without power-off memory.
1	Absolute position linear mode	The encoder is used as an absolute encoder with power-off memory. This mode is applicable to applications where the load travel range is fixed and multi-turn data does not overflow.
2	Absolute position rotation mode	The encoder is used as an absolute encoder with power-off memory. This mode applies to applications where the load travel range is not limited and the number of unidirectional revolutions is lower than 32767.
3	Absolute position linear mode (encoder overflow not detected)	Encoder overflow will not be detected in this mode.
4	Absolute position single-turn mode	-

Note

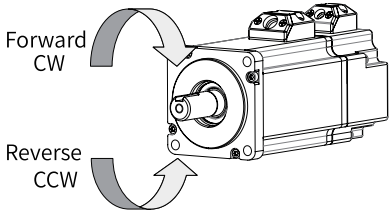
In the absolute position mode, the system automatically detects the motor code to check whether an absolute encoder is used. If not, E122.0 (Multi-turn absolute encoder setting error) will be reported.

For details on the absolute position mode, see section "Introduction to the Absolute Encoder System" in SV660N Series Servo Drive Function Guide.

Sub-index 03h	Name	Direction of rotation			Setting Condition & Effective Time	At stop & Next power-on	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 1	Default	0

Defines the forward direction of the motor when viewed from the motor shaft side.

Setpoint	Direction of rotation	Remarks
0	Counterclockwise (CCW) as forward direction	Defines the CCW direction as the forward direction when a forward run command is received, indicating the motor rotates in the CCW direction when viewed from the motor shaft side.
1	Clockwise (CW) as forward direction	Defines the CW direction as the forward direction when a forward run command is received, indicating the motor rotates in the CW direction when viewed from motor shaft side.



Sub-index 06h	Name	Stop mode at S-ON OFF			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	int16
	Access	RW	Mapping	-	Related Mode	All	Data Range	-3 to +1	Default	0

Defines the deceleration mode of the motor for stopping rotating upon S-ON OFF and the motor status after stop.

Setpoint	Stop Mode
-3	Stop at zero speed, keeping dynamic braking status
-2	Ramp to stop as defined by 6084h/609Ah, keeping dynamic braking status
-1	Dynamic braking stop, keeping dynamic braking status
0	Coast to stop, keeping de-energized status
1	Ramp to stop as defined by 6084h/609Ah, keeping de-energized status

Set a proper stop mode according to the mechanical status and operation requirements.
For comparison of stop modes, see section "Servo OFF" in SV660N Series Servo Drive Commissioning Guide.
After the brake output function is enabled, the stop mode upon S-ON OFF is forcibly set to "Ramp to stop as defined by 6085h, keeping dynamic braking status".

Sub-index 07h	Name	Stop mode at No. 2 fault			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	int16
	Access	RW	Mapping	-	Related Mode	All	Data Range	-5 to +3	Default	2

Defines the deceleration mode of the motor for stopping rotating upon occurrence of a No. 2 fault and the motor status after stop.

Setpoint	Stop Mode
-5	Stop at zero speed, keeping dynamic braking status
-4	Stop at emergency-stop torque, keeping dynamic braking status
-3	Ramp to stop as defined by 6085h, keeping dynamic braking status
-2	Ramp to stop as defined by 6084h/609Ah, keeping dynamic braking status
-1	Dynamic braking stop, keeping dynamic braking status
0	Coast to stop, keeping de-energized status
1	Ramp to stop as defined by 6084h/609Ah, keeping de-energized status
2	Ramp to stop as defined by 6085h, keeping de-energized status
3	Stop at emergency-stop torque, keeping de-energized status

After the brake (BK) output function is enabled, the stop mode at No. 2 fault is forcibly set to "Ramp to stop as defined by 6085h, keeping dynamic braking status".

Sub-index 08h	Name	Stop mode at overtravel			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 7	Default	1

Defines the deceleration mode of the motor for stopping rotating upon overtravel and the motor status after stop.

Setpoint	Stop Mode
0	Coast to stop, keeping de-energized status
1	Stop at zero speed, keeping position lock status
2	Stop at zero speed, keeping de-energized status
3	Ramp to stop as defined by 6085h, keeping de-energized status
4	Ramp to stop as defined by 6085h, keeping position lock status
5	Dynamic braking stop, keeping de-energized status
6	Dynamic braking stop, keeping dynamic braking status
7	Not responding to overtravel

When the servo motor drives a vertical axis, set 2002-08h (H02-07) to 1 or 4 to allow the motor shaft to stay locked upon overtravel.
For comparison of stop modes, see section "Servo OFF" in SV660N Series Servo Drive Commissioning Guide.
After the brake output function is enabled, the stop mode at S-ON OFF is forcibly set to "Ramp to stop as defined by 6085h, keeping position lock status".

Sub-index 09h	Name	Stop mode at No. 1 fault			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 2	Default	2

Defines the deceleration mode of the motor for stopping rotating when a No. 1 fault occurs and the motor status after stop.

Setpoint	Stop Mode
0	Coast to stop, keeping de-energized state
1	Dynamic braking stop, keeping de-energized status
2	Dynamic braking stop, keeping dynamic braking status

For details on No. 1 fault and comparison of stop modes, see Chapter "Troubleshooting" and section "Servo OFF" in SV660N Series Servo Drive Commissioning Guide.
After the brake output function is enabled, the stop mode at No. 1 fault is forcibly set to "Dynamic braking stop, keeping dynamic braking status".

Sub-index 0Ah	Name	Delay from brake output ON to command received			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 500 (ms)	Default	250

Defines the delay from the moment the brake (BK) output signal is ON to the moment the servo drive starts to receive commands after power-on.
Within the time defined by 2002-0Ah (H02–09), the servo drive does not receive position/speed/torque references.
See section "Brake Settings" in SV660N Series Servo Drive Commissioning Guide to check the brake sequence for the motor at standstill.

Sub-index 0Bh	Name	Delay from brake (BK) output OFF to motor de-energized in the stop state			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	50 to 1000 (ms)	Default	150

Defines the delay from the moment brake (BK) output is OFF to the moment when the motor at standstill enters the de-energized status.
See section "Brake Settings" in SV660N Series Servo Drive Commissioning Guide to check the brake sequence for the motor at standstill.

Sub-index 0Ch	Name	Motor speed threshold at brake (BK) output OFF in the rotation state			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	20 to 3000 (ms)	Default	30
Defines the motor speed threshold when brake (BK) output is OFF in the rotation state. See section "Brake Settings" in SV660N Series Servo Drive Commissioning Guide to check the brake sequence for a rotating motor.										

Sub-index 0Dh	Name	Delay from S-ON OFF to brake (BK) output OFF in the rotation state			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Map ping	-	Related Mode	All	Data Range	1 to 1000 (ms)	Default	500
Defines the delay from the moment the S-ON signal is OFF to the moment the brake (BK) output is OFF in the rotation state. See section "Brake Settings" in SV660N Series Servo Drive Commissioning Guide to check the brake sequence for a rotating motor.										

Sub-index 10h	Name	Warning display on the keypad			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Map ping	-	Related Mode	-	Data Range	0 to 1	Default	0
Defines whether to switch the keypad to the fault display mode when a No. 3 fault occurs. For details on No.3 warnings, see Chapter "Troubleshooting" in SV660N Series Servo Drive Commissioning Guide.										

Sub-index 11h	Name	Brake enable switch			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Map ping	-	Related Mode	-	Data Range	0 to 1	Default	1

Setpoint	Description
0	Inhibited
1	Enable

Sub-index 15h	Name	Dynamic brake relay coil ON delay			Setting Condition & Effective Time	During running At once	Data Structure	-	Data Type	Uint16
	Access	RW	Map ping	-	Related Mode	-	Data Range	30 to 30000	Default	30

Sub-index 16h	Name	Permissible minimum resistance of regenerative resistor			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Map ping	-	Related Mode	-	Data Range	1 to 1000	De fault	40
The permissible minimum resistance of the regenerative resistor is only related to the servo drive model.										

Sub-index 17h	Name	Power of built-in regenerative resistor			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Map ping	-	Related Mode	-	Data Range	0 to 65535	De fault	0
The power of the built-in regenerative resistor is only related to the servo drive model, which is unmodifiable.										

Sub-index 18h	Name	Resistance of built-in regenerative resistor			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Map ping	-	Related Mode	-	Data Range	0 to 65535	De fault	0

The resistance of the built-in regenerative resistor is only related to the servo drive model, which is unmodifiable.
The built-in regenerative resistor comes into rescue when the maximum braking energy calculated exceeds the absorption capacity of the capacitor.
When using the built-in regenerative resistor, connect a jumper bar between terminals P⊕ and D.
When the value of 2001-0Bh (Servo drive model) is 2 or 3, the built-in regenerative resistor is not installed in the servo drive.

Servo Drive Model		Specifications of Built-in Regenerative Resistor	
		Resistance (Ω)	Power (W)
Single-phase 220 V	SV660NS1R6I	-	-
	SV660NS2R8I	-	-
	SV660NS5R5I	50	50
Three-phase 220 V	SV660NS7R6I	25	80
	SV660NS012I		
Three-phase 380 V	SV660NT3R5I	100	80
	SV660NT5R4I	100	80
	SV660NT8R4I	50	80
	SV660NT012I		
	SV660NT017I	35	100
	SV660NT021I		
	SV660NT026I		

Sub-index 19h	Name	Resistor heat dissipation coefficient			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Map ping	-	Related Mode	-	Data Range	10 to 100 (%)	De fault	30
Defines the heat dissipation coefficient of the regenerative resistor, which is applicable to both external and built-in regenerative resistors. Set the heat dissipation coefficient 2002-19h (H02-24) based on actual cooling conditions of the resistor. Recommendations: Set 2002-19h (H02-24) to a value lower than or equal to 30% in case of natural ventilation. Set 2002-19h (H02-24) to a value lower than or equal to 50% in case of forced-air cooling.										

Sub-index 1Ah	Name	Regenerative resistor type			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Map ping	-	Related Mode	-	Data Range	0 to 3	De fault	3
Defines the regenerative resistor type and the mode of absorbing and releasing the braking energy. Select the regenerative resistor type based on section "Wiring and Setting of Regenerative Resistor" in SV660N Series Servo Drive Hardware Guide.										

Sub-index 1Bh	Name	Power of external regenerative resistor			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Map ping	-	Related Mode	-	Data Range	1 to 65535 (W)	De fault	40
Defines the power of the external regenerative resistor. Note: The value of 2002-1Bh (H02-26) cannot be lower than the calculated value.										

Sub-index 1Ch	Name	Resistance of external regenerative resistor			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Map ping	-	Related Mode	-	Data Range	15 to 1000 (W)	De fault	50
Defines the resistance of the external regenerative resistor. Note: The value of 2002-1Ch (H02-27) cannot be lower than the calculated value.										

Sub-index 1Fh	Name	User password			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Map ping	-	Related Mode	-	Data Range	0 to 65535	De fault	0

Sub-index 20h	Name	System parameter initialization			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 2	Default	0

Used to restore default values or clear fault records.

Setpoint	Description	Remarks
0	No operation	-
1	Restore default setting	Restore parameters to default values except parameters in groups 2000h and 2001h.
2	Clear fault records	Clear the latest 10 faults and warnings.

If necessary, use Inovance software tool to back up parameters except those in groups 2000h and 2001h.

Sub-index 21h	Name	Default keypad display			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 99	Default	50

The keypad can switch to the monitored value display mode (group 200Bh) based on settings. 2002-21h is used to set the offset of the parameter within group 200Bh.
If a parameter not in group 200Bh is set, the keypad does not switch to the monitored value display mode.

Sub-index 24h	Name	Keypad data update frequency			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 20	Default	0

Sub-index 2Ah	Name	Manufacturer password			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0

2.5.3.4 Group 2003h: Input Terminal Parameters

Index 2003h	Name	Terminal input parameters			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint16
	Access	-	Mapping	Yes	Related Mode	-	Data Range	OD Data Range	Default	OD Default Value

Used to set terminal input parameters.

Sub-index 00h	Name	Number of entries			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	65

Sub-index 03h	Name	DI1 function			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 40	Default	14

Defines the function of DI1.

Descriptions for the setpoints are shown in the following table.

Setpoint	DI Function
0	No assignment
1	Servo ON
2	Fault reset
14	Positive limit switch
15	Negative limit switch
31	Home switch
34	Emergency stop
38	Touch probe 1
39	Touch probe 2

Note

1. Set 2003-03h to a value listed in the preceding table. Otherwise, E122.1 will occur.

2. Do not assign the same function to different DIs. Otherwise, E122.1 will occur.

3. If a certain function is assigned to a DI and the logic of this DI is activated, this DI function will remain active even if you cancel the function assignment.

4. DI1...DI4 are normal DIs, requiring the input signal width to be larger than 1 ms.

5. DI5 is a high-speed DI, requiring the input signal width to be larger than 0.25 ms.

6. When the touch probe function is enabled, DI5 and DI4 are assigned with touch probe 1 and touch probe 2 respectively by default.

Sub-index 04h	Name	DI1 logic			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Used to set the level logic of DI1 when the function assigned to DI1 is active.
DI1 to DI4 are normal DIs, requiring the input signal width to be larger than 1 ms. Set active level logic correctly according to the host controller and peripheral circuits. The width of the input signal is shown in the following table for your reference.

Setpoint	DI Logic Upon Active DI Function	Remarks
0	Low level	Low level must remain active for more than 1 ms.
1	High level	High level must remain active for more than 1 ms.

Sub-index 05h	Name	DI2 function			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 40	Default	15

Sub-index 06h	Name	DI2 logic			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Sub-index 07h	Name	DI3 function			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 40	Default	31

Sub-index 08h	Name	DI3 logic			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Sub-index 09h	Name	DI4 function			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 40	Default	39

Sub-index 0Ah	Name	DI4 logic			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Sub-index 0Bh	Name	DI5 function			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 40	Default	38

Sub-index 0Ch	Name	DI5 logic			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Sub-index 3Dh	Name	DI1 filter time			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 500 (ms)	Default	0.5

Sub-index 3Eh	Name	DI2 filter time			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 500 (ms)	Default	0.5

Sub-index 3Fh	Name	DI3 filter time			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 500 (ms)	Default	0.5

Sub-index 40h	Name	DI4 filter time			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 500 (ms)	Default	0.5

Sub-index 41h	Name	DI5 filter time			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 500 (ms)	Default	0.5

2.5.3.5 Group 2004h: Output Terminal Parameters

Index 2004h	Name	Output terminal parameters			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint16
	Access	-	Mapping	Yes	Related Mode	-	Data Range	OD Data Range	Default	OD Default Value
Used to set output terminal parameters.										

Sub-index 00h	Name	Number of entries			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	6

Sub-index 01h	Name	DO1 function			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 32	Default	1

Defines the function of DO1.

Descriptions for the setpoints are shown in the following table.

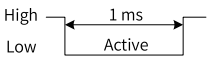
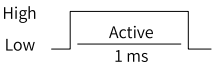
Setpoint	DO Function
0	No assignment
1	Servo ready
2	Motor rotation
9	Brake
10	Warning
11	Fault
25	Comparison output
31	EtherCAT-forced output
32	EDM safety state output

Set 2004-01h to a value listed in the preceding table.

Different DOs can be assigned with the same function.

Sub-index 02h	Name	DO1 logic level			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Defines the level logic of DO1 when the function assigned to DO1 is active.
DO1 to DO3 are normal DOs, requiring the minimum output signal width to be 1 ms. The host controller must be able to receive valid DO logic changes.

Setpoint	DO1 Logic Upon Active DO Function	Transistor Status	Minimum Signal Width
0	Low level	ON	
1	High level	OFF	

Before receiving DO logic changes, view the setpoint of 200D-12h (Forced DI/DO selection) to check whether the DO level is determined by the actual operating status of the servo drive or by forced DO (200D-14h or 60FEh).

Sub-index 03h	Name	DO2 function			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 32	Default	11

Sub-index 04h	Name	DO2 logic level			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Sub-index 05h	Name	DO3 function			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 32	Default	9

Sub-index 06h	Name	DO3 logic level			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Sub-index 18h	Name	EtherCAT-forced DO logic in non-OP status			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 7	Default	1

Descriptions for the setpoints are shown in the following table.

Setpoint	DO Function
0	Status of DO1, DO2, and DO3 unchanged in the non-OP status
1	No output in DO1 and status of others unchanged in the non-OP status
2	No output in DO2 and status of others unchanged in the non-OP status
3	No output in DO1 or DO2 and status of others unchanged in the non-OP status
4	No output in DO3 and status of others unchanged in the non-OP status
5	No output in DO1 or DO3 and status of others unchanged in the non-OP status
6	No output in DO2 or DO3 and status of others unchanged in the non-OP status
7	No output in DO1, DO2, or DO3 in the non-OP status

2.5.3.6 Group 2005h: Position Control Parameters

Index 2005h	Name	Position control parameters			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint16
	Access	-	Mapping	Yes	Related Mode	-	Data Range	OD Data Range	Default	OD Default Value

Used to set position control parameters.

Sub-index 00h	Name	Number of entries			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	55

Sub-index 05h	Name	First-order low-pass filter time constant			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	PP/HM/ CSP	Data Range	0 to 6553.5 (ms)	Default	0

Sub-index 06h	Name	Moving average filter time constant 1			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	PP/HM/ CSP	Data Range	0 to 1000 (ms)	Default	0

Sub-index 07h	Name	Moving average filter time constant 2			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	PP/HM/ CSP	Data Range	0 to 128.0 (ms)	Default	0

Sub-index 08h	Name	Numerator of electronic gear ratio			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	Yes	Related Mode	PP/HM/ CSP	Data Range	0 to (2^{32} - 1)	Default	1

Sub-index 0Ah	Name	Denominator of electronic gear ratio			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	Yes	Related Mode	PP/HM/ CSP/CSV/ PV	Data Range	0 to (2^{32} - 1)	Default	1

Sub-index 14h	Name	Speed feedforward control selection			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	PP/HM/ CSP	Data Range	0 to 3	Default	1

Defines the source of the speed loop feedforward signal.
In the position control mode, speed feedforward can be used to improve the position reference response speed.

Setpoint	Speed feedforward source	Remarks
0	No speed feedforward	-
1	Internal speed feedforward	The speed information corresponding to the position reference (encoder unit) is used as the speed loop feedforward source.
2	60B1 used as speed feedforward	60B1h is used as the source of external speed feedforward signal in the CSP mode. The polarity of 60B1h can be set in bit6 of 607Eh.
3	Zero phase control	Zero phase control can be used together with H8-17 (Zero phase delay) to reduce the position follow-up deviation during startup.

Speed feedforward control parameters include 2008-13h (Speed feedforward filter time constant) and 2008-14h (Speed feedforward gain). See section "Feedforward Gain" in SV660N Series Servo Drive Function Guide for details.

Sub-index 15h	Name	Condition for COIN (positioning completed) signal output			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 3	Default	0

Sub-index 1Fh	Name	Local homing mode			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	0, 6	Default	0

Setpoint	Description
0	0: Disable
6	6: Current position as the home

Used to execute local homing when the homing method defined in CiA402 profile cannot be called by the host controller through operating bit4 of the control word.

Note

Use this function in the Servo OFF state only. Failure to comply may result in malfunction of the motor due to sudden change in the position feedback. After homing is done successfully, the present position feedback will be cleared.

Sub-index 24h	Name	Homing time limit			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	RPDO	Related Mode	HM	Data Range	0 to 6553.5 (s)	Default	5000.0

Defines the maximum homing time.
If 2005-24h is set to an excessively low value or if the home is not found within the time defined by 2005-24h, E601.0 (Homing timeout) occurs.

Sub-index 25h	Name	Local home offset			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Int32
	Access	RW	Mapping	-	Related Mode	HM	Data Range	-1073741824 to +1073741824	Default	0

2005-25h is used together with 2005-1Fh. After homing is done, the present position feedback is the value of 2005-25h.

Sub-index 2Fh	Name	Position offset in absolute position linear mode (low 32 bits)			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Int32
	Access	RW	Mapping	-	Related Mode	All	Data Range	-2^{31} to $(2^{31} - 1)$ (encoder unit)	Default	0

Sub-index 31h	Name	Position offset in absolute position linear mode (high 32 bits)			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Int32
	Access	RW	Mapping	-	Related Mode	All	Data Range	-2^{31} to (2^{31} - 1) (encoder unit)	Default	0
These two parameters define the offset of the mechanical absolute position (encoder unit) relative to the motor absolute position (encoder unit) when the absolute encoder system works in the linear mode (2002-02 = 1). Position offset in the absolute position linear mode = Motor absolute position - Mechanical absolute position										

Note

Default values of 2005-2Fh and 2005-31h are 0 in the absolute position linear mode. After homing is done, the servo drive calculates the difference between the absolute position fed back by the encoder and the mechanical absolute position first. Then, the servo drive assigns the difference to 2005-2Fh and 2005-31h and saves it to EEPROM.

Sub-index 33h	Name	Mechanical gear ratio (numerator) in the absolute position rotation mode			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	1 to 65535	Default	1

Sub-index 34h	Name	Mechanical gear ratio (denominator) in absolute position rotation mode			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	1 to 65535	Default	1
Defines the ratio of the feedback pulses (encoder unit) per load revolution to the absolute position fed back by the encoder when the absolute encoder system works in the rotation mode (2002-02 = 2). Assume that the encoder resolution is R_E, the encoder pulses per load revolution is R_M, and 2005-35h and 2005-37h are 0, then the following formula applies: $R_M = R_E$ x 2005-33h/2005-34h										

Note

The servo drive calculates the upper limit of mechanical absolute position based on 2005-35h and 2005-37h first. If 2005-35h and 2005-37h are set to 0, the servo drive turns to calculating the upper limit based on 2005-33h and 2005-34h.

Sub-index 35h	Name	Pulses per load revolution in absolute position rotation mode (low 32 bits)			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to (2^{32} - 1) (encoder unit)	Default	0

Sub-index 37h	Name	Pulses per load revolution in absolute position rotation mode (high 32 bits)			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to (2^{32} - 1) (encoder unit)	Default	0
Defines the feedback pulses (encoder unit) per load revolution when the absolute encoder system works in the rotation mode (2002-02 (H02–01)= 2). Assume the encoder pulses per load revolution is R_M and 2005-35h or 2005-37h is not 0, the following formula applies: P_M = 2005-37h x 2^{32} + 2005-35h										

Note

The servo drive calculates the upper limit of mechanical absolute position based on 2005-35h and 2005-37h first. If 2005-35h and 2005-37h are set to 0, the servo drive turns to calculating the upper limit based on 2005-33h and 2005-34h.

2.5.3.7 Group 2006h: Speed Control Parameters

Index 2006h	Name	Speed control parameters			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint16
	Access	-	Mapping	Yes	Related Mode	-	Data Range	OD Data Range	Default	OD Default Value
Used to set speed control parameters										

Sub-index 00h	Name	Number of entries			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	16

Sub-index 04h	Name	Speed reference			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Int16
	Access	RW	Mapping	-	Related Mode	Local speed mode	Data Range	-6000 to +6000 (RPM)	Default	200
2006-04h is valid in the local speed mode and invalid in the EtherCAT mode.										

Sub-index 06h	Name	Acceleration ramp time of speed reference			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	Local speed mode	Data Range	0 to 65535 (ms)	Default	0
2006-06h is valid in the local speed mode and invalid in the EtherCAT mode.										

Sub-index 07h	Name	Deceleration ramp time of speed reference			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	Local speed mode	Data Range	0 to 65535 (ms)	Default	0
2006-07h is valid in the local speed mode and invalid in the EtherCAT mode.										

Sub-index 09h	Name	Positive speed limit			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	Local speed mode	Data Range	0 to 6000 (RPM)	Default	6000
2006-09h is valid in the local speed mode and invalid in the EtherCAT mode.										

Sub-index 0Ah	Name	Negative speed limit			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	Local speed mode	Data Range	0 to 6000 (RPM)	Default	6000
2006-0Ah is valid in the local speed mode and invalid in the EtherCAT mode.										

Sub-index 0Bh	Name	Quick declaration coefficient			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	-	Data Range	0–2	Default	0

The default value is 0. When 6085h (Quick stop deceleration) is set to the maximum value but the ramp time still exceeds the expected value, enlarge the value of 6085h through 2006-0Bh to reduce the stop time.

Setpoint	Name
0	x 1
1	x 10
2	x 100

Note

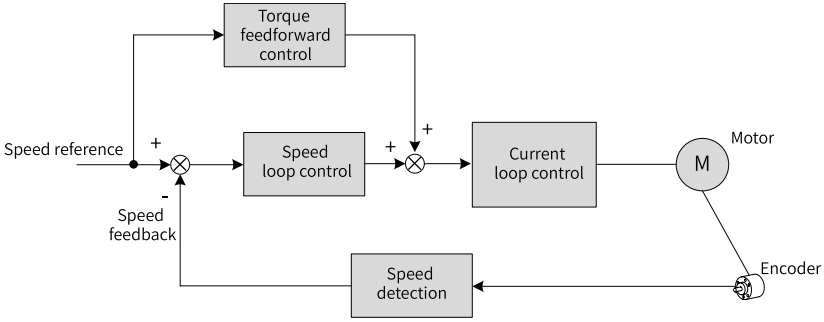
When the brake function is enabled and the stop mode at S-ON OFF is set to "Ramp to stop", the maximum time of ramp-to-stop is Min (H02-12, stop time defined by 6085h).

Sub-index 0Ch	Name	Torque feedforward control			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0–2	Default	1

Defines whether to enable internal torque feedforward in the control modes other than torque control.
Torque feedforward can be used to improve the torque reference response speed and reduce the position deviation during acceleration/deceleration at constant speed.

Setpoint	Torque feedforward control	Remarks
0	/	-
1	Internal torque feedforward	The speed reference is used as the torque feedforward signal source, which is further divided into the following two situations: In the position control mode, the speed reference refers to that output from the position controller. In the speed control mode, the speed reference refers to that set by the user.
2	60B2h used as external torque feedforward source	60B2h is used as the external torque feedforward signal source in the CSP and CSV modes. The polarity of the torque feedforward signal can be set in bit5 of 607Eh. Note: When 60B2h is used as the torque feedforward signal, you can adjust 2008-16h (H08-21) and 2008-15h (H08-20) to achieve the desired performance.

Torque feedforward parameters include 2008-16h (Torque feedforward gain) and 2008-15h (Torque feedforward filter time constant). For details, see section "Feedforward Gain" in SV660N Series Servo Drive Function Guide.
The block diagram for torque feedforward control in control modes other than torque control is as follows:



Sub-index 0Dh	Name	Acceleration/ Deceleration ramp time of jog speed			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	-	Data Range	0 to 65535 (ms)	Default	10

Defines the acceleration/deceleration time in the jog mode set through H0D-11 or the software tool.

Sub-index 0Eh	Name	Speed feedforward smoothing filter			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	-	Data Range	0 to 2000 (us)	Default	0
Defines the speed feedforward filter time constant.										

Sub-index 11h	Name	Threshold of TGON (motor rotation) signal			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 1000	Default	20

Sub-index 1Dh	Name	Cogging torque compensation selection			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	1

2.5.3.8 Group 2007h: Torque Control Parameters

Index 2007h	Name	Torque control parameters			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint16
	Access	-	Mapping	Yes	Related Mode	-	Data Range	OD Data Range	Default	OD Default Value
Used to set torque control parameters.										

Sub-index 00h	Name	Number of entries			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	40

Sub-index 04h	Name	Torque reference value set through keypad			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Int16
	Access	RW	Mapping	-	Related Mode	Local torque mode	Data Range	-400.0 to +400.0 (unit: %)	Default	0

Sub-index 06h	Name	Torque reference filter time constant 1			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0.00 to 30.00 (ms)	Default	0.20

Sub-index 07h	Name	Torque reference filter time constant 2			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0.00 to 30.00 (ms)	Default	0.27
Defines the torque reference filter time constant. Low-pass filtering of torque references helps smoothen torque references and reduce vibration. Pay attention to the responsiveness during setting as an excessively high setpoint lowers down the responsiveness.										

Note

The servo drive offers two low-pass filters, in which the low-pass filter 1 is used by default.

Gain switchover can be used in the position or speed control mode. Once certain conditions are satisfied, the servo drive can switch to filter 2. For details on gain switchover, see section "Gain Switchover".

Sub-index 0Ah	Name	Positive internal torque limit			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	Local torque mode	Data Range	0.0 to 400.0 (%)	Default	350

Sub-index 0Bh	Name	Negative internal torque limit			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	Local torque mode	Data Range	0.0 to 400.0 (%)	Default	350

Note

2007-0Ah and 2007-0Bh are valid only in the local torque mode (H02-00 = 2). For torque limit in the EtherCAT mode, use 60E0h/60E1h/6072h. Use the torque limit with caution as an excessively low limit value may lead to insufficient motor torque output.

If the setpoint exceeds the maximum torque of the servo drive and motor, the actual torque will be limited to a value within the maximum torque of the servo drive and motor.

Sub-index 10h	Name	Emergency-stop torque			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0.0 to 400.0 (%)	Default	100

Sub-index 14h	Name	Positive internal speed limit in torque control			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	Local torque mode	Data Range	0 to 6000 (RPM)	Default	3000

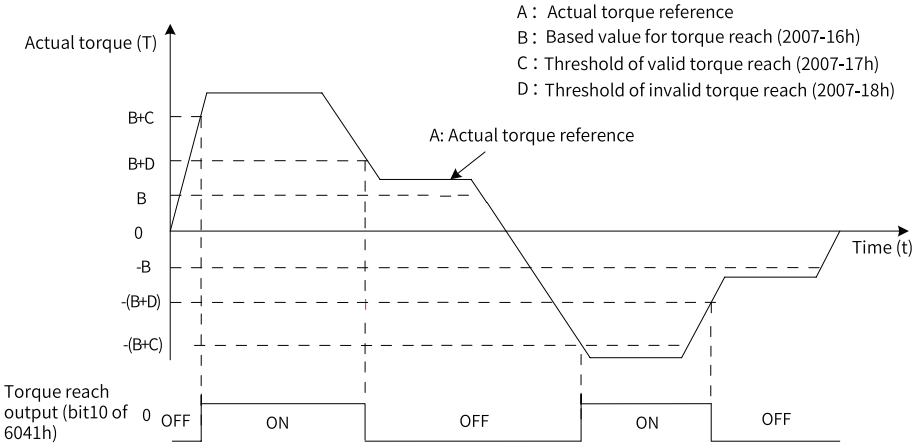
Sub-index 15h	Name	Negative internal speed limit in torque control			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	Local torque mode	Data Range	0 to 6000 (RPM)	Default	3000
2007-14h and 2007-15h are valid in the local torque mode only (H02-00 = 2). Use 607F for speed limit in the EtherCAT, CST, and PT modes.										

Sub-index 16h	Name	Base value for torque reach			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PT	Data Range	0.0 to 400.0 (%)	Default	0.0

Sub-index 17h	Name	Threshold for valid torque reach			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PT	Data Range	0.0 to 400.0 (%)	Default	20

Sub-index 18h	Name	Threshold for invalid torque reach			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PT	Data Range	0.0 to 400.0 (%)	Default	10

The torque reach function is used to judge whether the actual torque reference reaches the range of valid torque reach. If yes, the servo drive outputs the corresponding flag (bit10 of status word) to the host controller.



Actual torque reference (viewed in 200B-03h): A
Base value for torque reach (2007-16h): B
Threshold of valid torque reach (2007-17h): C
Threshold of invalid torque reach (2007-18h): D
C and D are the offset based on B.
The torque reach signal is activated only when the actual torque reference meets the following condition: $|A| \geqslant B + C$
Otherwise, the torque reach signal remains inactive.
The torque reach signal is deactivated only when the actual torque reference meets the following condition: $|A| < B + D$

Sub-index 19h	Name	Depth of field-weakening			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	60 to 115 (%)	Default	115

Use the default value in general cases. Reducing the field-weakening depth improves the dynamic performance of the field-weakening area and reduces current ripple, but also leads to load rate rise.

Sub-index 1Ah	Name	Max. permissible demagnetizing current			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	1 to 200 (unit: %)	Default	100
Use the default value in general cases. Increasing the demagnetizing current extends the motor speed range, but also poses a greater challenge on the bearing capacity of the motor. If you need to increase the setpoint of 2007-1Ah, contact Inovance first.										

Sub-index 1Bh	Name	Field-weakening selection			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0
0: Disable; 1: Enable										

Sub-index 1Ch	Name	Field-weakening gain			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0.001 to 1.000	Default	0.030

Sub-index 25h	Name	Time constant of low-pass filter 2			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0.00 to 10.00 (ms)	Default	0.00

Sub-index 26h	Name	Torque reference filter selection			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0
0: First-order filter 1: Biquad filter										

Sub-index 27h	Name	Biquad filter attenuation ratio			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 50	Default	16

2.5.3.9 Group 2008h: Gain Parameters

Index 2008h	Name	Gain parameters			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint16
	Access	-	Mapping	Yes	Related Mode	-	Data Range	OD Data Range	Default	OD Default Value
Used to set gain parameters.										

Sub-index 00h	Name	Number of entries			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	65

Sub-index 01h	Name	Speed loop gain			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0.1 to 2000 (Hz)	Default	39
Defines the proportional gain of the speed loop. 2008-01h determines the responsiveness of the speed loop. The higher the setpoint, the higher the responsiveness. Note that an excessively high setpoint may cause vibration. In the position control mode, the position loop gain must be increased together with the speed loop gain.										

Sub-index 02h	Name	Speed loop integral time constant			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0.15 to 512 (ms)	Default	20.51
Defines the integral time constant of the speed loop. The lower the setpoint, the better the integral action, and the quicker will the deviation value be close to 0. Note: There is no integral action when 2008-02h is set to 512.00.										

Sub-index 03h	Name	Position loop gain			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/HM/CSP	Data Range	0.1 to 2000 (Hz)	Default	55.7
Defines the proportional gain of the position loop. 2008-03h determines the responsiveness of the position loop. A high setpoint shortens the positioning time. Note that an excessively high setpoint may cause vibration. The first gain set include parameters 2008-01h, 2008-02h, 2008-03h, and 2007-07h.										

Sub-index 04h	Name	2nd speed loop gain			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0.1 to 2000 (Hz)	Default	75

Sub-index 05h	Name	2nd speed loop integral time constant			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0.15 to 512.00 (ms)	Default	10.61

Sub-index 06h	Name	2nd position loop gain			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/HM/CSP	Data Range	0.1 to 2000.0 (Hz)	Default	120

Defines the second gain of the position loop and speed loop. The second gain set include parameters 2008-04h, 2008-05h, 2008-06h and 2007-07h. For details on gain switchover, see section "Gain Switchover".

Sub-index 09h	Name	2nd gain mode setting			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 1	Default	1

Defines the switchover mode of the 2nd gain set.

Setpoint	Mode
0	0: Fixed to the 1st gain set, P/PI switched by bit26 of 60FE (switched to P when bit26 of 60FE is set to 1)
1	1: Switched between the 1st gain set (2008-01h...2008-03h, 2007-06h) and the 2nd gain set (2008-04h...2008-06h, 2007-07h) as defined by 2008-0Ah

Sub-index 0Ah	Name	Gain switchover condition			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 10	Default	0
See the following table for gain switchover conditions.										

Table 2–11 Conditions for gain switchover

Setpoint	Gain switchover condition	Remarks
0	Fixed to the 1st gain set	The 1st gain set applies.
1	DI	Gains are switched through bit26 of 60FE. bit26 signal inactive: 1st gain set (2008-01h...2008-03h, 2007-06h) bit26 signal active: 2nd gain set (2008-04h...2008-06h, 2007-07h) If the bit26 signal cannot be assigned to DI, the 1st gain set applies.
2	Torque reference too large	If the torque reference absolute value exceeds (Level + Dead time) [%] in the last 1st gain set, the servo drive switches to the 2nd gain set. If the torque reference absolute value is lower than (level – dead time) [%] and such status lasts within the delay defined by 2008- 0Bh (Gain switchover delay) in the last 2nd gain set, the servo drive switches to the 1st gain set.
3	Speed reference too large	If the speed reference absolute value exceeds (Level + Dead time) [RPM] in the last 1st gain set, the servo drive switches to the 2nd gain set. If the speed reference absolute value keeps lower than (Level + Dead time) [RPM] within the delay defined by 2008-0Bh in the last 2nd gain set, the servo drive switches to the 1st gain set.
4	Speed reference too large	Active in the control modes other than speed control If the absolute value of the change rate in the speed reference exceeds (Level + Dead time) [10 RPM/s] in the last 1st gain set, the servo drive switches to the 2nd gain set. If the absolute value of the change rate in the speed reference keeps lower than (Level - Dead time) [10 RPM/s] within the delay defined by 2008-0Bh in the last 2nd gain set, the servo drive switches to the 1st gain set. In the speed control mode, the 1st gain set always applies.
5	Speed reference high-speed/low-speed threshold	If the speed reference absolute value exceeds (Level - Dead time) [RPM] in the last 1st gain set, the servo drive starts switching to the 2nd gain set, with gains changed gradually. When the speed reference absolute value reaches (Level + Dead time) [RPM], the 2nd gain set applies. If the speed reference absolute value is lower than (Level + Dead time) [RPM] in the last 2nd gain set, the servo drive starts reverting to the 1st gain set, with gains changed gradually. When the speed reference absolute value reaches (Level - Dead time) [RPM], the 1st gain set applies.

Setpoint	Gain switchover condition	Remarks
6	Position deviation too large	Active only in the position control mode If the position deviation absolute value exceeds (Level + Dead time) [encoder unit] in the last 1st gain set, the servo drive switches to the 2nd gain set. If the position deviation absolute value keeps lower than (Level - Dead time) [encoder unit] within the delay defined by 2008-0Bh in the last 2nd gain set, the servo drive switches to the 1st gain set. The 1st gain set applies in control modes other than position control.
7	Position reference available	Active only in the position control mode If the position reference is not 0 in the last 1st gain set, the servo drive switches to the 2nd gain set. If the position reference keeps being 0 within the delay defined by 2008-0Bh in the last 2nd gain set, the servo drive switches to the 1st gain set. The 1st gain set applies in control modes other than position control.
8	Positioning completed	Active only in the position control mode If positioning has been completed in the last 1st gain set, the servo drive switches to the 2nd gain set. If positioning has been completed within the delay defined by 2008-0Bh in the last 2nd gain set, the servo drive switches to the 1st gain set. The 1st gain set applies in control modes other than position control.
9	Actual speed too high	Active only in the position control mode If the absolute value of actual speed exceeds (Level + Dead time) [RPM] in the last 1st gain set, the servo drive switches to the 2nd gain set. If the absolute value of actual speed exceeds (Level - Dead time) [RPM] within the delay defined by 2008-0Bh in the last 2nd gain set, the servo drive switches to the 1st gain set. The 1st gain set applies in control modes other than position control.
10	Position reference + Actual speed	Active only in the position control mode If the position reference is not 0 in the last 1st gain set, the servo drive switches to the 2nd gain set. If the position reference keeps being 0 within the delay defined by 2008-0Bh in the last 2nd gain set, the 2nd gain set applies. When the position reference keeps being 0 after the time defined by 2008-0Bh elapses, if the absolute value of actual speed does not reach (Level) [RPM], the servo drive switches to the 1st gain set (except the speed integral time constant which is fixed to 2008-05h (2nd speed loop integral time constant)); if the absolute value of the actual speed is lower than (Level - Dead time) [RPM], the servo drive switches to the 1st gain set without any exception. The 1st gain set applies in control modes other than position control.

Sub-index 0Bh	Name	Gain switchover delay			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 1000 (ms)	Default	5
Defines the delay when the servo drive switches from the 2nd gain set to the 1st gain set.										

Sub-index 0Ch	Name	Gain switchover level			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 20000	Default	50
Defines the gain switchover level. Gain switchover is affected by both the level and the dead time. For details, see descriptions of 2008-0Ah. The unit of gain switchover level varies with the switchover condition.										

Sub-index 0Dh	Name	Gain switchover dead time			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 20000	Default	30
Defines the dead time for gain switchover. Gain switchover is affected by both the level and the dead time. For details, see descriptions of 2008-0Ah. The unit of gain switchover dead time varies with the switchover condition.										

Note

Set 2008-0Ch to a value higher than 2008-0Dh. If 2008-0Ch is set to a value lower than 2008-0Dh, the servo drive sets 2008-0Ch to the same value as 2008-0Dh.

Sub-index 0Eh	Name	Position gain switchover time			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 1000 (ms)	Default	3
In the position control mode, if 2008-06h (2nd position loop gain) is set to a value far higher than 2008-03h (Position loop gain), set the time for switching from 2008-03h to 2008-06h. 2008-0Eh can be used to reduce the impact caused by an increase in the position loop gain. 2008-06h is invalid if it is set to a value lower than or equal to 2008-03h. In this case, the servo drive switches to the 2nd gain set immediately.										

Sub-index 10h	Name	Load moment of inertia ratio			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 120 (multiplier)	Default	3
Defines the mechanical load inertia ratio relative to the motor moment of inertia. The setpoint 0 indicates the motor is disconnected from the load. The setpoint 1.00 indicates the mechanical load inertia equals the motor moment of inertia. In inertial auto-tuning (offline and online), the servo drive automatically calculates and updates the value of 2008-10h. When online inertia auto-tuning (2009-04h ≠ 0) is used, the servo drive sets 2008-10h automatically. To set 2008-10h manually, disable online inertia auto-tuning (2009- 04h = 0).										

Note

When the value of 2008-10h is the same as the actual inertia ratio, the value of speed loop gain (2008-01h/2008-04h) indicates the actual maximum follow-up frequency of the speed loop.

Sub-index 12h	Name	Zero phase delay			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/HM/CSP	Data Range	0 to 4 (ms)	Default	0

Sub-index 13h	Name	Speed feedforward filter time constant			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Map ping	-	Related Mode	PP/HM/CSP	Data Range	0 to 64 (ms)	Default	0.5
Defines the filter time constant of speed feedforward.										

Sub-index 14h	Name	Speed feedforward gain			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/HM/CSP	Data Range	0 to 1000 (%)	Default	0
In the position control mode, speed feedforward is the value of 2008-14h multiplied by the speed feedforward signal, which is part of the speed reference. Increasing the value of 2008-14h improves the responsiveness of position references and reduces the position deviation during operation at a constant speed. Set 2008-13h to a fixed value first, and then gradually increase the value of 2008-14h from 0 to a certain setpoint at which speed feedforward achieves the desired effect. Adjust 2008-13h and 2008-14h repeatedly until a balanced setting is achieved.										

Note

For the speed feedforward function and speed feedforward signal selection, see 2005-14h (Speed feedforward control selection).

Sub-index 15h	Name	Torque feedforward filter time constant			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 64 (ms)	Default	0.5
Defines the filter time constant of torque feedforward.										

Sub-index 16h	Name	Torque feedforward gain			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 300 (%)	Default	0
In the non-torque control mode, torque feedforward is the value of 2008-16h multiplied by the torque feedforward signal, which is part of the torque reference. Increasing the value of 2008-16h improves the responsiveness to variable speed references. Increasing the value of 2008-16h improves the responsiveness to position references and reduces the position deviation during operation at a constant speed. When adjusting torque feedforward parameters, use the default value of 2008-15h first and gradually increase the value of 2008-16h to enhance the torque feedforward effect. When speed overshoot occurs, keep the value of 2008-16h unchanged and increase the value of 2008-20h. Adjust 2008-15h and 2008-16h repeatedly until a balanced setting is achieved.										

Note

For the torque feedforward function and torque feedforward signal selection, see 2006-0Ch (Torque feedforward control selection).

Sub-index 17h	Name	Speed feedback filtering option			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Map ping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 4	Default	0
Defines the moving average filtering times for speed feedback. The higher the setpoint, the weaker the speed feedback fluctuation, but the longer the feedback delay will be.										

Note

When 2008-17h is set to a value higher than 0, 2008-18h (Cutoff frequency of speed feedback low-pass filter) is invalid.

Sub-index 18h	Name	Cutoff frequency of speed feedback low-pass filter			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 8000 (Hz)	Default	8000
Defines the cutoff frequency for first-order low-pass filtering on the speed feedback.										

Note

The lower the setpoint, the weaker the speed feedback fluctuation, and the longer the feedback delay will be.

Setting 2008-18h to 8000 negates the filtering effect.

Sub-index 19h	Name	Pseudo derivative feedback and feedforward control coefficient			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 200 (%)	Default	100
Defines the control mode of the speed loop. When 2008-19h is set to 200.0, PI control (default control mode of the speed loop) is applied to the speed loop, which features fast dynamic response. When 2008-19h is set to 0.0, speed loop integral action is enhanced, which filters out low-frequency interferences but also slows down the dynamic response. 2008-19h can be used to keep a good responsiveness of the speed loop, with the anti-interference capacity in low-frequency bands improved and the speed feedback overshoot not increased.										

Sub-index 1Ch	Name	Speed observer cutoff frequency			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	50 to 600 (Hz)	Default	170

Sub-index 1Dh	Name	Speed observer inertia correction coefficient			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	1 to 1600 (%)	Default	100

Sub-index 1Eh	Name	Speed observer filter time			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 10 (ms)	Default	0.8

Sub-index 1Fh	Name	Disturbance compensation time			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 100 (ms)	Default	0.2

Sub-index 20h	Name	Disturbance cutoff frequency			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	10 to 4000 (Hz)	Default	600

Sub-index 21h	Name	Disturbance compensation gain			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 100 (%)	Default	0

Sub-index 22h	Name	Disturbance observer inertia correction coefficient			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1600 (%)	Default	100

Sub-index 26h	Name	Phase modulation for medium-frequency jitter suppression 2			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	-90 to +90 (%)	Default	0

Sub-index 27h	Name	Frequency of medium-frequency jitter suppression 2			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1000 (Hz)	Default	0

Sub-index 28h	Name	Compensation gain of medium-frequency jitter suppression 2			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 300 (%)	Default	0

Sub-index 29h	Name	Speed observer selection			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Sub-index 2Bh	Name	Model control selection			Setting Condition & Effective Time	During running &At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Sub-index 2Ch	Name	Model gain			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0.1 to 2000	Default	40

Sub-index 2Fh	Name	Feedforward value			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 102.4	Default	95

Sub-index 36h	Name	Medium- and low-frequency jitter suppression frequency 3			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 300 (Hz)	Default	0

Sub-index 37h	Name	Medium- and low-frequency jitter suppression compensation 3			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 200 (%)	Default	0

Sub-index 39h	Name	Medium- and low-frequency jitter suppression phase modulation 3			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 600 (%)	Default	100

Sub-index 3Ch	Name	Medium- and low-frequency jitter suppression frequency 4			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 300 (Hz)	Default	0

Sub-index 3Dh	Name	Medium- and low-frequency jitter suppression compensation 4			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 200 (%)	Default	0

Sub-index 3Eh	Name	Medium- and low-frequency jitter suppression phase modulation 4			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 600 (%)	Default	100

Sub-index 3Fh	Name	Position loop integral time constant			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0.15 to 512	Default	512

Sub-index 40h	Name	2nd position loop integral time constant			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0.15 to 512	Default	512

Sub-index 41h	Name	Speed observer feedback source			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Sub-index 49h	Name	Viscous friction of zero deviation control			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 100	Default	0

Sub-index 4Ah	Name	Forward coulomb friction of zero deviation control			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 100	Default	0

Sub-index 4Bh	Name	Reverse coulomb friction of zero deviation control			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Int16
	Access	RW	Mapping	-	Related Mode	-	Data Range	-100 to 0	Default	0

Sub-index 4Ch	Name	Friction compensation selection of zero deviation control			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Sub-index 4Dh	Name	Acceleration compensation factor of zero deviation control			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 900	Default	0

Sub-index 4Eh	Name	Static friction of zero deviation control			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 100	Default	0

Sub-index 4Fh	Name	Transition speed between coulomb friction and viscous friction of zero deviation control			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 100	Default	0

Sub-index 50h	Name	Initial torque shock of zero deviation control			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 100	Default	0

Sub-index 51h	Name	Friction compensation delay of zero deviation control			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1000	Default	20

2.5.3.10 Group 2009h: Gain Auto-tuning Parameters

Index 2009h	Name	Gain auto-tuning parameters			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint16
	Access	-	Mapping	Yes	Related Mode	-	Data Range	OD Data Range	Default	OD Default Value
Used to set gain auto-tuning parameters.										

Sub-index 00h	Name	Number of entries			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	60

Sub-index 01h	Name	Gain auto-tuning mode			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 7	Default	4
2009-01h is set to 4 by default.										

Sub-index 02h	Name	Stiffness level in the 1st gain set			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 41	Default	15
Defines the stiffness level of the servo system. The higher the stiffness level, the stronger the gains and the quicker the response will be. But an excessively high stiffness level will cause vibration. The setpoint 0 indicates the weakest stiffness and 41 indicates the strongest stiffness.										

Sub-index 03h	Name	Adaptive notch mode			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 4	Default	3
Defines the working mode of the adaptive notch.										

Sub-index 04h	Name	Online inertia auto-tuning mode			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 3	Default	2
Defines whether to enable online inertia auto-tuning and the inertia ratio update speed during online inertia auto-tuning.										

Sub-index 06h	Name	Offline inertia auto-tuning mode			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 1	Default	1
Defines the offline inertia auto-tuning mode. The offline inertia auto-tuning function can be enabled through 200D-03h. For details on offline inertia auto-tuning, see section "Inertia Auto-tuning" in SV660N Series Servo Drive Function Guide.										

Sub-index 07h	Name	Maximum speed in inertia auto-tuning			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	100 to 1000 (RPM)	Default	500
Defines the maximum permissible speed reference value in offline inertia auto-tuning mode. During inertia auto-tuning, the higher the speed, the more accurate the auto-tuned values. Use the default value of 2009-07h in general cases.										

Sub-index 08h	Name	Time constant for accelerating to the maximum speed during inertia auto-tuning			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	20 to 800 (ms)	Default	125
Defines the time for the motor to accelerate from 0 RPM to the speed defined by 2009-07h during offline inertia auto-tuning.										

Sub-index 09h	Name	Interval after an individual inertia auto-tuning			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	50 to 10000 (ms)	Default	800
Defines the time interval between two consecutive speed references when 2009-06h (Offline inertia auto-tuning mode) is set to 0 (Bidirectional).										

Sub-index 0Ah	Name	Number of motor revolutions per inertia auto-tuning			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	All	Data Range	0 to 100 (r)	Default	1
Defines the number of motor revolutions needed when 2009-06h (Offline inertia auto-tuning mode) is set to 0 (Bidirectional).										

Note

In offline inertia auto-tuning, check whether the travel distance of the motor at the stop position is larger than the setpoint of 2009-0Ah. If not, decrease the setpoint of 2009-07h or 2009-08h until the travel distance at the stop position is larger than the setpoint of 2009-0Ah.

Sub-index 0Ch	Name	Vibration threshold			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 100 (%)	Default	5
Defines the threshold of vibration detected by the notch. When the current feedback exceeds the threshold, the notch starts working.										

Sub-index 0Dh	Name	Frequency of the 1st notch			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	50 to 8000 (Hz)	Default	8000
Defines the center frequency of the notch, which is the mechanical resonance frequency. In the torque control mode, setting 2009-0Dh to 8000 deactivates the notch function.										

Sub-index 0Eh	Name	Width level of the 1st notch			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 20	Default	2
Defines the width level of the notch. Use the default value of 2009-0Eh in general cases. Width level is the ratio of the notch width to the notch center frequency.										

Sub-index 0Fh	Name	Depth level of the 1st notch			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 99	Default	0
Defines the depth level of the notch. The depth level of the notch is the ratio between the input to the output at the notch center frequency. The higher the setpoint, the lower the notch depth and the weaker the mechanical resonance suppression will be. Note that an excessively high setpoint may cause system instability. For use of notches, see section "Vibration Suppression" in SV660N Series Servo Drive Function Guide.										

Sub-index 10h	Name	Frequency of the 2nd notch			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	50 to 8000 (Hz)	Default	8000

Sub-index 11h	Name	Width level of the 2nd notch			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 20	Default	2

Sub-index 12h	Name	Depth level of the 2nd notch			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 99	Default	0
Descriptions for parameters of the 2nd notch are the same as that of the 1st notch (2009-0Dh, 2009-0Eh, 2009-0Fh).										

Sub-index 13h	Name	Frequency of the 3rd notch			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	50 to 8000 (Hz)	Default	8000

Sub-index 14h	Name	Width level of the 3rd notch			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 20	Default	2

Sub-index 15h	Name	Depth level of the 3rd notch			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 99	Default	0
Descriptions for parameters of the 3rd notch are the same as that of the 1st notch (2009-0Dh, 2009-0Eh, 2009-0Fh).										

Note

The 3rd notch can be configured as an adaptive notch (2009-03h = 1 or 2). In this case, notch parameters are updated automatically and cannot be modified manually. If the notch frequency is 8000 Hz, the notch function is disabled.

Sub-index 16h	Name	Frequency of the 4th notch			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	50 to 8000 (Hz)	Default	8000

Sub-index 17h	Name	Width level of the 4th notch			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 20	Default	2

Sub-index 18h	Name	Depth level of the 4th notch			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 99	Default	0
Descriptions for parameters of the 4th notch are the same as that of the 1st notch (2009-0Dh, 2009-0Eh, 2009-0Fh).										

Note

The 4th notch can be configured as an adaptive notch (2009-03h = 1 or 2). In this case, parameters are updated automatically by the servo drive and cannot be modified manually. If the notch frequency is 8000 Hz, the notch function is disabled.

Sub-index 19h	Name	Auto-tuned resonance frequency			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	0 to 5000	Default	0
When 2009-03h (Adaptive notch mode) is set to 3, the present mechanical resonance frequency will be displayed.										

Sub-index 1Fh	Name	Tension fluctuation compensation gain			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int16
	Access	RO	Mapping	-	Related Mode	-	Data Range	-100 to +100	Default	0

Sub-index 20h	Name	Tension fluctuation compensation filter time			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 25	Default	0.5

Sub-index 21h	Name	Gravity compensation value			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 100 (%)	Default	0

Sub-index 22h	Name	Positive friction compensation value			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 100 (%)	Default	0

Sub-index 23h	Name	Negative friction compensation value			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Int16
	Access	RW	Mapping	-	Related Mode	-	Data Range	-100 to 0 (%)	Default	0

Sub-index 24h	Name	Friction compensation speed			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 20	Default	2

Sub-index 25h	Name	Friction compensation speed selection			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 19	Default	0

Description

Setpoint	Description
0	Slow speed mode + Speed reference
1	Slow speed mode + Model speed
2	Slow-speed mode + Speed feedback
16	High-speed mode + Speed reference
17	High-speed mode + Model speed
18	High-speed mode + Speed feedback

Sub-index 26h	Name	Vibration monitoring time			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	1200

Sub-index 27h	Name	Frequency of low-frequency resonance suppression 1 at the mechanical end			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	1 to 100 (Hz)	Default	100

Sub-index 28h	Name	Low-frequency resonance suppression 1 at the mechanical end			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 3	Default	2

Sub-index 2Ah	Name	Frequency of the 5th notch			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	50 to 8000 (Hz)	Default	8000

Sub-index 2Bh	Name	Width level of the 5th notch			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 20	Default	2

Sub-index 2Ch	Name	Depth level of the 5th notch			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 99	Default	0

Sub-index 2Dh	Name	Frequency of low-frequency resonance suppression 2 at mechanical load end			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 200	Default	0

Sub-index 2Eh	Name	Responsiveness of low-frequency resonance suppression 2 at mechanical load end			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0.01 to 10	Default	1

Sub-index 30h	Name	Width of low-frequency resonance suppression 2 at mechanical load end			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 2	Default	100

Sub-index 32h	Name	Frequency of low-frequency resonance suppression 3 at mechanical load end			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 2000	Default	0

Sub-index 33h	Name	Responsiveness of low-frequency resonance suppression 3 at mechanical load end			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0.01 to 10	Default	1

Sub-index 35h	Name	Width of low-frequency resonance suppression 3 at mechanical load end			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 2	Default	100

Sub-index 39h	Name	STune mode setting			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 4	Default	4

Sub-index 3Ah	Name	STune resonance suppression switchover frequency			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 4000	Default	900

Sub-index 3Bh	Name	STune resonance suppression reset selection			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

2.5.3.11 Group 200Ah: Fault and Protection Parameters

Index 200Ah	Name	Fault and protection parameters			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint16
	Access	-	Mapping	Yes	Related Mode	-	Data Range	OD Data Range	Default	OD Default Value
Used to set the fault and protection parameters.										

Sub-index 00h	Name	Number of entries			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	60

Sub-index 01h	Name	Power input phase loss protection			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 3	Default	0
SV660N series servo drives support single-phase/three-phase 220 V and three-phase 380 V power supplies. When voltage fluctuation or phase loss occurs on the power supply, power input phase loss protection will be triggered by the servo drive based on the setting of 200A-01h.										

Note

200A-01h = 0: The servo drive reports E420.0 (Phase loss fault) when H01-10 (Servo drive model) is set to 60005 (850 W).

200A-01h = 1: The servo drive does not report E420.0 (Phase loss fault). When H01-10 (Servo drive model) is set to 60005 (850 W), derate 80%.

Three-phase 220 V servo drives (S7R6, S012) need no derating in case of single-phase power input. Three-phase 380 V servo drives enter the NRD status in case of a phase loss fault. In this case, you cannot operate the servo drive by hiding the phase loss fault.

Sub-index 02h	Name	Absolute position limit			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 2	Default	0
Defines whether the absolute position limit is active and the condition for activating the position limit. After the absolute position limit is enabled, when the target position reference exceeds the position limit in the position control mode, the servo drive takes the position limit as the target and stops after reaching the limit; when the absolute position feedback reaches the position limit in other control modes, the servo drive reports an overtravel warning and stops in the mode defined by 2002-08h (Stop mode at overtravel).										

Sub-index 05h	Name	Motor overload protection gain			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	50 to 300 (%)	Default	100
Defines the motor overload duration before E620.0 (Motor overload) is reported. You can change the setpoint of 200A-05h based on motor temperature to reduce or prolong the time to trigger overload protection. The setpoint 50% indicates the trigger time is reduced by 50%. The setpoint 150% indicates the trigger time is prolonged by 50%. Set 200A-05h based on the actual temperature of the motor.										

Sub-index 09h	Name	Overspeed threshold			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 20000 (RPM)	Default	0
Defines the overspeed threshold of the motor.										

Sub-index 0Bh	Name	Threshold of excessive local position deviation			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to (2^{32} - 1)	Default	25185824
Defines the threshold for reporting EB00.0 (Position deviation too large). The function of 200A-0Bh is the same as 6065h (Following error window), both of which are active.										

Sub-index 0Dh	Name	Runaway protection			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 1	Default	1
Used to enable runaway protection.										

Sub-index 13h	Name	IGBT over-temperature threshold			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	120 to 175 (°C)	Default	135
Defines the over-temperature protection threshold of the power module.										

Sub-index 14h	Name	Filter time constant of touch probe 1			Setting Condition & Effective Time	During running & Next power-on	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 6.3 (us)	Default	2

Sub-index 15h	Name	Filter time constant of touch probe 2			Setting Condition & Effective Time	During running & Next power-on	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 6.3 (us)	Default	2
Touch probe 1 and touch probe 2 are high-speed DIs. When external input signals suffer from spike interference, set 200A-14h or 200A-15h to filter the out spike interference. Note: The oscilloscope in the software tool displays the unfiltered signals of touch probe 1 and touch probe 2. Signals with width lower than 0.25 ms will not be displayed.										

Sub-index 16h	Name	STO function display			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0
Defines whether to display the STO status or report E150.0 after the STO function is triggered. 0: Displays the STO status. The keypad displays "sto_" after the STO function is triggered. In this case, no fault is reported and no output is generated from the fault DO. 1: Displays the STO fault. The keypad displays "E150.0" after the STO function is triggered. In this case, the servo drive reports E150.0 and the fault DO generates output.										

Sub-index 18h	Name	TZ signal filter time			Setting Condition & Effective Time	At stop & Next power-on	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 31 (unit: 25 ns)	Default	15

Sub-index 1Ah	Name	Filter time constant of speed feedback display value			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 5000 (ms)	Default	50
Defines the filter time constant of the speed feedback display value to smoothen the speed feedback. 200Ah-1Ah applies to the monitoring parameter 200B-01h (Motor speed actual value) and the speed display value monitored through the software tool.										

Sub-index 1Bh	Name	Motor overload detection			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0
Defines whether to enable motor overload detection.										

Take caution when hiding the motor overload fault as such operation may damage the motor.

Sub-index 1Ch	Name	Motor rotation DO speed filter time			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 5000 (ms)	Default	50
Defines the low-pass filter time constant of speed feedback signals. 200A-1Ch is active only when the speed feedback signals are used to judge the speed-related DO signals.										

Sub-index 21h	Name	Over-temperature protection time window for stalled motor			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 65535 (ms)	Default	200
Defines the over-temperature duration before E630.0 (Motor stalled) is detected by the servo drive. You can adjust the sensitivity for detecting E630.0 by changing the setpoint of 200A-21h.										

Sub-index 22h	Name	Over-temperature protection for stalled motor			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	-	Data Range	0 to 1	Default	1
Defines whether to enable the over-temperature protection detection on E630.0 (Motor stalled).										

Sub-index 25h	Name	Absolute encoder multi-turn overflow fault selection			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	No	Related Mode	All	Data Range	0 to 1	Default	0
200A-25h sets whether to hide the detection on E735.0 (Encoder multi-turn counting overflow) in the absolute position linear mode.										

Sub-index 29h	Name	Overtravel compensation selection			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	0 to 1	Default	0
0: Enabled, used to handle the position reference loss caused by disturbed position limit signals in CSP mode										

Sub-index 32h	Name	Regenerative transistor over-temperature threshold			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	100 to 175 (℃)	Default	115

Sub-index 33h	Name	Encoder communication error tolerance threshold			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	0 to 31	Default	3

Sub-index 34h	Name	Phase loss detection filter times			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	3 to 36	Default	20

Sub-index 35h	Name	Encoder temperature protection threshold			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	0 to 175	Default	0
0: Disable										

Sub-index 38h	Name	Runaway current threshold			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	100 to 400 (%)	Default	200

Sub-index 39h	Name	Reset delay			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	0 to 60000 (ms)	Default	10000
Faults E620.0, E630.0, E640.0, E640.1, and E650.0 can be reset only after the time defined by 200A-39h elapses.										

Sub-index 3Ah	Name	Runaway speed threshold			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	1 to 1000 (RPM)	Default	50

Sub-index 3Bh	Name	Runaway speed filter time			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	0.1 to 100.0 (ms)	Default	2

Sub-index 3Ch	Name	Runaway protection detection time			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	10 to 1000 (ms)	Default	30

Sub-index 47h	Name	Overspeed threshold			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	0 to 20000	Default	0

Sub-index 48h	Name	MS1 motor overload curve switchover			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	0 to 3	Default	0

Sub-index 49h	Name	Maximum time of ramp-to-stop			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	0 to 65535 (ms)	Default	10000
Defines the maximum time taken by the motor in decelerating from 6000 RPM to 0 RPM when the stop mode is set to "Ramp to stop as defined by 6084h/609Ah (HM)" or "Ramp to stop as defined by 6085h".										

Sub-index 4Ah	Name	STO 24 V disconnection filter time			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	0 to 5 (ms)	Default	5
Defines the filter time from the moment when STO1 and STO2 are disconnected from the 24 V power supply to the moment when the STO status is displayed or E150.0 is reported.										

Sub-index 4Bh	Name	STO fault tolerance filter time			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	0 to 10 (ms)	Default	10
Defines the filter time from the moment when STO1 and STO2 are input with different voltages to the moment when E150.1 is reported.										

Sub-index 4Ch	Name	Servo OFF delay after STO triggered			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	Yes	Related Mode	All	Data Range	0 to 25 (ms)	Default	20
Defines filter time from the moment when the STO status is displayed or E150.0/E150.1 is reported to the moment when the S-ON signal is switched off.										

2.5.3.12 Group 200Bh: Monitoring Parameters

Index 200Bh	Name	Monitoring parameters			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint16
	Access	-	Mapping	Yes	Related Mode	-	Data Range	OD Data Range	Default	OD Default Value
Used to set monitoring parameters.										

Sub-index 00h	Name	Number of entries			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	65

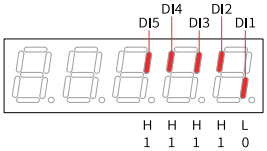
Sub-index 01h	Name	Motor speed actual value			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int16
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	-32767 to +32767 (RPM)	Default	0
Indicates the actual motor speed after round-off, which is accurate to 1 RPM. You can set the filter time constant for 200B-01h in 200A-1Ah (Filter time constant of speed feedback display value).										

Sub-index 02h	Name	Speed reference			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int16
	Access	RO	Mapping	TPDO	Related Mode	PP/PV/HM/ CSP/CSV	Data Range	-32767 to +32767 (RPM)	Default	0
Indicates the present speed reference (accurate to 1 RPM) of the servo drive in the position and speed control modes.										

Sub-index 03h	Name	Internal torque reference			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int16
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	-500 to +500 (%)	Default	0
Indicates present torque reference which is accurate to 0.1%. The value 100.0% corresponds to the rated torque of the motor.										

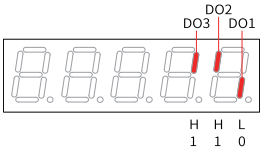
Sub-index 04h	Name	Monitored DI status			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to 65535	Default	0

Indicates the level status of DI1 to DI5 without filtering.
Upper LED segments ON: high level (indicated by "1")
Lower LED segments ON: low level (indicated by "0")
In cases where DI1 is low level and DI2 to DI5 are high level, the corresponding binary value is 11110, the value of 200B-04h read in the software tool is 30, and the corresponding keypad display is as follows.



Sub-index 06h	Name	Monitored DO status			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to 65535	Default	0

Indicates the level status of DO1 to DO3 without filtering.
Upper LED segments ON: high level (indicated by "1")
Lower LED segments ON: low level (indicated by "0")
In cases where DO1 is low level and DO2 to DO3 are high level, the corresponding binary value is "110", the value of 200B-06h read in the software tool is 6, and the corresponding keypad display is as follows.



Sub-index 08h	Name	Absolute position counter			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	-2^{31} to 2^{31} - 1 (reference unit)	Default	0
Indicates present absolute position (reference unit) of the motor in the position control mode. This parameter is a 32-bit integer, which is displayed as a decimal on the keypad.										

Sub-index 0Ah	Name	Mechanical angle			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	0 to 360 (°)	Default	0
Indicates present mechanical angle (encoder unit) of the motor. The value 0 indicates that the mechanical angle is 0°.										

Sub-index 0Bh	Name	Electrical angle			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	0 to 360 (°)	Default	0
Indicates the present electrical angle of the motor, which is accurate to 0.1°. The electrical angle variation range is ±360.0° when the motor rotates. If the motor has four pairs of poles, each revolution generates four rounds of angle changes from 0° to 359.9°. Similarly, if the motor has five pairs of poles, each revolution generates five rounds of angle changes from 0° to 359.9°.										

Sub-index 0Dh	Name	Average load rate			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	0 to 800 (%)	Default	0
Indicates the percentage of the average load torque to the rated torque of the motor, which is accurate to 0.1%. The value 100.0% corresponds to the rated torque of the motor.										

Sub-index 10h	Name	Position following deviation (encoder unit)			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	PP/ HM/ CSP	Data Range	-2^{31} to 2^{31} - 1 (reference unit)	Default	0
Counts the position pulses fed back by the encoder in any control mode. This parameter is a 32-bit integer, which is displayed as a decimal on the keypad.										

Note

When the motor is equipped with an absolute encoder, 200B-12 displays only the low 32 bits of the motor position feedback. The actual motor position feedback can be obtained in 200B-4E (Absolute position (low 32 bits) of absolute encoder) and 200B-50 (Absolute position (high 32 bits) of absolute encoder).

Sub-index 12h	Name	Feedback pulse counter			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Int32
	Access	RO	Mapping	No	Related Mode	-	Data Range	-2^{31} to $+(2^{31}$ - 1) (p)	Default	0

Sub-index 14h	Name	Total power-on time			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	- (s)	Default	0
Indicates the total operating time of the servo drive. This parameter is a 32-bit integer, which is displayed as a decimal on the keypad.										

Note

If the servo drive is switched on and off continuously within a short period of time, a deviation within 1 h may be present in the total power-on record.

Sub-index 19h	Name	RMS value of phase current			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to 6553.5 (A)	Default	-
Indicates the RMS value of the phase current of the servo motor, which is accurate to 0.1 A.										

Sub-index 1Bh	Name	Bus voltage			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to 6553.5 (V)	Default	-
Indicates the DC bus voltage of the main circuit after rectification, which is accurate to 0.1 V.										

Sub-index 1Ch	Name	Module temperature			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	-20 to +200 (°C)	Default	-
Indicates the temperature of the module inside the servo drive, which can be used as a reference for estimating the actual temperature of the servo drive.										

Sub-index 1Dh	Name	Absolute encoder fault information given by FPGA			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to 65535	Default	0

Sub-index 1Eh	Name	Axis status information given by FPGA			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to 65535	Default	0

Sub-index 1Fh	Name	Axis fault information given by FPGA			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to 65535	Default	0

Sub-index 20h	Name	Encoder fault information			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to 65535	Default	0

Sub-index 22h	Name	Fault log			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 9	Default	-
Used to view any one of the latest 10 faults that occurred on the servo drive.										

Sub-index 23h	Name	Fault code of the selected fault			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	-	Default	-

Sub-index 24h	Name	Time stamp of the selected fault			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	(s)	Default	-

Sub-index 26h	Name	Motor speed upon occurrence of the selected fault			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	(RPM)	Default	-

Sub-index 27h	Name	Motor phase-U current upon occurrence of the selected fault			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	(A)	Default	-

Sub-index 28h	Name	Motor phase-V current upon occurrence of the selected fault			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	(A)	Default	-

Sub-index 29h	Name	Bus voltage upon occurrence of the selected fault			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	(V)	Default	-

Sub-index 2Ah	Name	DI status upon occurrence of the selected fault			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	(V)	Default	-

Sub-index 2Ch	Name	DO status upon occurrence of the selected fault			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	-	Default	-
200B-23h...200B-2Bh display corresponding parameter values when the fault displayed in 200B-23h occurs.										

Sub-index 2Eh	Name	Internal fault code			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to 65535	Default	0

Sub-index 2Fh	Name	Absolute encoder fault information given by FPGA upon occurrence of the selected fault			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to 65535	Default	0

Sub-index 30h	Name	System status information given by FPGA upon occurrence of the selected fault			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to 65535	Default	0

Sub-index 31h	Name	System fault information given by FPGA upon occurrence of the selected fault			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to 65535	Default	0

Sub-index 32h	Name	Encoder fault information upon occurrence of the selected fault			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to 65535	Default	0

Sub-index 34h	Name	Internal fault code upon occurrence of the selected fault			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to 65535	Default	0

Sub-index 36h	Name	Position deviation counter			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	PP/HM/ CSP	Data Range	-2^{31} to (2^{31} - 1) (reference unit)	Default	0
Indicates the position deviation value which has not been divided or multiplied by the electronic gear ratio in the position control mode. This parameter is a 32-bit integer, which is displayed as a decimal on the keypad. Note: Position deviation (reference unit) refers to the value converted with encoder position deviation, so the precision may be compromised.										

Sub-index 38h	Name	Motor speed actual value			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	-6000 to +6000 (RPM)	Default	0
Indicates the actual value of the motor speed, which is accurate to 0.1 RPM. This parameter is a 32-bit integer, which is displayed as a decimal on the keypad. You can set the filter time constant for speed feedback in 200A-1Ah.										

Sub-index 3Ah	Name	Bus voltage of the control circuit			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to 6553.5	Default	0
Indicates the DC bus voltage of the control circuit after rectification.										

Sub-index 3Bh	Name	Mechanical absolute position (low 32 bits)			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	0 to 2^{32} (reference unit)	Default	0
Indicates the low 32-bit value (encoder unit) of the mechanical position feedback when an absolute encoder is used.										

Sub-index 3Dh	Name	Mechanical absolute position (high 32 bits)			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	-2^{31} to (2^{31} - 1) (reference unit)	Default	0
Indicates the high 32-bit value (encoder unit) of the mechanical position feedback when an absolute encoder is used.										

Sub-index 40h	Name	Notrdy (Not ready) state			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	0 to 5	Default	0

Display Value	Meaning
0	None
1	Control circuit power supply error (H0B-57)
2	Phase loss detection error
3	Main circuit power supply error (including short-circuited-to-ground error)
4	Other servo drive faults
5	Short-circuited-to-ground detection not done

Sub-index 43h	Name	Encoder temperature			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int16
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	-100 to +200	Default	-
Indicates the encoder temperature value.										

Sub-index 44h	Name	Brake load rate			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int16
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	0 to 200 (%)	Default	0
Indicates the brake load rate. When the load rate exceeds 100%, the servo drive stops braking.										

Sub-index 47h	Name	Number of revolutions of the absolute encoder			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	0 to 65535	Default	0
Indicates the number of revolutions of the absolute encoder.										

Sub-index 48h	Name	Single-turn position feedback of absolute encoder			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	0 to (2^{31} - 1) (encoder unit)	Default	0
Indicates the single-turn position feedback of the encoder.										

Sub-index 4Eh	Name	Absolute position (low 32 bits) feedback of the absolute encoder			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	-2^{31} to (2^{31} - 1) (encoder unit)	Default	0
Indicates the low 32-bit value of the position feedback of the absolute encoder.										

Sub-index 50h	Name	Absolute position (high 32 bits) feedback of the absolute encoder			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	-2^{31} to (2^{31} - 1) (encoder unit)	Default	0
Indicates the high 32-bit value of the position feedback of the absolute encoder.										

Sub-index 52h	Name	Single-turn position (low 32 bits) of the rotating load			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	0 to (2^{32} - 1) (encoder unit)	Default	0
Indicates the low 32-bit value (encoder unit) of the position feedback of the load when the absolute encoder system works in the rotation mode (2002-02h = 2).										

Sub-index 54h	Name	Single-turn position (high 32 bits) of the rotating load			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	-2^{31} to (2^{31} - 1) (encoder unit)	Default	0
Indicates the high 32-bit value (encoder unit) of the position feedback of the load when the absolute encoder system works in the rotation mode (2002-02h = 2).										

Sub-index 56h	Name	Single-turn position of the rotating load			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	-2 to (2^{31} - 1) (reference unit)	Default	0
Indicates the position feedback of the load when the absolute encoder system works in the rotation mode (2002-02h = 2).										

Sub-index 5Bh	Name	Group number of the abnormal parameter			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	0 to 65535	Default	0
Indicates the group number of the abnormal parameter when E101 occurs.										

Sub-index 5Ch	Name	Offset of abnormal parameter within the group			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	0 to 65535	Default	0
Indicates the offset of the abnormal parameter within the parameter group when E101 occurs.										

2.5.3.13 Group 200Dh: Auxiliary Function Parameters

Index 200Dh	Name	Auxiliary functions			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint16
	Access	-	Mapping	-	Related Mode	-	Data Range	OD Data Range	Default	OD Default Value
Used to set monitoring parameters.										

Sub-index 00h	Name	Number of entries			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	21

Sub-index 01h	Name	Software reset			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Defines whether to enable software reset.

Setpoint	Description	Remarks
0	No operation	-
1	Enable	Programs in the servo drive are reset automatically (similar to the program reset upon power-on) after the software reset function is enabled, without the need for a power cycle.

Software reset is available in the following conditions:
The servo drive is in the S-OFF state.
No. 1 non-resettable faults do not occur.
No operation is performed on EEPROM (the software reset function is invalid when 200A-04h is set to 1).

Sub-index 02h	Name	Fault reset			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Defines whether to enable fault reset.

Setpoint	Description	Remarks
0	No operation	-
1	Enable	When a No. 1 or No. 2 resettable fault occurs, you can enable the fault reset function in the non-operational state after rectifying the fault cause, stopping the keypad from displaying the fault. When a No. 3 warning occurs, you can enable the fault reset function directly, regardless of the servo drive status.

For fault classification, see Chapter "Troubleshooting".
The fault reset function, once enabled, stops the keypad from displaying the fault only. It does not activate modifications made on parameters.
This function is not applicable to non-resettable faults. Use this function with caution in cases where the fault causes are not rectified.

Sub-index 03h	Name	Offline inertia auto-tuning			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Used to enable offline inertia auto-tuning through the keypad.
In the parameter display mode, switch to "200D-03h", and press the SET key to enable offline inertia auto-tuning. For details, see section "Inertia Auto-tuning".

Sub-index 04h	Name	Encoder initial angle auto-tuning			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Setpoint	Description
0	No operation
1	Enable

Sub-index 05h	Name	Read/write in encoder ROM			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 2	Default	0

Setpoint	Description
0	No operation
1	Write ROM
2	Read ROM

Sub-index 06h	Name	Emergency stop			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Defines whether to enable emergency stop.

Setpoint	Description
0	No operation
1	Enable

When emergency stop is enabled, the servo drive stops immediately in the stop mode defined by 605Ch regardless of the operating status.

Sub-index 0Ch	Name	Jog function			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	-	Default	-

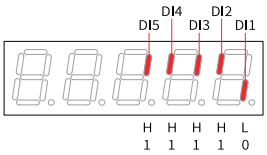
Used to enable the jog function through the keypad.
The jog function can be set through the keypad. For details, see Section "Jogging" in SV660N Series Servo Drive Commissioning Guide.
This function is not related to the control mode of the servo drive.

Sub-index 12h	Name	Forced DI/DO selection			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 3	Default	0

Defines whether to enable forced DI/DO.

Sub-index 13h	Name	Forced DI setting			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 31	Default	31

Used to set the level logic of the DI functions assigned in group 2003h when forced DI function is enabled (200D-12h = 1 or 3).
The value of 200D-13h is displayed as a hexadecimal on the keypad, when it is converted to a binary value, bit(n) = 1 indicates the DI function logic is high level; bit(n) = 0 indicates the DI function logic is low level.
Example:
The value of 200D-13h is 0x1E, which corresponds to the binary value "11110", indicating DI1 is low level, and DI2 to DI5 are high level. You can also monitor the status of DI1 to DI5 through 200B-04h.



Whether the DI function is active depends not only on 200D-13h but also on the DI logic set in group 2003h.

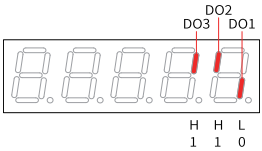
Sub-index 14h	Name	Forced DO setting			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 7	Default	0

Defines whether the DO functions assigned in group 2004h are active when the forced DO function is enabled (200D-12h = 2 or 3).

The value of 200D-14h is displayed as a hexadecimal on the keypad. When it is converted to a binary value, bit(n) = 1 indicates the DO function is active; bit(n) = 0 indicates the DO function is inactive.

Example:

The value of 200D-14h is 6, which corresponds to the binary value "110", indicating the function assigned to DO1 is active, and functions assigned to DO2 and DO3 are inactive. Assume DO1...DO3 in group 2004h are "active low", then 200B-06h is displayed as follows:



Sub-index 15h	Name	Absolute encoder reset			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	All	Data Range	0 to 2	Default	0

Defines whether to reset the encoder fault or the multi-turn data of the encoder.

Setpoint	Description
0	No operation
1	Reset encoder fault
2	Reset encoder fault and multi-turn data

Note

The absolute position of the encoder changes abruptly after multi-turn data reset. In this case, perform mechanical homing.

2.5.3.14 Group 200Eh: Communication Function Parameters

Index 200Eh	Name	Communication parameters			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint16
	Access	-	Mapping	-	Related Mode	-	Data Range	OD Data Range	Default	OD Default Value

Defines servo motor parameters.

Sub-index 00h	Name	Number of entries			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	97

Sub-index 01h	Name	Node address			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	1 to 127	Default	1
Defines the servo drive axis address during RS232 communication. 0: Broadcast address. The host controller performs the write operation on all the servo drives through the broadcast address. The servo drives acts accordingly after receiving the broadcast address frames, without responding. 1 to 127: Each of the servo drive networked must have a unique address. Otherwise, communication error or failure will occur.										

Sub-index 02h	Name	Update parameter values written through communication to EEPROM			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 3	Default	3
Defines whether to save parameters written through RS232 and EtherCAT (writing with SDO only) communication to EEPROM.										

Note

The value of 200E-02h will always be updated and saved to EEPROM.

If the parameters modified need not be saved after power off, set 200E-02h to 0. This is to prevent EEPROM from being damaged by frequent parameter saving, leading to E108.0 (Parameter write error).

Sub-index 15h	Name	EtherCAT slave name			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	0 to 65535	Default	-
Indicates the station number assigned to the slave by the master during EtherCAT communication.										

Sub-index 16h	Name	EtherCAT slave alias			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to 65535	Default	-
For masters that fail to assign the station numbers, set the slave station numbers through 200Eh-16h during EtherCAT communication. 200E-16h = 0: The master assigns the station numbers by default. 200E-16h ≠ 0: The set station number applies by default, with the one assigned by master deactivated.										

Sub-index 17h	Name	Sync loss window			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	1 to 20	Default	8
Defines the maximum number of master signal loss events allowed by the slave. The slave reports EE08.2 (IRQ loss) if the value of 200E-17h is exceeded.										

Sub-index 18h	Name	EtherCAT station alias from EEPROM			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0

Sub-index 19h	Name	Sync loss counter			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0

Sub-index 1Ah	Name	Port 0 invalid frame counter			Setting Condition & Effective Time	At display	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0
Indicates CRC error of Port0. If there is a counting value, the frames received by Port0 are damaged. The possible cause may lie in the cable or PHY port, including 0x301 RX-ER. Normally, 0x300 = 0x301, if 0x300 > 0x301, CRC errors occur in the network.										

Sub-index 1Bh	Name	Port 1 invalid frame counter			Setting Condition & Effective Time	At display	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0
Indicates CRC error of Port1. If there is a counting value, the frames received by Port0 are damaged. The possible cause may lie in the cable or PHY port, including 0x301 RX-ER. Normally, 0x300 = 0x301, if 0x300 > 0x301, CRC errors occur in the network.										

Sub-index 1Ch	Name	Port 0/1 transfer error counter			Setting Condition & Effective Time	At display	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0
If the received data is wrong and ended with an extra error flag, it indicates the data has already been processed by other stations.										

Sub-index 1Dh	Name	Process unit and PDI error counter			Setting Condition & Effective Time	At display	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0
If data exchange error occurs between ESC and internal MCU, keep the setpoint to 0. If the counting value increases, the internal anti-disturbance performance of the board is abnormal.										

Sub-index 1Eh	Name	Port 0/1 loss counter			Setting Condition & Effective Time	At display	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0
If data link loss is detected by the ESC port, the counting value of the corresponding link loss counter increases. This may be caused by poor contact or broken cables.										

Sub-index 20h	Name	Sync mode setting			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 2	Default	1

Defines the synchronization mode.

Setpoint	Operation mode	Description
0	Manufacturer function	Manufacturer function
1	Synchronization mode 1	Applicable to host controllers with a jitter of 1 us during synchronization.
2	Synchronization mode 2	Applicable to host controllers with a jitter above 1 us during synchronization.

Note

In synchronization mode, the synchronization cycle must be an integer multiple of 125 us. Otherwise, the servo drive reports EE13.0 (Synchronization cycle setting error).

Sub-index 21h	Name	Sync error window			Setting Condition & Effective Time	At stop & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	100 to 4000 (ns)	Default	3000
Defines the permissible jitter range of synchronization signals when the servo drive works in synchronization mode 1 (200E-20h = 1).										

Note

In synchronization mode 1 (200E-20h = 1), if the jitter range of synchronization signals exceeds the value of 200E-21h after ESM enters the OP state, the servo drive reports EE15.0 (Synchronization cycle error too large).

Sub-index 22h	Name	EtherCAT network state and link state			Setting Condition & Effective Time	At display	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0
Indicates the connection status of the state machine and EtherCAT network ports.										

Sub-index 23h	Name	CSP excessive position increment counter			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0
Defines the counting value when the position reference increment exceeds the maximum position reference increment threshold. When the counting value exceeds the threshold, EB01.0 or EB01.1 occurs.										

Sub-index 24h	Name	AL fault code			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 65535	Default	0

Sub-index 25h	Name	Enhanced link detection enable			Setting Condition & Effective Time	During running & Next power-on	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Sub-index 26h	Name	EtherCAT XML reset selection			Setting Condition & Effective Time	During running & Next power-on	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 1	Default	0

Sub-index 51h	Name	Serial port baud rate			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 10	Default	9

Defines the communication rate between the servo drive and the host controller.

Setpoint	Baud rate (bps)
0	300
1	600
2	1200
3	2400
4	4800
5	9600
6	19200
7	38400
8	57600
9	115200
10	230400

The baud rate set in the servo drive must be the same as that in the host controller. Otherwise, communication will fail.

Sub-index 52h	Name	Modbus data format			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 3	Default	3

Defines the data check mode between the servo drive and the host controller during communication.
The data format set in the servo drive must be the same as that in the host controller. Otherwise, communication will fail.

Sub-index 53h	Name	Modbus response delay			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 20	Default	0

Sub-index 54h	Name	Modbus communication timeout			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 600	Default	0

Sub-index 5Bh	Name	Modbus version			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 655.35	Default	0

Sub-index 5Eh	Name	EtherCAT COE version			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	-	Related Mode	-	Data Range	0 to 655.35	Default	0

Sub-index 61h	Name	XML file version			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint16
	Access	RW	Mapping	-	Related Mode	-	Data Range	0 to 655.35	Default	0

2.5.3.15 Group 203Fh: Manufacturer Fault Codes

Index 203Fh	Name	Manufacturer fault code			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Uint32
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	0 to (2^{32} - 1)	Default	-
Indicates the fault code of the highest level. The value of 203Fh is a hexadecimal, in which the high 16 bits indicate the manufacturer internal fault code, and the low 16 bits indicate the manufacturer external fault code.										

2.5.4 Parameters Defined by the Device Profile (Group 6000h)

Index 603Fh	Name	Error code			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	0 to 65535	Default	-
When an error described in CiA402 profile occurs on the drive, 603Fh is the same as that described in CiA402. For details, see *"2.3.1 List of Fault and Warning Codes" on page 35*. The value of 603F is a hexadecimal. 203Fh displays the auxiliary byte of the error code in hexadecimal. The data type of 203Fh is Uint32, in which the high 16 bits represent the internal error code of the manufacturer, and the low 16 bits represent the external error code of the manufacturer.										

Index 6040h	Name	Control word			Setting Condition & Effective Time	At once	Data Structure	VAR	Data Type	Uint16
	Access	RW	Mapping	RPDO	Related Mode	All	Data Range	0 to 65535	Default	0

Defines the control command.

bit	Name	Description
0	Switch on	1: Active, 0: Inactive
1	Enable voltage	1: Active, 0: Inactive
2	Quick stop	0: Active, 1: Inactive
3	Enable operation	1: Active, 0: Inactive
4 to 6	Operation mode specific	Related to the operation mode of the servo drive.
7	Fault reset	0: Inactive 0 -> 1: Fault reset is available only for faults and warnings that can be reset. 1: Other control commands are invalid. 1->0: Invalid
8	Halt	1: Active, 0: Inactive
9	Operation mode specific	Related to the operation mode of the servo drive.
10	Reserved	Undefined
11 to 15	Manufacturer-specific	Manufacturer-specific

Note:

- All bits in the control word constitute a control command.
- The meanings of bit0...bit3 and bit7 are the same in each mode. The servo drive switches to the preset status according to the CiA402 state machine switchover process only when commands are sent in sequence. Each command corresponds to a certain status.
- bit4...bit6 are related to each mode (see the control commands in different modes for details).
- bit9 is not defined.

Index 6041h	Name	Status word			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	0 to 65535	Default	0

Indicates the servo drive status.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
ms		oms		ila	tr	rm	ms	w	sod	qs	ve	f	oe	so	rtso

MSB LSB

Note：ms=manufacturer-specific；oms=operation mode specific；ila =internal limit active；tr=target reached；rm=remote；w=warning；sod=switch on disabled；qs=quick stop；ve=voltage enabled；f=fault；oe=operation enabled；so=switch on；rtso=ready to switch on

Table 2–12 Description of each bit of 6041h

bit	Name	Description
0	Ready to switch on	1: Active, 0: Inactive
1	Switch on	1: Active, 0: Inactive
2	Operation enabled	1: Active, 0: Inactive
3	Fault	1: Active, 0: Inactive
4	Voltage enabled	1: Active, 0: Inactive
5	Quick stop	0: Active, 1: Inactive
6	Switch on disabled	1: Active, 0: Inactive
7	Warning	1: Active, 0: Inactive
8	Manufacturer-specific	Undefined
9	Remote	1: Active, control word activated 0: Inactive
10	Target reached	1: Active, 0: Inactive
11	Internal limit active	1: Active, 0: Inactive
12 to 13	Operation mode specific	Related to the servo drive operation mode.
14	Manufacturer-specific	Undefined
15	Home found	1: Active, 0: Inactive

Table 2–13 Descriptions of setpoints of 6041h

Binary Value	Description
xxxx xxxx x0xx 0000	Not ready to switch on
xxxx xxxx x1xx 0000	Switch on disabled
xxxx xxxx x01x 0001	Ready to switch on
xxxx xxxx x01x 0011	Switched on
xxxx xxxx x01x 0111	Operation enabled
xxxx xxxx x00x 0111	Quick stop active
xxxx xxxx x0xx 1111	Fault reaction active
xxxx xxxx x0xx 1000	Fault

Note

- Meanings of bit0 to bit9 are the same in each mode of operation. After commands are sent in sequence by the control word 6040h, the servo drive feeds back the acknowledged status.
- Meanings of bit12 and bit13 vary with the mode of operation. For details, see parameters related to each mode.
- Meanings of bit10, bit11, and bit15 are the same in each mode of operation and indicate the servo drive status after a certain mode of operation is implemented.

605Ah	Name	Quick stop option code			Setting Condition & Effective Time	Any condition & At stop	Data Structure	VAR	Data Type	Int16
	Access	RW	Mapping	No	Related Mode	All	Data Range	0 to 7	Default	2

Defines the deceleration mode of the motor for stopping rotating upon quick stop and the motor status after stop.

Setpoint	Stop Mode
0	Coast to stop, keeping de-energized status
1	Ramp to stop as defined by 6084h/609Ah (HM), keeping de-energized status
2	Ramp to stop as defined by 6085h, keeping de-energized status
3	Stop at emergency-stop torque, keeping de-energized status
4	N/A
5	Ramp to stop as defined by 6084h/609Ah (HM), keeping position lock status
6	Ramp to stop as defined by 6085h, keeping position lock status
7	Stop at emergency-stop torque, keeping position lock status

When the brake function is enabled and the value of 605Ah is lower than 4, the stop mode is forcibly set to "Ramp to stop as defined by 6085h, keeping de-energized state".

605Ch	Name	Disable operation option code			Setting Condition & Effective Time	Any condition & At stop	Data Structure	-	Data Type	Int16
	Access	RW	Mapping	No	Related Mode	All	Data Range	-4 to +1	Default	0

Defines the deceleration mode of the motor for stopping rotating upon S-ON OFF and the motor status after stop.

Setpoint	Stop Mode
-4	Ramp to stop as defined by 6085h, keeping dynamic braking status
-3	Stop at zero speed, keeping dynamic braking status
-2	Ramp to stop under all modes, keeping dynamic braking status
-1	Dynamic braking stop, keeping dynamic braking status
0	Coast to stop, keeping de-energized status
1	Ramp to stop under all modes, keeping de-energized status

Set a proper stop mode according to the mechanical status and operation requirements.
After the brake output (BK) function is enabled, the stop mode upon S-ON OFF is forcibly set to "Ramp to stop as defined by 6085h, keeping dynamic braking status".

605Dh	Name	Stop option code			Setting Condition & Effective Time	Any condition & At stop	Data Structure	-	Data Type	Int16
	Access	RW	Mapping	No	Related Mode	All	Data Range	1 to 3	Default	1

Defines the deceleration mode of the motor for stopping rotating upon halt and the motor status after stop.
PP/PV/HM mode:

Setpoint	Stop Mode
1	Ramp to stop as defined by 6084h/609Ah (HM), keeping position lock status
2	Ramp to stop as defined by 6085h, keeping position lock status
3	Stop at emergency-stop torque, keeping position lock status

PT mode:

Setpoint	Stop Mode
1/2/3	Ramp to stop as defined by 6087h, keeping position lock status

605Eh	Name	Fault reaction option code			Setting Condition & Effective Time	Any condition & At stop	Data Structure	-	Data Type	Int16
	Access	RW	Mapping	No	Related Mode	All	Data Range	-5 to +3	Default	0

Defines the deceleration mode of the motor for stopping rotating upon occurrence of a No. 2 fault and the motor status after stop.

Setpoint	Stop Mode
-5	Stop at zero speed, keeping dynamic braking status
-4	Stop at emergency-stop torque, keeping dynamic braking status
-3	Ramp to stop as defined by 6085h, keeping dynamic braking status
-2	Ramp to stop as defined by 6084h/609Ah, keeping dynamic braking status
-1	Dynamic braking stop, keeping dynamic braking status
0	Coast to stop, keeping de-energized status
1	Ramp to stop as defined by 6084h/609Ah, keeping de-energized status
2	Ramp to stop as defined by 6085h, keeping de-energized status
3	Stop at emergency-stop torque, keeping de-energized status

After the brake (BK) output function is enabled, the stop mode at No. 2 fault is forcibly set to "Ramp to stop as defined by 6085h, keeping dynamic braking status".

Index 6060h	Name	Modes of operation			Setting Condition & Effective Time	At once	Data Structure	VAR	Data Type	Int8
	Access	RW	Mapping	RPDO	Related Mode	All	Data Range	0 to 10	Default	0

Defines the servo drive operation mode.

Setpoint	Modes of Operation	
0	N/A	Reserved
1	Profile position (PP) mode	See section "Profile Position Mode" in SV660N Series Servo Drive Function Guide.
2	N/A	Reserved
3	Profile velocity (PV) mode	See section "Profile Velocity Mode" in SV660N Series Servo Drive Function Guide.
4	Profile torque (PT) mode	See section "Profile Torque Mode" in SV660N Series Servo Drive Function Guide.
5	N/A	Reserved
6	Homing (HM) mode	See section "Homing Mode" in SV660N Series Servo Drive Function Guide.
7	Interpolated position (IP) mode	Not supported
8	Cyclic synchronous position (CSP) mode	See section "Cyclic Synchronous Position Mode" in SV660N Series Servo Drive Function Guide.
9	Cyclic synchronous velocity (CSV) mode	See section "Cyclic Synchronous Velocity Mode" in SV660N Series Servo Drive Function Guide.
10	Cyclic synchronous torque (CST) mode	See section "Cyclic Synchronous Torque Mode" in SV660N Series Servo Drive Function Guide.

If an unsupported operation mode is set through SDO, a SDO error will be returned. For details, see *"2.3.3 SDO Transfer Abort Code" on page 44*.
If an operation mode not supported is set through PDO, this operation mode is invalid.

Index 6061h	Name	Modes of operation display			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Int8
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	0 to 10	Default	0

Displays the current operation mode of the servo drive.

Setpoint	Modes of Operation	
0	N/A	Reserved
1	Profile position (PP) mode	See section "Profile Position Mode" in SV660N Series Servo Drive Function Guide.
2	N/A	Reserved
3	Profile velocity (PV) mode	See section "Profile Velocity Mode" in SV660N Series Servo Drive Function Guide.
4	Profile torque (PT) mode	See section "Profile Torque Mode" in SV660N Series Servo Drive Function Guide.
5	N/A	Reserved
6	Homing (HM) mode	See section "Homing Mode" in SV660N Series Servo Drive Function Guide.
7	Interpolated position (IP) mode	Not supported
8	Cyclic synchronous position (CSP) mode	See section "Cyclic Synchronous Position Mode" in SV660N Series Servo Drive Function Guide.
9	Cyclic synchronous velocity (CSV) mode	See section "Cyclic Synchronous Velocity Mode" in SV660N Series Servo Drive Function Guide.
10	Cyclic synchronous torque (CST) mode	See section "Cyclic Synchronous Torque Mode" in SV660N Series Servo Drive Function Guide.

6062h	Name	Position demand value			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	PP/HM/ CSP	Data Range	(reference unit)	Default	0

Indicates the input position reference (reference unit) in the S-ON state.

6063h	Name	Position actual value*			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	(encoder unit)	Default	0

Indicates the input position reference (encoder unit) in the S-ON state.

6064h	Name	Position actual value			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	-(reference unit)	Default	0

Represents the single-turn absolute position feedback of the rotating load in real time in user-defined unit. This value is equal to 200B-08h in the absolute position mode.
Position actual value (6064h) x Gear ratio (6091h) = Position actual value* (6063h)

Index 6065h	Name	Following error window			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint32
	Access	RW	Mapping	RPDO	Related Mode	PP/HM/ CSP	Data Range	0 to (2^{32} - 1) (reference unit)	Default	3145728
Defines the threshold of excessive position deviation (reference unit). For 6065h, setpoints beyond 2147483647 will be forcibly changed to 2147483647.										

Index 6066h	Name	Following error time out			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint16
	Access	RW	Mapping	RPDO	Related Mode	PP/HM/ CSP	Data Range	0 to 65535 (ms)	Default	0
Defines the time lapse to trigger excessive position deviation (EB00.0). When the position deviation (reference unit) exceeds ±6065h and such status persists after the time defined by 6066h elapses, EB00.0 (Excessive position deviation) will occur.										

Index 6067h	Name	Position window			Setting Condition & Effective Time	During running & At stop	Data Structure	VAR	Data Type	Uint32
	Access	RW	Mapping	RPDO	Related Mode	PP	Data Range	0 to (2^{32} - 1) (reference unit)	Default	734
Defines the threshold for position reach. When the position deviation is within ±6067h and the time reaches the value defined by 6068h, the position is reached and bit10 of 6041h is set to 1. This flag bit is valid only when the S-ON signal is active in the PP mode.										

Index 6068h	Name	Position window time			Setting Condition & Effective Time	During running & At stop	Data Structure	VAR	Data Type	Uint16
	Access	RW	Mapping	RPDO	Related Mode	PP	Data Range	0 to 65535 (ms)	Default	0
Defines the time window for position reach.										

Index 606Ch	Name	Velocity actual value			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	-	Default	0
Indicates the speed actual value (reference unit/s).										

Index 606Dh	Name	Velocity window			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint16
	Access	RW	Mapping	RPDO	Related Mode	PV	Data Range	0 to 65535 (RPM)	Default	10

Index 606Eh	Name	Velocity window time			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint16
	Access	RW	Mapping	RPDO	Related Mode	PV	Data Range	0 to 65535 (ms)	Default	0

606Dh is used to set the threshold for speed reach. 606Eh is used to set the window time for speed reach.
If the difference between the speed reference and speed feedback is within ±606D and such status persists for the time defined by 606E, the speed is reached, and bit10 (Target reached) of 6041h is set to 1.
This flag bit is valid only when the servo drive is enabled in PV mode.

Index 606Fh	Name	Velocity threshold			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint16
	Access	RW	Mapping	RPDO	Related Mode	PV	Data Range	0 to 65535 (RPM)	Default	10

Defines the threshold for zero speed.
When the speed feedback is within ±606F and the time defined by 6070 elapses, the motor speed is acknowledged to be 0 and bit12 of 6041 is set to 1.
This flag bit is valid only in PV mode.

Index 6070h	Name	Velocity threshold time			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint16
	Access	RW	Mapping	RPDO	Related Mode	PV	Data Range	0 to 65535 (ms)	Default	0

Defines the threshold for zero speed.
When the speed feedback is within ±606F and the time defined by 6070 elapses, the motor speed is acknowledged to be 0 and bit12 of 6041 is set to 1.
This flag bit is valid only in PV mode.

Index 6071h	Name	Target torque			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Int16
	Access	RW	Mapping	RPDO	Related Mode	PT/CST	Data Range	-4000.0 to +4000.0 (%)	Default	0

Defines the target torque in PT and CST modes.
The value 100.0% corresponds to the rated torque of the motor.

Index 6072h	Name	Max. torque			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint16
	Access	RW	Mapping	RPDO	Related Mode	All	Data Range	0 to 4000.0 (%)	Default	3500
Defines the maximum torque limit of the servo drive in forward/reverse direction.										

Index 6074h	Name	Torque demand value			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Int16
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	-(%)	Default	-
Indicates the torque reference output value during operation. The value 100.0% corresponds to the rated torque of the motor.										

Index 6077h	Name	Torque actual value			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Int16
	Access	RO	Mapping	TPDO	Related Mode	All	Data Range	-(%)	Default	-
Indicates the actual torque output of the servo drive. The value 100.0% corresponds to the rated torque of the motor.										

Index 607Ah	Name	Target position			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Int32
	Access	RW	Mapping	RPDO	Related Mode	PP/CSP	Data Range	-2 to (2^{31} - 1) (reference unit)	Default	0
Defines the target position in PP mode and CSP mode. In CSP mode, 607Ah represents the absolute target position. In PP mode, 607Ah represents either incremental position or absolute position as defined by the control word.										

Index 607Ch	Name	Home offset			Setting Condition & Effective Time	During running & At stop	Data Structure	VAR	Data Type	Int32
	Access	RW	Mapping	RPDO	Related Mode	HM	Data Range	-2 to (2^{31} - 1) (reference unit)	Default	0
Defines the physical distance between the mechanical zero and the motor home in the homing mode. The home offset is activated only after homing is done upon power-on and bit15 of 6041h is set to 1. Home offset is used in the following cases: • Determines the present position according to 60E6h after homing is done. • If 607Ch is outside the value of 607Dh (Software position limit), EE09.1 (Home setting error) will occur.										

Index 607Dh	Name	Software position limit			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Uint32
	Access	-	Mapping	Yes	Related Mode	All	Data Range	OD Data Range	Default	OD Default Value

Defines the minimum and maximum software position limits.

- Minimum absolute software position limit = (607D-1h)
- Maximum absolute software position limit = (607D-2h)

The software position limit is used to judge the absolute position. When homing is not performed, the internal software position limit is invalid.

The condition for activating the absolute software position limit is set in the object dictionary 0x200A-02h.

- 0: No limit
- 1: Absolute software position limit activated
- 2: Absolute software position limit activated after homing

The absolute software position limit takes effect once the following conditions are met: The device is powered on, the homing operation is done, and bit15 of 6041h is set to 1. If the minimum software position limit is higher than the maximum software position limit, EE09.0 (Software position limit setting error) will occur.

When the position reference or position feedback reaches the internal software position limit, the servo drive takes the position limit as the target position in the position control mode and stops upon reaching the limit, with an overtravel fault being reported. If a reverse displacement command is input, the motor exits from the overtravel state and this bit is zeroed out.

When both the DI limit switch and internal software position limit are activated, the overtravel status is determined by the DI limit switch.

Sub-index 0h	Name	Highest sub-index supported			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	2

Sub-index 1h	Name	Min. position limit			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Int32
	Access	RW	Mapping	RPDO	Related Mode	All	Data Range	-2 to (2^{31} - 1) (reference unit/s)	Default	-2^{31}

Sub-index 2h	Name	Max. position limit			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Int32
	Access	RW	Mapping	RPDO	Related Mode	All	Data Range	-2 to (2^{31} - 1) (reference unit/s)	Default	2^{31} - 1

Defines the maximum software position limit relative to the mechanical zero.

Maximum software position limit = (607D-2h)

Index 607Eh	Name	Polarity			Setting Condition & Effective Time	During running & At stop	Data Structure	VAR	Data Type	Uint8
	Access	RW	Mapping	RPDO	Related Mode	All	Data Range	0 to 255	Default	0

Defines the polarity of position, speed, and torque references.

bit	Description
0 to 4	Undefined
5	Torque reference polarity 0: Multiply by 1 1: Multiply by -1 PT: Inverts the target torque (6071h). CSP/CSV: Inverts the torque offset (60B2h). CST: Inverts the torque reference (6071h + 60B2h).
6	Speed reference polarity 0: Multiply by 1 1: Multiply by -1 PT: Inverts the target torque (6071h). CSP: Inverts the velocity offset (60B1h) CSV: Inverts the speed reference (60FFh + 60B1h).
7	Position reference polarity 0: Multiply by 1 1: Multiply by -1 PP: Inverts the target position (607Ah) CSP: Inverts the position reference (607Ah + 60B0h).

Index 607Fh	Name	Max. profile velocity			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint32
	Access	RW	Mapping	RPDO	Related Mode	PP/PV/PT/HM/CST	Data Range	0 to (2^{32} - 1) (reference unit/s)	Default	104857600

Defines the speed limit in PP, PV, PT, CST, and HM modes.

Index 6081h	Name	Profile velocity			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint32
	Access	RW	Mapping	RPDO	Related Mode	PP	Data Range	0 to (2^{32} - 1) (reference unit/s)	Default	174762

Defines the constant operating speed of the target position in PP mode.

Index 6083h	Name	Profile acceleration			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint32
	Access	RW	Mapping	RPDO	Related Mode	PP/PV	Data Range	0 to (2^{31} - 1) (reference unit/s^2)	Default	174762 66667
Defines the position reference acceleration in PP mode. In PP mode, if the value of 6083h exceeds that of 60C5h, the value of 60C5h will be used. For 6083h, the setpoint 0 will be forcibly changed to 1.										

Index 6084h	Name	Profile deceleration			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint32
	Access	RW	Mapping	RPDO	Related Mode	PP/PV	Data Range	0 to (2^{31} - 1) (reference unit/s^2)	Default	174762 66667
Defines the position reference deceleration in PP mode. In PP mode, if the value of 6084h exceeds that of 60C6h, the value of 60C6h will be used. For 6084h, the setpoint 0 will be forcibly changed to 1.										

Index 6085h	Name	Quick stop deceleration			Setting Condition & Effective Time	During running & At stop	Data Structure	VAR	Data Type	Uint32
	Access	RW	Mapping	Yes	Related Mode	PP/PV/ HM/CSP/ CSV	Data Range	0 to 2^{32} - 1 (reference unit/s^2)	Default	2^{31} - 1
Defines the deceleration rate during ramp-to-stop when the quick stop command is active in the PP, CSV, PV, and HM modes, with 605Ah (Quick stop option code) set to 2 or 6. Defines the deceleration rate during ramp-to-stop when the halt command is active in the PP, CSV, PV, and HM modes, with 605Dh (Stop option code) set to 2. For 6085h, the setpoint 0 will be forcibly changed to 1.										

Index 6087h	Name	Torque slope			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint32
	Access	RW	Mapping	RPDO	Related Mode	PT/CST	Data Range	0 to 2^{32} - 1 (%/s)	Default	2^{32} - 1
Defines the acceleration rate (torque reference increment per second) of the torque reference in PT and CST modes. In PT and CST modes, if 605A (Quick stop option code) is set to 1, 2, 5, or 6, or 605D (Stop option code) is set to 1 or 2, the servo drive decelerates to stop as defined by 6087h. If the value of 6087h exceeds the torque reference limit, the limit value will be used. For 6087h, the setpoint 0 will be forcibly changed to 1.										

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	De fault	OD Default Value

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

The relation between the motor position feedback (encoder unit) and the load shaft position feedback (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.

$$\text{Motor speed (RPM)} = \frac{\text{Load shaft speed x Gear ratio (6091h)}}{\text{Motor revolutions}} \text{ x } 60$$

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

$$\text{Motor acceleration} = \frac{\text{Load shaft acceleration x Gear ratio (6091h)}}{\text{Motor revolutions}} \text{ x } \frac{1000}{60}$$

Sub-index 00h	Name	Highest sub-index supported			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	2

Sub-index 01h	Name	Motor revolutions			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	RPDO	Related Mode	-	Data Range	1 to (2^{32} - 1)	Default	Encoder resolution

Sub-index 02h	Name	Shaft revolutions			Setting Condition & Effective Time	During running & At once	Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	RPDO	Related Mode	-	Data Range	1 to (2^{32} - 1)	De fault	1

Index 6098h	Name	Homing method			Setting Condition & Effective Time	During running & At stop	Data Structure	VAR	Data Type	Int8
	Access	RW	Mapping	RPDO	Related Mode	HM	Data Range	-2 to +35	De fault	0

Indicates the servo drive status.

Mode	Description
-2	Forward, positive mechanical limit as deceleration point and Z signal as home
-1	Reverse, negative mechanical limit as deceleration point and Z signal as home
1	Reverse, negative limit switch as deceleration point and Z signal as home, falling edge of the negative limit switch signal must be reached before Z signal
2	Forward, positive limit switch as deceleration point and Z signal as home, falling edge of positive limit switch signal must be reached before Z signal
3	Forward, home switch as deceleration point and Z signal as home, falling edge on the same side of the home switch signal must be reached before Z signal
4	Reverse, home switch as deceleration point and Z signal as home, rising edge on the same side of the home switch signal must be reached before Z signal
5	Reverse, home switch as deceleration point and Z signal as home, falling edge on the same side of the home switch signal must be reached before Z signal
6	Forward, home switch as deceleration point and Z signal as home, rising edge on the same side of the home switch signal must be reached before Z signal
7	Forward, home switch as deceleration point and Z signal as home, falling edge on the same side of the home switch signal must be reached before Z signal
8	Forward, home switch as deceleration point and Z signal as home, rising edge on the same side of the home switch signal must be reached before Z signal
9	Forward, home switch as deceleration point and Z signal as home, rising edge on the other side of the home switch signal must be reached before Z signal
10	Forward, home switch as deceleration point and Z signal as home, falling edge on the other side of the home switch signal must be reached before Z signal
11	Reverse, home switch as deceleration point and Z signal as home, falling edge on the same side of the home switch signal must be reached before Z signal
12	Reverse, home switch as deceleration point and Z signal as home, rising edge on the same side of the home switch signal must be reached before Z signal
13	Reverse, home switch as deceleration point and Z signal on the other side of the home switch signal as home, rising edge on the other side of the home switch signal must be reached before Z signal
14	Reverse, home switch as deceleration point and Z signal on the other side of the home switch signal as home, falling edge on the other side of the home switch signal must be reached before Z signal
15 to 16	N/A
17 to 32	Similar to setpoints 1...14 except that the deceleration point coincide with the home
33	Reverse, Z signal as home
34	Forward, Z signal as home
35	Current position as home

Index 6099h	Name	Homing speeds			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint32
	Access	-	Mapping	Yes	Related Mode	HM	Data Range	OD Data Range	Default	OD Default Value
Defines the two speed values used in the homing mode. • Speed during search for switch • Speed during search for zero										

Sub-index 0h	Name	Highest sub-index supported			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	2	Default	2

Sub-index 1h	Name	Speed during search for switch			Setting Condition & Effective Time	During running & At stop	Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	RPDO	Related Mode	HM	Data Range	0 to (2^{32} - 1) (reference unit/s)	De fault	1747627
Defines the speed in searching for the deceleration point signal. A high setpoint prevents occurrence of E601.0 (Homing timeout). Note: After finding the deceleration point, the slave decelerates and blocks the change of the home signal during deceleration. To prevent the slave from encountering the home signal during deceleration, set the switch position of the deceleration point signal properly to leave sufficient deceleration distance or increase the homing acceleration rate to shorten the deceleration time.										

Sub-index 2h	Name	Speed during search for zero			Setting Condition & Effective Time	During running & At stop	Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	RPDO	Related Mode	HM	Data Range	10 to (2^{32} - 1) (reference unit/s)	Default	174763
Defines the speed in searching for the home signal. Set this sub-index to a low value to avoid overshoot during stop at high speed, preventing excessive deviation between the stop position and the preset mechanical home.										

Index 609A	Name	Homing acceleration			Setting Condition & Effective Time	During running & At stop	Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	RPDO	Related Mode	HM	Data Range	0 to (2^{32} - 1) (reference unit/s^2)	Default	100
Defines the acceleration rate in the homing mode. The setpoint is activated after homing is started. In the HM mode, if 605Dh (Stop option code) is set to 2, the servo drive decelerates to stop as defined by 609Ah. 609A indicates the position reference (reference unit) increment per second. For 609A, the setpoint 0 will be forcibly changed to 1.										

Index 60B0h	Name	Position offset			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Int32
	Access	RW	Mapping	RPDO	Related Mode	CSP	Data Range	-2 to (2^{31} - 1) (reference unit)	Default	0
Defines the position reference offset in CSP mode. The sum of 607Ah and 60B0h determines the target position of the servo drive. Target position = 607Ah + 60B0h										

Index 60B1h	Name	Velocity offset			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Int32
	Access	RW	Mapping	RPDO	Related Mode	CSP/CSV	Data Range	-2 to (2^{31} - 1) (reference unit/s)	Default	0
Defines the external speed feedforward signal of EtherCAT in CSP mode (activated when 2005-14h is set to 2). 60B1h can be used to reduce the position deviation during positioning. After positioning is done, set the velocity offset to 0. Failure to comply will result in deviation between the target position and the position feedback. 60B1h also defines the speed reference offset in CSV mode.										

Index 60B2h	Name	Torque offset			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Int16
	Access	RW	Mapping	RPDO	Related Mode	CSP/CSV/ CST	Data Range	-4000.0 to +4000.0 (%)	Default	0
Defines the external torque feedforward signal of EtherCAT in CSV mode (activated when 2006-0Ch is set to 2). Defines the torque reference offset in CST mode. After offset, the following formula applies: Target torque = 6071h + 60B2h										

Index 60B8h	Name	Touch probe function			Setting Condition & Effective Time	During running & At stop	Data Structure	VAR	Data Type	Int16
	Access	RW	Mapping	RPDO	Related Mode	-	Data Range	0 to 65535	Default	0

Defines the functions of touch probe 1 and touch probe 2.
See the following table for descriptions of each bit of 60B8.

bit	Function	Description
0	Touch probe 1 function selection 0: Switch off touch probe 1 1: Enable touch probe 1	bit0 to bit5: settings related to touch probe 1 When a DI is used to trigger the touch probe function, the DI source cannot be changed once the touch probe function is enabled. For absolute encoders, Z signal refers to the zero point of the single-turn position feedback.
1	Touch probe 1 trigger mode 0: Single trigger mode (Latches the position at the first trigger event.) 1: Continuous trigger mode	
2	Touch probe 1 trigger signal selection 0: DI signal 1: Z signal	
3	N/A	
4	Touch probe 1 positive edge 0: Switch off latching at positive edge 1: Enable latching at positive edge	
5	Touch probe 1 negative edge 0: Switch off latching at negative edge 1: Enable latching at negative edge	
6 to 7	N/A	bit8 to bit13: settings related to touch probe 2
8	Touch probe 2 function selection 0: Switch off touch probe 2 1: Enable touch probe 2	
9	Touch probe 2 trigger mode 0: Single trigger mode (Latches the position at the first trigger event.) 1: Continuous trigger mode	
10	Touch probe 2 trigger signal selection 0: DI signal 1: Z signal	
11	N/A	
12	Touch probe 2 positive edge 0: Switch off latching at positive edge 1: Enable latching at positive edge	
13	Touch probe 2 negative edge 0: Switch off latching at negative edge 1: Enable latching at negative edge	
14 to 15	N/A	-

For absolute encoders, Z signal refers to the zero position of the single-turn position feedback.

Index 60B9h	Name	Touch probe status			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Uint16
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	-	Default	-

Indicates the status of touch probe 1 and touch probe 2.

bit	Function	Description
0	Touch probe 1 function selection 0: Switch off touch probe 1 1: Enable touch probe 1	bit0 to bit7: status of touch probe 1
1	Touch probe 1 positive edge value 0: No positive edge value latched 1: Positive edge value latched	
2	Touch probe 1 negative edge value 0: No negative edge value latched 1: Negative edge value latched	
3 to 7	N/A	bit8 to bit15: status of touch probe 2
8	Touch probe 2 function selection 0: Switch off Touch probe 2 1: Enable touch probe 2	
9	Touch probe 2 positive edge value 0: No positive edge value latched 1: Positive edge value latched	
10	Touch probe 2 negative edge value 0: No negative edge value latched 1: Negative edge value latched	
11 to 15	N/A	

Index 60BAh	Name	Touch probe 1 positive edge			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	-(reference unit)	Default	-

Indicates the position value of touch probe 1 at positive edge (reference unit).

Index 60BBh	Name	Touch probe 1 negative edge			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	-(reference unit)	Default	-

Indicates the position value of touch probe 1 at negative edge (reference unit).

Index 60BCh	Name	Touch probe 2 positive edge			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	-(reference unit)	Default	-
Indicates the position value of touch probe 2 at positive edge (reference unit).										

Index 60BDh	Name	Touch probe 2 negative edge			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	-	Data Range	-(reference unit)	Default	-
Indicates the position value of touch probe 2 at negative edge (reference unit).										

Index 60C5h	Name	Max. acceleration			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint32
	Access	RW	Mapping	RPDO	Related Mode	All	Data Range	0 to (2^{32} - 1) (reference unit/s^2)	Default	2^{31} - 1
Defines the maximum limit of acceleration. In the HM mode, if the value of 609Ah exceeds that of 60C5h, the value of 60C5h will be used. For 60C5h, the setpoint 0 will be forcibly changed to 1.										

Index 60E0h	Name	Positive torque limit value			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint16
	Access	RW	Mapping	RPDO	Related Mode	All	Data Range	0 to 4000.0 (%)	Default	3500
Defines the maximum torque limit of the servo drive in the forward direction.										

Index 60E1h	Name	Negative torque limit value			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint16
	Access	RW	Mapping	RPDO	Related Mode	All	Data Range	0 to 4000.0 (%)	Default	3500
Defines the maximum torque limit of the servo drive in the reverse direction.										

Index 60E3h	Name	Supported homing methods			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	HM	Data Range	OD Data Range	Default	OD Default Value
Indicates the supported homing methods.										

Sub-index 00h	Name	Highest sub-index supported			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	31

Sub-index 01h	Name	1st supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint8
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	769

Meaning:

bit0 to bit7	The low 8 bits indicate the supported homing method. Set 6098h to the corresponding value.
bit8	Relative position homing 0: Not supported 1: Supported
bit9	Absolute position homing 0: Not supported 1: Supported
bit10 to bit15	N/A

Defines whether to use relative or absolute position homing through 60E6h.

Sub-index 02h	Name	2nd supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	770

The low 8 bits indicate the supported homing method.

Sub-index 03h	Name	3rd supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	771

The low 8 bits indicate the supported homing method.

Sub-index 04h	Name	4th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	772

The low 8 bits indicate the supported homing method.

Sub-index 05h	Name	5th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	773
The low 8 bits indicate the supported homing method.										

Sub-index 06h	Name	6th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	774
The low 8 bits indicate the supported homing method.										

Sub-index 07h	Name	7th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	775
The low 8 bits indicate the supported homing method.										

Sub-index 08h	Name	8th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	776
The low 8 bits indicate the supported homing method.										

Sub-index 09h	Name	9th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	777
The low 8 bits indicate the supported homing method.										

Sub-index 0Ah	Name	10th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	778
The low 8 bits indicate the supported homing method.										

Sub-index 0Bh	Name	11th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	779
The low 8 bits indicate the supported homing method.										

Sub-index 0Ch	Name	12th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	780
The low 8 bits indicate the supported homing method.										

Sub-index 0Dh	Name	13th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	781
The low 8 bits indicate the supported homing method.										

Sub-index 0Eh	Name	14th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	782
The low 8 bits indicate the supported homing method.										

Sub-index 0Fh	Name	15th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	783
The low 8 bits indicate the supported homing method.										

Sub-index 10h	Name	16th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	784
The low 8 bits indicate the supported homing method.										

Sub-index 11h	Name	17th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	785
The low 8 bits indicate the supported homing method.										

Sub-index 12h	Name	18th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	786
The low 8 bits indicate the supported homing method.										

Sub-index 13h	Name	19th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	787
The low 8 bits indicate the supported homing method.										

Sub-index 14h	Name	20th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	788
The low 8 bits indicate the supported homing method.										

Sub-index 15h	Name	21st supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	789
The low 8 bits indicate the supported homing method.										

Sub-index 16h	Name	22nd supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	790
The low 8 bits indicate the supported homing method.										

Sub-index 17h	Name	23rd supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	791
The low 8 bits indicate the supported homing method.										

Sub-index 18h	Name	24th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	792
The low 8 bits indicate the supported homing method.										

Sub-index 19h	Name	25th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	793
The low 8 bits indicate the supported homing method.										

Sub-index 1Ah	Name	26th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	794
The low 8 bits indicate the supported homing method.										

Sub-index 1Bh	Name	27th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	795
The low 8 bits indicate the supported homing method.										

Sub-index 1Ch	Name	28th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	796
The low 8 bits indicate the supported homing method.										

Sub-index 1Dh	Name	29th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	797
The low 8 bits indicate the supported homing method.										

Sub-index 1Eh	Name	30th supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	798
The low 8 bits indicate the supported homing method.										

Sub-index 1Fh	Name	31st supported homing method			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint16
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	799
The low 8 bits indicate the supported homing method.										

Index 60E6h	Name	Actual position calculation method			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Uint8
	Access	RW	Mapping	No	Related Mode	HM	Data Range	0 to 1	Default	0

Defines the method for calculating the mechanical position after homing is done.

Setpoint	Actual position calculation method
0	Absolute position homing After homing is done, the following formula applies: 6064h (Position actual value) = 607Ch (Home offset)
1	Relative position homing After homing is done, the following formula applies: 6064h (Position actual value) = Present position feedback + 607Ch (Home offset)

After homing is triggered, changes in 60E6h will be blocked.

Index 60F4h	Name	Following error actual value			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	PP/HM/CSP	Data Range	-	Default	0
Indicates the position deviation (reference unit).										

Index 60FCh	Name	Position demand value*			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	PP/HM/ CSP	Data Range	-(Encoder unit)	Default	-
Indicates the position reference (encoder unit). If no warning is detected when the S-ON signal is active, the relation between the position reference in reference unit and that in encoder unit is as follows: 60FCh (encoder unit) = 6062h (reference unit) x 6091h										

Index 60FDh	Name	Digital inputs			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Int32
	Access	RO	Mapping	TPDO	Related Mode	PP/HM/CSP	Data Range	-	Default	0

Indicates current DI logic of the drive.

0: Inactive

1: Active

The DI signal indicated by each bit is described as follows:

Bit	Signal
0	1: Reverse overtravel active
1	1: Forward overtravel active
2	1: Home signal active
3 to 15	N/A
16	1: DI1 input active
17	1: DI2 input active
18	1: DI3 input active
19	1: DI4 input active
20	1: DI5 input active
21 to 26	N/A
27	1: STO1 signal input
28	1: STO2 signal input
29	1: EDM output active
30 to 31	N/A

Index 60FEh	Name	Digital outputs			Setting Condition & Effective Time	-	Data Structure	ARR	Data Type	Int32
	Access	-	Mapping	Yes	Related Mode	-	Data Range	OD Data Range	Default	OD Default Value

Indicates the current DO logic of the servo drive.

Sub-index 0h	Name	Highest sub-index supported			Setting Condition & Effective Time	-	Data Structure	-	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	2

Sub-index 1h	Name	Physical outputs			Setting Condition & Effective Time	During running & At stop	Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	RPDO	Related Mode	-	Data Range	0 to (2^{32} - 1)	Default	0

Indicates the DO logic.
The signal indicated by each bit is described as follows:

Bit	Related Signal	Description
0 to 15	N/A	-
16	DO1	Forced output (0: OFF; 1: ON), only when H0D-17 is set to 4 and bit16 of 60FE-02 is set to 1
17	DO2	Forced output (0: OFF; 1: ON), only when H0D-17 is set to 4 and bit17 of 60FE-02 is set to 1
18	DO3	Forced output (0: OFF; 1: ON), only when H0D-17 is set to 4 and bit18 of 60FE-02 is set to 1
19 to 25	N/A	-
26	Gain switchover	Switched between P and PI, only when bit26 of 60FE-02 is set to 1
27 to 31	N/A	-

Sub-index 2h	Name	Bit mask			Setting Condition & Effective Time	During running & At stop	Data Structure	-	Data Type	Uint32
	Access	RW	Mapping	No	Related Mode	-	Data Range	0 to (2^{32} - 1)	Default	0

Defines whether to enable the forced DO function.
The signal indicated by each bit is described as follows:

Bit	Related DO	Description
0 to 15	N/A	-
16	DO1	H0D-17 = 4, forced DO1 output enabled
17	DO2	H0D-17 = 4, forced DO2 output enabled
18	DO3	H0D-17 = 4, forced DO3 output enabled
19 to 25	N/A	-
26	Gain switchover	Switchover between P and PI enabled
27 to 31	N/A	-

Index 60FFh	Name	Target velocity			Setting Condition & Effective Time	During running & At once	Data Structure	VAR	Data Type	Int32
	Access	RW	Mapping	Yes	Related Mode	PV/CSV	Data Range	-2^{31} to $+(2^{31}$ - 1)	Default	0

Defines the target velocity in PV and CSV modes.
The maximum operating speed of the motor in CSV mode is determined by the maximum motor speed.

Index 6502h	Name	Supported drive modes			Setting Condition & Effective Time	-	Data Structure	VAR	Data Type	Uint32
	Access	RO	Mapping	No	Related Mode	-	Data Range	-	Default	941

Indicates the operation modes supported by the servo drive.

bit	Description	Supported or Not 0: No 1: Yes
0	Profile position (PP) mode	1
1	Velocity (VL) mode	0
2	Profile velocity (PV) mode	1
3	Profile torque (PT) mode	1
4	N/A	0
5	Homing (HM) mode	1
6	Interpolated position (IP) mode	0
7	Cyclic synchronous position (CSP) mode	1
8	Cyclic synchronous velocity (CSV) mode	1
9	Cyclic synchronous torque (CST) mode	1
10 to 31	Manufacturer-specific	Reserved and undefined

If 6502h is supported, you can obtain the supported drive modes through 6502h.

2.6 Application Cases

2.6.1 AM600 Series Controller as the Host Controller

This section describes how to configure the SV660N series servo drive for working with the AM600 series controller.

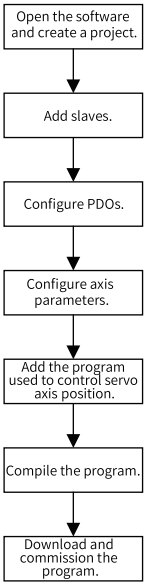
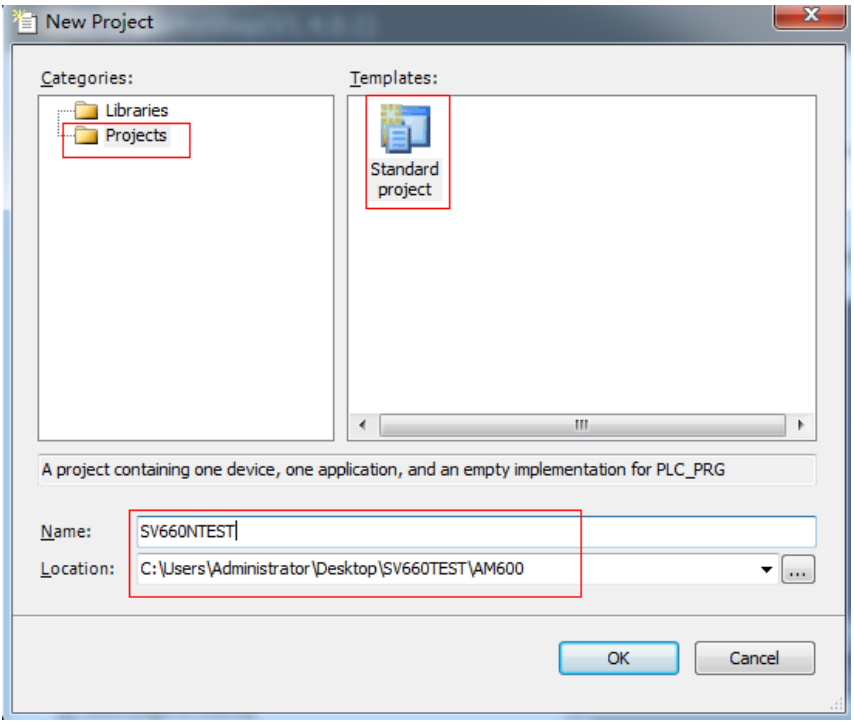
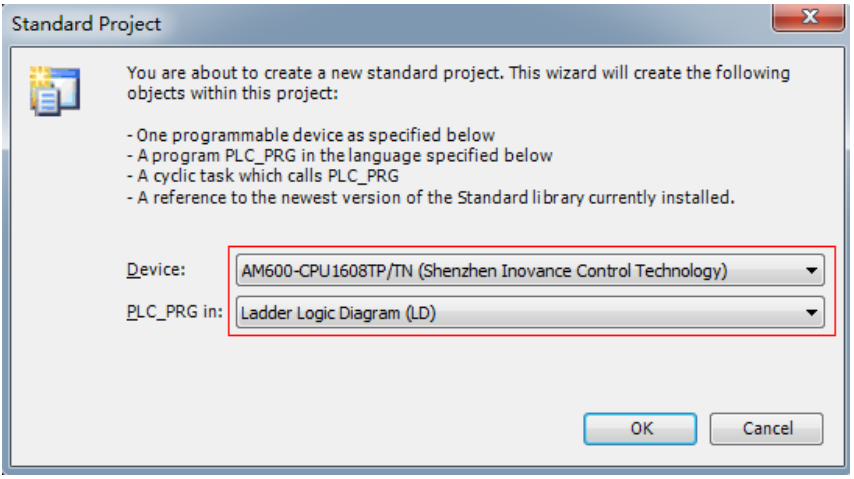


Figure 2-9 Configuration flowchart

Opening the software and creating an AM600 project

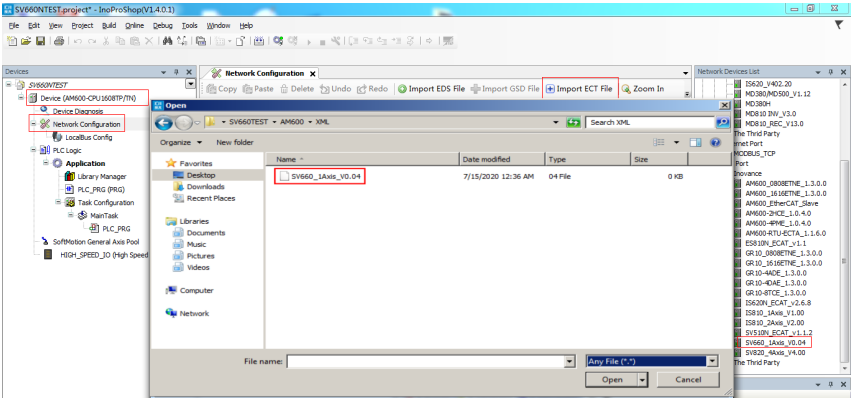
Select **AM600-CPU1608TP**, as shown in the following interface.

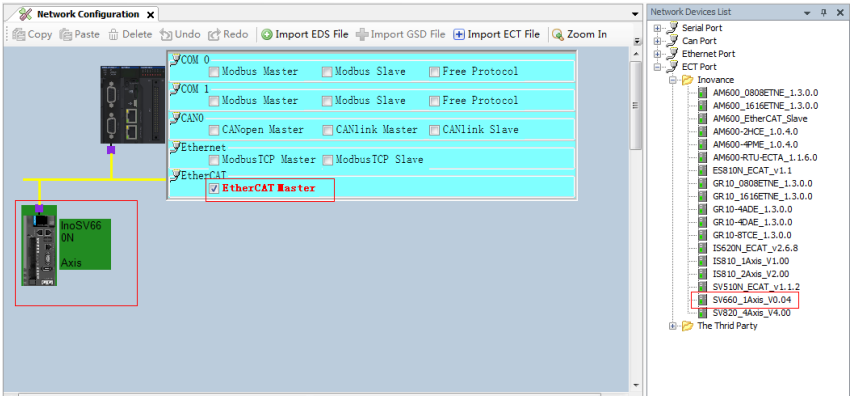




Adding the SV660N servo drive as slave

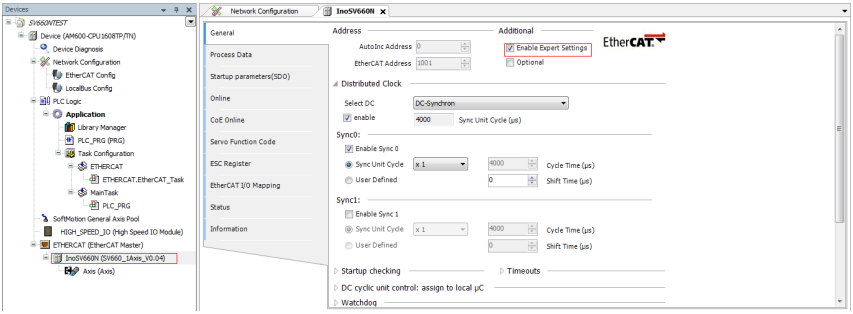
Open the network configuration and import the ECT file of SV660N. Add an SV660N servo drive as a slave, as shown in the following interface.

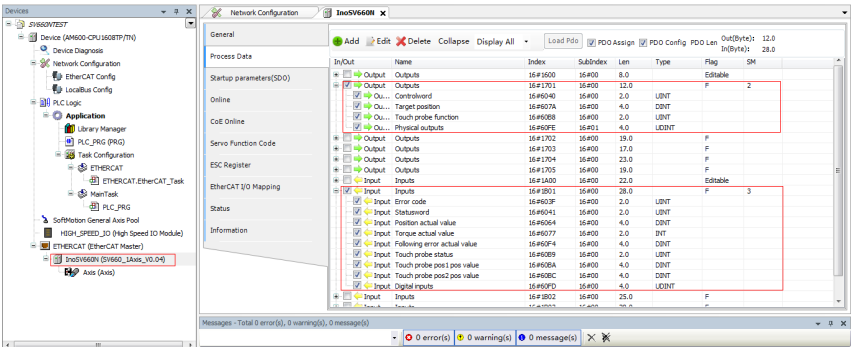




Configuring PDO

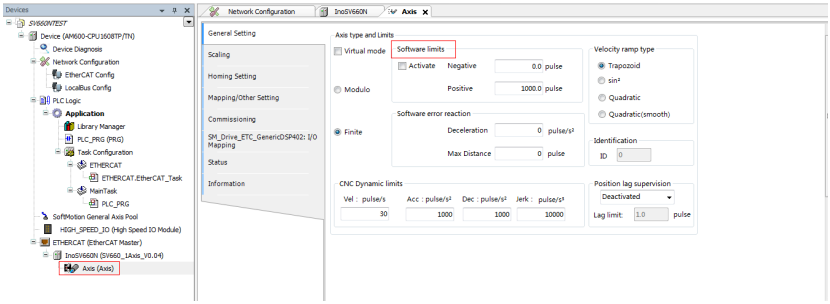
Select **Enable Expert Settings** and configure PDOs in the process data as needed. In this case, CSP is used as the operation mode and the default values of 1600 and 1A00 are used for PDO parameters.



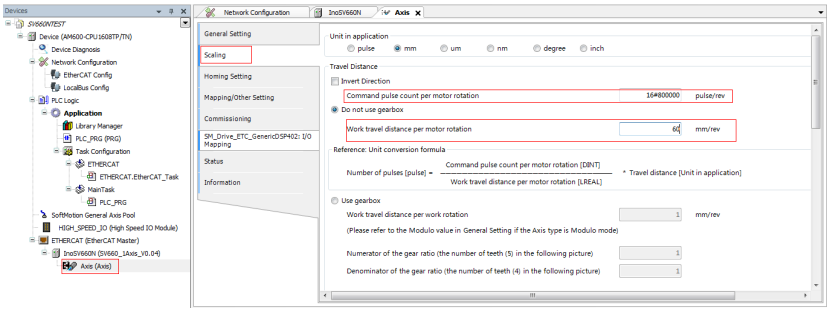


Configuring axis parameters

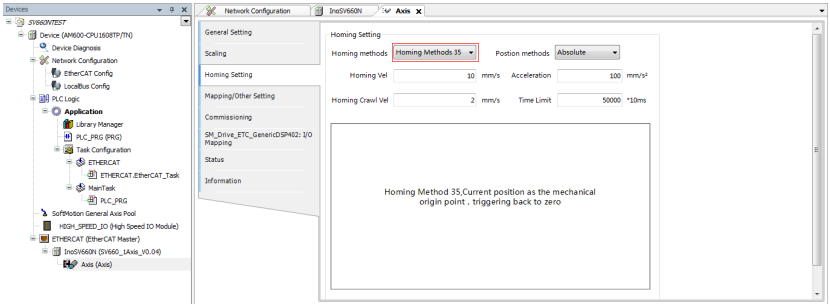
1. Set the software position limit and the operation mode in basic axis settings.



2. Select 16#800000 for the 23-bit encoder and 16#100000 for the 20-bit encoder during unit conversion. In this case, the single-turn travel distance is set to 60 mm and 1 mm/s equals to 1 RPM of the motor.

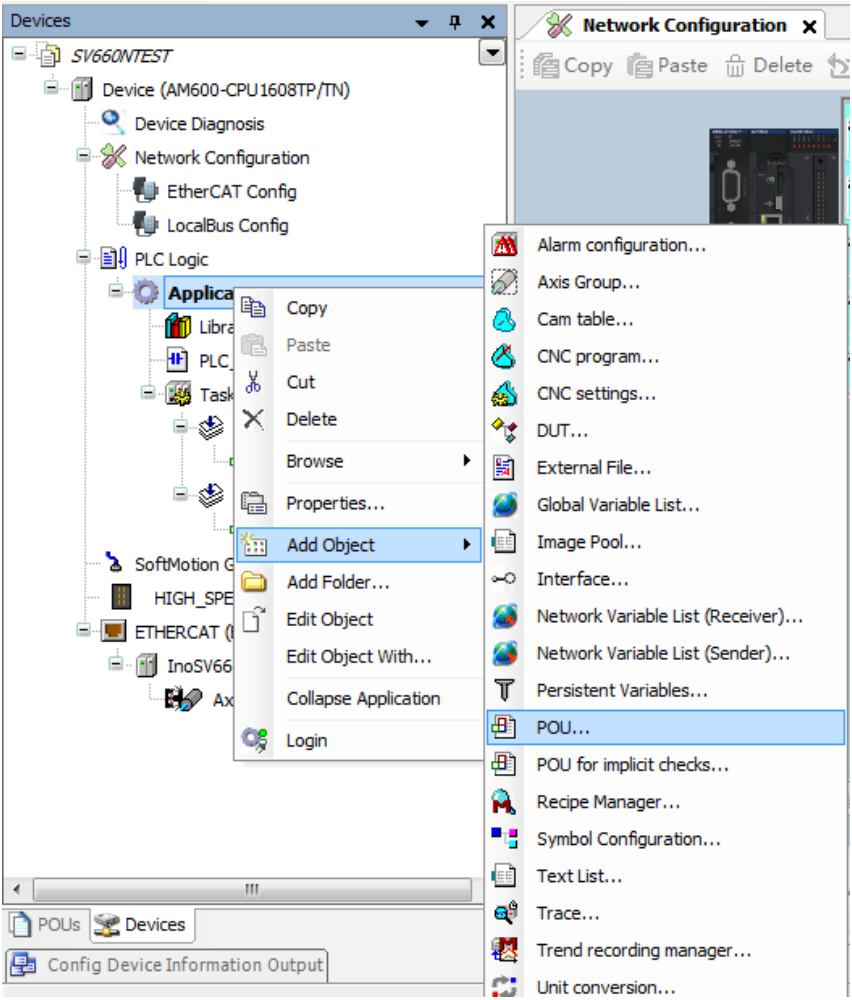


3. Select the homing mode according to actual needs. For details, see section "Introduction to the Homing mode" in SV660N Series Servo Drive Function Guide for details.

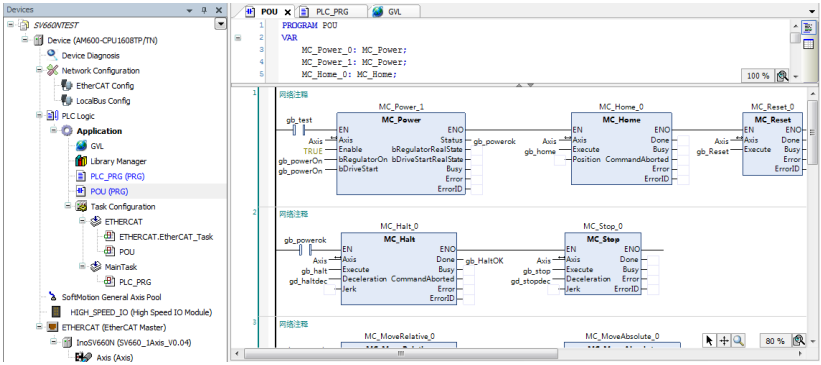


Adding a program

Add a program to control the servo axis position, as shown in the following interface.

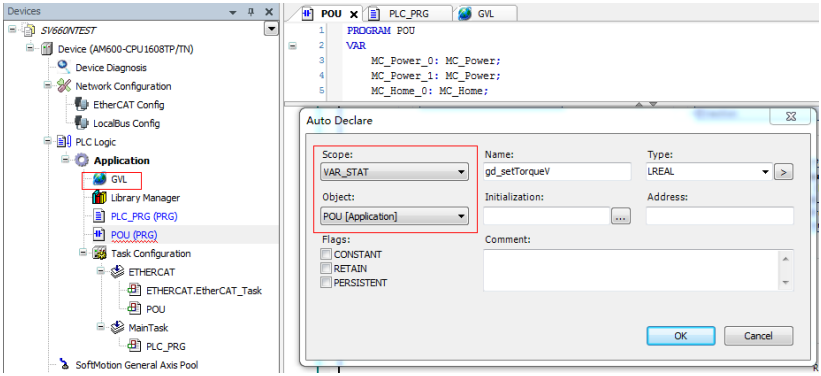


- Implement basic functions such as enabling, homing and positioning through adding function blocks.



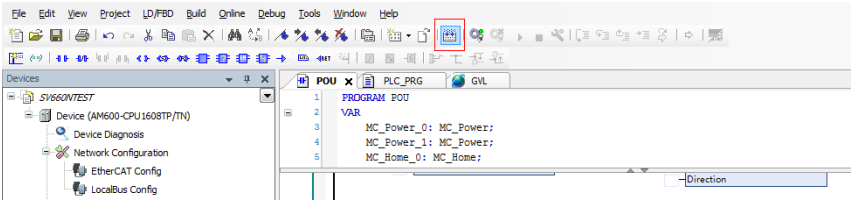
- To implement directed motion through the logic program, some variables may need to be called to different POUs. Therefore, set the variables as global variables.

```
CASE iStatus OF
    10:
    gb_powerOn:=TRUE;
    IF gb_powerok THEN
    iStatus:=20;
    END_IF
    20:
    gd_MoveAbsPos:=1000;gd_MoveAbsVel:=200;gd_MoveAbsVelacc:=200;gd_MoveAbsVeldec:=200;gb_moveAbs:=TRUE;
    IF gb_moveAbsOK THEN
    gb_moveAbs:=FALSE;iStatus:=30;
    END_IF
    30:
    gd_MoveAbsPos:=2000;gd_MoveAbsVel:=400;gd_MoveAbsVelacc:=400;gd_MoveAbsVeldec:=400;gb_moveAbs:=TRUE;
    IF gb_moveAbsOK THEN
    gb_moveAbs:=FALSE;iStatus:=40;
    END_IF
    40:
    gd_MoveAbsPos:=0;gd_MoveAbsVel:=1000;gd_MoveAbsVelacc:=1000;gd_MoveAbsVeldec:=1000;gb_moveAbs:=TRUE;
    IF gb_moveAbsOK THEN
    gb_moveAbs:=FALSE;iStatus:=50;
    END_IF
    50:
    gb_powerOn:=FALSE;
    iStatus:=0;
END_CASE
```



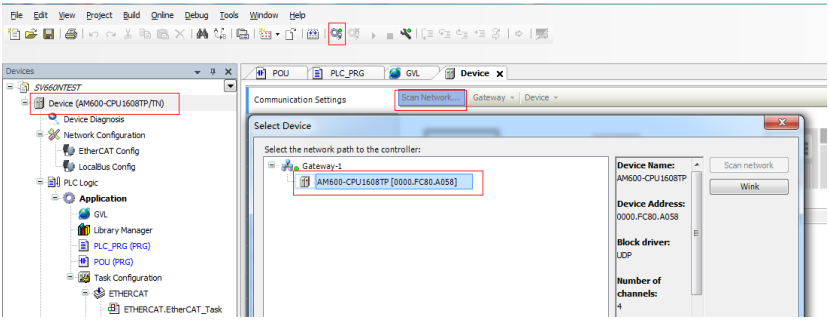
Compiling

After compiling the program, click the icon indicated by the red square box to check whether the program is correct.

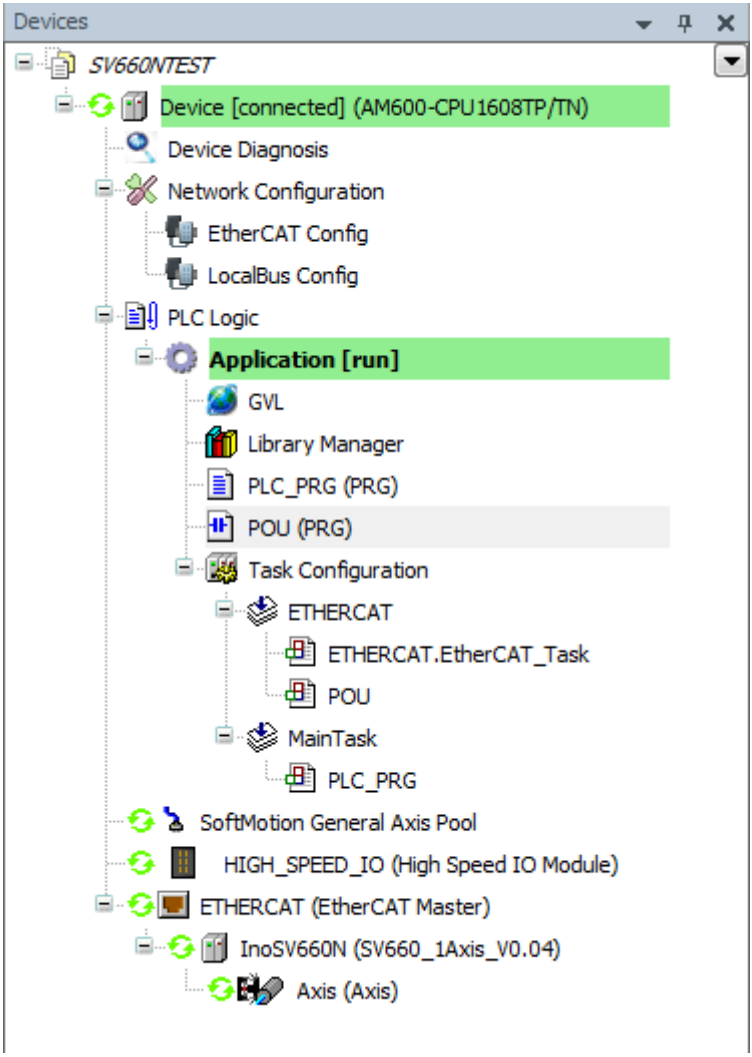


Downloading and commissioning

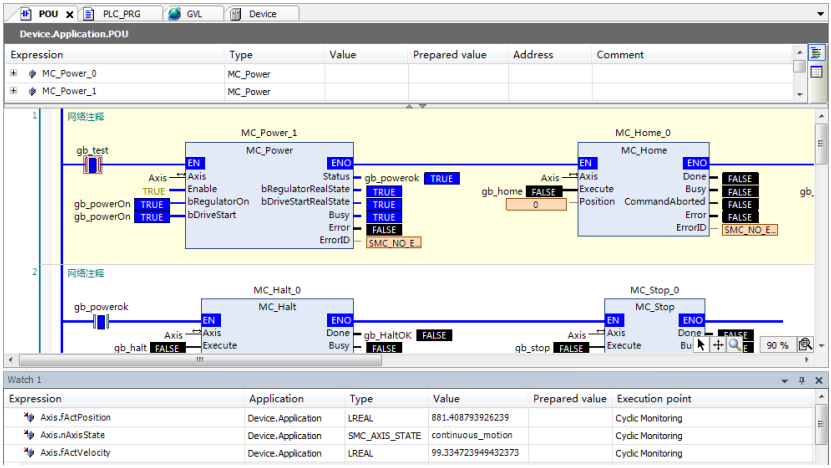
1. After checking that the program is correct, download the program to PLC. The program can be activated after running. Before downloading, scan the PLCs first to select the PLC to be downloaded, and then click the download icon, as shown in the following interface.



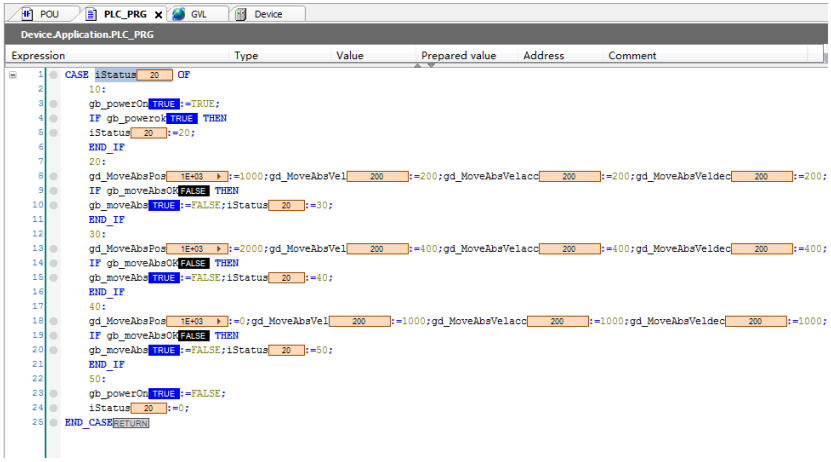
2. After log-in, ensure the servo drive and the axis are in normal state.



3. Monitor critical parameters through the monitoring function. Start the testing program to perform basic tests such as enabling, homing and positioning.



4. After the testing is done, perform directed running program.



2.6.2 Omron NX1P2 Controller as the Host Controller

This section describes how to configure the SV660N series servo drive for working with an Omron NX1P2 controller.

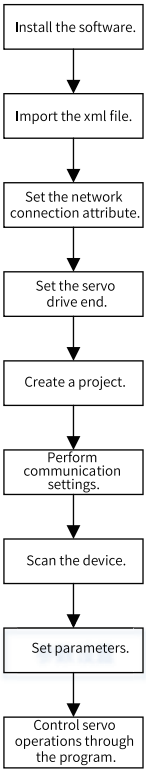


Figure 2-10 Configuration flowchart

Installing the Sysmac Studio software

It is recommended to install the Sysmac Studio software of V1.10 or later.

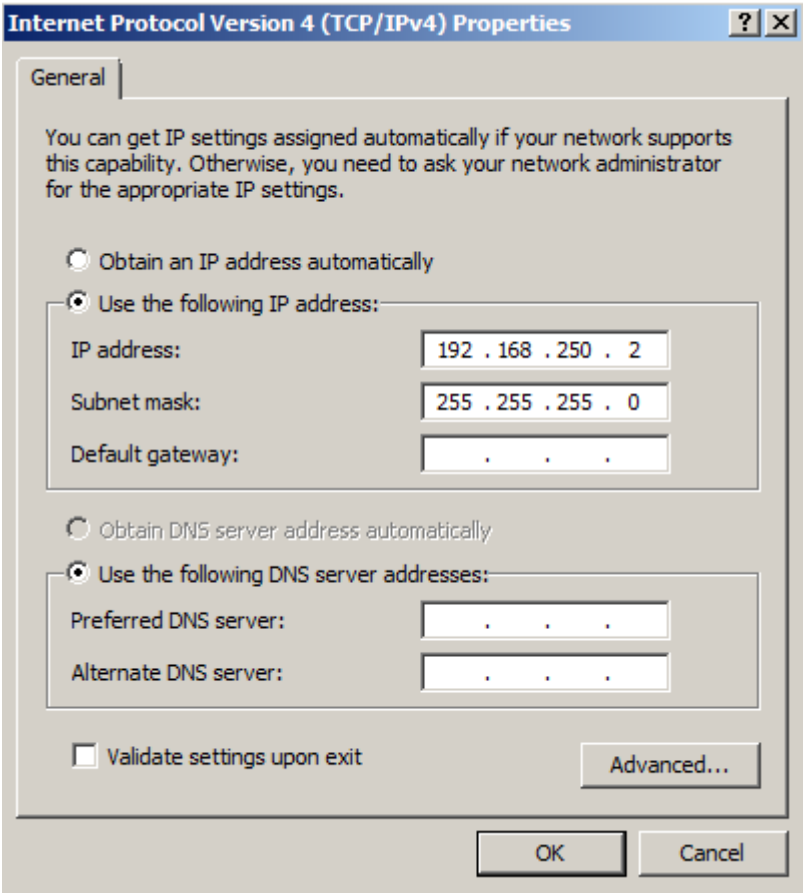
Importing the xml file

It is recommended to import the device description file of "SV660_1Axis_V0.04-0506.xml" or later version. The file path is as follows: OMRON\Sysmac Studio\IODeviceProfiles\EsiFiles\UserEsiFiles.

If the xml file is saved under this path for the first time, the Sysmac Studio software must be restarted.

Setting the network connection attribute

- If the PC is connected to the controller through an USB, skip this step.
- If the PC is connected to the controller through Ethernet, set the TCP/IP attribute of the PC, as shown below.



Configuring the servo drive

Recommended version:

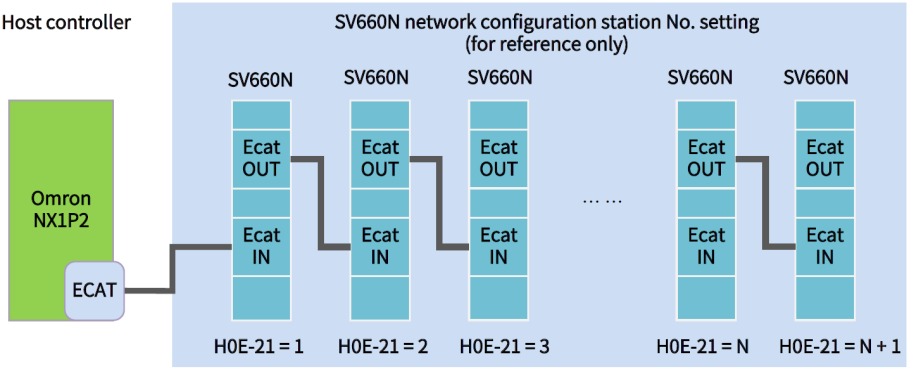
Use MCU software version of 0900.0 (H01-00 = 0900.1) or later for SV660N series servo drives.

Use FPGA software version of 0902.1 (H01-01 = 0902.1) or later for SV660N series servo drives.

Pay attention to the setting of H0E-21.

Para. No.	Name	Value Range	Unit	Initial Value	Related Mode	Setting Condition	Effective Time	Setpoint
H0E-21	EtherCAT slave alias	0 to 65535	-	0	-	At stop	At once	Non-zero

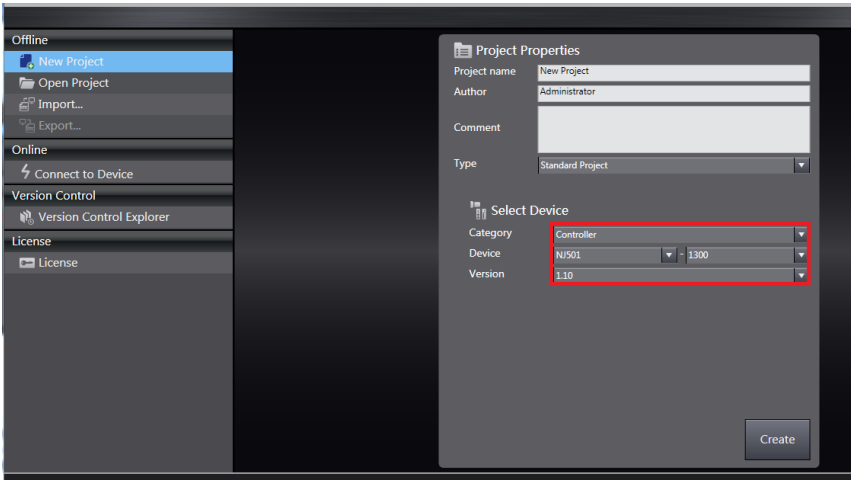
When an Omron controller is used, set the EtherCAT communication station number in H0E-21. It is recommended to set the station number according to the actual connection sequence for the convenience of configuration management.



Creating a project

Device: Select the device according to the actual controller model.

Version: Use V1.09 or later versions. NX1P2-1140DT supports V1.13 only.



Communication setting

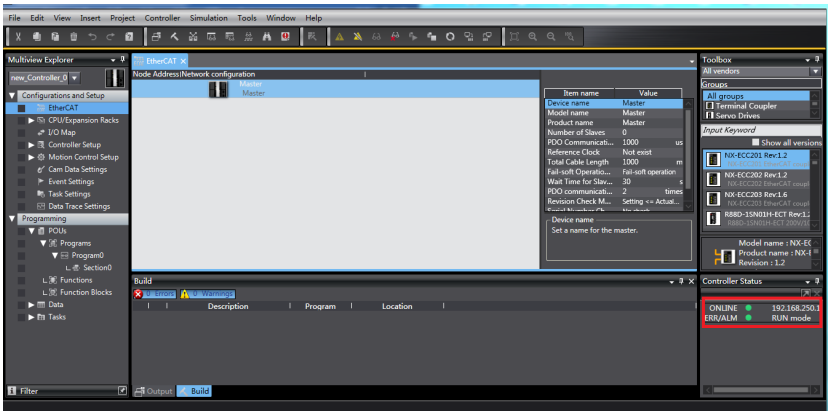
After entering the main interface, set the connection mode between the PC and the controller in **Controller** > **Connection type**.

- 1) Select **Remote connection via USB** to perform **USB Communication Test** directly. If the test is succeeded, proceed to the next step.
- 2) Select **Ethernet connection via a hub**, in this case, set the IP address to 192.168.250.1 (controlled by NX), and then perform **Ethernet Communication Test**. If the test is succeeded, proceed to the next step.

Scanning the device

Switch the controller status to **ONLINE** and **RUN mode**.

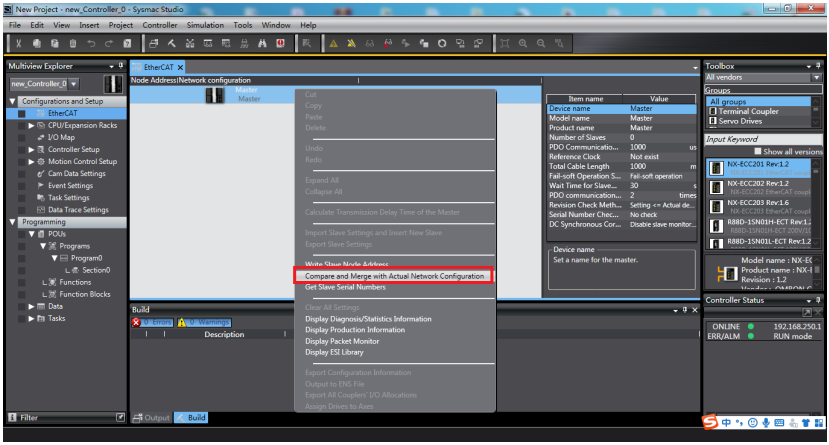
1. Observe the controller status in the lower right corner, which is **ONLINE** and **RUN mode**.

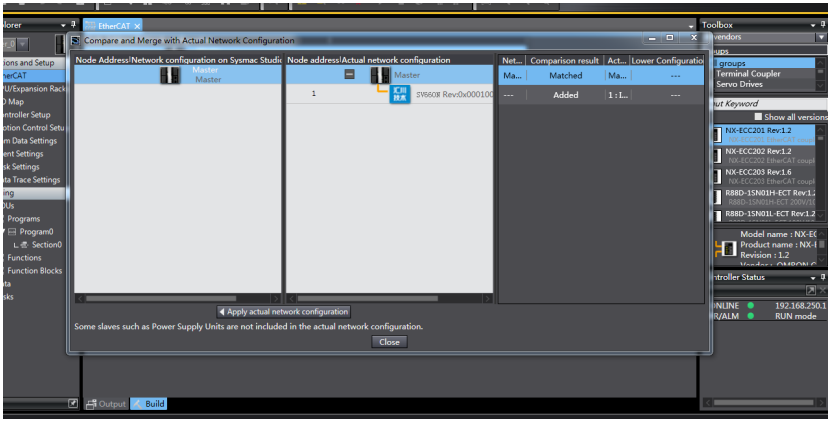


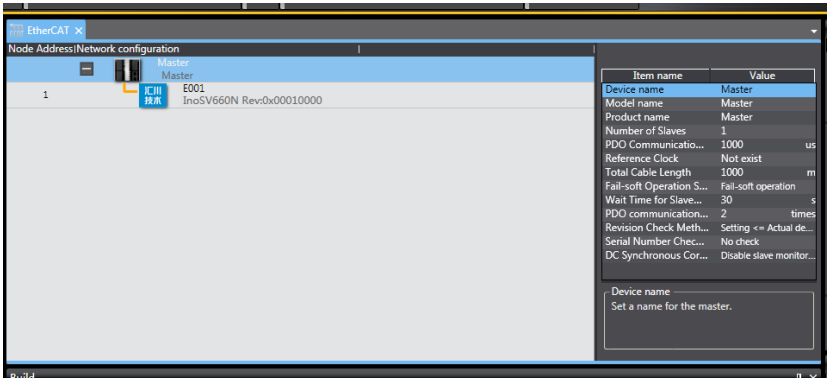
2. A prompt window appears if it is a new controller.

3. Click **Yes** in the window displayed. The name shown in the window is the project name.
   Scan the devices and add slaves.

   Right click **Configurations and Setup→EtherCAT** > **Master**, and select **Compare and Merge with Actual Network Configuration**. The controller scans all the slaves in the network (an error will be reported if the station number is 0). After scanning, click **Apply actual network configuration** in the pop-up window to add the slave. You can view the slaves added in the main page.





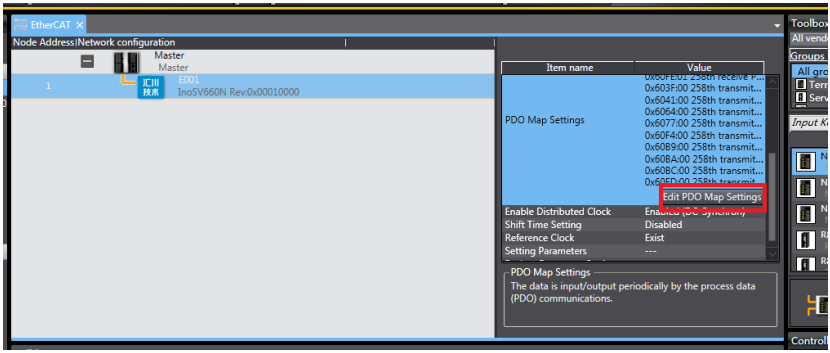


Setting parameters

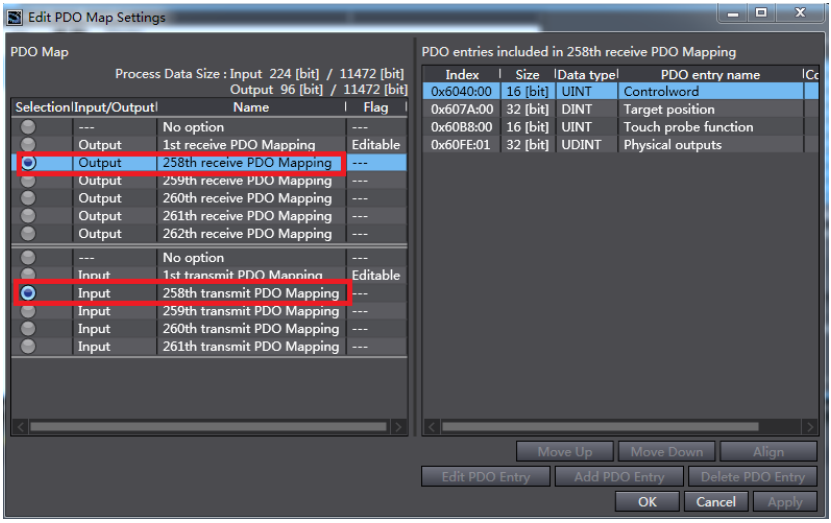
Switch the controller to the offline mode and set PDO mapping, axis parameters, and distributed clock.

Setting PDO mapping

1. Setting the PDO mapping.



2. Select the editable RPDO and TPDO provided by SV660N for configuration.

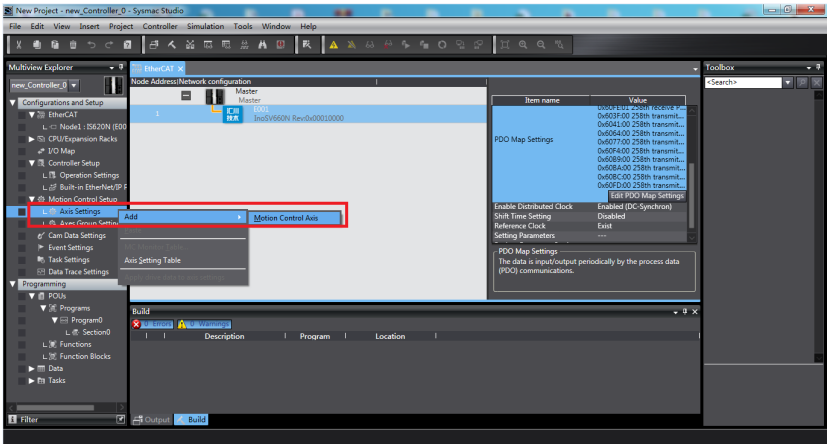


3. Modify the PDO mapping object through **Add PDO Entry** and **Delete PDO Entry**. The commonly used mapping parameters are shown in the following interface.

Index	Size	Data type	PDO entry name
0x603F:00	16 [bit]	UINT	Error code
0x6041:00	16 [bit]	UINT	Statusword
0x6064:00	32 [bit]	DINT	Position actual value
0x6077:00	16 [bit]	INT	Torque actual value
0x60F4:00	32 [bit]	DINT	Following error actual value
0x60B9:00	16 [bit]	UINT	Touch Probe Status
0x60BA:00	32 [bit]	DINT	Touch Probe pos 1 pos value
0x60BC:00	32 [bit]	DINT	Touch Probe pos 2 pos value
0x60FD:00	32 [bit]	UDINT	Digital inputs

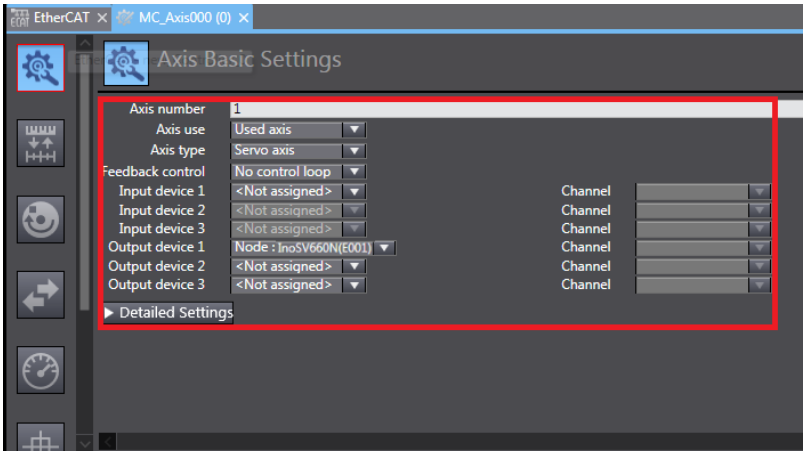
Setting axis parameters

1. Click **Motion Control Setup**, and right click **Axis settings** , then click **Add** > **Motion Control Axis**, as shown in the following interface.



2. MC_Axis000 can be renamed through a simple click. For example, if it is named as "Rewind axis", the axis variable "Rewind axis" used in the NX program represents control on this SV660N servo axis.
3. Double-click **MC_Axis000** and configure the SV660N device of the corresponding station in the corresponding basic axis setting interface.

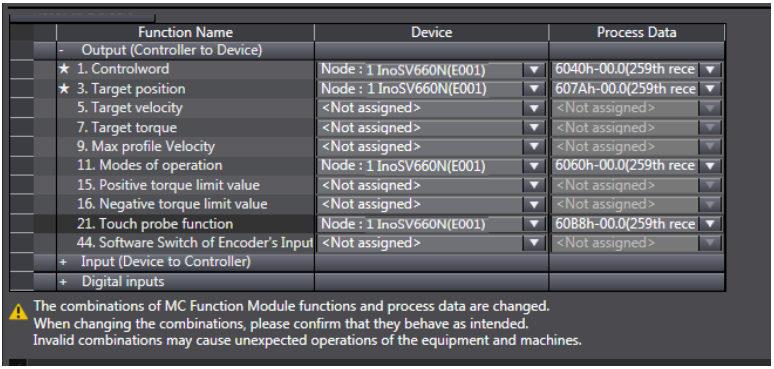
   a. Axis assignment



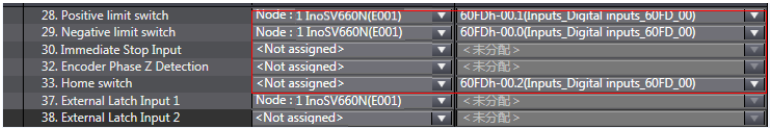
- **Axis number**: Represents the Ethernet communication station No. of the servo drive, which is also the value of H0E-21.
- **Axis use**: Represents the axis in use.
- **Axis type**: Represents the servo axis.
- **Output device 1**: Select the SV660N servo drive.

   b. Detailed settings

- Select the PDO mapping objects according to the preceding step "Setting parameters", which is to assign the output parameters (controller to device) and input parameters (device to controller). Note that the object name, node number, and index number must be set correctly. Each mapping object selected in the preceding step "Setting parameters" must be assigned correctly. Otherwise, an error will be reported.



- 60FDh must be mapped to the same as that in the Omron controller, as shown in the following interface. bit0...bit2 of SV660N indicate the negative position limit, positive position limit, and the home respectively. bit16...bit20 indicate the status of DI1...DI5.

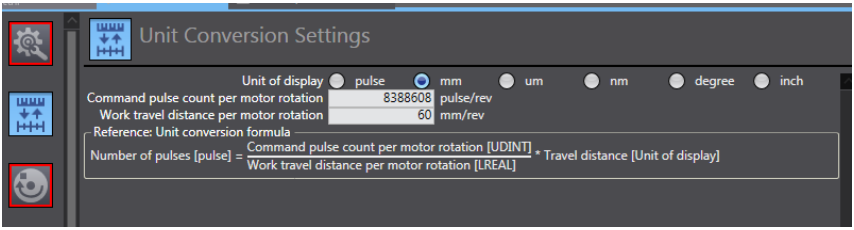


Note

As restricted by configurations of Omron software tool, axis configuration for SV660N series servo drives needs to be performed manually.

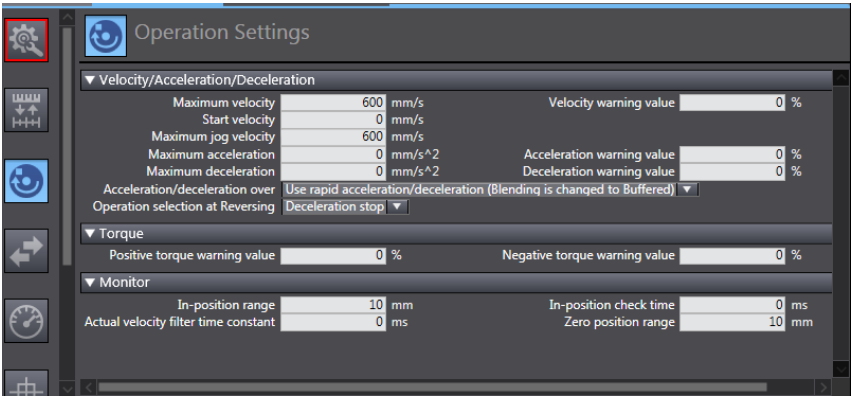
Unit conversion setting

Set **Command pulse count per motor rotation** based on the resolution of the motor encoder (example: 8388608 PPR for motor equipped with 23-bit encoder). For the convenience of commissioning, set the **Work travel distance per motor rotation** to 60 mm/rev, indicating 1 mm/s equals to 1 RPM of the motor.



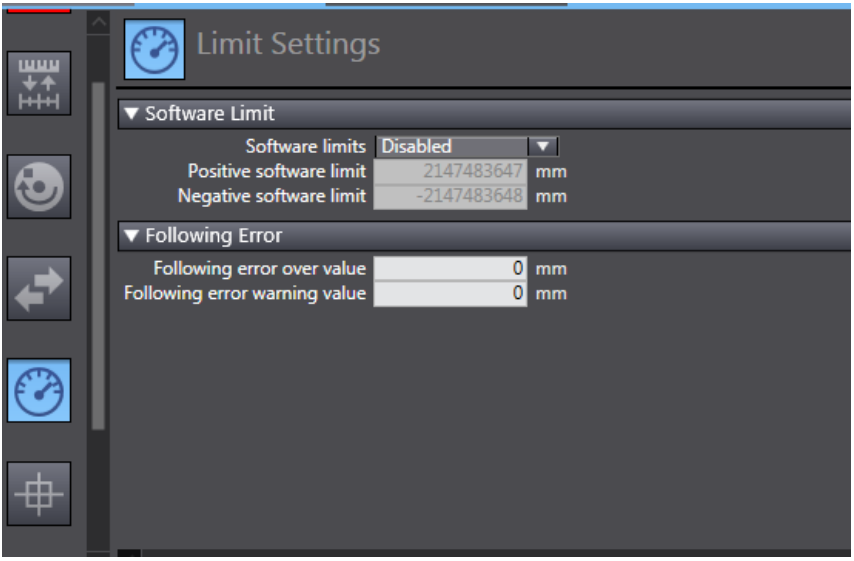
Select **Unit of display** based on the actual operation unit and set the gear ratio. All the position-type parameters in the host controller will be displayed in this unit.

Operation settings



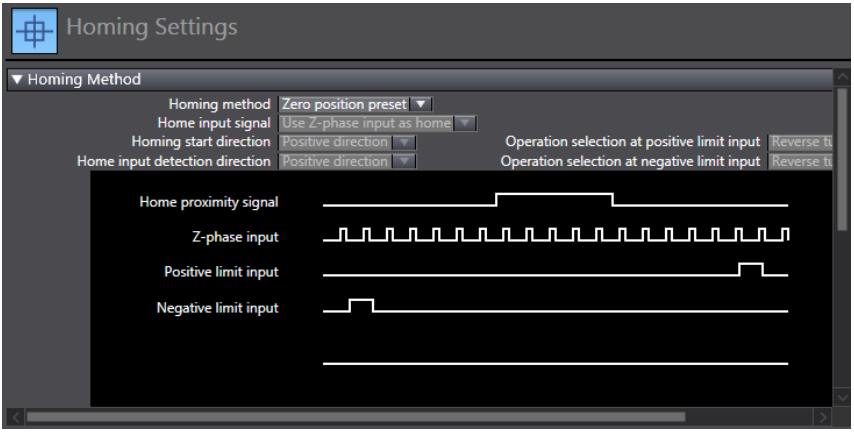
- **Velocity/Acceleration/Deceleration**: Set the maximum speed of the load (if the motor speed converted exceeds 6000 RPM, a parameter setting error, which is marked by a red box, will be reported by the host controller software) according to actual conditions. If the acceleration/deceleration rate is 0, the motion profile will be generated based on the maximum acceleration/deceleration rate (there is no need to set the acceleration/deceleration rate in general cases).
- **Torque**: If the warning value is 0, no warning will be reported. There is no need to set the warning value in general cases
- **Monitor**: Set the **In-position range** and **Zero position range** based on actual motor and mechanical conditions. An excessively low setpoint may result in positioning or homing failure.

Position limit



You can use the function of software position limit. The software position limit will be activated after homing.

Homing



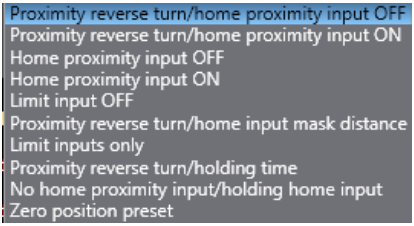
The homing method involves cooperation between the servo drive and host controller. Set the homing method based on the following table.

Description of NX Software	Servo Drive Function	Terminal Configuration
Home proximity signal	Home switch (FunIN.31)	-
Positive limit input	P-OT (FunIN.14)	DI1
Negative limit input	N-OT (FunIN.15)	DI2

Select the homing method of the host controller and set the homing speed, acceleration, and home offset based on actual mechanical conditions.

- Introduction to homing
  Function block: MC_Home and MC_HomeWithParameter

  1. Set MC_Home in the preceding figure and MC_HomeWithParameter in the function block.
  2. The two function blocks both include 10 types of homing methods.

MC_Home	MC_HomeWithParameter
	Designate the homing action to be modified. 0: Promixity reverse turn/home proximity input OFF 1: Proximity reverse turn/home proximity input ON 4: Home proximity input OFF 5: Home proximity input ON 8: Limit input OFF 9: Proximity reverse turn/home input mask distance 11: Limit inputs only 12: Proximity reverse turn/holding time 13: No home proximity input/holding home input 14: Zero position preset

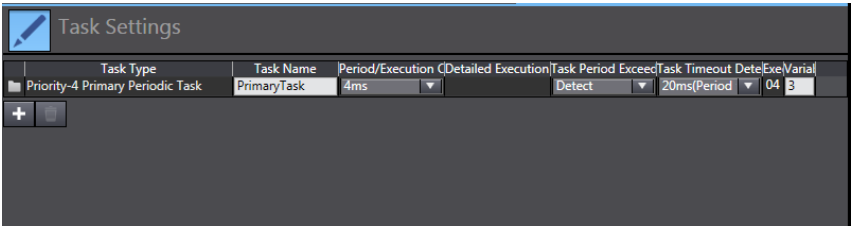
- **Home proximity input OFF**: The search for the home signal starts after the falling edge of the home proximity switch is reached.
- **Home proximity input ON**: The search for the home signal starts after the rising edge of the home proximity switch is reached.
- **Proximity reverse turn**: The home proximity signal is ON when homing starts, and reverse running applies after the falling edge of the home proximity signal is reached.
- **Home input mask distance**: The home signal is masked by the host controller within the set distance after receiving the homing signal (for example, edge change of home proximity signal), and the home signal is received only after the set distance is passed.
- **Holding time**: The home signal is masked by the host controller within the set period of time after receiving the homing signal (for example, edge change of home proximity signal), and home signal is received only after the set period of time elapses.
- **Zero position preset**: The home offset is being written to the position reference/ position feedback in the host controller with current position as the home and motor at a standstill.

Note

The low-speed searching for the home signal applies in all the homing methods. In case of operations at high speed, the home signal is hidden during decelerating from high speed to low speed.

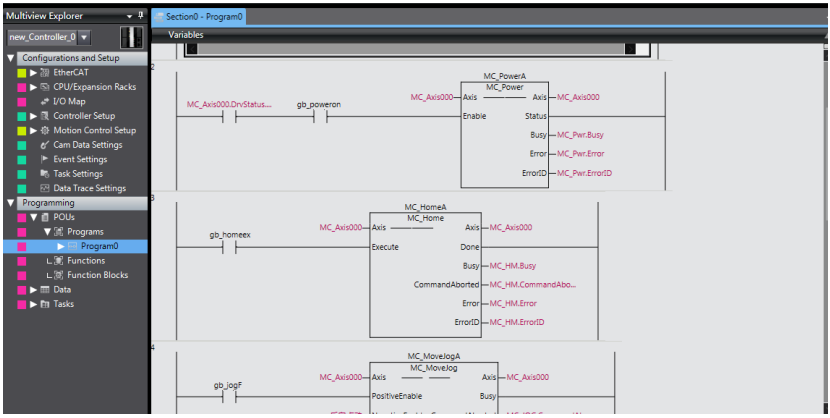
Distributed clock

The default clock is 1 ms. The synchronization clock (cycle of primary fixed-cycle tasks) named "PDO communication cycle" can be modified in **Task Settings**. The modification will be activated after switching to the online status at next power-on.



Program-controlled servo operations

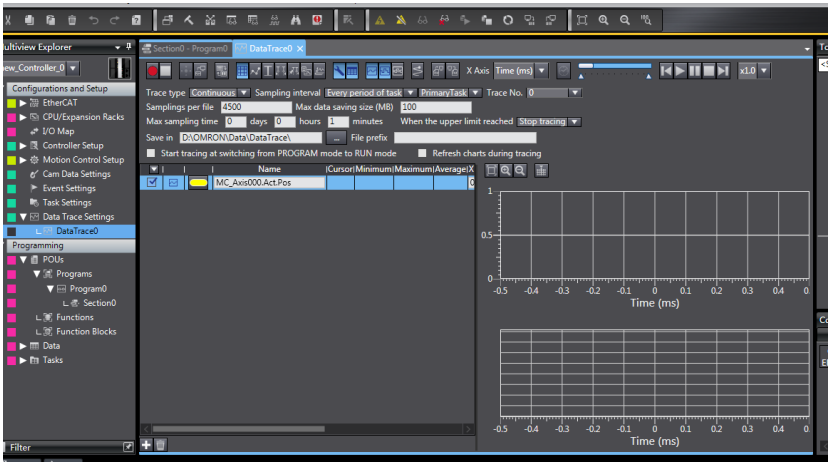
1. After configurations are done, you can control the servo operations through the PLC program.
   If the **MC_POWER** module is used, it is recommended to add the servo status bit **MC_Axis000.DrvStatus. Ready** (MC_Axis000 is the axis name). This is to prevent the situation where the PLC program is running but the communication configuration is not done.



2. After all the settings and programming are done, switch to the online state, and click  to download the program to the controller.

   Click  to use the synchronization function. This function serves to compare the difference between the current program and the program in the controller, allowing users to determine whether to download the program to the controller, upload it from the controller "  " or leave it unchanged based on the difference.

   You can monitor the data through the monitoring list or collect the data waveform by using the data tracking function during operation.



2.6.3 Beckhoff TwinCAT3 as the master

This section describes how to configure the SV660N servo drive for working with Beckhoff TwinCAT3.

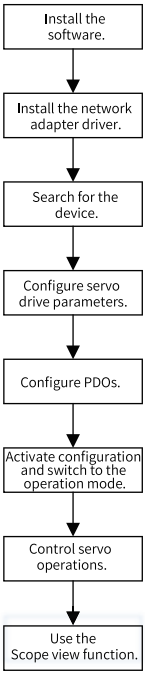


Figure 2-11 Configuration flowchart

Installing the TwinCAT software

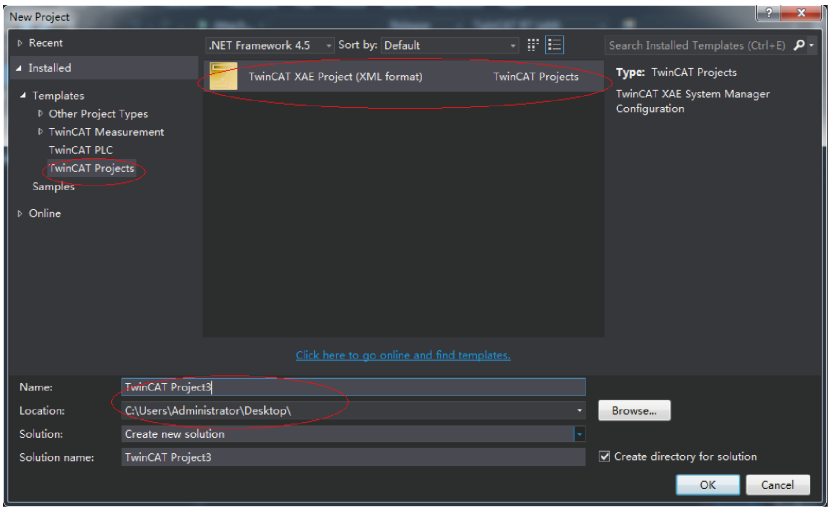
The TwinCAT3 software, which supports Windows7 32-bit or 64-bit systems, can be downloaded from the official website of Beckhoff.

Note

The Ethernet card must be 100 M Ethernet card equipped with Intel chip. If other brands are used, the EtherCAT operation may fail.

---

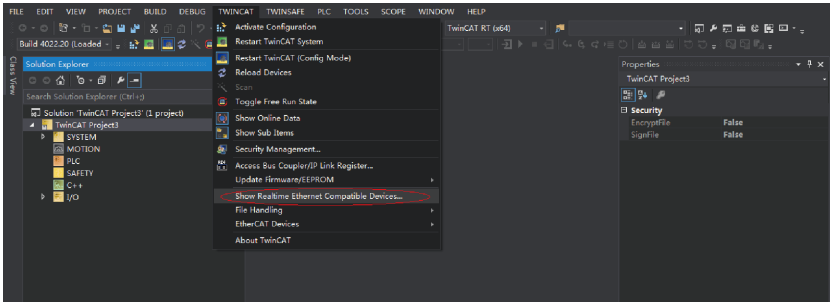
1. Copy the SV660N EtherCAT configuration file (SV660_1Axis_V0.04-0506) to the TwinCAT installation directory: TwinCAT\3.1\Config\Io\EtherCAT.
2. Open TwinCAT3 and create a **New Twincat3 Project**.



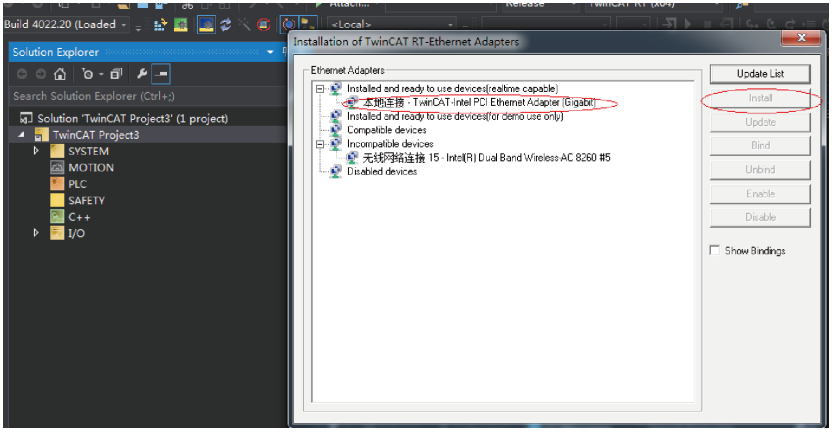
Installing the network adapter driver

Install the TwinCAT network adapter driver.

1. Open **Show Real Time Ethernet Compatible Devices...** in the menu shown in the following figure to display the following dialog box. Select local connection under **Incompatible devices**, and click **Install**.



2. After installation is done, the network adapter installed will be displayed under **Installed and ready to use devices(realtime capable)**.

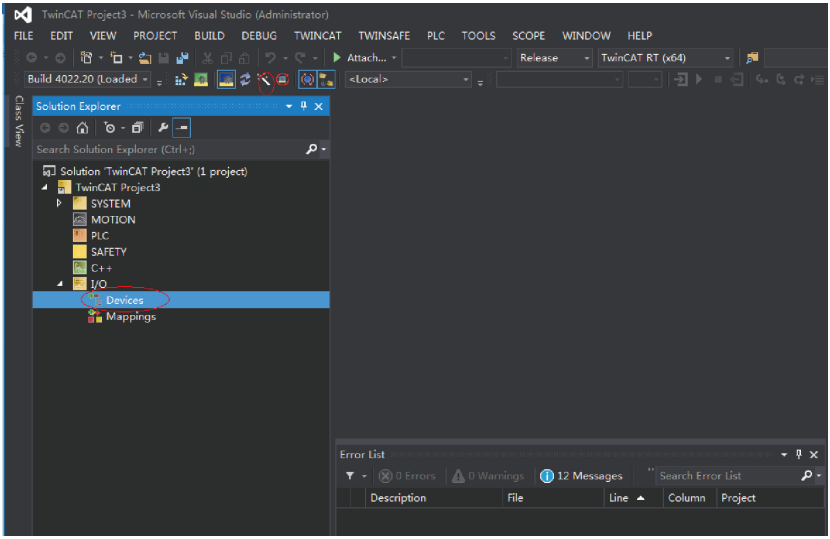


Searching for devices

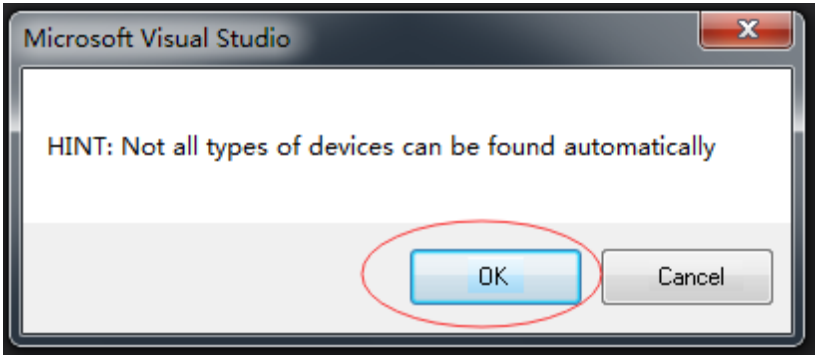
1. Create a project and start searching for devices.

   Select 

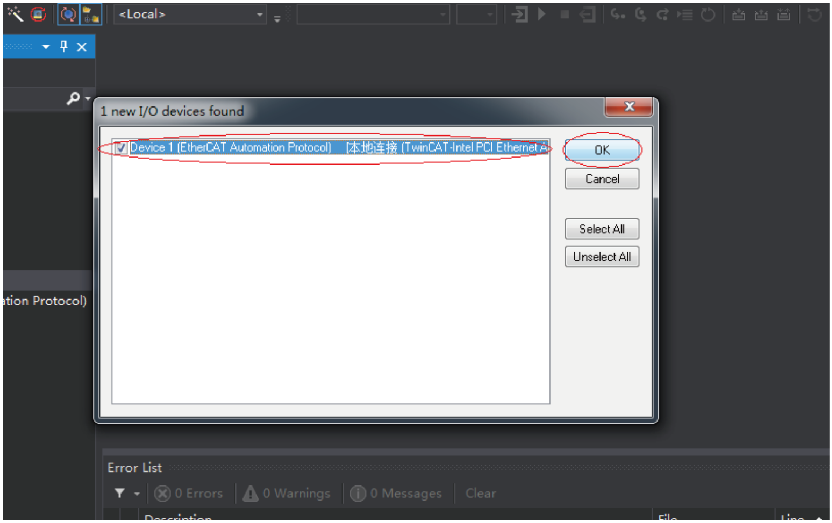
, and click  as shown below.



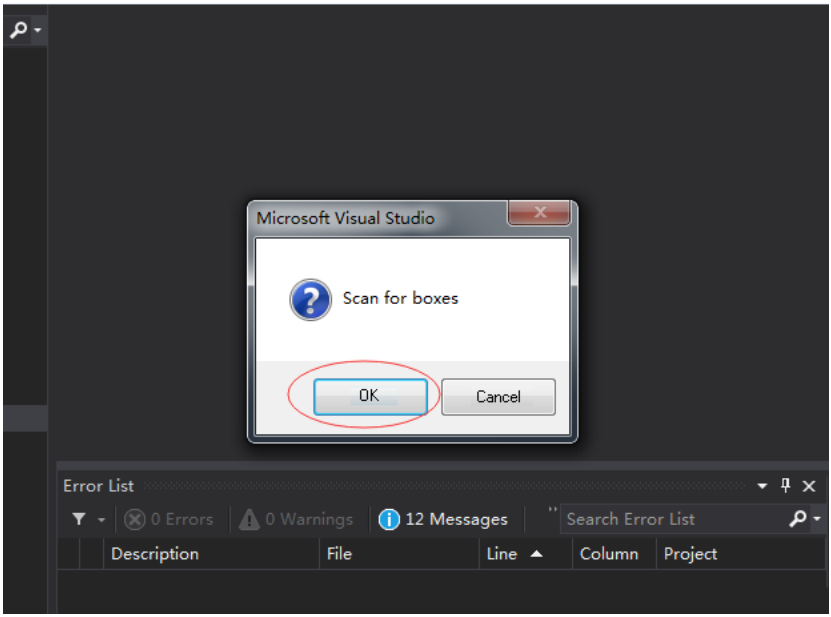
2. Click **OK**.



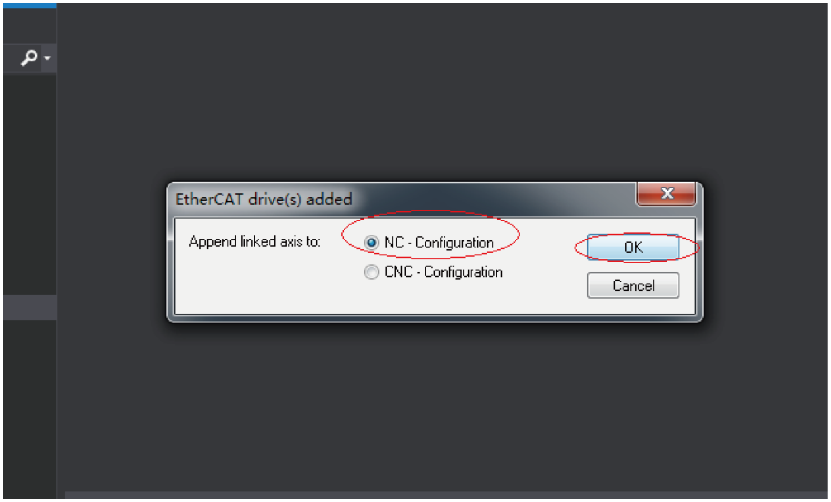
3. Click **OK**.



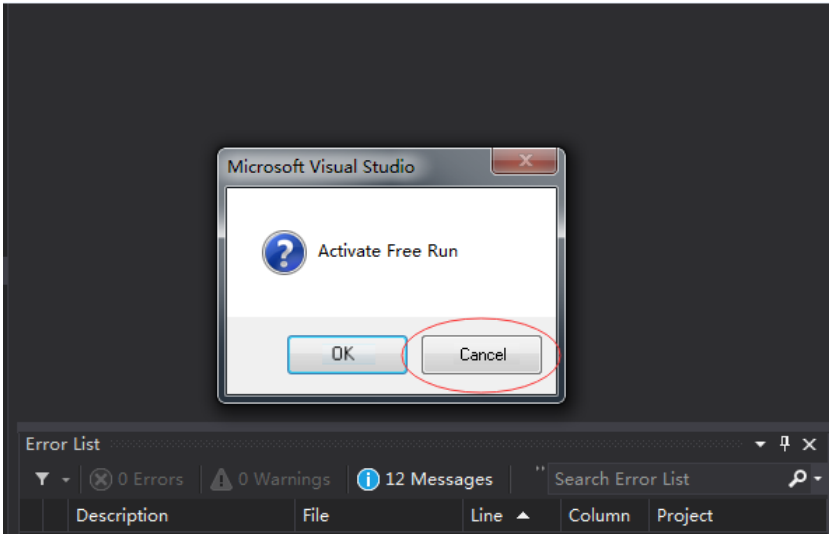
4. Click **OK**.



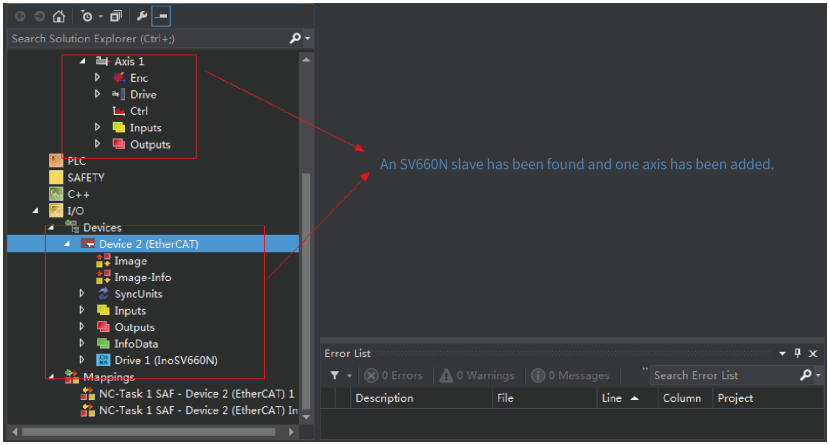
5. Click **OK**.



6. Click **Cancel**.

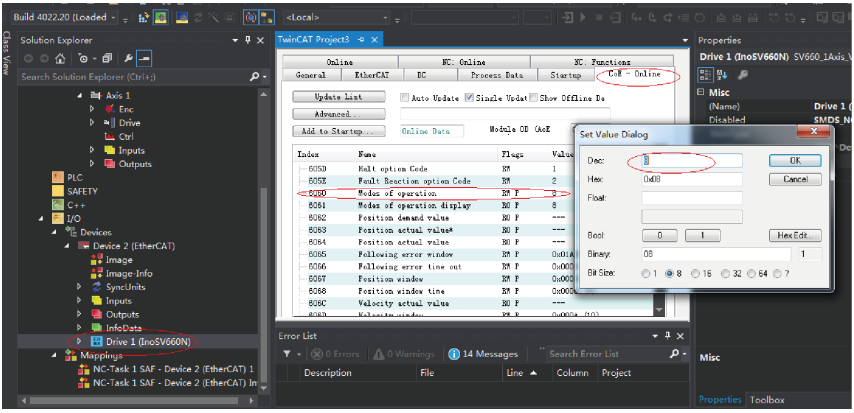


7. The search for the device is done, as shown below.



Configuring servo drive parameters

Configure parameters through SDO communication in CoE - Online interface. When 200E-01h is set to 3, the parameter values modified through SDO communication will be saved upon power failure. To modify 6060h to CSP mode (8), follow the procedure shown in the following figure.



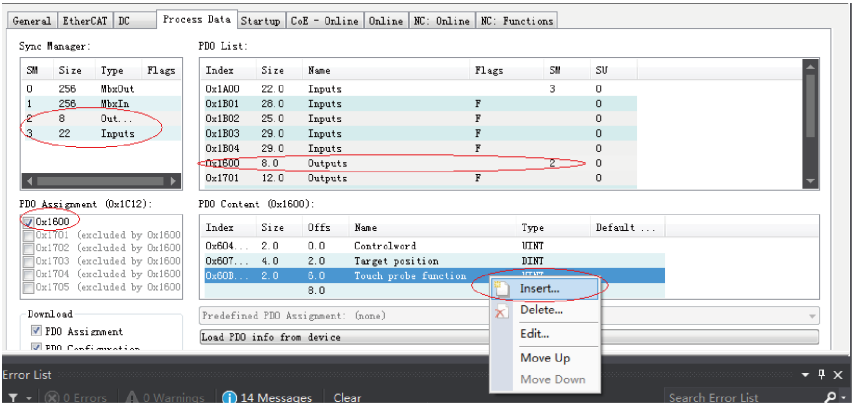
Note

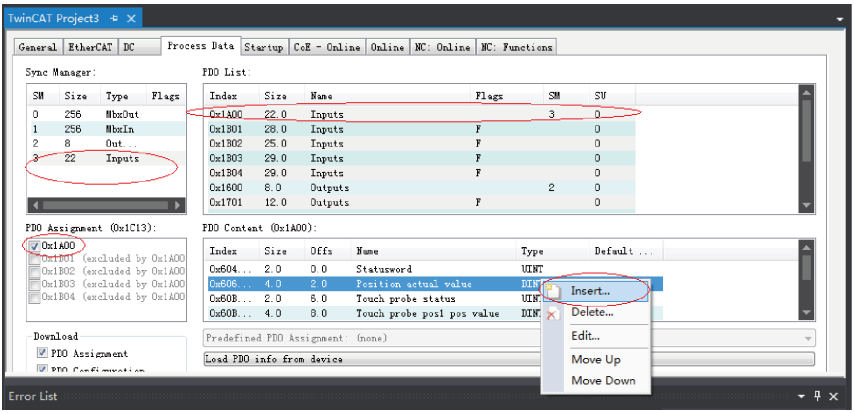
This operation is available only when H02-00 (Control mode) is set to 9 (EtherCAT mode).

Configuring PDO

Check **0x1600** and **0x1A00** as shown in the following figure. Change the current PDO only if it does not fulfill your needs. To modify the PDO, right-click on the **PDO**

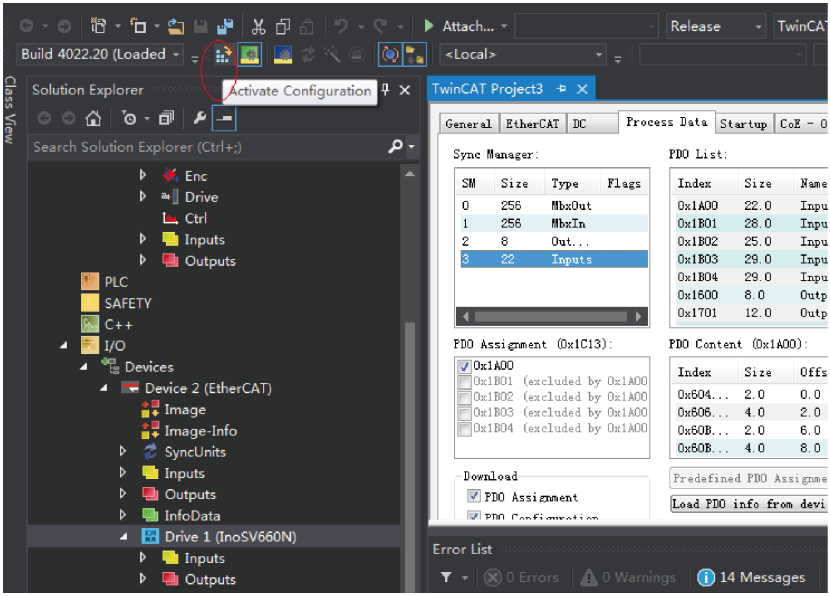
Content window, click **Delete** to delete the redundant PDO or click **Insert** to add the PDO needed.



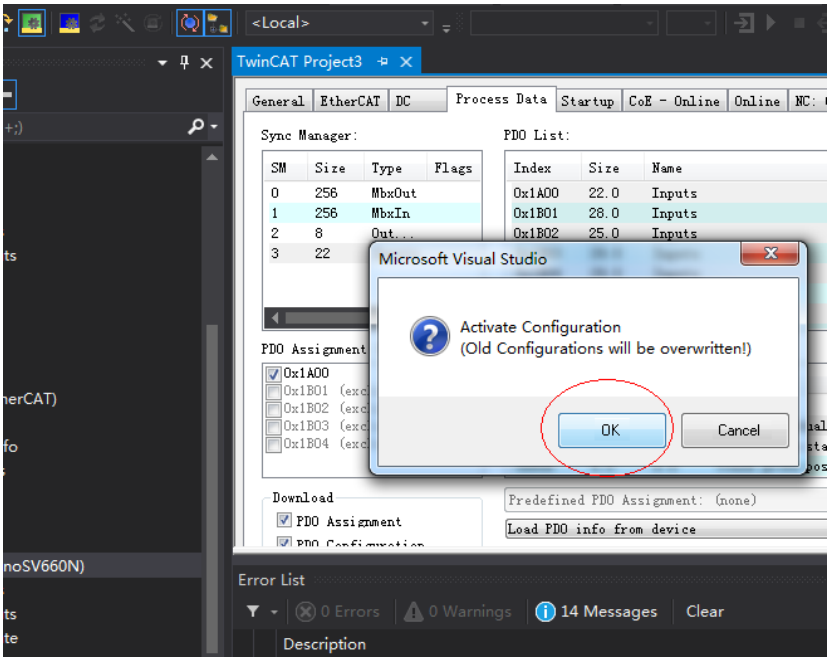


Activating the configuration and switching to the RUN mode

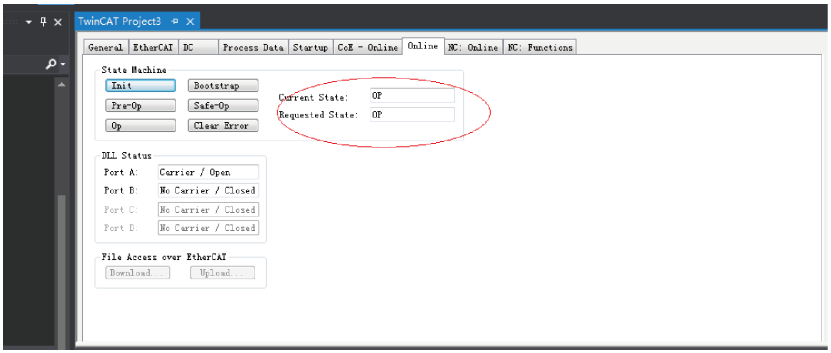
1. Click  .


Build 4022.20 (Loaded
Activate Configuration
Solution Explorer
Search Solution Explorer (Ctrl+;)
Enc
Drive
Ctrl
Inputs
Outputs
PLC
SAFETY
C++
I/O
Devices
Device 2 (EtherCAT)
Image
Image-Info
SyncUnits
Inputs
Outputs
InfoData
Drive 1 (InoSV660N)
Inputs
Outputs
TwinCAT Project3
General
EtherCAT
DC
Process Data
Startup
Sync Manager:
PDO List:
PDO Assignment (0x1C13):
PDO Content (0x1A00):
Download
PDO Assignment
Error List
0 Errors
0 Warnings
14 Messages

2. Click **OK**.


<Local>
TwinCAT Project3
General
EtherCAT
DC
Process Data
Startup
CoE - Online
Online
Sync Manager:
PDO List:
PDO Assignment
Microsoft Visual Studio
Activate Configuration
(Old Configurations will be overwritten!)
OK
Cancel
Download
PDO Assignment
Predefined PDO Assignment: (none)
Load PDO info from device
Error List
0 Errors
0 Warnings
14 Messages
Clear
Description

3. After you click **OK**, the device enters OP status as shown in the Online interface. Meanwhile, the 3rd LED on the keypad displays "8", and the keypad displays "_88RY".



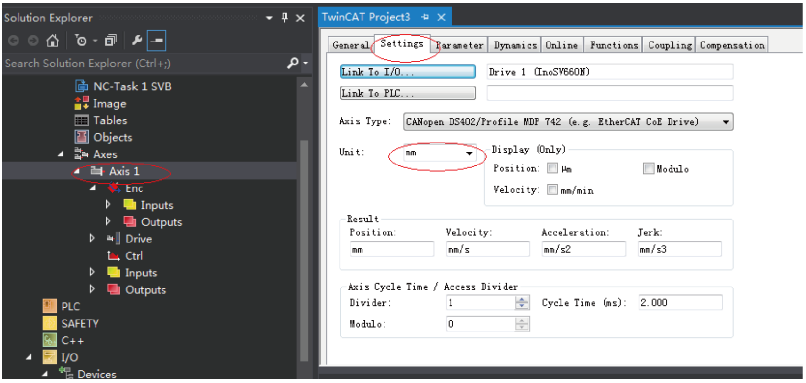
Controlling servo drive operations

Control the servo drive through NC or PLC programs.

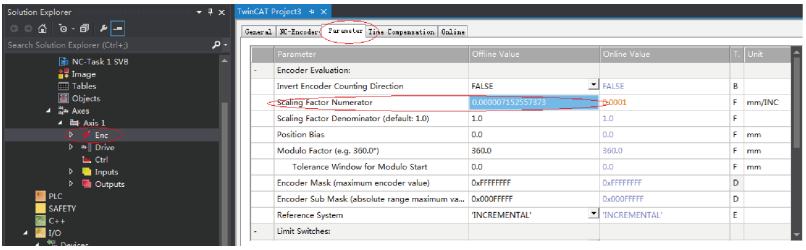
1. When operating in CSP mode

   a. Set the unit.

   Set the unit to **mm** during test.



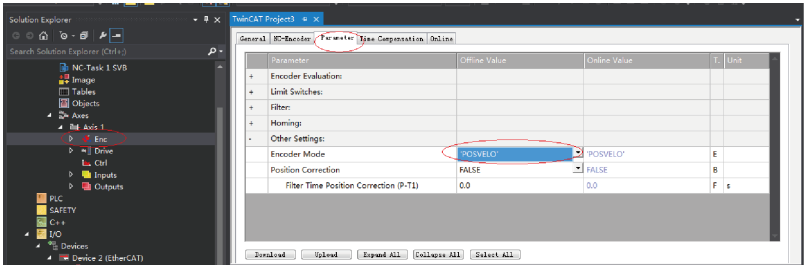
   b. Set the scaling factor.



Scaling factor: Indicates the distance corresponding to the encoder pulses per position feedback.

For example, 8388608 PPR corresponds to a distance of 60 mm, and the scaling factor is: 60/8388608 = 0.000007152557373 mm/Inc.

c. Set the encoder feedback mode to **POSVELO**.



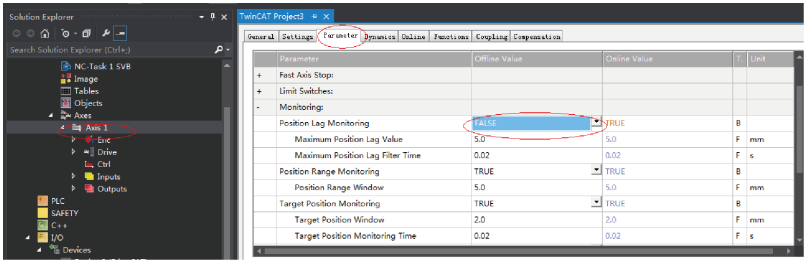
Descriptions for **Other Settings**:

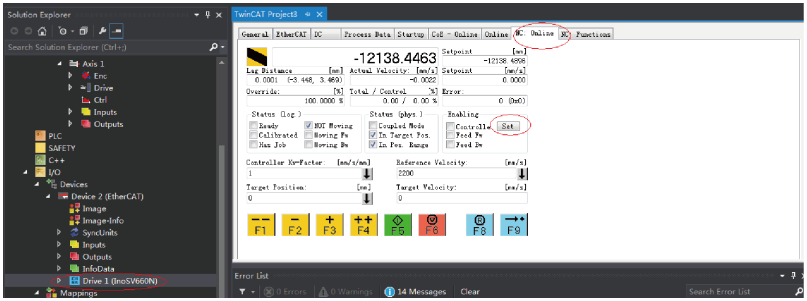
Encoder mode: There are three encoder modes: POS, POSVELO, and POSVELOACC.

- **POS**: The encoder only calculates the position, which is used when the position loop is in the servo drive.
- **POSVELO**: The encoder only calculates the position and the speed, which is used when the position loop is in TWinCAT NC.
- **POSVELOACC**: The TWinCAT NC uses the encoder to determine the position, speed, and acceleration.

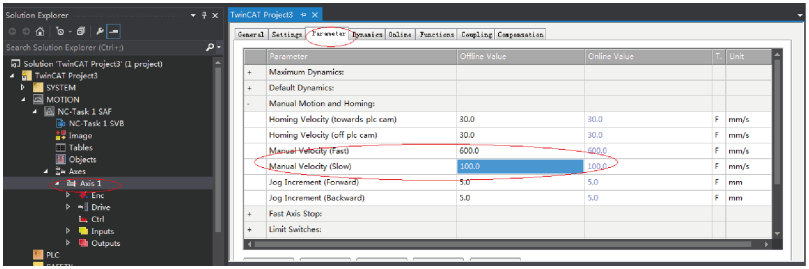
d. Jogging test

Hide the system deviation temporarily.



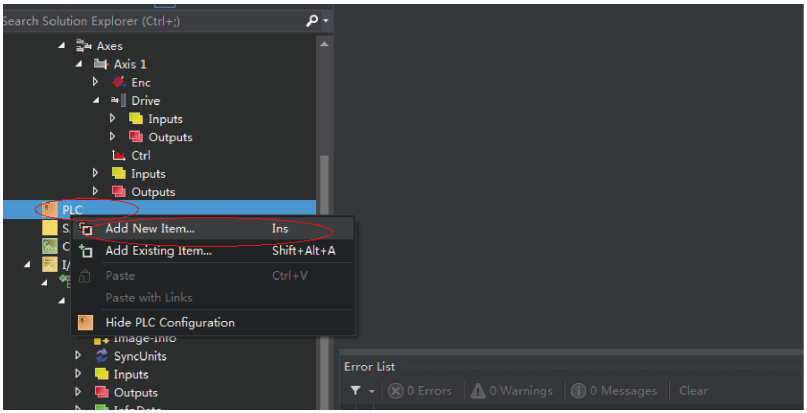


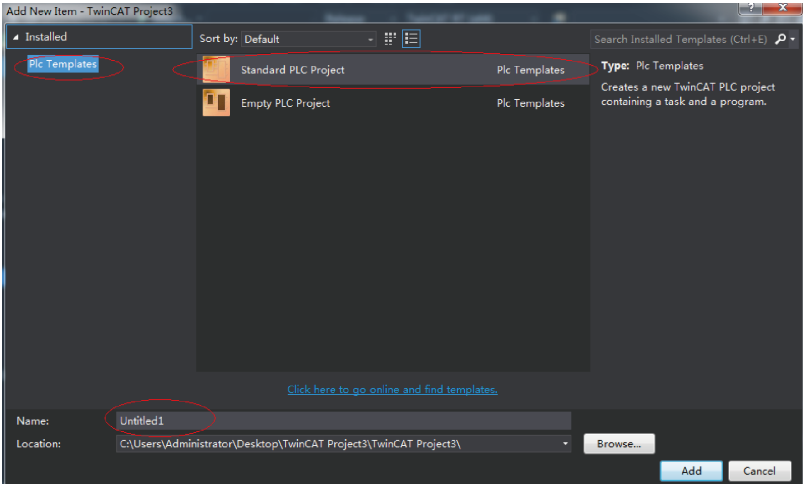
Click **Set** to display a dialog box and then click **All** to enable the servo drive. Perform jogging through F1 to F4. The jog speed is set as follows.



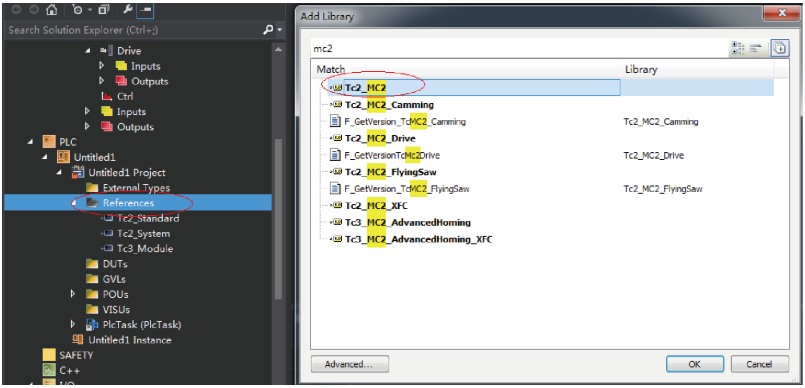
2. Controlling the servo drive operations through the PLC

   a. Create a PLC program.

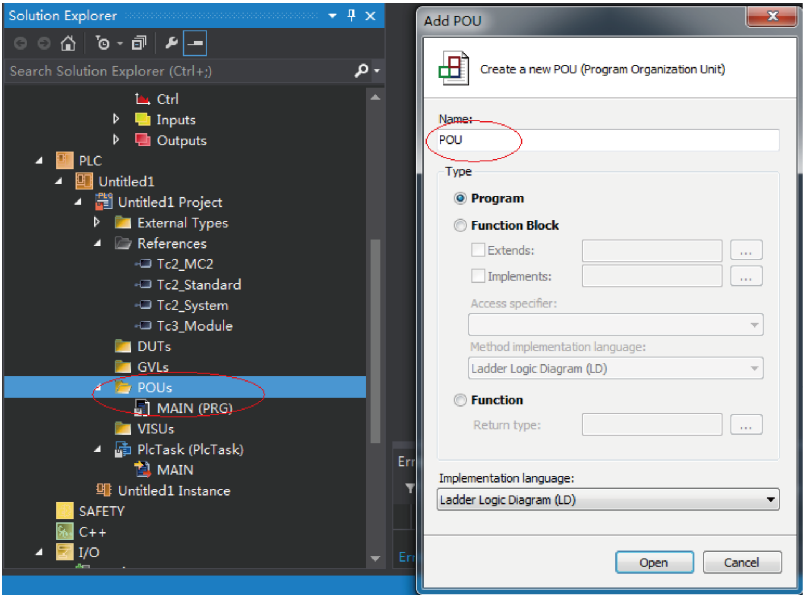




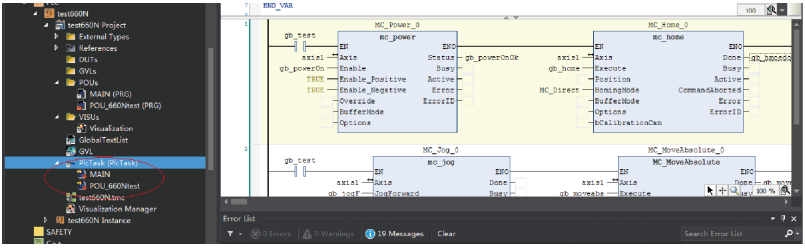
b. Add a motion control library for calling the motion control function blocks easily.



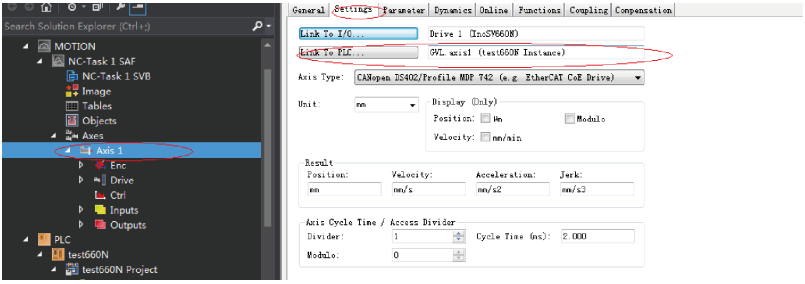
c. Create a POU program.



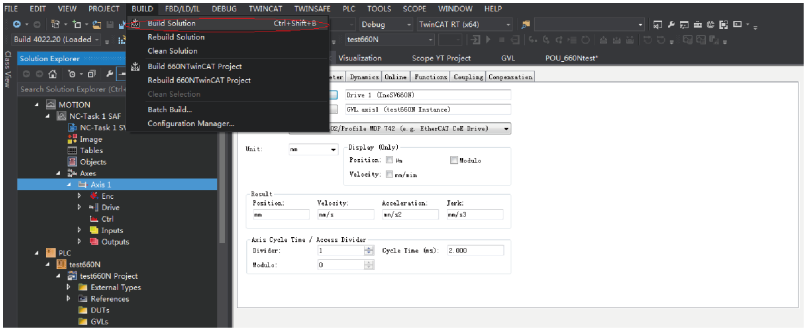
d. Call the motion module to implement some simple actions and input the final program to **PlcTask (PlcTask)**.

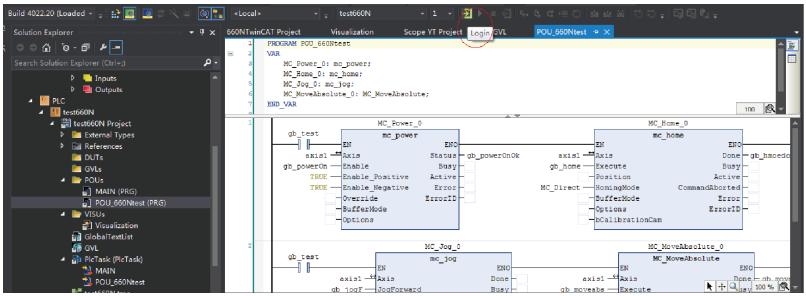


e. Link the axis to the variable defined in the PLC.

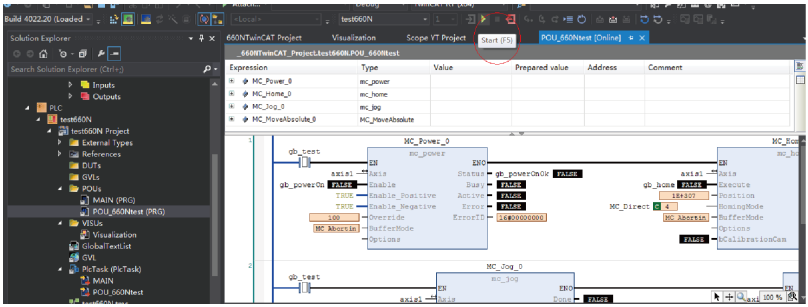


f. Compile the program. If there is not fault, activate the configuration and log onto the PLC.



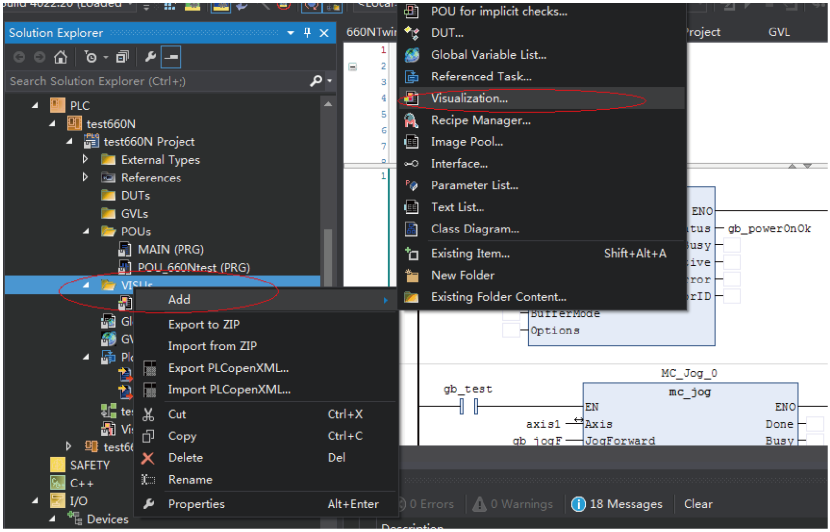


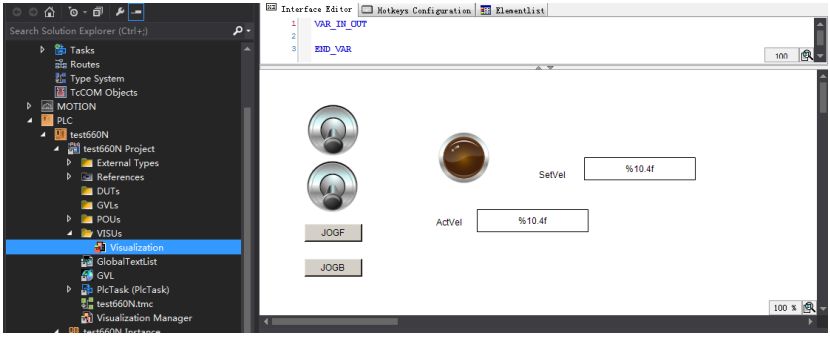
g. Click the start button marked in the following figure to make the servo drive run.



3. Controlling the servo drive operations through the HMI

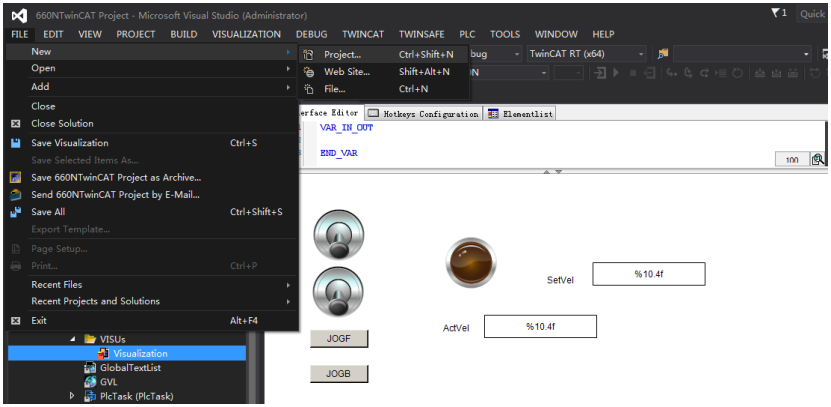
   Add the HMI interface to control the servo drive through the HMI interface.

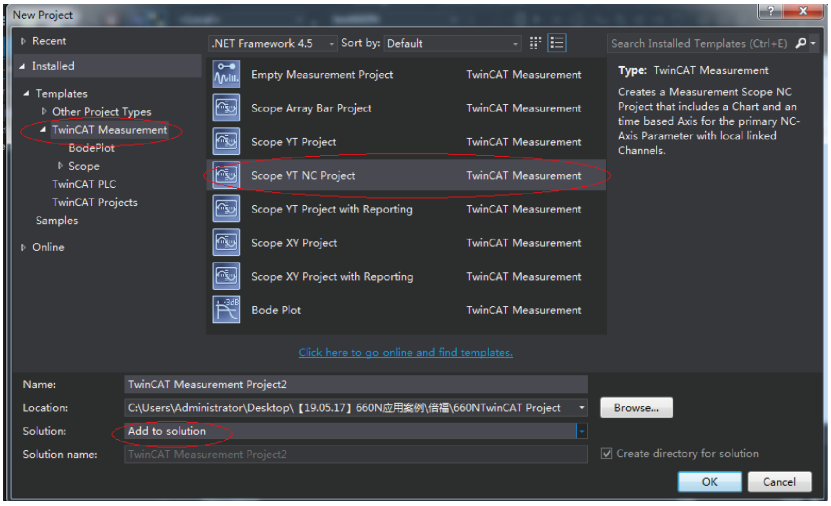




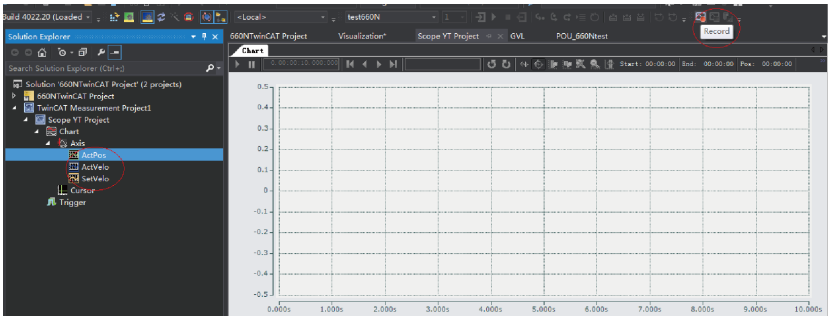
Use the scope view function.

1. Add a scope view project as shown in the following figure.





2. Add parameters to be monitored and monitor these parameters during operation of the PLC.



2.6.4 KEYENCE KV7500 Controller as the Host Controller

2.6.4.1 Configuring the Servo Drive

- Servo drive version
  It is recommended to use the device description file of "SV660N-Ecat_v0.09.xml" or later for trial run of SV660N series servo drives. It is recommended to use the MCU software version of 901.4 (H01-00 = 901.4) or later for SV660N series servo drives.
- Description of 60FD
  bit0: negative limit bit1: positive limit

  bit2: home switch

  bit16...bit20: correspond to DI1...DI5 respectively

2.6.4.2 Configuring KEYENCE KV7500 Software Tool

As software tool versions earlier than KV STUDIO 9.45 do not support extension of KEYENCE EtherCAT module "KV-XH16EC", the version of the KEYENCE software tool used must be KV STUDIO 9.45 or later.

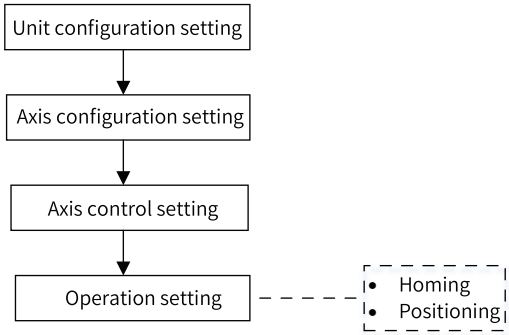
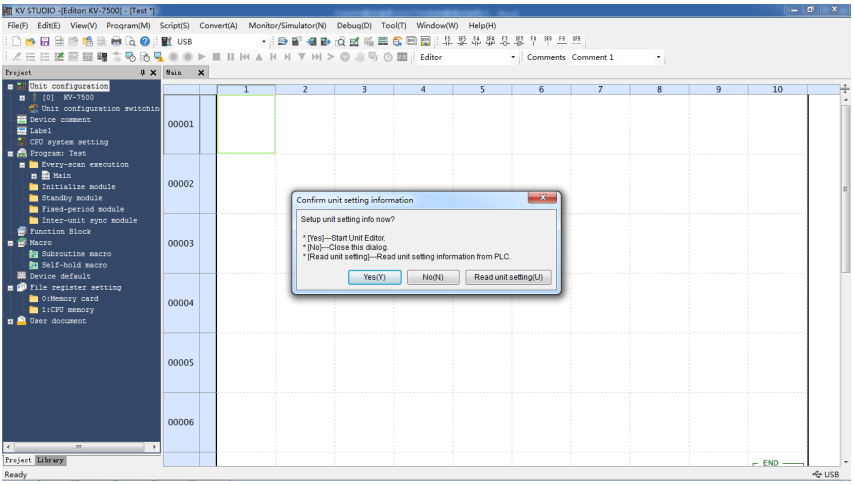


Figure 2-12 Configuration flowchart

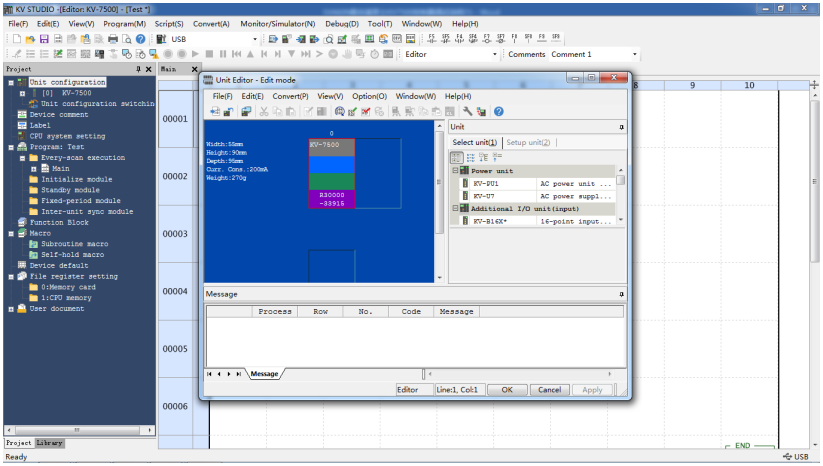
Unit configuration setting

Create a project and click **OK** to display the following window.

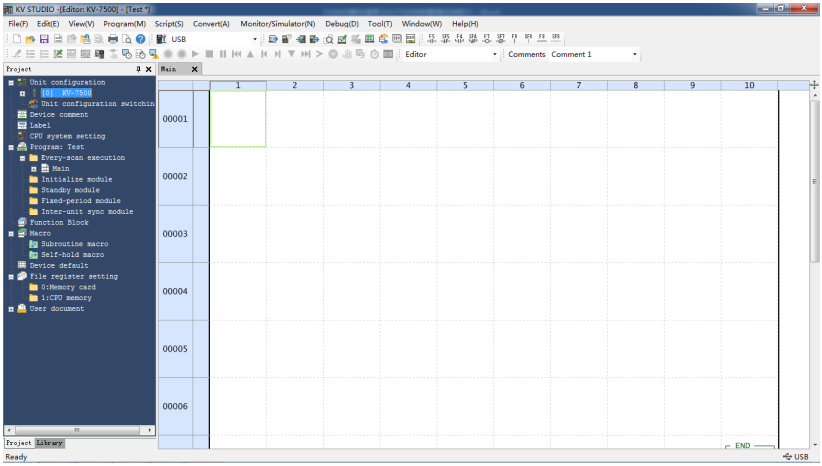


Click **Yes**, **No**, or **Read unit setting** as needed.

- Click **Read unit setting** when the physical PLC unit is connected properly and able to communicate with the software tool. The software tool obtains unit configurations automatically according to the physical connection.
- If you click **Yes**, the **Unit Editor** window opens, allowing you to select units for configuration through dragging or double-clicking.

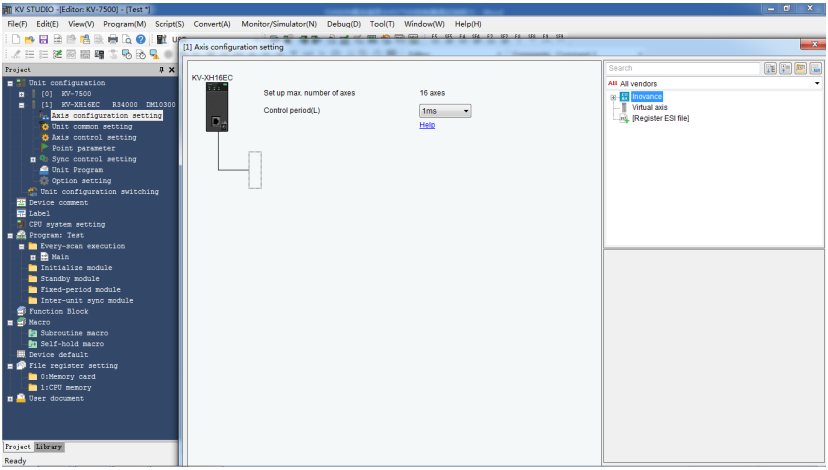


- If you click **No**, you can click **Tool** > **Unit editor** or double-click **[0] KV7500** under **Unit configuration**.

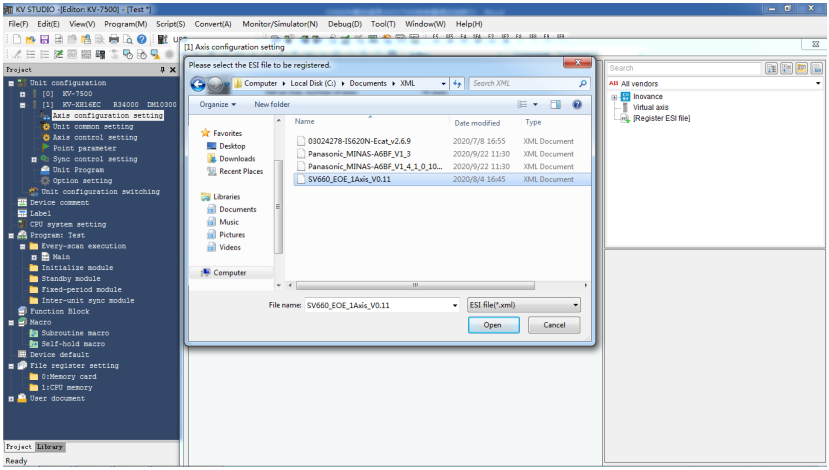


Axis configuration setting

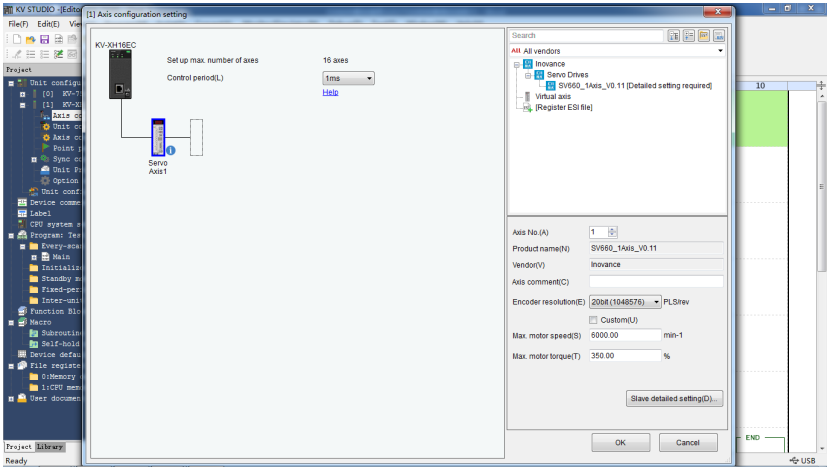
1. Open **Axis configuration setting** and double-click **Register ESI file**.



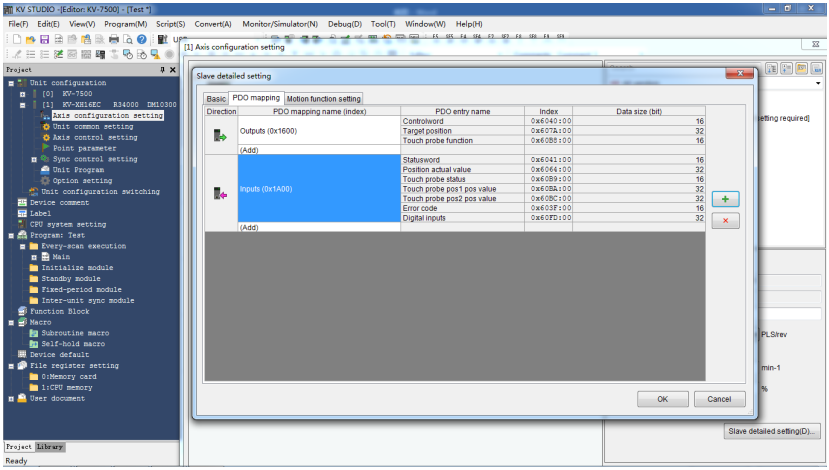
2. Find the storage directory of the device description file ".xml" and open it to import the ".xml" file.



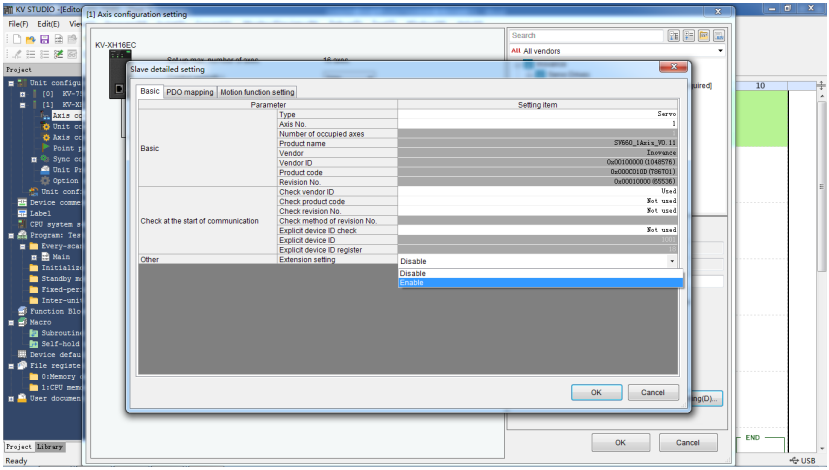
3. After the device description file is imported, you can start to add axes and set the control cycle in **Axis configuration setting**. The default control cycle is 1 ms and the minimum control cycle is 250 us.
4. You can add the axes needed through dragging or double-clicking. Select the corresponding axis and set critical information such the **Encoder resolution**, **Max. motor speed**, and **Max. motor torque** for this axis.



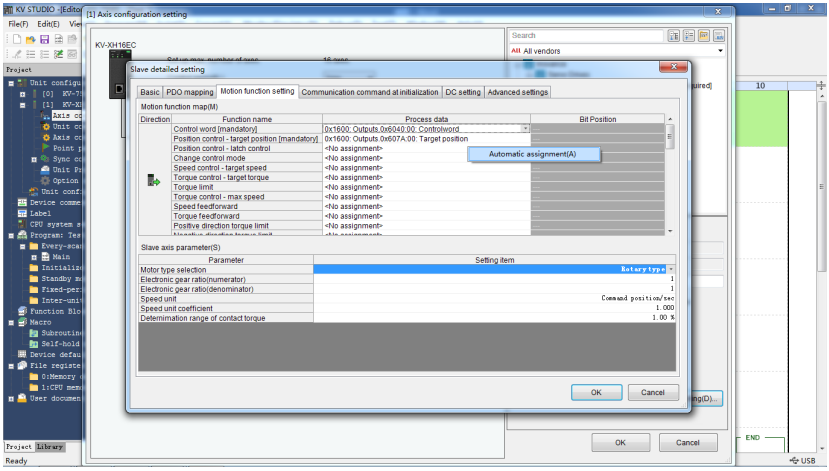
5. You can add **PDO mapping** in **Slave detailed setting**.



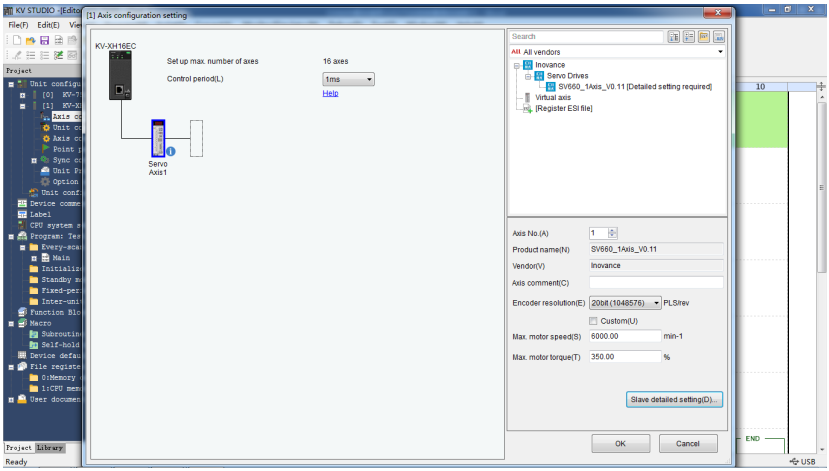
6. If extension setting is needed, set **Extension setting** to **Enable**.



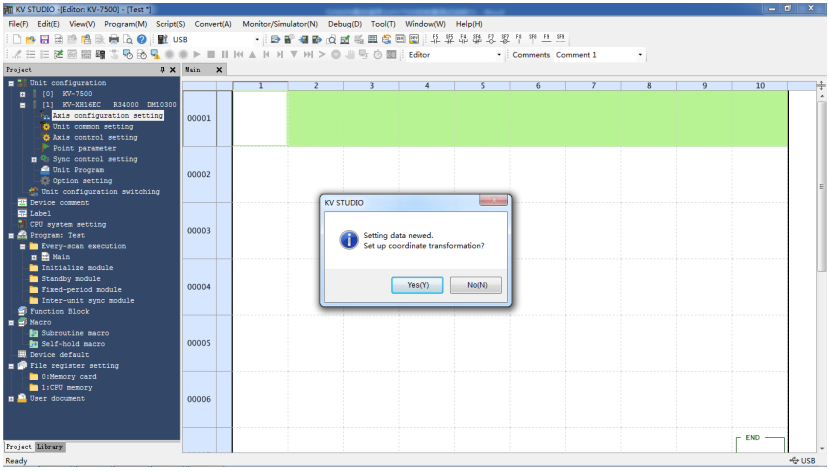
7. For **Motion function setting**, you can double-click or click on the combo box (small triangle icon) to select the PDO configuration needed from the dropdown list, or you can right-click > **Automatic assignment** > **Yes**, in this way the assigned contents will correspond to preceding PDO contents automatically.
   During manual assignment, do not neglect any contents in the PDO mapping. Otherwise, a prompt window displays to remind you of the missing contents when you click **OK**. For **Communication command at initialization**, **DC setting**, and **Advanced settings**, use the default values. After settings are done, click **OK**.



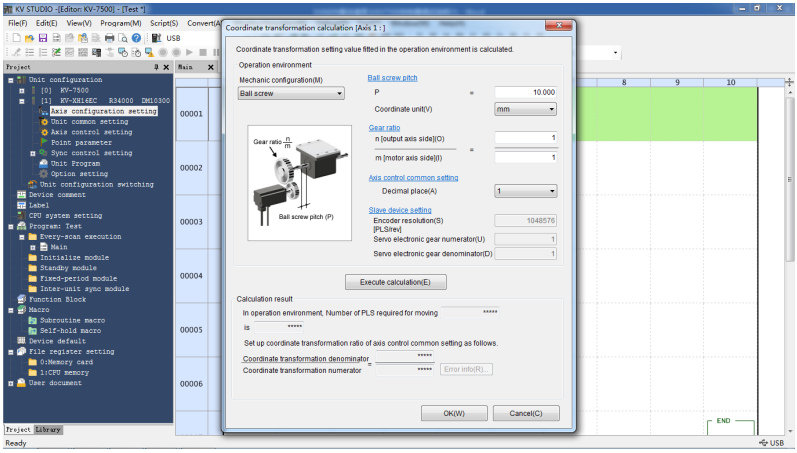
8. After settings in **Slave detailed setting** are done, the exclamation symbol disappears.



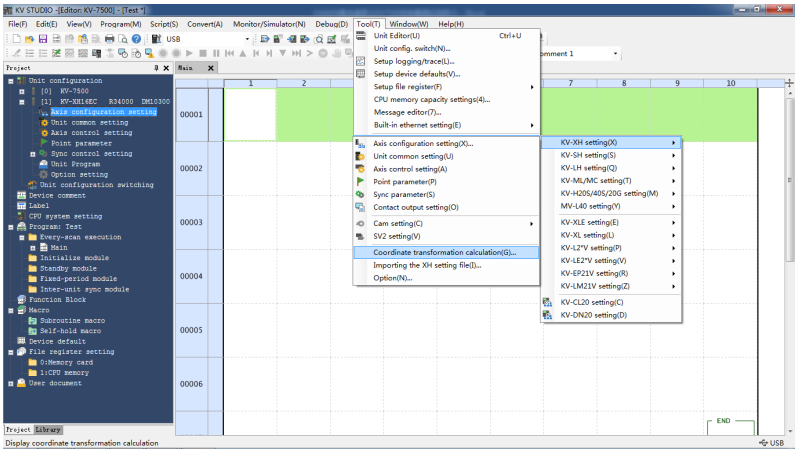
9. After adding the axes, click **OK**, and the following dialog box displays, asking you whether to set up coordinate (electronic gear ratio) transformation.



- Click **Yes** and the coordinate transformation dialog box displays. Set mechanical parameters and the coordinate unit based on actual conditions and click **Execute calculation**. The software calculates the denominator and numerator for coordinate transformation automatically and writes parameters to **Axis control setting** automatically.

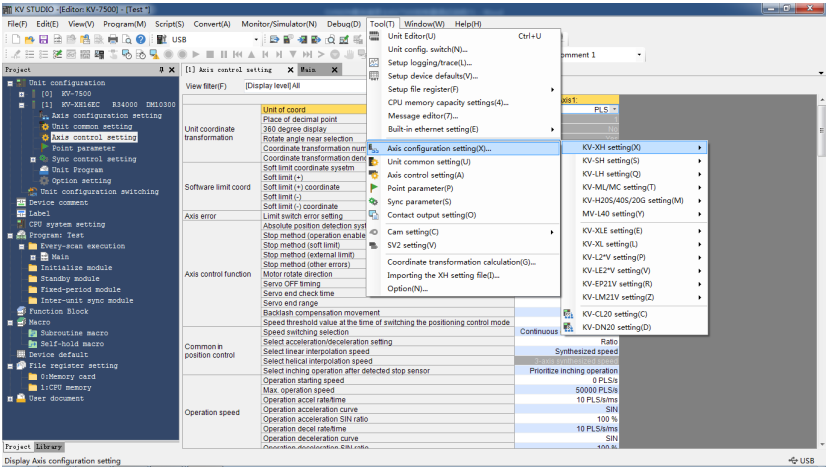


- If you click **No**, you can click **Tool** > **Coordinate transformation calculation...** > **KV-XH setting**.



Axis control setting

1. To open axis control setting, click **Tool** > **Axis configuration setting** > **KV-XH setting** > **Axis control setting**, or click **Axis control setting** under **Project**.
2. In axis control setting, you can set items including **Unit coordinate transformation**, **Software limit coord**, **Axis error**, **Axis control function**, **Common in position control**, **Operation speed**, and **JOG**.



Operation settings

Homing

Before homing, assign **(+) limit switch**, **(-) limit switch**, and **Orgin sensor** in **Motion function setting** under **Axis configuration setting** to each bit of 60FD. 60FD is defined as follows:

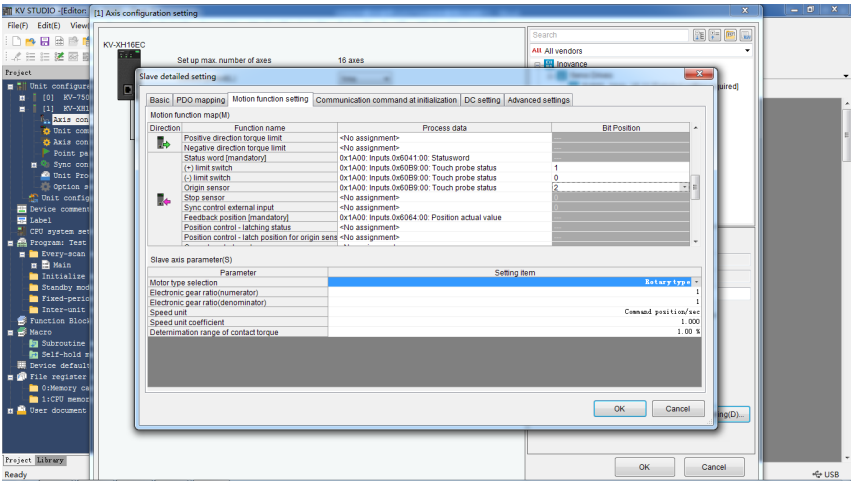
bit0: negative limit

bit1: positive limit

bit2: home switch

bit16...bit20 correspond to DI1...DI5 respectively

In automatic assignment, **(+) limit switch**, **(-) limit switch**, and **Origin sensor** must be assigned manually. You can assign them to corresponding bits of 60FD based on the relation shown in the following figure or to bit16...bit20 (which requires DIs of the servo drive to be assigned with (+) limit switch, (-) limit switch, and origin sensor).



Set the limit parameters for the homing operation in **Axis control setting** > **Origin return**. For detailed trajectories, see KEYENCE instruction manual for positioning/motion control unit KV-XH16EC.

Default	Value Range	Description
DOG type (with phase Z)	DOG type (with phase Z)	Decelerating upon DOG signal input and homing through phase Z signal
	DOG type (without phase Z)	Decelerating upon DOG signal input and homing through falling edge of DOG signal
	DOG-type jogging (with phase Z)	Pausing after moving based on Dog ON upon DOG signal input, then moving to the homing direction through position-type speed control and homing with phase Z signal.
	DOG-type jogging (without phase Z)	Moving based on Dog ON upon DOG signal input before homing
	DOG type (contact)	Homing started when the ON duration of the torque limit signal keeps longer than the compression torque time upon DOG signal input
	Origin sensor and phase Z	Homing executed in the initial phase Z position after the origin sensor is ON
	Rising edge of origin sensor	Homing executed through the rising edge of the origin sensor
	Middle point of origin sensor (without phase Z)	Taking the middle point of the ON range of origin sensor as the origin and comparing it with that in "Rising edge of origin sensor" Even if the light-receptive performance of the origin sensor degrades, the homing position can hardly change with the time.
	Rising edge of limit switch	Homing executed with the limit switch in the negative direction (direction where the current coordinate decreases) acting as the origin sensor
	Immediate homing with phase Z	Homing executed with phase Z signal
	Data setting type	Taking current coordinate as the origin coordinate

The following homing methods are available in IS620N and SV660N series servo drives.

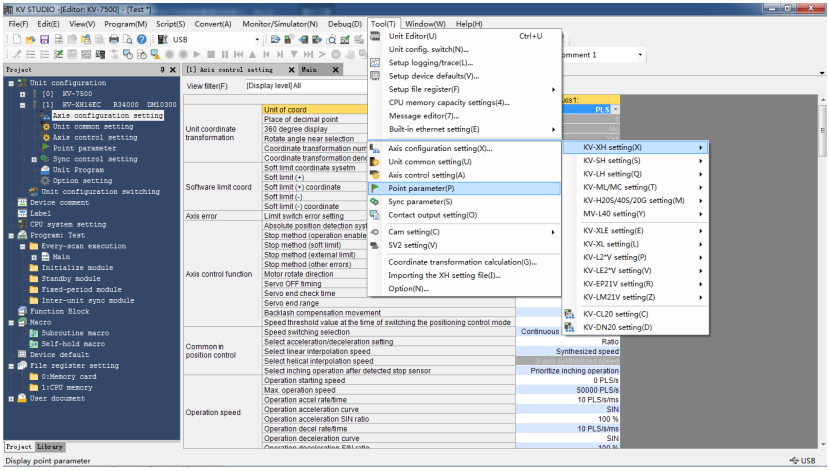
No.	Homing mode	IS620N	SV660N
1	DOG-type (with phase Z)	OK	OK
2	DOG-type (without phase Z)	OK	OK
3	DOG-type jogging (with phase Z)	No	No
4	DOG-type jogging (without phase Z)	No	No

No.	Homing mode	IS620N	SV660N
5	DOG-type (contact)	OK	Homing is available, but the reference coordinate after homing is not 0. Updating to the xml coordinate of IS620N clears the reference coordinate.
6	Origin sensor and phase Z	OK	OK
7	Rising edge of origin sensor	OK	OK
8	Middle point of origin sensor	No	No
9	Rising edge of limit switch	Homing is available, but the reference coordinate after homing is not 0	Homing is available, but the reference coordinate after homing is not 0
10	Immediate homing with phase Z	OK	OK

Positioning

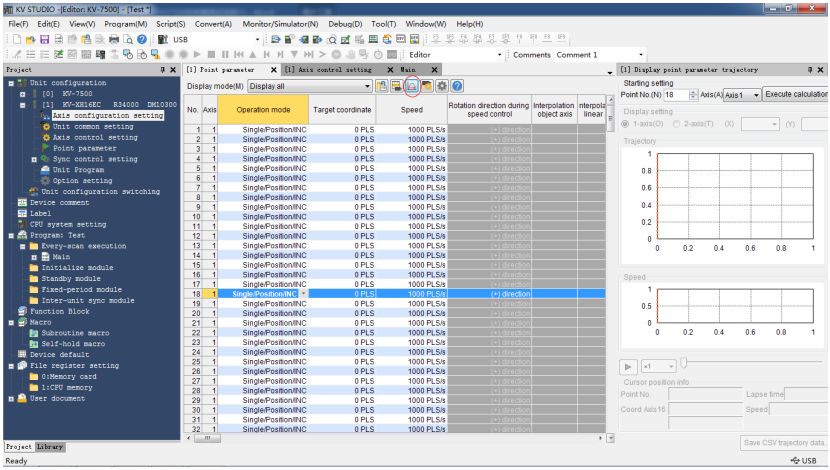
Set the unit coordinate transformation properly before positioning. The unit coordinate transformation is "PLS" by default, which allows no modification on the numerator or denominator. Assume N revolutions are required by the servo drive, in this case, the number of commands that need to be sent by the host controller is N x Pulses per revolution. If coordinate transformation calculation has been executed, the unit coordinate transformation parameters will match the unit transformation results automatically.

1. To set the motion profile of the servo drive, click **Tool** > **Point parameter** > **KV-XH setting**.



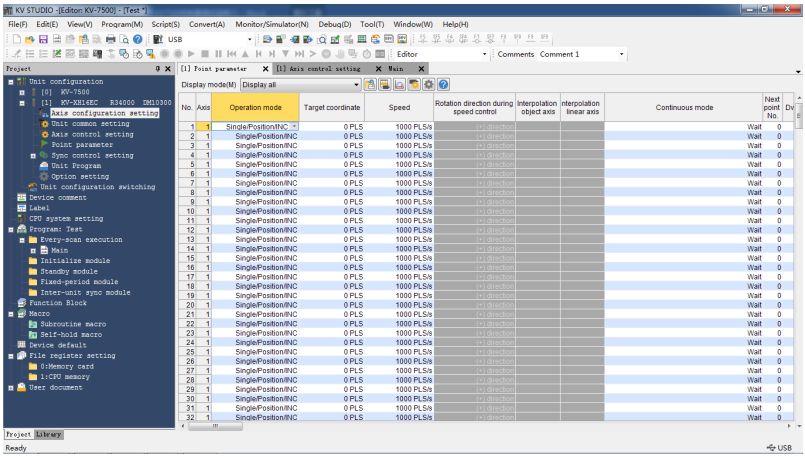
Set the target coordinate and speed per positioning segment as needed. After settings are done, you can call the corresponding **Point No.** through the program to start operation.

2. You can preview the parameter trajectory through the following short-cut.

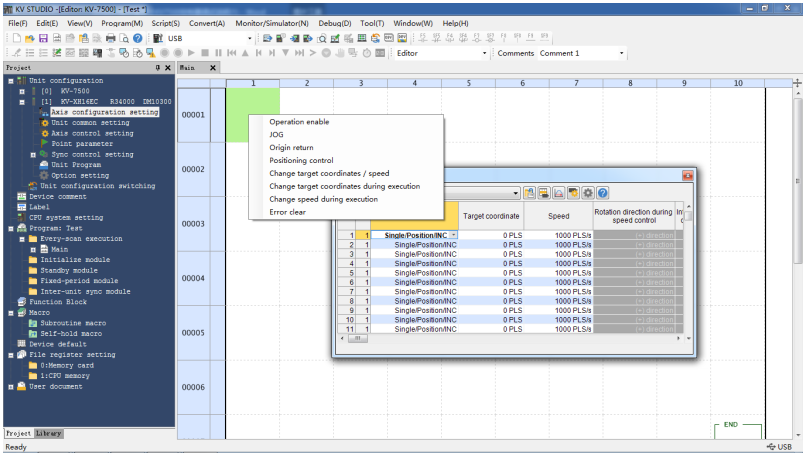


3. Ladder diagrams can be written with regular methods or the following short-cut provided by KEYENCE.

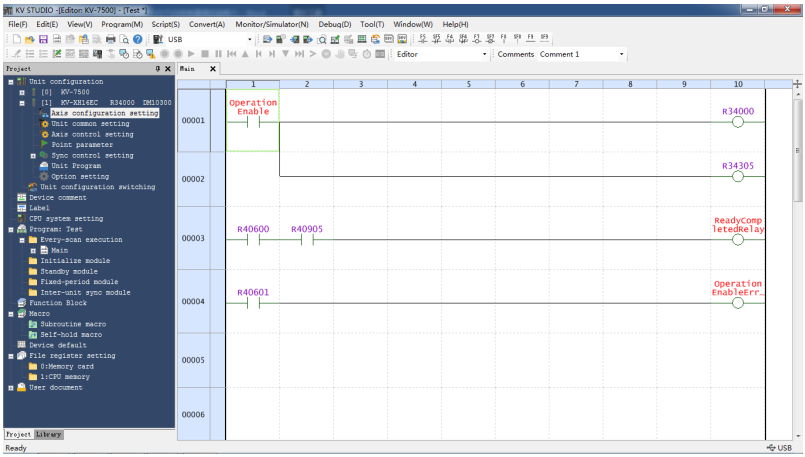
   a. Drag down the **Point parameter** window with the left mouse button, and zoom out the window to put it in a proper place.



b. Move the mouse to the point parameter, such as "No.1-Axis1", and wait until the mouse icon to change from an arrow to a small hand. Then drag towards the program edit interface with the right mouse button, and the following short-cut displays.



c. Select the function needed, such as **Operation enable**, and click it to generate a DEMO program automatically.
Then designate the part in red as the relay needed. After these actions are done, this function is done compiling.

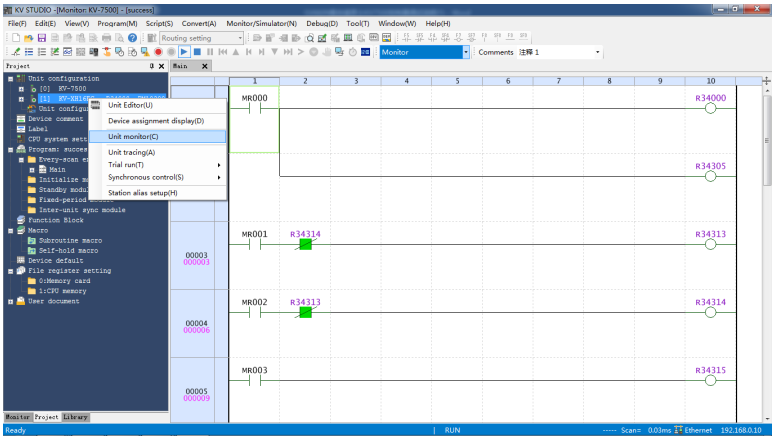


4. Unit monitor

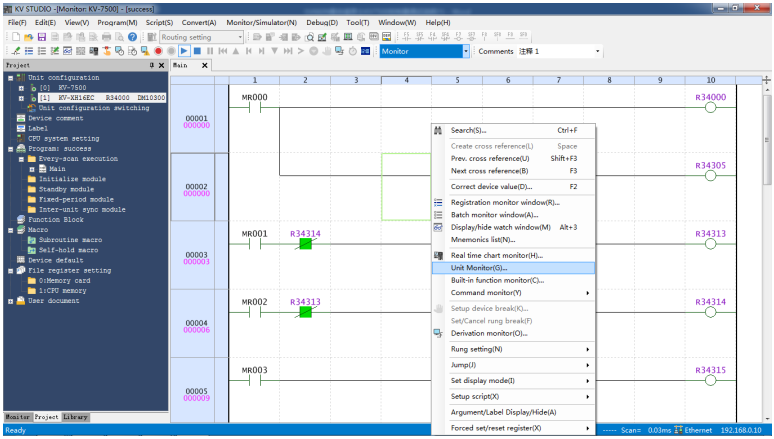
   The unit monitor supports monitoring on the operating state of KV-XH16EC or the internal data.

   a. You can open **Unit monitor** in the following three ways:

   - Select the unit to be monitored and right-click to select **Unit monitor** in the short-cut menu.

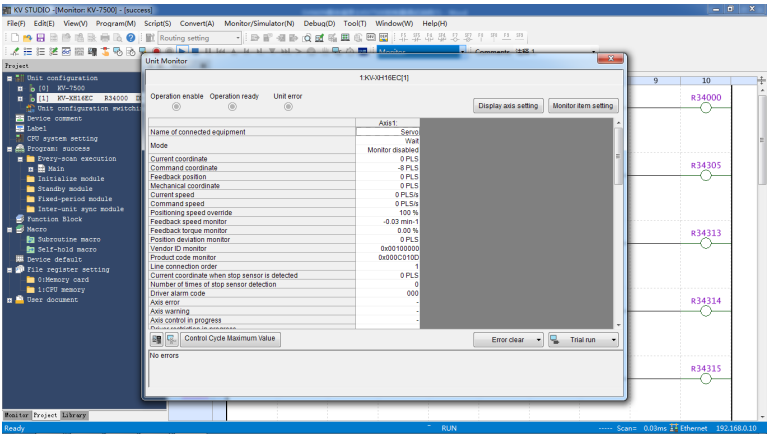


   - Double-click with the left mouse button to open the **Unit monitor**.
   - Right-click the blank section in the **Main** program to select **Unit monitor** in the menu displayed.



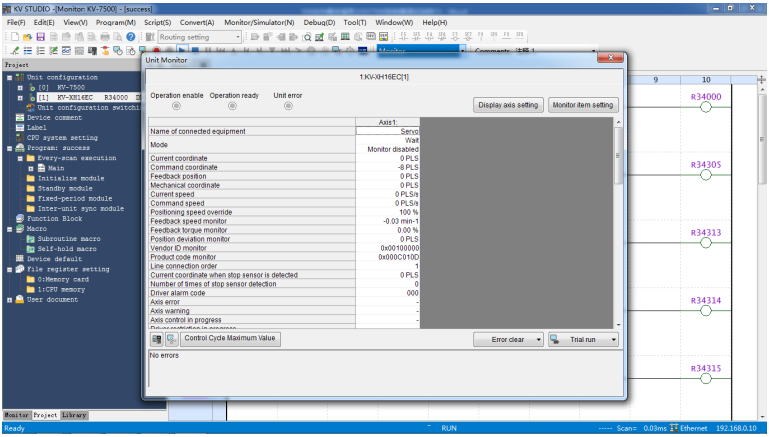
b. The unit monitor displays the operating state of each axis.

1). To change the operating state of the monitor item, click **Monitor item setting** on the top right corner.



2). To check whether I/O signals such as limit switch signals and origin sensor signals are normal, open **Unit monitor** and find the corresponding monitoring position.

If corresponding message is received, a small black circle will be displayed.



The error state of the unit can also be displayed in the **Unit monitor**. The axis error can be cleared using the **Error clear** button in the bottom right.

2.6.4.3 Trial Run

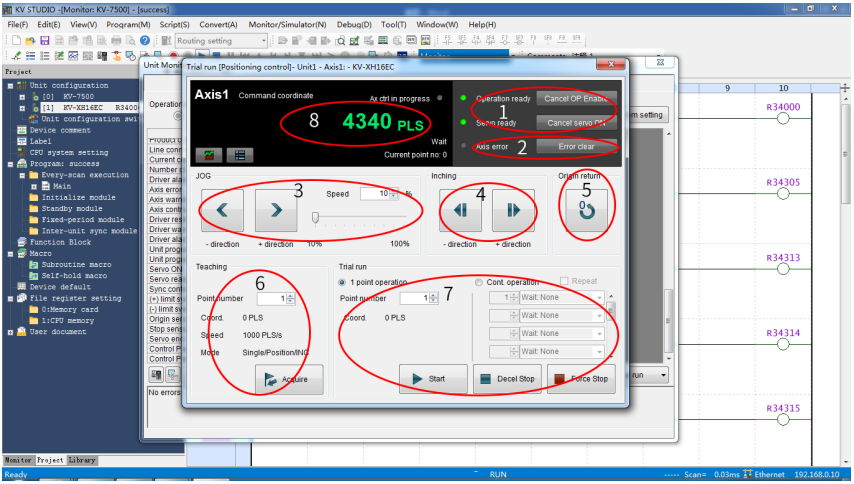
In trial run, actions can be acknowledged directly, without the need for programming ladder diagrams.

1. You can find the **Trial run** button at the bottom right of the unit monitor interface.
2. Select the control mode from positioning control, speed control, and torque control.
3. Then, select the object axis for trial run.

Note

If trial run is executed in the speed control mode or torque control mode, a warning will be reported. To execute trial run, set the control mode to position control.

The following introduces trial run → positioning control.



1. OP enable/Servo ON

   Unrelated to the status of the ladder diagram program. "OP enable" and "Servo ON" can be executed through commissioning. After operations are done, the **Operation ready** and **Servo ready** indicators turn green. To ensure safety, set the CPU unit to PROG mode and execute operations again after stopping ladder diagram program.

   Confirm the following items when the **Servo ready** indicator is not in green.

   - No error occurs on the axis.
   - No warning occurs on the servo drive.
   - The main circuit power supply of the servo drive is switched on.
   - The Ethernet cable is connected.

2. Axis error/Error clear

   Check the error details and clear the error. After rectifying the error cause, click **Error clear** button to clear the error.

3. JOG

   Click **- direction** or **+ direction** buttons to execut forward or reverse jog, which operates with the speed multiplied by a certain ratio (settable with an increment of 1%) between 10% to 100% based on the setpoint in **Axis control setting** > **Jog at high speed**.

4. Inching

   Click **- direction** or **+ direction** buttons to execute forward or reverse inching based on **Axis control setting** > **JOG starting speed** and the movement value defined in **Axis control setting** > **Inching movement**.

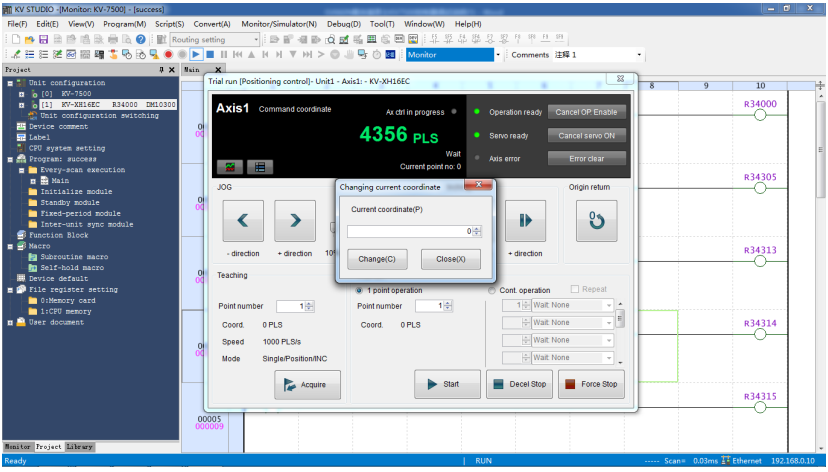
5. Origin return

Click the **Origin return** button to execut homing.

6. Teaching
   Click the **Acquire** button to save current command coordinate value to the buffer memory of the target coordinate of the designated poing number. The teaching function is available only in the online edit mode. The teaching value will also be reflected to the buffer memory and the point parameter.

7. Trial run
   Designate a point number and click the **Start** button to execute point positioning. To stop operation, click the **Decel Stop** or **Force Stop** button to stop smoothly with speed reduced to zero gradually or stop immediately with shock being incurred. Clicking the **1 point operation** button makes the servo drive execute positioning of one point. Clicking the **Cont. operation** button makes the servo drive execute positioning of ten points at most. Clicking the **Repeat** button makes the servo drive return to the point in the first row and execute positioning repeatedly after positioning of the point in the last row is done. The time interval between points can be set to a value within 0.1s to 20.0s.

8. Changing current coordinate
   Click **Command coordinate** and the **Changing current coordinate** dialog box displays. Enter the coordinate needing to be changed and click the **Change** button to change the current coordinate of the axis in trial run, and then close the **Changing current coordinate** dialog box. If you click the **Close** button after changing current coordinate, the **Changing current coordinate** dialog box will be closed with current coordinate unchanged.



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