CKD

Electric Actuator

ECR (Controller)
IO-Link Specifications

INSTRUCTION MANUAL

SM-A10616-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 Corporation

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.

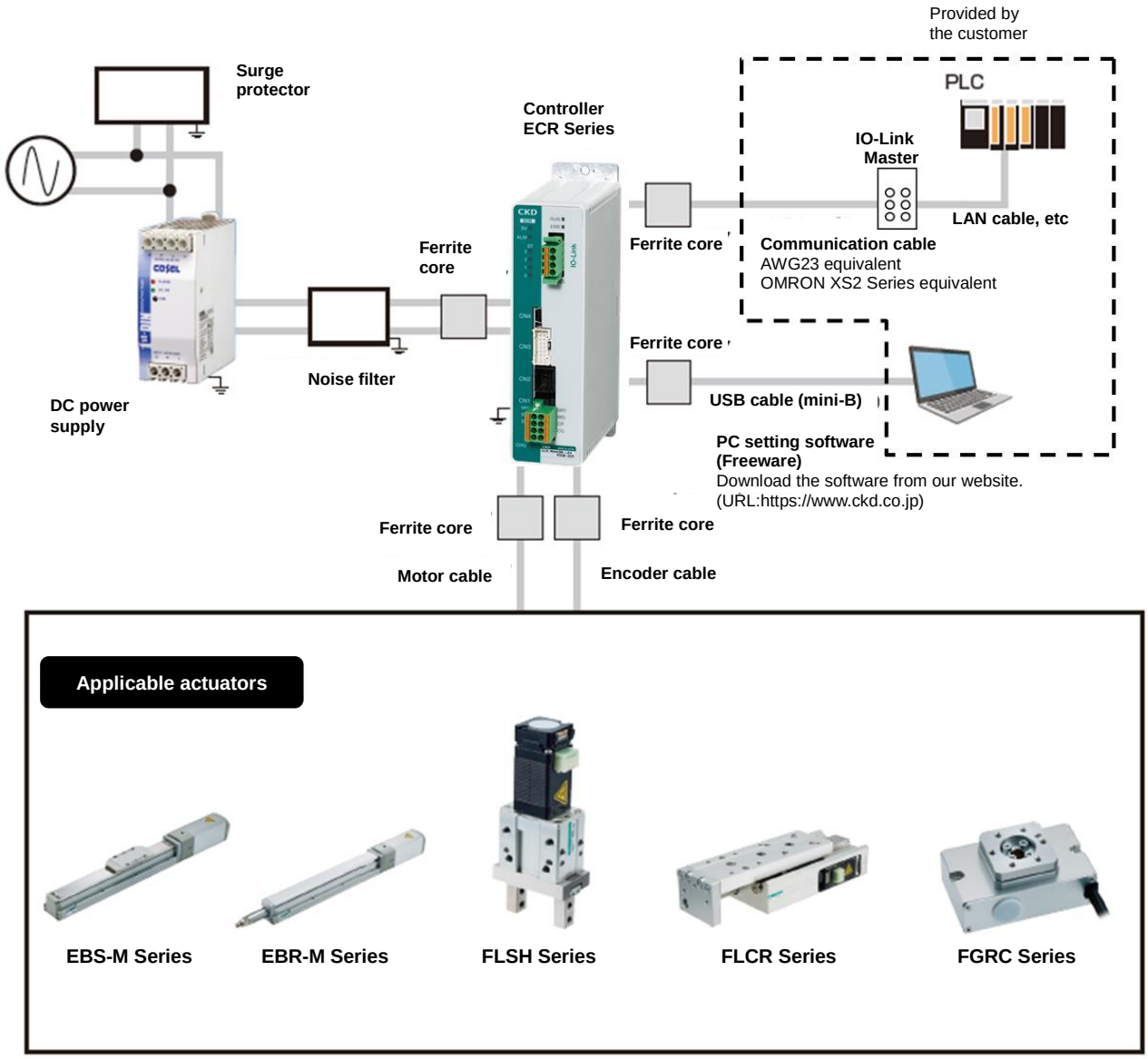
CONTENTS

1. PRODUCT OVERVIEW

1.1 Product configuration

	Name		Quantity
1	Controller unit		1
2	Accessory	Power supply connector: DFMC1,5/4-STF-3,5（PHOENIX CONTACT）	1
		Communication connector (IO-Link): FMC1,5/4/ST-3,5-RF（PHOENIX CONTACT）	1

1.2 System configuration



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-CBLME1-∗
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

Item	Details
Communication protocol	IO-Link
Communication protocol version	V1.1
Transmission speed	COM3 (230.4kbps)
Port	Class A
Process data length (input) *1	PIO mode: 2 bytes Simple direct value mode: 9 bytes Full direct value mode: 9 bytes
Process data length (output) *1	PIO mode: 2 bytes Simple direct value mode: 7 bytes Full direct value mode: 22 bytes
Min. cycle time	PIO mode: 1 ms Simple direct value mode: 2 ms Full direct value mode 2.5 ms
Data storage	2 kbytes
SIO mode support	None
Vendor ID *2	855 (base 10)/0x357 (base 16)
Device ID *3	Simple direct value mode 4194305 (decimal) / 0x400001 (hexadecimal) Full direct value mode 4194306 (decimal) / 0x400002 (hexadecimal) PIO mode, standard 64-point mode 4194307 (decimal) / 0x400003 (hexadecimal) PIO mode, standard 128-point mode 4194308 (decimal) / 0x400004 (hexadecimal) PIO mode, standard 256-point mode 4194309 (decimal) / 0x400005 (hexadecimal) PIO mode, standard 512-point mode 4194310 (decimal) / 0x400006 (hexadecimal) PIO mode, teaching 64-point mode 4194311 (decimal) / 0x400007 (hexadecimal) PIO mode, simple 7-point mode 4194312 (decimal) / 0x400008 (hexadecimal) PIO mode, solenoid valve mode double 2-position type 4194313 (decimal) / 0x400009 (hexadecimal) PIO mode, solenoid valve mode double 3-position type 4194314 (decimal) / 0x40000A (hexadecimal) PIO mode, solenoid valve mode single type 4194315 (decimal) / 0x40000B (hexadecimal)

*1: If the table setting, etc. cannot be configured using the data length shown here when configuring the data in IO-Link Master (PLC), a data table with a greater value is generally set.
*2: Shows CKD.
*3: Shows the product.

1.3.2 Communication status display

■ RUN (green lamp)

Blinking (ON for 0.9 seconds --> OFF for 0.1 seconds)	Establishing IO-Link communication
ON	IO-Link communication not established

■ ERR (red lamp)

<When starting>
This shows the operation mode configured.

ON for 1 second	
PIO mode	OFF for 2 seconds
Simple direct value mode	OFF for 0.5 seconds --> ON for 0.5 seconds --> OFF for 1 second
Full direct value mode	OFF for 0.5 seconds --> ON for 0.5 seconds --> OFF for 0.5 seconds --> ON for 0.5 seconds

*Lights for one second, and then displays the operation mode value only for two seconds.
*Indicator blinks as described above two times, with it turning OFF for 0.5 seconds between the first and second time.

<After power on>

High speed blinking (ON for 0.1 seconds --> OFF for 0.1 seconds)	24 VDC voltage drop on IO-Link line

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.

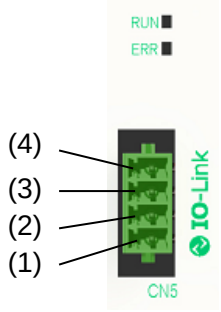
Use a DC stabilized power supply with surplus capacity (24 VDC ±10% or 48 VDC ±10%) for the controller and input/output circuit.
Connecting directly to an AC power supply may lead to fire, rupture, or damage.

⚠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 number	Signal
(1)	L+
(2)	DI/DO
(3)	L−
(4)	C/Q

3. USAGE

3.1 Data communication

Type of data communication	Description
Cyclic communication	Communication sent cyclically between the IO-Link Master and IO-Link device on a data frame of a size designated by the device. Refers to PD (Process Data) communication.
Message communication	Communication to access any IO-Link device data via the IO-Link Master from PLC and other high-end devices when necessary. Use when accessing OD (On-request data). Also referred to as Service Data in this document.

3.2 IODD files

This product provides 11 types of operation modes, including PIO modes (nine types), simple direct value mode, and full direct value mode. Each mode has a different IODD file. Select which to use based on the operation mode.

You can obtain the files from the CKD website.
https://www.ckd.co.jp/

[PIO mode]
CKD-ECR_PIO_MODE_nnnn-yyyymmdd-IODDvvv.xml
* "nnnn" is the operation mode (PIO).
B064: Standard 64-point mode, B128: Standard 128-point mode, B256: Standard 256-point mode, B512: Standard 512-point mode, T064: Teaching 64-point mode, S007: Simple 7-point mode, VW2P: Solenoid valve mode 2-position type, VW3P: Solenoid valve mode 3-position type, VSGL: Solenoid valve mode single type

[Simple direct value mode]
CKD-ECR_SIMPLE _MODE-yyyymmdd-IODDvvv.xml

[Full direct value mode]
CKD-ECR_FULL_MODE-yyyymmdd-IODDvvv.xml
*"yyyymmdd" is the date. "vvv" is the version.

The following files will be downloaded with the IODD files. Copy them to the folder designated for your tools.
Device icon: CKD-ECR-icon.png
Device symbol: CKD-ECR-pic.png
Vendor logo: CKD-logo.png
Connector symbol: CKD-con-pic.png

3.3 IO-Link device settings

Generally, a PLC development tool or other appropriate tool must be used to set this product as a connected IO-Link device for the corresponding port of the IO-Link Master. Some of the necessary settings include device ID, process data, and process data length.

In most cases, input/output process data is mapped using the setting table,
but when there is no relevant setting table, the data table is generally mapped to be larger than the data length.

◎For OMRON IO-Link master units, the PD(in) process data (9 bytes) for the full direct value mode is set so that five 2-byte InputData tables are mapped.

*Refer to the relevant PLC and IO-Link Master manuals for connection methods.

3.4 Communication format

3.4.1 Process data

Data length and other settings are required for PLC. Refer to the instruction manual of the manufacturer.

■ Process data input/PD (in)

Set the data to write from the controller to the IO-Link Master.

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

Byte order	Bit		Item	Value (base 10)	Index 0x0028 Subindex *1	Format
PD(in)#0 (1st byte)	7	MSB	Operation preparation complete	0: Incomplete, 1: Complete	11	Boolean
	6		Warning *3	0: Triggered, 1: Not triggered	10	Boolean
	5		Alarm *3	0: Triggered, 1: Not triggered	9	Boolean
	4		Servo ON state *3	0: OFF state, 1: ON state	8	Boolean
	3		Home position return complete *3	0: Incomplete, 1: Complete	7	Boolean
	2		Point travel complete *2	0: Incomplete, 1: Complete	6	Boolean
	1		Zone 2	0: Outside zone, 1: Inside zone	5	Boolean
	0	LSB	Zone 1	0: Outside zone, 1: Inside zone	4	Boolean
PD(in)#1 (2nd byte)	7	MSB	Traveling	0: Stopped, 1: Traveling	3	Boolean
	6		Point zone	0: Outside zone, 1: Inside zone	2	Boolean
	5		Point number confirmation bit 5	Port numbers 0 to 63 Alarms 0 to 15 *Set the travel complete point number when normal and the alarm when abnormal.	1	UInteger6
	4		Point number confirmation bit 4			
	3		Point number confirmation bit 3/alarm confirmation bit 3			
	2		Point number confirmation bit 2/alarm confirmation bit 2			
	1		Point number confirmation bit 1/alarm confirmation bit 1			
	0	LSB	Point number confirmation bit 0/alarm confirmation bit 0			

*1: When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.
*2: Both point travel complete and traveling may be "1" at the same time depending on the timing.
*3: 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.

<Simple direct value mode (operation mode: 1)/Full direct value mode (operation mode: 2)>

Byte order	Bit		Item	Value (base 10)	Index 0x0028 Subindex *1	Format
PD(in)#0 (1st byte)	7	MSB	Operation preparation complete	0: Incomplete, 1: Complete	14	Boolean
	6		Warning *3	0: Triggered, 1: Not triggered	13	Boolean
	5		Alarm *3	0: Triggered, 1: Not triggered	12	Boolean
	4		Servo ON state *3	0: OFF state, 1: ON state	11	Boolean
	3		Home position return complete *3	0: Incomplete, 1: Complete	10	Boolean
	2		Point travel complete *2	0: Incomplete, 1: Complete	9	Boolean
	1		-			
	0	LSB	Point number confirmation bit 8	Binary data [During direct value travel] 0 [During point travel] Complete point number is set 0 to 511	8	UInteger9
PD(in)#1 (2nd byte)	7	MSB	Point number confirmation bit 7			
	6		Point number confirmation bit 6			
	5		Point number confirmation bit 5			
	4		Point number confirmation bit 4			
	3		Point number confirmation bit 3			
	2		Point number confirmation bit 2			
	1		Point number confirmation bit 1			
	0	LSB	Point number confirmation bit 0			
PD(in)#2 (3rd byte)	7	MSB	-			
	6		-			
	5		-			
	4		Zone 2	0: Outside zone, 1: Inside zone	7	Boolean
	3		Zone 1	0: Outside zone, 1: Inside zone	6	Boolean
	2		Traveling *2	0: Stopped, 1: Traveling	5	Boolean
	1		Point zone	0: Outside zone, 1: Inside zone	4	Boolean
	0	LSB	Direct travel status	0: Point travel, 1: Direct value travel	3	Boolean
PD(in)#3 (4th byte)	7	MSB	Present position (0.01 mm) *3	-999999 to 999999	2	Integer32
	0	LSB				
PD(in)#4 (5th byte)	7	MSB				
	0	LSB				
PD(in)#5 (6th byte)	7	MSB				
	0	LSB				
PD(in)#6 (7th byte)	7	MSB				
	0	LSB				
PD(in)#7 (8th byte)	7	MSB	Monitor value *3	Depends on PD(out) data selection 0: Speed [mm/s] 1: Current [%] 3: Alarm -	1	UInteger16
	0	LSB				
PD(in)#8 (9th byte)	7	MSB				
	0	LSB				

*1: When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order from the first byte.
*2: Both point travel complete and traveling may be "1" at the same time depending on the timing.
*3: Present position and monitor value are updated as needed (there is no instruction bit to control starting or stopping). 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.

■ Process data output/PD (out)

Set data to write from the PLC to the controller.

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

Byte order	Bit		Item	Value (base 10)	Index 0x0029 Subindex *1	Format
PD(out)#0 (1st byte)	7	MSB	Pause	0: Pause start, 1: Cancel	7	Boolean
	6		Stop	0: Stop, 1: Cancel	6	Boolean
	5		Alarm reset	1: Reset	5	Boolean
	4		Servo ON	1: Servo ON, 0: Cancel	4	Boolean
	3		Home position return start	1: Home position return start	3	Boolean
	2		Point travel start	1: Start	2	Boolean
	1		-			
	0	LSB	-			
PD(out)#1 (2nd byte)	7	MSB	-			
	6		-			
	5		Point number selection bit 5	Binary data 0 to 63	1	Uinteger6
	4		Point number selection bit 4			
	3		Point number selection bit 3			
	2		Point number selection bit 2			
	1		Point number selection bit 1			
	0	LSB	Point number selection bit 0			

*1: When referencing PD(Out) data as service data, Index=0x0029 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

- When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status. Similarly, if communication is not established, it will not be sent to the controller even if each bit is ON ("1").
- Stop and pause are b contact. Set bit ON ("1") (cancel) for both when operating.
- Reset can be executed whether in PLC mode or TOOL mode.

<Simple direct value mode (operation mode: 1)>

Byte order	Bit		Item	Value (base 10)	Index 0x0029 Subindex *1	Format
PD(out)#0 (1st byte)	7	MSB	Pause	0: Pause start, 1: Cancel	10	Boolean
	6		Stop	0: Stop, 1: Cancel	9	Boolean
	5		Alarm reset	1: Reset	8	Boolean
	4		Servo ON	1: Servo ON, 0: Cancel	7	Boolean
	3		Home position return start	1: Home position return start	6	Boolean
	2		Point travel start	1: Start	5	Boolean
	1		-			
	0	LSB	Point number selection bit 8	Binary data 0 to 511	4	UInteger9
PD(out)#1 (2nd byte)	7	MSB	Point number selection bit 7			
	6		Point number selection bit 6			
	5		Point number selection bit 5			
	4		Point number selection bit 4			
	3		Point number selection bit 3			
	2		Point number selection bit 2			
	1		Point number selection bit 1			
	0	LSB	Point number selection bit 0			
PD(out)#2 (3rd byte)	7	MSB	-			
	6		-			
	5		-			
	4		-			
	3		Monitor No.	0 = Speed, 1 = Current value, 3 = Alarm *2	3	UInteger3
	2					
	1					
	0	LSB	Direct value travel selection	0 = Point travel, 1 = Direct value travel *3	2	Boolean
PD(out)#3 (4th byte)	7	MSB	Position (0.01 mm) (0.01 deg)	-999999 to 999999	1	Integer32
	0	LSB				
PD(out)#4 (5th byte)	7	MSB				
	0	LSB				
PD(out)#5 (6th byte)	7	MSB				
	0	LSB				
PD(out)#6 (7th byte)	7	MSB				
	0	LSB				

*1: When referencing PD(Out) data as service data, Index=0x0029 (read only). When referencing everything, Subindex=0, set in order from the first byte.
*2: Designates which information is set to the PD(in) monitor value.
*3: If direct value travel selection is set to "0," 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. Similarly, if communication is not established, it will not be sent to the controller even if each bit is ON ("1").
- 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 ("1") (cancel) for both when operating.
- Reset can be executed whether in PLC mode or TOOL mode.

<Full direct value mode (operation mode: 2)>

Byte order	Bit		Item	Value (base 10)	Index 0x0029 Subindex *1	Format
PD(out)#0 (1st byte)	7	MSB	Pause	0: Pause start, 1: Cancel	23	Boolean
	6		Stop	0: Stop, 1: Cancel	22	Boolean
	5		Alarm reset	1: Reset	21	Boolean
	4		Servo ON	1: Servo ON, 0: Cancel	20	Boolean
	3		Home position return start	1: Home position return start	19	Boolean
	2		Point travel start	1: Start	18	Boolean
	1		-			
	0	LSB	Point number selection bit 8	Binary data [Point travel] 0 to 511 [Direct value travel] 0	17	UInteger9
PD(out)#1 (2nd byte)	7	MSB	Point number selection bit 7			
	6		Point number selection bit 6			
	5		Point number selection bit 5			
	4		Point number selection bit 4			
	3		Point number selection bit 3			
	2		Point number selection bit 2			
	1		Point number selection bit 1			
	0	LSB	Point number selection bit 0			
PD(out)#2 (3rd byte)	7	MSB	-			
	6		-			
	5		Rotation direction	0: Common, 1: Close rotation, 2: CW, 3: CCW	16	UInteger2
	4					
	3		Monitor No.	0: Speed, 1: Current value, 3: Alarm *2	15	UInteger3
	2					
	1					
	0	LSB	Direct value travel selection	0: Point travel, 1: Direct value travel *4	14	Boolean
PD(out)#3 (4th byte)	7	MSB	Position (0.01 mm) (0.01 deg)	-999999 to 999999	13	Integer32
	0	LSB				
PD(out)#4 (5th byte)	7	MSB				
	0	LSB				
PD(out)#5 (6th byte)	7	MSB				
	0	LSB				
PD(out)#6 (7th byte)	7	MSB				
	0	LSB				
PD(out)#7 (8th byte)	7	MSB	Positioning width (0.01 mm) (0.01 deg)	0 to 999 (when setting = 0, use common parameter value)	12	UInteger16
	0	LSB				
PD(out)#8 (9th byte)	7	MSB				
	0	LSB				
PD(out)#9 (10th byte)	7	MSB	Speed (mm/s) (deg/s)	0 to 9999 (when setting = 0, use the common parameter value) *3	11	UInteger16
	0	LSB				
PD(out)#10 (11th byte)	7	MSB				
	0	LSB				

*1: When referencing PD(out) data as service data, Index=0x0029 (read only). When referencing everything, Subindex=0, set in order from the first byte.
*2: Designates which information is set to the PD(in) monitor value.
*3: The corresponding items and settable range differ for S-Tools.
*4: If direct value travel selection is set to "0," the same point travel as 512-point mode can be used.

Full direct value mode continued

PD(out)#11 (12th byte)	7	MSB	Acceleration (0.01 G)	0 to 255 (Use the common parameter values if setting is 0) *3	10	UInteger8
	0	LSB				
PD(out)#12 (13th byte)	7	MSB	Deceleration (0.01 G)	0 to 255 (Use the common parameter values if setting is 0) *3	9	UInteger8
	0	LSB				
PD(out)#13 (14th byte)	7	MSB	Pressing current (%)	0 to 100 (Use the common parameter values if setting is 0)	8	UInteger8
	0	LSB				
PD(out)#14 (15th byte)	7	MSB	Pressing speed (mm/s) (deg/s)	0 to 99 (Use the common parameter values if setting is 0)	7	UInteger8
	0	LSB				
PD(out)#15 (16th byte)	7	MSB	Pressing distance (0.01 mm) (0.01 deg)	-999999 to 999999 (Use the common parameter values if setting is 0)	6	Integer32
	0	LSB				
PD(out)#16 (17th byte)	7	MSB				
	0	LSB				
PD(out)#17 (18th byte)	7	MSB				
	0	LSB				
PD(out)#18 (19th byte)	7	MSB				
	0	LSB				
PD(out)#19 (20th byte)	7	MSB	Gain magnification (%)	0 to 9999 (When setting = 0, this means that gain magnification is not used.) *5	5	UInteger16
	0	LSB				
PD(out)#20 (21st byte)	7	MSB				
	0	LSB				
PD(out)#21 (22nd byte)	7	MSB	Position specification method	0 : ABS 1 : INC	4	Boolean
	6		Operation method	0: POSI, 1: PRS1, 2: PRS2	3	UInteger2
	5					
	4		Acceleration/deceleration method	0: Common, 1: Trapezoid	2	UInteger2
	3					
	2		Stop method	0: Common, 1: Control, 2: Fixed excitation 3: ASVOFF1, 4: ASVOFF2 5: ASVOFF3	1	UInteger3
	1					
	0	LSB				

*5: The corresponding items and settable range differ for S-Tools.

- When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status. Similarly, if communication is not established, it will not be sent to the controller even if each bit is ON ("1").
- 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 ("1") (cancel) for both when operating.
- Reset can be executed whether in PLC mode or TOOL mode.

3.4.2 Data Index and Subindex

OD(On-request data)

- Not all the data that can be read or written by the user are covered for the actuator. For data that cannot be accessed by IO-Link, access via the setting tool (S-Tools).
- Depending on the actuator's model number (size, etc.), values may cause an error even if within the valid setting range of this table.

(1) Identification

Index (base 16)	Sub index	Item	Value (base 10)	Access *1	Data length	Format
0x0010	0	Vendor Name	CKD Corporation	R	64byte	String
0x0011	0	Vender Text	https://www.ckd.co.jp/	R	64byte	String
0x0012	0	Product Name	ECR-MNNN3B-LK	R	64byte	String
0x0013	0	Product ID	Refer to [Product ID and DeviceID3]	R	64byte	String
0x0014	0	Product Text	Electric Controller	R	64byte	String
0x0015	0	Serial-Number	***	R	16byte	String
0x0016	0	Hardware Revision	***	R	64byte	String
0x0017	0	Firmware Revision	***	R	64byte	String
0x0018	0	Application Specific Tag	At factory shipment "Developed by v33fan/V_STACK"	R/W	32byte	String
0x0000	0	Direct Parameters1	Direct parameters *2	R	16byte	Record
	1	Reserved	Reserved	R	1byte	UInteger8
	2	Master Cycle Time	Master cycle time	R	1byte	UInteger8
	3	Min Cycle Time	Min. cycle time	R	1byte	UInteger8
	4	M-Sequence Capability	Sequence function	R	1byte	UInteger8
	5	IO-Link VersionID	IO-Link version ID	R	1byte	UInteger8
	6	Process Data Input Length	Process data PD(in) length	R	1byte	UInteger8
	7	Process Data Output Length	Process data PD(out) length	R	1byte	UInteger8
	8	Vendor ID 1	0x03	R	1byte	UInteger8
	9	Vendor ID 2	0x57	R	1byte	UInteger8
	10	Device ID 1	0x40	R	1byte	UInteger8
	11	Device ID 2	0x00	R	1byte	UInteger8
	12	Device ID 3	Refer to [Product ID and DeviceID3]	R	1byte	UInteger8
	13	Reserved	Reserved	R	1byte	UInteger8
	14	Reserved	Reserved	R	1byte	UInteger8
	15	Reserved	Reserved	R	1byte	UInteger8
	16	Standard Command	Reserved	R/W	1byte	UInteger8

*1: R: Read, R/W: Read/Write
*2: The type of value set for each item is the same as those for IO-Link.

<Product ID and DeviceID3>

Operation mode		Product ID	Device ID 3
PIO mode	Standard 64-point mode	ECR-MNNN3B-LK_PIO_MODE(B064)	0x03
	Standard 128-point mode	ECR-MNNN3B-LK_PIO_MODE(B128)	0x04
	Standard 256-point mode	ECR-MNNN3B-LK_PIO_MODE(B256)	0x05
	Standard 512-point mode	ECR-MNNN3B-LK_PIO_MODE(B512)	0x06
	Teaching 64-point mode	ECR-MNNN3B-LK_PIO_MODE(T064)	0x07
	Simple 7-point mode	ECR-MNNN3B-LK_PIO_MODE(S007)	0x08
	Solenoid mode Double 2-position type	ECR-MNNN3B-LK_PIO_MODE(VW2P)	0x09
	Solenoid mode Double 3-position type	ECR-MNNN3B-LK_PIO_MODE(VW2P)	0x0A
	Solenoid mode Single type	ECR-MNNN3B-LK_PIO_MODE(VSGL)	0x0B
Simple direct value mode		ECR-MNNN3B-LK_SIMPLE_MODE	0x01
Full direct value mode		ECR-MNNN3B-LK_FULL_MODE	0x02

(2) Parameter and commands

Common specifications

Index (base 16)	Sub Index	Item	Value (base 10)	Access *1	Data length	Format	DS *2
0x0002	0	System Command	Refer to [System Command]	W	1 byte	UInteger8	-
0x000C	0	Device Access Locks	0x0000: No lock 0x0001: Parameter lock 0x0002: Data storage lock	R/W	2 bytes	Record	●
0x0020	0	Error Count	Error count (Cleared when the power is turned ON.) *3	R	2 bytes	UInteger16	-
0x0024	0	Device Status	0: Normal 1: Reserved 2: Reserved 3: Reception of process data temporarily disabled 4: Reception of process data disabled due to error	R	1 byte	UInteger8	-
0x0025	0	Detailed Devices Status	Event qualifier (refer to [Event qualifier] Event code high-end Event code low-end 3-byte configuration x max. 8 *4	R	24 bytes	Array[8] of 3Octet String	-
0x0030	0	Offset Time	0 (Reserved)	R/W	1 byte	Record	-

*1: R: Read, R/W: Read/Write.
*2: Shows the data storage target.
*3: Count added plus 1 if there is an error Level 2 or higher when PD (in) alarm signal turns off.
(Only 1 added even if multiple errors are generated)
*4: Refer to the following and 3.9 Error events.

<System Command>

Value (base 16)	Command	Description
0x82	Restore Factory Settings	Set the setting value to the default state

*5: Initializes identification and user data (to default settings), except for common point data, operation mode, and error event mode. Use data initialization (Index = 0x505, Subindex = 0) to initialize point data and all user data.

<Event qualifier>

Bit7	MODE	1: Single shot, 2: Terminated, 3: Issued
6		
5	TYPE	1: Notification, 2: Warning, 3: Error
4		
3	SOURCE	0: Device
2	INSTANCE	0: Unknown, 4: Application
1		
0		

Individual specifications 1

Index (Base 16)	Sub Index	Item	Value (base 10)	Access *1	Data length	Format	DS *2
0x0041	0	Operation mode	0: PIO mode 1: Simple direct value mode 2: Full direct value mode *3	R/W	1 byte	UInteger8	-
0x0042	0	Data Storage mode	1: Forced upload *4	R/W	1 byte	UInteger8	-
0x0043	0	Error event mode	0: Error event generated/released 1: Error event single shot 2: Do not send error events *5	R/W	1 byte	UInteger8	-
0x0044	0	Data initialization executing	1: Data initialization executing *6	R	1 byte	UInteger8	-
0x0047	0	Operation mode (PIO)	0: Standard 64-point mode 1: Standard 128-point mode 2: Standard 256-point mode 3: Standard 512-point mode 4: Teaching 64-point mode 5: Simple 7-point mode 6: Solenoid valve mode 2-position type 7: Solenoid valve mode 3-position type 8: Solenoid valve mode single type *3	R/W	1 byte	UInteger8	-
0x0048	0	Output selection 1	0: Point zone 1: Zone 1 2: Zone 2 3: Traveling	R/W	1 byte	UInteger8	●
0x0049	0	Output selection 2	0: Point zone 1: Zone 1 2: Zone 2 3: Traveling	R/W	1 byte	UInteger8	●

*1: R: Read, R/W: Read/Write
*2: Shows the data storage target.
*3: Change the operation mode/operation mode (PIO) from S-Tools. After changing, cycle the power. Even if this value is changed, it will return to the original value when starting due to the IO-Link master setting.
*4: Request a forced data storage upload. After execution, the writing value will clear.
*5: After changing the mode, turn the power OFF/ON.
*6: After executing data initialization (Index=0x0505), use this information to confirm that processing is complete. If referenced after processing ends early, 1 (data initializing) cannot be confirmed even once.

If the device comparison function for the Data Storage function is set to "Yes" and the operation mode or operation mode (PIO) is changed, it will return to the original mode when starting according to the Device ID set in the IO-Link master. When changing the operation mode or operation mode (PIO), set the appropriate Device ID using the development tool for the PLC or other means. (Refer to [Product ID and DeviceID3])

Individual specifications 2

Index (Base 16)	Sub Index	Item	Value (base 10)	Access *1	Data length	Format	DS *2
0x1000	0	Point data number specification	0 to 511	R/W	2 bytes	UInteger16	-
0x1001 *3	0	Point data	*4	R/W	30 bytes	Record	Some are ●
	1	Position (0.01 mm) (0.01deg)	-999999 to 999999	R/W	4 bytes	Integer32	-
	2	Positioning width (0.01mm) (0.01deg)	0 to 999 (Use the common parameter values if setting is 0)	R/W	2 bytes	UInteger16	-
	3	Speed (mm/s)(deg/s)	0 to 9999 (Use the common parameter values if setting is 0)	R/W	2 bytes	UInteger16	-
	4	Acceleration (0.01 G)	0 to 255 (Use the common parameter values if setting is 0)	R/W	1 byte	UInteger8	-
	5	Deceleration (0.01 G)	0 to 255 (Use the common parameter values if setting is 0)	R/W	1 byte	UInteger8	-
	6	Pressing current (%)	0 to 100 (Use the common parameter values if setting is 0)	R/W	1 byte	UInteger8	-
	7	Pressing speed (mm/s) (deg/s)	0 to 99 (Use the common parameter values if setting is 0)	R/W	1 byte	UInteger8	-
	8	Pressing distance (0.01mm) (0.01deg)	-999999 to 999999	R/W	4 bytes	Integer32	-
	9	Gain magnification (%)	0 to 9999 (Do not use gain if setting is 0)	R/W	2 bytes	UInteger16	-
	10	Rotation direction	0: Common 1: Close rotation 2: CW 3: CCW If accessed with Subindex=0 0x00 Rotation direction (lower 4 bits) Stop method / Acceleration/deceleration method (upper 4 bits) (lower 4 bits) Position designation / Operation mode (upper 4 bits) (lower 4 bits) (composed of these 4 bytes)	R/W	1byte	UInteger4	
	11	Stop method	0: Common 1: Control 2: Fixed excitation 3: ASVOFF1 4: ASVOFF2 5: ASVOFF3	R/W	1 byte	UInteger4	-
	12	Acceleration/deceleration method	0: Common 1: Trapezoid	R/W	1 byte	UInteger4	-
	13	Position specification method	0：ABS 1：INC	R/W	1 byte	UInteger4	-
	14	Operation method	0：POSI 1：PRS1 2：PRS2	R/W	1 byte	UInteger4	-
	15	Point zone (+)	-999999 to 999999	R	4 bytes	Integer32	-
	16	Point zone (-)	-999999 to 999999	R	4 bytes	Integer32	-

*1: R: Read, R/W: Read/Write
*2: Shows the data storage target.
*3: Point numbers 0 to 31 are targets for data storage (handled in a separate index)
*4: Use S-Tools to set/change common values for point data. Some situations may generate errors even within the setting range, depending on the actuator model No. (size, etc.).

Access the point data after specifying the point data number (Index = 0x1000) (while specified). (Initial value when power is turned ON = 1)

Individual specifications 3

Index (Base 16)	Sub Index	Item	Value (base 10)	Access *1	Data length	Format	DS *2
0x0302	0	Soft limit (+) (0.01mm) (0.01deg)	-999999 to 999999	R/W	4 bytes	Integer32	●
0x0304	0	Soft limit (-) (0.01mm) (0.01deg)	-999999 to 999999	R/W	4 bytes	Integer32	●
0x0308	0	Zone 1 (+) (0.01mm) (0.01deg)	-999999 to 999999	R/W	4 bytes	Integer32	●
0x030A	0	Zone 1 (-) (0.01mm) (0.01deg)	-999999 to 999999	R/W	4 bytes	Integer32	●
0x030C	0	Zone 2 (+) (0.01mm) (0.01deg)	-999999 to 999999	R/W	4 bytes	Integer32	●
0x030E	0	Zone 2 (-) (0.01mm) (0.01deg)	-999999 to 999999	R/W	4 bytes	Integer32	●
0x0312	0	Home position offset amount (0.01 mm) (0.01 deg)	-999999 to 999999	R/W	4 bytes	Integer32	●
0x0310	0	Home position return speed (mm/s) (deg/s)	1 to 99	R/W	2 bytes	UInteger16	●
0x0311	0	Zone hysteresis (0.01 mm) (0.01 deg)	0 to 999	R/W	2 bytes	UInteger16	●
0x0318	0	Automatic home position return	0: Disabled 1: Enabled	R/W	2 bytes	UInteger16	●
0x0329	0	Fixed current at stop (%)	0 to 100	R/W	2 bytes	UInteger16	●
0x032B	0	Pressing judgment time (ms)	0 to 9999	R/W	2 bytes	UInteger16	●

*1: R: Read, R/W: Read/Write
*2: Shows the data storage target.

Individual specifications 4

Index (Base 16)	Sub Index	Item	Value (base 10)	Access *1	Data length	Format	DS
0x0386	0	Stroke	Actuator stroke	R	2 bytes	UInteger16	-
0x070A	0	Alarm code	Refer to the separate table	R	2 bytes	UInteger16	-

*1: R: Read, R/W: Read/Write

Individual specifications 5

Index (Base 16)	Sub Index	Item	Value (base 10) *2	Access *1	Data length	Format	DS
0x0400	0	Controller model number	***	R	40 bytes	String	-
0x0401	0	Controller serial number	***	R	16 bytes	String	-
0x0402	0	Actuator model number	***	R	40 bytes	String	-
0x0403	0	Actuator serial number	***	R	16 bytes	String	-
0x0450	0	Integrated running distance (m) (10^3deg)	Max 1000000000	R	4 bytes	UInteger32	-
0x0451	0	Integrated number of travel times	Max 1000000000	R	4 bytes	UInteger32	-
0x0452	0	Integrated operating time (sec)	Max 1000000000	R	4 bytes	UInteger32	-
0x0480	0	Alarm data details		R	8 bytes	Record	-
	1	Alarm code	***	R	2 bytes	UInteger16	-
	2	Time information (year, month)	YYMM (BCD code)	R	2 bytes	UInteger16	-
	3	Time information (day, hour)	DDHH (BCD code)	R	2 bytes	UInteger16	-
	4	Time information (minute, second)	MMSS (BCD code)	R	2 bytes	UInteger16	-
0x0505	0	Data initialization	0x999n: Data initialization n: Set the bits as follows. bit0(LSB): 1 = Initialize all parameter data bit1: (Not in use) bit2: 1 = Initialize all point data bit3: (Not in use) 0 if read *3	R/W	2 bytes	UInteger16	-
0x0512	0	Set time information		R/W *4	8 bytes	Record	-
	1	Year/Month	YYMM (BCD code)	R/W	2 bytes	UInteger16	-
	2	Day/Hour	DDHH (BCD code)	R/W	2 bytes	UInteger16	-
	3	Minute/Second	MMSS (BCD code)	R/W	2 bytes	UInteger16	-
	4	Setting request	bit 0 (LSB): 1 = Minute/Second setting bit 1: 1 = Day/Hour setting bit 2: 1 = Year/Month setting	R/W	2 bytes	UInteger16	-
0x0520	0	Software reset	9999: Software reset 0 if read *5	R/W	2 bytes	UInteger16	-
0x0717	0	Present time information		R	6 bytes	Record	-
	1	Year/Month	YYMM (BCD code)	R	2 bytes	UInteger16	-
	2	Day/Hour	DDHH (BCD code)	R	2 bytes	UInteger16	-
	3	Minute/Second	MMSS (BCD code)	R	2 bytes	UInteger16	-

*1: R: Read, R/W: Read/Write
*2: Date and time information is expressed as a BCD code
*3: A completed normally response will be returned when receiving is completed normally. Refer to data initialization executing (Index=0x0044) and check that processing has completed. Common speed and other common point data will be the parameter data.
*4: The input value will be returned once read.
*5: A completed normally response will be returned when receiving is completed normally. The reset process is used to execute initialization for communication, etc. Determine whether it has completed by confirming that the port status of the IO-Link master has changed from OFF to ON.
In order to prevent malfunction, do not execute while the actuator is operating or operate/write data while resetting.

3.4.3 PIO mode process data details

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

PD(in): Controller → PLC

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#0	7	MSB	Operation preparation complete	0: Incomplete, 1: Complete	11	Boolean
	6		Warning	0: Triggered, 1: Not triggered	10	Boolean
	5		Alarm	0: Triggered, 1: Not triggered	9	Boolean
	4		Servo ON state	0: OFF state, 1: ON state	8	Boolean
	3		Home position return complete	0: Incomplete, 1: Complete	7	Boolean
	2		Point travel complete	0: Incomplete, 1: Complete	6	Boolean
	1		Zone 2	0: Outside zone, 1: Inside zone	5	Boolean
	0	LSB	Zone 1	0: Outside zone, 1: Inside zone	4	Boolean
PD(in)#1	7	MSB	Traveling	0: Stopped, 1: Traveling	3	Boolean
	6		Point zone	0: Outside zone, 1: Inside zone	2	Boolean
	5		Point number confirmation bit 5	Port numbers 0 to 63 Alarms 0 to 15 *Set the travel complete point number when normal and the alarm when abnormal.	1	UInteger6
	4		Point number confirmation bit 4			
	3		Point number confirmation bit 3/alarm confirmation bit 3			
	2		Point number confirmation bit 2/alarm confirmation bit 2			
	1		Point number confirmation bit 1/alarm confirmation bit 1			
	0	LSB	Point number confirmation bit 0/alarm confirmation bit 0			

PD(out): PLC → controller

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#0	7	MSB	Pause	0: Pause start, 1: Cancel	7	Boolean
	6		Stop	0: Stop, 1: Cancel	6	Boolean
	5		Alarm reset	1: Reset	5	Boolean
	4		Servo ON	1: Servo ON, 0: Cancel	4	Boolean
	3		Home position return start	1: Home position return start	3	Boolean
	2		Point travel start	1: Start	2	Boolean
	1		-			
	0	LSB	-			
PD(out)#1	7	MSB	-			
	6		-			
	5		Point number selection bit 5	Binary data 0 to 63	1	Uinteger6
	4		Point number selection bit 4			
	3		Point number selection bit 3			
	2		Point number selection bit 2			
	1		Point number selection bit 1			
	0	LSB	Point number selection bit 0			

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

PD(in): Controller → PLC

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#0	7	MSB	Operation preparation complete	0: Incomplete, 1: Complete	10	Boolean
	6		Warning	0: Triggered, 1: Not triggered	9	Boolean
	5		Alarm	0: Triggered, 1: Not triggered	8	Boolean
	4		Servo ON state	0: OFF state, 1: ON state	7	Boolean
	3		Home position return complete	0: Incomplete, 1: Complete	6	Boolean
	2		Point travel complete	0: Incomplete, 1: Complete	5	Boolean
	1		Selection output 2 Point zone/zone 1/ zone 2/ traveling	0: Outside zone, 1: Inside zone or 0: Stopped, 1: Traveling	4	Boolean
	0	LSB	Selection output 1 Point zone/zone 1/ zone 2/ traveling	0: Outside zone, 1: Inside zone or 0: Stopped, 1: Traveling	3	Boolean
PD(in)#1	7	MSB	Traveling	0: Stopped, 1: Traveling	2	Boolean
	6		Point number confirmation bit 6	Port numbers 0 to 127 Alarms 0 to 15 *Set the travel complete point number when normal and the alarm when abnormal.	1	UInteger7
	5		Point number confirmation bit 5			
	4		Point number confirmation bit 4			
	3		Point number confirmation bit 3/alarm confirmation bit 3			
	2		Point number confirmation bit 2/alarm confirmation bit 2			
	1		Point number confirmation bit 1/alarm confirmation bit 1			
	0	LSB	Point number confirmation bit 0/alarm confirmation bit 0			

PD(out): PLC → controller

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#0	7	MSB	Pause	0: Pause start, 1: Cancel	7	Boolean
	6		Stop	0: Stop, 1: Cancel	6	Boolean
	5		Alarm reset	1: Reset	5	Boolean
	4		Servo ON	1: Servo ON, 0: Cancel	4	Boolean
	3		Home position return start	1: Home position return start	3	Boolean
	2		Point travel start	1: Start	2	Boolean
	1		-			
	0	LSB	-			
PD(out)#1	7	MSB	-			
	6		Point number selection bit 6	Binary data 0 to 127	1	Uinteger7
	5		Point number selection bit 5			
	4		Point number selection bit 4			
	3		Point number selection bit 3			
	2		Point number selection bit 2			
	1		Point number selection bit 1			
	0	LSB	Point number selection bit 0			

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

PD(in): Controller → PLC

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#0	7	MSB	Operation preparation complete	0: Incomplete, 1: Complete	9	Boolean
	6		Warning	0: Triggered, 1: Not triggered	8	Boolean
	5		Alarm	0: Triggered, 1: Not triggered	7	Boolean
	4		Servo ON state	0: OFF state, 1: ON state	6	Boolean
	3		Home position return complete	0: Incomplete, 1: Complete	5	Boolean
	2		Point travel complete	0: Incomplete, 1: Complete	4	Boolean
	1		Selection output 2 Point zone/zone 1/ zone 2/ traveling	0: Outside zone, 1: Inside zone or 0: Stopped, 1: Traveling	3	Boolean
	0	LSB	Selection output 1 Point zone/zone 1/ zone 2/ traveling	0: Outside zone, 1: Inside zone or 0: Stopped, 1: Traveling	2	Boolean
PD(in)#1	7	MSB	Point number confirmation bit 7	Port numbers 0 to 255 Alarms 0 to 15 *Set the travel complete point number when normal and the alarm when abnormal.	1	UInteger8
	6		Point number confirmation bit 6			
	5		Point number confirmation bit 5			
	4		Point number confirmation bit 4			
	3		Point number confirmation bit 3/alarm confirmation bit 3			
	2		Point number confirmation bit 2/alarm confirmation bit 2			
	1		Point number confirmation bit 1/alarm confirmation bit 1			
	0	LSB	Point number confirmation bit 0/alarm confirmation bit 0			

PD(out): PLC → controller

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#0	7	MSB	Pause	0: Pause start, 1: Cancel	7	Boolean
	6		Stop	0: Stop, 1: Cancel	6	Boolean
	5		Alarm reset	1: Reset	5	Boolean
	4		Servo ON	1: Servo ON, 0: Cancel	4	Boolean
	3		Home position return start	1: Home position return start	3	Boolean
	2		Point travel start	1: Start	2	Boolean
	1		-			
	0	LSB	-			
PD(out)#1	7	MSB	Point number selection bit 7	Binary data 0 to 255	1	Uinteger8
	6		Point number selection bit 6			
	5		Point number selection bit 5			
	4		Point number selection bit 4			
	3		Point number selection bit 3			
	2		Point number selection bit 2			
	1		Point number selection bit 1			
	0	LSB	Point number selection bit 0			

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

PD(in): Controller → PLC

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#0	7	MSB	Operation preparation complete	0: Incomplete, 1: Complete	9	Boolean
	6		Warning	0: Triggered, 1: Not triggered	8	Boolean
	5		Alarm	0: Triggered, 1: Not triggered	7	Boolean
	4		Servo ON state	0: OFF state, 1: ON state	6	Boolean
	3		Home position return complete	0: Incomplete, 1: Complete	5	Boolean
	2		Point travel complete	0: Incomplete, 1: Complete	4	Boolean
	1		Selection output 2 Point zone/zone 1/ zone 2/ traveling	0: Outside zone, 1: Inside zone or 0: Stopped, 1: Traveling	3	Boolean
	0	LSB	Point number confirmation bit 8	Port numbers 0 to 511 Alarms 0 to 15 *Set the travel complete point number when normal and the alarm when abnormal.	1	UInteger9
PD(in)#1	7	MSB	Point number confirmation bit 7			
	6		Point number confirmation bit 6			
	5		Point number confirmation bit 5			
	4		Point number confirmation bit 4			
	3		Point number confirmation bit 3/alarm confirmation bit 3			
	2		Point number confirmation bit 2/alarm confirmation bit 2			
	1		Point number confirmation bit 1/alarm confirmation bit 1			
	0	LSB	Point number confirmation bit 0/alarm confirmation bit 0			

PD(out): PLC → controller

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#0	7	MSB	Pause	0: Pause start, 1: Cancel	7	Boolean
	6		Stop	0: Stop, 1: Cancel	6	Boolean
	5		Alarm reset	1: Reset	5	Boolean
	4		Servo ON	1: Servo ON, 0: Cancel	4	Boolean
	3		Home position return start	1: Home position return start	3	Boolean
	2		Point travel start	1: Start	2	Boolean
	1		-			
	0	LSB	Point number selection bit 8	Binary data 0 to 511	1	Uinteger9
PD(out)#1	7	MSB	Point number selection bit 7			
	6		Point number selection bit 6			
	5		Point number selection bit 5			
	4		Point number selection bit 4			
	3		Point number selection bit 3			
	2		Point number selection bit 2			
	1		Point number selection bit 1			
	0	LSB	Point number selection bit 0			

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

PD(in): Controller → PLC

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#0	7	MSB	Operation preparation complete	0: Incomplete, 1: Complete	11	Boolean
	6		Warning	0: Triggered, 1: Not triggered	10	Boolean
	5		Alarm	0: Triggered, 1: Not triggered	9	Boolean
	4		Servo ON state	0: OFF state, 1: ON state	8	Boolean
	3		Home position return complete	0: Incomplete, 1: Complete	7	Boolean
	2		Point travel complete/write complete	0: Incomplete, 1: Complete	6	Boolean
	1		Selection output 2 Point zone/zone 1/ zone 2/ traveling	0: Outside zone, 1: Inside zone or 0: Stopped, 1: Traveling	5	Boolean
	0	LSB	Selection output 1 Point zone/zone 1/ zone 2/ traveling	0: Outside zone, 1: Inside zone or 0: Stopped, 1: Traveling	4	Boolean
PD(in)#1	7	MSB	Traveling	0: Stopped, 1: Traveling	3	Boolean
	6		Teaching state	0: Normal status, 1: Teaching status	2	Boolean
	5		Point number confirmation bit 5	Port numbers 0 to 63 Alarms 0 to 15 *Set the travel complete point number when normal and the alarm when abnormal.	1	UInteger6
	4		Point number confirmation bit 4			
	3		Point number confirmation bit 3/alarm confirmation bit 3			
	2		Point number confirmation bit 2/alarm confirmation bit 2			
	1		Point number confirmation bit 1/alarm confirmation bit 1			
	0	LSB	Point number confirmation bit 0/alarm confirmation bit 0			

PD(out): PLC → controller

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#0	7	MSB	Pause	0: Pause start, 1: Cancel	11	Boolean
	6		Stop	0: Stop, 1: Cancel	10	Boolean
	5		Alarm reset	1: Reset	9	Boolean
	4		Servo ON	1: Servo ON, 0: Cancel	8	Boolean
	3		Home position return start	1: Home position return start	7	Boolean
	2		Point travel start/write start	1: Start	6	Boolean
	1		INCH selection	0：JOG, 1：INCH	5	Boolean
	0	LSB	JOG/INCH(+) travel start	1: Start	4	Boolean
PD(out)#1	7	MSB	JOG/INCH(-) travel start	1: Start	3	Boolean
	6		Teaching selection	0: Normal, 1: Teaching mode	2	Boolean
	5		Point number selection bit 5	Binary data 0～63	1	Uinteger6
	4		Point number selection bit 4			
	3		Point number selection bit 3			
	2		Point number selection bit 2			
	1		Point number selection bit 1			
	0	LSB	Point number selection bit 0			

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

PD(in): Controller → PLC

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#0	7	MSB	Operation preparation complete	0: Incomplete, 1: Complete	16	Boolean
	6		Warning	0: Triggered, 1: Not triggered	15	Boolean
	5		Alarm	0: Triggered, 1: Not triggered	14	Boolean
	4		Servo ON state	0: OFF state, 1: ON state	13	Boolean
	3		Home position return complete	0: Incomplete, 1: Complete	12	Boolean
	2		Point zone	0: Outside zone, 1: Inside zone	11	Boolean
	1		Zone 2	0: Outside zone, 1: Inside zone	10	Boolean
	0	LSB	Zone 1	0: Outside zone, 1: Inside zone	9	Boolean
PD(in)#1	7	MSB	Traveling	0: Stopped, 1: Traveling	8	Boolean
	6		Point number 7 travel complete	0: Incomplete, 1: Complete	7	Boolean
	5		Point number 6 travel complete	0: Incomplete, 1: Complete	6	Boolean
	4		Point number 5 travel complete	0: Incomplete, 1: Complete	5	Boolean
	3		Point number 4 travel complete	0: Incomplete, 1: Complete	4	Boolean
	2		Point number 3 travel complete	0: Incomplete, 1: Complete	3	Boolean
	1		Point number 2 travel complete	0: Incomplete, 1: Complete	2	Boolean
	0	LSB	Point number 1 travel complete	0: Incomplete, 1: Complete	1	Boolean

PD(out): PLC → controller

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#0	7	MSB	Pause	0: Pause start, 1: Cancel	12	Boolean
	6		Stop	0: Stop, 1: Cancel	11	Boolean
	5		Alarm reset	1: Reset	10	Boolean
	4		Servo ON	1: Servo ON, 0: Cancel	9	Boolean
	3		Home position return start	1: Home position return start	8	Boolean
	2		-			
	1		-			
	0	LSB	-			
PD(out)#1	7	MSB	-			
	6		Point number 7 travel start	1: Start	7	Boolean
	5		Point number 6 travel start	1: Start	6	Boolean
	4		Point number 5 travel start	1: Start	5	Boolean
	3		Point number 4 travel start	1: Start	4	Boolean
	2		Point number 3 travel start	1: Start	3	Boolean
	1		Point number 2 travel start	1: Start	2	Boolean
	0	LSB	Point number 1 travel start	1: Start	1	Boolean

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

PD(in): Controller → PLC

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#0	7	MSB	Operation preparation complete	0: Incomplete, 1: Complete	13	Boolean
	6		Warning	0: Triggered, 1: Not triggered	12	Boolean
	5		Alarm	0: Triggered, 1: Not triggered	11	Boolean
	4		Servo ON state	0: OFF state, 1: ON state	10	Boolean
	3		Home position return complete	0: Incomplete, 1: Complete	9	Boolean
	2		Point zone	0: Outside zone, 1: Inside zone	8	Boolean
	1		Zone 2	0: Outside zone, 1: Inside zone	7	Boolean
	0	LSB	Zone 1	0: Outside zone, 1: Inside zone	6	Boolean
PD(in)#1	7	MSB	Traveling	0: Stopped, 1: Traveling	5	Boolean
	6		-			
	5		Switch 2	0：OFF, 1：ON	4	Boolean
	4		Switch 1	0：OFF, 1：ON	3	Boolean
	3		-			
	2		-			
	1		Point number 2 travel complete	0: Incomplete, 1: Complete	2	Boolean
	0	LSB	Point number 1 travel complete	0: Incomplete, 1: Complete	1	Boolean

PD(out): PLC → controller

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#0	7	MSB	-			
	6		-			
	5		Alarm reset	1: Reset	5	Boolean
	4		Servo ON	1: Servo ON, 0: Cancel	4	Boolean
	3		Home position return start	1: Home position return start	3	Boolean
	2		-			
	1		-			
	0	LSB	-			
PD(out)#1	7	MSB	-			
	6		-			
	5		-			
	4		-			
	3		-			
	2		-			
	1		Solenoid valve travel command 2	1：ON	2	Boolean
	0	LSB	Solenoid valve travel command 1	1：ON	1	Boolean

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

PD(in): Controller → PLC

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#0	7	MSB	Operation preparation complete	0: Incomplete, 1: Complete	13	Boolean
	6		Warning	0: Triggered, 1: Not triggered	12	Boolean
	5		Alarm	0: Triggered, 1: Not triggered	11	Boolean
	4		Servo ON state	0: OFF state, 1: ON state	10	Boolean
	3		Home position return complete	0: Incomplete, 1: Complete	9	Boolean
	2		Point zone	0: Outside zone, 1: Inside zone	8	Boolean
	1		Zone 2	0: Outside zone, 1: Inside zone	7	Boolean
	0	LSB	Zone 1	0: Outside zone, 1: Inside zone	6	Boolean
PD(in)#1	7	MSB	Traveling	0: Stopped, 1: Traveling	5	Boolean
	6		-			
	5		Switch 2	0：OFF, 1：ON	4	Boolean
	4		Switch 1	0：OFF, 1：ON	3	Boolean
	3		-			
	2		-			
	1		Point number 2 travel complete	0: Incomplete, 1: Complete	2	Boolean
	0	LSB	Point number 1 travel complete	0: Incomplete, 1: Complete	1	Boolean

PD(out): PLC → controller

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#0	7	MSB	-			
	6		-			
	5		Alarm reset	1: Reset	5	Boolean
	4		Servo ON	1: Servo ON, 0: Cancel	4	Boolean
	3		Home position return start	1: Home position return start	3	Boolean
	2		-			
	1		-			
	0	LSB	-			
PD(out)#1	7	MSB	-			
	6		-			
	5		-			
	4		-			
	3		-			
	2		-			
	1		Solenoid valve travel command 2	1：ON	2	Boolean
	0	LSB	Solenoid valve travel command 1	1：ON	1	Boolean

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

PD(in): Controller → PLC

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#0	7	MSB	Operation preparation complete	0: Incomplete, 1: Complete	13	Boolean
	6		Warning	0: Triggered, 1: Not triggered	12	Boolean
	5		Alarm	0: Triggered, 1: Not triggered	11	Boolean
	4		Servo ON state	0: OFF state, 1: ON state	10	Boolean
	3		Home position return complete	0: Incomplete, 1: Complete	9	Boolean
	2		Point zone	0: Outside zone, 1: Inside zone	8	Boolean
	1		Zone 2	0: Outside zone, 1: Inside zone	7	Boolean
	0	LSB	Zone 1	0: Outside zone, 1: Inside zone	6	Boolean
PD(in)#1	7	MSB	Traveling	0: Stopped, 1: Traveling	5	Boolean
	6		-			
	5		Switch 2	0：OFF, 1：ON	4	Boolean
	4		Switch 1	0：OFF, 1：ON	3	Boolean
	3		-			
	2		-			
	1		Point number 2 travel complete	0: Incomplete, 1: Complete	2	Boolean
	0	LSB	Point number 1 travel complete	0: Incomplete, 1: Complete	1	Boolean

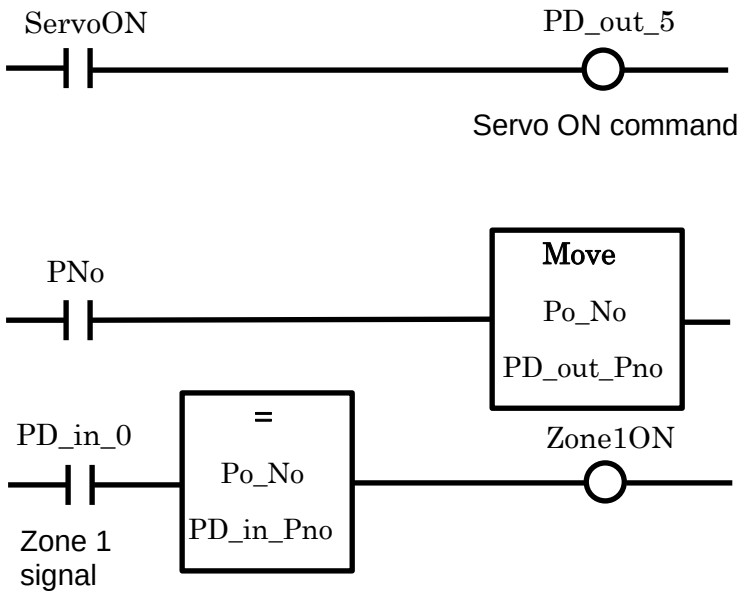
PD(out): PLC → controller

Byte order	Bit		Descriptions	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#0	7	MSB	-			
	6		-			
	5		Alarm reset	1: Reset	4	Boolean
	4		Servo ON	1: Servo ON, 0: Cancel	3	Boolean
	3		Home position return start	1: Home position return start	2	Boolean
	2		-			
	1		-			
	0	LSB	-			
PD(out)#1	7	MSB	-			
	6		-			
	5		-			
	4		-			
	3		-			
	2		-			
	1		Solenoid valve travel command 2	1：ON	1	Boolean
	0	LSB	-			

3.5 Data access

3.5.1 Process data

Process data is normally exchanged cyclically between the IO-Link Master and IO-Link device. Normally, data length and configuration are set with the connection settings of the PLC development tool, and relay and data memory are assigned. Set the PD (out) data with coil, bit SET, Move command, etc. to update it. PD (in) data can be viewed with contact, comparison command, Move command, etc. Basic actuator operations (such as servo ON, home position return, point number selection, and travel start instruction) are controlled only by process data.



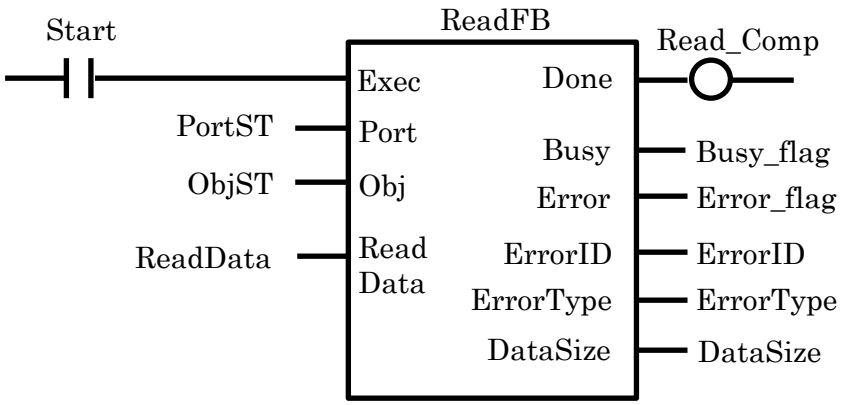
*Refer to the PLC manufacturer's manual for details on settings, updates, and other references.

3.5.2 Service Data

Service data (OD and message communication) normally uses FBs (function blocks), etc. provided by the PLC manufacturer for reading and writing. Access examples are shown below. These do not describe the FB of a specific manufacturer, so refer to the PLC manufacturer's manual for detailed parameters.

There is a limit on the amount that can be received with a single IO-Link Master unit. It is necessary to check the contact which shows whether the actual program can be executed or not before execution.

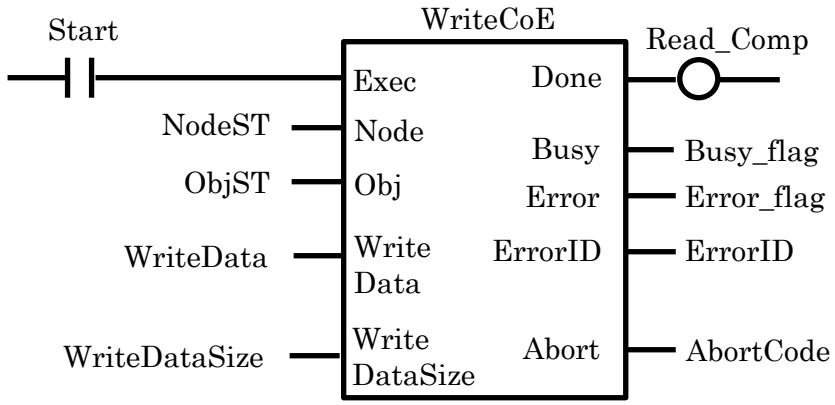
●Using the IO-Link access function



Port: Setting information regarding the port to be read
Obj: Index and SubIndex information to be read
ReadData: Storage area of read data
DataSize: Storage area of the read data size

There are also FBs that specify the node number (station alias).

●Using the CoE object write (read) function



・Example of writing to the specified service data address
*Using Index = 0x4000 of the object (with Port 0) to write 20 to the home position return speed (Index = 0x310)
(1) Write the Index = 0x310 of the data that you want to write to Subindex = 0x03
(2) Write the Subindex = 0 of the data that you want to write to Subindex = 0x04
(3) Write the Length = 2 of the data that you want to write to Subindex = 0x05
(4) Write the Data = 20 that you want to write to Subindex = 0x06
(5) Write "2" to SubIndex = 0x01 and execute writing to the relevant data.
*FBs are executed five times from (1) to (5).

・Example of reading to given service data address
*Using Index = 0x4000 of the object (with Port 0) to read the content of soft limit (+) (Index = 0x302)
(1) Write Index=0x302 for the data to read to Subindex=0x03
(2) Write SubIndex=0 for the data to read to Subindex=0x04
(3) Write "3" to SubIndex=0x01 and then read the applicable data.
*Use the read function from here on
(4) Monitor until Subindex = 0x02 is "2" (success).
(5) Acquire data with SubIndex = 0x06.
*FBs are executed five times from (1) to (5).

・There are also FBs that specify the node number (station alias).

*If all data composed from multiple elements (data with multiple Sunindex data) is accessed using Subindex = 0, some items (such as point data mode) will have a bit configuration. (Refer to 1.2.2 Communication format)

*For TOOL mode, only writing from the setting tool (S-Tools) is enabled. Writing from the PLC will not be accepted.

*When a rewrite of data for DS function target items is executed, the DS function may be downloaded and the data may be returned to its pre-update state at the next power on. (For information on DS function items, refer to the DS field in 3.4.2 Data Index and Subindex; for information on the DS function, refer to 3.8 Data Storage function)

*Set so that the high-end values of multiple-byte data come first. Take care with data types used with a ladder, etc.

(Ex: 4 byte data)

1st byte	2nd byte	3rd byte	4th byte
High-end data			Low-end data

・Depending on the manufacturer, data may not be accessible even if the data types are specified to the FB input/output parameters corresponding to their size, such as 4-byte data specified to DWORD or UINT, and 2-byte data specified to WORD or USINT.
If this occurs, access using a byte type array of the same size (a 4 byte BYTE array in the case of the example above).
・Note that when writing the character example data area, there are FBs whose 232 byte BYTE type array must have a data length specified to 232 bytes.

*Refer to the PLC manufacturer's manual for information on FBs.

3.5.3 Return error codes

*The following error codes are set as the FB output parameters for the input parameters set for reading/writing data.
◎When using OMRON Corporation functions blocks IOL_ReadObj and IOL_WriteObj, the ErrorID will be 0x4800, and output parameter: ErrorType will be set.
◎When using the CoE object, the relevant Index (0x4000, etc.) is set to Subindex = 0x07 (Errorcode).

Error code	Description	Remarks
0x8000	Application error	
0x8011	Index is outside the range	
0x8012	Subindex is outside the range	
0x8020	This service is temporarily unavailable.	
0x8021	This service is temporarily unavailable.	
0x8022	This service is temporarily unavailable.	
0x8023	Write prohibited	
0x8030	Parameter value is outside the range	
0x8031	Larger than the effective range	0x8031 or 0x8131
0x8032	Smaller than the effective range	0x8032 or 0x8132
0x8033	Large data length	
0x8034	Small data length	
0x8035	Incorrect function	
0x8040	Attempted to set a disabled parameter	
0x8041	Parameter set error	
0x8101	Currently writing from a setting tool, etc. Cannot receive	
0x8104	Error during internal processing of reading/writing (Operation Retry)	
0x8105	Error during internal processing of reading/writing (Function)	
0x8106	Error during internal processing of reading/writing (Other 1)	
0x8107	Error during internal processing of reading/writing (Other 2)	
0x8108	Device damage	A device inside the unit is damaged.
0x8109	Waiting on write processing	The interval between multiple write command executions is too short. Lengthen the interval.
0x8131	Larger than the effective range	
0x8132	Smaller than the effective range	

3.5.4 IO-Link Master Unit error reset

There is no soft reset function on the IO-Link Master Unit. If there is an error during data access, it may only be possible to release the error by turning the power OFF/ON. Take sufficient care with the content when accessing data.

3.6 Operation mode

The following three types of operation modes (IO-Link) 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(IO-Link): 0)

This mode performs control in accordance with conventional signal I/O. It is operated using the point numbers and "Control" bits for the first byte (#0) and the second byte (#1) for PD(out).

- Standard 64-point mode (abbreviation: B064) (operation mode (PIO): 0)
- Standard 128-point mode (abbreviation: B128) (operation mode (PIO): 1)
- Standard 256-point mode (abbreviation: B256) (operation mode (PIO): 2)
- Standard 512-point mode (abbreviation: B512) (operation mode (PIO): 3)
- Teaching 64-point mode (abbreviation: T064) (operation mode (PIO): 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(IO-Link): 1)

Used to change only position data based on set point data. Position data set to PD (out) is not saved. A value is not set for the PD (in) point number during travel complete. (If point travel is executed, the point number for which travel was completed will be set)

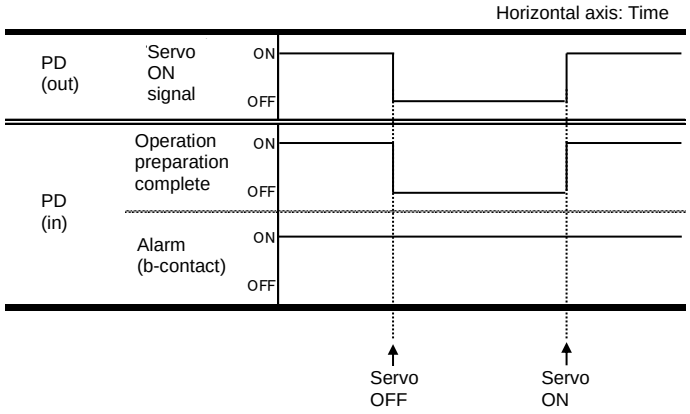
■ Full direct value mode (abbreviation: FDP) (operation mode(IO-Link): 2)

Sets point data to PD (out) and starts operation. Point data set to PD (out) is not saved. A value is not set for the PD (in) point number during travel complete. (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.

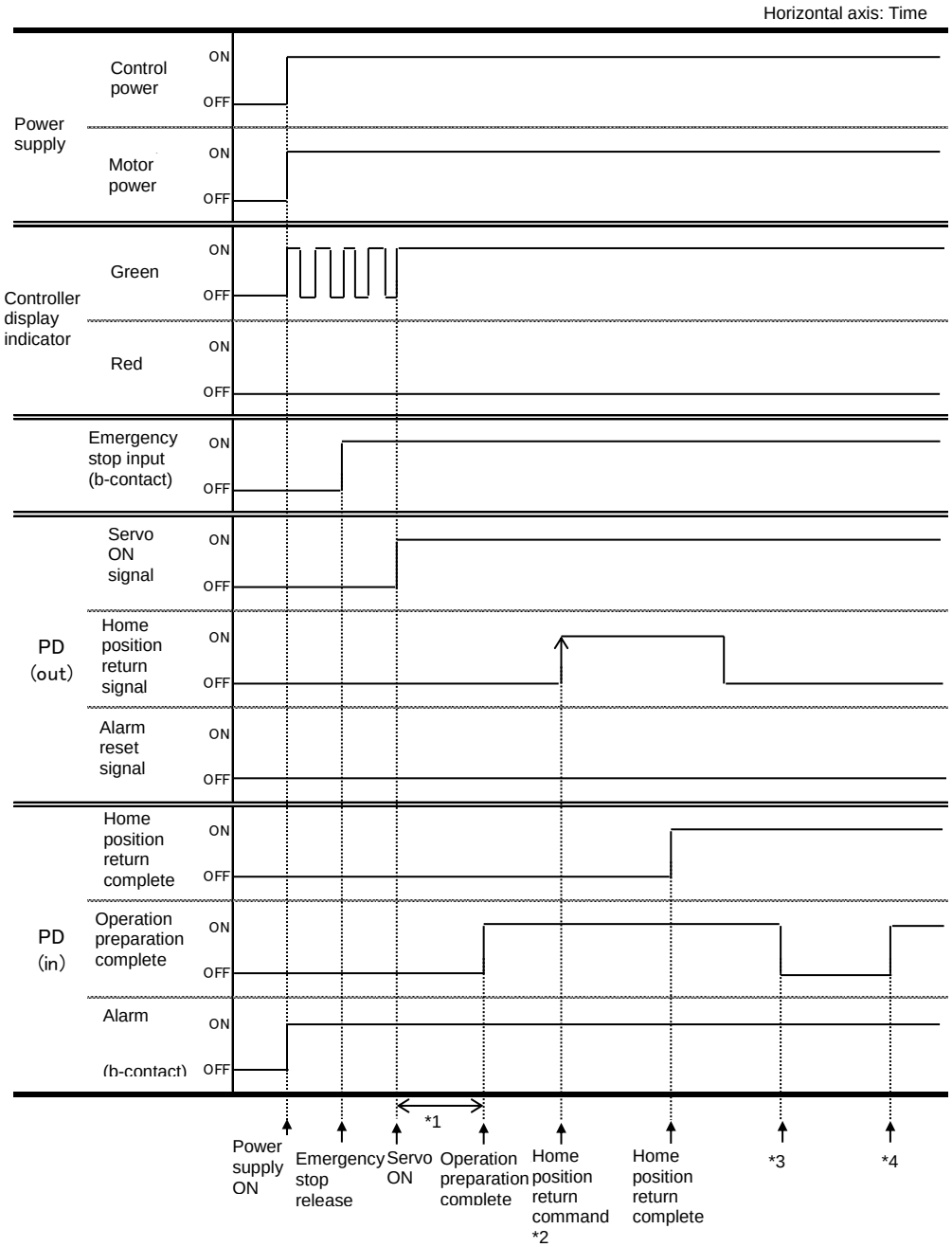
⚠ CAUTION

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.

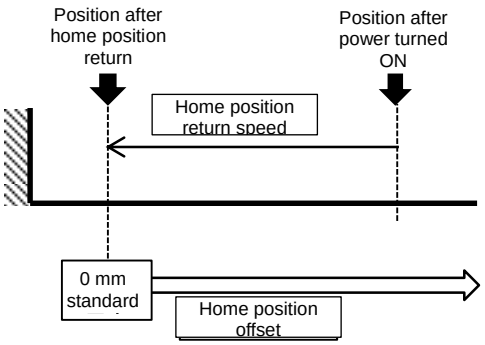


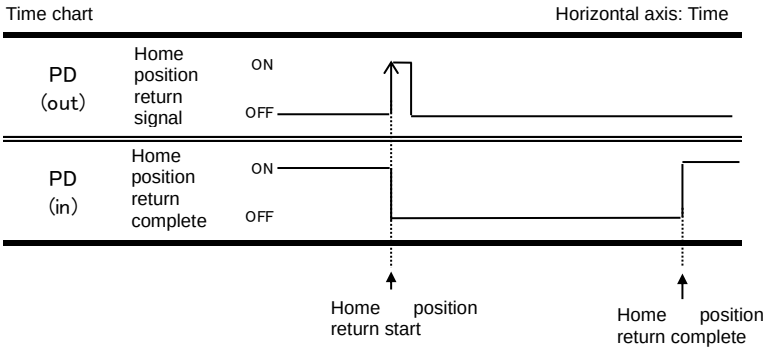
*1: Depending on the stroke position, operation preparation complete takes 1.5 s to 5.0 s following the first servo ON after turning the power ON.
*2: When operating with the parameter automatic home position return is disabled.
*3: When operation with the setting tool is enabled (TOOL mode).
*4: When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

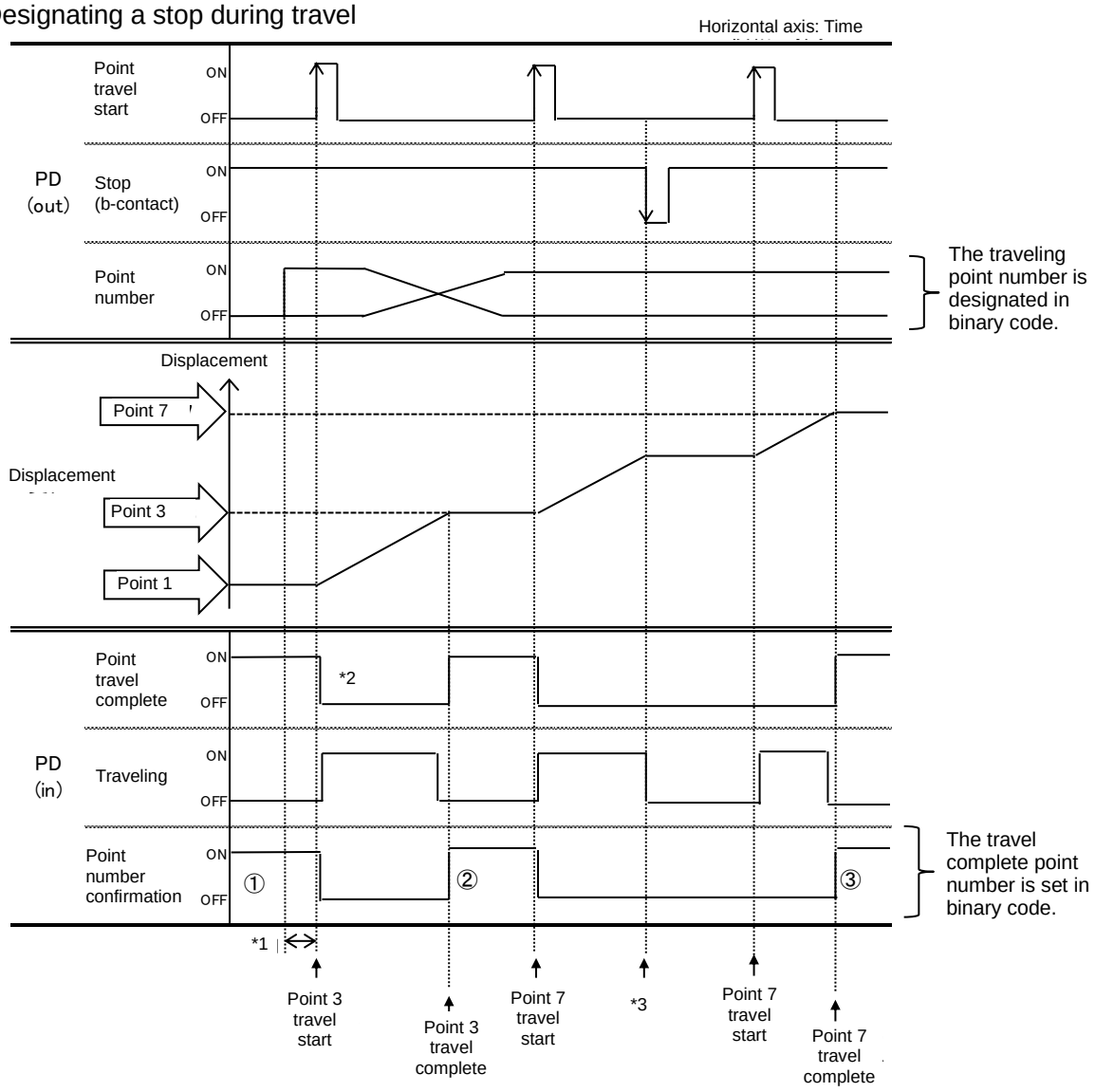




3.7.4 Positioning operation

■ PIO mode (operation mode: 0)

Designating a stop during travel

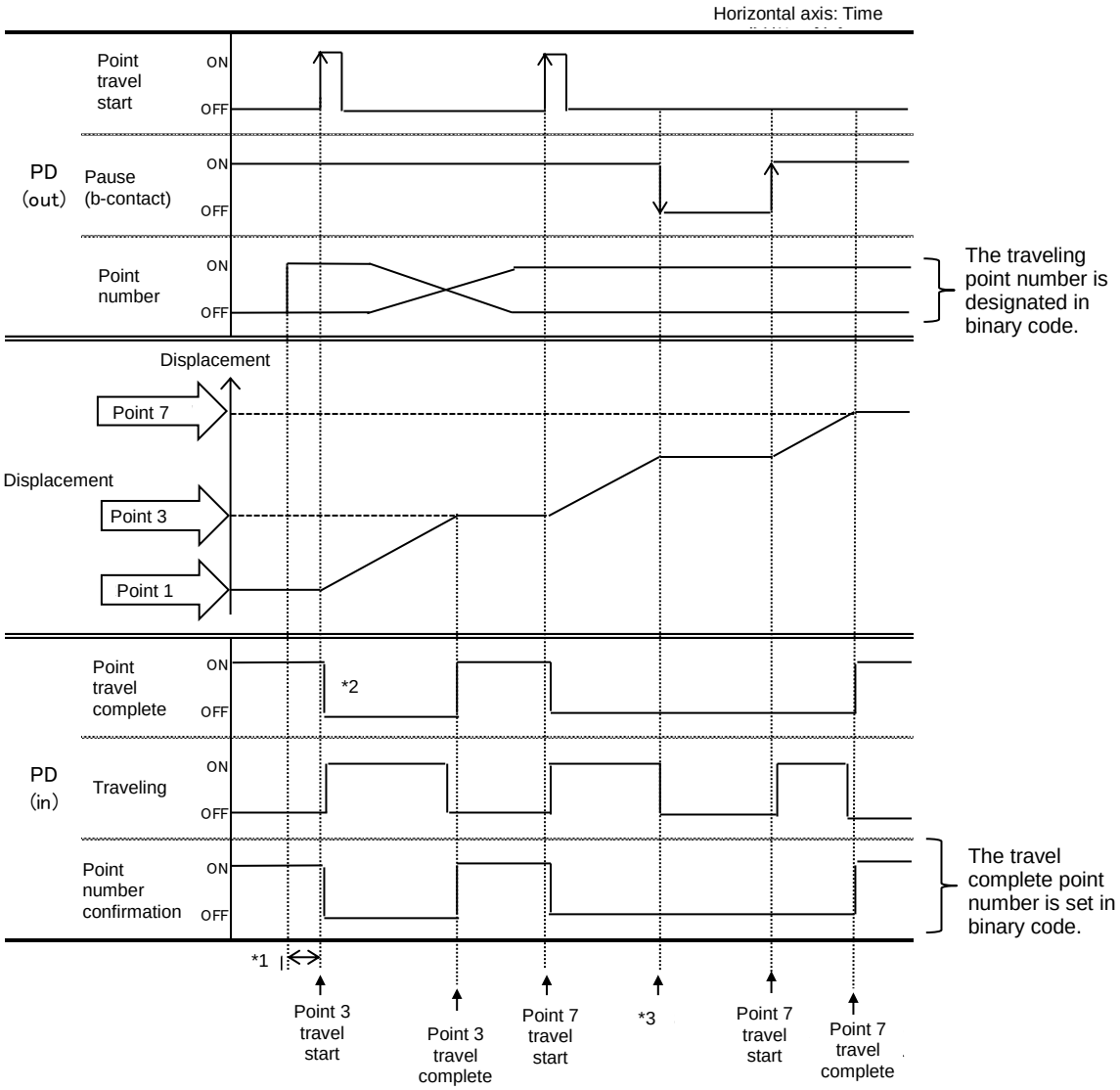


*1: Leave an interval of at least 10 ms between point number selection and travel start ON.
*2: Note that the previous point travel complete will still be ON until an instruction is received, even after point travel start ON. Also, both point travel complete and traveling may be ON at the same time depending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

*If a positioning operation is executed when rewriting service data, the operation intended by the data rewrite may not occur.

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

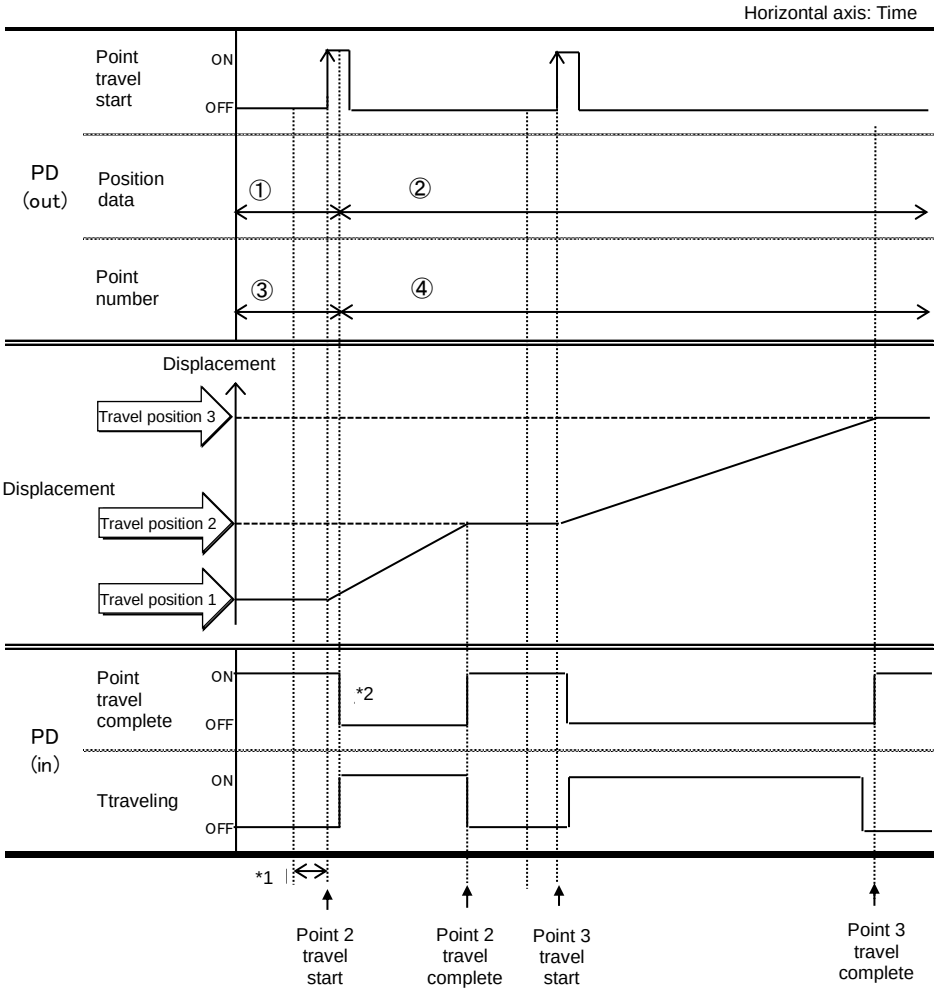
Designating a pause during travel



*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 traveling 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 PD(out), set the position and point number in PD(out), 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 PD(out) 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 signal and traveling signal may be ON at the same time depending on the timing.

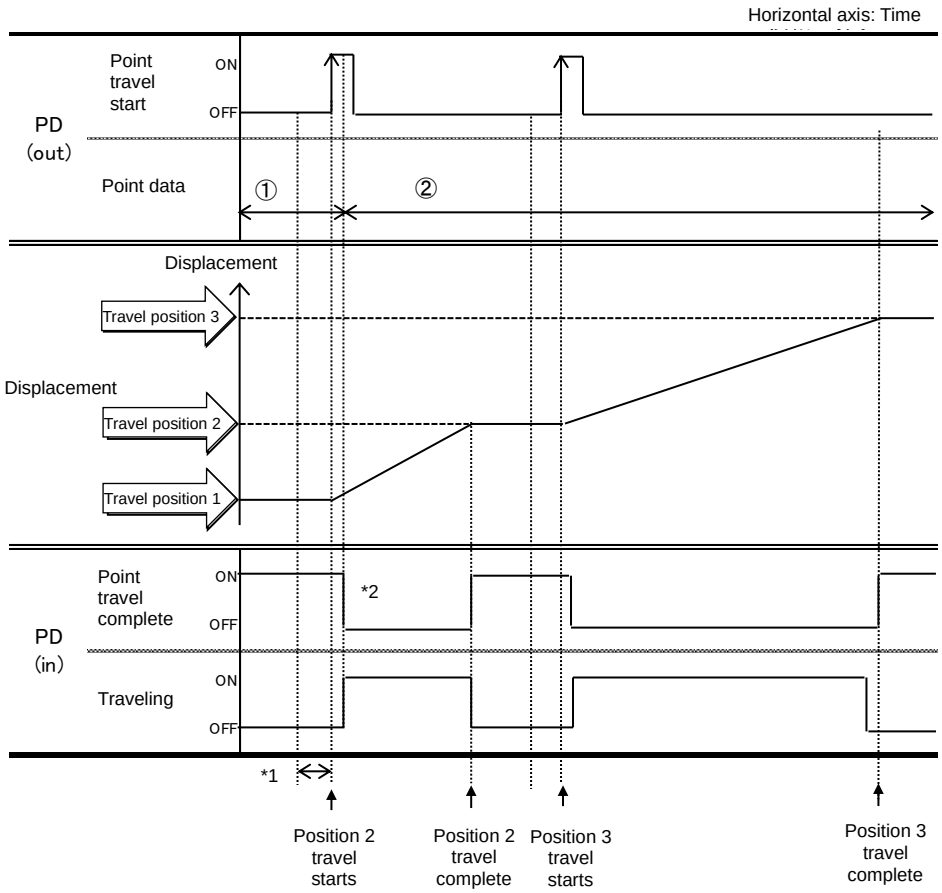
・Data set as position data in the figure above.
(1) Travel position 2 position data
(2) Travel position 3 position data

・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 PD (in) 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 position, speed, and other point data to PD (out), turn the travel start command bit ON.

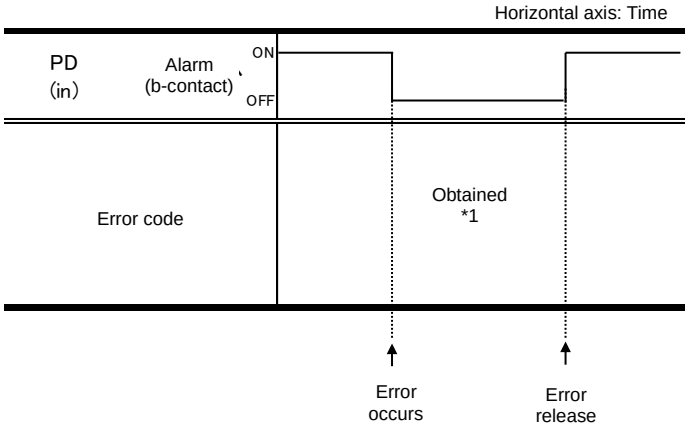


*1: Leave an interval of at least 10 ms for point travel start ON after setting the PD(out) point data.
*2: Note that the previous point travel complete will still be ON until an instruction is received, even after point travel start ON. Also, both travel complete signal and traveling signal may be ON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

・Data set as PD (out) point data in the figure above.
(1) Travel position 2 point data
(2) Travel position 3 point data

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

3.7.5 Errors and obtaining error codes



*1: Obtain Alarm (Index = 0x70A) or Alarm details (Index = 480) with service data.

3.8 Data Storage function

IO-Link has a Data Storage function (DS), which backs up IO-Link device setting parameter data by IO-Link Master port, and restores backup data when the IO-Link device is replaced due to device failure, etc. This function is supported by the product.

3.8.1 IO-Link Master settings

The following items are set with the PLC setting, development tools, etc. for each port in the IO-Link Master.
○ Device comparison function setting to check whether the connected IO-Link device matches the set method
○ Backup function setting for backing up the IO-Link device setting parameters
○ Restore function setting for restoring the IO-Link device backup data
○ Vendor ID, device ID, revision, process data length, and other IO-Link device settings

These settings are set with the PLC setting/development tools.
When these settings are configured, IO-Link Master backs up and restores data,
and the IO-Link device requests and backs up data.
*Refer to the PLC manufacturer's manual for details.

3.8.2 Operation mode switching

The following operation modes are available: PIO mode (operation mode: 0), simple direct value mode (operation mode: 1), and full direct value mode (operation mode: 2). The following PIO modes are available: standard mode (operation mode (PIO)s: 0 to 3), teaching 64-point mode (operation mode (PIO): 4), simple 7-point mode (operation mode (PIO): 5), solenoid valve mode (operation mode (PIO)s: 6 to 8). The device ID is set for each and the data length/content of process data and IODD files differ for each, so the setting tool (S-Tools) is normally used to configure both initial settings and operation modes.

If the IO-Link master supports the device ID rewriting function and a previously used controller is connected when replacing devices, etc., the IO-Link master will rewrite the device ID if the device ID differs. This will result in switching to the operation mode used by the equipment. When switching the operation mode, first turn the controller power OFF/ON or perform a software reset.

・If the Data Storage function is enabled, backup data will be restored if any difference is found in the applicable data immediately after turning the power on. Do not turn the power OFF immediately after turning the power ON (for about one minute), as doing so may corrupt data in memory.
・If the restore function is used after connecting a device with a different actuator size, etc., the data to restore will be outside the setting range, causing an error. If an error occurs, either disable the restore function or delete the backup data.

3.8.3 Download/Upload

■ Download

If the backup data stored on the IO-Link Master at startup and the parameter data set to the connected IO-Link device do not match, the IO-Link Master downloads the stored backup data. Therefore, if the controller is replaced with a backup controller due to failures, etc., the minimum amount of setting data required for operation can be written to the new controller.
*Conditions are checked before upload processing.
*When downloading data, the IO-Link master will do so when the execution conditions are satisfied, so the controller cannot request this of the IO-Link master at an arbitrary timing.

・Do not access the service data while downloading.
・To connect a controller for which downloading is not to be executed, first disable the "Restore function setting" on the IO-Link master.
・If the device comparison setting is used to check if the serial number also matches, an error will occur when the controller is replaced. To download backup data when replacing the controller, either uncheck the serial number in the device comparison settings or change the setting to the serial number of the new unit.

*Refer to the PLC manufacturer's manual for details on the backup data deleting function and download execution conditions.

■ Upload

If the IO-Link master has not retained any backup data when started (or if backup data was cleared with the controller connected) and a request is received from the IO-Link device, upload the setting parameters of the IO-Link device for use as backup data.

・Do not access the service data while uploading.
・If upload is not an enabled PLC setting, upload will not be executed even if forced upload (Index = 0x0042) is specified.

*Refer to the PLC manufacturer's manual for details on the backup data deleting function and upload execution conditions.

■ DS Upload/Download target items

The list of upload/download target items is called the Index List.

Item	Size
Device access lock	2 bytes
Application specific tag	4 bytes
Output selection 1	1 bytes
Output selection 2	1 bytes
Home position return speed	2 bytes
Automatic home position return	2 bytes
Fixed current at stop	2 bytes
Pressing judgment time	2 bytes
Soft limit (+)	4 bytes
Soft limit (-)	4 bytes
Zone 1 (+)	4 bytes
Zone 1 (-)	4 bytes
Zone 2 (+)	4 bytes
Zone 2 (-)	4 bytes
Home position offset amount	4 bytes
Point data 0 to 31 *1	30 bytes/point

*1: Point data is considered targeted or not targeted depending on the number. Set numbers in accordance with the application.

3.9 Error events

When an error occurs with the controller, an error generation event is sent to the IO-Link Master.
When the error is released, an error release event is sent to the IO-Link Master.

Event code	Description
0x18**	**: Sets the error code type. TYPE (level = 1 or more) sends the error event.
0x5111	IO-Link communication power supply is low

*If error release happens offline, the error release event is not sent, and it may not be possible to clear the error display, etc.
If this happens, clear the display by turning the IO-Link Master unit OFF/ON.
*The display and other operations when the error generation event is sent differ depending on the IO-Link Master and PLC.
Refer to the PLC manufacturer's manual for details.

◎OMRON Corporation IO-Link Master GX-ILM08C
After an error generation event is sent, the A lamp of the port blinks in red until an error release event is sent.
In the relevant PLC I/O Port Status port, the IN Data Enable bit turns OFF
and the Device Error bit turns ON, but they are not logged in the controller event log,
so their contents cannot be seen.

OMRON Corporation IO-Link Master GX-ILM08C
When an error occurs, the relevant port's IN Data Enable bit turns OFF.
Note that the I/O LED display contents to the side of each port's connector may be different.

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.