CKD

Electric Actuator

ECR (Controller)
EtherCAT Specifications

INSTRUCTION MANUAL

SM-A10618-A

- Be sure to read this instruction manual before using the product.
- Pay especially close attention to the safety-related information contained within.
- Keep this instruction manual in a safe place so that it is readily available when needed.

CKD株式会社

PREFACE

Thank you for purchasing this CKD **"ECR" controller for electric actuators**. In order for this product to be used to its fullest potential, this instruction manual describes basic topics such as how to mount and use it. Read this manual thoroughly prior to use.
Keep this instruction manual in a safe place so that it is not lost.

The specifications and images in this instruction manual are subject to change without prior notice.

SAFETY INFORMATION

When designing and manufacturing equipment using this product, you are obligated to manufacture safe equipment. Therefore, confirm that the safety of the equipment's mechanisms and the system that runs the electrical controls can be ensured.

It is important to select, use, handle and maintain CKD products appropriately to ensure their safe usage.
Be sure to observe the warnings and precautions listed in this instruction manual to ensure equipment safety.

This product is equipped with various safety measures. Even so, mishandling could cause an accident. To prevent such an accident from occurring...

Make sure that you read this instruction manual thoroughly and understand its content before use.

There are three levels of precautions to indicate the level and potential for danger or damage: "DANGER", "WARNING" and "CAUTION".

⚠ **DANGER**	Mishandling could likely cause death or serious injury.
⚠ **WARNING**	Mishandling could cause death or serious injury.
⚠ **CAUTION**	Mishandling could cause injury or physical damage.

Note that some items indicated with "CAUTION" may lead to serious results depending on the conditions.
All items contain important information and must be observed.

The following icon is used to indicate other general precautions and usage hints.

	Indicates a general precaution or usage hint.

Product precautions

⚠ DANGER

Do not use this product for the following applications.

- Medical devices involved in maintaining or managing human life or health
- Mechanisms or machines meant to transfer or transport people
- Important security parts in machines

⚠ WARNING

Use this product in accordance with specifications.

Disposal precautions

⚠ CAUTION

When disposing of the product, follow laws and regulations related to processing and cleaning waste. Request a specialized waste processing vendor to dispose of waste.

CONTENTS

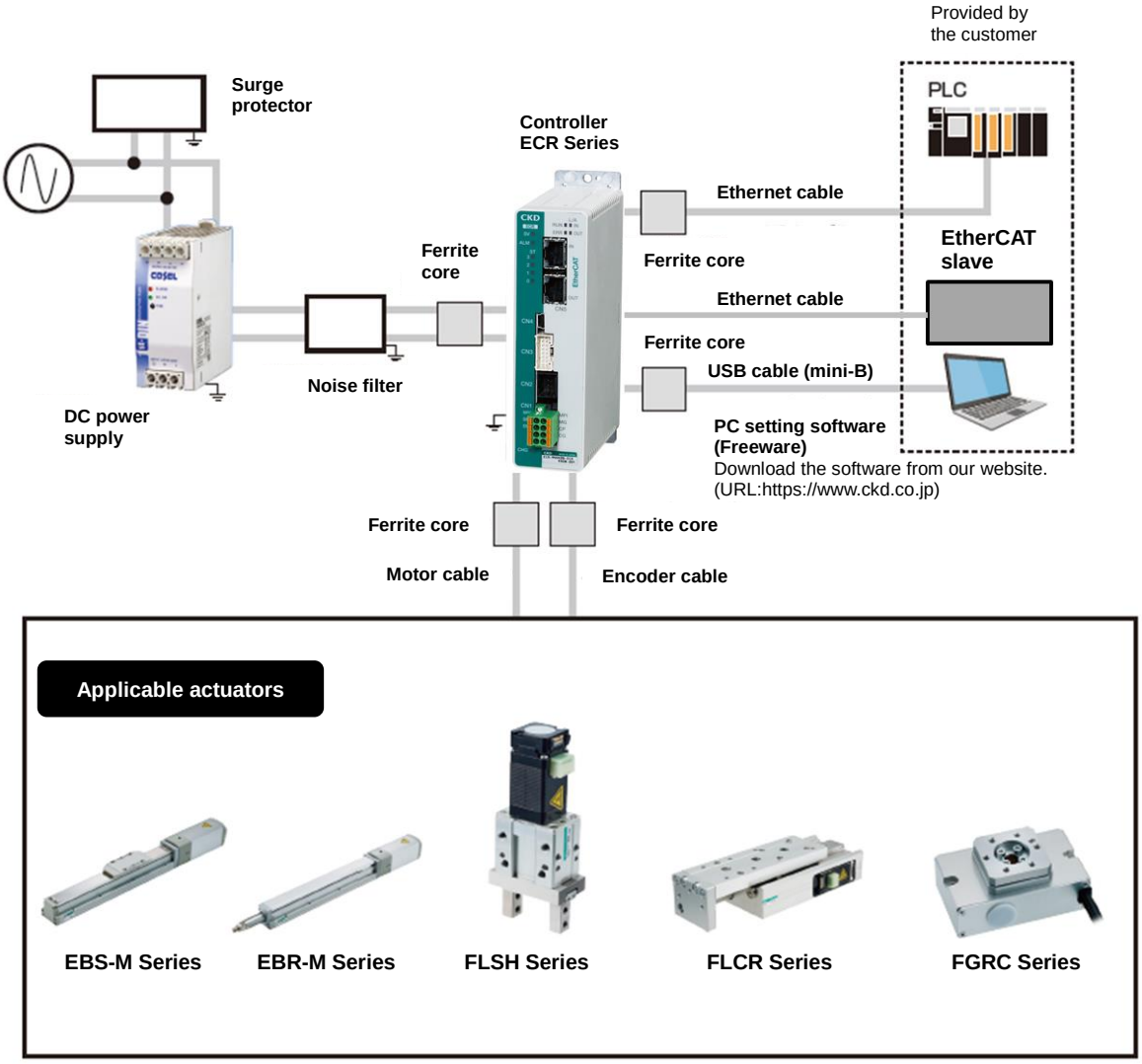
1. PRODUCT OVERVIEW

EtherCAT® is the patented technology and registered trademark licensed by German Beckhoff Automation GmbH.

1.1 Configuration of product

	Name		Qty.
1	Controller body		1
2	Accessory	Connector for power supply: DFMC1,5/4-STF-3,5 (PHOENIX CONTACT)	1

1.2 System Overview



System components that can be purchased from CKD are listed below.

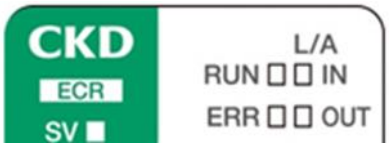
Descriptions	Name	Product name、Model No.
Normal configuration (when selecting the set model number)	Controller	ECR Series
	Actuator	EBS-M/EBR-M/FLSH/FLCR/FGRC Series
	Motor cable	EA-CBLM1-∗
	Encoder cable	EA-CBLE1-∗
Sold separately	24 VDC power supply	EA-PWR-KHNA240F-24
	48 VDC power supply	EA-PWR-KHNA480F-48
	Surge protector	AX-NSF-RAV-781BXZ-4
	Noise filter	AX-NSF-NF2015A-OD
	Ferrite core (7 pieces)	EA-NSF-FC01-SET
Freeware	PC setting software	S-Tools

1.3 Specifications

1.3.1 Communication specifications

Descriptions	Details
Communication protocol	EtherCAT
Communication speed	100Mbps (fast Ethernet, full duplex)
Process data	Variable PDO mapping
Max. PDO data length	RxPDO: 64 bytes/TxPDO: 64 bytes
Station alias	0 to 65535 (set with parameter)
Connection cable	EtherCAT-compatible cable (CAT5e or above twisted-pair cable [aluminum tape and braided double-shield] recommended)
Node address	Automatically assigned by master

1.3.2 Communication status display



■ RUN (green lamp)

Indicates the slave status.

OFF	INIT status
Blinking	PRE-OPERATION status
Blinking (momentarily)	SAFE-OPERATION status
Blinking (high-speed)	BOOTSTRAP status
ON	OPERATIONL status

■ ERR (red lamp)

Indicates the communication status.

OFF	Communication normal
Blinking (double/momentarily)	Communication error
ON	WDT error

■ L/A IN (green lamp)

Indicates the link status on the IN side.

OFF	NO LINK, NO ACTIVITY
ON	LINK, NO ACTIVITY
Blinking (high-speed)	LINK, ACTIVITY

■ L/A OUT (green lamp)

Indicates the link status on the OUT side.

OFF	NO LINK, NO ACTIVITY
ON	LINK, NO ACTIVITY
Blinking (high-speed)	LINK, ACTIVITY

2. INSTALLATION

⚠ DANGER

Do not use in locations with ignitable, flammable, or explosive substances or other such dangerous substances.
There may be risk of ignition, combustion, or explosion.

Make sure that the product does not come in contact with water drops or oil drops.
Fire or damage may result.

When mounting the product, be sure to hold and fix it securely (including workpieces).
If the product is knocked over, falls, or experiences malfunction, it may lead to injury.

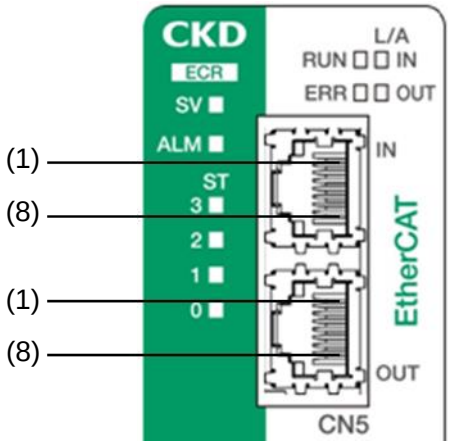
Use a DC stabilized power supply with surplus capacity (24 VDC ±10% or 48 VDC ±10%) for the controller and input/output circuit.
Connecting directly to an AC power supply may lead to fire, rupture, or damage.

⚠ WARNING

For hardware and all other equipment, design the safety circuit or equipment so that damage does not occur to the operator or equipment during emergency stop, or when the machine stops in the event of power failure or other abnormal system conditions.

2.1 Connection

This instruction manual discusses CN5: Interface Connector only.
For other connection methods, refer to the instruction manual (SM-A10615) for the electric actuator (controller).



Pin No.	Signal
(1)	TD+
(2)	TD-
(3)	RD+
(4)	Vacant
(5)	Vacant
(6)	RD-
(7)	Vacant
(8)	Vacant

3. USAGE

3.1 Data communication

Type of data communication	Content
Cyclic communication	This type of communication is used between the master and slave on a set cycle. Also called process data communication.
Message communication	This type of communication is used by a PLC or other host device to access certain data on a slave through the master, when needed. Also called service data.

3.2 ESI files

See the CKD website.
https://www.ckd.co.jp/

[ESI file]
CKD_ECR_ECAT_20190412.xml

Copy to the designated folder of the PLC development tool.

3.3 EtherCAT device settings

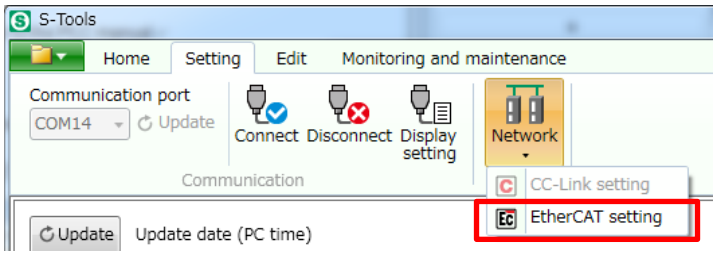
Normally, a PLC development tool or the like must be used to set the device ID and other settings of this product in the PLC.

For information on how to set the PLC, refer to the PLC manual.

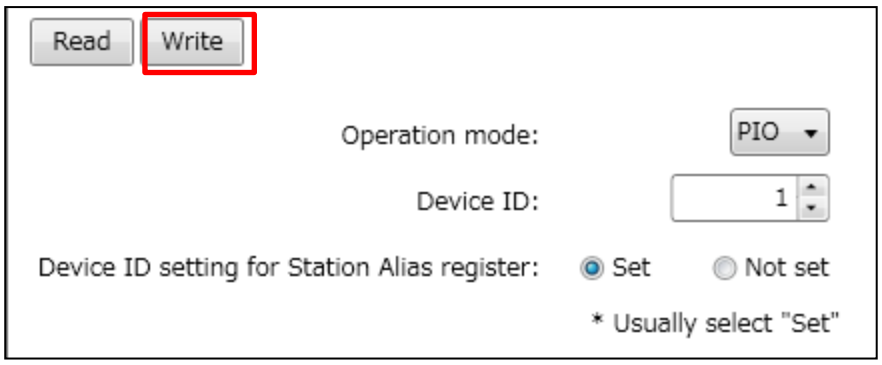
■ Controller EtherCAT settings

S-Tools can be used to change the device ID and other settings.

1 From the S-Tools menu, select "Setting" - "Network" - "EtherCAT setting."



2 Confirm that each set value has been set, and then select "Write."



[Operation mode]
Set the operation mode. Select "PIO," "SDP," or "FDP."

[Device ID]
Set the Device ID. The setting range is from "0" to "65535."

[Device ID setting for Station Alias register]
Select "Set" or "Not set." If "Set" is selected, the device ID value is set to both the device ID and Station Alias register.

- PIO mode (abbreviation: PIO)
- Simple direct value mode (abbreviation: SDP)
- Full direct value mode (abbreviation: FDP)

3.4 Communication format

3.4.1 Process data

■ Output signal/Output data

Set data for the PLC to read from the controller.

[PIO mode (operation mode: 0) [Example] 64-point mode (operation mode (PIO): 0)]

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2005	0x01	Output signal 1	0	Point number confirmation bit 0/ alarm confirmation bit 0	Port numbers 0 to 63 Alarms 0 to 15 *Set the travel complete point number when normal and the alarm when abnormal.
			1	Point number confirmation bit 1/ alarm confirmation bit 1	
			2	Point number confirmation bit 2/ alarm confirmation bit 2	
			3	Point number confirmation bit 3/ alarm confirmation bit 3	
			4	Point number confirmation bit 4	
			5	Point number confirmation bit 5	
			6	Point zone	0: Outside zone, 1: Inside zone
			7	Traveling *1	0: Stopped, 1: Traveling
			8	Zone 1	0: Outside zone, 1: Inside zone
			9	Zone 2	0: Outside zone, 1: Inside zone
			10	Point travel complete *1	0: Incomplete, 1: Complete
			11	Home position return complete *2	0: Incomplete, 1: Complete
			12	Servo ON state *2	0: OFF state, 1: ON state
			13	Alarm *2	0: Triggered, 1: Not triggered
			14	Warning *2	0: Triggered, 1: Not triggered
			15	Operation preparation complete	0: Incomplete, 1: Complete
			16 to 31	-	
	0x02	Output signal 2	0 to 31	-	

*1: Both point travel complete and traveling may be "1" (ON) at the same time depending on the timing.
*2: Content can be monitored even in TOOL mode when not in forced output mode. Other items will be "0" (OFF).

When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status.

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2007 *1	0x01	Output data 1	-	-	
	0x02	Output data 2	-	-	
	0x03	Output data 3	-	-	
	0x04	Output data 4	-	-	
	0x05	Output data 5	-	-	
	0x06	Output data 6	-	-	
	0x07	Output data 7	-	-	
	0x08	Output data 8	-	-	
	0x09	Output data 9	-	-	
	0x0A	Output data 10	-	-	
	0x0B	Output data 11	-	-	
	0x0C	Output data 12	-	-	
	0x0D	Output data 13	-	-	
	0x0E	Output data 14	-	-	

*1: There is no function assignment in PIO mode.

[Simple direct value mode (operation mode: 1)]

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2005	0x01	Output signal 1	0	Point number confirmation bit 0	Binary data [During direct value travel] 0 [During point travel] Set the travel complete point number.
			1	Point number confirmation bit 1	
			2	Point number confirmation bit 2	
			3	Point number confirmation bit 3	
			4	Point number confirmation bit 4	
			5	Point number confirmation bit 5	
			6	Point number confirmation bit 6	
			7	Point number confirmation bit 7	
			8	Point number confirmation bit 8	
			9	-	
			10	Point travel complete *1	0: Incomplete, 1: Complete
			11	Home position return complete *2	0: Incomplete, 1: Complete
			12	Servo ON state *2	0: OFF state, 1: ON state
			13	Alarm *2	0: Triggered, 1: Not triggered
			14	Warning *2	0: Triggered, 1: Not triggered
			15	Operation preparation complete	0: Incomplete, 1: Complete
			16 to 31	-	
	0x02	Output signal 2	0 to 3	Data response *2	Data read/write execution result 0 to 8
			4	Data complete *2	0: Incomplete, 1: Complete
			5	Data write status	0: Read, 1: Write
			6	-	
			7	-	
			8 to 11	Monitor response *2	0: Normal, 1: Monitor number error
			12	Monitor complete *2	0: Incomplete, 1: Complete
			13	-	
			14	-	
			15	Direct travel status	0: Point travel, 1: Direct value travel
			16	Point zone	0: Outside zone, 1: Inside zone
			17	Traveling *1	0: Stopped, 1: Traveling
			18	Zone 1	0: Outside zone, 1: Inside zone
			19	Zone 2	0: Outside zone, 1: Inside zone
			20 to 31	-	

*1: Both point travel complete and traveling may be "1" (ON) at the same time depending on the timing.
*2: Content can be monitored even in TOOL mode when not in forced output mode. Other items will be "0" (OFF).

When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status.

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2007	0x01	Output data 1	-	Position (0.01 mm) (0.01 deg) *1	-999999 to 999999
	0x02	Output data 2	-	Read data *1	Set the data that was read.
	0x03	Output data 3	-	Data (alarm) *1	Set the data for the alarm log that was read.
	0x04	Output data 4	-	Monitor value 1 *1	Set the monitor data that was read.
	0x05	Output data 5	-	Monitor value 2 *1	Set the monitor data that was read.
	0x06	Output data 6	-	Monitor value 3 *1	Set the monitor data that was read.
	0x07	Output data 7	-	-	
	0x08	Output data 8	-	-	
	0x09	Output data 9	-	-	
	0x0A	Output data 10	-	-	
	0x0B	Output data 11	-	-	
	0x0C	Output data 12	-	-	
	0x0D	Output data 13	-	-	
	0x0E	Output data 14	-	-	

*1: Content can be monitored even in TOOL mode when not in forced output mode. Other items will be "0" (OFF).

[Full direct value mode (operation mode: 2)]

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2005	0x01	Output signal 1	0	Point number confirmation bit 0	Binary data [During direct value travel] 0 [During point travel] Set the travel complete point number.
			1	Point number confirmation bit 1	
			2	Point number confirmation bit 2	
			3	Point number confirmation bit 3	
			4	Point number confirmation bit 4	
			5	Point number confirmation bit 5	
			6	Point number confirmation bit 6	
			7	Point number confirmation bit 7	
			8	Point number confirmation bit 8	
			9	-	
			10	Point travel complete *1	0: Incomplete, 1: Complete
			11	Home position return complete *2	0: Incomplete, 1: Complete
			12	Servo ON state *2	0: OFF state, 1: ON state
			13	Alarm *2	0: Triggered, 1: Not triggered
			14	Warning *2	0: Triggered, 1: Not triggered
			15	Operation preparation complete	0: Incomplete, 1: Complete
			16 to 31	-	
	0x02	Output signal 2	0 to 3	Data response *2	Data read/write execution result 0 to 8
			4	Data complete *2	0: Incomplete, 1: Complete
			5	Data write status	0: Read, 1: Write
			6	-	
			7	-	
			8 to 11	Monitor response *2	0: Normal, 1: Monitor number error
			12	Monitor complete *2	0: Incomplete, 1: Complete
			13	-	
			14	-	
			15	Direct travel status	0: Point travel, 1: Direct value travel
			16	Point zone	0: Outside zone, 1: Inside zone
			17	Traveling *1	0: Stopped, 1: Traveling
			18	Zone 1	0: Outside zone, 1: Inside zone
			19	Zone 2	0: Outside zone, 1: Inside zone
			20 to 31	-	

*1: Both point travel complete and traveling may be "1" (ON) at the same time depending on the timing.
*2: Content can be monitored even in TOOL mode when not in forced output mode. Other items will be "0" (OFF).

When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status.

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions		Value (decimal)
0x2007	0x01	Output data 1	-	Position (0.01 mm) (0.01 deg)	*1	-999999 to 999999
	0x02	Output data 2	-	Speed (mm/s) (deg/s)	*1	0 to 999
	0x03	Output data 3	-	Current (%)	*1	0 to 100
	0x04	Output data 4	-	-		
	0x05	Output data 5	-	Alarm	*1	Set the error code.
	0x06	Output data 6	-	-		
	0x07	Output data 7	-	-		
	0x08	Output data 8	-	-		
	0x09	Output data 9	-	-		
	0x0A	Output data 10	-	-		
	0x0B	Output data 11	-	Read data	*1	Set the data that was read.
	0x0C	Output data 12	-	Data (alarm)	*1	Set the data for the alarm log that was read.
	0x0D	Output data 13	-	Monitor value 1	*1	Set the monitor data that was read.
	0x0E	Output data 14	-	Monitor value 2	*1	Set the monitor data that was read.

*1: Content can be monitored even in TOOL mode when not in forced output mode. Other items will be "0" (OFF).

■ Input signal/Input data

Set data to write from the PLC to the controller.

[PIO mode (operation mode: 0) [Example] 64-point mode (operation mode (PIO): 0)]

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2001	0x01	Input signal 1	0	Point number selection bit 0	Binary data 0 to 63
			1	Point number selection bit 1	
			2	Point number selection bit 2	
			3	Point number selection bit 3	
			4	Point number selection bit 4	
			5	Point number selection bit 5	
			6	-	
			7	-	
			8	-	
			9	-	
			10	Point travel start	1: Start
			11	Home position return start	1: Home position return start
			12	Servo ON	1: Servo ON, 0: Cancel
			13	Alarm reset	1: Reset
			14	Stop	0: Stop, 1: Cancel
			15	Pause	0: Pause start, 1: Cancel
			16 to 31	-	
	0x02	Input signal 2	0 to 31	-	
0x2003 *1	0x01	Input data 1	-	-	
	0x02	Input data 2	-	-	
	0x03	Input data 3	-	-	
	0x04	Input data 4	-	-	
	0x05	Input data 5	-	-	
	0x06	Input data 6	-	-	
	0x07	Input data 7	-	-	
	0x08	Input data 8	-	-	
	0x09	Input data 9	-	-	
	0x0A	Input data 10	-	-	
	0x0B	Input data 11	-	-	
	0x0C	Input data 12	-	-	
	0x0D	Input data 13	-	-	
	0x0E	Input data 14	-	-	

*1: There is no function assignment in PIO mode.

- When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status. If communication is not established, it will not be sent to the controller even if each bit is ON.
- Stop and pause are b contact. Set bit ON (cancel) for both when operating.
- Reset can be executed whether in PLC mode or TOOL mode.

[Simple direct value mode (operation mode: 1)]

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2001	0x01	Input signal 1	0	Point number selection bit 0	Binary data 0 to 511
			1	Point number selection bit 1	
			2	Point number selection bit 2	
			3	Point number selection bit 3	
			4	Point number selection bit 4	
			5	Point number selection bit 5	
			6	Point number selection bit 6	
			7	Point number selection bit 7	
			8	Point number selection bit 8	
			9	-	
			10	Point travel start	1: Start
			11	Home position return start	1: Home position return start
			12	Servo ON	1: Servo ON, 0: Cancel
			13	Alarm reset	1: Reset
			14	Stop	0: Stop, 1: Cancel
			15	Pause	0: Pause start, 1: Cancel
			16 to 31	-	
	0x02	Input signal 2	0 to 3	-	
			4	Data request	1: Execute
			5	Data R/W selection	0: Read, 1: Write
			6 to 11	-	
			12	Monitor request	1: Execute
			13	-	
			14	-	
			15	Direct value travel selection *1	0: Point travel, 1: Direct value travel
			16 to 31	-	

*1: If direct value travel selection is set to "0" (OFF), the same point travel as 512-point mode can be used.

- When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status. If communication is not established, it will not be sent to the controller even if each bit is ON.
- After switching the monitor number, there will be some time lag until it actually switches. If referenced immediately after switching, unintended data may be referenced.
- Stop and pause are b contact. Set bit ON (cancel) for both when operating.
- Reset can be executed whether in PLC mode or TOOL mode.

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2003	0x01	Input data 1	-	Position (0.01 mm) (0.01 deg)	-999999 to 999999
	0x02	Input data 2	-	Write data	Data written when executing data write
	0x03	Input data 3	-	Data number	Data number of data to read/write
	0x04	Input data 4	-	Monitor number 1	1: Position, 2: Speed, 3: Current value, 5: Alarm
	0x05	Input data 5	-	Monitor number 2	1: Position, 2: Speed, 3: Current value, 5: Alarm
	0x06	Input data 6	-	Monitor number 3	1: Position, 2: Speed, 3: Current value, 5: Alarm
	0x07	Input data 7	-	-	
	0x08	Input data 8	-	-	
	0x09	Input data 9	-	-	
	0x0A	Input data 10	-	-	
	0x0B	Input data 11	-	-	
	0x0C	Input data 12	-	-	
	0x0D	Input data 13	-	-	
	0x0E	Input data 14	-	-	

[Full direct value mode (operation mode: 2)]

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2001	0x01	Input signal 1	0	Point number selection bit 0	Binary data 0 to 511
			1	Point number selection bit 1	
			2	Point number selection bit 2	
			3	Point number selection bit 3	
			4	Point number selection bit 4	
			5	Point number selection bit 5	
			6	Point number selection bit 6	
			7	Point number selection bit 7	
			8	Point number selection bit 8	
			9	-	
			10	Point travel start	1: Start
			11	Home position return start	1: Home position return start
			12	Servo ON	1: Servo ON, 0: Cancel
			13	Alarm reset	1: Reset
			14	Stop	0: Stop, 1: Cancel
			15	Pause	0: Pause start, 1: Cancel
			16 to 31	-	
	0x02	Input signal 2	0 to 3	-	
			4	Data request	1: Execute
			5	Data R/W selection	0: Read, 1: Write
			6 to 11	-	
			12	Monitor request	1: Execute
			13	-	
			14	-	
			15	Direct value travel selection *1	0: Point travel, 1: Direct value travel
			16 to 31		

*1: If direct value travel selection is set to "0" (OFF), the same point travel as 512-point mode can be used.

- When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status. If communication is not established, it will not be sent to the controller even if each bit is ON.
- After switching the data selection designation, there will be some time lag until the data actually switches. If referenced immediately after switching, unintended data may be referenced.
- Some values may generate errors even if set with the range in this table, depending on the actuator model No. (size, etc.).
- Stop and pause are b contact. Set bit ON (cancel) for both when operating.
- Reset can be executed whether in PLC mode or TOOL mode.

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2003	0x01	Input data 1	-	Position (0.01 mm) (0.01 deg)	-999999 to 999999
	0x02	Input data 2	-	Positioning width (0.01 mm) (0.01 deg)	0 to 999 (when setting = 0, use common parameter value)
	0x03	Input data 3	-	Speed (mm/s) (deg/s)	0 to 9999 (when setting = 0, use common parameter value)
	0x04	Input data 4	-	Acceleration (0.01 G)	0 to 255 (when setting = 0, use common parameter value)
	0x05	Input data 5	-	Deceleration (0.01 G)	0 to 255 (when setting = 0, use common parameter value)
	0x06	Input data 6	-	Pressing current (%)	0 to 100 (when setting = 0, use common parameter value)
	0x07	Input data 7	-	Pressing speed (mm/s) (deg/s)	0 to 99 (when setting = 0, use common parameter value)
	0x08	Input data 8	-	Pressing distance (0.01 mm) (0.01 deg)	-999999 to 999999 (when setting = 0, use common parameter value)
	0x09	Input data 9	-	Mode	Bit 1 to 0 (operation method) 0: POSI, 1: PRS1, 2: PRS2 Bit 3 to 2 (position specification method) 0: ABS, 1: INC Bit 7 to 4 (rotation direction) 0: Common, 1: Close rotation, 2: CW, 3: CCW Bit 11 to 8 0: Common , 1: Trapezoid Bit 15 to 12 0: Common, 1: Control, 2: Fixed excitation, 3: ASVOFF1, 4: ASVOFF2, 5: ASVOFF3
	0x0A	Input data 10	-	Gain magnification (%)	0 to 9999 (when setting = 0, displays gain magnification not in use)
	0x0B	Input data 11	-	Write data	Data written when executing data write
	0x0C	Input data 12	-	Data number	Data number of data to read/write
	0x0D	Input data 13	-	Monitor number 1	1: Position, 2: Speed, 3: Current value, 5: Alarm
	0x0E	Input data 14	-	Monitor number 2	1: Position, 2: Speed, 3: Current value, 5: Alarm

3.4.2 Cyclic data details for PIO mode

■ 64-point mode (B064) (operation mode (PIO): 0)

Output signal: Controller → PLC

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2003	0x01	Output signal 1	0	Point number confirmation bit 0/ alarm confirmation bit 0	Port numbers 0 to 63 Alarms 0 to 15 *Set the travel complete point number when normal and the alarm when abnormal.
			1	Point number confirmation bit 1/ alarm confirmation bit 1	
			2	Point number confirmation bit 2/ alarm confirmation bit 2	
			3	Point number confirmation bit 3/ alarm confirmation bit 3	
			4	Point number confirmation bit 4	
			5	Point number confirmation bit 5	
			6	Point zone	0: Outside zone, 1: Inside zone
			7	Traveling	0: Stopped, 1: Traveling
			8	Zone 1	0: Outside zone, 1: Inside zone
			9	Zone 2	0: Outside zone, 1: Inside zone
			10	Point travel complete	0: Incomplete, 1: Complete
			11	Home position return complete	0: Incomplete, 1: Complete
			12	Servo ON state	0: OFF state, 1: ON state
			13	Alarm	0: Triggered, 1: Not triggered
			14	Warning	0: Triggered, 1: Not triggered
			15	Operation preparation complete	0: Incomplete, 1: Complete

Input signal: PLC → Controller

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2001	0x01	Input signal 1	0	Point number selection bit 0	Binary data 0 to 63
			1	Point number selection bit 1	
			2	Point number selection bit 2	
			3	Point number selection bit 3	
			4	Point number selection bit 4	
			5	Point number selection bit 5	
			6	-	
			7	-	
			8	-	
			9	-	
			10	Point travel start	1: Start
			11	Home position return start	1: Home position return start
			12	Servo ON	1: Servo ON, 0: Cancel
			13	Alarm reset	1: Reset
			14	Stop	0: Stop, 1: Cancel
			15	Pause	0: Pause start, 1: Cancel

■ 128-point mode (B128) (operation mode (PIO): 1)

Output signal: Controller → PLC

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2003	0x01	Output signal 1	0	Point number confirmation bit 0/ alarm confirmation bit 0	Port numbers 0 to 127 Alarms 0 to 15 *Set the travel complete point number when normal and the alarm when abnormal.
			1	Point number confirmation bit 1/ alarm confirmation bit 1	
			2	Point number confirmation bit 2/ alarm confirmation bit 2	
			3	Point number confirmation bit 3/ alarm confirmation bit 3	
			4	Point number confirmation bit 4	
			5	Point number confirmation bit 5	
			6	Point number confirmation bit 6	
			7	Traveling	0: Stopped, 1: Traveling
			8	Selection output 1 Point zone/zone 1/ zone 2/traveling	0: Outside zone, 1: Inside zone or 0: Stopped, 1: Traveling
			9	Selection output 2 Point zone/zone 1/ zone 2/traveling	0: Outside zone, 1: Inside zone or 0: Stopped, 1: Traveling
			10	Point travel complete	0: Incomplete, 1: Complete
			11	Home position return complete	0: Incomplete, 1: Complete
			12	Servo ON state	0: OFF state, 1: ON state
			13	Alarm	0: Triggered, 1: Not triggered
			14	Warning	0: Triggered, 1: Not triggered
			15	Operation preparation complete	0: Incomplete, 1: Complete

Input signal: PLC → Controller

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2001	0x01	Input signal 1	0	Point number selection bit 0	Binary data 0 to 127
			1	Point number selection bit 1	
			2	Point number selection bit 2	
			3	Point number selection bit 3	
			4	Point number selection bit 4	
			5	Point number selection bit 5	
			6	Point number selection bit 6	
			7	-	
			8	-	
			9	-	
			10	Point travel start	1: Start
			11	Home position return start	1: Home position return start
			12	Servo ON	1: Servo ON, 0: Cancel
			13	Alarm reset	1: Reset
			14	Stop	0: Stop, 1: Cancel
			15	Pause	0: Pause start, 1: Cancel

■ 256-point mode (B256) (operation mode (PIO): 2)

Output signal: Controller → PLC

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2003	0x01	Output signal 1	0	Point number confirmation bit 0/ alarm confirmation bit 0	Port numbers 0 to 255 Alarms 0 to 15 *Set the travel complete point number when normal and the alarm when abnormal.
			1	Point number confirmation bit 1/ alarm confirmation bit 1	
			2	Point number confirmation bit 2/ alarm confirmation bit 2	
			3	Point number confirmation bit 3/ alarm confirmation bit 3	
			4	Point number confirmation bit 4	
			5	Point number confirmation bit 5	
			6	Point number confirmation bit 6	
			7	Point number confirmation bit 7	
			8	Selection output 1 Point zone/zone 1/ zone 2/traveling	0: Outside zone, 1: Inside zone or 0: Stopped, 1: Traveling
			9	Selection output 2 Point zone/zone 1/ zone 2/traveling	0: Outside zone, 1: Inside zone or 0: Stopped, 1: Traveling
			10	Point travel complete	0: Incomplete, 1: Complete
			11	Home position return complete	0: Incomplete, 1: Complete
			12	Servo ON state	0: OFF state, 1: ON state
			13	Alarm	0: Triggered, 1: Not triggered
			14	Warning	0: Triggered, 1: Not triggered
			15	Operation preparation complete	0: Incomplete, 1: Complete

Input signal: PLC → Controller

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2001	0x01	Input signal 1	0	Point number selection bit 0	Binary data 0 to 255
			1	Point number selection bit 1	
			2	Point number selection bit 2	
			3	Point number selection bit 3	
			4	Point number selection bit 4	
			5	Point number selection bit 5	
			6	Point number selection bit 6	
			7	Point number selection bit 7	
			8	-	
			9	-	
			10	Point travel start	1: Start
			11	Home position return start	1: Home position return start
			12	Servo ON	1: Servo ON, 0: Cancel
			13	Alarm reset	1: Reset
			14	Stop	0: Stop, 1: Cancel
			15	Pause	0: Pause start, 1: Cancel

■ 512-point mode (B512) (operation mode (PIO): 3)

Output signal: Controller → PLC

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2003	0x01	Output signal 1	0	Point number confirmation bit 0/ alarm confirmation bit 0	Port numbers 0 to 511 Alarms 0 to 15 *Set the travel complete point number when normal and the alarm when abnormal.
			1	Point number confirmation bit 1/ alarm confirmation bit 1	
			2	Point number confirmation bit 2/ alarm confirmation bit 2	
			3	Point number confirmation bit 3/ alarm confirmation bit 3	
			4	Point number confirmation bit 4	
			5	Point number confirmation bit 5	
			6	Point number confirmation bit 6	
			7	Point number confirmation bit 7	
			8	Point number confirmation bit 8	
			9	Selection output 2 Point zone/zone 1/ zone 2/traveling	0: Outside zone, 1: Inside zone or 0: Stopped, 1: Traveling
			10	Point travel complete	0: Incomplete, 1: Complete
			11	Home position return complete	0: Incomplete, 1: Complete
			12	Servo ON state	0: OFF state, 1: ON state
			13	Alarm	0: Triggered, 1: Not triggered
			14	Warning	0: Triggered, 1: Not triggered
			15	Operation preparation complete	0: Incomplete, 1: Complete

Input signal: PLC → Controller

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2001	0x01	Input signal 1	0	Point number selection bit 0	Binary data 0 to 511
			1	Point number selection bit 1	
			2	Point number selection bit 2	
			3	Point number selection bit 3	
			4	Point number selection bit 4	
			5	Point number selection bit 5	
			6	Point number selection bit 6	
			7	Point number selection bit 7	
			8	Point number selection bit 8	
			9	-	
			10	Point travel start	1: Start
			11	Home position return start	1: Home position return start
			12	Servo ON	1: Servo ON, 0: Cancel
			13	Alarm reset	1: Reset
			14	Stop	0: Stop, 1: Cancel
			15	Pause	0: Pause start, 1: Cancel

■ Teaching 64-point mode (T064) (operation mode (PIO): 4)

Output signal: Controller → PLC

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2003	0x01	Output signal 1	0	Point number confirmation bit 0/ alarm confirmation bit 0	Port numbers 0 to 63 Alarms 0 to 15 *Set the travel complete point number when normal and the alarm when abnormal.
			1	Point number confirmation bit 1/ alarm confirmation bit 1	
			2	Point number confirmation bit 2/ alarm confirmation bit 2	
			3	Point number confirmation bit 3/ alarm confirmation bit 3	
			4	Point number confirmation bit 4	
			5	Point number confirmation bit 5	
			6	Teaching state	0: Normal status, 1: Teaching status
			7	Traveling	0: Stopped, 1: Traveling
			8	Selection output 1 Point zone/zone 1/ zone 2/traveling	0: Outside zone, 1: Inside zone or 0: Stopped, 1: Traveling
			9	Selection output 2 Point zone/zone 1/ zone 2/traveling	0: Outside zone, 1: Inside zone or 0: Stopped, 1: Traveling
			10	Point travel complete/ write complete	0: Incomplete, 1: Complete
			11	Home position return complete	0: Incomplete, 1: Complete
			12	Servo ON state	0: OFF state, 1: ON state
			13	Alarm	0: Triggered, 1: Not triggered
			14	Warning	0: Triggered, 1: Not triggered
			15	Operation preparation complete	0: Incomplete, 1: Complete

Input signal: PLC → Controller

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2001	0x01	Input signal 1	0	Point number selection bit 0	Binary data 0 to 63
			1	Point number selection bit 1	
			2	Point number selection bit 2	
			3	Point number selection bit 3	
			4	Point number selection bit 4	
			5	Point number selection bit 5	
			6	Teaching selection	0: Normal, 1: Teaching mode
			7	JOG/INCH(-) travel start	1: Start
			8	JOG/INCH(+) travel start	1: Start
			9	INCH selection	0: JOG, 1: INCH
			10	Point travel start/ write start	1: Start
			11	Home position return start	1: Home position return start
			12	Servo ON	1: Servo ON, 0: Cancel
			13	Alarm reset	1: Reset
			14	Stop	0: Stop, 1: Cancel
			15	Pause	0: Pause start, 1: Cancel

■ Simple 7-point mode (S007) (operation mode (PIO): 5)

Output signal: Controller → PLC

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2003	0x01	Output signal 1	0	Point number 1 travel complete	0: Incomplete, 1: Complete
			1	Point number 2 travel complete	0: Incomplete, 1: Complete
			2	Point number 3 travel complete	0: Incomplete, 1: Complete
			3	Point number 4 travel complete	0: Incomplete, 1: Complete
			4	Point number 5 travel complete	0: Incomplete, 1: Complete
			5	Point number 6 travel complete	0: Incomplete, 1: Complete
			6	Point number 7 travel complete	0: Incomplete, 1: Complete
			7	Traveling	0: Stopped, 1: Traveling
			8	Zone 1	0: Outside zone, 1: Inside zone
			9	Zone 2	0: Outside zone, 1: Inside zone
			10	Point zone	0: Outside zone, 1: Inside zone
			11	Home position return complete	0: Incomplete, 1: Complete
			12	Servo ON state	0: OFF state, 1: ON state
			13	Alarm	0: Triggered, 1: Not triggered
			14	Warning	0: Triggered, 1: Not triggered
			15	Operation preparation complete	0: Incomplete, 1: Complete

Input signal: PLC → Controller

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2001	0x01	Input signal 1	0	Point number 1 travel start	1: Start
			1	Point number 2 travel start	1: Start
			2	Point number 3 travel start	1: Start
			3	Point number 4 travel start	1: Start
			4	Point number 5 travel start	1: Start
			5	Point number 6 travel start	1: Start
			6	Point number 7 travel start	1: Start
			7	-	
			8	-	
			9	-	
			10	-	
			11	Home position return start	1: Home position return start
			12	Servo ON	1: Servo ON, 0: Cancel
			13	Alarm reset	1: Reset
			14	Stop	0: Stop, 1: Cancel
			15	Pause	0: Pause start, 1: Cancel

■ Solenoid valve mode, double 2-position type (VW2P) (operation mode (PIO): 6)

Output signal: Controller → PLC

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2003	0x01	Output signal 1	0	Point number 1 travel complete	0: Incomplete, 1: Complete
			1	Point number 2 travel complete	0: Incomplete, 1: Complete
			2	-	
			3	-	
			4	Switch 1	0: OFF, 1: ON
			5	Switch 2	0: OFF, 1: ON
			6	-	
			7	Traveling	0: Stopped, 1: Traveling
			8	Zone 1	0: Outside zone, 1: Inside zone
			9	Zone 2	0: Outside zone, 1: Inside zone
			10	Point zone	0: Outside zone, 1: Inside zone
			11	Home position return complete	0: Incomplete, 1: Complete
			12	Servo ON state	0: OFF state, 1: ON state
			13	Alarm	0: Triggered, 1: Not triggered
			14	Warning	0: Triggered, 1: Not triggered
			15	Operation preparation complete	0: Incomplete, 1: Complete

Input signal: PLC → Controller

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2001	0x01	Input signal 1	0	Solenoid valve travel command 1	1: ON
			1	Solenoid valve travel command 2	1: ON
			2	-	
			3	-	
			4	-	
			5	-	
			6	-	
			7	-	
			8	-	
			9	-	
			10	-	
			11	Home position return start	1: Home position return start
			12	Servo ON	1: Servo ON, 0: Cancel
			13	Alarm reset	1: Reset
			14	-	
			15	-	

■ Solenoid valve mode, double 3-position type (VW3P) (operation mode (PIO): 7)

Output signal: Controller → PLC

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2003	0x01	Output signal 1	0	Point number 1 travel complete	0: Incomplete, 1: Complete
			1	Point number 2 travel complete	0: Incomplete, 1: Complete
			2	-	
			3	-	
			4	Switch 1	0: OFF, 1: ON
			5	Switch 2	0: OFF, 1: ON
			6	-	
			7	Traveling	0: Stopped, 1: Traveling
			8	Zone 1	0: Outside zone, 1: Inside zone
			9	Zone 2	0: Outside zone, 1: Inside zone
			10	Point zone	0: Outside zone, 1: Inside zone
			11	Home position return complete	0: Incomplete, 1: Complete
			12	Servo ON state	0: OFF state, 1: ON state
			13	Alarm	0: Triggered, 1: Not triggered
			14	Warning	0: Triggered, 1: Not triggered
			15	Operation preparation complete	0: Incomplete, 1: Complete

Input signal: PLC → Controller

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2001	0x01	Input signal 1	0	Solenoid valve travel command 1	1: ON
			1	Solenoid valve travel command 2	1: ON
			2	-	
			3	-	
			4	-	
			5	-	
			6	-	
			7	-	
			8	-	
			9	-	
			10	-	
			11	Home position return start	1: Home position return start
			12	Servo ON	1: Servo ON, 0: Cancel
			13	Alarm reset	1: Reset
			14	-	
			15	-	

■ Solenoid valve mode, single type (VSGL) (operation mode (PIO): 8)

Output signal: Controller → PLC

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2003	0x01	Output signal 1	0	Point number 1 travel complete	0: Incomplete, 1: Complete
			1	Point number 2 travel complete	0: Incomplete, 1: Complete
			2	-	
			3	-	
			4	Switch 1	0: OFF, 1: ON
			5	Switch 2	0: OFF, 1: ON
			6	-	
			7	Traveling	0: Stopped, 1: Traveling
			8	Zone 1	0: Outside zone, 1: Inside zone
			9	Zone 2	0: Outside zone, 1: Inside zone
			10	Point zone	0: Outside zone, 1: Inside zone
			11	Home position return complete	0: Incomplete, 1: Complete
			12	Servo ON state	0: OFF state, 1: ON state
			13	Alarm	0: Triggered, 1: Not triggered
			14	Warning	0: Triggered, 1: Not triggered
			15	Operation preparation complete	0: Incomplete, 1: Complete

Input signal: PLC → Controller

Index (hexadecimal)	Sub Index	Display name	Bit	Descriptions	Value (decimal)
0x2001	0x01	Input signal 1	0	-	
			1	Solenoid valve travel command 2	1: ON
			2	-	
			3	-	
			4	-	
			5	-	
			6	-	
			7	-	
			8	-	
			9	-	
			10	-	
			11	Home position return start	1: Home position return start
			12	Servo ON	1: Servo ON, 0: Cancel
			13	Alarm reset	1: Reset
			14	-	
			15	-	

3.4.3 Data number

Indicates the data number used when executing data read or data write.

Data number (hexadecimal)	Descriptions	Value (decimal)	Unit	Access *1	Remarks
0x0505	Data initialization	0x999n (hexadecimal)	-	R/W	n: Set the bit as follows. Bit 0: 1 = Parameter data Initialize all Bit 1: (Not in use) Bit 2: 1 = Point data Initialize all Bit 3: (Not in use) 0 if read
0x057F	Software reset	9999	-	W	9999 = Software reset
0x0702	status	0 to 65535	-	R	Bit 0: Point travel complete status 0: Incomplete, 1: Complete Bit 1: Point traveling 0: Stopped, 1: Traveling Bit 2: Point travel pressing 0: Pressing complete, 1: Pressing Bit 3: Within zone 1 range 0: Outside range, 1: Inside range Bit 4: Within zone 2 range 0: Outside range, 1: Inside range Bit 5: Motor power OFF status 0: ON, 1: OFF Bit 6: Undefined Bit 7: Emergency stop input status 0: Emergency stop cancel, 1: Emergency stop Bit 8: Home position return complete status 0: Incomplete, 1: Complete Bit 9: Home position return 0: Not returning, 1: Returning Bit 10: Servo ON state 0: OFF, 1: ON Bit 11: Undefined Bit 12: Operation preparation complete 0: Incomplete, 1: Complete Bit 13: Alarm status 0: None, 1: Yes Bit 14: Electrical angle adjustment complete status 0: Incomplete, 1: Complete Bit 15: Undefined
0x0708	Speed	0 to 9999	mm/s deg/s	R	-
0x0709	Current	0 to 100	%	R	-
0x070A	Alarm	0 to 65535	-	R	-
0x2810	Stroke length	0 to 9999	mm deg	R	-

*1: R = Read, R/W = Read/write

Data number (hexadecimal)	Descriptions	Value (decimal)	Unit	Access *1	Remarks
0x4000	Alarm log	Alarm code Alarm date and time	-	R	Read data Bit 15 to 0: Alarm code Bit 23 to 16: Month Bit 31 to 24: Year Data (alarm) Bit 7 to 0: Hour Bit 15 to 8: Day Bit 23 to 16: Second Bit 31 to 24: Minute
0x4C00	Integrated running distance	0 to 1000000000	m 10^3 deg	R	-
0x4C02	Integrated number of travel times	0 to 1000000000	times	R	-
0x4C04	Integrated operating time	0 to 1000000000	s	R	-
0x5000	Soft limit (+)	-999999 to 999999	0.01 mm 0.01deg	R/W	-
0x5002	Soft limit (-)	-999999 to 999999	0.01 mm 0.01deg	R/W	-
0x5004	Zone 1 (+)	-999999 to 999999	0.01 mm 0.01deg	R/W	-
0x5006	Zone 1 (-)	-999999 to 999999	0.01 mm 0.01deg	R/W	-
0x5008	Zone 2 (+)	-999999 to 999999	0.01 mm 0.01deg	R/W	-
0x500A	Zone 2 (-)	-999999 to 999999	0.01 mm 0.01deg	R/W	-
0x500C	Zone hysteresis	0 to 999999	0.01 mm 0.01deg	R/W	-
0x5010	Home position return speed	1 to 99	mm/s deg/s	R/W	-
0x5012	Home position offset amount	-999999 to 999999	0.01 mm 0.01deg	R/W	-
0x5014	Automatic home position return	0 to 1	-	R/W	-
0x5020	Pressing judgment time	0 to 9999	ms	R/W	-
0x5022	Fixed current at stop	0 to 100	%	R/W	-
0x5400	Operation mode (PIO)	0 to 8	-	R/W	0=B064, 1=B128, 2=B256, 3=B512, 4=T064, 5=S007, 6=VW2P, 7=VW3P, 8=VSGL
0x5480	Operation mode (EtherCAT) *2	0 to 2	-	R/W	0: PIO 1: SDP 2: FDP
0x5482	Station number	1 to 64	-	R/W	-
0x5484	Communication speed	0 to 4	-	R/W	0: 156kbps 1: 625kbps 2: 2.5Mbps 3: 5Mbps 4: 10Mbps

*1: R = Read, R/W = Read/write
*2: Change the operation mode from S-Tools. After changing, cycle the power.

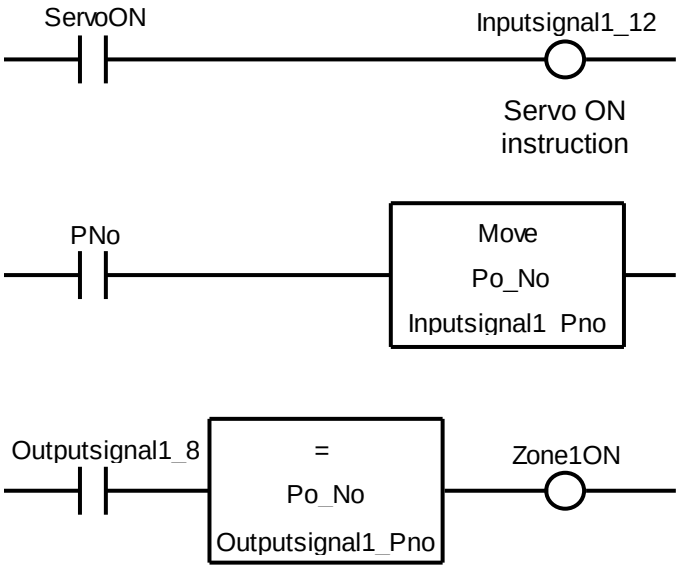
Data number (hexadecimal)	Descriptions	Value (decimal)	Unit	Access *1	Remarks
0x8000 + 32*n	Position	-999999 to 999999	0.01 mm 0.01deg	R/W	Point data for point No. n (n=0 to 511)
0x8002 + 32*n	Positioning width	0 to 999	0.01 mm 0.01deg	R/W	Point data for point No. n (n=0 to 511)
0x8004 + 32*n	Speed	0 to 9999	mm/s deg/s	R/W	Point data for point No. n (n=0 to 511)
0x8006 + 32*n	Acceleration	0 to 999	0.01G	R/W	Point data for point No. n (n=0 to 511)
0x8008 + 32*n	Deceleration	0 to 999	0.01G	R/W	Point data for point No. n (n=0 to 511)
0x800A + 32*n	Pressing current	0 to 100	%	R/W	Point data for point No. n (n=0 to 511)
0x800C + 32*n	Pressing speed	0 to 99	mm/s deg/s	R/W	Point data for point No. n (n=0 to 511)
0x800E + 32*n	Pressing distance	-999999 to 999999	0.01 mm 0.01deg	R/W	Point data for point No. n (n=0 to 511)
0x8010 + 32*n	Mode	0 to 1048575	-	R/W	Point data for point No. n (n=0 to 511) Bit 3 to 0: Operation method Bit 7 to 4: Position specification method Bit 11 to 8: Acceleration/deceleration method Bit 15 to 12: Stop method Bit 19 to 16: Rotation direction
0x8012 + 32*n	Gain magnification	0 to 9999	%	R/W	Point data for point No. n (n=0 to 511)
0x8014 + 32*n	Point zone (+)	-999999 to 999999	0.01 mm 0.01deg	R/W	Point data for point No. n (n=0 to 511)
0x8016 + 32*n	Point zone (-)	-999999 to 999999	0.01 mm 0.01deg	R/W	Point data for point No. n (n=0 to 511)

*1: R = Read, R/W = Read/write

3.5 Data access

■ Process data

Process data is always exchanged between the master and slave at a set cycle. Normally, the PLC development tool is used to set the data length and configuration, and to assign relays and data memory.Input signals and input data will be updated when data is set (coil, bit SET, Move command, etc.). Also, output signals and output data can be referenced through means such as contacts, Compare command, or Move command.



For detailed information on settings, updates and references, refer to the manual from the PLC manufacturer.

3.6 Operation mode

The following three types of operation modes (EtherCAT) are available. The PIO mode can be changed to the following nine types of settings, based on the operation mode (PIO) setting.

■ PIO mode (abbreviation: PIO) (operation mode (EtherCAT): 0)

This mode performs control in accordance with conventional signal I/O.

- 64-point mode (abbreviation: B064) (operation mode (PIO): 0)
- 128-point mode (abbreviation: B128) (operation mode (PIO): 1)
- 256-point mode (abbreviation: B256) (operation mode (PIO): 2)
- 512-point mode (abbreviation: B512) (operation mode (PIO): 3)
- Teaching 64-point mode (abbreviation: T064) (operation mode (PIO) mode: 4)
- Simple 7-point mode (abbreviation: S007) (operation mode (PIO): 5)
- Solenoid valve mode, double 2-position type (abbreviation: VW2P) (operation mode (PIO): 6)
- Solenoid valve mode, double 3-position type (abbreviation: VW3P) (operation mode (PIO): 7)
- Solenoid valve mode, single type (abbreviation: VSGL) (operation mode (PIO): 8)

■ Simple direct value mode (abbreviation: SDP) (operation mode (EtherCAT): 1)

Used to change only the position data, based on the point data that was already set. Position data set in input data is not saved. When travel is complete, the point number of the output signal is not set. (If point travel is executed, the point number for which travel was completed will be set.)

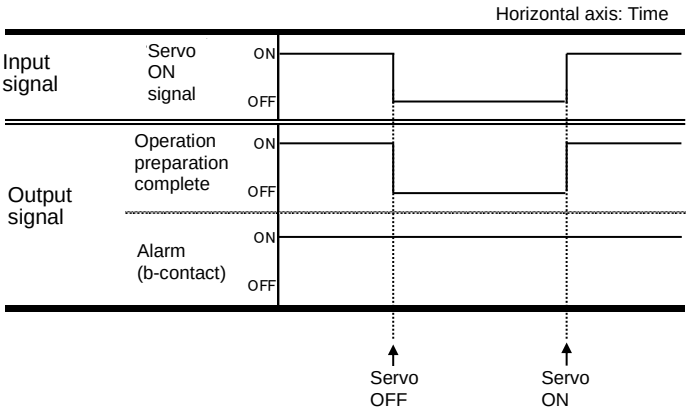
■ Full direct value mode (abbreviation: FDP) (operation mode (EtherCAT): 2)

Set the point data in input data and then operate. Point data set in input data is not saved. When travel is complete, the point number of the output signal is not set. (If point travel is executed, the point number for which travel was completed will be set.)

3.7 Operation time chart

3.7.1 Servo ON

If servo OFF occurs during operation, deceleration is stopped and the motor enters a de-energized state. During servo OFF, operation preparation complete output turns OFF, and if there are brakes, they are locked. Using the setting software makes servo ON/OFF operation possible regardless of the servo ON signal's state.



⚠WARNING

Keep safety in mind.
When turning servo OFF during operation, operation may continue with the inertia of the workpiece.

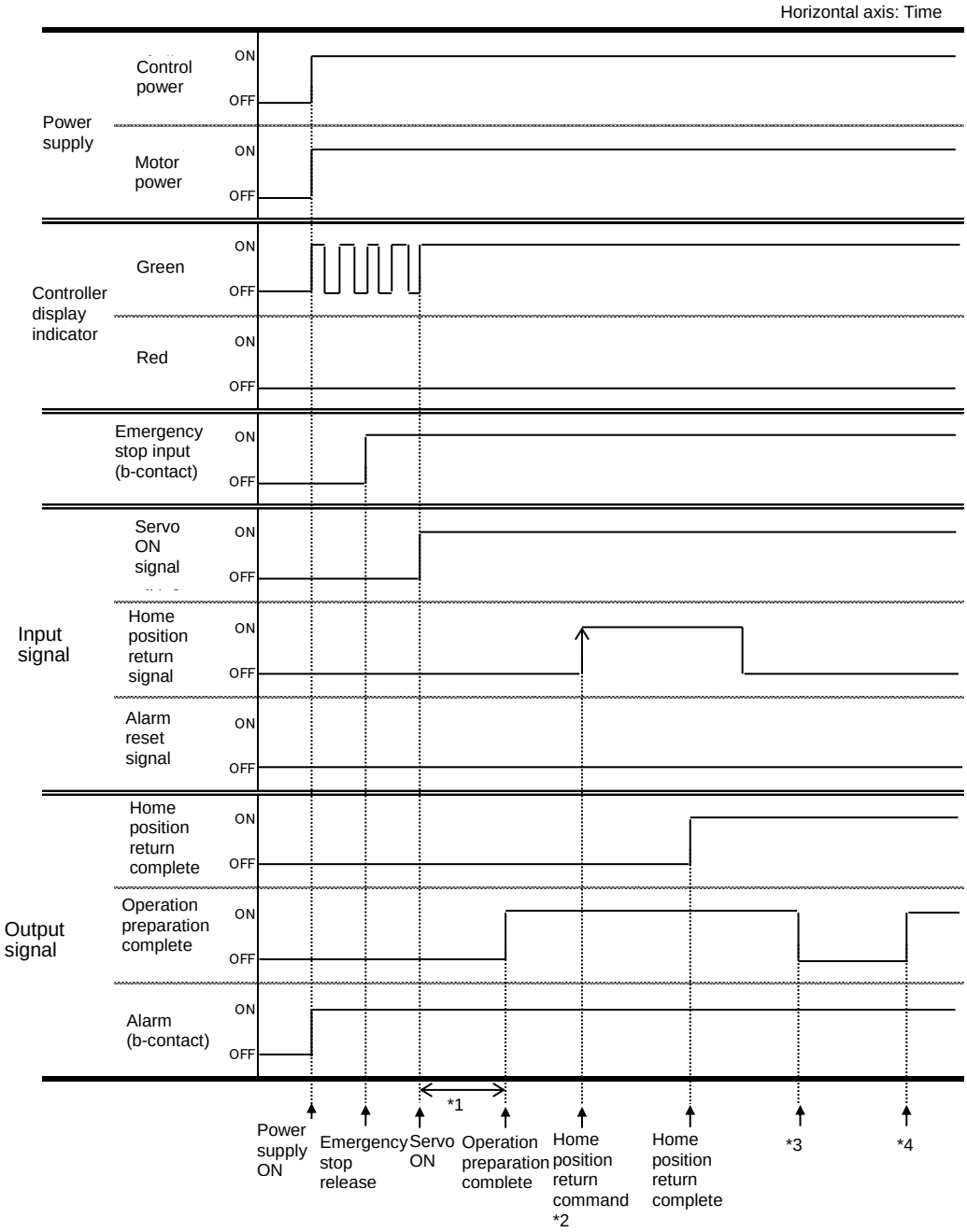
⚠CAUTION

When turning servo ON, be sure to confirm safety even if the actuator starts operating.
The actuator could start operating once the servo is turned ON, which could cause injury or damage the workpiece.
The movement instruction signal is level input for the solenoid valve mode single/double 3-position type, so it may operate simultaneously with servo ON.

If operation by setting tool is enabled, servo ON/OFF operation cannot be received via the servo ON signal.

3.7.2 When powered on

As in the figure below, the time chart covers home position return start after power ON to home position return complete.

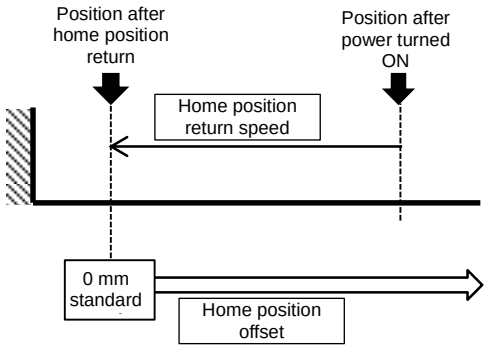


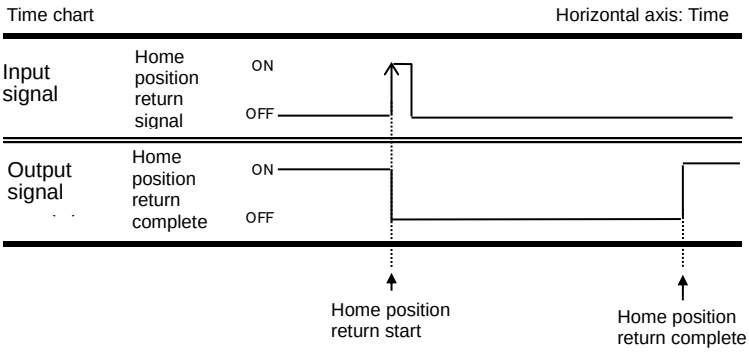
*1: Depending on the stroke position, operation preparation complete takes 1.5 s to 5.0 s following the first servo ON after turning the power ON.
*2: When operating with the parameter automatic home position return is disabled.
*3: When operation with the setting tool is enabled (TOOL mode).
*4: When operation with the setting tool is disabled (PLC mode).

Due to the use of a stepping motor, excitation phase detection is performed following the first servo ON after turning the power ON.

3.7.3 Home position return operation

When a home position return operation is executed, a home position return operation is performed. The position at which home position return operation completes becomes the home position (0 mm).

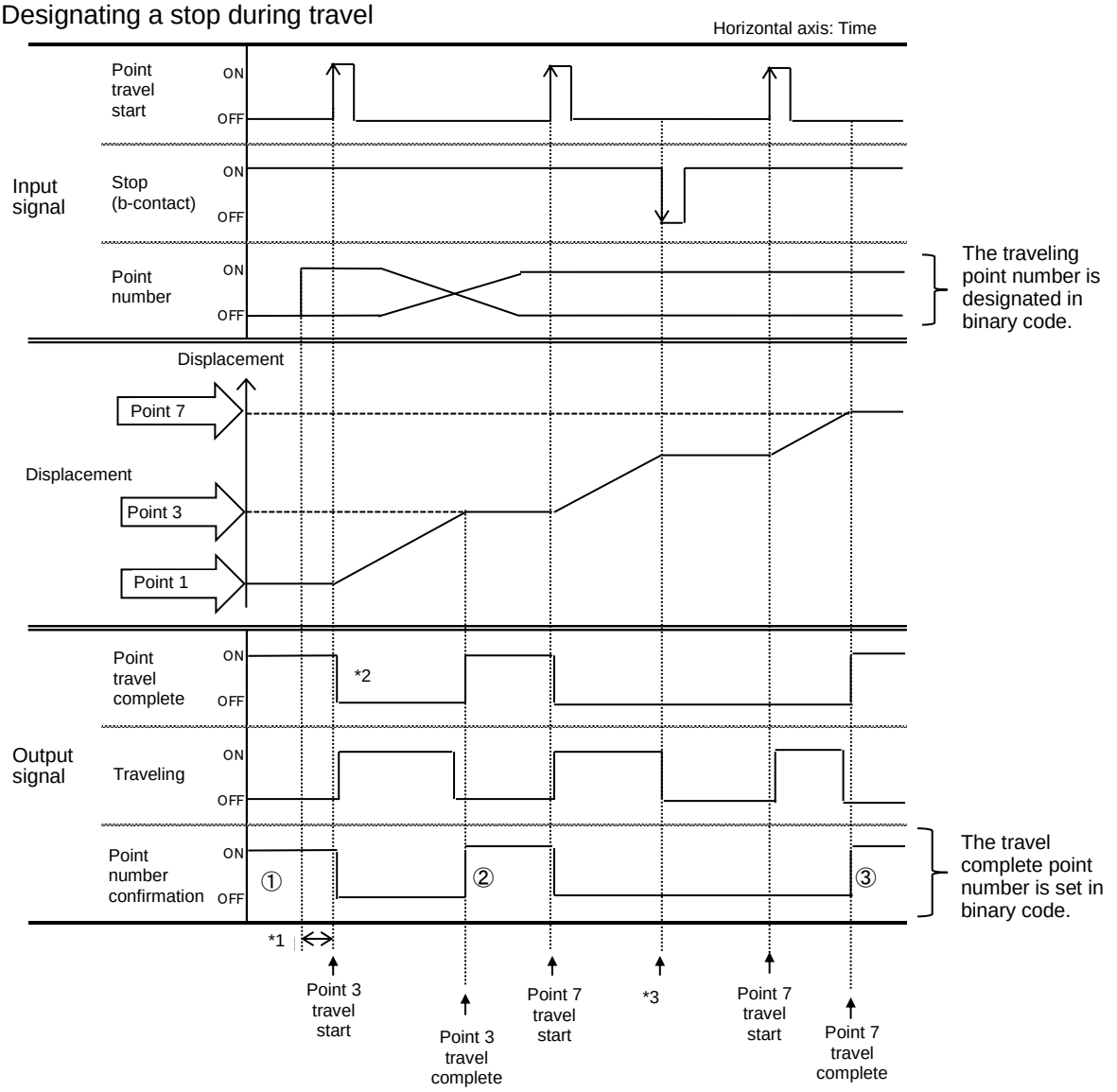




3.7.4 Positioning operation

■ PIO mode (operation mode: 0)

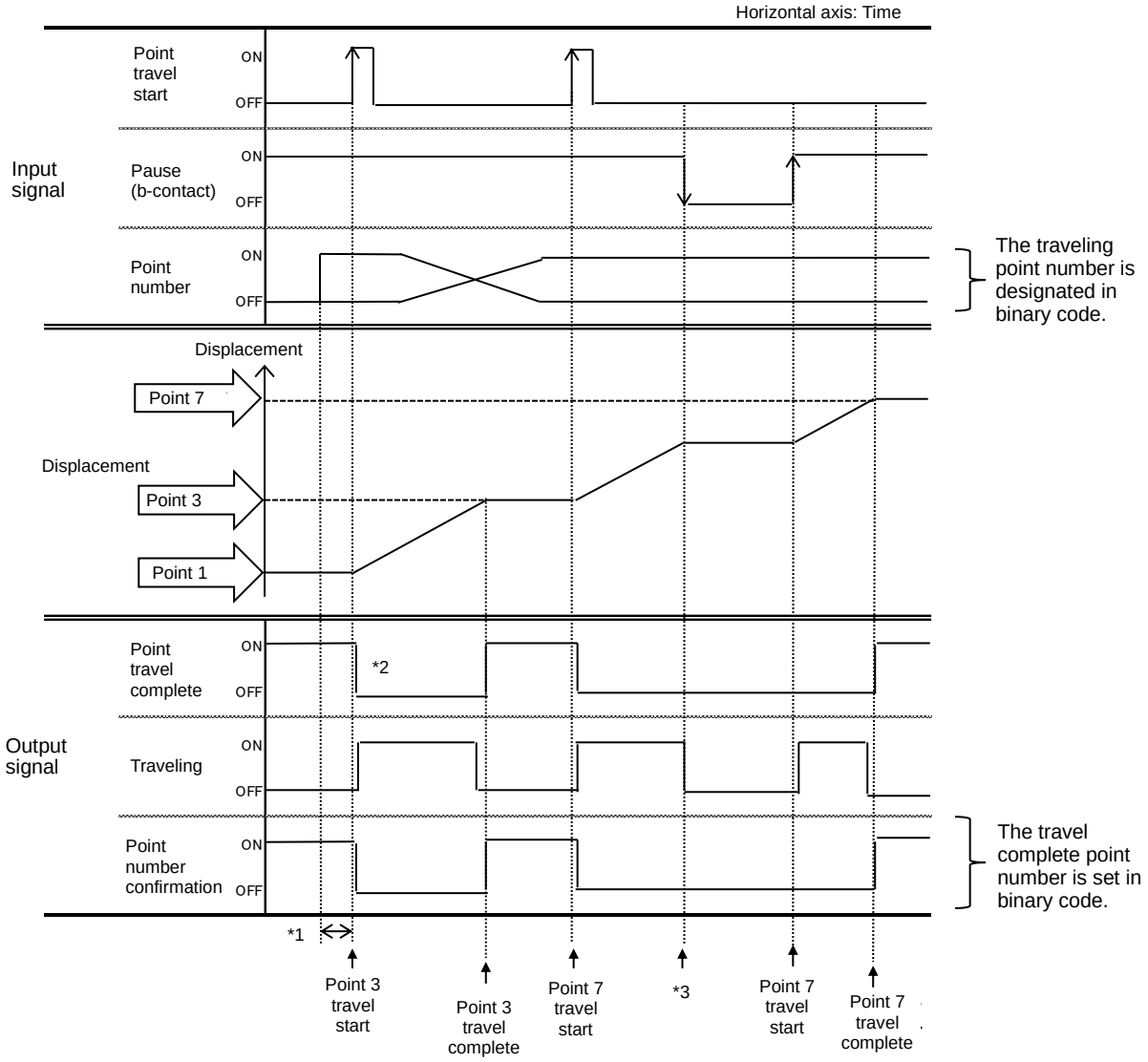
Designating a stop during travel



*1: Leave an interval of at least 10 ms between point number selection and travel start ON.
*2: Note that the previous point travel complete will still be ON until an instruction is received, even after point travel start ON. Also, both point travel complete and moving may be ON at the same time depending on the timing.
*3: "Stop" is b contact, so turn point travel start ON while the bit is ON. If stopped via "Stop," point travel complete will not turn ON.

・Point number set for point number confirmation in figure above
(1) Point 1
(2) Point 3
(3) Point 7

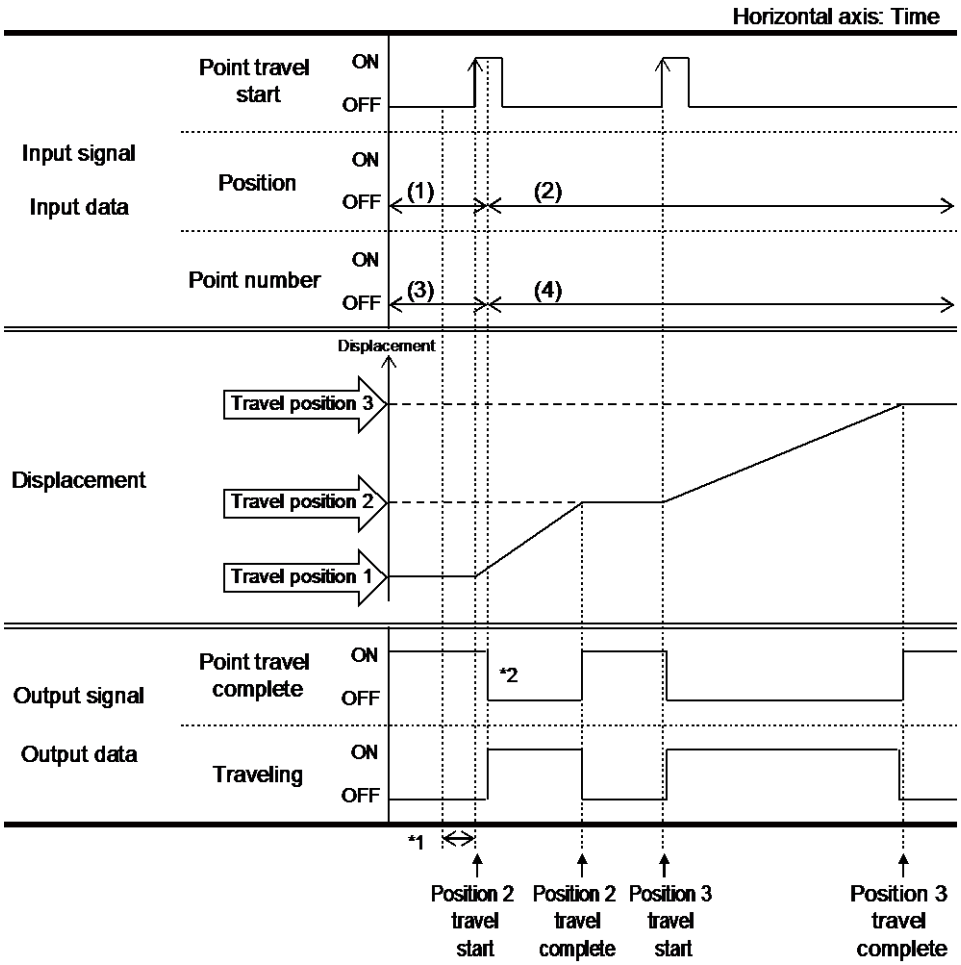
Designating a pause during travel



*1: Leave an interval of at least 10 ms between point selection and travel start ON.
*2: Note that the previous point travel complete will still be ON until an instruction is received, even after point travel start ON. Also, both travel complete signal and moving signal may be ON at the same time depending on the timing.
*3: "Pause" is b contact, so turn point travel start ON while the bit is ON. If stopped via "Pause," point travel complete will not turn ON.

■ Simple direct value mode (operation mode: 1)

With point data set for the point number designated by the input signal, set the position and point number in input data and the input signal, and then turn the point travel start bit ON.



*1: Leave an interval of at least 10 ms for point travel start ON after setting the position and point number.
*2: Note that the previous point travel complete will still be ON until an instruction is received, even after point travel start ON. Also, both travel complete and moving may be ON at the same time depending on the timing.

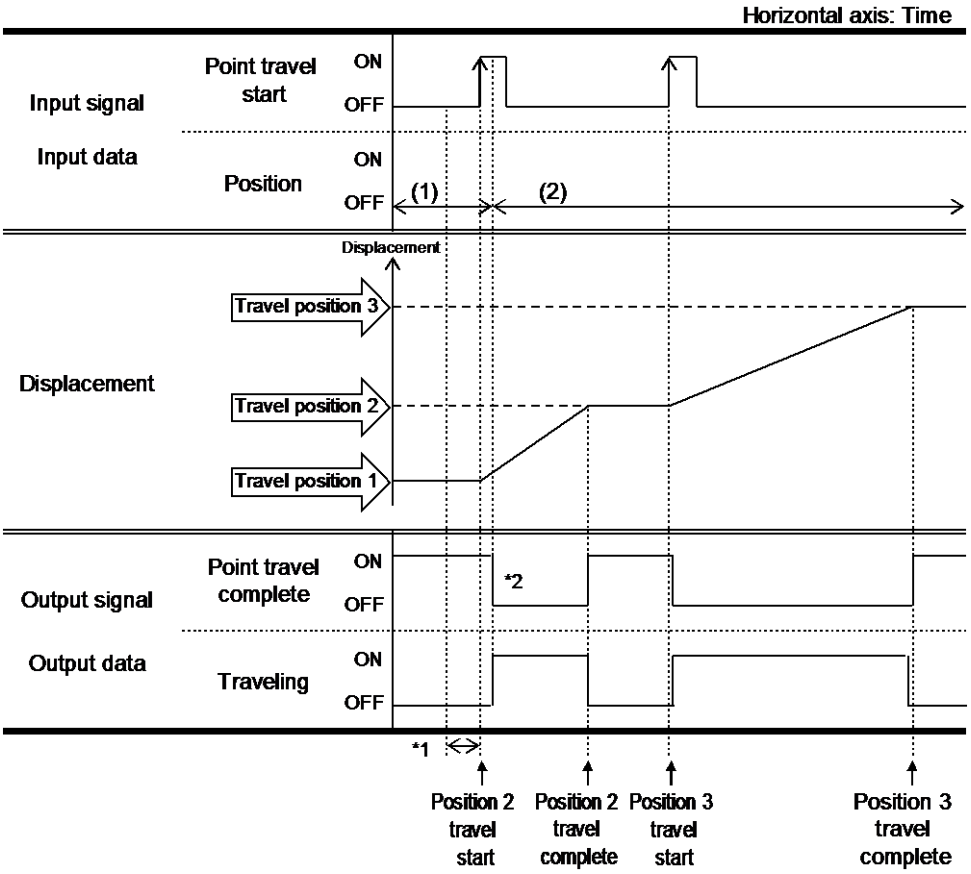
• Data set in position in above figure
(1) Position data for travel position 2
(2) Position data for travel position 3

・Data set in the point number in the simple direct value mode figure.
(3) Point number with point data set to travel position 2
(4) Point number with point data set to travel position 3 (using (3) is also acceptable if the speed, acceleration, etc. are the same)

*The point number is not set during travel complete.
*Operations during stop and pause are the same as in PIO mode.

■ Full direct value mode (operation mode: 2)

After setting the position, speed, and other point data in input data, turn the travel start bit ON.



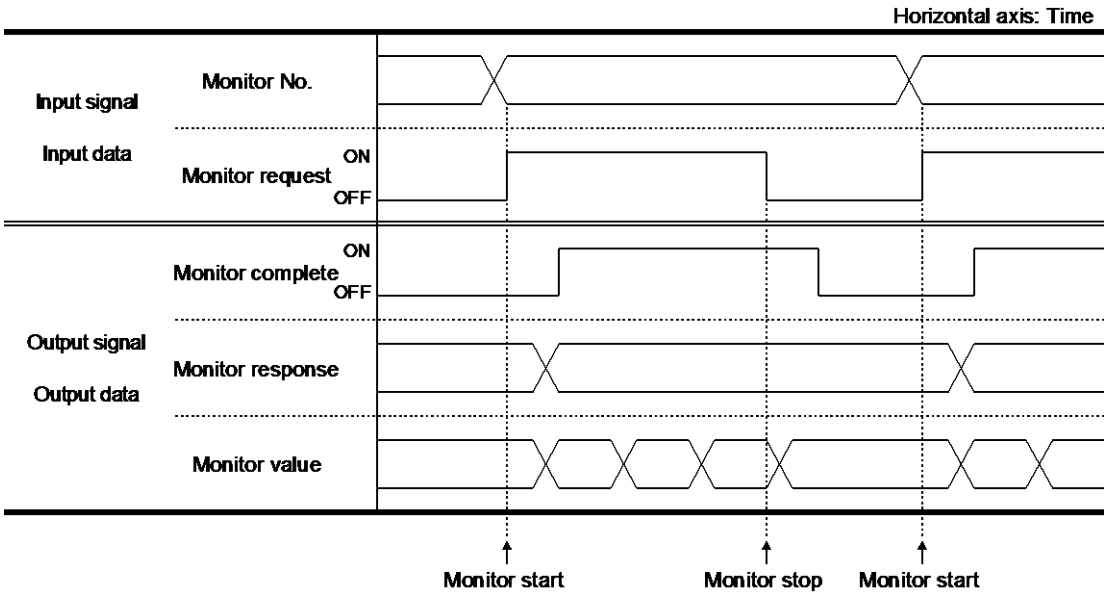
*1: Leave an interval of at least 10 ms for point travel start ON after setting the point data.
*2: Note that the previous point travel complete will still be ON until an instruction is received, even after point travel start ON. Also, both travel complete and moving may be ON at the same time depending on the timing.

• Data set in point data in above figure
(1) Point data for travel position 2
(2) Point data for travel position 3

* When travel is complete, the point number is not set.
* The behavior when stopped or paused is the same as for PIO mode.

3.7.5 Monitor

After setting the monitor number, turn monitor request ON.

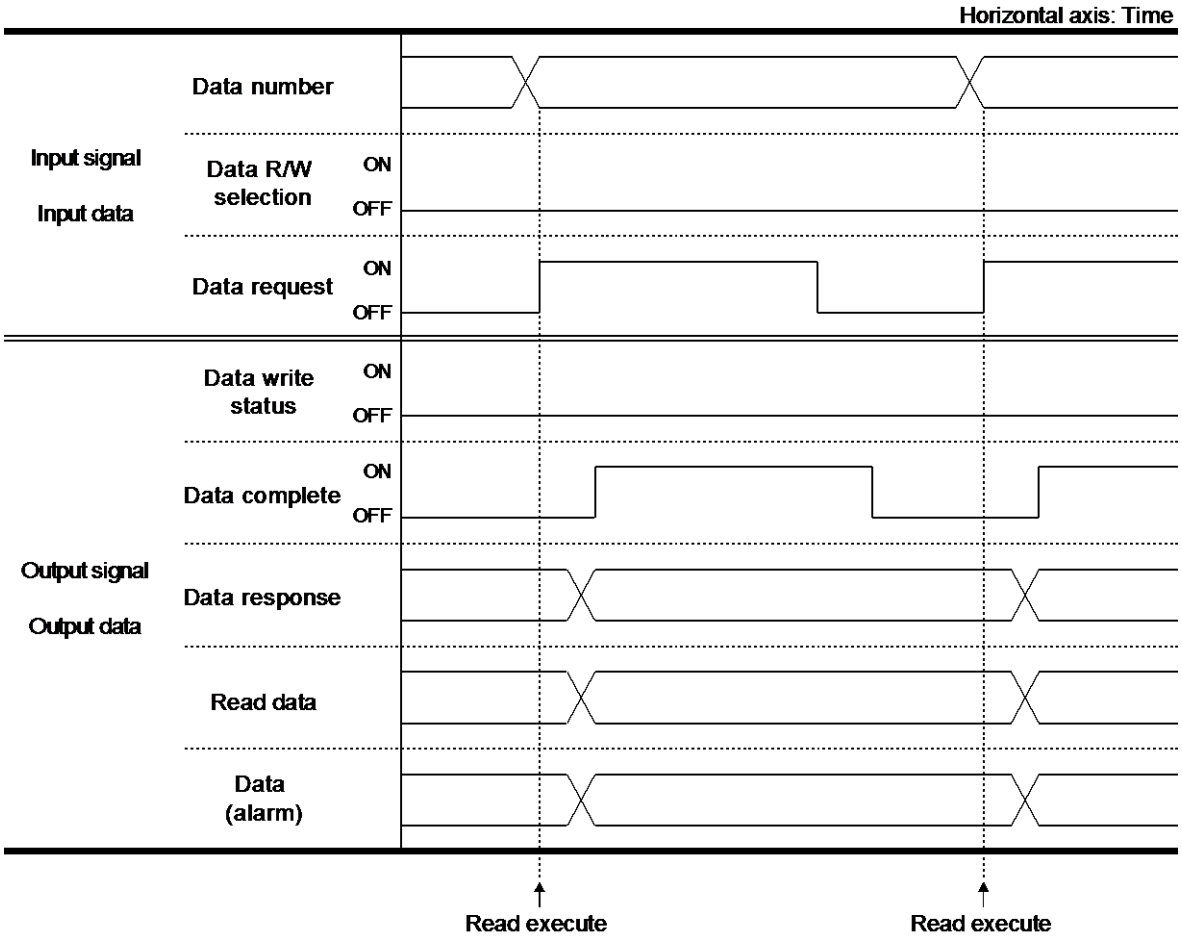


Monitor No. (hexadecimal)	Data output to monitor value (decimal)
0x0001	Position (0.01 mm) (0.01 deg) -999999 to 999999
0x0002	Speed (mm/s) (deg/s) 0 to 9999
0x0003	Current (%) 0 to 100
0x0005	Alarm

Monitor response				Content
Output signal 2 Bit 11	Output signal 2 Bit 10	Output signal 2 Bit 9	Output signal 2 Bit 8	
0	0	0	0	Normal
0	0	0	1	Monitor number error

3.7.6 Data read

After setting the data number and data R/W selection, turn data request ON.

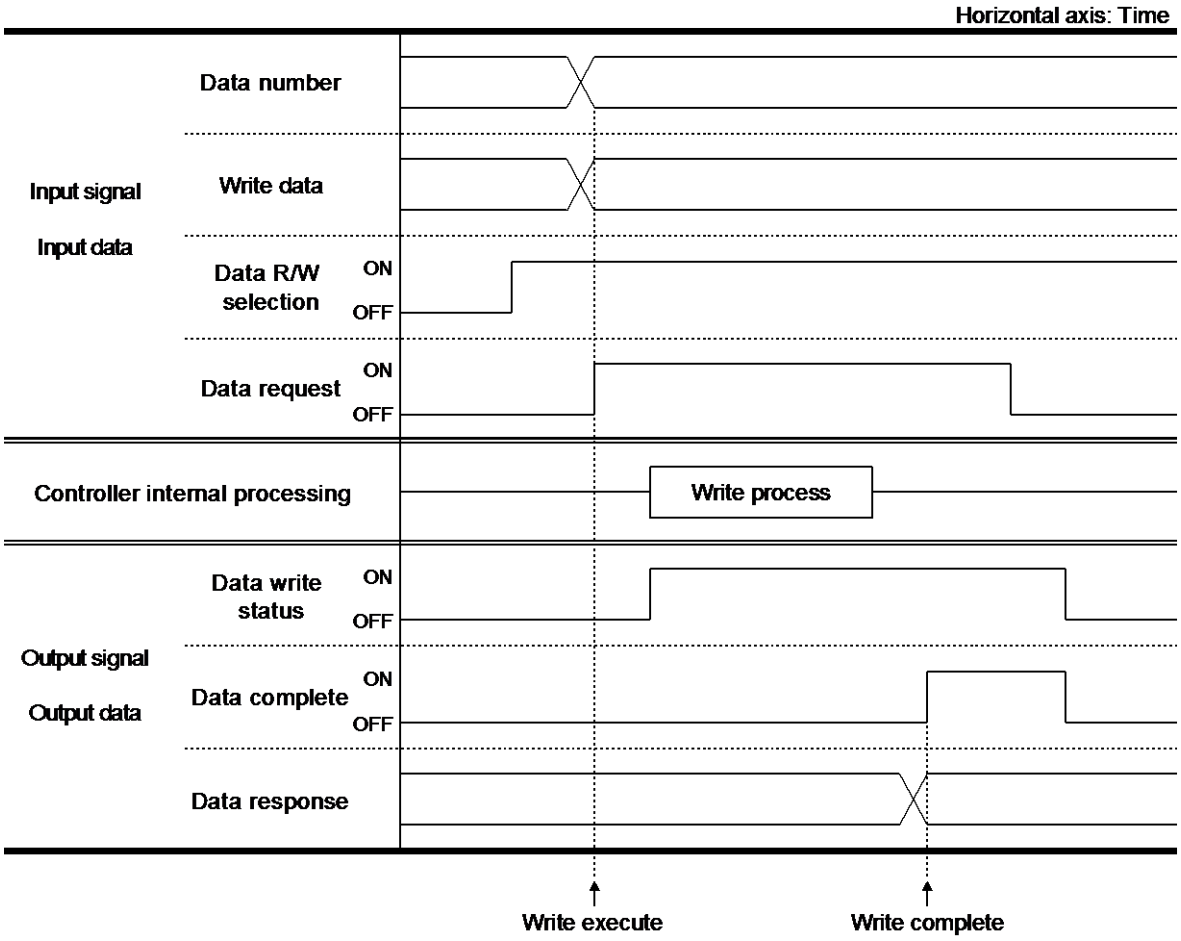


Confirm that data complete is ON, and then turn data request OFF.

Data response				Content
Output signal 2 Bit 3	Output signal 2 Bit 2	Output signal 2 Bit 1	Output signal 2 Bit 0	
0	0	0	0	Normal
0	0	1	0	Data number error

3.7.7 Data write

After setting the data number, write data, and data R/W selection, turn data request ON.



Confirm that data complete is ON, and then turn data request OFF.

Data response				Content
Output signal 2 Bit 3	Output signal 2 Bit 2	Output signal 2 Bit 1	Output signal 2 Bit 0	
0	0	0	0	Normal
0	0	1	0	Data number error
0	1	0	0	Failure
0	1	1	0	Request reception denied
0	1	1	1	Write data over lower limit
1	0	0	0	Write data over upper limit

4. WARRANTY PROVISIONS

4.1 Warranty Conditions

■ Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified below, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.
However, following failures are excluded from this warranty:

- Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or this Instruction Manual.
- Failure caused by incorrect use such as careless handling or improper management.
- Failure not caused by the product.
- Failure caused by use not intended for the product.
- Failure caused by modifications/alterations or repairs not carried out by CKD.
- Failure that could have been avoided if the customer's machinery or device, into which the product is incorporated, had functions and structures generally provided in the industry.
- Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
- Failure caused by acts of nature and disasters beyond control of CKD.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.

■ Confirmation of product compatibility

It is the responsibility of the customer to confirm compatibility of the product with any system, machinery, or device used by the customer.

■ Others

The terms and conditions of this warranty stipulate basic matters.
When the terms and conditions of the warranty described in individual specification drawings or the Specifications are different from those of this warranty, the specification drawings or the Specifications shall have a higher priority.

4.2 Warranty Period

The product is warranted for one (1) year from the date of delivery to the location specified by the customer.

4.3 Remarks

- Warranty period specified in 4.2 is based on the assumption that the product is operated for not more than eight (8) hours a day. If the product reaches the end of its service life within one (1) year, the warranty shall expire at that time.
- If the product is exported outside Japan by the customer, it shall be repaired if returned to CKD's facility or a company or plant specified by CKD. Work and cost associated with the return shall not be covered by the warranty. The repaired product shall be delivered to a place in Japan specified by the customer in a package appropriate for delivery in Japan.