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CC-Link IE TSN Compatible Closed Loop Stepping System Ezi-SERVO Series

User's Manual
(Motor + Encoder + Drive Integrated)

Ezi-SERVO® CC-Link IE TSN ALL
Closed Loop Stepping System

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Fast Accurate Smooth Motion

◎ CONTENTS ◎

Chapter1 Introduction

1.1 Before using the product

(1) Thank you for choosing our company's products.

(2) The Ezi-SERVO CC-Link IE TSN ALL is a stepping system consisting of a driver equipped with a 32-bit high-performance ARM processor and various motors, used as a remote station in a CC-Link IE TSN network.

(3) Ezi-SERVO CC-Link IE TSN ALL is an industrial product. Do not use it for any other purpose. Our company shall not be liable for any damages incurred due to non-compliance with this instruction.

(4) This User's Manual details the product's usage and safety precautions.

(5) Be sure to read this user's manual before use and operate the product safely and correctly.

(6) After reading the user's manual, keep it in a place where the person using the product can always see it.

(7) The contents of the user's manual and product specifications are subject to change without notice for performance improvements. For the latest version of the user's manual, please refer to our company's website (www.fastech-motions.com, cltsn.fastech-motions.com).

1.2 Safety precautions

To use this product safely, please read all the information provided in the user's manual thoroughly. Pay particular attention to the safety precautions, as they are designed to prevent unexpected hazards or damage.

Safety precautions are categorized as either 'WARNING' or 'CAUTION', with the following meanings:

⚠ **WARNING** Violating a instruction could result in death or serious injury to the user.

⚠ **CAUTION** Violating a instruction may result in injury to the user or property damage.

⚠ WARNING

■ General

- All work must be performed by personnel with expertise in the relevant field. Failure to do so may cause fire, injury, or device damage.
- Before starting work, ensure all power sources to the system are turned off. Failure to do so may result in electric shock.
- Do not use in explosive environments, environments with flammable gases, environments with corrosive gases, areas where water may splash, or near combustible materials. Failure to do so may cause fire, electric shock, or injury.

- If an alarm (protective function) occurs during operation, eliminate the cause. Continuing operation while ignoring the alarm may cause the Driver or motor to malfunction, resulting in injury or damage to the equipment.

■ Installation

- Install the product inside the housing. Failure to do so may result in injury or electric shock.
- Do not place objects on the product or subject it to impact.
- To prevent the Driver from overheating, install each product with adequate spacing (see '3.2.2 Installation method' for details). Failure to do so may result in fire or malfunction.

■ Wiring

- The case of this product is insulated from the internal circuit ground (GND) by capacitors, so be sure to ground it. Failure to do so may cause electric shock, fire, or malfunction.
- Use the rated voltage for the driver power supply. Failure to do so may cause fire or electric shock.
- Do not bend the cable excessively or pull it too hard. Doing so may cause fire or electric shock.
- Do not change the wiring while the power is on. Failure to follow these instructions may result in electric shock or damage to the device.

■ Operation, Maintenance, and Inspection

- Before performing any work, turn off the main power supply, wait at least 2 minutes, and verify the absence of voltage using a voltage tester or similar device. Failure to do so may result in residual charge in the internal electrolytic capacitors, posing an electric shock hazard.
- Do not disassemble or modify the product. Failure to comply may result in injury or damage to the device.
- Do not touch the power connector while power is applied. This can cause electric shock.
- When cleaning, loosening, or tightening screws, ensure all power sources connected to the system are disconnected. Failure to do so may result in electric shock or malfunction.

⚠ CAUTION

■ General

- Use the product according to the specified specifications. Failure to do so may cause electric shock, injury, or damage to the device.
- Do not touch the product while the device is operating. Also, do not touch the product for a short time after it stops operating. Failure to exercise caution may result in burns.
- Do not forcefully bend or pull cables connected to the product. Doing so may damage the device.

■ Installation

- Prevent metallic foreign objects from entering the product. Failure to do so may cause fire, electric shock, or injury.
- Do not drop the product. This may damage the product or cause injury.
- Do not place flammable materials near the product. Failure to comply may result in fire or burn hazards.
- When using multiple units in a single enclosed space, install a cooling device. Overheating may cause fire hazards.

■ Wiring

- Connect wiring securely according to the wiring diagram. Failure to do so may cause fire or electric shock.

■ Operation, Maintenance, and Inspection

- Use a DC power source with reinforced insulation between the primary and secondary sides for the product. Failure to do so may result in electric shock.
- When applying power, turn off all control input signals to the driver. Failure to follow this instruction may cause the motor to start, resulting in injury or damage to the equipment.
- Use the drive and motor only in the specified combinations. Failure to do so may cause a fire hazard.
- When manually moving the moving parts, do so with the servo in the Off state. Failure to do so may result in injury.
- The product has a default setting at shipment. When changing setting values, always refer to the relevant sections in the user's manual. Arbitrary changes may damage the product or equipment.
- If any abnormality occurs, immediately stop operation and disconnect the power supply. Failure to do so may cause fire, electric shock, or injury.

■ Disposal

- When disposing of the product, treat it as industrial waste. There is a risk of toxic substances being released.

1.3 Checking the product

Please verify that the purchased product includes the following accessories. If any are missing, contact our company (main phone: 032-234-6300).

(1) Integrated motor: 1 unit

(2) Driver connector set

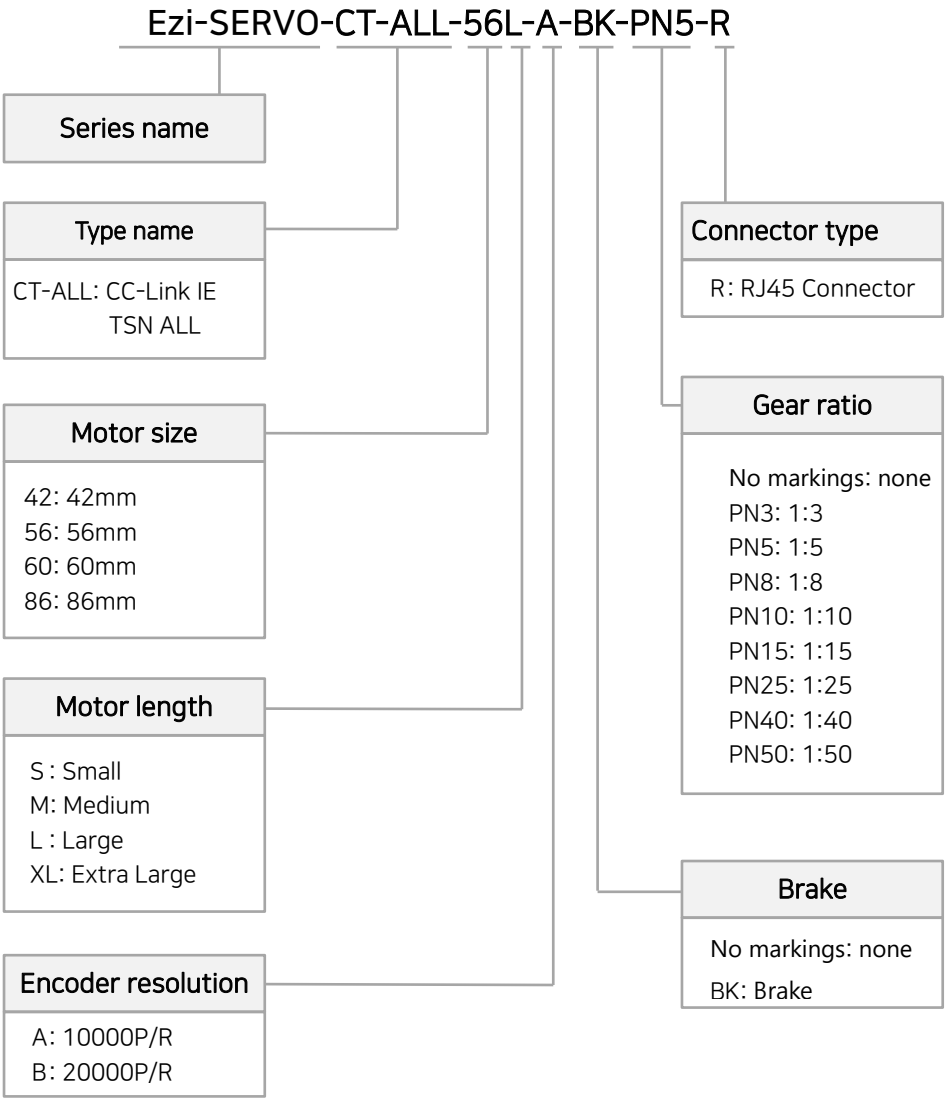
Purpose	Type	Part number	Manufacturer
Power connection	Terminal Block	MC421-38102	DECA
Input/Output connection	Housing	501646-1200	MOLEX
	Terminal	501648-1000	

Note

▶ The above connector is provided with the product. When using other parts, please verify that they meet the specifications.

1.4 How to read product name

Our company sells drivers and motors as a set. The product name standard for integrating both products into a single unit is as follows.



※ Please refer to A1 for the motor and driver combination table.

Chapter2 Driver specifications

2.1 Features

The main features of Ezi-SERVO CC-Link IE TSN ALL are as follows.

(1) CC-Link IE TSN-compatible motion control

Ezi-SERVO CC-Link IE TSN ALL is a stepping system that supports CC-Link IE TSN, an industrial network based on high-speed Ethernet (1 Gbps, full-duplex communication) .

(2) Closed loop control system

Ezi-SERVO is a servo system that prevents loss of synchronization because it constantly monitors the current position using a high-precision encoder mounted on the motor.

Ezi-SERVO receives motor position information from the encoder every 50 μs and corrects the position when necessary.

(3) No gain adjustment required

Typical servo systems require gain adjustment to improve performance. This adjustment process is time-consuming and can cause issues depending on the load type.

However, Ezi-SERVO is a servo system that utilizes the characteristics of stepping motors, eliminating the need for gain adjustment. It provides an optimal solution, particularly for low-stiffness loads (e.g., belt pulley systems) that pose challenges in conventional servo systems.

(4) Minimized heat generation, energy savings

Ezi-SERVO automatically controls motor current based on load. This suppresses heat generation in the motor and Driver, saving energy.

(5) Enhanced torque

Ezi-SERVO incorporates a boost circuit within the drive. This controls the voltage supplied to the motor to be higher than the input voltage to the driver, enhancing torque at high speeds. Additionally, the run current can be set up to 150%, improving torque by approximately 30% across all speed areas.

(6) No micro-vibration

Ezi-SERVO utilizes the characteristics of Stepping motors, eliminating the hunting issues common in conventional servo systems. Consequently, the motor comes to a complete stop, preventing micro-vibration. This makes Ezi-SERVO particularly effective in high-speed inspection equipment using vision systems, where vibration after stopping is undesirable.

(7) Smooth and precise rotation

Unlike conventional microstep drives, Ezi-SERVO incorporates a high-precision encoder and MCU to perform vector control and filtering control. This enables smooth operation without torque ripple even at low speeds.

(8) Fast response speed

Ezi-SERVO utilizes the high command position tracking capability inherent to stepping motors, resulting in extremely short positioning times. This significantly reduces positioning time in applications requiring frequent single-pitch movements.

Conventional servo systems require a settling time to complete operation stably after receiving a command, which increases the positioning time.

Ezi-SERVO utilizes the advantages of stepping motors to enable high-speed positioning with short response delay times.

(9) High torque, continuous operation

Ezi-SERVO enables continuous operation at higher torque than conventional servo motors in the low-speed area. It also operates stably under 100% load without maladjustment, eliminating the need for separate torque margin considerations unlike conventional stepping motors. Optimal current control based on rotational speed maintains high torque even in the high-speed area.

(10) High-speed operation

Ezi-SERVO monitors the current position via an encoder, enabling it to utilize maximum torque even under 100% load. This allows operation without maladjustment even in the high-speed area.

2.2 General specifications

The general specifications for the Ezi-SERVO CC-Link IE TSN ALL driver are as follows.

Item	Specifications
Operating ambient temperature	0–50 °C (non-freezing)
Storage ambient temperature	-25 to 70 °C (non-freezing)
Operating ambient humidity	85% RH or less (non-condensing)
Storage ambient humidity	85% RH or less (non-condensing)
Vibration resistance	Under intermittent vibration: ・10 to 57 Hz, displacement amplitude 0.075 mm ・57 to 150 Hz, acceleration amplitude 9.8 m/s² Under continuous vibration: ・10 to 55 Hz, acceleration amplitude 5.9 m/s²
Ambience	No corrosive gas, inflammable gas, oil mist or dust
Altitude	Operation: Up to 1,000 m above sea level Transportation/Storage: Up to 3,000 m above sea level
Degree of protection	IP10

2.3 Performance specifications

The performance specifications for the Ezi-SERVO CC-Link IE TSN ALL driver are as follows.

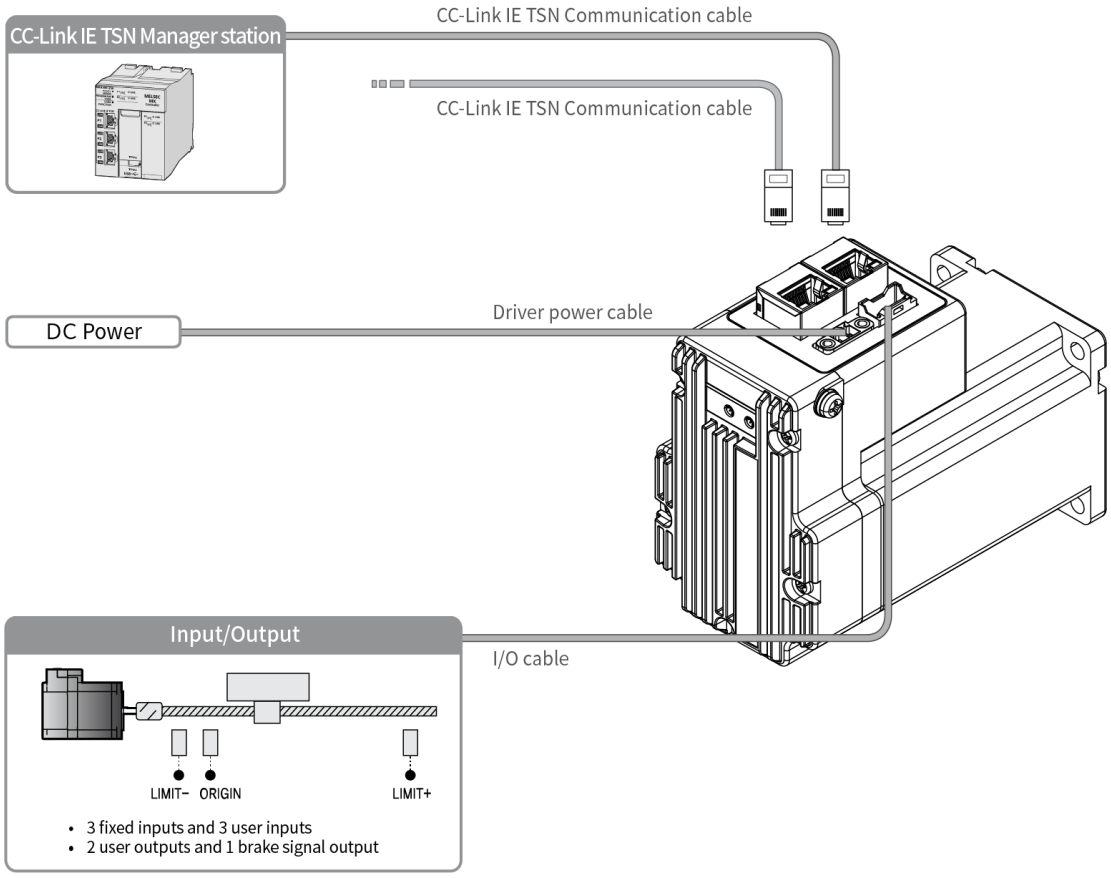
<table>
<tr><th colspan="2">Item</th><th>Ezi-SERVO CC-Link IE TSN ALL</th></tr>
<tr><td colspan="2">Input voltage</td><td>24 V DC ±10%</td></tr>
<tr><td colspan="2">Control method</td><td>Closed loop control using a 32-bit MCU</td></tr>
<tr><td colspan="2">Current consumption</td><td>Maximum 500 mA (excluding motor current)</td></tr>
<tr><td rowspan="3">I/O Signal</td><td>Input signals</td><td>· Fixed input: 3 points (LIMIT+, LIMIT-, ORIGIN), photocoupler input
· User input: 3points, photocoupler input</td></tr>
<tr><td>Output signals</td><td>· Fixed output: 1 point (Brake), photocoupler output
· User output: 2 points, photocoupler output</td></tr>
<tr><td>Torque off signals</td><td>· Fixed input 2 points (TQOFF1, TQOFF2), photocoupler input
· Fixed output 1 point (TQMON), photocoupler output</td></tr>
<tr><td colspan="2">Rotation speed</td><td>0 to 3,000 r/min</td></tr>
<tr><td colspan="2">Resolution</td><td>
<table>
<tr><th>Encoder resolution [P/R]</th><th colspan="10">Configurable resolution [P/R]</th></tr>
<tr><td>10,000</td><td>500</td><td>1,000</td><td>1,600</td><td>2,000</td><td>3,600</td><td>5,000</td><td>6,400</td><td>7,200</td><td>10,000</td><td></td></tr>
<tr><td>20,000</td><td>500</td><td>1,000</td><td>1,600</td><td>2,000</td><td>3,600</td><td>5,000</td><td>6,400</td><td>7,200</td><td>10,000</td><td>20,000</td></tr>
</table>
(Resolution set as parameter)
</td></tr>
<tr><td colspan="2">Error type</td><td>Overcurrent fault, Overspeed fault, Position tracking fault, Overload fault, Overheat fault, Regenerative voltage abnormality, Motor connection abnormality, Encoder connection abnormality, In-position error, ROM error, Input voltage error, Position error exceeding limit,</td></tr>
<tr><td colspan="2">LED indication</td><td>Driver status (ST1, ST2), Network status (RUN, ERR, LINK1, LINK2)</td></tr>
<tr><td colspan="2">Motor current during operation</td><td>50~150% (can be changed via parameter setting) ※Default setting is 100% at shipment</td></tr>
<tr><td colspan="2">Motor current during stop</td><td>20~100% (can be changed via parameter settings) ※Default setting value is 50%</td></tr>
<tr><td colspan="2">User software</td><td>Driver configuration program (Ezi-CT Manager)</td></tr>
<tr><td colspan="2">Monitor</td><td>Position/speed information, motor load rate, distance traveled/total distance traveled</td></tr>
</table>

2.4 CC-Link IE TSN communication specifications

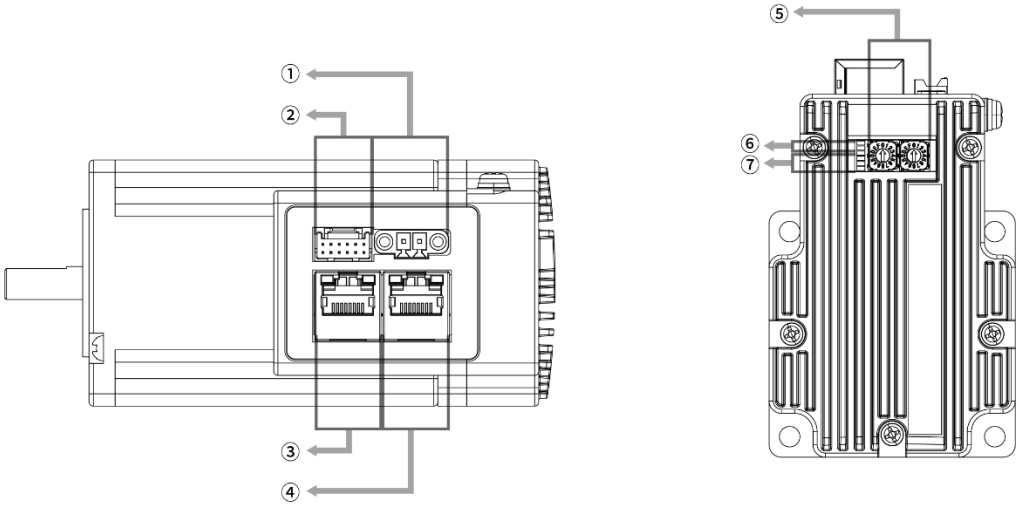
Item	Description
CC-Link IE TSN Class	Class B
Physical layer	1000BASE-T (IEEE 802.3ab)
Communication connector	RJ45×2 (Shielded)
Communication cable	Category 5e (Cat 5e) or higher STP (shielded twisted pair) Ethernet cable
Communication speed	1 Gbps, 100 Mbps
Transmission distance between stations	Up to 100 m
Network topology	・Line (Product-only configuration) ・Tree, Star (using CC-Link IE TSN-supported switching hubs)
Number of connection nodes	・Up to 254 stations ・Network ID set via configuration switch or parameter (Object 2101h)
Control method	CiA402 drive profile
CiA402 drive profile	・Cyclic synchronous position mode (CSP) ・Profile position mode (PP) ・Homing mode (HM)
Process data	Configurable PDO mapping
Communication cycle	0.25 ms or more
Supported modes of operation by communication mode	・Synchronous communication mode: CSP, PP, HM ・Asynchronous communication mode: PP, HM ・Minimum cycle period: 250 μs
Synchronization method	IEEE 802.1AS, IEEE 1588

2.5 System configuration

The system configuration of Ezi-SERVO CC-Link IE TSN ALL is as shown in the figure below.



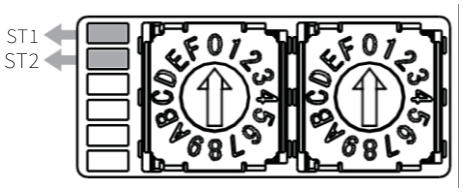
2.6 Part names and functions



No.	Name	Description
①	Power connector (CN2)	Connects the power supply.
②	Input/Output connector (CN1)	Connects the external input/output signal lines.
③	CC-Link IE TSN Communication connector (P1)	Connects to the manager station (PLC) or other drivers.
④	CC-Link IE TSN Communication connector (P2)	
⑤	Network ID setting switches (SW1, SW2)	Sets the network ID.
⑥	Driver status LED	Indicates the driver's operational status.
⑦	Network ID setting switches (SW1, SW2)	Sets the network ID.

2.7 Indication of LEDs

(1) LED indication related to driver status



Each LED indicates the driver status as follows.

Display	Function	Description
ST1: ST2:	ST1 flashes, and ST2 is off.	Servo Off state
ST1: ST2:	ST1 is on, and ST2 is off.	Servo On state
ST1: ST2:	Both ST1 and ST2 are lit.	In operation
ST1: ST2:	ST1 and ST2 flash alternately.	When a positional error exceeding the setting value occurs while the motor is stopped
ST1: ST2:	ST1 turns off, and ST2 flashes repeatedly a predetermined number of times depending on the type of error.	Error status

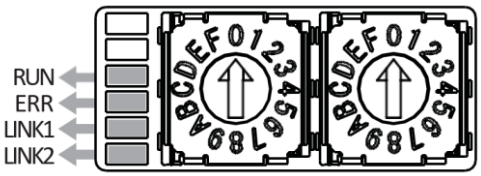
■ Alarm LED flashing frequency and error type list

LED number of flashes	Error type	Cause
1	Overcurrent abnormality	If excessive current flows through the motor drive components[*1]
2	Over-speed	When the motor drive speed exceeds 3,000 r/min[*2]
3	Position tracking error	When the position error (difference between the position command value and the actual position value) during motor operation exceeds the setting value[*3]
4	Overload error	When a load exceeding the motor's maximum torque is applied for 5 seconds or longer
5	Overheating	When the internal temperature of the driver exceeds 85℃
6	Regenerative voltage abnormality	When the motor's counter-electromotive force rises, causing the motor drive voltage to exceed the limit value[*4]
7	Motor connection abnormal	When there is an abnormality in the connection between the driver and the motor
8	Encoder connection error	If there is an abnormality in the connection between the driver and the encoder
10	Positioning error	When position error exceeding the setting value occurs continuously for 3 seconds or more after the motor completes operation[*5]
12	ROM error	If a fault occurs in the parameter storage device (ROM)
14	Input voltage error	If the input voltage exceeds the limit
15	Position error exceeding limit	When position error exceeds the setting value after motor operation completes[*3]

*1: SERVO-CT-ALL-42, SERVO-CT-ALL-56, SERVO-CT-ALL-60 are rated at 4.8 A and above.
*2: The Ezi-SERVO-CT-ALL-86 model has a speed of 2,000 rpm.
*3: The default setting value is corresponding to 1/2 rotation of the motor. The setting value can be modified via parameters. (Refer to Chapter 6 Troubleshooting)
*4: The back-EMF limit values per model are as follows.
Ezi-SERVO-CT-ALL-42, Ezi-SERVO-CT-ALL-56, Ezi-SERVO-CT-ALL-60 type: 48 V DC
*5: The default setting value is 0 pulses and can be set via parameters. (Refer to Object 6067h: Position Window)

(2) Network status indicator LED

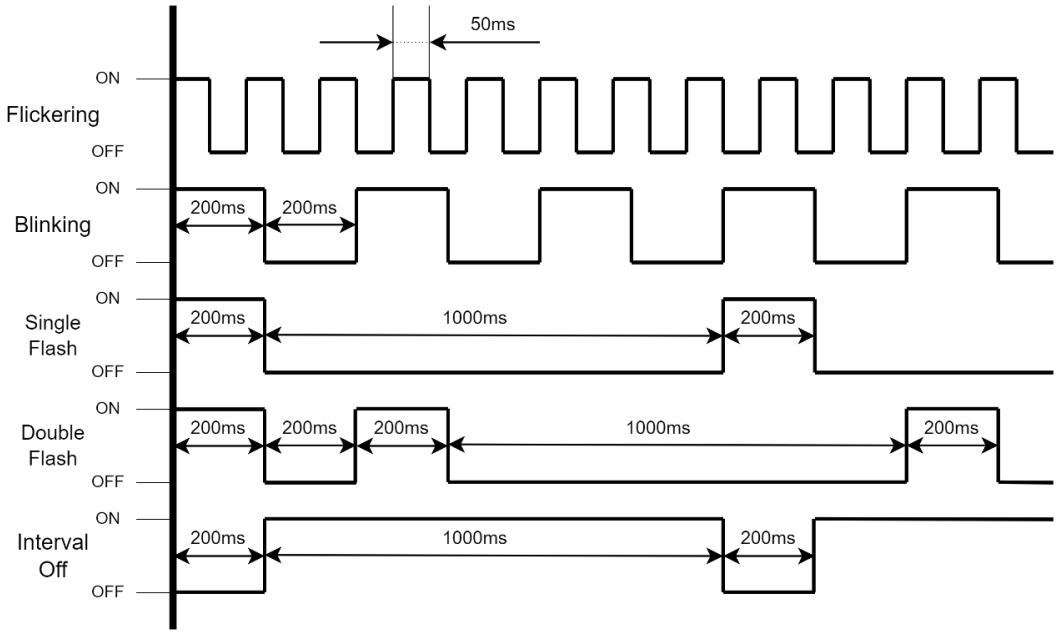
(a) These LEDs indicate the communication status of CC-Link IE TSN.



(b) Each LED displays as follows according to the communication status.

Display	Color	Status	Description
RUN	Green	Off	When power is off
		Single flash	The power is on, but it is not connected to the manager station.
		Double flash	Pre-operational state
		Blinking	Safe-operational state
		Interval off	Operational state
ERR	Red	Off	No error has occurred
		Blinking	Drive error
		Single flash	CC-Link IE TSN Communication error
		Double flash	IP address conflict with another drive
LINK1/LINK2	Green	Off	No communication connection
		On	Communication connected

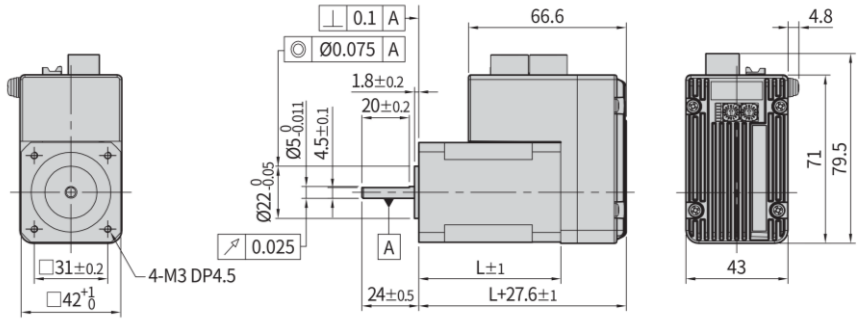
(c) The LED flash timing is as follows.



2.8 External dimensions

[Unit: mm]

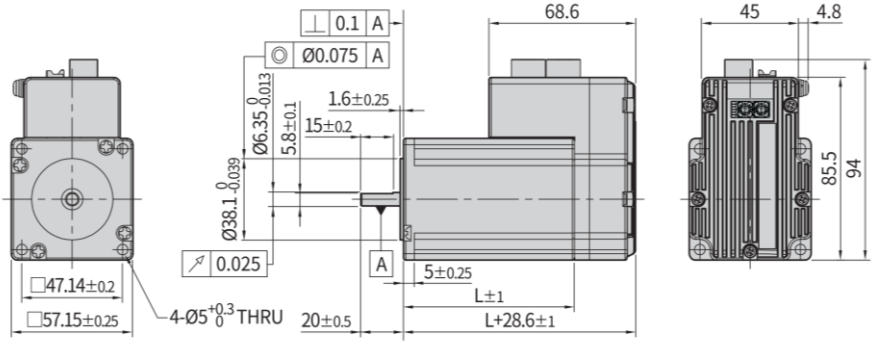
(1) Ezi-SERVO-CT-ALL-42



42 mm

Motor type	Length (L)
42M	40
42L	48
42XL	60

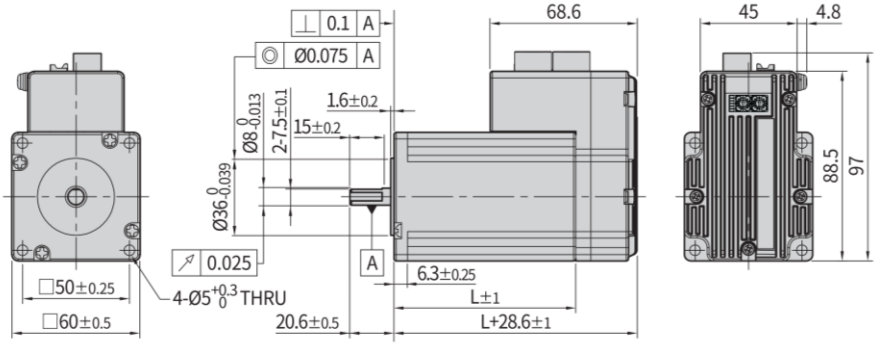
(2) Ezi-SERVO-CT-ALL-56



56 mm

Motor type	Length (L)
56S	46
56M	55
56L	80

(3) Ezi-SERVO-CT-ALL-60



60 mm

Motor type	Length (L)
60S	47
60M	56
60L	85

Chapter3 Operation

3.1 Operation sequence

The following explains how to use Ezi-SERVO CC-Link IE TSN ALL by connecting it to a CC-Link IE TSN-compatible manager station.

- Modes of operation: Profile position mode(PP mode)
- For details regarding the CC-Link IE TSN-compatible manager station, please refer to the User's Manual. [If you wish to know how to connect to the CC-Link IE TSN-compatible manager stations sold by major manufacturers, please refer to our company's website (www.fastech-motions.com).]

Item	Description
Installation	1) Install the motor and driver according to the installation conditions. 2) Verify operation with no load before connecting the load. 3) Before driving the motor, check the surrounding conditions and ensure safety.
⇩	
Wiring /Connection	1) Securely connect the following types of cables. ・Driver power cable ・CC-Link IE TSN communication cable 2) Set the network ID setting switch as follows. ・Setting details (×16:0, ×1:1)
⇩	
Power on	1) Apply power to the driver. 2) If operation is normal, the LED status is as follows. ・The ST1 LED is on and the ST2 LED is off. ・The ERR LED is off.
⇩	
Setting the connection method with the manager station	Use the manager station's setting function to set the PDO mapping to '2nd TPDO' and '2nd RPDO'. ・When operating in CSP mode, select '1st TPDO' and '1st RPDO'. ・When operating in PP mode, select '2nd TPDO' and '2nd RPDO'. Use the Manager station's configuration function to select the communication method. ・CSP modes of operation are only possible in synchronous communication mode. ・PP modes of operation are possible in both synchronous and asynchronous communication modes.
⇩	

Item	Description
Communication status setting	After changing the CC-Link IE TSN communication status to 'Operational' by controlling the manager station, verify that the driver's network status indicator LED displays the 'Operational' status. (See 2.7)
⇩	
Drive status control	After setting the Controlword (6040h) to change the driver status to 'Operation enabled', verify the following. (See 4.2.1) · If Statusword (6041h) changes to 'Operation enabled': Normal · If Statusword (6041h) changes to the 'Fault' state: Report the error code (603Fh), identify the alarm type, and take appropriate action.
⇩	
Mode setting	Set the value of Mode of operation (6060h) to '1' to designate the modes of operation as profile position mode.
⇩	
Operation settings	Enter 10000 for Target position (607Ah) and 1000 for Profile velocity (6081h).
⇩	
Movement command	Once the object settings related to motion operation are complete, set the Controlword to execute the move command. Here, enter 005Fh into the Controlword. This command rotates the motor by the Setting value (distance) in the Target position.
⇩	
Status check	Please verify the following to ensure the system is operating normally. · Is the motor performing the operation as set? · Does the motor produce noise or abnormal vibration during operation? · After the motor completes its operation, what is the status of the Statusword? When Statusword (6041h) · 'Target reached' is set to 1: Normal · If 'Fault' is set to 1: Check the error code and take necessary action.
⇩	
Adjustment	Adjust the setting value in the object as needed.

3.2 Installation

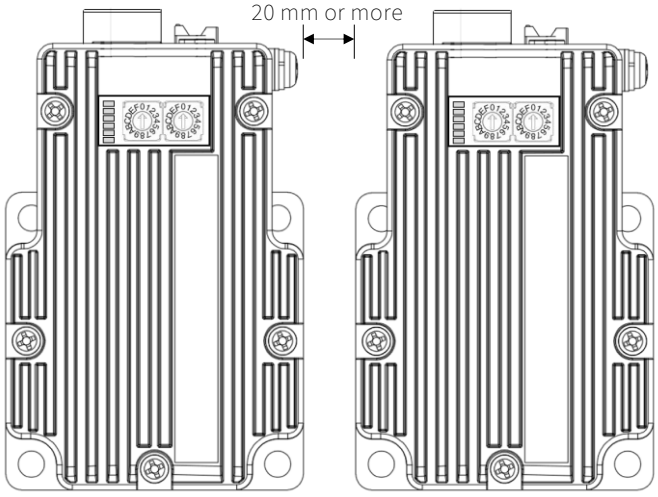
3.2.1 Installation environment

To ensure the reliability and stability of the product, you must comply with the contents presented in the User's Manual. In particular, do not install in the following environments.

(1) Locations where ambient temperature or relative humidity exceeds the standard specifications
(2) Locations where the ambient temperature fluctuates drastically
(3) Locations exposed to direct sunlight
(4) Locations with corrosive or flammable gases
(5) Locations where liquids such as water or oil may splash
(6) Locations subject to continuous vibration or excessive shock
(7) Locations with high levels of dust, salt, or iron
(8) Locations near power lines
(9) Locations with radioactive materials
(10) Locations where strong electric or magnetic fields are generated
(11) Locations at altitudes exceeding 1,000 meters above sea level

3.2.2 Installation method

(1) When installing two or more drivers side by side, maintain a horizontal distance of at least 20 mm and a vertical distance of at least 50 mm.



(2) If the ambient temperature exceeds the specified value, install a cooling fan or increase the spacing between drivers.

(3) Do not install equipment that generates significant heat or noise near the driver.

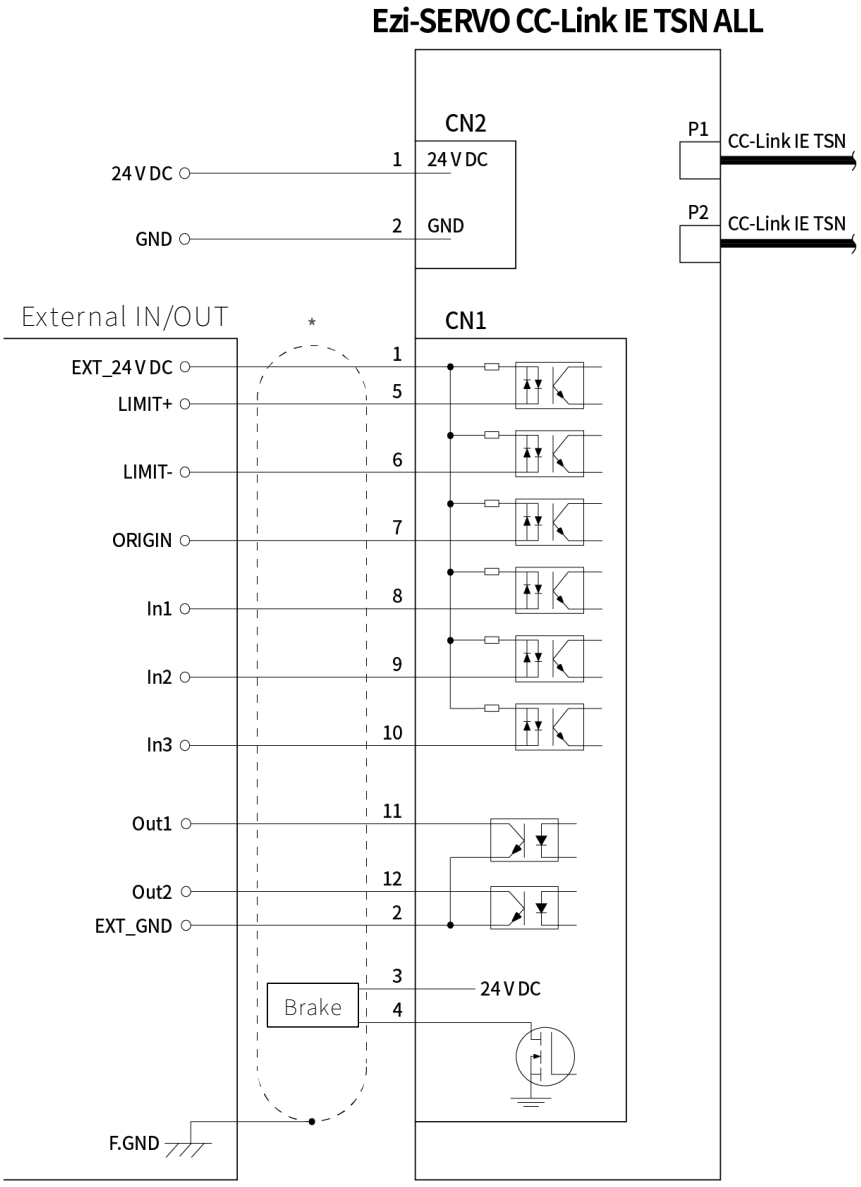
(4) Do not install the driver under a manager station or equipment that is sensitive to heat.

3.3 Wiring

This section describes important wiring considerations when building a system.

3.3.1 External wiring diagram

This explanation uses the example of an Electromagnetic Brake Motor.



*: Shielded cable

3.3.2 Driver power cable wiring

(1) Power supply Connector

The driver is equipped with the following connectors.

▶ Part number: ME060-38102 [DECA]

Pin No.	Description
1	Power input (24 V DC)
2	Power GND

(2) Driver power cable connection method

Please prepare a cable using the wires and connectors below to connect to the power connection connector.

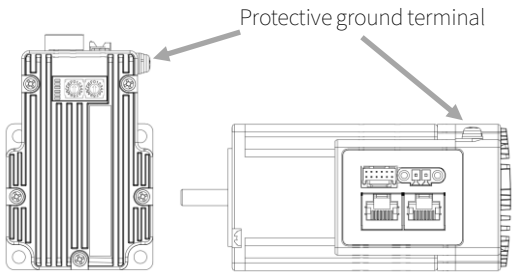
▶ Wire size: AWG22~20(0.33~0.5mm^2)

▶ Connector specifications

Type	Part number	Manufacturer
Terminal Block	MC421-38102	DECA

(3) Grounding the driver

The product is equipped with a grounding terminal, as shown in the figure below. Please use this terminal to ground the device.



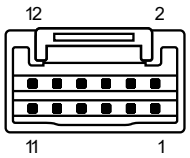
3.3.3 I/O cable wiring

Used when connecting input/output contacts or sensors.

(1) Input/Output connector

▶ Part Number: 501645-1220 [MOLEX]

Pin No.	Signal name	Input/Output
1	EXT_24V DC	Input
2	EXT_GND	Input
3	BRAKE+	Output
4	BRAKE-	Output
5	LIMIT+	Input
6	LIMIT-	Input
7	ORIGIN	Input
8	Digital In 1	Input
9	Digital In 2	Input
10	Digital In 3	Input
11	Digital Out 1	Output
12	Digital Out 2	Output

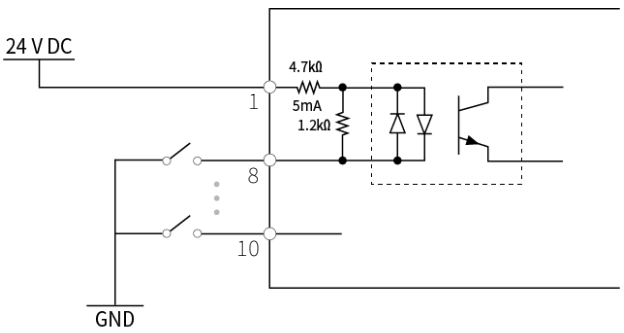


(a) LIMIT+/LIMIT-: For limit switches (collision prevention)

(b) ORIGIN: For home switch (used to determine origin position during homing

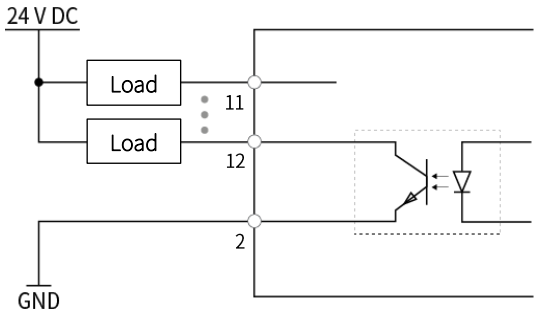
(c) User input (Digital In 1~3)

Item	Specifications
Number of input points	3points
Isolation method	Photocoupler
Rated input voltage	24 V DC
Rated input current	Approx. 5 mA
Operating voltage range	21.6 to 26.4 V DC
Input resistance	Approx. 4.7 kΩ
Response time	1 ms or less



(d) User output (Digital Out 1~2)

Item		Specifications
Number of output points		2 points
Isolation method		Photocoupler
Rated load voltage		24 V DC
Operating voltage range		20.4 to 26.4 V DC
Maximum load current		15 mA/point
Response time	Off → On	1 ms or less
	On → Off	1 ms or less



Please prepare a separate power supply for the output circuit. It can also be shared with the input circuit power supply, but in such cases, when calculating the power supply capacity, add the output power supply capacity to the input power supply capacity.

(e) BRAKE+/BRAKE-: For braking (Prevents motor rotation when Servo is Off)

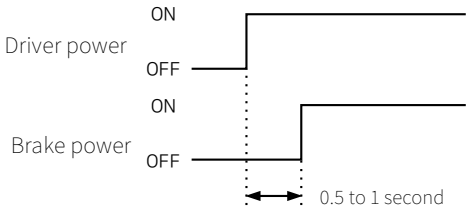
▶ BRAKE+: Power supply (24 V DC) supplied externally to drive the brake circuit

▶ BRAKE-: Output signal to control the motor based on the servo On/Off state and alarm occurrence

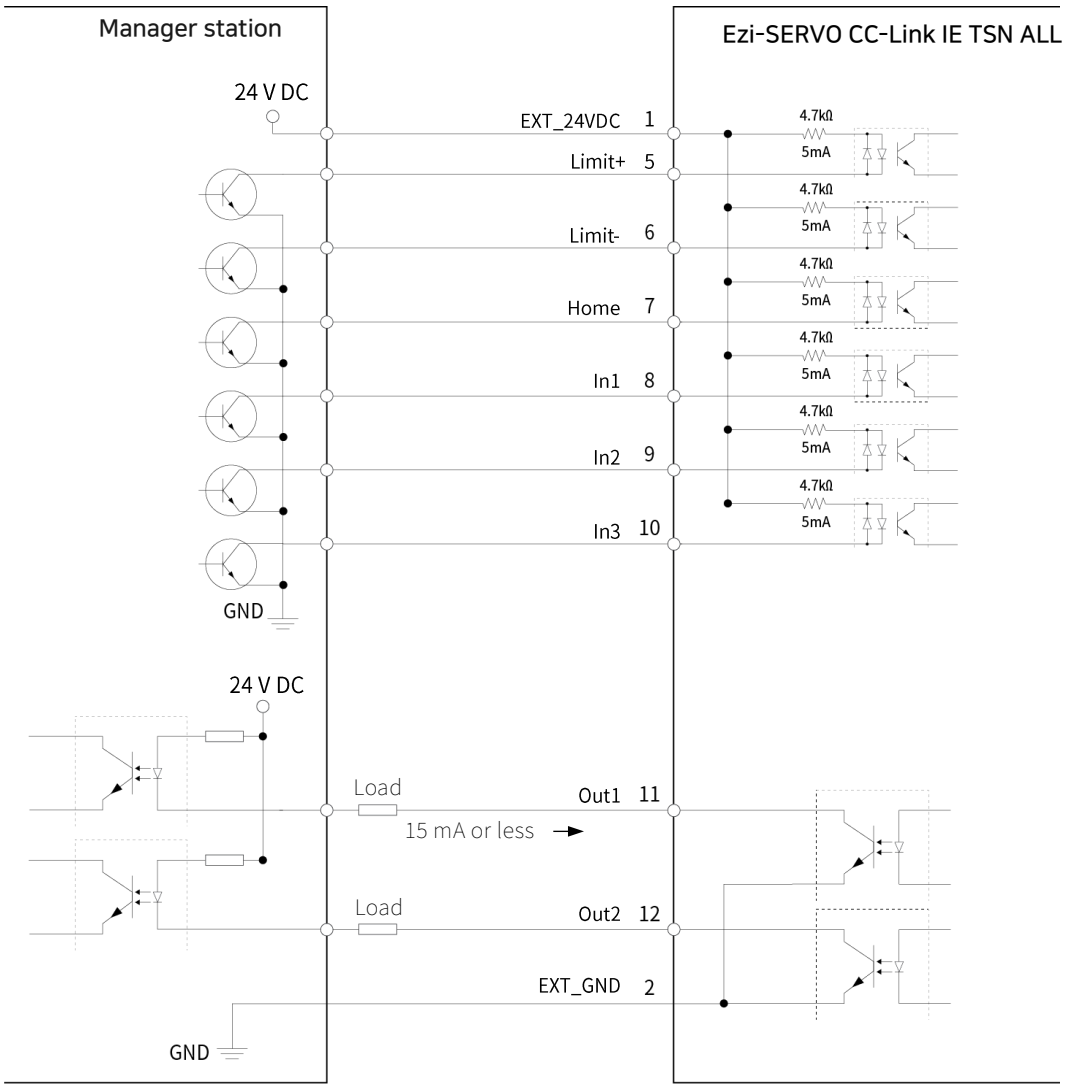
▶ Use the brake function only when the brake's current consumption is 600 mA or less.

▶ Brake operation timing

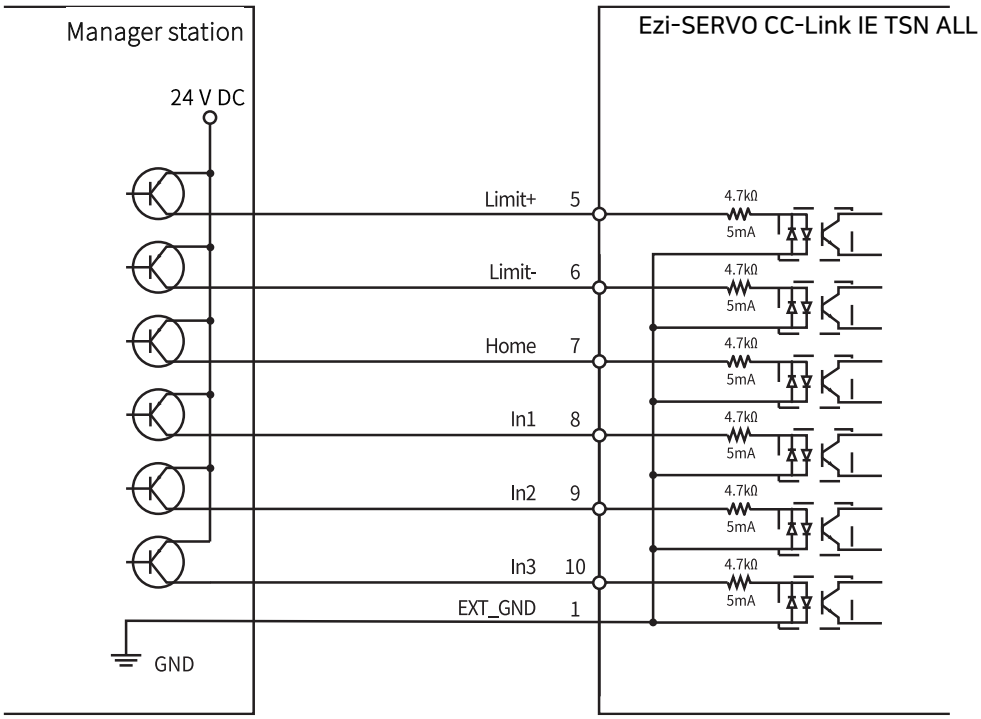
Ezi-SERVO CC-Link IE TSN ALL automatically controls the brake from the driver. When controlling the brake using the Manager station without using the Ezi-SERVO CC-Link IE TSN ALL brake control, refer to the timing chart on the right and apply power to the brake. Failure to do so may cause the driver to malfunction or the load to fall. Also, be careful not to operate the brake while the motor is rotating, as this may cause product failure.



(f) When connecting to the current sink output circuit



(g) When connecting to a current source output circuit



(2) Input/Output cable connection method

Please prepare cables using the following wires and connectors to connect to the input/output connection connectors.

▶ Wire size: AWG28~24(0.08 ~ 0.21 mm^2)

▶ Connector specifications

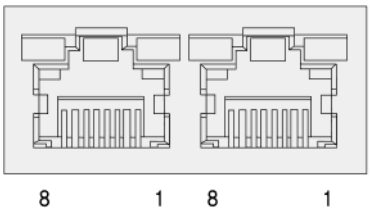
Type	Part number	Manufacturer
Housing	501646-1200	MOLEX
Terminal	501648-1000	

3.3.4 CC-Link IE TSN communication cable wiring

(1) CC-Link IE TSN Communication Connector

▶ Specification: RJ45 (Shielded) T568B

Pin No.	Signal name
1	DA+
2	DA-
3	DB+
4	DC+
5	DC-
6	DB-
7	DD+
8	DD-
Hood	FG



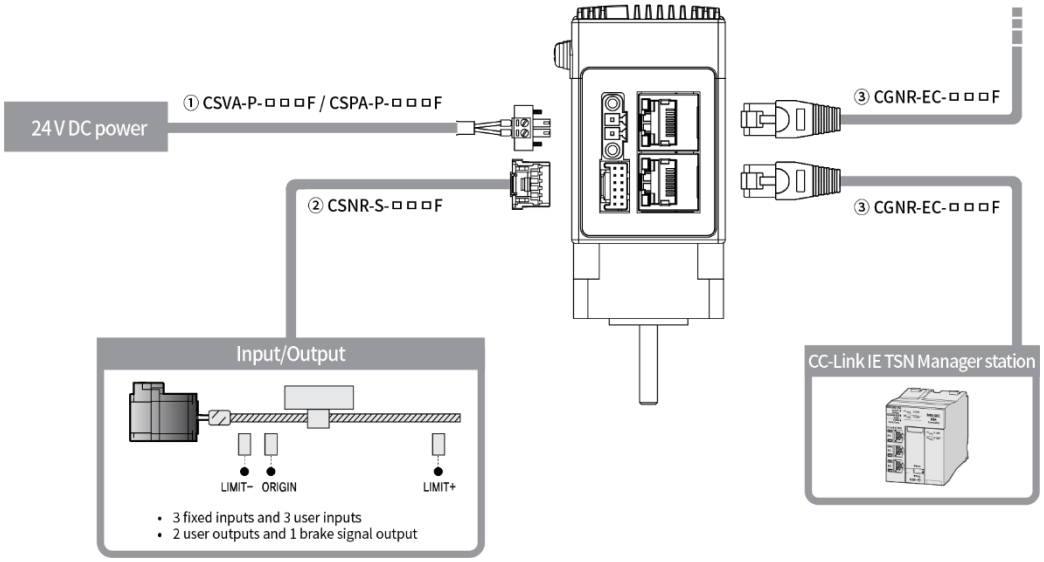
(2) CC-Link IE TSN communication cable specifications

▶ Category 5e (Cat 5e) or higher twisted pair cable

▶ Shield type: SF/FTP, S/FTP, SF/UTP

▶ Maximum 100 m (distance between nodes)

3.3.5 Optional accessory



(1) Driver power cable

This cable is used to connect the driver to the power source.

Purpose	Product name	Length [m]	Cable Type	Remarks
Connection between driver and power supply	CSVA-P-001F	1	Fixed	Max. usable length: 2 m
	CSVA-P-002F	2		
	CSVA-P-001M	1	Operable	
	CSVA-P-002M	2		

(2) Input/Output cable

This cable is used to connect the driver to input/output devices.

Purpose	Product name	Length [m]	Cable Type	Remarks
Connecting the driver to input/output devices	CSNR-S-001F	1	Fixed	Max. usable length: 20 m
	CSNR-S-002F	2		
	CSNR-S-003F	3		
	CSNR-S-005F	5		
	CSNR-S-001M	1	Operable	
	CSNR-S-002M	2		
	CSNR-S-003M	3		
	CSNR-S-005M	5		

(3) CC-Link IE TSN communication cable

This cable is used when building a CC-Link IE TSN network.

Purpose	Product name	Length [m]	Cable Type	Remarks
CC-Link IE TSN communication connection	CGNR-EC-001F	1	Fixed	・ STP(Shielded Twisted Pair) cable ・ Category 5e or higher ・ Max. usable length: 100 m
	CGNR-EC-002F	2		
	CGNR-EC-003F	3		
	CGNR-EC-005F	5		
	CGNR-EC-001M	1	Operable	
	CGNR-EC-002M	2		
	CGNR-EC-003M	3		
	CGNR-EC-005M	5		

Note

▶ For cables of lengths not listed in the table above, please contact our company separately.

▶ The maximum length for each available cable is as follows.

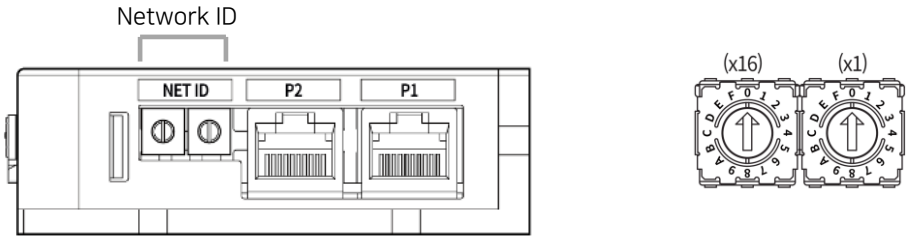
Cable	Max. usable length	Remarks
Input/Output cable	20 m	Optional
Driver power cable	2 m	
CC-Link IE TSN communication cable	100 m	

3.4 Setting the IP address

This section explains how to set the IP address.

(1) Setting method

(a) The network ID can be set using two rotary switches (Network ID setting switches). The left switch represents the tens digit, and the right switch represents the ones digit. The range of values that can be set is 0 to 255 (FFh). (Default setting: 00)



(b) The IP address required for CC-Link IE TSN communication is set using the network ID setting switches and subindexes 1 to 4 of object 2101h. The subnet mask is set using subindexes 1 to 4 of object 2102h.

Network ID Switch Setting	IP address				Remarks
	1st octet	2nd octet	3rd octet	4th octet	
0 (00h)	(Obj. 2101h: 01h)	(Obj. 2101h: 02h)	(Obj. 2101h: 03h)	(Obj. 2101h: 04h)	Subnet mask: Object 2102h
1~239 (EFh)	(Obj. 2101h: 01h)	(Obj. 2101h: 02h)	(Obj. 2101h: 03h)	Network ID Switch Setting value	Subnet Mask: Object 2102h
242(F2h)~ 254(FEh)					
240(F0h)	192	168	3	240	Network Speed: 1 Gbps Subnet mask: 255.255.255.0
241(F1h)	192	168	3	241	Network Speed: 100 Mbps Subnet mask: 255.255.255.0
255(FFh)	-	-	-	-	Not available

(c) The default value for object 2101h at shipment is 192.168.3.1.

(d) The IP address can also be set using the engineering software used at the manager station; in this case, the network ID must be set to 0. Setting values set via the engineering software are stored in object 2101h.

(e) Network IDs 240 (F0h) and 241 (F1h) can be used when utilizing the user software provided by our company. For detailed information related to this, refer to the User's Manual.

(f) Network ID 255 (FFh) cannot be used.

(g) The IP address must not be set identically to other remote stations connected to the same network. Setting it identically causes the 'ERR' LED to flash. (See section 2.7 Indication of LEDs)

(h) When changing the IP address using the network ID setting switch, be sure to turn the driver power off. Changing it while the power is on will not immediately reflect the new value; it will take effect only after powering off and then back on.

3.5 Adjustment

3.5.1 Reverse rotation direction

(1) If the motor's rotation direction is opposite to the expected direction, you can change the motor's rotation direction by setting the Polarity (607Eh) value.

(2) If the signals input to LIMIT+ and LIMIT- are reversed, setting the Reverse limit direction (2002h) value to the opposite of the rotation direction allows you to swap the directions of the two input signals without changing the wiring.

Note

▶ Refer to Section 4.3.2 Input/Output signals for the relationship between Reverse limit direction and the Limit switch.

3.5.2 Input/Output signal levels

(1) LIMIT+/LIMIT-/ORIGIN input signals

If the operating level of the LIMIT+/LIMIT-/ORIGIN input signal is set differently from the actual state, the displayed value on the Digital inputs will differ from the actual signal input. In such cases, use Sensor logics (2001h) to set the operating level of the LIMIT+/LIMIT-/ORIGIN input signal.

(2) User input/output signals

You can change the operation levels of user input/output signals (User input 1~6 and User output 1~5) using Digital input levels (2011h) and Digital output levels (2012h).

3.6 Maintenance

3.6.1 Inspection

The driver consists of various semiconductor devices. When performing inspections, handle the product with care to prevent damage to the semiconductor devices due to static electricity. The main inspection items are as follows.

(1) Check that there is no looseness at the connection points between the driver and motor.
(2) Ensure the driver and motor are securely mounted.
(3) Check that the driver's ventilation openings are not blocked.
(4) Check that the communication cable is properly inserted.
(5) Verify that the DC input power meets specifications.
(6) Check that the cables in use have no damaged sections.

3.6.2 Warranty

(1) Warranty period

The free warranty period for the product you purchased is 12 months from the date of purchase.

(2) Warranty coverage

If a malfunction occurs within the free warranty period, our company will repair it free of charge. However, please note that even within the free warranty period, repairs will be charged if any of the following conditions apply.

(a) If the malfunction occurs due to failure to follow the 'Safety Precautions' and other instructions specified in the user's manual or catalog.
(b) If the malfunction is caused by a product not manufactured by our company
(c) If the malfunction occurs due to repairs or modifications performed at locations not designated by our company
(d) If the malfunction occurs due to use in a manner not specified by our company
(e) When the malfunction is caused by reasons unforeseeable based on the level of science and technology at the time of product shipment
(f) When failure occurs due to natural disasters (lightning, fire, earthquake, flood damage, salt damage, gas, etc.)

The product warranty applies only to the driver or motor unit itself. When applying this product, please be sure to also consider system-level safety measures.

Chapter4 CC-Link IE TSN communication

4.1 CC-Link IE TSN network

4.1.1 Communication speed settings

Ezi-SERVO CC-Link IE TSN ALL supports both 1 Gbps and 100 Mbps communication speeds. If the communication speed set on the Ezi-SERVO CC-Link IE TSN ALL differs from that set on the manager station, the two products will not connect properly. Therefore, when connecting the Ezi-SERVO CC-Link IE TSN ALL to the manager station, always verify that the communication speeds of both products match.

The Ezi-SERVO CC-Link IE TSN can change its communication speed using object 2100h. This value can be changed using the SLMP command from the manager station or using the user software provided by our company.

Changes to the value of object 2100h are not reflected immediately; they take effect only after powering off and then on again. Therefore, after changing the value of object 2100h, be sure to save the value to EEPROM and then power off. Refer to '4.4 Saving Parameters' or the user software manual for the method to save to EEPROM.

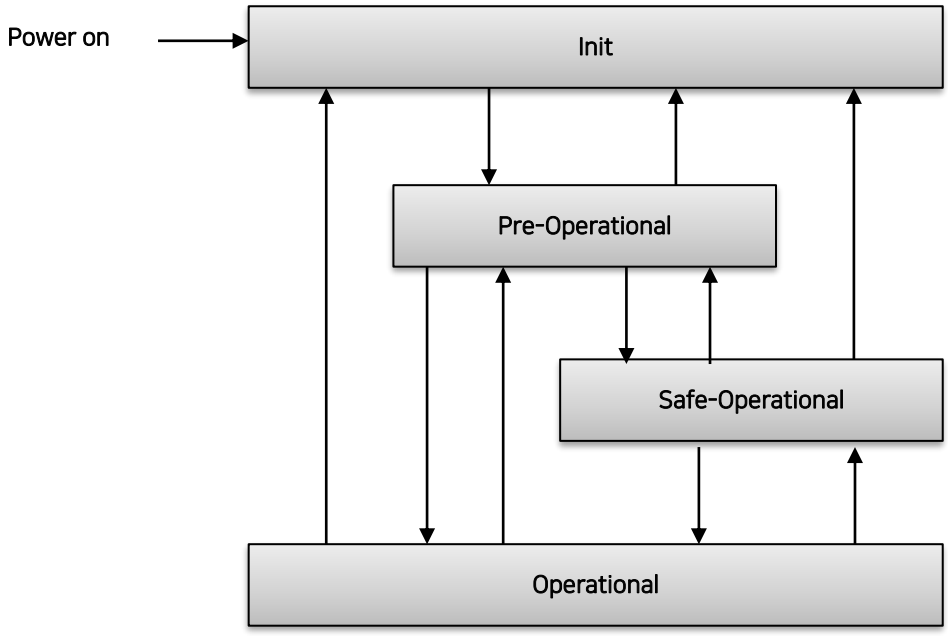
To connect the user software to the driver, the computer where the user software is installed must be connected to the driver via Ethernet. At this time, the network speed of the computer and the driver must be the same. If the speeds differ and the user software cannot connect properly, setting the network ID setting switch to 240 (F0h) or 241 (F1h) allows the driver's network speed to be temporarily changed, regardless of the value of object 2100h. For details, refer to the user software manual.

Note

▶ SLMP is an abbreviation for 'Seamless Message Protocol'.

4.1.2 NMT state machine

The NMT (Network Management State Machine) manages the status of the CC-Link IE TSN remote station as shown in the figure below, and it is controlled by the Manager station.



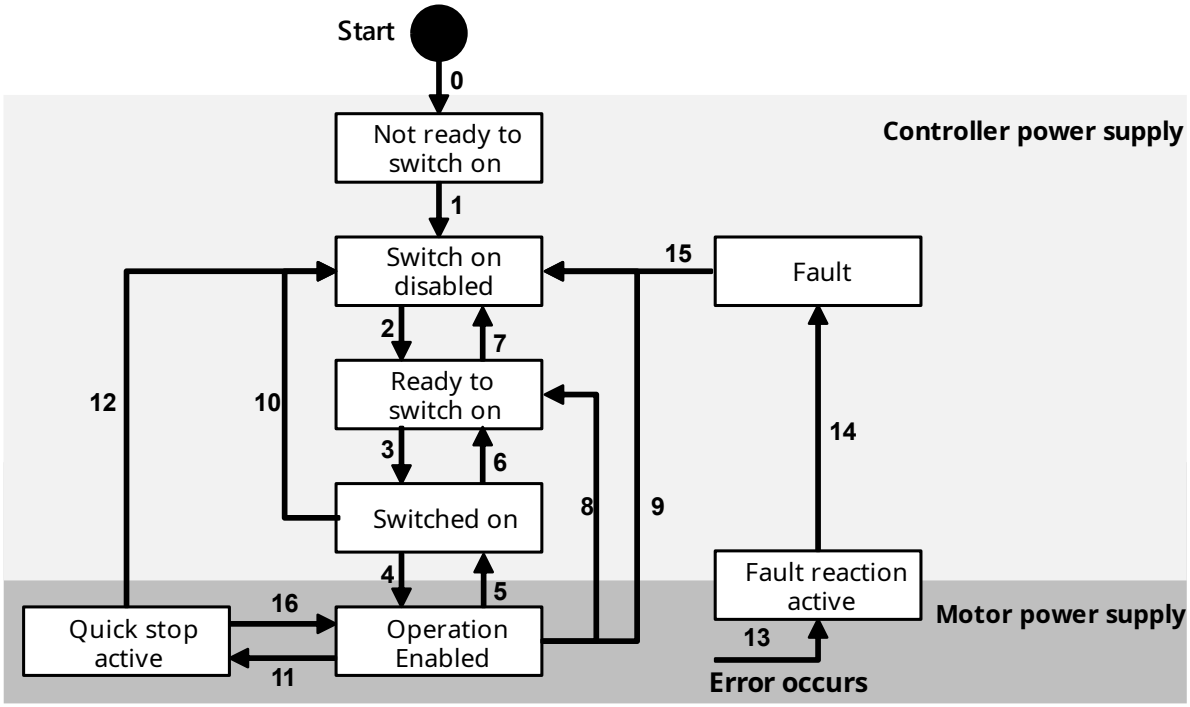
State	SDO Communication	PDO Transmission/ Reception	Details
Init	Not possible	Not possible	This is the step to initialize CC-Link IE TSN communication, and communication is currently impossible.
Pre-Operational	Possible	Not possible	The stage entered after communication initialization is complete; only SDO communication is possible. It handles the initial configuration of the network.
Safe-Operational	Possible	Possible	This stage allows both SDO communication and PDO transmission, enabling the driver's status to be relayed to the manager station via PDO transmission.
Operational	Possible	Possible	This stage enables all communication, allowing the manager station to control the driver and operate the motor.

The state where the arrow points down (↓) can only be changed by the manager station, while the state where the arrow points up (↑) can also be changed by the remote station.

4.2 CiA402 drive profile

4.2.1 Drive state machine

The state of Ezi-SERVO CC-Link IE TSN moves as shown in the figure below. The driver state is controlled by the Controlword (6040h), and the current state can be checked using the Statusword (6041h).



State	Description	Motor status
Not ready to switch on	Power is applied and initialization is in progress.	Non-excitation
Switch on disabled	The driver's functions are not activated.	Non-excitation
Ready to switch on	Same as above	Non-excitation
Switched on	Same as above	Non-excitation
Operation enabled	The driver's function is enabled.	Excitation
Quick stop active	The drive is receiving a quick stop command and performing the stop function.	Excitation
Fault reaction active	The driver has detected a fault and is processing the corresponding response.	Excitation
Fault	A fault has occurred in the driver.	Non-excitation

State transition		Event	Operation
0	Auto skip 0	When control power is applied, it moves automatically	Driver initialization
1	Auto skip 1	Automatically moves when driver initialization is complete	Communication is activated
2	Shutdown	· Automatically moves *1 · When a shutdown command is received	-
3	Switch on	When receiving a Switch on command	-
4	Enable operation	When receiving the Enable operation command	The driver enters a state where it can function normally
5	Disable operation	When the Disable operation command is received	· The driver is unable to perform its functions · Motor power is turned off
6	Shutdown	When a shutdown command is received	-
7	Disable voltage	· When receiving a Quick stop command · When receiving a Disable voltage command	-
8	Shutdown	When a shutdown command is received	· The driver ceases to function · Motor power is turned off
9	Disable voltage	When a disable voltage command is received	· driver fails to function · Motor power off
10	Disable voltage	· When the Quick Stop command is received · When the Disable voltage command is received	-
11	Quick stop	When a Quick Stop command is received	Executes the Quick stop function (the motor stops abruptly)
12	Disable voltage	· When the Quick stop operation is completed with the Quick stop option code set to 1, 2, or 3 · When the Quick stop operation is completed with the Quick stop option code set to 5, 6, or 7, and a Disable voltage command is received	· The driver fails to function · Motor power turns off
13	Error occurs	When an abnormality is detected	The set Fault reaction function is executed.
14	Auto skip 2	After quickly completing the fault detection, it automatically moves on	· The driver fails to function · Motor power is turned off
15	Fault reset	After the cause of the fault is eliminated, if a Fault reset command is received	If the fault condition no longer exists, the driver clears the alarm
16	Enable operation	When the Quick stop option code is set to 5, 6, or 7 and the Enable operation command is received	The driver enters a state where it can function normally

*1: Automatic movement is disabled. Movement occurs only when receiving the Shutdown command. Refer to subindex 2 (Disable automatic transition 2) in Advanced settings (2030h).

(1) The functions supported by the driver for each state are as follows.

State	Brake function	Motor power	Control command
Not ready to switch on	Yes	No	No
Switch on disabled	Yes	No	No
Ready to switch on	Yes	No	No
Switched on	Yes	No	No
Operation enabled	Yes	Yes	Yes
Quick stop active	Yes	Yes	Yes
Fault reaction active	Yes	Yes	Yes
Fault	Yes	No	No

(2) The driver status can be controlled by combining the bits in the Controlword (6040h).

(a) Controlword (6040h)

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
-	-	oms*1	oms	-	-	-	oms
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Fault reset	OMS	OMS	oms	Enable operation	Quick stop	Enable voltage	Switch on

*1: OMS: Operation Mode Specific ( )

(b) State control commands

Command	Bit 7	Bit 3	Bit 2	Bit 1	Bit 0	Transition number
Shutdown	0	x	1	1	0	2, 6, 8
Switch on	0	0	1	1	1	3
Switch on + Enable operation	0	1	1	1	1	3 + 4
Disable voltage	0	x	x	0	x	7, 9, 10, 12
Quick stop	0	x	0	1	x	7, 10, 11
Disable operation	0	0	1	1	1	5
Enable operation	0	1	1	1	1	4, 16
Fault reset	0 → 1	x	x	x	x	15

Quick stop option code (605Ah) has a setting value of 5 or 6, the status will stop after stopping at ' '. Quick stop active . To move the status to ' Operation enabled ', use the 'Enable operation' command in the Controlword.

(3) The driver status is output by combining the bits in the Statusword (6041h).

(a) Statusword (6041h)

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
-	OMS	oms	oms	Internal limit active	oms	Remote	OMS
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
-	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on

(b) Status Indicator

Status	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Not ready to switch on	0	x	x	0	0	0	0
Switch on disabled	1	x	x	0	0	0	0
Ready to switch on	0	1	x	0	0	0	1
Switched on	0	1	1	0	0	1	1
Operation enabled	0	1	1	0	1	1	1
Quick stop active	0	0	x	0	1	1	1
Fault reaction active	0	x	x	1	1	1	1
Fault	0	x	x	1	0	0	0

4.2.2 Modes of operation

The driver provides three modes of operation for controlling the motor. The mode of operation can be set via Mode of operation (6060h), and the current mode can be checked via Mode of operation display (6061h).

Mode of operation setting value	Modes of operation
0 (Default)	Not set
1	Profile position mode (PP)
6	Homing mode (HM)
8	Cyclic synchronous position mode (CSP)

Switch the modes of operation while the drive is stopped. Switching during operation will not change the modes of operation.

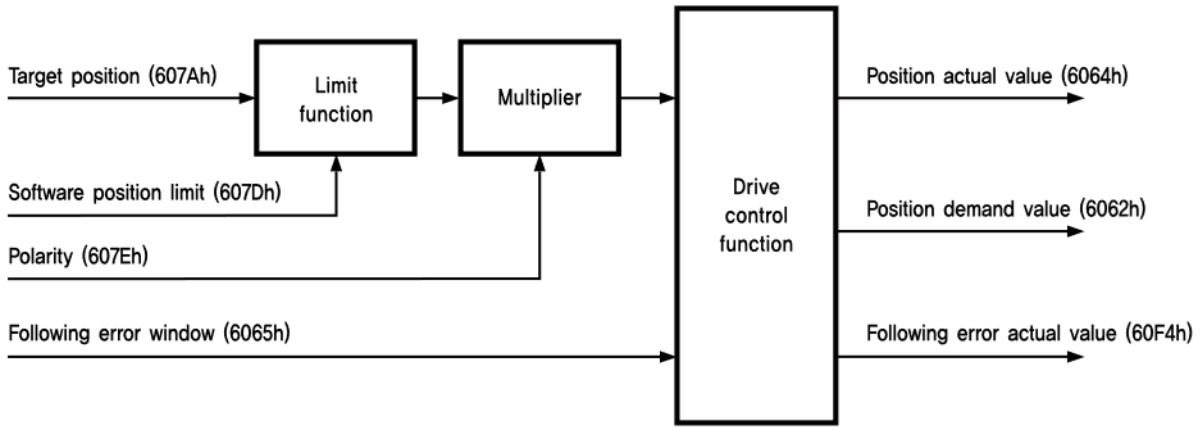
4.2.3 Cyclic synchronous position mode (CSP)

(1) Overview

In CSP mode, the Manager station generates the motion profile (trajectory). When the Manager station transmits the Target position (607Ah) to the driver via cyclic synchronous communication, the driver receives this value and executes position control.

When using this mode, set Mode of operation (6060h) to Cyclic synchronous position mode. If Mode of operation display (6061h) shows Cyclic synchronous position mode, the driver operates according to the setting value in the Target position (607Ah).

(2) Related object



Index	Sub	Name	Data type	Access	Save	PDO	Setting range	Default value
6040h	00h	Controlword	U16	RW	No	RxPDO	-	-
6041h	00h	Statusword	U16	RO	No	TxPDO	-	0000h
6060h	00h	Mode of operation	INT8	RW	No	RxPDO	-128 to 127	0
6061h	00h	Mode of operation display	INT8	Read	No	TxPDO	-	-
6062h	00h	Position demand value	INT32	Read	No	TxPDO	-	-
6064h	00h	Position actual value	INT32	RO	No	TxPDO	-	-
6065h	00h	Following error window	U32	RW	Yes	No	0 to 2147483647	5000
607Ah	00h	Target position	INT32	RW	No	RxPDO	-2147483648 to 2147483647	0
607Eh	00h	Polarity	U8	RW	Yes	No	-	0
607Fh	00h	Max profile velocity	U32	RW	Yes	No	1 to 2500000	2500000
60F4h	00h	Following error actual value	INT32	RO	No	TxPDO	-	-

(3) Controlword

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
-	-	-	-	-	-	-	-
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Fault reset	-	-	-	Enable operation	Quick stop	Enable voltage	Switch on

(4) Statusword

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
-	-	Following error	Target position ignored	Internal limit active	-	Remote	-
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
-	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on

Bit	Name	Value	Description
9	Remote	1	Controlword was processed correctly.
11	Internal limit active	0	Software limit[*1] was not detected.
		1	Software limit detected.
12	Target position ignored	0	The position value of the target position has been ignored.
		1	Execute the position value of the target position.
13	Following error	0	No position deviation error occurred.
		1	A position deviation error has occurred.

***1: As one of the driver's internal limiting functions, it stops motor rotation if the current position exceeds the set operating range. This is configured in Software position limit (607Dh).**

Note

▶ Cyclic synchronous position mode is only possible when the driver and manager station are connected in synchronous communication mode. Setting cyclic synchronous position mode while in asynchronous communication mode will cause a 'Synchronization type error' (E-073).

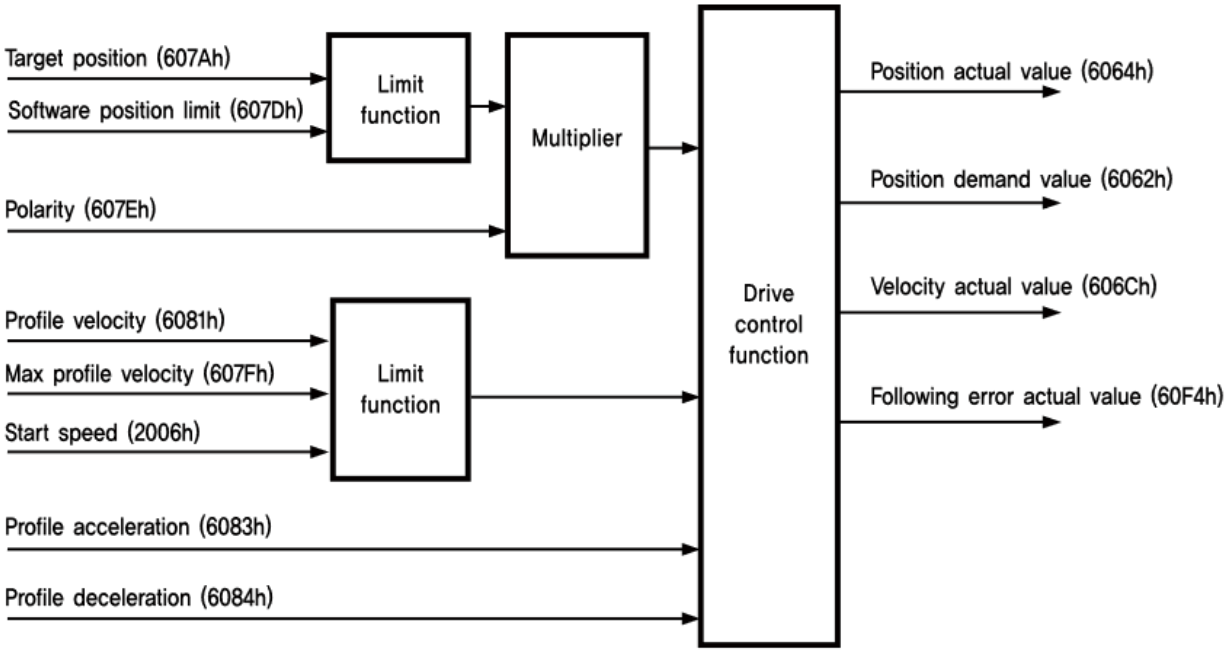
4.2.4 Profile position mode (PP)

(1) Overview

In PP mode, the driver executes PTP (Point To Point) position control using the motion profile (trajectory) it generates. This mode receives input from the Controlword (6040h) and moves to the position set in Target position (607Ah). The manager station sets the target position, speed, acceleration, etc.

When using PP mode, the Mode of operation (6060h) must be set to profile position mode. Position control commands become available when the Mode of operation display (6061h) indicates profile position mode.

(2) Related object



Index	Sub	Name	Data type	Access	Save	PDO	Setting range	Default value
6040h	00h	Controlword	U16	RW	No	RxPDO	-	–
6041h	00h	Statusword	U16	RO	No	TxPDO	-	0000h
6060h	00h	Mode of operation	INT8	RW	No	RxPDO	-128 to 127	0
6061h	00h	Mode of operation display	INT8	RO	No	TxPDO	-	-
2006h	00h	Start speed	U16	RW	Yes	No	1 to 50000	1
6062h	00h	Position demand value	INT32	RO	No	TxPDO	-	-
6064h	00h	Position actual value	INT32	RO	No	TxPDO	-	-
606Ch	00h	Velocity actual value	INT32	RO	No	TxPDO	-	-
607Ah	00h	Target position	INT32	RW	No	RxPDO	-2147483648 to 2147483647	0
607Dh	00h	Minimum position limit	INT32	RW	Yes	No	-2147483648 to 2147483647	-2147483648
	01h	Maximum position limit	INT32	RW	Yes	No	-2147483648 to 2147483647	2147483647
607Eh	00h	Polarity	U8	RW	Yes	No	-	0
607Fh	00h	Max profile velocity	U32	RW	Yes	No	1 to 2500000	2500000
6081h	00h	Profile velocity	U32	RW	Yes	RxPDO	1 to 2,500,000	10000
6083h	00h	Profile acceleration	U32	RW	Yes	RxPDO	1,000 to 1000000000	1000000
6084h	00h	Profile deceleration	U32	RW	Yes	RxPDO	1,000 to 1000000000	1000000
60F4h	00h	Following error actual value	INT32	RO	No	TxPDO	-	-

(3) Controlword

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
-	-	Non-stop Push	Push mode	-	-	-	Halt
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Fault reset	Relative	Change set immediately	New set-point	Enable operation	Quick stop	Enable voltage	Switch on

Bit	Name	Value	Description
4	New set-point	0→ 1	Executes a command to move to a new position. The position movement method is determined by the values of bits 5, 12, and 13.
5	Change set immediately	0	If the motor is moving when a position move command is issued, the position move command is executed after the previous command is completed.
		1	If the motor is moving when a position move command is executed, the previous command is ignored and the motor moves directly to the newly set position.
6	Relative	0	This is the target position for the Target position.
		1	The distance the Target position will move.
8	Halt	0	Starts or continues driving.
		1	The position movement command is canceled, and operation stops according to the setting value in the Halt option code (605Dh).
12	Push mode	0	Standard position movement.
		1	The position movement command operates as a Push command.
13	Non-stop push	0	When executing the Push command, if a work is detected, the motor stops and resets the Push command.
		1	When executing the Push command, the motor stops if a work is detected and resumes movement once the detected work disappears. Receiving the Halt command resets the Push command.

(4) Statusword

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
-	Push detected	Following error	Set-point acknowledge	Internal limit active	Target reached	Remote	Push state
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
-	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on

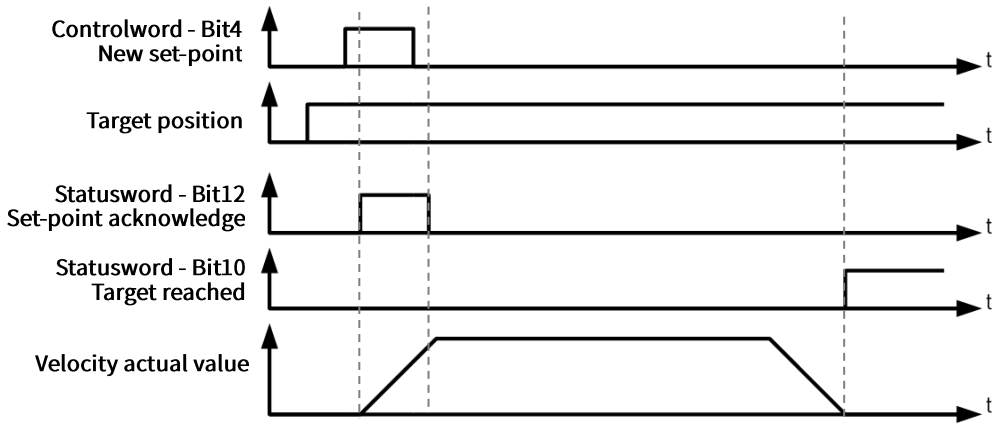
Bit	Name	Value	Description
8	Push state	0	(Target reached = 0) The motor is executing a normal position movement command.
		1	(Target reached = 0) The motor is executing a Push command.
9	Remote	1	The control word has been processed correctly.
10	Target reached	0	Controlword Halt (bit 8) = 0: Target position is not reached. Controlword Halt (bit 8) = 1: The controller is halted.
		1	Controlword Halt (bit 8) = 0: Reached the target location. Controlword Halt (bit 8) = 1: Controller is halted.
11	Internal limit active	0	Software limit is not detected.
		1	Software limit is detected.

Bit	Name	Value	Description
12	Set-point acknowledge	0	The New set-point (bit 4) in the Controlword has been reset, and the previous position move command has been processed. You can now enter a new position value.
		1	The New set-point (bit 4) in the Controlword is set, or a previous position move command is in progress.
13	Following error	0	No position deviation error has occurred.
		1	Position deviation error occurred.
14	Push detected	0	Push command execution in progress; work not detected.
		1	Push command execution in progress, work detected.

(5) Positioning Mode

(a) Normal Movement

A command to move to a newly set target position is initiated by changing the New set-point (bit 4) in the Controlword (6040h) from '0' to '1'. When the driver receives such a request, the Set point acknowledge (bit 12) in the Statusword becomes '1', and the position movement command is executed. The target position is referenced in Target position (607Ah), and whether the position value is absolute or relative coordinates is determined by the Relative (bit 6) in the Controlword.



When the target position is reached, the Target reached (bit 10) in the Statusword becomes '1'. However, if the target position is not reached due to the following issues, the Target reached (bit 10) does not become '1'.

▶ When an error occurs and the system enters Fault state

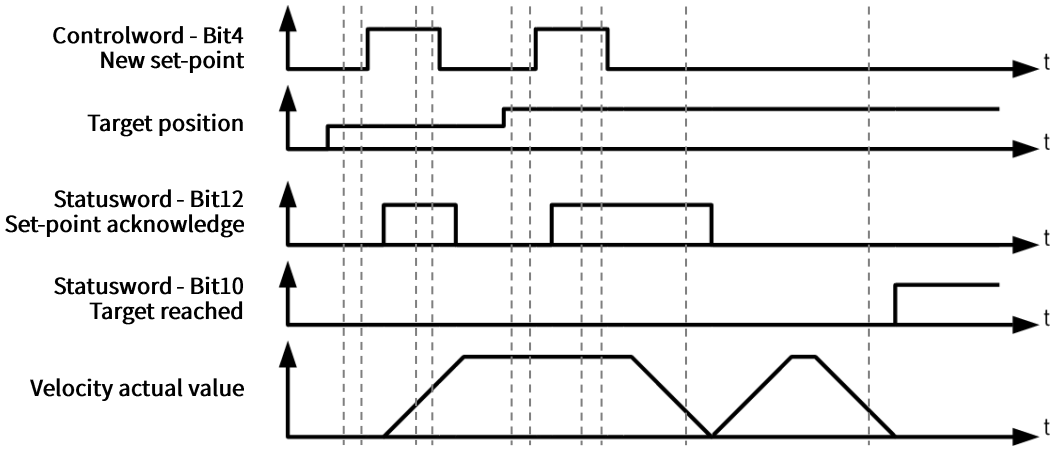
▶ When the operation exits the enabled state

▶ If the limit switch in the direction of travel is activated during movement, causing a stop

▶ If the current position exceeds the Software position limit (607Dh) during movement

(b) Next target position input

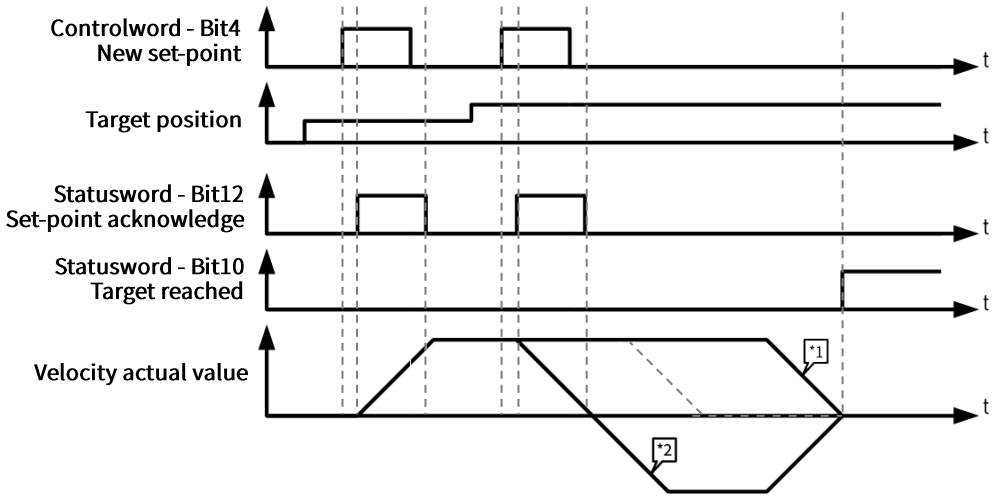
When the Change set immediately bit (bit 5) in the Controlword is '0', if a command to move to a new target position is received while in operation, the current operation is completed before initiating the new movement. By pre-inputting the next target position into the buffer in this manner, position movement commands can be executed quickly without delay.



At this time, the Set-point acknowledge (bit 12) in the Statusword becomes ‘0’ after the New set-point (bit 4) in the Controlword becomes ‘0’ and the previous operation is completed. The Target reached (bit 10) becomes ‘1’ when all operations are completed.

(c) Target position modification

When Change set immediately (bit 5) in the Controlword is '1', if a command to move to a new target position is received while in operation, the current operation is stopped and the next operation is initiated immediately.



*1: Indicates that the new target position is sufficiently ahead of the previous target position, causing the system to pass the previous target position and move to the new one.

*2: Indicates that the new target position is behind the previous target position, requiring deceleration to match that position.

Upon reaching the new target position, the Target reached (bit 10) of the Statusword becomes '0'. If there was no previous position move command or it has already been completed, the command behaves identically to a standard position move command while keeping Change set immediately (bit 5) set to '1'.

(d) Push command (Stop mode)

The Push command (Stop mode) moves the motor to the target position while maintaining a specified force. If work is detected during movement, it stops and releases the Push command.

▶ When using the Push command, the motor force is set by the Push ratio in Push mode (201Ah).

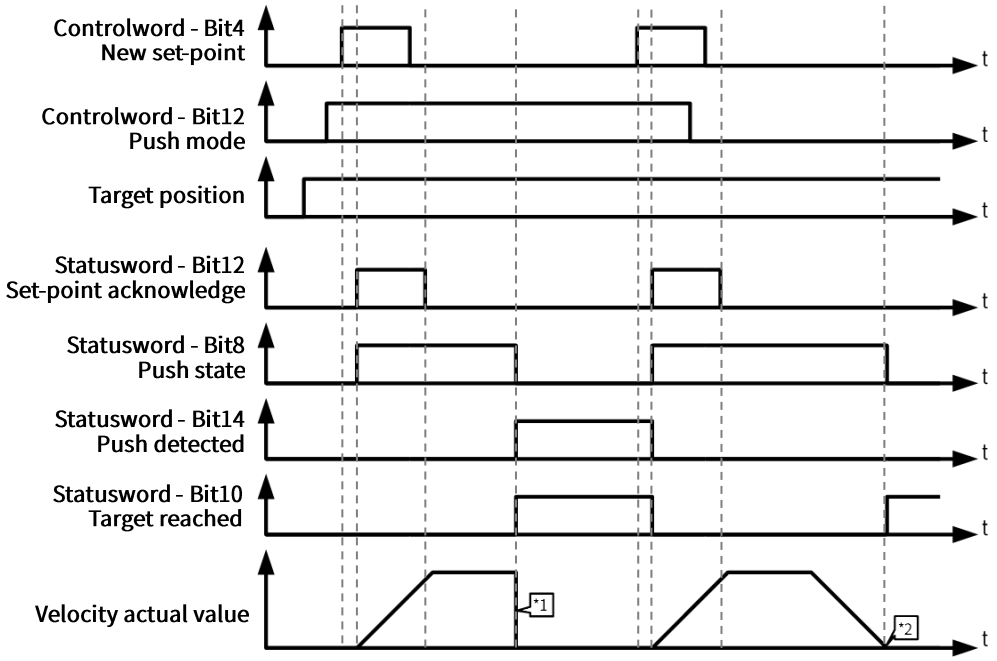
▶ The distance the motor moves backward when releasing the Push command can be set via the Pull back distance in Push mode (201Ah).

▶ To apply a Push command (Stop mode) to the newly set target position, you can request it by changing the New set-point (bit 4) from '0' to '1' while the Push mode (bit 12) of the Controlword is '1' and the Non-stop push (bit 13) is '0'.

▶ When the driver receives such a request, the Set-point acknowledge (bit 12) and Push State (bit 8) of the Statusword become '1', and the Push command is executed.

▶ The target position refers to Target position (607Ah), and whether the position value is an absolute coordinate or a relative coordinate is determined by the Relative bit (bit 6) in the Controlword.

▶ In Push mode (Stop mode), the Push command is released when the work is detected or reaches the target position.



*1: Indicates the workpiece was detected before reaching the target position. The workp detection status can be determined by the Push detected (bit 14) value in the Statusword. If the workpiece is detected, the motor performs a Quick stop.

*2: Indicates the case where the target position is reached without the work being detected.

Note

▶ If the travel speed is high or the Push ratio is set low, the system may sometimes detect work even when none is present. In such cases, reduce the travel speed or increase the Push ratio.

▶ While the Push command is active, the 'Next target position input' and 'Target position modification' functions cannot be used.

(e) Push command (Non-stop mode)

The Push command (Non-stop mode) moves the motor to the target position while maintaining a fixed force. If the work is detected during movement, it pauses briefly but resumes moving once the work disappears. The Push command (Non-stop mode) continues until a stop command is received.

▶ When using the Push command, the motor force is set to the Push ratio in Push mode (201Ah).

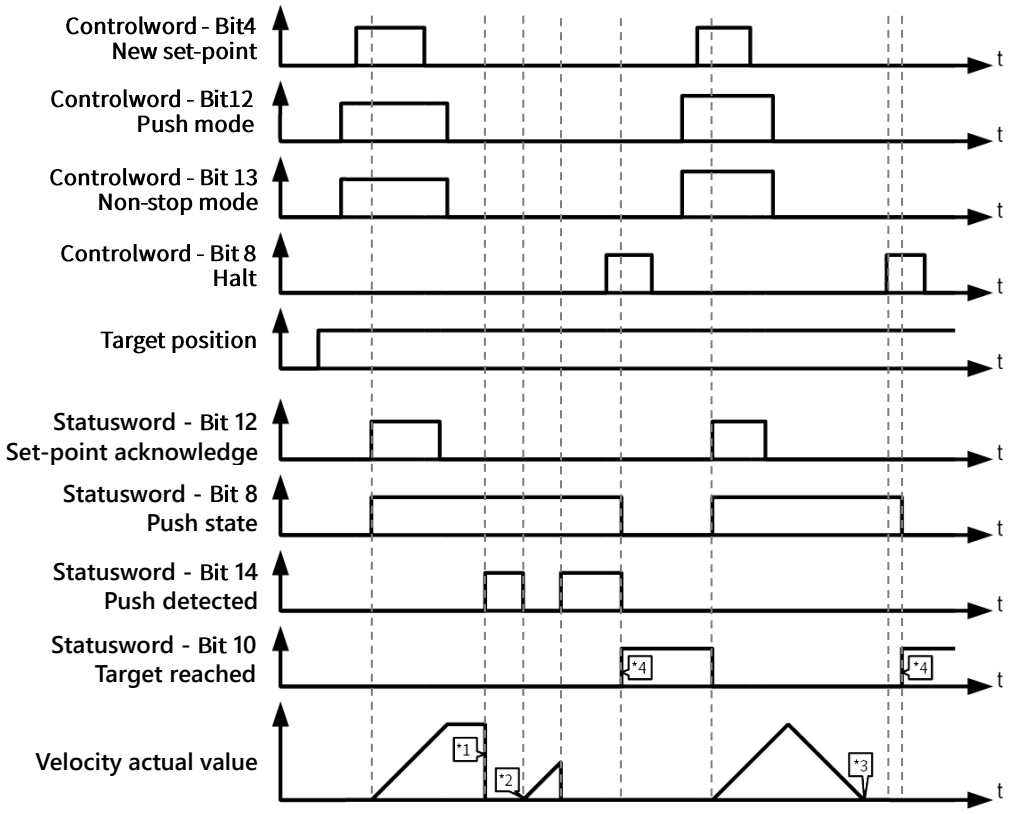
▶ The distance the motor moves backward when the Push command is released can be set via the Pull back distance in Push mode (201Ah).

▶ To apply a Push command (Non-stop mode) to the newly set target position, you can request it by changing the New set-point (bit 4) from '0' to '1' while the Push mode (bit 12) of the Controlword and Non-stop push (bit 13) are set to '1'.

▶ When the driver receives such a request, the Set-point acknowledge (bit 12) and Push state (bit 8) of the Statusword become '1', and the Push command is executed

▶ The target position refers to Target position (607Ah), and whether the position value is an absolute coordinate or a relative coordinate is determined by the Relative bit (bit 6) in the Controlword.

▶ In Push mode (Non-stop mode), the Push command is not released even when the work is detected or arrives at the target position. The Push command is released only when the Halt bit (bit 8) in the Control Word is set to '1'.



*1: Indicates that a workpiece was detected during a Push command. The work detection status can be determined by the Push detected value (bit 14) in the Statusword.

*2: If the work disappears, the Push command continues to execute.

*3: When the target position is reached, the motor stops but the Push command is not released.

*4: When the Halt bit (bit 8) in the Controlword becomes '1', the motor stops and the Push command is released. When the Push command is released, the Target reached bit (bit 10) in the Statusword becomes '1'.

Note

▶ If the movement speed is too fast or the Push ratio is set too low, the system may incorrectly detect the work even when it is not present. In such cases, reduce the movement speed or increase the Push ratio.

▶ While the Push command is active, the 'Next target position input' and 'Target position modification' functions cannot be used.

4.2.5 Homing mode (HM)

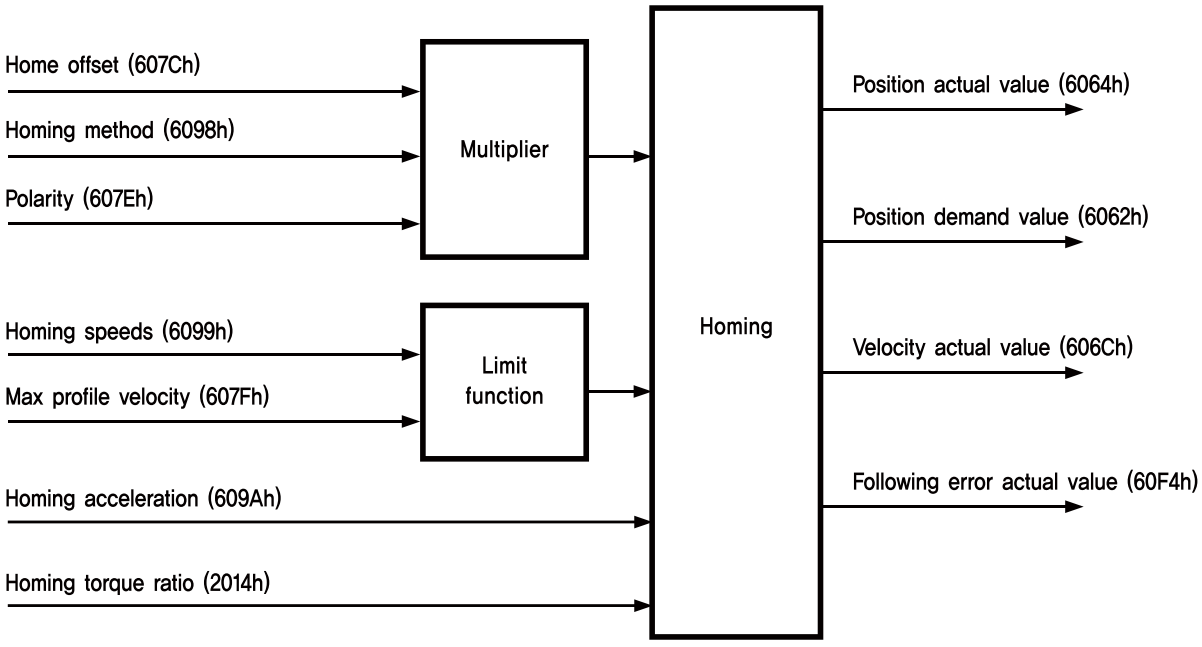
(1) Overview

Homing mode is a mode that receives input from the Controlword (6040h) to find the home position, with the driver generating the drive profile (path). To use this mode, homing mode must be set in the Mode of operation (6060h). When the Mode of operation display (6061h) shows homing mode, the homing command can be used.

Note

- ▶ Some homing methods utilize the Touch probe 2 function during homing operations. Therefore, the Touch probe 2 function cannot be enabled while in homing mode (HM). Setting bit 8 (TP2 enable) of object 60B8h to 1 while in homing mode will cause an FF50h (E-080) error.
- ▶ Switching to homing mode while the Touch probe 2 function is enabled will cause an FF50h (E-080) error.

(2) Related object



Index	Sub	Name	Data type	Access	Save	PDO	Setting range	Default value
6040h	00h	Controlword	U16	RW	No	RxPDO	-	–
6041h	00h	Statusword	U16	RO	No	TxPDO	-	0000h
6060h	00h	Mode of operation	INT8	RW	No	RxPDO	-128 to 127	0
6061h	00h	Mode of operation display	INT8	RO	No	TxPDO	-	-
6062h	00h	Position demand value	INT32	RO	No	TxPDO	-	-
6064h	00h	Position actual value	INT32	RO	No	TxPDO	-	-
606Ch	00h	Velocity actual value	INT32	RO	No	TxPDO	-	-
607Ch	00h	Home offset	I32	RW	Yes	No	-2147483648 to 2147483647	0
607Eh	00h	Polarity	U8	RW	Yes	No	-	0
607Fh	00h	Max profile velocity	U32	RW	Yes	No	1 to 2500000	2500000
6098h	00h	Homing method	I8	RW	Yes	RxPDO	-6 to 37	0
6099h	01h	Speed during search for switch	U32	RW	Yes	RxPDO	1 to 2,500,000	5000
	02h	Speed during search for zero	U32	RW	Yes	RxPDO	1 to 500,000	1000
609Ah	00h	Homing acceleration	U32	RW	Yes	RxPDO	1000 to 1000000000	100000
60F4h	00h	Following error actual value	INT32	RO	No	TxPDO	-	-
2014h	00h	Homing torque ratio	U8	RW	Yes	No	20 to 90	50

Set the homing operation using the Homing method (6098h). This mode uses the home switch, positive limit switch, negative limit switch, encoder index pulse, positive stopper, and negative stopper.

Homing method using limit switches If not, during homing, if a limit switch turns on, the movement reverses direction. If the opposite limit switch turns on during this reverse movement, homing fails.

If the sensor origin and the mechanism origin differ, they can be set using the Home offset (607Ch). Setting the mechanism origin position in the Home offset causes the system to move that distance after finding the sensor origin via the Homing method. After all actions complete, the Homing attained bit (bit 12) in the Statusword becomes '1', and the position objects are initialized.

If a limit switch is activated during homing, the system stops to move in the opposite direction. The stopping method when a limit switch is activated depends on the setting value for the Limit stop method (2003h).

(3) Controlword

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
-	-	-	-	-	-	-	Halt
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Fault reset	-	-	Homing operation start	Enable operation	Quick stop	Enable voltage	Switch on

Bit	Name	Value	Description
4	Homing operation start	0→ 1	Homing operation start.
8	Halt	0	Initiate or continue operation.
		1	The homing command is canceled, and operation stops according to the setting value in the Halt option code (605Dh).

(4) Statusword

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
-	-	Homing error	Homing attained	Internal limit active	Target reached	Remote	-
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
-	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on

Bit	Name	Value	Description
9	Remote	1	Controlword is processed successfully.
10	Target reached	0/1	This combination of three bits indicates the homing operation status. For details, please refer to the table below.
12	Homing attained	0/1	
13	Homing error	0/1	

The homing status based on the combination of bits 10, 12, and 13 is as follows.

Bit 13	Bit 12	Bit 10	State
X	X	0	Executing homing operation.
0	0	1	The homing operation has been canceled or has not started.
0	1	1	The homing operation has been successfully completed.
1	0	1	Homing failed.

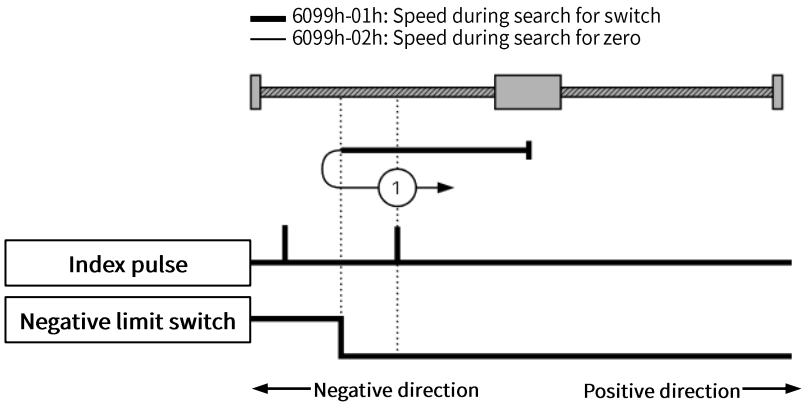
(5) Homing Method

The homing method is classified as follows based on the setting value for Homing (6098h).

Setting value	Description
1	Homing on negative limit switch and index pulse
2	Homing on positive limit switch and index pulse
7	Homing on home switch (positive direction, negative edge) and index pulse
10	Homing on home switch (positive direction, positive edge) and index pulse
11	Homing on home switch (negative direction, positive edge) and index pulse
14	Homing on home switch (negative direction, negative edge) and index pulse
17	Homing on negative limit switch
18	Homing on positive limit switch
24	Homing on home switch (positive direction, negative edge)
25	Homing on home switch (positive direction, positive edge)
28	Homing on home switch (negative direction, positive edge)
29	Homing on home switch (negative direction, negative edge)
33	Homing index pulse (negative direction)
34	Homing index pulse (positive direction)
35	Set the current position origin
37	Set the current position origin and reset current position
-3	Homing on negative mechanical limit
-4	Homing on positive mechanical limit
-5	Homing on negative mechanical limit and index pulse
-6	Homing on positive mechanical limit and index pulse

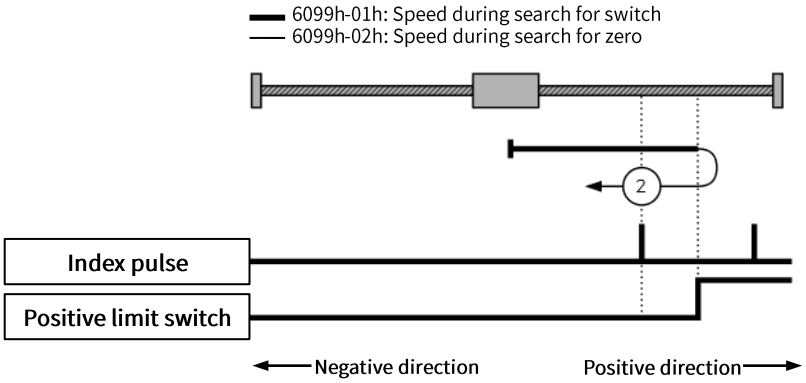
(a) Homing method 1: Homing on negative limit switch and index pulse

When the negative limit switch is in the off state, the initial movement direction is negative, and operation proceeds at the speed during search for switch. When the negative limit switch is in the on state, the direction switches to the positive direction, and movement proceeds at the speed during search for zero. Subsequently, while operating in the positive direction, if the first index pulse is detected, movement stops, and that position becomes the origin.



(b) Homing method 2: Homing on positive limit switch and index pulse

If the positive limit switch is off, the initial movement direction is positive and operates at the speed during search for switch. When the positive limit switch turns on, it reverses direction and moves at the speed during search for zero. Subsequently, while moving backward, it stops upon detecting the first index pulse, and that position becomes the origin.



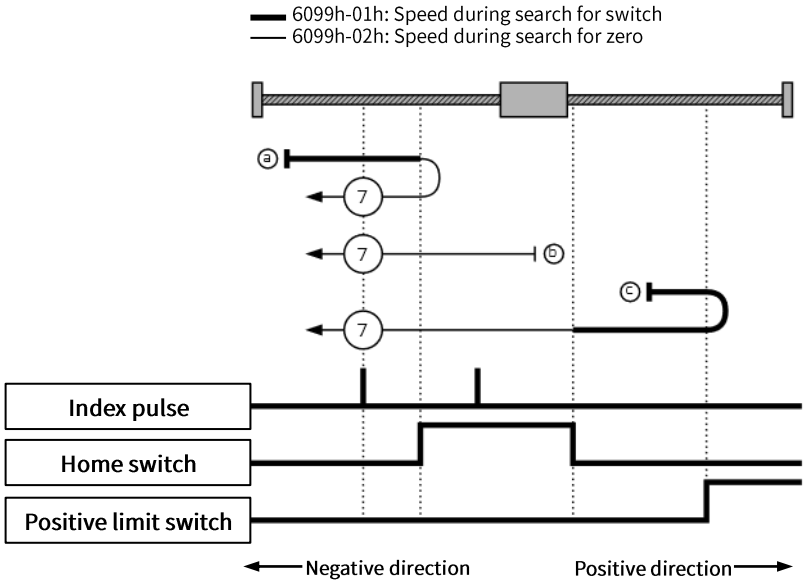
(c) Homing method 7: Homing on home switch (positive direction, negative edge) and index pulse

This method operates as follows based on the home switch, index pulse, and positive limit switch.

ⓐ When homing starts, if the home switch is off, the initial movement direction is positive and operates at the speed during search for switch. When the home switch turns on, the direction reverses to negative direction at the speed during search for zero. During this Negative direction movement, when the first index pulse is detected, movement stops, and that position becomes the origin.

ⓑ If the home switch is in the on state, the initial movement direction is in the negative direction, and it operates at the speed during search for zero. Subsequently, while operating in the negative direction, if the home switch is in the off state and the first index pulse is detected, movement stops, and that position becomes the origin.

ⓒ If the home switch is in the off state, the initial movement direction is in the positive direction, and it operates at the speed during search for switch. When the positive limit switch is in the on state, it takes the negative direction and moves at the speed during search for switch. When the home switch is in the on state, it moves at the speed during search for zero. Subsequently, while driving in the negative direction, if the first index pulse is detected while the home switch is in the off state, movement stops, and that position becomes the origin.



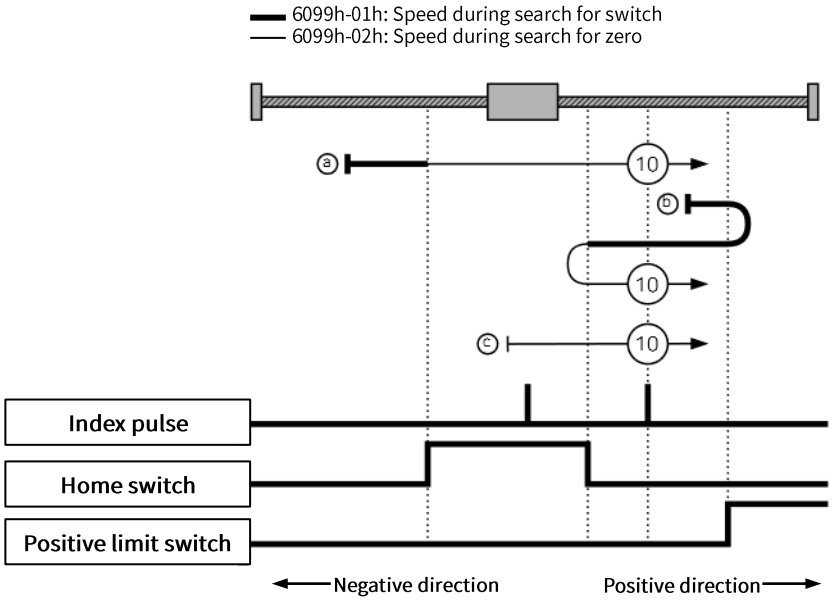
(d) Homing method 10: Homing on home switch (positive direction, positive edge) and index pulse

This method operates as follows based on the home switch and Positive limit switch:

ⓐ When homing starts, if the Home switch is Off, the initial movement direction is positive direction and it operates at the speed during search for switch. When the home switch turns on, it moves at the speed during search for zero. Subsequently, while moving in the positive direction, if the home switch is Off and the first index pulse is detected, movement stops; that position becomes the origin.

ⓑ If the home switch is in the off state, the initial movement direction is positive, and it operates at the speed during search for switch. If the positive limit switch is in the on state, it reverses direction to take the negative direction and moves at the speed during search for switch. When the home switch is in the on state, the direction switches to the positive direction and moves at the speed during search for zero. Subsequently, while driving in the positive direction, if the first index pulse is detected while the home switch is in the off state, movement stops, and that position becomes the origin.

ⓒ If the home switch is in the on state, the initial movement direction is the positive direction and it operates at the speed during search for zero. Subsequently, while operating in the positive direction, if the home switch is in the off state and the first index pulse is detected, movement stops, and that position becomes the origin.



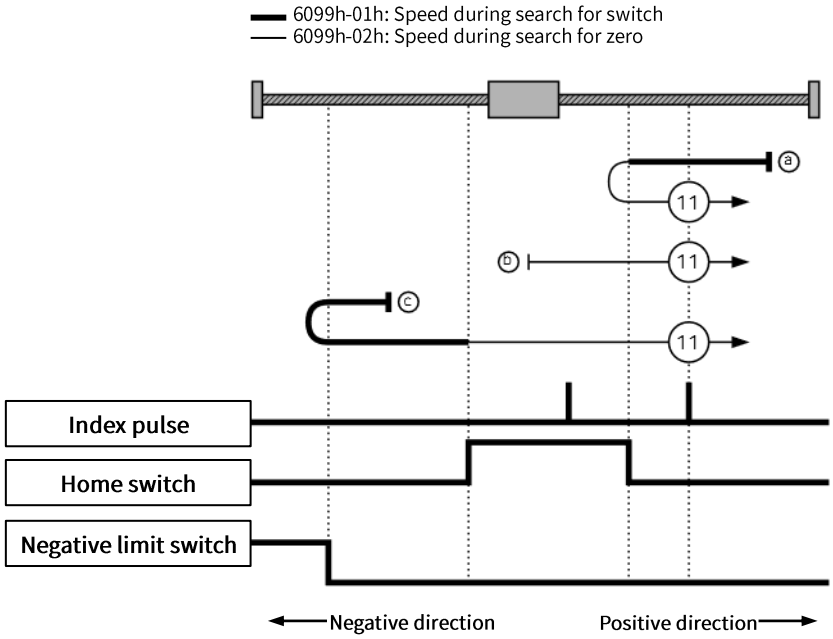
(e) Homing method 11: Homing on home switch (negative direction, positive edge) and index pulse

This method operates as follows based on the home switch and Negative limit switch:

ⓐ When homing starts, if the home switch is in the off state, the initial movement direction is negative direction and it operates at the speed during search for switch. When the home switch turns on, it switches direction to positive direction and moves at the speed during search for zero. Subsequently, while operating in the positive direction, if the first index pulse is detected, it stops moving; that position becomes the origin.

ⓑ When the home switch is in the on state, the initial movement direction is the positive direction, and it operates at the speed during search for zero. Subsequently, while operating in the positive direction, if the home switch is detected in the off state upon receiving the first index pulse, movement stops, and that position becomes the origin.

ⓒ If the home switch is in the off state, the initial movement direction is negative, and it operates at the speed during search for switch. When the negative limit switch is in the on state, it switches direction to positive and moves at the speed during search for switch. When the home switch is in the on state, it moves at the speed during search for zero. Subsequently, while driving in the positive direction, if the first index pulse is detected while the home switch is in the off state, movement stops, and that position becomes the origin.



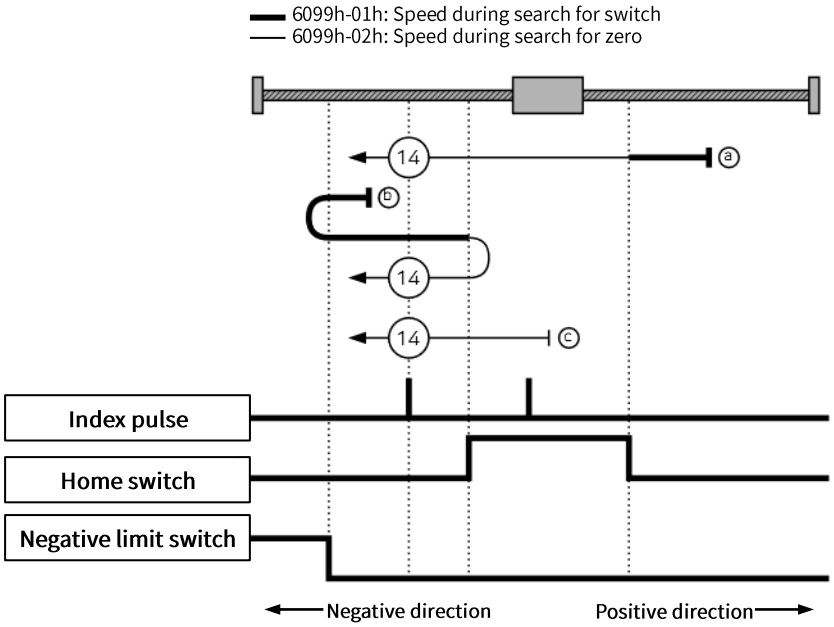
(f) Homing method 14: Homing on home switch (negative direction, negative edge) and index pulse

This method operates as follows based on the home switch and negative limit switch:

ⓐ When homing starts, if the home switch is off, the initial movement direction is negative and it operates at the speed during search for switch. When the home switch turns on, it moves at the speed during search for zero. Subsequently, while moving in the negative direction, if the home switch is off and the first index pulse is detected, movement stops, and that position becomes the origin.

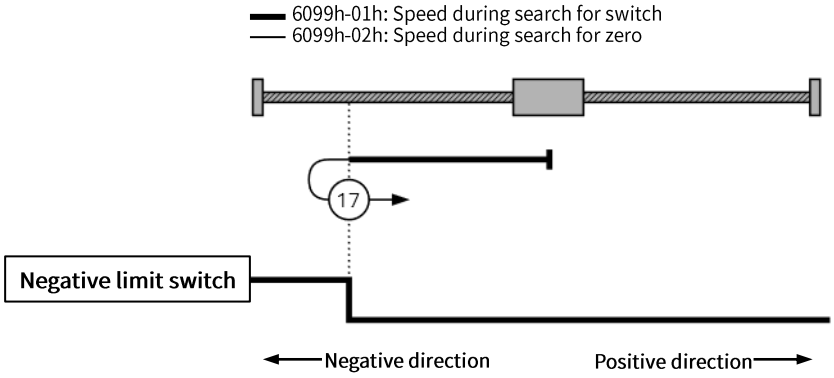
ⓑ If the home switch is Off, the initial movement direction is negative, and it operates at the speed during search for switch. When the negative limit switch is on, it switches direction to positive and moves at the speed during search for switch. When the home switch is in the on state, the direction switches to negative direction and moves at the speed during search for zero. Subsequently, while driving in negative direction, if the first index pulse is detected while the home switch is in the Off state, movement stops, and that position becomes the origin.

ⓒ If the home switch is in the on state, the initial movement direction is in the negative direction and it operates at the speed during search for zero. Subsequently, while operating in the negative direction, if the home switch is in the off state and the first index pulse is detected, movement stops, and that position becomes the origin.



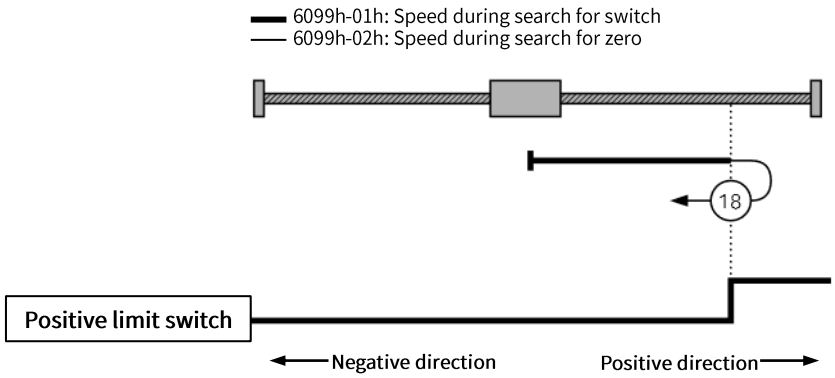
(g) Homing method 17: Homing on negative limit switch

The initial movement direction is negative, and it operates at the speed during search for switch. When the negative limit switch is in the on state, it switches direction to positive and moves at the speed during search for zero. Subsequently, while operating in the positive direction, if the negative limit switch is in the off state, it stops moving, and that position becomes the origin.



(h) Homing method 18: Homing on positive limit switch

The initial movement direction is positive, and it operates at the speed during search for switch. When the positive limit switch is activated, the direction reverses to negative and moves at the speed during search for zero. Subsequently, while moving in the negative direction, if the positive limit switch deactivates, movement stops, and that position becomes the origin.



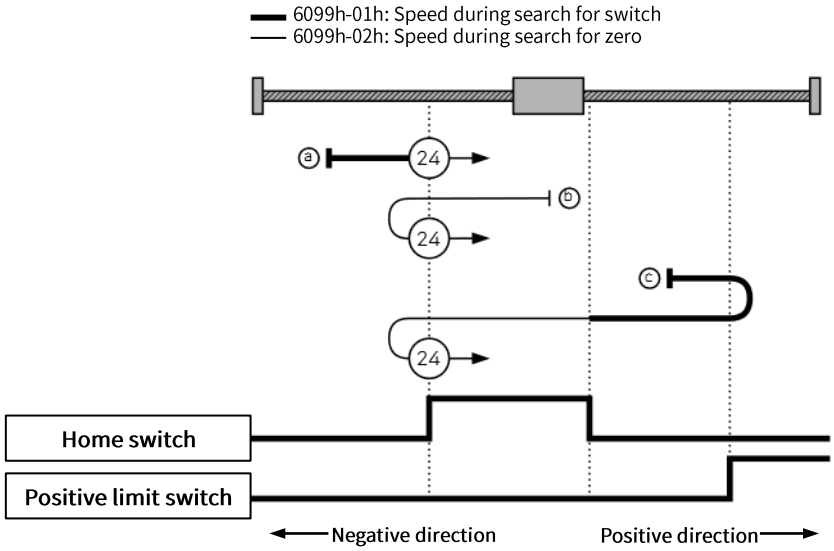
(i) Homing method 24: Homing on home switch (positive direction, negative edge)

This method operates as follows based on the home switch and positive limit switch.

ⓐ When homing starts, if the home switch is off, the initial movement direction is the positive direction and it operates at the speed during search for switch. When the home switch turns on, it stops moving, and that position becomes the origin.

ⓑ If the home switch is on, the initial movement direction is Negative direction and operates at the speed during search for zero. When the home switch turns off, the direction switches to positive direction. Subsequently, while moving forward, if the home switch turns on, movement stops, and that position becomes the origin.

ⓒ When the home switch is off, the initial movement direction is positive and it operates at the speed during search for switch. When the positive limit switch is on, it takes the negative direction and moves at the speed during search for switch. When the Home switch is in the on state, it operates at the speed during search for zero. When the home switch is in the off state, it switches to the positive direction. Subsequently, while operating in the positive direction, if the home switch becomes on, it stops moving, and that position becomes the origin.



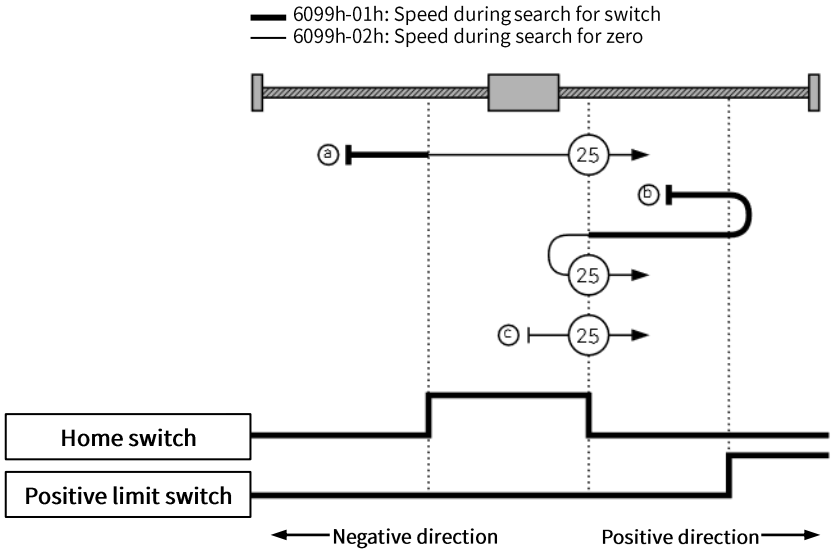
(j) Homing method 25: Homing on home Switch (positive direction, positive edge)

This method operates as follows based on the home switch and positive limit switch:

ⓐ When homing starts, if the home switch is Off, the initial movement direction is the positive direction, and it operates at the speed during search for switch. When the home switch turns on, it moves at the speed during search for zero. Subsequently, while operating in the Positive direction, if the home switch turns off, it stops moving, and that position becomes the origin.

ⓑ If the home switch is off, the initial movement direction is positive and it operates at the speed during search for switch. If the positive limit switch becomes on, it takes the negative direction and moves at the speed during search for switch. If the home switch becomes on, it takes the positive direction and moves at the speed during search for zero. Subsequently, while operating in the positive direction, if the home switch becomes off, movement stops, and that position becomes the origin.

ⓒ If the home switch is on, the initial movement direction is the positive direction and it operates at the speed during search for zero. Subsequently, while operating in the positive direction, if the home switch turns off, movement stops, and that position becomes the origin.



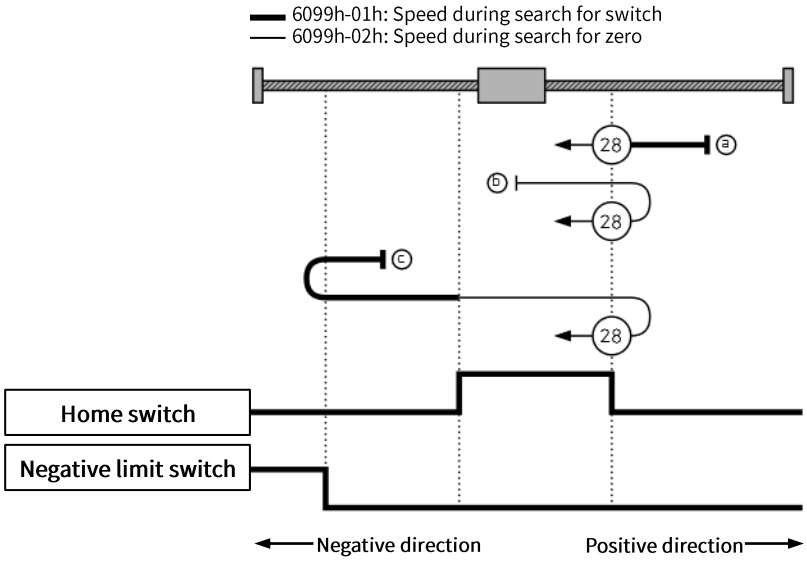
(k) Homing method 28: Homing on home switch (negative direction, positive edge)

This method operates as follows based on the home switch and negative limit switch:

ⓐ If the home switch is off when homing starts, the initial movement direction is in the negative direction and it operates at the speed during search for switch. When the home switch turns on, movement stops, and that position becomes the origin.

ⓑ If the home switch is on, the initial movement direction is positive, driven at the speed during search for zero. When the home switch turns off, the direction switches to negative direction. If the home switch turns on during this Negative direction movement, the movement stops, and that position becomes the origin.

ⓒ When the home switch is off, the initial movement direction is negative and it operates at the speed during search for switch. When the negative limit switch is on, it switches direction to positive and moves at the speed during search for switch. When the home switch is in the on state, it operates at the speed during search for zero. When the home switch is in the off state, it takes the negative direction. If the home switch becomes on while moving in the negative direction, it stops moving, and that position becomes the origin.



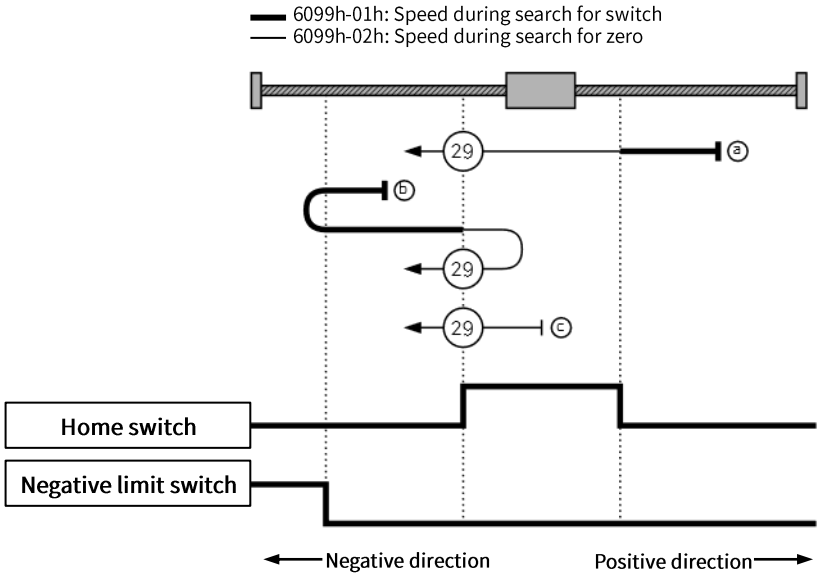
(l) Homing method 29: Homing on home switch (negative direction, negative edge)

This method operates as follows based on the home switch and negative limit switch:

ⓐ When homing starts, if the home switch is off, the initial movement direction is negative and it operates at the speed during search for switch. When the home switch turns on, it moves at the speed during search for zero. Subsequently, while moving in the negative direction, if the home switch turns off, it stops moving, and that position becomes the origin.

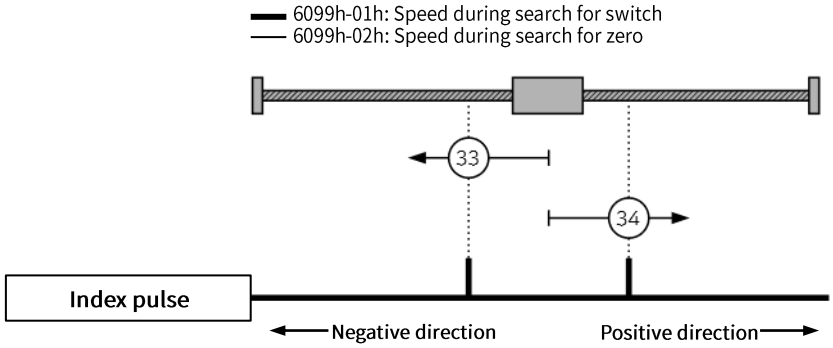
ⓑ If the home switch is off, the initial movement direction is negative, and it operates at the speed during search for switch. If the negative limit switch becomes on, it switches direction to positive and moves at the speed during search for switch. If the home switch becomes on, it switches direction to negative and moves at the speed during search for zero. Subsequently, while operating in negative direction, if the home switch becomes off, movement stops, and that position becomes origin.

ⓒ If the home switch is on, the initial movement direction is negative and it operates at the speed during search for zero. Subsequently, while operating in negative direction, if the home switch turns off, movement stops, and that position becomes the origin.



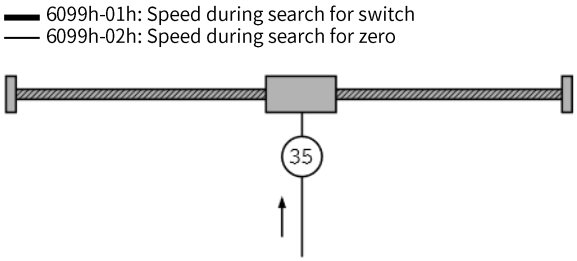
(m) Homing methods 33, 34: Homing index pulse

Method 33's initial movement direction is in the negative direction, while Method 34's initial movement direction is in the positive direction. During operation at the speed during search for zero, detecting an index pulse stops movement, and that position becomes the origin.



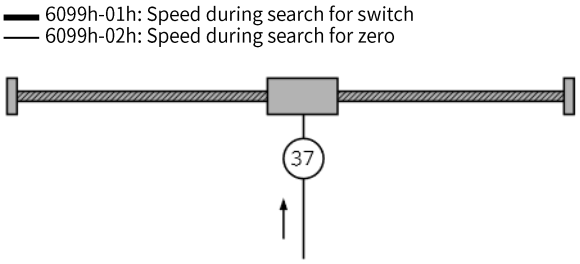
(n) Homing method 35: Set the current position origin

This method sets the current position as the sensor origin. If the home offset (607Ch) is set to a non-zero value, it moves to that position.



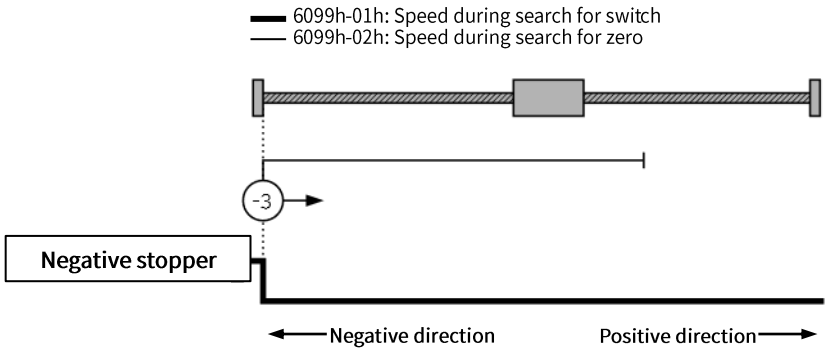
(o) Homing method 37: Set the current position origin and reset current position

This method sets the current position as the sensor origin position. If the Home offset (607Ch) is set to a non-zero value, it initializes the current position to the Home offset value.



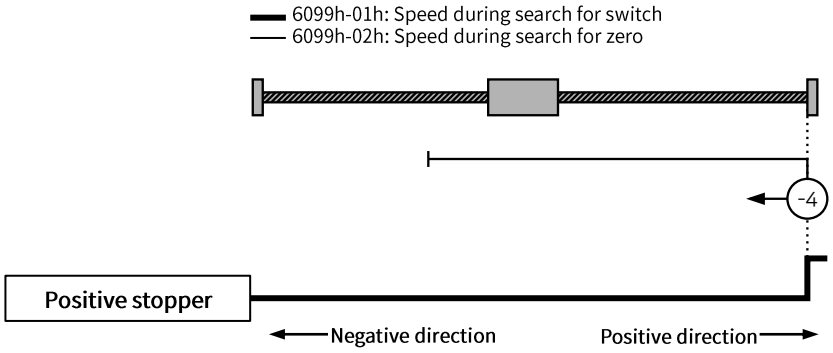
(p) Homing method -3: Homing on negative mechanical limit

Initial movement direction is negative, operating at the speed during search for zero. If the negative stopper is encountered during movement, it is judged that a certain load has been detected and movement stops, and that position becomes the origin. The reference load value can be set using the Homing torque ratio (2014h).



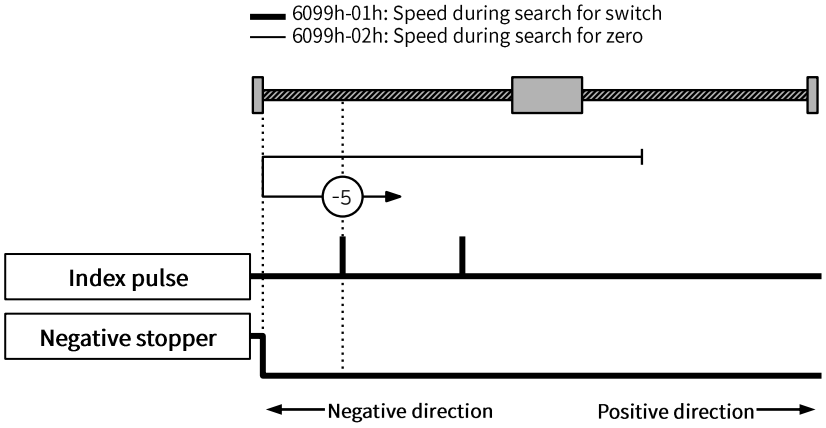
(q) Homing method -4: Homing on positive mechanical limit

The initial movement direction is positive, and it operates at the speed during search for zero. If it collides with the positive stopper during movement, it is judged that a certain load has been detected, and movement stops; that position becomes the origin. The reference load value can be set using the Homing torque ratio (2014h).



(r) Homing method -5: Homing on negative mechanical limit and index pulse

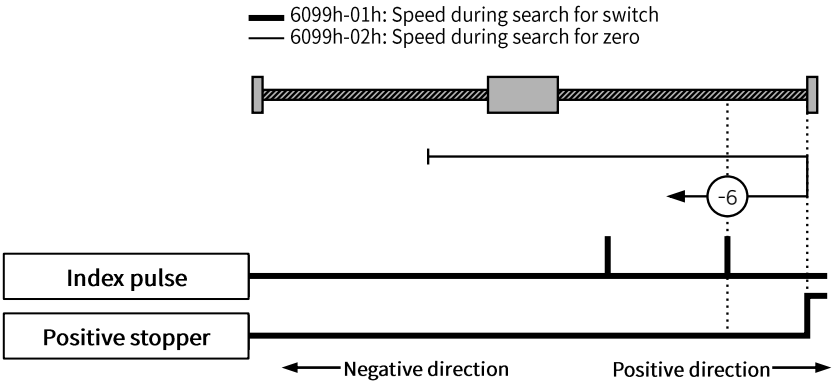
The initial movement direction is negative, and it operates at the speed during search for zero. If it collides with the negative stopper during movement, it detects a certain load and switches direction to the positive direction, then moves at the speed during search for zero. Subsequently, while continuing to operate in the positive direction, it stops movement upon detecting the first index pulse, and that position becomes the origin. The reference load value can be set using the Homing torque ratio (2014h).



(s) Homing method -6: Homing on positive mechanical limit and index pulse

The initial movement direction is the positive direction, driven at the speed during search for zero. If it encounters the positive stopper during movement, it detects a certain load, reverses direction, and moves at the speed during search for zero. It then continues moving in the negative direction. When the

first index pulse is detected during this negative movement, it stops moving, and that position becomes the origin. The reference load value can be set using the Homing torque ratio (2014h).



4.3 Function

4.3.1 Touch probe

(1) Overview

The touch probe detects the status of an external input signal (origin sensor, Z-phase signal from the encoder, user input) used as a trigger signal and latches the current position (Position actual value). There are two touch probes: Touch probe 1 and Touch probe 2.

Note

▶ Some homing methods utilize the Touch probe 2 function during homing operations. Therefore, the Touch probe 2 function cannot be enabled while in homing mode (HM). Setting bit 8 (TP2 enable) of object 60B8h to 1 while in Homing mode will cause an FF50h (E-080) error.

▶ Switching to homing mode while the Touch probe 2 function is enabled will cause an FF50h (E-080) error.

(2) Related object

Index	Sub	Name	Data type	Access	Save	PDO	Setting range	Default value
60B8h	00h	Touch probe function	U16	RW	No	RxPDO	-	0000h
60B9h	00h	Touch probe status	U16	RO	No	TxPDO	-	0000h
60BAh	00h	Touch probe 1 positive value	INT32	RO	No	TxPDO	-2147483648 to 2147483647	-
60BBh	00h	Touch Probe 1 negative value	INT32	RO	No	TxPDO	-2147483648 to 2147483647	-
60BCh	00h	Touch Probe 2 positive value	INT32	RO	No	TxPDO	-2147483648 to 2147483647	-
60BDh	00h	Touch probe 2 negative value	INT32	RO	No	TxPDO	-2147483648 to 2147483647	-
60D0h	01h	Touch probe 1 source	U16	RW	No	No	1 to 5	1
	02h	Touch probe 2 source	U16	RW	No	No	1 to 5	1
60D5h	00h	Touch Probe 1 Positive Edge Counter	U16	RO	No	TxPDO	0 to 65535	-
60D6h	00h	Touch probe 1 Negative edge counter	U16	RO	No	TxPDO	0 to 65535	-
60D7h	00h	Touch Probe 2 Positive Edge Counter	U16	RO	No	TxPDO	0 to 65535	-
60D8h	00h	Touch probe 2 Negative Edge Counter	U16	RO	No	TxPDO	0 to 65535	-

(3) Touch probe function (60B8h)

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
-	-	TP2 negative edge action	TP2 positive edge action	TP2 source		TP2 trigger action	TP2 enable
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
-	-	TP1 Negative edge action	TP1 positive edge action	TP1 source		TP1 trigger action	TP1 enable

*TP: Touch probe

Bit	Name	Value	Description
0	TP1 enable	0	Stops the operation of Touch probe 1.
		1	Executes the operation of Touch probe 1.
1	TP1 trigger action	0	Latches only when the first trigger signal is detected.
		1	Continues to latch each time a trigger signal is detected.
2~3	TP1 source	0	Triggered by the origin signal.
		1	Triggered by the Z-phase signal.
		2	Triggered by the signal set at 60D0h.
		3	Reserved
4	TP1 positive edge action	0	Does not execute the action when a positive edge is detected.
		1	Executes the action when a positive edge is detected.
5	TP1 negative edge action	0	Does not execute the action when a negative edge is detected.
		1	Executes the action when a negative edge is detected.
6~7	-	-	Reserved
8	TP2 enable	0	Stops the operation of Touch probe 2.
		1	Executes the operation of Touch probe 2.
9	TP2 trigger action	0	Latches only when the first trigger signal is detected.
		1	Continues to latch each time a trigger signal is detected.
10~11	TP2 source	0	Triggered by the origin signal.
		1	Triggered by the Z-phase signal.
		2	Triggered by the signal set in 60D0h.
		3	Reserved
12	TP2 positive edge action	0	Does not execute the action when a positive edge is detected.
		1	Executes the action when a positive edge is detected.
13	TP2 negative edge action	0	Does not execute the action when a negative edge is detected.
		1	Executes the action when a negative edge is detected.
14~15	-	-	Reserved

(4) Touch probe status (60B9h)

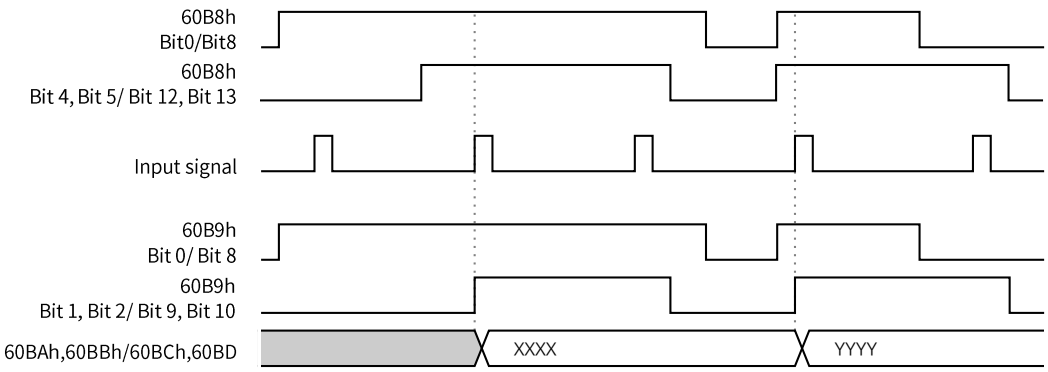
Bit 15	Bit 14	Beat 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
TP2 count		-	-	-	TP2 negative edge latch	TP2 positive edge latch	TP2 enabled status
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
TP1 count		-	-	-	TP1 negative edge latch	TP1 positive edge latch	TP1 enabled status

Bit	Name	Value	Description
0	TP1 enabled status	0	Touch probe 1 is in a stopped state.
		1	Touch probe 1 is in operation.
1	TP1 positive edge latch	0	The positive edge of the selected signal was not detected.
		1	The positive edge of the selected signal has been detected.
2	TP1 negative edge latch	0	The negative edge of the selected signal was not detected.
		1	The negative edge of the selected signal has been detected.
3~5	-	-	Reserved
6~7	TP1 count	0~3	Displays the number of detections for Touch Probe 1.
8	TP2 enabled status	0	Touch probe 2 operation is stopped.
		1	Touch probe 2 is currently in operation.
9	TP2 Positive Edge Latch	0	The positive edge of the selected signal was not detected.
		1	The positive edge of the selected signal has been detected.
10	TP2 negative edge latch	0	The negative edge of the selected signal was not detected.
		1	The negative edge of the selected signal has been detected.
11~13	-	-	Reserved
14~15	TP2 count	0~3	Displays the detection count for Touch Probe 2.

(5) Touch probe control and status

(a) Touch probe operation: Initial signal detection

Touch probe function: Setting bits 1 and 9 to 0 causes the touch probe to use only the first detected signal after operation begins. Refer to the timing chart below for the operation sequence.

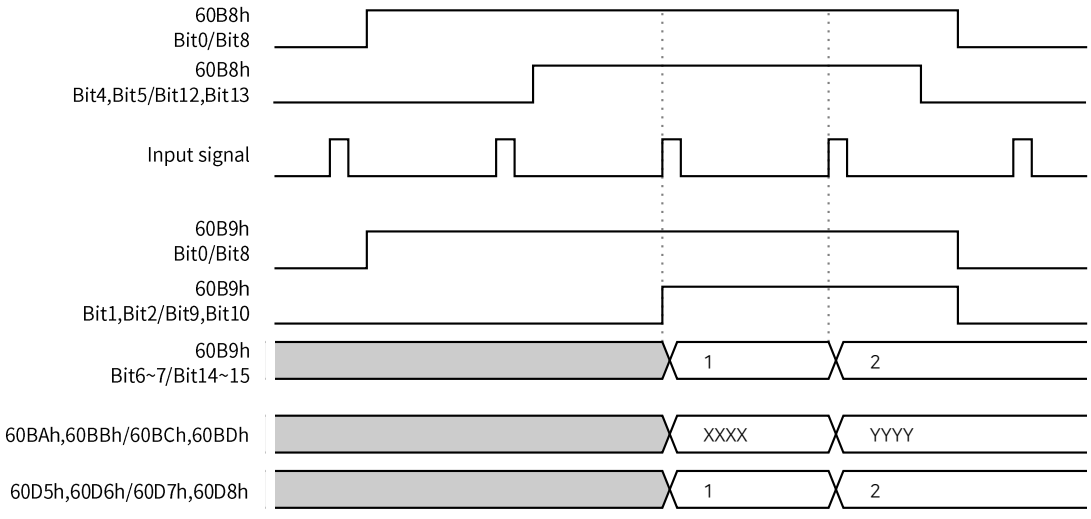


Bits 1 and 2, and bits 9 and 10 of the Touch probe status can be used to determine whether an input signal has been detected.

The detected position values can be confirmed by checking the values of Touch probe 1 positive value, Touch probe 2 positive value, Touch probe 1 negative value, Touch probe 2 negative value.

(b) Touch probe operation: Continuous signal detection

When setting bits 1 and 9 of the touch probe function to 1, the touch probe utilizes all signals detected after operation begins. Refer to the timing chart below for the operation sequence.



Bits 6 and 7, and bits 14 and 15 of the Touch probe status increment each time an input signal is detected. (The range of this value is 0 to 3).

The number of times the input signal was detected can be confirmed by checking the values of the Touch probe 1 positive edge counter, Touch probe 2 positive edge counter, Touch probe 1 negative edge counter, and Touch probe 2 negative edge counter.

4.3.2 Input/Output signals

(1) Overview

Ezi-SERVO CC-Link IE TSN provides 3 fixed inputs (ORIGIN, LIMIT+, LIMIT-), 6 user inputs, 1 fixed output (BRAKE), and 5 user outputs.

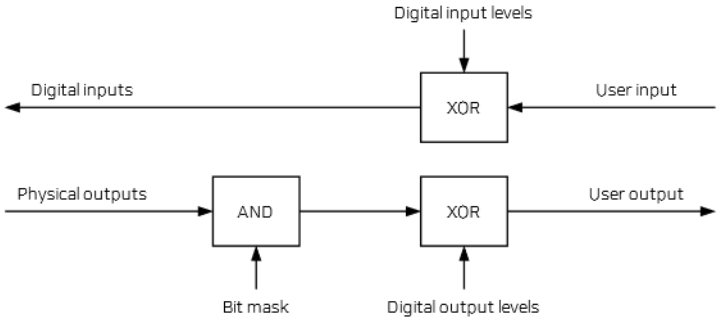
(2) Related object

Index	Sub	Name	Data type	Access	Save	PDO	Setting range	Default value
60FDh	00h	Digital inputs	U32	RO	No	TxPDO	-	00000000h
60FEh	00h	Physical outputs	U32	RW	No	RxPDO	-	-
	01h	Bit mask	U32	RW	No	No	-128 to 127	00000000h
2001h	00h	Sensor logic	U8	RW	No	No	-	00h
2002h	00h	Reverse limit direction	U8	RW	No	No	0 to 1	00h
2010h	00h	Brake delay	U16	RW	No	No	0 to 1000	200
2011h	00h	Digital input levels	U16	RW	No	No	-	0000h
2012h	00h	Digital output levels	U16	RW	No	No	-	0000h

(3) User Input/Output

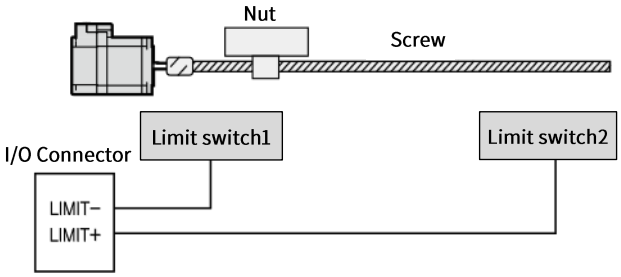
Digital input levels and Digital output levels can be used to set the operating levels for user input/output.

The diagram below illustrates the relationship between Digital inputs and Digital input levels, and the relationship between Digital outputs and Digital output levels.



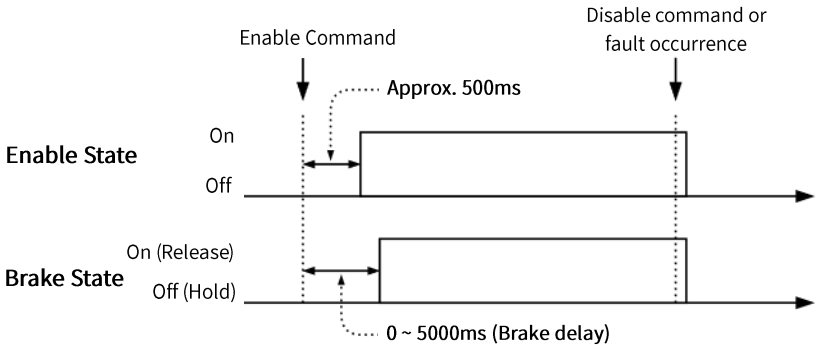
(4) ORIGIN and LIMIT inputs

The ORIGIN and LIMIT input signals can change their operating levels via bits 0 and 1 of Sensor logics (2001h). For details, refer to Sensor logics. Reverse limit direction (2002h) allows swapping the LIMIT+ and LIMIT- input signals. The relationship between Reverse limit direction (2002h) and LIMIT+ LIMIT- is as follows.



(5) BRAKE output

The BRAKE output signal operates according to the Operation enabled bit in the Statusword (6041h). The time at which BRAKE turns ON can be set via Brake delay (2010h).



The BRAKE output can be manually disabled by setting bit 0 (Set brake) in Digital outputs (60FEh). For details, refer to Digital outputs.

4.4 Saving parameters

Parameters are stored in the driver's RAM or EEPROM. Parameters stored in RAM are erased when power is disconnected, but parameters stored in EEPROM remain intact even after power loss. When power is applied to the driver, parameters from EEPROM are transferred to RAM and automatically set up.

When parameters are set, they are stored in RAM. To save parameters from RAM to EEPROM, enter 65766173h in subindex 1 (Store parameters) of Store parameters (1010h).

Note

- ▶ Do not disconnect power while parameters are being saved to EEPROM. Failure to shut down properly may result in some parameters not being saved.
- ▶ The number of times parameters can be stored in EEPROM is approximately 100,000 times.

Chapter5 Object dictionary

5.1 Object dictionary area

The parameters of Ezi-SERVO CC-Link IE TSN are structured identically to the CANopen object dictionary. All objects are distinguished by a 4-digit hexadecimal Index and are grouped within the object dictionary.

Index	area	Description
1000h~1FFFh	Communication area	Related objects for configuring CC-Link IE TSN communication or displaying its status
2000h~5FFFh	Manufacturer-specific area	FASTECH-specific objects
6000h~9FFFh	Device profile area	Objects defined in the CiA 402 drive profile

5.2 Reading and writing objects

Each object can be read or written using SLMP commands or user software. For details, refer to the relevant user's manual.

5.3 Object description format

Objects are data structures within the river containing parameters, status variables, execution commands, etc., and are composed as follows.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
-	Sub index	-	-	-	-	-	-	-	-	PDO Mapping	Modes of operation

Item	Description
Index	The object's index, represented as a 4-digit hexadecimal number.
Sub	The subindex of the object, represented in decimal.
Name	The name of the object.
Setting range	The setting range for values.
Unit	Physical units.
Default setting	Default value set before shipment. This value can be restored using Restore default parameters (1011h). Also referred to as the initial value.
Data attribute	Indicates the timing at which the object's value changes when modified. ・A: Update immediately ・B: Update after operation stop ・-: Write prohibited
Data type	Indicates the data type of the object.

Data type	Abbreviation	Size	Range
Unsigned8	U8	1 byte	0~255
Unsigned16	U16	2 bytes	0~65,535
Unsigned32	U32	4 bytes	0 to 4,294,967,295
Integer8	INT8	1 byte	-128 to 127
Integer16	INT16	2 bytes	-32768 to 32767
Integer32	INT32	4 bytes	-2,147,483,648 to 2,147,483,647
Visible String	STRING	String	-
Structure	REC	Structure	-

Item	Description
Access	The access method for the object. · RO: Read only · RW: Read/Write
Save	Indicates whether the object value can be stored in EEPROM via Store parameters (1010h). · Yes: Saved in EEPROM. · No: Not saved in EEPROM.
PDO	Indicates whether the PDO mapping of objects is possible · RxPDO: Reception PDOs can be mapped. · TxPDO: Transmission PDOs can be mapped. · No: Mapping to PDO is not possible.
Mode	Indicates which modes of operation it applies to. · -: Not related to modes of operation · CSP: Cyclic synchronous position mode · PP: Profile position mode · HM: Homing mode

5.4 Communication object

5.4.1 Object 1000h: Device type

Indicates the device profile.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
1000h	-	Device type	-	-	0004 0192h	-	U32	RO	No	No	-

Bit	Name	Description
0~15	Device profile	0192h: CiA402 drive profile
16~23	Type	04h: Stepping motor driver
24~31	Mode	00h

5.4.2 Object 1001h: Error register

Indicates the type of error occurring in the driver. When a related error occurs, the corresponding bit becomes '1'. The 'General Error' bit always becomes '1' when an error occurs.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
1001h	-	Error register	-	-	00h	-	U8	RO	No	No	-

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Manufacturer specific error	-		Communication error				General error

5.4.3 Object 1008h: Device name

Indicates the product name. The value of the device name varies depending on the product model.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
1008h	-	Device name	-	-	Ezi-SERVO-CT-ALL	-	STRING	RO	No	No	-

5.4.4 Object 1009h: Hardware version

Indicates the hardware version of the driver. The displayed value may vary depending on the product version.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
1009h	-	Hardware version	-	-		-	STRING	RO	No	No	-

5.4.5 Object 100Ah: Software version

Indicates the software version of the driver. The displayed value varies depending on the product version.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
100Ah	-	Software version	-	-		-	STRING	RO	No	No	-

5.4.6 Object 1010h: Store parameters

Saves all storable objects in RAM to EEPROM.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
1010h	0	Number of entries	-	-	1	-	U8	RO	No	No	-
	1	Store parameters	-	-	0000 0001h	A	U32	RW	No	No	-

Entering 65766173h ('save') in subindex 01h saves the parameters of all backup target objects to EEPROM. Backup targets refer to objects marked with 'Yes' in the 'Save' field.

ASCII	'e'	'v'	'a'	's'
Hex	65h	76h	61h	73h

If an invalid value is entered, the SLMP End Code CCDAh is returned and the object is not saved.

5.4.7 Object 1011h: Restore default parameters

Initializes the values of objects stored in the driver's EEPROM.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
1011h	0	Number of entries	-	-	1	-	U8	RO	No	No	-
	1	Restore default parameters	-	-	0000 0001h	A	U32	RW	No	No	-

Entering 64616F6Ch in subindex 01h initializes all backup target objects to their default settings. The initialized setting values take effect only after powering off and then back on the drive.

ASCII	'd'	'a'	'o'	'l'
Hex	64h	61h	6Fh	6Ch

If an incorrect value is entered, the SLMP End Code CCDAh is returned.

5.4.8 Object 1018h: Identity

Represents the device's information.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
1018h	0	Number of entries	-	-	4	-	U8	RO	No	No	-
	1	Vendor ID	-	-	00001604h	-	U32	RO	No	No	-
	2	Product code	-	-	0000 5101h	-	U32	RO	No	No	-
	3	Revision number	-	-		-	U32	RO	No	No	-
	4	Serial number	-	-		-	U32	RO	No	No	-

Name	Description
Vendor ID	Indicates the ID of the company registered with the CC-Link Association. The Vendor ID is the same for all products manufactured and sold by FASTECH.
Product code	This is the unique code for the product, and this value differs for each product model.
Revision number	This is the revision number for the specific model.
Serial number	The serial number assigned to the product during manufacturing.

5.5 PDO mapping object

Note

▶ Writing values to objects 1600h, 1601h, 1A00h, and 1A01h is only possible when the NMT state machine is in the 'Pre-Operational' state.

5.5.1 Object 1600h: RxPDO-Map 0

Configures the first reception PDO mapping object.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
1600h	0	Number of entries	0~16	-	6	-	U8	RW	No	No	-
	1	1st PDO object	-	-	1D01 0110h	A	U32	RW	No	No	-
	2	2nd PDO object	-	-	6040 0010h	A	U32	RW	No	No	-
	3	3rd PDO object	-	-	6060 0008h	A	U32	RW	No	No	-
	4	4th PDO object	-	-	0000 0008h	A	U32	RW	No	No	-
	5	5th PDO object	-	-	607A 0020h	A	U32	RW	No	No	-
	6	6th PDO object	-	-	60FE 0120h	A	U32	RW	No	No	-
	7	7th PDO object	-	-	0000 0000h	A	U32	RW	No	No	-
	8	8th PDO object	-	-	0000 0000h	A	U32	RW	No	No	-
	9	9th PDO object	-	-	0000 0000h	A	U32	RW	No	No	-
	10	10th PDO object	-	-	0000 0000h	A	U32	RW	No	No	-

5.5.2 Object 1601h: RxPDO-Map 1

Configures the second reception PDO mapping object.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
1601h	0	Number of entries	0~16	-	9	-	U8	RW	No	No	-
	1	1st PDO object	-	-	1D01 0110h	A	U32	RW	No	No	-
	2	2nd PDO object	-	-	6040 0010h	A	U32	RW	No	No	-
	3	3rd PDO object	-	-	6060 0008h	A	U32	RW	No	No	-
	4	4th PDO object	-	-	0000 0008h	A	U32	RW	No	No	-
	5	5th PDO object	-	-	607A 0020h	A	U32	RW	No	No	-
	6	6th PDO object	-	-	6081 0020h	A	U32	RW	No	No	-
	7	7th PDO object	-	-	6083 0020h	A	U32	RW	No	No	-
	8	8th PDO object	-	-	6084 0020h	A	U32	RW	No	No	-
	9	9th PDO object	-	-	60FE 0120h	A	U32	RW	No	No	-
	10	10th PDO object	-	-	0000 0000h	A	U32	RW	No	No	-

5.5.3 Object1A00h: TxPDO-Map 0

Configures the first Transmission PDO mapping object.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
1A00h	0	Number of entries	0~16	-	7	-	U8	RW	No	No	-
	1	1st PDO object	-	-	1D02 0110h	A	U32	RW	No	No	-
	2	2nd PDO object	-	-	6041 0010h	A	U32	RW	No	No	-
	3	3rd PDO object	-	-	6061 0008h	A	U32	RW	No	No	-
	4	4th PDO object	-	-	0000 0008h	A	U32	RW	No	No	-
	5	5th PDO object	-	-	603F 0010h	A	U32	RW	No	No	-
	6	6th PDO object	-	-	6064 0020h	A	U32	RW	No	No	-
	7	7th PDO object	-	-	60FD 0020h	A	U32	RW	No	No	-
	8	8th PDO object	-	-	0000 0000h	A	U32	RW	No	No	-
	9	9th PDO object	-	-	0000 0000h	A	U32	RW	No	No	-
	10	10th PDO object	-	-	0000 0000h	A	U32	RW	No	No	-

5.5.4 Object 1A01h: TxPDO-Map 1

Configures the second Transmission PDO mapping object.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
1A01h	0	Number of entries	0~16	-	8	-	U8	RW	No	No	-
	1	1st PDO object	-	-	1D02 0110h	A	U32	RW	No	No	-
	2	2nd PDO object	-	-	6041 0010h	A	U32	RW	No	No	-
	3	3rd PDO object	-	-	6061 0008h	A	U32	RW	No	No	-
	4	4th PDO object	-	-	0000 0008h	A	U32	RW	No	No	-
	5	5th PDO object	-	-	603F 0010h	A	U32	RW	No	No	-
	6	6th PDO object	-	-	6064 0020h	A	U32	RW	No	No	-
	7	7th PDO object	-	-	606C 0020h	A	U32	RW	No	No	-
	8	8th PDO object	-	-	60FD 0020h	A	U32	RW	No	No	-
	9	9th PDO object	-	-	0000 0000h	A	U32	RW	No	No	-
	10	10th PDO object	-	-	0000 0000h	A	U32	RW	No	No	-

5.6 Drive profile object

5.6.1 Object 603Fh: Error code

Displays error codes generated by the driver. For details related to error codes, refer to Section 6.1 Error Code List.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
603Fh	-	Error code	-	-	0	-	U16	RO	No	TxPDO	-

5.6.2 Object 6040h: Controlword

Controls the state transition of the driver.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
6040h	-	Controlword	-	-	0000h	A	U16	RW	No	RxPDO	-

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
-	-	oms	oms	-	-	-	oms
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Fault reset	oms	oms	oms	Enable operation	Quick stop	Enable voltage	Switch on

Bit	Name	Description
0	Switch on	Controls the state of the drive state machine. For details, refer to '4.2.1 Drive State Machine'.
1	Enable voltage	
2	Quick stop	
3	Enable operation	
4	OMS	Varies by modes of operation. For details, refer to each mode of operation in '4.2 CiA402 Drive profile'.
5		
6		
7	Fault reset	Setting this bit to 0→ 1 clears the error code.
8	OMS	For details, refer to each mode of operation in '4.2 CiA402 Drive profile'.
9	-	Reservation
10		
11		

Bit	Name	Description
12	OMS	For details, refer to each Mode of operation in '4.2 CiA402 Drive profile'.
13		
14	-	Reservation
15		

5.6.3 Object 6041h: Statusword

Indicates the current status of the driver.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
6041h	-	Statusword	-	-	0000h	-	U16	RO	No	TxPDO	-

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Safety activated	OMS	oms	oms	Internal limit active	oms	Remote	OMS
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
-	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on

Bit	Name	Description
0	Ready to switch on	Indicates the state of the drive state machine. For details, refer to '4.2.1 Drive State Machine'.
1	Switched on	
2	Operation enabled	
3	Fault	
4	Voltage enabled	
5	Quick stop	
6	Switch on disabled	
7	-	Reservation
8	OMS	Varies by modes of operation. For details, refer to each mode of operation in '4.2 CiA402 Drive profile'.
9	Remote	Controlword is processed normally, it becomes 1.
10	oms	For details, refer to each mode of operation in '4.2 CiA402 Drive profile'.
11	Internal limit active	Becomes 1 when Software Limit is detected.
12	oms	For details, refer to each Mode of operation in '4.2 CiA402 Drive profile'.
13		
14		
15	Safety activated	When the Safety Function is activated, it becomes 1.

5.6.4 Object 605Ah: Quick stop option code

Sets how the motor stops when a quick stop command is received.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
605Ah	-	Quick stop option code	0, 1, 2, 5, 6	-	2	A	I16	RW	Yes	No	-

Setting value	Description
0	Immediately switches to 'Switch on disabled' state.
1	Switches to 'Switch on disabled' state after deceleration stop.
2	After quick stop, switches to 'Switch on disabled' state.
5	After deceleration stop, switches to 'Quick stop active' state.
6	After Quick stop, switches to 'Quick stop active' state.

5.6.5 Object 605Bh: Shutdown option code

Configures the behavior during shutdown (Operation enabled → Ready to switch on).

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
605Bh	-	Shutdown Option Code	0, 1	-	0	A	I16	RW	Yes	No	-

Setting value	Description
0	Immediately switches to the 'Ready to switch on' state.
1	Transitions to 'Ready to switch on' state after deceleration stop.

5.6.6 Object 605Ch: Disable operation option code

Configures the behavior during Disable Operation (Operation enabled → Switched on).

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
605Ch	-	Disable operation Option Code	0, 1	-	1	A	I16	RW	Yes	No	-

Setting value	Description
0	Immediately switches to the 'Switched on' state.
1	Transitions to 'Switched on' state after deceleration stop.

5.6.7 Object 605Dh: Halt option code

Sets the method by which the motor halts when bit 8 of the Controlword (6040h) is set to '1'.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
605Dh	-	Halt option code	1, 2	-	1	A	I16	RW	Yes	No	-

Setting value	Description
1	After deceleration stop, transitions to the 'Operation enabled' state.
2	Transitions to 'Operation enabled' state after Quick stop.

5.6.8 Object 605Eh: Fault reaction option code

Configure the action when an error occurs.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
605Eh	-	Fault reaction Option Code	0, 1, 2	-	2	A	I16	RW	Yes	No	-

Setting value	Description
0	Immediately cuts off power to the motor.
1	Deceleration stop.
2	Performs a quick stop.

5.6.9 Object 6060h: Mode of operation

Sets the driver's modes of operation. The current modes of operation are displayed in Mode of operation display (6061h).

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
6060h	-	Mode of operation	0, 1, 6, 8	-	0	B	I8	RW	No	RxPDO	-

Setting value	Description
0	Not set.
1	Profile position mode (PP)
6	Homing mode (HM)
8	Cyclic synchronous position mode (CSP)

5.6.10 Object 6061h: Mode of operation display

Displays the current mode of operation. The value definitions are identical to Mode of operation (6060h).

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
6061h	-	Mode of operation display	-	-	0	-	I8	RO	No	TxPDO	-

5.6.11 Object 6062h: Position demand value

Displays the user-set position. This position value is the real-time target position the driver transmits to the Stepping motor.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
6062h	-	Position demand value	-	pulse	-	-	I32	RO	No	TxPDO	-

5.6.12 Object 6064h: Position actual value

Displays the current position detected by the encoder.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
6064h	-	Position Actual Value	-	pulse	-	-	I32	RO	No	TxPDO	-

5.6.13 Object 6065h: Following error window

Sets the value for detecting position error. This object cannot be set while Operation is enabled. Please set it after executing the Disable operation command.

If the value of Following error actual value exceeds the setting value, an alarm such as 'Position following error (FF03h)' or 'Position error exceeded (FF0Fh)' occurs, and the driver enters Fault status.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
6065h	-	Following error window	0 to 2147483647	pulse	5000	A	U32	RW	Yes	No	-

5.6.14 Object 6067h: Position window

Sets the range value to determine when positioning is complete. This object cannot be set while the operation is enabled. Please set it after executing the Disable operation command.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
6067h	-	Position window	0 to 63	pulse	0	A	U32	RW	Yes	No	-

5.6.15 Object 606Bh: Velocity demand value

Displays the internal command speed. The speed displays a positive value when the motor rotates in the positive direction and a negative value when rotating in the negative direction. This object is supported only in Profile position mode and homing mode. It displays 0 in cyclic synchronous position mode.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
606Bh	-	Velocity demand value	-	pps	-	-	I32	RO	No	TxPDO	-

5.6.16 Object 606Ch: Velocity actual value

Displays the current speed of the motor.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
606Ch	-	Actual Velocity Value	-	pps	-	-	I32	RO	No	TxPDO	-

Note

▶ This object does not display the motor's current speed; it displays the same value as the Velocity demand value (606Bh).

5.6.17 Object 607Ah: Target position

Sets the target position in Profile position mode and Cyclic synchronous position mode.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
607Ah	-	Target position	-2147483648 to 2147483647	pulse	0	A	I32	RW	No	RxPDO	PP CSP

5.6.18 Object 607Ch: Home offset

Sets the difference value between the sensor origin position and the mechanism origin position. During homing mode, it completes homing using the method set in Home method, then moves by the Home offset distance. If the setting value is greater than 0, it moves in the positive direction; if the value is less than 0, it moves in the negative direction.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
607Ch	-	Home Offset	-2147483648 to 2147483647	pulse	0	B	I32	RW	Yes	No	HM

5.6.19 Object 607Dh: Software position limit

Software position limit is the absolute range of positions where the position object can be located; the driver cannot operate beyond this range. If an attempt is made to move to a position outside this range, the target position is modified to fall within the range. Additionally, if the current position is outside this range, the 'Internal limit active' bit of the Statusword (6041h) is set to 1, preventing movement in that direction.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
607Dh	0	Number of entries	-	-	2	-	U8	RO	No	No	-
	1	Minimum position limit	-2147483648 to 2147483647	pulse	-2147483648	B	I32	RW	Yes	No	PP CSP
	2	Maximum position limit	-2147483648 to 2147483647	pulse	2147483647	B	I32	RW	Yes	No	PP CSP

Note

▶ If you do not wish to use the Software position limit function, set both the Min position limit value and the Max position limit value to 0.

5.6.20 Object 607Eh: Polarity

Sets the polarity (motor rotation direction). If bit 7 is 1, the polarity of Related objects changes.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
607Eh	-	Polarity	-	-	0	B	U8	RW	Yes	No	-

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Position polarity	-	-	-	-	-	-	-

5.6.21 Object 607Fh: Max profile velocity

Sets the maximum command speed. Regardless of the value entered at the Manager station, the driver will not move faster than the Max profile velocity value.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
607Fh	-	Max profile velocity	1 to 2500000	pps	2,500,000	B	U32	RW	Yes	No	-

5.6.22 Object 6081h: Profile velocity

Sets the velocity used in Profile position mode.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
6081h	-	Profile velocity	1 to 2500000	pps	10000	B	U32	RW	Yes	RxPDO	PP

5.6.23 Object 6083h: Profile acceleration

Sets the acceleration used in profile position mode.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
6083h	-	Profile acceleration	1000 to 1000000000	pps^2	1000000	B	U32	RW	Yes	RxPDO	PP

5.6.24 Object 6084h: Profile deceleration

Sets the deceleration used in Profile position mode.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
6084h	-	Profile deceleration	1000 to 1000000000	pps^2	1000000	B	U32	RW	Yes	RxPDO	PP

5.6.25 Object 6098h: Homing method

Sets the homing method.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
6098h	-	Homing method	-128 to 127	-	0	B	I8	RW	Yes	RxPDO	HM

Setting value	Description
1	Homing on negative limit switch and index pulse
2	Homing on positive limit switch and index pulse
7	Homing on home switch (positive direction, negative edge) and index pulse
10	Homing on home switch (positive direction, positive edge) and index pulse
11	Homing on home switch (negative direction, positive edge) and index pulse
14	Homing on home switch (negative direction, negative edge) and index pulse
17	Homing on negative limit switch
18	Homing on positive limit switch
24	Homing on home switch (positive direction, negative edge)
25	Homing on home switch (positive direction, positive edge)
28	Homing on home switch (negative direction, positive edge)
29	Homing on home switch (negative direction, negative edge)
33	Homing index pulse (negative direction)
34	Homing index pulse (positive direction)
35	Set the current position origin
37	Set the current position origin and reset current position
-3	Homing on negative mechanical limit
-4	Homing on negative mechanical limit
-5	Homing on negative mechanical limit and index pulse
-6	Homing on positive mechanical limit and index pulse

5.6.26 Object 6099h: Homing speeds

Sets the speed during homing.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
6099h	0	Number of entries	-	-	2	-	U8	RO	No	No	-
	1	Speed during search for switch	1 to 2500000	pps	5000	B	U32	RW	Yes	RxPDO	HM
	2	Speed during search for zero	1 to 500000	pps	1000	B	U32	RW	Yes	RxPDO	HM

Name	Description
Speed during search for switch	The speed used until the Home switch is found.
Speed during search for zero	The speed used after finding the Home switch until the origin position is located.

5.6.27 Object 609Ah: Homing acceleration

Sets the acceleration/deceleration speed used during homing mode.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
609Ah	-	Homing acceleration	1000 to 1000000000	pps^2	100000	B	U32	RW	Yes	RxPDO	HM

5.6.28 Object 60B8h: Touch probe function

Sets the function of the Touch probe.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
60B8h	-	Touch probe function	-	-	0000h	A	U16	RW	No	RxPDO	-

Bit	Name	Value	Description
0	TP1 enable	0	Stops the operation of Touch probe 1.
		1	Executes the operation of Touch probe 1.
1	TP1 trigger action	0	Latches only when the first trigger signal is detected.
		1	It continues to latch each time a trigger signal is detected.
2~3	TP1 source	0	Triggered by the origin signal.
		1	Triggered by the Z-phase signal.
		2	Triggered by the signal set in 60D0h.
		3	Reserved
4	TP1 positive edge action	0	Does not execute the action when a positive edge is detected.
		1	Executes the action when a positive edge is detected.
5	TP1 negative edge action	0	Does not execute the action when a negative edge is detected.
		1	Executes the action when a negative edge is detected.
6~7	-	0	Reserved
8	TP2 enable	0	Stops the operation of Touch probe 2.
		1	Executes the operation of Touch probe 2.
9	TP2 trigger action	0	Latches only when the first trigger signal is detected.
		1	Continues to latch each time a trigger signal is detected.
10~11	TP2 source	0	Triggered by the origin signal.
		1	Triggered by the Z-phase signal.
		2	Triggered by the signal set in 60D0h.
		3	Reserved
12	TP2 positive edge action	0	Does not execute the action when a positive edge is detected.
		1	Executes the action when a positive edge is detected.
13	TP2 negative edge action	0	Does not execute the action when a negative edge is detected.
		1	Executes the action when a negative edge is detected.
14~15	-	0	Reserved

Note

▶ Some homing methods utilize the Touch probe 2 function during homing operations. Therefore, the Touch probe 2 function cannot be enabled while in homing mode (HM). Setting bit 8 (TP2 enable) of object 60B8h to 1 while in Homing mode will cause an FF50h (E-080) error.

▶ Switching to Homing mode while the Touch probe 2 function is enabled will cause an FF50h (E-080) error.

5.6.29 Object 60B9h: Touch probe status

Displays the status of the Touch probe.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
60B9h	-	Touch probe status	-	-	0000h	-	U16	RO	No	TxPDO	-

Bit	Name	Value	Description
0	TP1 enabled status	0	Touch probe 1 is in a stopped state.
		1	Touch probe 1 is in operation.
1	TP1 positive edge latch	0	The positive edge of the selected signal was not detected.
		1	The positive edge of the selected signal has been detected.
2	TP1 negative edge latch	0	The negative edge of the selected signal was not detected.
		1	The negative edge of the selected signal has been detected.
3~5	-	0	Reserved
6~7	TP1 count	0 to 3	Displays the number of detections for Touch probe 1.
8	TP2 enabled status	0	Touch probe 2 operation is stopped.
		1	Touch probe 2 is currently operating.
9	TP2 positive edge latch	0	The positive edge of the selected signal was not detected.
		1	The positive edge of the selected signal has been detected.
10	TP2 negative edge latch	0	The negative edge of the selected signal was not detected.
		1	The negative edge of the selected signal has been detected.
11~13	-	0	Reserved
14~15	TP2 count	0 to 3	Displays the detection count for Touch probe 2.

5.6.30 Object 60BAh: Touch probe 1 positive value

Indicates the position of the latch when the positive edge of Touch probe 1 is detected.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
60BAh	-	Touch probe 1 positive value	-	pulse	-	-	I32	RO	No	TxPDO	-

5.6.31 Object 60BBh: Touch probe 1 negative value

Indicates the position of the latch when the negative edge of Touch probe 1 is detected.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
60BBh	-	Touch probe 1 negative value	-	pulse	-	-	I32	RO	No	TxPDO	-

5.6.32 Object 60BCh: Touch probe 2 positive value

Indicates the position of the latch when the positive edge of Touch probe 2 is detected.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
60BCh	-	Touch probe 2 positive value	-	pulse	-	-	I32	RO	No	TxPDO	-

5.6.33 Object 60BDh: Touch probe 2 negative value

Indicates the latch position when the negative edge of Touch probe 2 is detected.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
60BDh	-	Touch probe 2 negative value	-	pulse	-	-	I32	RO	No	TxPDO	-

5.6.34 Object 60C2h: Interpolation time period

Sets the interpolation period used in Cyclic synchronous position mode.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
60C2h	0	Number of entries	-	-	2	-	U8	RO	No	No	-
	1	Interpolation time period value	0 to 255	-	2	A	U8	RW	Yes	No	-
	2	Interpolation time index	-4 to 1	-	-3	A	I8	RW	Yes	No	-

Interpolation Period [seconds]=Interpolation Time Period Value × $10^{\text{Interpolation Time Index}}$

Note

▶ When set to synchronous communication mode, the cycle time is automatically applied as the interpolation period.

5.6.35 Object 60D0h: Touch source

Selects the trigger to be used with the latch function. Setting bits 2-3 and bits 10-11 of the Touch probe function (60B8h) to 2 causes the input signal set in this object to be used as the trigger.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
60D0h	0	Number of entries	-	-	2	-	U8	RO	No	No	-
	1	Touch probe 1 source	1, 2, 3, 5	-	1	A	U16	RW	No	No	-
	2	Touch probe 2 source	1, 2, 3, 5	-	1	A	U16	RW	No	No	-

Setting value	Description
1	Home switch
2	User input 3
3	User input 4
5	Z-phase

5.6.36 Object 60D5h: Touch probe 1 positive edge counter

Indicates the number of times the positive edge was latched on Touch probe 1.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
60D5h	-	Touch probe 1 positive edge counter	-	-	-	-	U16	RO	No	TxPDO	-

5.6.37 Object 60D6h: Touch probe 1 negative edge counter

Indicates the number of times the negative edge was latched on Touch probe 1.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
60D6h	-	Touch probe 1 negative edge counter	-	-	-	-	U16	RO	No	TxPDO	-

5.6.38 Object 60D7h: Touch probe 2 positive edge counter

Indicates the number of times the positive edge was latched on Touch probe 2.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
60D7h	-	Touch probe 2 positive edge counter	-	-	-	-	U16	RO	No	TxPDO	-

5.6.39 Object 60D8h: Touch probe 2 negative edge counter

Indicates the number of times the negative edge was latched on Touch probe 2.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
60D8h	-	Touch probe 2 negative edge counter	-	-	-	-	U16	RO	No	TxPDO	-

5.6.40 Object 60F4h: Following error actual value

Displays position deviation.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
60F4h	-	Following error Actual Value	-	pulse	-	-	I32	RO	No	TxPDO	-

Following error actual value = Position demand value (6062h) - Position actual value (6064h)

If the position deviation value exceeds the Following error window (6065h), a Following error occurs.

5.6.41 Object 60FDh: Digital inputs

Displays the status of digital inputs.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
60FDh	-	Digital inputs	-	-	0000 0000h	-	U32	Read	No	TxPDO	-

Bit 31	Bit 30	Bit 29	Bit 28	Beat 27	Bit 26	Bit 25	Bit 24
-	Motor Power	TQOFF2	TQOFF1	-	-	User input 6	User input 5
Bit 23	**Bit 22**	**Bit 21**	**Bit 20**	**Bit 19**	**Bit 18**	**Bit 17**	**Bit 16**
User input 4	User input 3	User input 2	User input 1	Reserved	Reserved	Reserved	-
Bit 15	**Bit 14**	**Bit 13**	**Bit 12**	**Bit 11**	**Bit 10**	**Bit 9**	**Bit 8**
-	-	-	-	-	-	-	-
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
-	-	-	-	-	Origin switch	Positive limit switch	Negative limit switch

5.6.42 Object 60FEh: Digital outputs

Controls user outputs and brakes.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
60FEh	0	Number of entries	-	-	2	-	U8	RO	No	No	-
	1	Physical outputs	-	-	0000 0000h	A	U32	RW	No	RxPDO	-
	2	Bit mask	-	-	001F 0000h	A	U32	RW	No	No	-

(1) Physical outputs

Outputs digital output signals.

Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
-	-	-	-	-	-	-	-
Bit 23	**Bit 22**	**Bit 21**	**Bit 20**	**Bit 19**	**Bit 18**	**Bit 17**	**Bit 16**
-	-	-	User output 5	User output 4	User output 3	User output 2	User output 1
Bit 15	**Bit 14**	**Bit 13**	**Bit 12**	**Bit 11**	**Bit 10**	**Bit 9**	**Bit 8**
-	-	-	-	-	-	-	-
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
-	-	-	-	-	-	-	Set brake

<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>Set brake</td><td>When bit 0 (Set brake) of the bit mask is set to 1, it operates as follows.
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>Brake release</td></tr><tr><td>1</td><td>Brake hold
(However, this is only possible when the driver is not in Operation enabled state.)</td></tr></table></td></tr>
<tr><td>16~20</td><td>User Output 1-5</td><td>User outputs set to 1 in the bit mask operate as follows.
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>Output off</td></tr><tr><td>1</td><td>Output on</td></tr></table></td></tr>
</table>

(2) Bit mask

Select the brake control method and configure the port to be used as a user output.

Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
-	-	-	-	-	-	-	-
Bit 23	Beat 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
-	-	-	User output 5	User output 4	User output 3	User output 2	User output 1
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
-	-	-	-	-	-	-	-
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
-	-	-	-	-	-	-	Set brake

Bit	Name	Value	Description
0	Set brake	0	Automatically applies the brakes.
		1	Operates the brake manually.
16	User output 1	0	User output 1 is not used (output off).
		1	User output 1 is used.
17	User output 2	0	User output 2 is not used (output off).
		1	User output 2 is used.
18	User output 3	0	User output 3 is not used (output off).
		1	User output 3 is used.
19	User output 4	0	User output 4 is not used (output off).
		1	User output 4 is enabled.
20	User output 5	0	User output 5 is not used (output off).
		1	User output 5 is used.

5.6.43 Object 6502h: Supported drive modes

Displays the modes of operation supported by the driver.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
6502h	-	Supported drive modes	-	-	0000 00A1h	-	U32	Read	No	No	-

Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
-	-	-	-	-	-	-	-
Bit 23	Beat 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
-	-	-	-	-	-	-	-
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
-	-	-	-	-	-	-	-
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Cyclic synchronous position mode	-	Homing mode	-	-	-	-	Profile Position Mode

5.7 Manufacturer-specific object

5.7.1 Object 2001h: Sensor logics

Sets the logic for specific input signals. A value of 0 for the corresponding bit sets it to negative logic, while a value of 1 sets it to positive logic.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2001h	-	Sensor logics	-	-	00h	A	U8	RW	Yes	No	-

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
-	-	-	-	-	-	Limit switch	Origin switch

5.7.2 Object 2002h: Reverse limit direction

Used to reverse the direction without changing the wiring when the wiring of the limit switch input signal is incorrect. Setting to 1 swaps the LIMIT+ and LIMIT- inputs at the IN/OUT terminals.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2002h	-	Reverse limit direction	0, 1	-	0	A	U8	RW	Yes	No	-

5.7.3 Object 2003h: Limit stop method

Sets the stop method when the Limit switch is On. Setting the stop method to 0 or 1 causes the driver to stop automatically when the Limit switch is on in PP mode and HM mode, but not in CSP mode. Setting it to 3 or 4 causes the driver to stop automatically in all modes.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2003h	-	Limit stop method	0 to 4	-	0	A	U8	RW	Yes	No	-

Setting value	Description	
	PP/HM mode	CSP mode
0	Quick stop	No stop
1	deceleration stop	No stop
2	No stop	No stop
3	Quick stop	Quick stop
4	deceleration stop	deceleration stop

Note

▶ During deceleration stop, the deceleration rate follows Profile deceleration (6084h) in PP mode, Homing acceleration (609Ah) in HM mode, and Limit deceleration (201Bh) in CSP mode.

5.7.4 Object 2005h: Encoder resolution

Displays the resolution of the encoder mounted on the driver.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2005h	-	Encoder resolution	-	-	-	-	U32	RO	No	No	-

Note

▶ For the number of pulses required per motor revolution, please refer to the value for Reference resolution (200Ch).

5.7.5 Object 2006h: Start speed

Sets the motor start speed in PP mode or HM mode.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2006h	-	Start speed	1 to 50000	pps	1	B	U16	RW	Yes	No	PP HM

5.7.6 Object 2007h: Run current

Sets the operating current of the motor.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2007h	-	Run current	5 to 15	-	10	A	U8	RW	Yes	No	-

Run current is expressed as the ratio of the upper limit of the current flowing through the motor during operation to the motor's rated phase current (Motor current control upper limit / Motor rated phase current × 100%). This value is related to the output torque during motor operation; therefore, a higher value increases the torque during operation. Consequently, if torque is deemed insufficient, increasing this parameter's value can boost the motor torque.

■ Operating current [%] = Setting value × 10 [%]

Note

▶ Please note that a high Run current value may also increase the motor's operating temperature.

5.7.7 Object 2008h: Boost current

Sets the motor boost current.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2008h	-	Boost current	0 to 7	-	0	A	U8	RW	Yes	No	-

Boost current is additional current supplied to the motor to improve acceleration/deceleration characteristics when sufficient acceleration/deceleration time is difficult to set. It is expressed as a percentage relative to the Run Current. Boost current is applied only during acceleration/deceleration.

■ Boost current [%] = Setting value x 50 [%]

For example, when using an EzM2-42XL (rated current: 1.2 A), setting Run Current to 10 (100%) and Boost Current to 1 (50%) results in the following current flowing through the motor during acceleration:

■ Acceleration current setting = Operating current × (100% + Boost current) = 100% × (100% + 50%) = 150%

■ Motor current during acceleration = (1.2 A × 100%) × (100% + 50%) = 1.2 A × 150% = 1.8 A

Note

▶ The maximum motor current the driver can handle is 4 A. Therefore, even if the Boost Current setting value is increased, it cannot exceed 4 A.

▶ This object cannot be configured while Operation is enabled. Please configure it after executing the Disable operation command.

5.7.8 Object 2009h: Stop current

Sets the current value flowing when the motor is stopped and no load is applied. The value is proportional to the Run current setting value.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2009h	-	Stop current	2 to 10	-	5	A	U8	RW	Yes	No	-

The driver automatically adjusts the motor's drive current from Stop current to Run current based on the load size. The reason for setting Stop current in this manner is to reduce heat generation when the motor is stopped or under light load. Please note that setting a value exceeding the default setting value (50%) may cause the motor temperature to rise.

■ Standby current [%] = Setting value x 10 [%]

5.7.9 Object 200Ah: Motor number

Displays the number of the currently set motor.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
200Ah	-	Motor number	-	-	-	-	U16	RO	No	No	-

5.7.10 Object 200Ch: Reference resolution

Sets the number of pulses required for one motor revolution.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
200Ch	-	Reference resolution	-	-	10000	A	U32	RW	Yes	No	-

Note

▶ Set the Reference resolution (200Ch) to a value equal to or smaller than the setting value for Encoder resolution (2005h). Setting a value larger than the Encoder resolution will display a fixed value for the Following error.

▶ This object cannot be set while Operation is enabled. Please execute the Disable operation command before setting it.

5.7.11 Object 200Dh: Position control gain

Sets the position control gain of the driver.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
200Dh	-	Position control gain	0 to 63	-	3	A	U8	RW	Yes	No	-

Position control gain is a parameter used to adjust the response characteristics of the load connected to the motor when the motor stops.

The position control gain value is determined by a combination of the bandwidth adjustment value and the gain adjustment value.

■ Position control gain = Bandwidth adjustment value × 8 + Gain adjustment value

The position control gain values corresponding to the bandwidth adjustment value and gain adjustment value are as shown in the table below.

Bandwidth adjustment value \ Gain adjustment value	0	1	2	3	4	5	6	7
0	0	1	2	3	4	5	6	7
1	8	9	10	11	12	13	14	15
2	16	17	18	19	20	21	22	23
3	24	25	26	27	28	29	30	31
4	32	33	34	35	36	37	38	39
5	40	41	42	43	44	45	46	47
6	48	49	50	51	52	53	54	55
7	56	57	58	59	60	61	62	63

The bandwidth adjustment value is applied when adjusting the mechanical bandwidth of an inertial load and affects system stability.

The gain adjustment value is applied when adjusting the gain of the internal PID controller. A smaller value increases responsiveness to position deviation, leading to greater overshoot and vibration. A larger value decreases responsiveness to position deviation, resulting in smaller overshoot and vibration.

The procedure for setting the bandwidth adjustment value and gain adjustment value is as follows.

- Set the bandwidth adjustment value to ensure stable operation based on the motor's inertial load.
  (Large inertial load ➔ Large bandwidth adjustment value)

Since a large bandwidth adjustment value slows responsiveness, set it to the minimum setting value that ensures stability.

- After the bandwidth adjustment value is set, set the gain adjustment value to achieve the desired responsiveness.
  (Fast responsiveness ➔ Small setting value)

Note

▶ This object cannot be configured while in Operation enabled state. Please configure it after executing the Disable operation command.

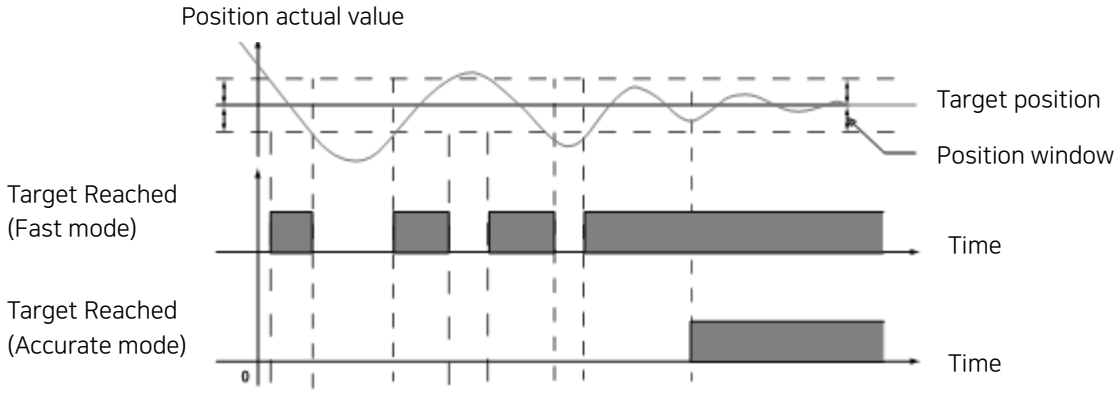
5.7.12 Object 200Eh: In-position mode

Set the modes of operation upon completion of position determination.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
200Eh	-	In-position mode	0, 1	-	0	A	U8	RW	Yes	No	-

In position control mode, when the position deviation is within the setting value in the Position window (6067h) after the position command ends, it is judged as position determination complete (Target reached).

Setting value	Description
0	Fast mode (when position deviation is within the setting value of the Position window)
1	Accurate mode (when position deviation remains within the Position window Setting value for 10 0 ms)



Note

▶ This object cannot be configured while Operation is enabled. Please configure it after executing the Disable operation command.

5.7.13 Object 200Fh: Encoder filter time

Set the filter applied to the encoder input.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
200Fh	-	Encoder filter time	0, 1	-	0	A	U8	RW	Yes	No	-

Setting value	Description
0	Default setting at factory shipment
1	500ns filter applied

Note

▶ This object cannot be configured while Operation is enabled. Please configure it after executing the Disable operation command.

5.7.14 Object 2010h: Brake delay

Sets the time until the brake is released after the Enable operation command.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2010h	-	Brake delay	0 to 5000	ms	200	A	U16	RW	Yes	No	-

5.7.15 Object 2011h: Digital input levels

Sets the operating level for user inputs.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2011h	-	Digital input levels	-	-	0000h	A	U16	RW	Yes	No	-

Bit	Description
0	Sets the action level for User Input 1.
1	Sets the action level for User Input 2.
2	Sets the action level for User Input 3.
3	Set the action level for User Input 4.
4	Set the action level for User Input 5.
5	Set the operation level for User Input 6.
6 to 15	-

5.7.16 Object 2012h: Digital output levels

Sets the operating level for the user output.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2012h	-	Digital output levels	-	-	0000h	A	U16	RW	Yes	No	-

Bit	Description
0	Sets the action level for User Output 1.
1	Sets the operating level for User Output 2.
2	Sets the operation level for User Output 3.
3	Set the operation level for User Output 4.
4	Set the operation level for User Output 5.
5 to 15	-

5.7.17 Object 2014h: Homing torque ratio

Sets the reference load value used to determine load detection during homing operations.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2014h	-	Homing Torque Ratio	20 to 90	%	50	B	U8	RW	Yes	No	HM

This object is used in -3, -4, -5, -6 of the Homing method (6098h). The unit is %, and it is proportional to the motor's Run current value.

Homing method	Description
-3	Homing on negative mechanical limit
-4	Homing on positive mechanical limit
-5	Homing on negative mechanical limit and index pulse
-6	Homing on positive mechanical limit and index pulse

5.7.18 Object 2018h: Internal current value

Displays the current value flowing through the motor when controlling it via the driver. This value represents the magnitude of the vector formed by synthesizing the current vectors flowing through each phase.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2018h	-	Internal current value	-	mA	-	-	U16	RO	No	No	-

5.7.19 Object 201Ah: Push mode

Configure the Push command used in Profile position mode.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
201Ah	0	Number of entries	-	-	2	-	U8	RO	No	No	-
	1	Push ratio	0 to 100	%	50	B	U8	RW	Yes	No	PP
	2	Pull back distance	0 to 2147483647	pulse	100	B	U32	RW	Yes	No	PP

Name	Description
Push ratio	Sets the motor force during a Push command. This indicates the percentage of the motor's maximum force. If a force greater than the set percentage is applied to the motor in the opposite direction of movement during a Push command, the system determines that work has been detected.
Pull back distance	Allows the motor to retract a specified distance when the Push command is released. The retraction position is calculated by adding the Pull back distance to the Position actual value in the opposite direction of the Push command.

5.7.20 Object 201Bh: Limit Deceleration

Sets the deceleration applied during deceleration stop in Cyclic synchronous position mode.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
201Bh	-	Limit deceleration	1000 to 1000000000	pps^2	1000000	B	U32	RW	Yes	No	CSP

5.7.21 Object 2020h: Error code history setting

Delete error code history or adjust the recording time.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2020h	0	Number of entries	-	-	2	-	U8	RO	No	No	-
	1	Function	-	-	0	A	U32	RW	Yes	No	-
	2	Interval for same error code	0 to 3600000	ms	0	A	U32	RW	Yes	No	-
	3	Interval for last error code	0 to 3600000	ms	0	A	U32	RW	Yes	No	-

Name	Description
Function	You can reset the error code history using the Function. Entering the value '00726C63h' into the Function will clear all current contents.
Interval for same error code	If an error with the same value occurs again within the set time, that error code will not be recorded. Setting the value to 0 will record all error codes without restriction.
Interval for last error code	If an error occurs again within the set time period, regardless of type, that error code will not be recorded. Setting the value to 0 will record all error codes without restriction.

5.7.22 Object 2021h: Error code history

Displays the history of recently occurred error codes. The maximum number of error codes that can be stored is 30. Error codes stored in the Error code history are not erased even if the driver's power is turned off. To initialize the Error code history, refer to the Function in the Error code history setting.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2021h	0	Number of entries	-	-	30	-	U8	RO	No	No	-
	1	Latest error code (Error Code 1)	-	-	0	-	U16	RO	No	No	-
	2	2nd latest error code (Error Code 2)	-	-	0	-	U16	RO	No	No	-
	3	3rd latest error code (Error Code 3)	-	-	0	-	U16	RO	No	No	-
	4	4th latest error code (Error Code 4)	-	-	0	-	U16	RO	No	No	-
	...										
	30	30th latest error code (Error Code 30)	-	-	0	-	U16	RO	No	No	-

5.7.23 Object 2025h: Lifetime record

Provides the total operating time and distance traveled by the driver to date.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2025h	0	Number of entries	-	-	10	-	U8	RO	No	No	-
	1	LTR*1 operating time	-	s	0	-	U32	RO	No	No	-
	2	LTR enable time	-	s	0	-	U32	RO	No	No	-
	3	LTR rotation count	-	rotation	0	-	U32	RO	No	No	-
	4	POR*2 operating time	-	s	0	-	U32	RO	No	No	-
	5	POR enable time	-	s	0	-	U32	RO	No	No	-
	6	POR rotation count	-	rotation	0	-	U32	RO	No	No	-
	7	LTR2 operating time	-	s	0	-	U32	RO	No	No	-
	8	LTR2 enable time	-	s	0	-	U32	RO	No	No	-
	9	LTR2 rotation count	-	rotation	0	-	U32	RO	No	No	-
	10	LTR2 function	-	-	0000 0000h	A	U32	RW	No	No	-

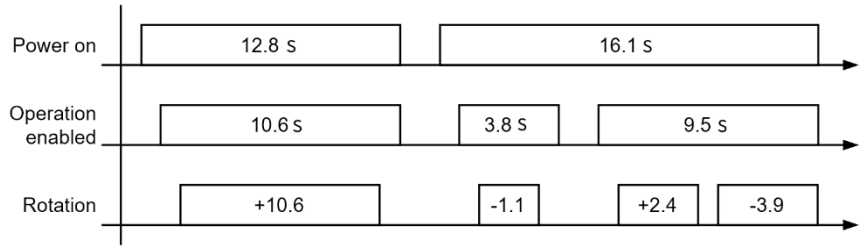
*1: Lifetime record, *2: Power-on record

Name	Description
LTR operating time	Displays the total time the driver has been operating since shipment. Decimal places are discarded when the driver power is turned off.
LTR enable time	Displays the total time the driver has been in the Operation enabled state since shipment. Fractions of time are discarded when the driver power is turned off.
LTR rotating count	Displays the total number of rotations the motor has made via commands since the driver was shipped. Fractions of a rotation are discarded when the driver power is turned off.
POR operating time	Displays the time elapsed since the driver was last powered on.

Name	Description
POR enable time	Displays the total time the driver has remained in the Operation enabled state since the most recent power-up.
POR rotating count	Displays the total number of rotations the driver has performed to rotate the motor via commands since the driver was last powered on.
LTR2 operating time	Similar to LTR operating time, this displays the total time the driver has been operating since power-up. It can be initialized using the LTR2 function.
LTR2 enable time	Displays the total time the driver has maintained an Operation enabled state after power-up. Can be initialized using the LTR2 function.
LTR2 rotating count	Similar to LTR rotating count, this displays the total number of rotations the driver has performed on the motor via commands. It can be initialized using the LTR2 function.
LTR2 function	Entering 00726C63h into the LTR2 function initializes the LTR2 operating time, LTR2 enable time, and LTR2 rotating count. When the initialization command is entered, the values of these three objects are immediately reset to zero, and information begins accumulating again from that point.

LTR: Data cannot be initialized, LTR2: Data can be initialized

For example, if the driver operates as shown below, the values for each item are as follows.



Item	Value	Description
LTR operating time	28 seconds	12 + 16.1 = 28.1
LTR enable time	23 seconds	10 + (3.8 + 9.5) = 23.3
LTR rotating count	17 rotations	10 + (1.1 + 2.4 + 3.9) = 17.4
POR operating time	16 seconds	16.1
POR enable time	13 seconds	3.8 + 9.5 = 13.3
POR rotating count	7 rotations	1.1 + 2.4 + 3.9 = 7.4

5.7.24 Object 2030h: Advanced settings

This parameter is only used for special purposes.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2030h	0	Number of entries	-	-	5	-	U8	RO	No	No	-
	1	Automatic recovery from communication error		-	0	A	U8	RW	Yes	No	-
	2	Disable automatic transition 2	0, 1	-	0	A	U8	RW	Yes	No	-
	3	Config internal limit active bit	0, 1	-	0	A	U8	RW	Yes	No	-
	4	Reserved		-							-
	5	Transition to Fault State when Safety activated	0, 1	-	0	A	U8	RW	Yes	No	-

Name	Description
Automatic recovery from communication error	This object allows setting whether to clear 'Communication error (7500h)' when the CC-Link IE TSN communication status recovers. The setting value is 1, which automatically clears 'Communication error (7500h)' during the NMT state machine's transition from Safe-Operational to Operational status.
Disable automatic transition 2	This object allows you to change whether the 'State transition 2' of the drive state machine occurs automatically. Setting this value to 1 prevents State transition 2 from occurring automatically; instead, it is performed via the 'Shutdown' command.
Config internal limit active bit	This object allows changing the behavior of bit 11 (Internal limit active) in the Statusword (6041h). Setting this value to 1 causes the Internal limit active bit to also display the H/W Limit (Limit switch) status.
Transit to Fault state wh en Safety activated	This object allows setting an alarm notification when the safety function activates. Setting the value to 1 causes an alarm (error code FF45h) to occur when the TQOFF input is off and the safety function is activated. This error can be cleared using the 'Fault Reset' command.

5.7.25 Object 2031h: Encoder count error

Sets the encoder count error (error code FF46h).

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2031h	0	Number of entries	-	-	3	-	U8	RO	No	No	-
	1	Enable encoder count error	0, 1	-	1	A	U8	RW	Yes	No	-
	2	Acceptable encoder count limit value	0 to 2147483647	pulse	28	A	U32	RW	Yes	No	-
	3	Encoder count error time out	500 to 10000	ms	1000	A	U16	RW	Yes	No	-

Name	Description
Enable encoder count error	Enables or disables encoder count error.
Acceptable encoder count limit value	Sets the maximum acceptable 'position error value' for determining encoder count error.
Encoder count error timeout	Sets the inspection time for determining encoder count errors.

5.7.26 Object 2100h: Communication speed

Specifies the communication speed for the CC-Link IE TSN network.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2100h	-	Communication speed	-	-	1000	B	U16	RW	Yes	No	-

Setting value	Description
100	100 Mbps
1000	1 Gbps (default)

Changes to the value of object 2100h are not reflected immediately; they take effect only after powering off and then back on. Therefore, if you change the value of object 2100h, be sure to save the value to EEPROM and then power off.

The changed value can be saved to EEPROM by writing 65766173h to Subindex 1 of object 1010h or by using the parameter save function in the User Software.

5.7.27 Object 2101h: IP address

Sets the IP address for CC-Link IE TSN.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2101h	0	Number of entries	-	-	4	-	U8	RO	No	No	-
	1	1st octet	0 to 223	-	192	A	U8	RW	Yes	No	-
	2	2nd octet	0 to 255	-	168	A	U8	RW	Yes	No	-
	3	3rd octet	0 to 255	-	3	A	U8	RW	Yes	No	-
	4	4th octet	1 to 254	-	1	A	U8	RW	Yes	No	

The IP address is set using the value of the network ID setting switch and the values of subindexes 1 to 4 of object 2101h.

Changes to the value of object 2101h are not reflected immediately; they take effect only after powering off and then back on. Therefore, if you change the value of object 2101h, be sure to save the value to EEPROM and then power off.

The value of object 2101h can be changed using the user software provided by our company or the engineering software used at the Manager station. When changing the value using engineering software, the value of the Network ID setting switch must be set to '0'. Values changed via Engineering software are automatically saved to EEPROM. (For details regarding the engineering software at the Manager station, please refer to the user's manual for that product.)

5.7.28 Object 2102h: Subnet mask

Sets the subnet mask for the CC-Link IE TSN network.

Index	Sub	Name	Setting Range	Unit	Default setting	Data attribute	Data type	Access	Save	PDO	Mode
2102h	0	Number of entries	-	-	4	-	U8	RO	No	No	-
	1	1st octet	0 to 255	-	255	A	U8	RW	Yes	No	-
	2	2nd octet	0 to 255	-	255	A	U8	RW	Yes	No	-
	3	3rd octet	0 to 255	-	255	A	U8	RW	Yes	No	-
	4	4th octet	0 to 255	-	0	A	U8	RW	Yes	No	

The values of object 2102h do not take effect immediately when changed; they are applied only after powering off and then back on. Therefore, if you change the value of object 2102h, be sure to save that value to EEPROM and then power off.

If the network ID setting switch is set to 240 (F0h) or 241 (F1h), the driver's subnet mask is set to the default value of 255.255.255.0, regardless of the value of object 2102h.

The value of object 2102h can be changed using the engineering software used at the Manager station. When changing the value using the engineering software, the network ID setting switch must be set to '0'. Values changed via the engineering software are automatically saved to the EEPROM. (For details regarding the engineering software at the manager station, refer to the user's manual.)

Chapter6 Troubleshooting

6.1 Error code list

When an error occurs in the driver, its operation changes to the 'Fault reaction active' state. The error type can be identified using the Error code (603Fh) when the Driver is in either the 'Fault' state or the 'Fault reaction active' state.

Error code	External Display	Error type	Cause	Measures	How to reset *1
7500h	E-500	Communication error	If an error occurs during CC-Link IE TSN communication	· Please check the status of the manager station. · Check the connection status of the communication cable. · If communication problems occur due to noise, implement noise measures.	①, ②, ③
FF01h	E-001	Overcurrent abnormal	If a current exceeding 4.8 A flows through the motor drive device	· Check for a short circuit in the motor wires. If an abnormality is found, replace the motor. · If the alarm persists after taking the above measures, replace the driver.	①, ②, ③
FF02h	E-002	Overspeed excessive	If the motor drive speed exceeds 3,000 r/min	· Check the speed command value of the manager station and set it lower if it is high.	①, ②, ③
FF03h	E-003	Position tracking abnormal	If the position error (difference between the commanded position and the actual position) during motor operation exceeds the setting value	· Check the assembly condition of the motor and mechanism. If an abnormality is found in the equipment structure, modify the structure. · If no operating sound is heard during brake operation, check the brake condition and replace it if any abnormality is found. · Check the motor bearings and motor cable condition. If any abnormalities are found, replace the motor. · Check the connection status of the encoder cable. · If the motor's mechanical components experience temporary impact causing irregular rotation, eliminate the root cause of the impact. · If the alarm persists after taking the above measures, replace the driver. · If the value for detecting position error is set too low, adjust the detection value. The detection value can be set using the Object Following error window (6065h).	①, ②, ③

Error code	External Display	Error type	Cause	Measures	How to reset *1
FF04h	E-004	Overload abnormal	If a load exceeding the motor's maximum torque is applied for 5 seconds or longer	· Please verify that the manager station did not issue a command to move the mechanism beyond its end position. · Inspect the condition of the motor and mechanism (loose screws, presence of foreign objects, structural deformation). If any abnormalities are found, take appropriate action. · Check the operating status of the H/W limit sensor and the wiring condition of the sensor cable. · Compare the load on the mechanism with the motor torque. If the torque is insufficient, replace the motor with one capable of higher torque than the load, or reduce the operating speed. · Check the condition of the motor bearings. If any abnormalities are found, replace the motor. · If the alarm persists after taking the above measures, replace the driver.	①, ②, ③
FF05h	E-005	Overheating	When the internal temperature of the driver exceeds 85°C	· If the ambient temperature is too high or heat-generating components are located near the driver, install a cooling fan. · Install the driver with a gap of at least 50 mm between drivers. · If the alarm persists despite taking the above measures, replace the driver.	①, ②, ③
FF06h	E-006	Regenerative voltage abnormal	When the motor's counter-electromotive force increases, causing the motor drive voltage to exceed the limit value	· If acceleration/deceleration time is too short, change the acceleration/deceleration conditions or reduce the drive speed. · If the alarm persists after taking the above measures, replace the driver.	①, ②, ③
FF07h	E-007	Motor connection abnormal	If there is an abnormality in the connection between the driver and the motor	· Check for open circuits on the motor. If an abnormality is found, replace the motor. · Check the connection status of the motor cable. If an abnormality is found, replace the cable. · Check the wiring condition of the connector. If an abnormality is found, correct the connection or replace the cable. · If the alarm persists after taking the above measures, replace the driver.	①, ②, ③

Error code	External Display	Error type	Cause	Measures	How to reset *1
FF08h	E-008	Encoder connection error	If there is an abnormality in the connection between the driver and the encoder	· Please check the connection status between the driver and motor encoder connectors. · Check the condition of the encoder relay cable. · Check the connection status between the encoder base cable and the encoder relay cable. · Check the encoder status. If an abnormality is found, replace the motor. · If the alarm persists after taking the above measures, replace the driver.	①, ②, ③
FF0Ah	E-010	Position error	If position error exceeding the setting value occurs continuously for 3 seconds or more after the motor completes operation	· Check the condition of the mechanism and the belt tension. If any issues are found, adjust the belt tension to prevent vibration. · Check the wiring condition of the motor cable and encoder cable. If any issues are found, correct the connection or replace the cable.	①, ②, ③
FF0Ch	E-012	ROM error	If an error occurs in the parameter storage device (ROM)	· If the alarm persists, replace the driver.	③
FF0Eh	E-014	Abnormal input voltage	If the input voltage exceeds the limit	· Please verify that the power voltage supplied to the power connector meets the specifications. · If the alarm continues to sound even though the power supply voltage is normal, please replace the driver.	①, ②, ③
FF0Fh	E-015	Position error exceeded	If position error exceeding the setting value occurs after the motor completes operation	· Compare the load on the mechanism with the motor torque. If the torque is insufficient, replace the motor with one that has greater torque than the load, or reduce the operating speed. · Please check the connection status of the encoder cable. · If no operating sound is heard during brake operation, replace the brake cable. · If the motor's mechanical components have been impacted, causing the motor to rotate poorly, eliminate the root cause of the impact.	①, ②, ③

Error code	External Display	Error type	Cause	Measures	How to reset *1
FF10h	E-016	Emergency stop circuit malfunction	When the input states of TQOFF1 and TQOFF2 are different	· Please verify that the status of the sensor connected to TQOFF1 is identical to that of the sensor connected to TQOFF2. · Please double-check the connection status of the cables connected to the product's torque-off signal connector (CN6).	③
FF31h	E-049	Driver alarm occurred	When another alarm occurs on the driver	· If the alarm persists, replace the driver.	①, ②, ③
FF32h	E-050	Driver internal communication abnormal	If a timeout error occurs	· If the alarm persists, replace the driver.	①, ②, ③
FF34h	E-052		If a CRC error occurs		①, ②, ③
FF35h	E-053		When the command is not executed properly		①, ②, ③
FF3Ch	E-060	Servo enable command execution error	If the Servo enable command does not execute properly	· If the alarm persists, replace the driver.	①, ②, ③
FF3Dh	E-061	Push command execution error	If the Push command does not execute properly	· If the alarm persists, replace the driver.	①, ②, ③
FF3Fh	E-063	Driver SVOFF occured	If the driver has disabled itself due to servo failure	· If the alarm persists, replace the driver.	①, ②, ③
FF41h	E-065	Servo enable failure	If the in-position signal is unstable or not detected during the servo enable process of the driver	· Check for vibration or external force on the mechanism where the motor is mounted and eliminate the root cause.	①, ②, ③
FF42h	E-066	Servo disable failure	If the SVOFF signal from the driver is not detected during the driver's servo disable process	· If the alarm persists, replace the driver.	①, ②, ③
FF43h	E-067	Homing failure	If the position signal is unstable or not detected during the homing process	· Check for vibration or external force during the homing process and eliminate the root cause.	①, ②, ③

Error code	External Display	Error type	Cause	Measures	How to reset *1
FF44h	E-068	CSP speed limit exceeded	If the input speed value in CSP mode exceeds the limit speed	· Check the speed command value from the manager station and set it lower if it is high.	①, ②, ③
FF46h	E-070	Encoder coefficient error	When abnormal encoder input signals prevent normal measurement	· If abnormalities caused by vibration or external forces from the equipment are detected, adjust the value of subindex 2 (Acceptable encoder count limit value) of Encoder count error (2031h). · If the value of Following error actual value (60F4h) continues to increase, check the connection between the driver and encoder connectors. · Check the encoder status; if an abnormality is found, replace the motor.	①, ②, ③
FF49h	E-073	Synchronization type error	When CSP mode is used while not in synchronous communication mode	· Set the driver's synchronization method to synchronous communication mode in the CC-Link IE TSN manager station.	①, ②, ③
FF4Ch	E-076	Driver internal communication faulty	If communication cannot be initiated	· If the alarm persists, replace the driver.	③
FF50h	E-080	Poor homing conditions	Switching to Homing mode while Touch probe 2 function is active	· Please disable Touch probe 2 functionality before switching to homing mode. (Refer to object 60B8h)	①, ②, ③
FF64h	E-100	ROM error	If parameters are not stored correctly in ROM	· If the alarm persists, replace the driver.	③
FF65h	E-101		If the ROM checksum does not match		
FF66h	E-102		Error occurred while reading data from FRAM		
FF6Eh	E-110		An error occurred while reading data from ROM		
FF79h	E-121		When an error occurs while writing data to ROM (1)		
FF7Ah	E-122		Error occurred while writing data to ROM (2)		

Error code	External Display	Error type	Cause	Measures	How to reset *1
FF7Bh	E-123	ROM error	Error occurred while writing data to ROM (3)	· If the alarm persists, replace the driver.	
FF7Ch	E-124		When an error occurs while writing data to the ROM (4)		
FFC8h	E-200	ROM data out of range	If the parameter value stored in ROM is out of range	· Please initialize all parameters. · If the alarm persists, replace the driver.	③

*1: Refer to Section 6.3 for error code reset procedures.

6.2 Error code history

The alarm stores the most recent 30 occurrences in ROM. You can check or reset the stored data using the following methods.

(1) Error history can be checked via Error code history (2021h). Entering the value '00726C63h' in subindex 1 (Function) of Error code history setting (2020h) will reset all error history.

(2) You can check or delete alarm history using the user software. For details, refer to the corresponding user's manual.

6.3 Error code clearance

When an alarm occurs, always eliminate the cause and ensure safety before clearing the error using the following method.

Clear Method No.	Clear method
①	Set the Fault reset bit (6040h: Bit 7) in the Controlword to 0 → 1.
②	Use the Alarm Reset function in the driver configuration program. (When resetting the alarm using the driver configuration program, disconnect the driver's CC-Link IE TSN communication connection before executing.)
③	Turn the power off and then back on.

6.4 SLMP End code

End code	Cause
0000h	The request completed successfully.
C059h	An instruction different from the specified sequence was received.
C05Ch	There is an error in the request.
CEE0h	The request cannot be processed because another request is being processed.
CF30h	The specified parameter ID does not exist.
CCC7h	You accessed an object under conditions where access is not permitted.
CCC8h	Attempted to read from a write-only object.
CCC9h	Attempted to write to a read-only object.
CCCAh	An undefined index was specified in the object dictionary.
CCCBh	Attempted to map an object that is not eligible for PDO mapping.
CCCCh	The total number of data items or the total data length for PDO mapping exceeded the value defined by the application.
CCD3h	A non-existent subindex was specified.
CCD4h	The request parameter is outside the allowed range.
CCD5h	A value exceeding the parameter range has been set.

End code	Cause
CCD6h	A value smaller than the parameter range has been set.
CCDAh	The application cannot transmit or store data.
CCFFh	This is a general application error.

A1 Motor and driver combination table

A1.1 Combinations of standard motor and driver

Unit product name	Motor product name	Driver product name
Ezi-SERVO-CT-ALL-42M-A-R	Integrated motor and driver	
Ezi-SERVO-CT-ALL-42M-B-R		
Ezi-SERVO-CT-ALL-42L-A-R		
Ezi-SERVO-CT-ALL-42L-B-R		
Ezi-SERVO-CT-ALL-42XL-A-R		
Ezi-SERVO-CT-ALL-42XL-B-R		
Ezi-SERVO-CT-ALL-56S-A-R		
Ezi-SERVO-CT-ALL-56S-B-R		
Ezi-SERVO-CT-ALL-56M-A-R		
Ezi-SERVO-CT-ALL-56M-B-R		
Ezi-SERVO-CT-ALL-56L-A-R		
Ezi-SERVO-CT-ALL-56L-B-R		
Ezi-SERVO-CT-ALL-60S-A-R		
Ezi-SERVO-CT-ALL-60S-B-R		
Ezi-SERVO-CT-ALL-60M-A-R		
Ezi-SERVO-CT-ALL-60M-B-R		
Ezi-SERVO-CT-ALL-60L-A-R		
Ezi-SERVO-CT-ALL-60L-B-R		

A1.2 Combinations of electromagnetic brake motor and driver

Unit product name	Motor product name	Driver product name
Ezi-SERVO-CT-ALL-42M-A-BK-R	Integrated motor and driver	
Ezi-SERVO-CT-ALL-42M-B-BK-R		
Ezi-SERVO-CT-ALL-42L-A-BK-R		
Ezi-SERVO-CT-ALL-42L-B-BK-R		
Ezi-SERVO-CT-ALL-42XL-A-BK-R		
Ezi-SERVO-CT-ALL-42XL-B-BK-R		
Ezi-SERVO-CT-ALL-56S-A-BK-R		
Ezi-SERVO-CT-ALL-56S-B-BK-R		
Ezi-SERVO-CT-ALL-56M-A-BK-R		
Ezi-SERVO-CT-ALL-56M-B-BK-R		
Ezi-SERVO-CT-ALL-56L-A-BK-R		
Ezi-SERVO-CT-ALL-56L-B-BK-R		
Ezi-SERVO-CT-ALL-60S-A-BK-R		
Ezi-SERVO-CT-ALL-60S-B-BK-R		
Ezi-SERVO-CT-ALL-60M-A-BK-R		
Ezi-SERVO-CT-ALL-60M-B-BK-R		
Ezi-SERVO-CT-ALL-60L-A-BK-R		
Ezi-SERVO-CT-ALL-60L-B-BK-R		

A1.3 Combinations of geared motor and driver

Unit product name	Motor product name	Driver product name	Gear ratio
Ezi-SERVO-CT-ALL-42M-A-PN3-R	Integrated motor and driver		1:3
Ezi-SERVO-CT-ALL-42M-B-PN3-R			
Ezi-SERVO-CT-ALL-42M-A-PN5-R			1:5
Ezi-SERVO-CT-ALL-42M-B-PN5-R			
Ezi-SERVO-CT-ALL-42M-A-PN8-R			1:8
Ezi-SERVO-CT-ALL-42M-B-PN8-R			
Ezi-SERVO-CT-ALL-42M-A-PN10-R			1:10
Ezi-SERVO-CT-ALL-42M-B-PN10-R			
Ezi-SERVO-CT-ALL-42M-A-PN15-R			1:15
Ezi-SERVO-CT-ALL-42M-B-PN15-R			
Ezi-SERVO-CT-ALL-42M-A-PN25-R			1:25
Ezi-SERVO-CT-ALL-42M-A-PN25-R			
Ezi-SERVO-CT-ALL-42M-A-PN40-R			1:40
Ezi-SERVO-CT-ALL-42M-A-PN40-R			
Ezi-SERVO-CT-ALL-42M-A-PN50-R			1:50
Ezi-SERVO-CT-ALL-42M-A-PN50-R			
Ezi-SERVO-CT-ALL-42L-A-PN3-R			1:3
Ezi-SERVO-CT-ALL-42L-B-PN3-R			
Ezi-SERVO-CT-ALL-42L-A-PN5-R			1:5
Ezi-SERVO-CT-ALL-42L-B-PN5-R			
Ezi-SERVO-CT-ALL-42L-A-PN8-R			1:8
Ezi-SERVO-CT-ALL-42L-B-PN8-R			
Ezi-SERVO-CT-ALL-42L-A-PN10-R			1:10
Ezi-SERVO-CT-ALL-42L-B-PN10-R			
Ezi-SERVO-CT-ALL-42L-A-PN15-R			1:15
Ezi-SERVO-CT-ALL-42L-B-PN15-R			
Ezi-SERVO-CT-ALL-42L-A-PN25-R			1:25
Ezi-SERVO-CT-ALL-42L-B-PN25-R			
Ezi-SERVO-CT-ALL-42L-A-PN40-R			1:40
Ezi-SERVO-CT-ALL-42L-B-PN40-R			
Ezi-SERVO-CT-ALL-42L-A-PN50-R			1:50
Ezi-SERVO-CT-ALL-42L-B-PN50-R			

Unit product name	Motor product name	Driver product name	Gear ratio
Ezi-SERVO-CT-ALL-42XL-A-PN3-R	Integrated motor and driver		1:3
Ezi-SERVO-CT-ALL-42XL-B-PN3-R			
Ezi-SERVO-CT-ALL-42XL-A-PN5-R			1:5
Ezi-SERVO-CT-ALL-42XL-B-PN5-R			
Ezi-SERVO-CT-ALL-42XL-A-PN8-R			1:8
Ezi-SERVO-CT-ALL-42XL-B-PN8-R			
Ezi-SERVO-CT-ALL-42XL-A-PN10-R			1:10
Ezi-SERVO-CT-ALL-42XL-B-PN10-R			
Ezi-SERVO-CT-ALL-42XL-A-PN15-R			1:15
Ezi-SERVO-CT-ALL-42XL-B-PN15-R			
Ezi-SERVO-CT-ALL-42XL-A-PN25-R			1:25
Ezi-SERVO-CT-ALL-42XL-B-PN25-R			
Ezi-SERVO-CT-ALL-42XL-A-PN40-R			1:40
Ezi-SERVO-CT-ALL-42XL-B-PN40-R			
Ezi-SERVO-CT-ALL-42XL-A-PN50-R			1:50
Ezi-SERVO-CT-ALL-42XL-B-PN50-R			
Ezi-SERVO-CT-ALL-56S-A-PN3-R			1:3
Ezi-SERVO-CT-ALL-56S-A-PN3-R			
Ezi-SERVO-CT-ALL-56S-A-PN5-R			1:5
Ezi-SERVO-CT-ALL-56S-A-PN5-R			
Ezi-SERVO-CT-ALL-56S-A-PN8-R			1:8
Ezi-SERVO-CT-ALL-56S-A-PN8-R			
Ezi-SERVO-CT-ALL-56S-A-PN10-R			1:10
Ezi-SERVO-CT-ALL-56S-A-PN10-R			
Ezi-SERVO-CT-ALL-56S-A-PN15-R			1:15
Ezi-SERVO-CT-ALL-56S-A-PN15-R			
Ezi-SERVO-CT-ALL-56S-A-PN25-R			1:25
Ezi-SERVO-CT-ALL-56S-A-PN25-R			
Ezi-SERVO-CT-ALL-56S-A-PN40-R			1:40
Ezi-SERVO-CT-ALL-56S-A-PN40-R			
Ezi-SERVO-CT-ALL-56S-A-PN50-R			1:50
Ezi-SERVO-CT-ALL-56S-A-PN50-R			

Unit product name	Motor product name	Driver product name	Gear ratio
Ezi-SERVO-CT-ALL-42XL-A-PN3-R	Integrated motor and driver		1:3
Ezi-SERVO-CT-ALL-42XL-B-PN3-R			
Ezi-SERVO-CT-ALL-42XL-A-PN5-R			1:5
Ezi-SERVO-CT-ALL-42XL-B-PN5-R			
Ezi-SERVO-CT-ALL-42XL-A-PN8-R			1:8
Ezi-SERVO-CT-ALL-42XL-B-PN8-R			
Ezi-SERVO-CT-ALL-42XL-A-PN10-R			1:10
Ezi-SERVO-CT-ALL-42XL-B-PN10-R			
Ezi-SERVO-CT-ALL-42XL-A-PN15-R			1:15
Ezi-SERVO-CT-ALL-42XL-B-PN15-R			
Ezi-SERVO-CT-ALL-42XL-A-PN25-R			1:25
Ezi-SERVO-CT-ALL-42XL-B-PN25-R			
Ezi-SERVO-CT-ALL-42XL-A-PN40-R			1:40
Ezi-SERVO-CT-ALL-42XL-B-PN40-R			
Ezi-SERVO-CT-ALL-42XL-A-PN50-R			1:50
Ezi-SERVO-CT-ALL-42XL-B-PN50-R			
Ezi-SERVO-CT-ALL-56S-A-PN3-R			1:3
Ezi-SERVO-CT-ALL-56S-A-PN3-R			
Ezi-SERVO-CT-ALL-56S-A-PN5-R			1:5
Ezi-SERVO-CT-ALL-56S-A-PN5-R			
Ezi-SERVO-CT-ALL-56S-A-PN8-R			1:8
Ezi-SERVO-CT-ALL-56S-A-PN8-R			
Ezi-SERVO-CT-ALL-56S-A-PN10-R			1:10
Ezi-SERVO-CT-ALL-56S-A-PN10-R			
Ezi-SERVO-CT-ALL-56S-A-PN15-R			1:15
Ezi-SERVO-CT-ALL-56S-A-PN15-R			
Ezi-SERVO-CT-ALL-56S-A-PN25-R			1:25
Ezi-SERVO-CT-ALL-56S-A-PN25-R			
Ezi-SERVO-CT-ALL-56S-A-PN40-R			1:40
Ezi-SERVO-CT-ALL-56S-A-PN40-R			
Ezi-SERVO-CT-ALL-56S-A-PN50-R			1:50
Ezi-SERVO-CT-ALL-56S-A-PN50-R			

Unit product name	Motor product name	Driver product name	Gear ratio
Ezi-SERVO-CT-ALL-56M-A-PN3-R	Integrated motor and driver		1:3
Ezi-SERVO-CT-ALL-56M-A-PN3-R			
Ezi-SERVO-CT-ALL-56M-A-PN5-R			1:5
Ezi-SERVO-CT-ALL-56M-A-PN5-R			
Ezi-SERVO-CT-ALL-56M-A-PN8-R			1:8
Ezi-SERVO-CT-ALL-56M-A-PN8-R			
Ezi-SERVO-CT-ALL-56M-A-PN10-R			1:10
Ezi-SERVO-CT-ALL-56M-A-PN10-R			
Ezi-SERVO-CT-ALL-56M-A-PN15-R			1:15
Ezi-SERVO-CT-ALL-56M-A-PN15-R			
Ezi-SERVO-CT-ALL-56M-A-PN25-R			1:25
Ezi-SERVO-CT-ALL-56M-A-PN25-R			
Ezi-SERVO-CT-ALL-56M-A-PN40-R			1:40
Ezi-SERVO-CT-ALL-56M-A-PN40-R			
Ezi-SERVO-CT-ALL-56M-A-PN50-R			1:50
Ezi-SERVO-CT-ALL-56M-A-PN50-R			
Ezi-SERVO-CT-ALL-56L-A-PN3-R			1:3
Ezi-SERVO-CT-ALL-56L-A-PN3-R			
Ezi-SERVO-CT-ALL-56L-A-PN5-R			1:5
Ezi-SERVO-CT-ALL-56L-A-PN5-R			
Ezi-SERVO-CT-ALL-56L-A-PN8-R			1:8
Ezi-SERVO-CT-ALL-56L-A-PN8-R			
Ezi-SERVO-CT-ALL-56L-A-PN10-R			1:10
Ezi-SERVO-CT-ALL-56L-A-PN10-R			
Ezi-SERVO-CT-ALL-56L-A-PN15-R			1:15
Ezi-SERVO-CT-ALL-56L-A-PN15-R			
Ezi-SERVO-CT-ALL-56L-A-PN25-R			1:25
Ezi-SERVO-CT-ALL-56L-A-PN25-R			
Ezi-SERVO-CT-ALL-56L-A-PN40-M			1:40
Ezi-SERVO-CT-ALL-56L-A-PN40-R			
Ezi-SERVO-CT-ALL-56L-A-PN50-R			1:50
Ezi-SERVO-CT-ALL-56L-A-PN50-R			

Unit product name	Motor product name	Driver product name	Gear ratio
Ezi-SERVO-CT-ALL-60S-A-PN3-R	Integrated motor and driver		1:3
Ezi-SERVO-CT-ALL-60S-A-PN3-R			
Ezi-SERVO-CT-ALL-60S-A-PN5-R			1:5
Ezi-SERVO-CT-ALL-60S-A-PN5-R			
Ezi-SERVO-CT-ALL-60S-A-PN8-R			1:8
Ezi-SERVO-CT-ALL-60S-A-PN8-R			
Ezi-SERVO-CT-ALL-60S-A-PN10-R			1:10
Ezi-SERVO-CT-ALL-60S-A-PN10-R			
Ezi-SERVO-CT-ALL-60S-A-PN15-R			1:15
Ezi-SERVO-CT-ALL-60S-A-PN15-R			
Ezi-SERVO-CT-ALL-60S-A-PN25-R			1:25
Ezi-SERVO-CT-ALL-60S-A-PN25-R			
Ezi-SERVO-CT-ALL-60S-A-PN40-R			1:40
Ezi-SERVO-CT-ALL-60S-A-PN40-R			
Ezi-SERVO-CT-ALL-60S-A-PN50-R			1:50
Ezi-SERVO-CT-ALL-60S-A-PN50-R			
Ezi-SERVO-CT-ALL-60M-A-PN3-R			1:3
Ezi-SERVO-CT-ALL-60M-A-PN3-R			
Ezi-SERVO-CT-ALL-60M-A-PN5-R			1:5
Ezi-SERVO-CT-ALL-60M-A-PN5-R			
Ezi-SERVO-CT-ALL-60M-A-PN8-R			1:8
Ezi-SERVO-CT-ALL-60M-A-PN8-R			
Ezi-SERVO-CT-ALL-60M-A-PN10-R			1:10
Ezi-SERVO-CT-ALL-60M-A-PN10-R			
Ezi-SERVO-CT-ALL-60M-A-PN15-R			1:15
Ezi-SERVO-CT-ALL-60M-A-PN15-R			
Ezi-SERVO-CT-ALL-60M-A-PN25-R			1:25
Ezi-SERVO-CT-ALL-60M-A-PN25-R			
Ezi-SERVO-CT-ALL-60M-A-PN40-R			1:40
Ezi-SERVO-CT-ALL-60M-A-PN40-R			
Ezi-SERVO-CT-ALL-60M-A-PN50-R			1:50
Ezi-SERVO-CT-ALL-60M-A-PN50-R			

Unit product name	Motor product name	Driver product name	Gear ratio
Ezi-SERVO-CT-ALL-60L-A-PN3-R	Integrated motor and driver		1:3
Ezi-SERVO-CT-ALL-60L-A-PN3-R			
Ezi-SERVO-CT-ALL-60L-A-PN5-R			1:5
Ezi-SERVO-CT-ALL-60L-A-PN5-R			
Ezi-SERVO-CT-ALL-60L-A-PN8-R			1:8
Ezi-SERVO-CT-ALL-60L-A-PN8-R			
Ezi-SERVO-CT-ALL-60L-A-PN10-R			1:10
Ezi-SERVO-CT-ALL-60L-A-PN10-R			
Ezi-SERVO-CT-ALL-60L-A-PN15-R			1:15
Ezi-SERVO-CT-ALL-60L-A-PN15-R			
Ezi-SERVO-CT-ALL-60L-A-PN25-R			1:25
Ezi-SERVO-CT-ALL-60L-A-PN25-R			
Ezi-SERVO-CT-ALL-60L-A-PN40-R			1:40
Ezi-SERVO-CT-ALL-60L-A-PN40-R			
Ezi-SERVO-CT-ALL-60L-A-PN50-R			1:50
Ezi-SERVO-CT-ALL-60L-B-PN50-R			

A2 Motor specifications

A2.1 General specifications

Item	Specifications
Operating ambient temperature	0~40 ℃[*1] (non-freezing)
Storage ambient temperature	-20 to 60 ℃ (non-freezing)
Operating ambient humidity	85% RH or less (non-condensing)
Storage ambient humidity	85% RH or less (non-condensing)
Insulation resistance	When measured with a 500 V DC insulation tester, the insulation resistance of the following places shall be 100 MΩ or more · Case ↔ Motor winding · Case ↔ Electronic brake winding
Ambience	No corrosive gas, inflammable gas, oil mist or dust
Altitude	Operation: Up to 1,000 m above sea level Transportation/Storage: Up to 3,000 m above sea level
Degree of protection	IP40 (excluding motor output shaft and connector section)
Insulation class	Class B (130℃)

*1: Depending on operating conditions, excessive heat may be generated in the motor. Take special care to ensure the motor's surface temperature does not exceed 80℃ to protect the sensors installed on the motor.

A2.2 Standard motor

Motor model				Ezi-SERVOII-CT-ALL-42 type			Ezi-SERVOII-CT-ALL-56 type		
			Unit	42M	42L	42XL	56S	56M	56L
Drive type			-	Bipolar drive					
Number of phases			-	2-phase					
Phase rated current			A/phase	1.2	1.2	1.2	3.0	3.0	3.0
Maximum stopping torque			N·m	0.44	0.5	0.65	0.64	1.0	1.5
Rotor inertia moment			g·cm2	54	77	114	180	280	520
Weight			kg	0.440	0.520	0.660	0.760	0.920	1.360
Length (L)			mm	40	48	60	46	55	80
Allowable radial load	Distance from motor shaft end	3mm	N	22	22	22	52	52	52
		8mm		26	26	26	65	65	65
		13mm		33	33	33	85	85	85
		18mm		46	46	46	123	123	123
Permissible axial load			N	Must be lower than the motor unit weight					

A2.3 Electromagnetic brake motor

Unit product name	Motor product name	Electronic brake					Motor unit weight [kg]	Allowable radial load [N]				Allowable axial load [N]
		Type	Power input [V]	Rated current [A]	Consum-ption power [W]	Static friction torque [N·m]		Distance from motor shaft end [mm]				
								3	8	13	18	
Ezi-SERVO-CT-ALL-42M-■-BK-▲	Integrated motor and driver	Non-excitation Operating	24 V DC ±10 %	0.2	5	0.2	0.700	22	26	33	46	Must be lower than the motor unit weight
Ezi-SERVO-CT-ALL-42L-■-BK-▲							0.780					
Ezi-SERVO-CT-ALL-42XL-■-BK-▲							0.920					
Ezi-SERVO-CT-ALL-56S-■-BK-▲				0.27	6.6	0.7	1.180	52	65	85	123	
Ezi-SERVO-CT-ALL-56M-■-BK-▲							1.340					
Ezi-SERVO-CT-ALL-56L-■-BK-▲							1.780					
Ezi-SERVO-CT-ALL-60S-■-BK-▲							1.280	70	87	114	165	
Ezi-SERVO-CT-ALL-60M-■-BK-▲							1.420					
Ezi-SERVO-CT-ALL-60L-■-BK-▲							1.980					

"■" indicates encoder resolution.

"▲" indicates connector type.

- The electronic brake can be used for position holding when the power is off.
  Do not use it for braking.
- The weight is the total weight of the motor unit, which is the motor and electronic brake combined as one unit.
- The motor model name is the combined model name of the motor and brake.
- The motor's specifications and torque characteristics are identical to those of the Standard motor.

A2.4 Geared motor

● 42mm

Unit product name	Max. holding torque [N·m]	Rotor inertia moment [kg·m²]	Backlash [arc-min]	Angular transmi-ssion error [arcmin]	Gear ratio	Resolution (Set to 10,000 P/R)	Allowable torque [N·m]	Max. instanta-neous torque [N·m]	Allowable Speed range [r/min]	Unit weight [kg]	Allowable radial load (Center of shaft) [N]	Allowable axial load [N]
Ezi-SERVO-CT-ALL-42M-■-PN3-▲	0.85	54x 10^{-7}	3	5	3	0.012°	6	12	0~1000	0.90	240	270
Ezi-SERVO-CT-ALL-42M-■-PN5-▲	1.42				5	0.0072°	9	18	0~600		290	330
Ezi-SERVO-CT-ALL-42M-■-PN8-▲	2.28				8	0.0045°	9	18	0~375		340	410
Ezi-SERVO-CT-ALL-42M-■-PN10-▲	2.85				10	0.0036°	6	12	0~300		360	450
Ezi-SERVO-CT-ALL-42M-■-PN15-▲	4.14		5	7	15	0.0024°	6	12	0~200	1.06	410	540
Ezi-SERVO-CT-ALL-42M-■-PN25-▲	6.90				25	0.00144°	9	18	0~120		490	640
Ezi-SERVO-CT-ALL-42M-■-PN40-▲	9.00				40	0.0009°	9	18	0~75		570	640
Ezi-SERVO-CT-ALL-42M-■-PN50-▲	9.00				50	0.00072°	9	18	0~60		620	640
Ezi-SERVO-CT-ALL-42L-■-PN3-▲	0.92	77x 10^{-7}	3	5	3	0.012°	6	12	0~1000	0.98	240	270
Ezi-SERVO-CT-ALL-42L-■-PN5-▲	1.54				5	0.0072°	9	18	0~600		290	330
Ezi-SERVO-CT-ALL-42L-■-PN8-▲	2.47				8	0.0045°	9	18	0~375		340	410
Ezi-SERVO-CT-ALL-42L-■-PN10-▲	3.09				10	0.0036°	6	12	0~300		360	450
Ezi-SERVO-CT-ALL-42L-■-PN15-▲	4.49		5	7	15	0.0024°	6	12	0~200	1.14	410	540
Ezi-SERVO-CT-ALL-42L-■-PN25-▲	7.49				25	0.00144°	9	18	0~120		490	640
Ezi-SERVO-CT-ALL-42L-■-PN40-▲	9.00				40	0.0009°	9	18	0~75		570	640
Ezi-SERVO-CT-ALL-42L-■-PN50-▲	9.00				50	0.00072°	9	18	0~60		620	640
Ezi-SERVO-CT-ALL-42XL-■-PN3-▲	1.45	114x 10^{-7}	3	5	3	0.012°	6	12	0~1000	1.12	240	270
Ezi-SERVO-CT-ALL-42XL-■-PN5-▲	2.42				5	0.0072°	9	18	0~600		290	330
Ezi-SERVO-CT-ALL-42XL-■-PN8-▲	3.87				8	0.0045°	9	18	0~375		340	410
Ezi-SERVO-CT-ALL-42XL-■-PN10-▲	4.84				10	0.0036°	6	12	0~300		360	450
Ezi-SERVO-CT-ALL-42XL-■-PN15-▲	6.00		5	7	15	0.0024°	6	12	0~200	1.28	410	540
Ezi-SERVO-CT-ALL-42XL-■-PN25-▲	9.00				25	0.00144°	9	18	0~120		490	640
Ezi-SERVO-CT-ALL-42XL-■-PN40-▲	9.00				40	0.0009°	9	18	0~75		570	640
Ezi-SERVO-CT-ALL-42XL-■-PN50-▲	9.00				50	0.00072°	9	18	0~60		620	640

"■" indicates encoder resolution.

"▲" indicates connector type.

● 56mm

Unit product name	Max. holding torque [N·m]	Rotor inertia moment [kg·m²]	Backlash [arc-min]	Angular transmi-ssion error [arcmin]	Gear ratio	Resolution (Set to 10,000 P/R)	Allowable torque [N·m]	Max. instanta-neous torque [N·m]	Allowable Speed range [r/min]	Unit weight [kg]	Allowable radial load (Center of shaft) [N]	Allowable axial load [N]
Ezi-SERVO-CT-ALL-56S-■-PN3-▲	1.1	180x 10^{-7}	3	5	3	0.012°	18	35	0~1000	1.90	430	310
Ezi-SERVO-CT-ALL-56S-■-PN5-▲	1.9				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO-CT-ALL-56S-■-PN8-▲	3.0				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO-CT-ALL-56S-■-PN10-▲	3.8				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO-CT-ALL-56S-■-PN15-▲	5.5				15	0.0024°	18	35	0~200	2.20	740	630
Ezi-SERVO-CT-ALL-56S-■-PN25-▲	9.3				25	0.00144°	27	50	0~120		870	790
Ezi-SERVO-CT-ALL-56S-■-PN40-▲	14.9				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO-CT-ALL-56S-■-PN50-▲	18.6				50	0.00072°	27	50	0~60		1100	1100
Ezi-SERVO-CT-ALL-56M-■-PN3-▲	2.0	280x 10^{-7}	3	5	3	0.012°	18	35	0~1000	2.06	430	310
Ezi-SERVO-CT-ALL-56M -■-PN5-▲	3.4				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO-CT-ALL-56M -■-PN8-▲	5.4				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO-CT-ALL-56M-■-PN10-▲	6.8				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO-CT-ALL-56M-■-PN15-▲	9.9				15	0.0024°	18	35	0~200	2.36	740	630
Ezi-SERVO-CT-ALL-56M-■-PN25-▲	16.6				25	0.00144°	27	50	0~120		870	790
Ezi-SERVO-CT-ALL-56M-■-PN40-▲	27.0				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO-CT-ALL-56M-■-PN50-▲	27.0				50	0.00072°	27	50	0~60		1100	1100
Ezi-SERVO-CT-ALL-56L-■-PN3-▲	4.0	520x 10^{-7}	3	5	3	0.012°	18	35	0~1000	2.50	430	310
Ezi-SERVO-CT-ALL-56L-■-PN5-▲	6.8				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO-CT-ALL-56L-■-PN8-▲	10.8				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO-CT-ALL-56L-■-PN10-▲	13.6				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO-CT-ALL-56L-■-PN15-▲	18.0				15	0.0024°	18	35	0~200	2.80	740	630
Ezi-SERVO-CT-ALL-56L-■-PN25-▲	27.0				25	0.00144°	27	50	0~120		870	790
Ezi-SERVO-CT-ALL-56L-■-PN40-▲	27.0				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO-CT-ALL-56L-■-PN50-▲	27.0				50	0.00072°	27	50	0~60		1100	1100

"■" indicates encoder resolution.

"▲" indicates connector type.

● 60mm

Unit product name	Max. holding torque [N·m]	Rotor inertia moment [kg·m²]	Backlash [arc-min]	Angular transmi-ssion error [arcmin]	Gear ratio	Resolution (Set to 10,000 P/R)	Allowable torque [N·m]	Max. instanta-neous torque [N·m]	Allowable Speed range [r/min]	Unit weight [kg]	Allowable radial load (Center of shaft) [N]	Allowable axial load [N]
Ezi-SERVO-CT-ALL-60S-■-PN3-▲	1.5	240x 10^{-7}	3	5	3	0.012°	18	35	0~1000	1.98	430	310
Ezi-SERVO-CT-ALL-60S-■-PN5-▲	2.5				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO-CT-ALL-60S-■-PN8-▲	4.0				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO-CT-ALL-60S-■-PN10-▲	5.1				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO-CT-ALL-60S-■-PN15-▲	7.4				15	0.0024°	18	35	0~200	2.28	740	630
Ezi-SERVO-CT-ALL-60S-■-PN25-▲	12.3				25	0.00144°	27	50	0~120		870	790
Ezi-SERVO-CT-ALL-60S-■-PN40-▲	19.8				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO-CT-ALL-60S-■-PN50-▲	24.7				50	0.00072°	27	50	0~60		1100	1100
Ezi-SERVO-CT-ALL-60M-■-PN3-▲	2.6	490x 10^{-7}	3	5	3	0.012°	18	35	0~1000	2.12	430	310
Ezi-SERVO-CT-ALL-60M -■-PN5-▲	4.4				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO-CT-ALL-60M -■-PN8-▲	7.0				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO-CT-ALL-60M-■-PN10-▲	8.8				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO-CT-ALL-60M-■-PN15-▲	12.8				15	0.0024°	18	35	0~200	2.42	740	630
Ezi-SERVO-CT-ALL-60M-■-PN25-▲	21.4				25	0.00144°	27	50	0~120		870	790
Ezi-SERVO-CT-ALL-60M-■-PN40-▲	27.0				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO-CT-ALL-60M-■-PN50-▲	27.0				50	0.00072°	27	50	0~60		1100	1100
Ezi-SERVO-CT-ALL-60L-■-PN3-▲	5.2	690x 10^{-7}	3	5	3	0.012°	18	35	0~1000	2.68	430	310
Ezi-SERVO-CT-ALL-60L-■-PN5-▲	8.7				5	0.0072°	27	50	0~600		510	390
Ezi-SERVO-CT-ALL-60L-■-PN8-▲	13.9				8	0.0045°	27	50	0~375		600	480
Ezi-SERVO-CT-ALL-60L-■-PN10-▲	18.0				10	0.0036°	18	35	0~300		640	530
Ezi-SERVO-CT-ALL-60L-■-PN15-▲	18.0				15	0.0024°	18	35	0~200	2.98	740	630
Ezi-SERVO-CT-ALL-60L-■-PN25-▲	27.0				25	0.00144°	27	50	0~120		870	790
Ezi-SERVO-CT-ALL-60L-■-PN40-▲	27.0				40	0.0009°	27	50	0~75		1000	970
Ezi-SERVO-CT-ALL-60L-■-PN50-▲	27.0				50	0.00072°	27	50	0~60		1100	1100

"■" indicates encoder resolution.

"▲" indicates connector type.

A3 Compliant standards

A3.1 CE Marking

Ezi-SERVO CC-Link IE TSN ALL has obtained CE certification and affixes the CE mark to the product.

(1) EMC Directive

(a) EMC compliance depends on the specific control equipment, electrical components, wiring, etc., used with the motor and driver. Therefore, if necessary, please conduct EMC testing directly on the configured system to verify its status.

(b) Applicable Standards

EMI	EN 61800-3:2004+A1:2012
EMS	EN 61800-3:2004

A3.2 KC Marking

Ezi-SERVO CC-Link IE TSN ALL has obtained KC certification based on the Radio Act and affixes the KC mark to the product.

A3.3 RoHS Directive

This product does not contain any substances exceeding the threshold values regulated by the RoHS Directive.

A4 Revision History

Please note that the revision number of the user's manual is printed on the back cover.

Revision No.	Revision date	Revision details/Related page
Rev.1	April 2026	First edition

CC-Link IE TSN

Accelerating the construction of smart factories with

2026-07-09 Rev.2

FASTECH
Fast Accurate Smooth Motion

FASTECH Co., Ltd.

FASTECH Headquarters : (Postal Code:14502) Rm#1201 ~ 1202, 401-dong, Bucheon Techno-Park, 655 Pyeongcheon-ro, Wonmi-gu, Bucheon-si, Gyeonggi-do, Republic of Korea
TEL : +82-32-234-6317 FAX : +82-32-234-6302 E-mail : sales@fastech-motions.com

FASTECH JAPAN : (〒 450-0001 Aichi) Nagoya, Nakamura Ward, Nagono, 1-Chome 47-1 Nagoya International Center Bldg. 18rd Floor
TEL : +81-70-6588-5905 E-Mail : sales_japan@fastech-motions.com