OMRON

Displacement Sensor

ZW-8000/7000/5000 series

Confocal Fiber Type Displacement Sensor

User's Manual for Communications Settings

ZW-8000□
ZW-7000□
ZW-5000□

SYSMAC always in control

Z363-E1-06

Introduction

Thank you for purchasing the ZW-8000/7000/5000 Series.
This manual provides information regarding functions, performance and operating methods that are required for using the ZW-8000/7000/5000 Series.
When using the ZW-8000/7000/5000 Series, be sure to observe the following:

- The ZW-8000/7000/5000 Series must be operated by personnel knowledgeable in electrical engineering.
- To ensure correct use, please read this manual thoroughly to deepen your understanding of the product.
- Please keep this manual in a safe place so that it can be referred to whenever necessary.

User's Manual for Communications Settings

Confocal Fiber Type
Displacement Sensor

ZW-8000/7000/5000 Series

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For details on the precautions on safety, refer to the following manual:

"Precautions on Safety" described in Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)

Precautions for Safe Use

For details on the precautions for safe use, refer to the following manual:

"Precautions for Safe Use" described in Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)

Precautions for Correct Use

For details on the precautions for correct use, refer to the following manual:

"Precautions for Correct Use" described in Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)

Editor's Note

● Meaning of Symbols

Menu items that are displayed on the main or sub-display, and windows, dialog boxes and other GUI elements displayed on the personal computer are indicated enclosed by brackets [ ].

● Visual Aids

Important	Indicates points that are important to achieve the full product performance, such as operational precautions.
Note	Indicates application procedures.
	Indicates pages where related information can be found.
Optional	Indicates that the setting is optional in a configuration procedure.

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  If you do so, please also tell us the manual number, which is found at the end of the manual.

Relevant Manuals

The following table provides the relevant manuals for the ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor.
Read all of the manuals that are relevant to your system configuration and application before you use the ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor.
Most operations are performed from the Sysmac Studio Automation Software. Refer to the “Sysmac Studio Version 1 Operation Manual (Cat. No. W504)” for information on the Sysmac Studio.

Purpose of use	Manual	
	ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual	ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual for Communications Settings
Overview of ZW-8000/7000/5000 series	●	
Setup and Wiring	●	
Basic Operation	●	
Function Setting	●	
Offline Setting	●	
Confirm the Menu List	●	
Connecting to the Sensor Controller	●	
Connecting to the Sensor Controller for Communication Settings		●
Overview of Communication Specifications		●
Parallel I/O		●
EtherCAT		●
EtherNet/IP		●
No-protocol		●
Specifications and External Dimensions	●	
Processing Item List		●
System Data List		●
Object Dictionary		●
Update the Firmware	●	
Troubleshooting	●	
Error Messages		●

Related Manuals

The related manuals are described the below tables. Please check the manuals.

Manual name	Cat. No.	Model numbers	Application	Description
Sysmac Studio Version 1 Operation Manual	W504	SYSMAC-SE2□□□	Learning about the operating procedures and functions of the Sysmac Studio.	Describes the operating procedures of the Sysmac Studio.
Confocal Fiber Type Displacement Sensor ZW-8000/7000/5000 series User's Manual	Z362	ZW-8000□ ZW-7000□ ZW-5000□	To learn how to set-up of Confocal Fiber Type Displacement Sensor of ZW-8000/7000/5000 series.	Describes how to set-up of Confocal Fiber Type Displacement Sensor of ZW-8000/7000/5000 series.
Confocal Fiber Type Displacement Sensor ZW-8000/7000/5000 series User's Manual for Communication Settings (This manual)	Z363	ZW-8000□ ZW-7000□ ZW-5000□	To learn how to use communication settings of Confocal Fiber Type Displacement Sensor of ZW-8000/7000/5000 series.	Describes how to use communication settings of Confocal Fiber Type Displacement Sensor of ZW-8000/7000/5000 series.

Table of Contents

5.No-protocol Connection

6.Sensor Controller Operations

7.Troubleshooting

8.Appendices

Overview of Communication Specifications

1-1 Overview of Communication Specifications

Overview of Communication Specifications

This chapter provides a general description of the communication specifications and sensor control method, which is necessary to know before setting up the communication between the ZW-8000/7000/5000 series and an external device.

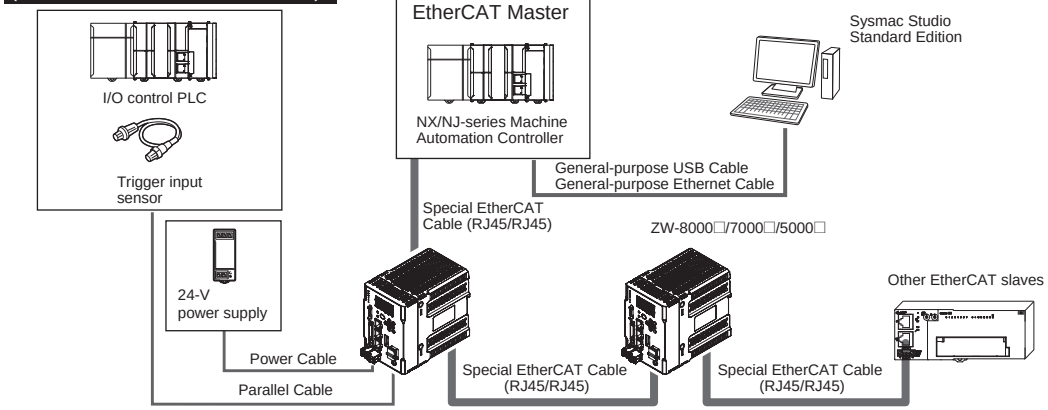
1-2 Checking the System Configuration

This product is a displacement sensor of the confocal fiber type.

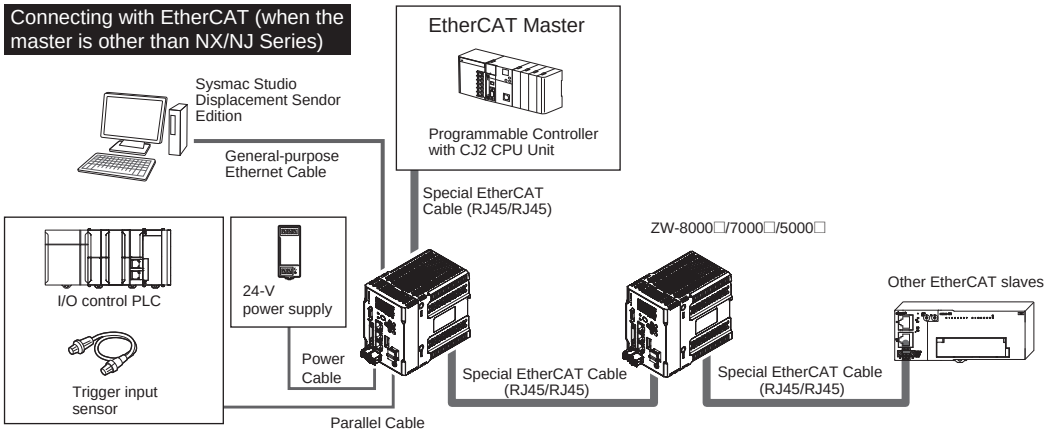
The connection with an external device such as a PLC and a personal computer allows a measurement command to be input and measurement results to be output from the external device.

System Configuration

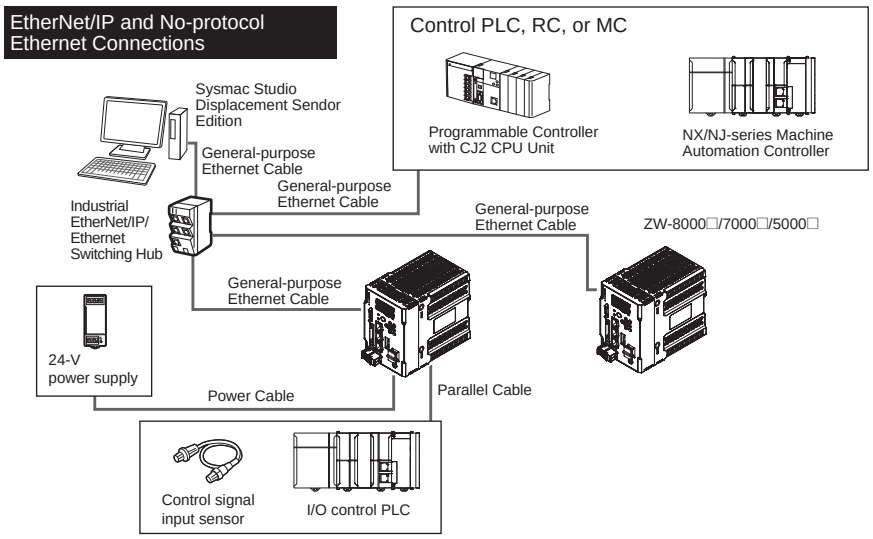
Connecting with EtherCAT (when the master is NX/NJ Series)



Connecting with EtherCAT (when the master is other than NX/NJ Series)



EtherNet/IP and No-protocol Ethernet Connections



Connection Compatibility

Connected to ZW-8000□/7000□/5000□	Other connection				
	EtherCAT	EtherNet/IP	Ethernet (no-protocol)	RS-232C (no-protocol)	Parallel I/O Cable
EtherCAT	---	Not compatible	Compatible	Compatible	Compatible
EtherNet/IP	Not compatible	---	Compatible	Compatible	Compatible
Ethernet (no-protocol)	Compatible	Compatible	---	Compatible	Compatible
RS-232C (no-protocol)	Compatible	Compatible	Compatible	---	Compatible

Important

- EtherCAT and EtherNet/IP connections cannot be used at the same time.
- Can be connected simultaneously via Ethernet with PC tools (Sysmac Studio, SmartMonitorZW) and another device (PLC etc). Can be connected simultaneously via Ethernet with PC tools (Sysmac Studio, SmartMonitorZW) and another device (PLC etc). The port number for the PC tool is 9600 (fixed) and 9602 (fixed). When connecting different devices, set the port number to other than 9600 and 9602 (default value is 9601).
- When the measurement cycle is 40µs or less and ETherCAT is connected, analog output is not executed.

Product	Model	Application
ZW	ZW-8000□/7000□/5000□	This Displacement Sensor performs measurements.
PC Tool	Sysmac Studio Standard Edition • SYSMAC-SE200D (no licenses included (media only)) • SYSMAC-SE201L (1-license edition) • SYSMAC-SE2□□L (multilicense editions (3, 10, 30, or 50 licenses)) Sysmac Studio Measurement Sensor Edition • SYSMAC-ME00□L (1 or 3 licences)	This is the setup application. It is part of the Sysmac Studio Package and it runs on Windows. The Sysmac Studio comes in two different editions. • Sysmac Studio Standard Edition The Sysmac Studio provides an integrated development environment for the NX/NJ series Controllers and other Machine Automation Controllers and EtherCAT Slaves. It supports setup, programming, debugging, operation, and maintenance. The Sysmac Studio Standard Edition DVD includes Support Software for EtherNet/IP, DeviceNet, serial communications, and PT screen design (CX-Designer). Refer to the Sysmac catalog (Cat. No. P072) for details. • Sysmac Studio Measurement Sensor Edition This license provides the functions that are required to set up ZW-8000/7000/5000 Series Vision Sensors from the Sysmac Studio. This model number is for the license only. You must also purchase the DVD for the Sysmac Studio Standard Edition Ver.1.22 or higher.
Special EtherCAT Cable	*	The Special EtherCAT Cable connects the Sensor to another Sensor or to another EtherCAT device.
General-purpose Ethernet cable	---	Prepare commercially available Ethernet cable satisfying the following requirements: • Category 5e or more, 30 m or less • RJ45 connector (8-pin modular jack) • For direct connection: Select cross cable. • For connection through an industrial switching hub: Select straight cable.
Special RS-232C Cable	For connecting to a PLC or programmable terminal • ZW-XPT2 For connecting to a PC • ZW-XRS2	Connect the sensor with a PLC, programmable terminal, or personal computer etc..
Industrial EtherNet/IP / Ethernet Switching Hub	• W4S1-03B (3 ports type) • W4S1-05B • W4S1-05C (5 ports type)	The Switching Hub connects multiple Sensors to one Touch Finder or one computer running PC Tool.

Product	Model	Application
EtherCAT Junction Slave	• GX-JC03 (3 ports type) • GX-JC06 (6 ports type)	Used to connect multiple sensors or PLCs using EtherCAT.

*: Refer to Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362) "9-1 Specifications and External Dimensions".

Parallel I/O Connection

2-1 Parallel I/O Connection

I/O Signal Functions

The following describes the functions of I/O signals.

Analog Output Terminals

Analog output

Name	Description
Analog voltage output	This outputs the measured value from -10 V to +10 V as the voltage value. When measurement not possible: Approx. 10.8V (default value, can be selected by user) At alarm: Approx. 10.8V
Analog current output	This outputs the measured value, from 20 mA to 4 mA as the current value. When measurement not possible: Approx. 21 mA (default value, can be selected by user) At alarm: Approx. 21 mA

32-pole expansion connector

Judgment output

Name	Description
HIGH output	Judgment result HIGH (HIGH threshold value < measured value) is output.
PASS Output	Judgment result PASS (LOW threshold value ≤ measured value ≤ HIGH threshold value) is output.
LOW output	Judgment result LOW (LOW threshold value > measured value) is output.

ALARM output

Name	Description
ALARM output	This turns ON when there is a system error.

BUSY output

Name	Description
BUSY output	This turns ON during sampling with the hold function enabled. It allows you to check whether or not the self-trigger is functioning correctly. It also turns ON during bank switching. This signal is turned ON in FUNC mode.

ENABLE output

Name	Description
ENABLE output	This turns ON when the sensor is ready for measurement. This output is interlocked with the ENABLE indicator.

SYNCFLG/TRIGBUSY output

Name	Description
SYNCFLG/TRIGBUSY output	In the internal/PDO synchronized mode, this output signal operates as SYNCFLG. This turns ON when measurement synchronization processing is executed by SYNC input and the state changes to one where normal measurement values can be output. In the external synchronous measurement mode, this output signal operates as TRIGBUSY. This turns ON while a measurement by TRIG input is being performed. The next TRIG input cannot be turned ON until this turns OFF.

STABILITY output

Name	Description
STABILITY output	Turns ON when the 1 surface is in the measuring range.

LOGSTAT output

Name	Description
LOGSTAT output	This turns ON while internal logging is in execution.

LOGERR output

Name	Description
LOGERR output	Turns ON when memory for Internal logging is full and the executes Internal logging.

TASKSTAT output

Name	Description
TASKSTAT output	This turns ON when the measurement value is finalized.

ZERO input

Name	Description
ZERO input	This is used to execute and clear a zero reset.

RESET input

Name	Description
RESET input	This resets all executing measurements and outputs. While a RESET is being input, judgment output conforms to the non-measurement setting. If this RESET input switches ON while the hold function is used, the state in effect before the hold function was set will be restored.

TIMING input

Name	Description
TIMING input	This timing input is for signal input from external devices. Use it for hold function timing.

LIGHT OFF input

Name	Description
LIGHT OFF input	Turns OFF the light for measurement. While LIGHT OFF is being input, the analog output and judgment output conform to the non-measurement setting.

LOGGING input

Name	Description
LOGGING input	This is used to start internal logging.

SYNC/TRIG input

Name	Description
SYNC input	This is used to synchronize imaging between multiple ZW. With external synchronous measurement mode selected, this signal works as TRIG input. For the following conditions, it performs as a SYNC input. • [Fieldbus] setting: When either [OFF] or [EtherNet/IP] is selected. • [Synchronous measurement mode] setting: When Internal/PDO synchronized mode is selected. For the following conditions, it performs as a TRIG input. • [Internal synchronous measurement mode] setting: When select [External synchronous measurement mode].

Important

When the Internal synchronous measurement mode is External synchronous measurement mode, updates each input signals by inputting the TRIG input signal. To be enabled each input signal, enter the TRIG input signal.

Settings for Parallel Input

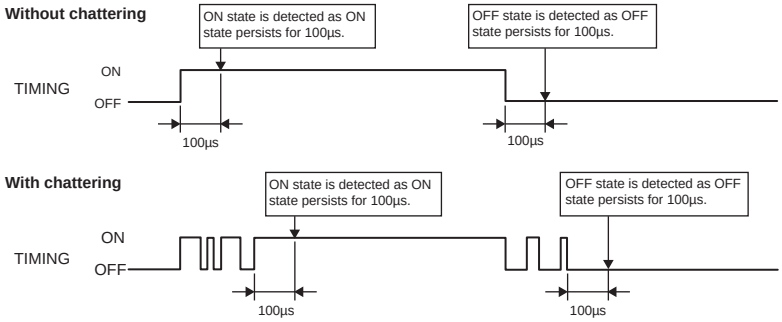
Used for preventing chattering in parallel input and malfunction due to noise.

Item	Setting item	Setting value	Description
I/O settings	Width of input signal filter	5 µs/10 µs/20 µs/50 µs/100 µs/200 µs/500 µs/1000 µs 100 µs (default value)	Set the width of filter.

▶ Multi View Explore : [Bank Group] | [(Bank Data Name)] (double click)
→ Edit pane : [I/O Settings] icon ( )
→ I/O Setting Screen : [I/O Settings]

1 **Set [Width of input signal filter].**

Example) When the filter setting value is 100µs (default value)
As an ON state persists for 100µs, an ON or OFF state of TIMING signal is detected. Therefore, a delay in the detection of TIMING signal occurs for a period of time equivalent to the set filter value.



Settings for Analog Output

The following describes the settings for outputting the current measurement results from the analog output of the analog output terminal block.

Setting the analog output destination

With analog output, the measurement results can be output converted to a current from 4 to 20 mA or a voltage from -10 to +10 V.
Selects which to output, the current or the voltage.

Important

The same output destination is set for all banks. The output destination cannot be set separately for individual banks.

Item	Setting item	Setting value	Description
Sensor settings	Analog output	Voltage output (default value)	Voltage output
		Current output	Current output

Note

The analog output destination can also be set with key operations on the Sensor Controller.

Setting the analog output destination p.160

1 **Set the operating mode to the FUNC mode.**

Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362) "3-2 Switching operation modes"

▶ Multi View Explore : [Device Group] | [(Sensor Name)] | [System] | [System Data] (double-click)

→ Edit pane : [Sensor settings] icon ( )

2 **Select the output destination from [Analog output].**

Important

When satisfies the following conditions, the analog output is disabled. A clamp value is output.

- Measurement cycle is 40 µs or less.
- EtherCAT communication is selected in the Fieldbus.

Assigning Analog Output

Set the task for which to output the results as analog.

Item	Setting item	Setting value	Description
Analog output	Output object	None/TASK1/TASK2/TASK3/ TASK4	Select the task to output as analog.

1 **Set the operating mode to the FUNC mode.**

Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362) "3-2 Switching operation modes"

▶ Multi View Explore : [Bank Group] | [(Bank Data Name)] (double click)
→ Edit pane : [I/O Settings] icon ( )
→ I/O Setting Screen : [Analog output]

2 **Select the task from [Output object].**
You can select from the above setting values.
None/TASK1/TASK2/TASK3/TASK4

Note

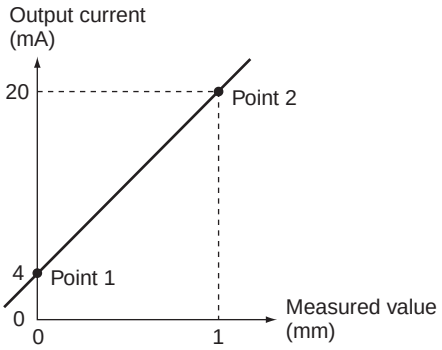
Analog output can also be assigned with key operations on the Sensor Controller.

Assigning Analog Output p.161

Setting Monitor Focus

With analog output, the relationship between the output value and measured value to be displayed can be set as desired to convert the measurement result to 4 to 20 mA current or -10 to +10 V voltage before output.
Set the focus to match the connected external device.
The output range can be set by entering the output value for the current or voltage values for any two points.

Example: When setting 4 mA output (1st point) for measured value of 0 mm and 20 mA output for measured value of 1 mm (2nd point) (current output)



Important

- Separate the two specified points by at least 1% of the rated measuring range of the connected Sensor Head or 40 µm.
- After executing functions that add/subtract the span and offset values to/from the measurement value, execute the monitor focus.

Item	Setting item		Setting value	Description
Monitor focus	Monitor focus		ON/OFF (default value)	Sets monitor focus ON/OFF.
	Point1	Distance value	-999.999999 to 999.999999 [mm]	Sets the reference measured value for output. The default setting differs depending on the Sensor Head.
		Current output value	4 (default value) to 20 [mA]	When the analog output destination is set to current, sets the current to be output when the distance value is measured.
		Voltage output value	-10 (default value) to 10 [V]	When the analog output destination is set to voltage, sets the voltage to be output when the distance value is measured.
	Point2	Distance value	-999.999999 to 999.999999 [mm]	Sets the reference measured value for output. The default setting differs depending on the Sensor Head.
		Current output value	4 (default value) to 20 [mA]	When the analog output destination is set to current, sets the current to be output when the distance value is measured.
		Voltage output value	-10 (default value) to 10 [V]	When the analog output destination is set to voltage, sets the voltage to be output when the distance value is measured.

Note

The monitor focus can also be set with key operations on the Sensor Controller.

Setting Monitor Focus p.161

1 **Set the operating mode to the FUNC mode.**

Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362) "3-2 Switching operation modes"

▶ Multi View Explore : [Device Group] | [(Sensor Name)] | [Bank Group] | [(Bank Data Name)] (double click)
→ Edit pane : [I/O Settings] icon ( )
→ I/O Setting Screen : [Analog output]

2 **Select ON from [Monitor Focus].**

3 **Enter the [Distance] and [Output value] at [Point1].**

4 **Likewise, enter the [Distance] and [Output value] at [Point2].**

Adjusting the analog output value

Discrepancies may occur between the current value/voltage value output as analog set on the Sensor Controller and the current value/voltage value actually measured due to the conditions for the connected external device or other factors.
The analog output adjustment function can be used to correct this discrepancy.
The output values are corrected by entering the adjustment value for the current or voltage values for any two points.

Important

Set the output destination and select either current or voltage output beforehand. Also, connect the analog output signal line to an external ammeter or voltmeter.

Item	Setting item	Setting value	Description	
Analog output adjustment	Analog output adjustment		ON/OFF (default value)	Set analog output correction ON/OFF.
	Point1	Reference value (current/value)	4 to 20 [mA]/-10 to 10 [V]	Sets the current or voltage to be used as the correction reference in the entry field on the left.
		adjustment value	-999 to 999	Sets the adjustment value when the reference value is measured in the entry field on the right.
	Point2	Reference value (current/value)	4 to 20 [mA]/-10 to 10 [V]	Sets the current or voltage to be used as the correction reference in the entry field on the left.
		adjustment value	-999 to 999	Sets the adjustment value when the reference value is measured in the entry field on the right.

1 **Set the operating mode to the FUNC mode.**

Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362) "3-2 Switching operation modes"

▶ Multi View Explore : [Device Group] | [(Sensor Name)] | [Bank Group] | [(Bank Data Name)] (double click)
→ Edit pane : [I/O Settings] icon ( )
→ I/O Setting Screen : [Analog output]

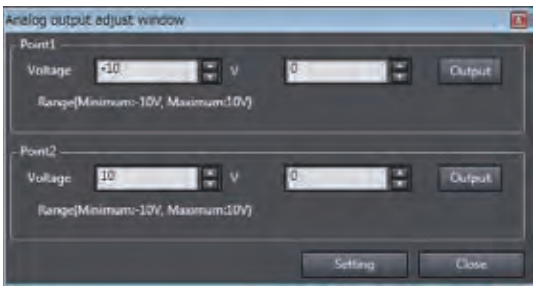
2 **Select ON from [Analog output adjustment].**

Important

This setting is allowable only when Online.

3 **Click [Setting].**
The “Analog Output Adjust” popup menu appears.

4 **Enter the [Distance] and [Output value] at [Point1], and click [Output].**



5 **Likewise, enter the [Distance] and [Output value] at [Point2], and click [Output].**

6 **Click [Setting].**

Note

Analog output values can also be adjusted with key operations on the Sensor Controller.

Adjusting the analog output value p.163

Settings for Judgment Output

The following describes the settings for outputting the judgment results from the judgment output of the 32-pole extension connector.

Assigning judgment output

Set the task for which to output the judgment results.
The judgment results for the selected task are output from the following output terminals of the 32-pole extension connector.

HIGH/PASS/LOW

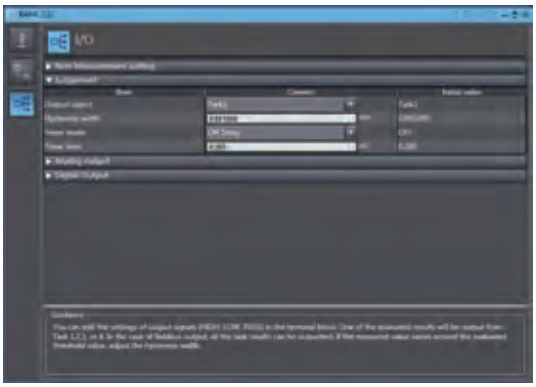
Item	Setting item	Setting value	Description
Judgment	Output object	TASK1/TASK2/TASK3/TASK4	Select the task for which to output the judgment result.

1 **Set the operating mode to the FUNC mode.**

Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362) "3-2 Switching operation modes"

▶ Multi View Explore : [Bank Group] | [(Bank Data Name)] (double click)
→ Edit pane : [I/O Settings] icon ( )
→ I/O Setting Screen : [Judgment]

2 **Select the task from [Output object].**



Note

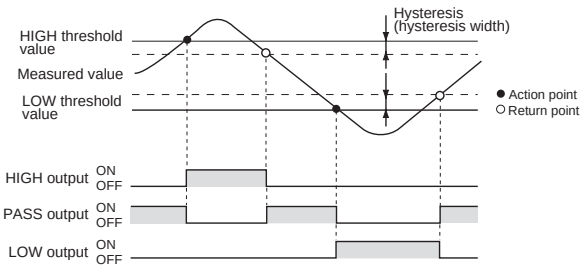
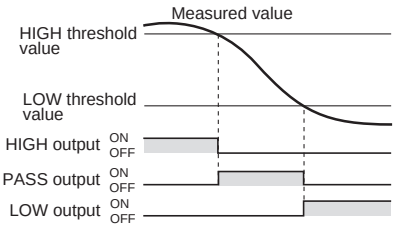
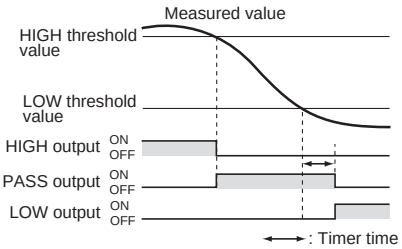
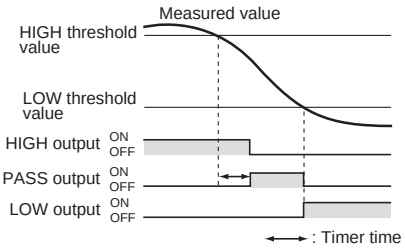
Judgment output can also be assigned with key operations on the Sensor Controller.

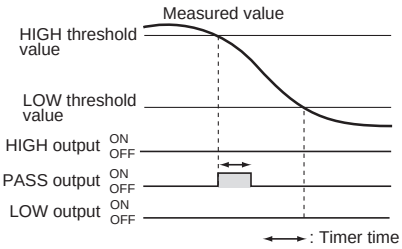
Assigning judgment output p.164

Setting Operation at Judgment Output

Set the hysteresis width of the judgment upper/lower limit values and judgment output timing.

Refer to “4-4 Setting Threshold Value” described in Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User’s Manual (Z362).

Item	Setting item	Setting value	Description
Judgment output	Hysteresis width	0 to 99.9999mm	Sets the hysteresis value (difference between operating point and recovery point) of the judgment upper/lower limit values when HIGH/PASS/LOW judgment is unstable near the boundary.  Satisfy the following conditions. HIGH threshold value ≥ HIGH threshold value - Hysteresis (hysteresis width) > LOW threshold value + Hysteresis (hysteresis width) ≥ LOW threshold value
	Timer mode	OFF (default value)	Outputs the judgment as soon as the judgment result has been applied. 
		Off Delay	Delays the falling edge of the outputs by the value set at [Timer Duration] after the judgment result has been applied. 
		On Delay	Delays the rising edge of the outputs by the value set at [Timer Duration] after the judgment result has been applied. 

Item	Setting item	Setting value	Description
Judgment output	Timer mode	One Shot	When the judgment result is turned ON, output by the value set as [Timer Duration]. 
	Timer time	1 (default value) to 5000 [ms]	Sets the timer duration when the timer mode is other than OFF.

1 **Set the operating mode to the FUNC mode.**

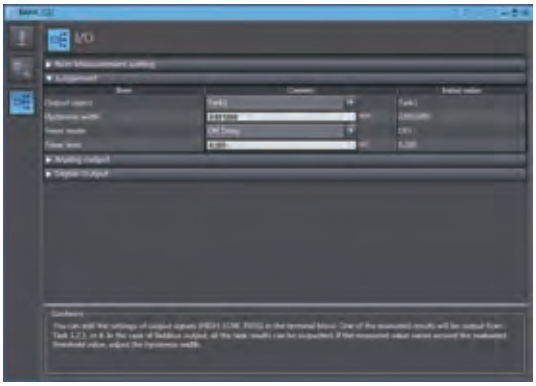
Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362) "3-2 Switching operation modes"

▶ Multi View Explore : [Bank Group] | [(Bank Data Name)] (double click)
→ Edit pane : [I/O Settings] icon ( )
→ I/O Setting Screen : [Judgment]

2 **Set [Hysteresis Width].**

3 **Select the judgment output timing to match operation of the external device from [Timer mode].**

4 **Sets [Timer time].**



Note

The operations for judgment output can also be set with key operations on the Sensor Controller.

Setting Operation at Judgment Output p.165

Important

- The timer mode cannot be used when the measurement mode is external/PDO synchronous measurement mode.
- Timer time shall be a value rounded up by Measurement Cycle Time unit.
- When 2 area mode is selected, minimum value shall be doubled Measurement Cycle.

Settings for Bank Control

This section describes the settings for controlling banks by using parallel I/O.

Selecting banks

The bank is selected in combinations of the bank select input signals (BANK_SEL1 to 3).

Bank selection input 1 (BANK_SEL1)	Bank selection input 2 (BANK_SEL2)	Bank selection input 3 (BANK_SEL3)	Selected bank
OFF	OFF	OFF	BANK1
ON	OFF	OFF	BANK2
OFF	ON	OFF	BANK3
ON	ON	OFF	BANK4
OFF	OFF	ON	BANK5
ON	OFF	ON	BANK6
OFF	ON	ON	BANK7
ON	ON	ON	BANK8

Important

- At most it takes about 100ms to switch banks.
- During bank switching, the BUSY output becomes ON.
- If the bank mode is set to [JUDGE], the bank cannot be switched at the external signal input because the number of banks increases to 32.

Outputting the currently selected bank number

The currently selected bank number is output.
The output bank number depends on the combination of the bank number output signals (BANK_OUT1 to 3).

Bank number output 1 (BANK_OUT1)	Bank number output 2 (BANK_OUT2)	Bank number output 3 (BANK_OUT3)	Output bank
OFF	OFF	OFF	BANK1
ON	OFF	OFF	BANK2
OFF	ON	OFF	BANK3
ON	ON	OFF	BANK4
OFF	OFF	ON	BANK5
ON	OFF	ON	BANK6
OFF	ON	ON	BANK7
ON	ON	ON	BANK8

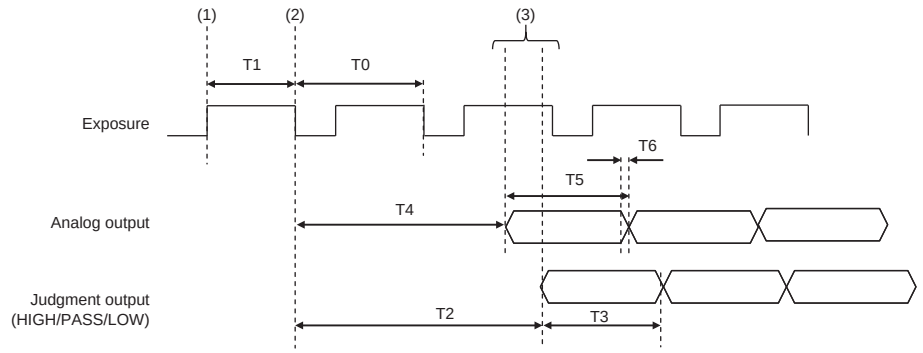
Timing Chart

The following shows the timing charts when communication is performed with external devices.

Relationship between image capture duration and judgment output

Item		Min.	Max.
T0	Measuring cycle	60 μs (ZW-8000□) 20 μs (ZW-7000□) 80 μs (ZW-5000□)	Depends on the set conditions
T1	Exposure time	1 μs	T0 - 3 μs
T2	Response time of judgment output*1	–	250 μs + P*2
T3	Refresh cycle of judgment output*1	–	T + 200 μs
T4	Response time of analog output*1	–	80 μs (ZW-7000□/5000□) 200 μs (ZW-8000□)
T5	Refresh time of analog output*1	–	TO (1 area mode) 2TO (2 area mode)
T6	Response delay time of Analog output	–	Output voltage: Approx 1.5 μs Current output: Approx 10 μs

*1 In 2 area mode, T0 is added to the values in the chart.
*2 P = 0 μs (ZW-7000□/5000□)
100 μs (ZW-8000□)



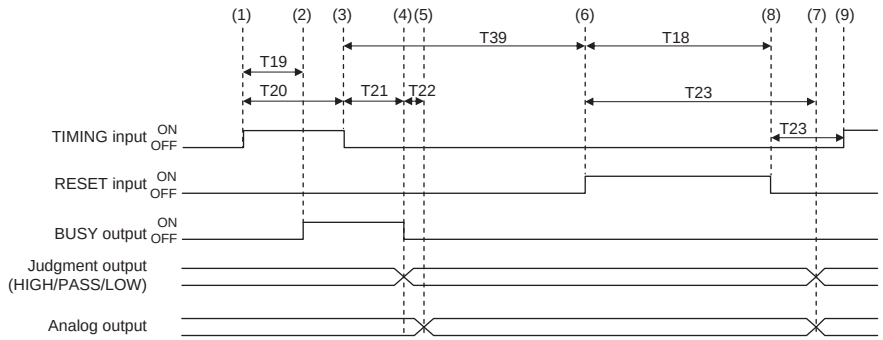
Explanation of operations

(1) During each measuring cycle, the light source is lit and exposure is started.
(2) After the end of exposure, measurement starts.
(3) After the end of measurement, the judgment result and the analog output are updated.

Hold (peak/bottom/peak to peak/average)

Item		Min.	Max.
T18	RESET Minimum input time	2 × T0 + C[*1] + 1100 µs	–
T19	TIMING - BUSY ON maximum response time[*2]	–	TO + C[*1]+ P[*3] + 80 µs (When specify timing to measure mode is selected) 2 × TO + C[*1]+ P[*3] + 80 µs (When specify timing to exposure mode is selected)
T20	TIMING minimum input time[*2]	T0 + C[*1]+ 20 µs (Minimun OFF time is T0 + C[*1] + 60 µs.)	–
T21	TIMING - BUSY OFF maximum response time[*2]	–	T0 + C[*1]+ P[*3] + 300 µs
T22	BUSY OFF - maximum response time of judgment/analog output[*2]	–	30 µs
T23	RESET maximum response time and RESET OFF-TIMING ON minimum time[*2]	–	2 × TO + C[*1] + 3000 µs
T39	TIMING OFF - RESET ON minimum time[*2]	TO + C[*1]+ 60 µs (When specify timing to measure mode is selected) 2 × TO + C[*1] + 60 µs (When specify timing to exposure mode is selected)	–

*1 C = Filter width of input signal
*2 In 2 area mode, T0 is added to the values in the chart.
*3 P = 0 µs (ZW-7000□/5000□)
100 µs (ZW-8000□)



Explanation of operations

(1) The TIMING input is turned ON.
(2) During the TIMING input minimum time, when the TIMING input is ON, sampling is started and the BUSY output is turned ON.
(3) The TIMING input is turned OFF.
(4) After the TIMING input turns OFF, sampling is ended and the Judgment result and Analog output are updated. The BUSY output is also turned OFF.
(5) After the Judgment result, and the analog output are updated.
(6) The RESET input is turned ON. If the RESET input is turned ON during the RESET input minimum time, the measured value is reset.
(7) The judgment result and analog output are reset.
(8) The RESET input is turned OFF.
(9) After the RESET input is turned OFF, the TIMING input can be turned ON again.

Important

- Judgment and Analog output may not be updated until BUSY is turned ON after Sampling procedure.
- When the setting for non-measurement is “CLAMP”, if the sampling value is an abnormal value or an undetermined value *, sampling is not executed. If sampling has been started, it is stopped. The output value is as follows.
  - Hold the clamp value.
  - To start and continue sampling even if a sampling value is an abnormal value or an undetermined value, set “KEEP” as the non-measurement setting.

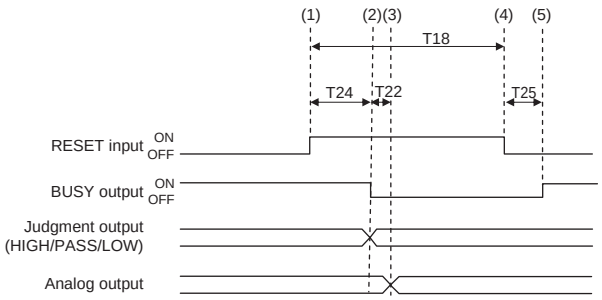
  *: After the start of measurement, if measurement results are not obtained the number of times required to take the average, the measurement result is not applied.

  *: The RESET of (6) through (8) can be omitted. When performing TIMING input consecutively, make sure that the interval between TIMING inputs is the minimum OFF time of T20 or longer.

Hold (auto peak/auto bottom/auto peak-to-peak)

Item		Min.	Max.
T18	RESET minimum input time	2 × T0 + C*1 + 1100 μs	–
T22	BUSY-OFF maximum response time of judgment/analog output	–	0 μs (1 area mode) TO (2 area mode)
T24	BUSY OFF maximum response time*2	–	T23
T25	RESET - BUSY ON maximum response time*2	–	T23

*1 C = Filter width of input signal
*2 In 2 area mode, T0 is added to the values in the chart.



Explanation of operations

(1) The RESET input is turned ON. If the RESET input is turned ON during the RESET input minimum time, the measured value is reset.
(2) Judgment result is reset. The BUSY output is turned OFF.
(3) After judgement result is reset, Analog output is reset.
(4) The RESET input is turned OFF.
(5) The BUSY output is turned ON.

Important

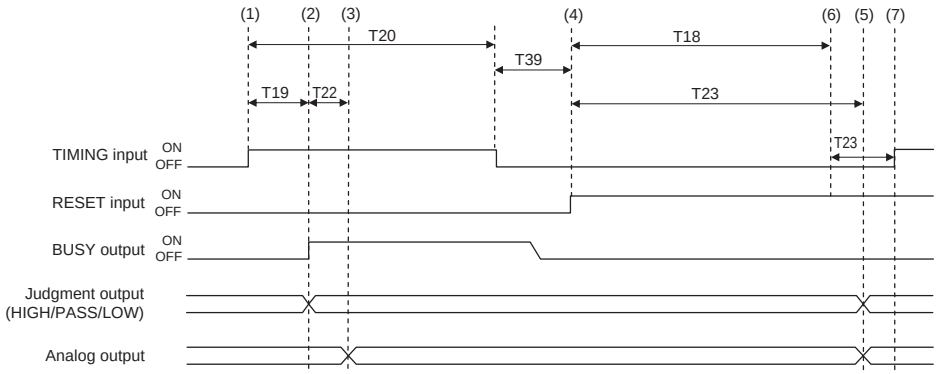
- Judgment and Analog output may not be updated until BUSY is turned OFF after Sampling procedure.
- When the setting for non-measurement is “CLAMP”, if the sampling value is an abnormal value or an undetermined value *, sampling is not executed. If sampling has been started, it is stopped. The output value is as follows.
  - Hold the clamp value.
  - The BUSY signal is turned OFF.
  - To start and continue sampling even if a sampling value is an abnormal value or an undetermined value, set “KEEP” as the non-measurement setting.

  *: After the start of measurement, if measurement results are not obtained the number of times required to take the average, the measurement result is not applied.

Hold (sampling)

Item		Min.	Max.
T18	RESET Minimum input time	2 × T0 + C*1 + 1100 µs	–
T19	TIMING - BUSY ON maximum response time*2	–	TO + C*1 + P*3 + 80 µs (When specify timing to measure mode is selected) 2 × TO + C*1 + P*3+ 80 µs (When specify timing to exposure mode is selected)
T20	TIMING minimum input time*2	T0 + C*1 + 20 µs (Minimum OFF time is T0 + C*1 + 60 µs.)	–
T22	BUSY-ON maximum response time of judgment/analog output	–	30 µs
T23	RESET maximum response time and RESET OFF-TIMING ON minimum time*2	–	T0+C*1+3000 µs
T39	TIMING OFF - RESET ON minimum time*2	TO + C*1 + 60 µs (When specify timing to measure mode is selected) 2 × TO + C*1 + 60 µs (When specify timing to measure mode is selected)	

*1 C = Filter width of input signal
*2 In 2 area mode, T0 is added to the values in the chart.
*3 P = 0 µs (ZW-7000□/5000□)
100 µs (ZW-8000□)



Explanation of operations

(1) The TIMING input is turned ON.
(2) During the TIMING input minimum time, when the TIMING input is ON, sampling is started and the BUSY output is turned ON. The measurement result is sampled and the judgment result is output.
(3) After the Judgment result, and the analog output are updated.
(4) The RESET input is turned ON. If the RESET input is turned ON during the RESET input minimum time, the measured value is reset.
(5) The judgment result and the analog output are reset.
(6) The RESET input is turned OFF.
(7) After the RESET input is turned OFF, the TIMING input can be turned ON again.

Important

- Judgment and Analog output may not be updated until BUSY is turned OFF after Sampling procedure.
- When the setting for non-measurement is “CLAMP”, if the sampling value is an abnormal value or an undetermined value *, sampling is not executed. The output value is as follows.
  - Hold the clamp value.

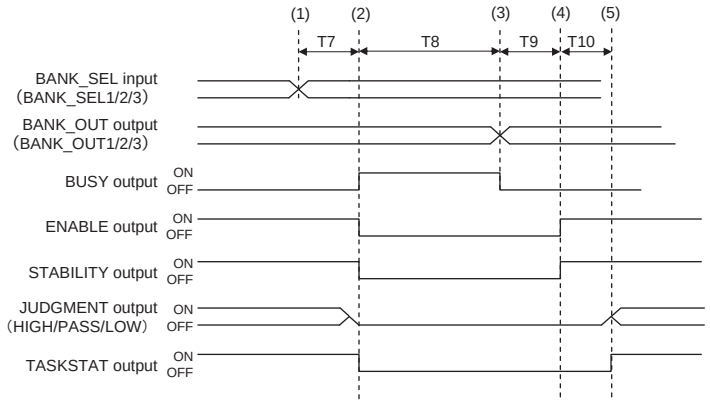
• The BUSY signal is not turned ON.

*: After the start of measurement, if measurement results are not obtained the number of times required to take the average, the measurement result is not applied.

*: The RESET of (6) through (8) can be omitted. When performing TIMING input consecutively, make sure that the interval between TIMING inputs is the minimum OFF time of T20 or longer.

Bank Switching

Item		Min.	Max.
T7	Input response time	–	200 ms
T8	Bank switching time	–	100 ms
T9	Measurement start response time	–	Depends on the set conditions
T10	Maximum response time of judgement ON	–	Depends on the set conditions



Explanation of operations

(1) The BANK_SEL signal is switched to the bank number to switch to.

(2) After the input response time, the measurement stops and the BUSY output is turned ON, The ENABLE output, STABILITY output, HIGH/PASS/LOW output, and TASKSTAT output are turned OFF at the same time.

(3) After bank switching ends, the BUSY output is turned OFF and the BANK_ OUT output is switched.

(4) Measurement is restarted and the ENABLE output, STABILITY output is turned ON.

(5) When the measurement result is applied, the HIGH/PASS/LOW output and TASKSTAT output turn ON.

Important

Under the following conditions, the sensor controller display section does not change in conjunction with the output signal and will continue to display the previous measurement state.

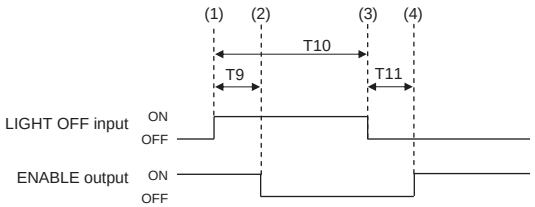
• When external synchronization measurement mode is set and TRIG input is not on.

• When the PDO synchronous measurement mode is set and EtherCAT is not established.

LIGHT OFF

Item		Min.	Max.
T9	LIGHT OFF - ENABLE OFF maximum response time	–	2 × T0 + C*1 + P*2 + 300 µs
T10	LIGHT OFF minimum input time	T0 + C*1 + 20 µs (Minimum OFF time is T0 + C*1 + 60 µs.)	–
T11	LIGHT OFF - ENABLE ON maximum response time	–	2 × T0 + C*1 + P*2 + 150 µs

*1 C = Filter width of input signal
*2 P = 0 µs (ZW-7000□/5000□)
100 µs (ZW-8000□)

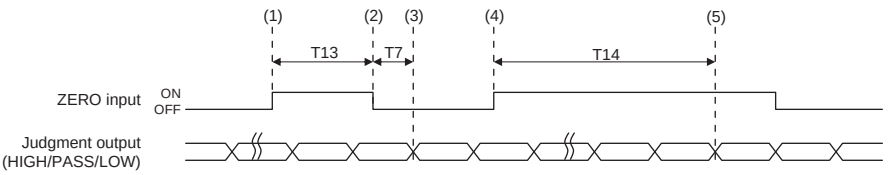


Explanation of operations

(1) The LIGHT OFF input is turned ON.
(2) After the LIGHT OFF input is turned ON, the light source is turned OFF and the ENABLE output is turned OFF.
(3) The LIGHT OFF input is turned OFF.
(4) After the LIGHT OFF input is turned OFF, the light source is turned ON and the ENABLE output is turned ON.

Zero reset

Item		Min.	Max.
T7	Input response time	–	3 ms + T0 × 2
T13	ZERO input time	50 ms	0.8 s
T14	ZERO input cancel time	1s	–

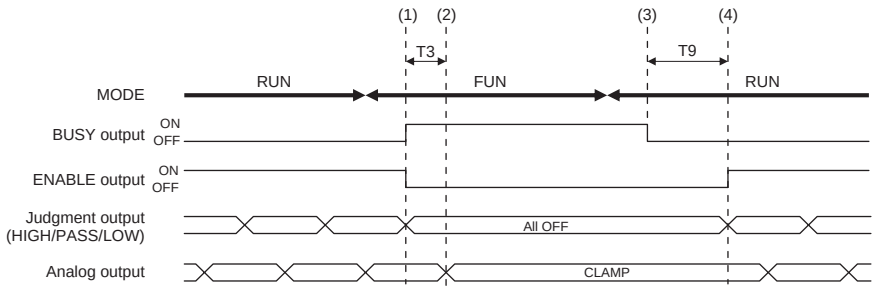


Explanation of operations

(1) The ZERO input is turned ON.
(2) After the ZERO input time, the ZERO input is turned OFF.
(3) After the ZERO input is turned OFF, the zero reset is executed and the judgment results reflected in the measurement results are output.
(4) The ZERO input is turned ON.
(5) After at least the cancel time of ZERO input has passed, the zero reset is cancelled.

Operating Mode Switching

Item		Min.	Max.
T3	Response time of analog output	–	T0 + 20 μs
T9	Measurement start response time	–	Depends on the set conditions



Explanation of operations

(1) After the mode is switched from RUN to FUNC mode, the BUSY output and ENABLE output are turned OFF. The judgment outputs all go OFF.
(2) The response time of analog output after the BUSY output is turned ON, the analog output is output clamped.
(3) After the mode is switched from the FUNC mode to the RUN mode, the BUSY output is turned OFF.
(4) Measurement is restarted and the ENABLE signal is turned ON, then the measurement results are output.

Important

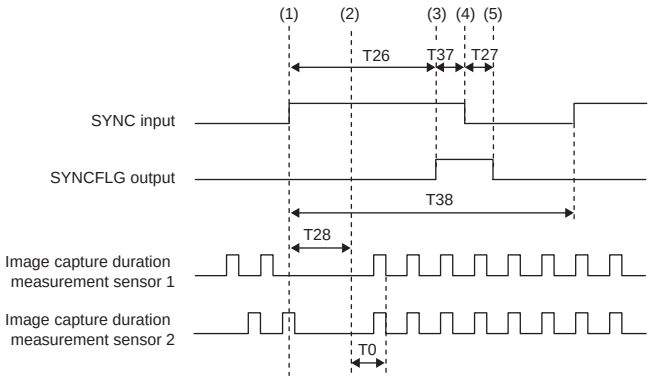
Under the following conditions, the sensor controller display section does not change in conjunction with the output signal and will continue to display the previous measurement state.

- When external synchronization measurement mode is set and TRIG input is not on.
- When the PDO synchronous measurement mode is set and EtherCAT is not established.

Measurement cycle

Item		Min.	Max.
T26	SYNC ON - SYNCFLG_ON maximum response time	–	T0 + C*1 + P*2 + 130 µs
T27	SYNC_OFF - SYNCFLG_OFF maximum response time	–	T0 + C*1 + P*2 + 250 µs
T28	Response time when restart to capture after SYNC input	–	T0 + C*1 + 70 µs
T37	SYNCFLG_ON - SYNC_OFF time	0 µs	–
T38	Minimum SYNC cycle	T0 + T26 + T27 + T37	–

*1 C = Filter width of input signal
*2 P = 0 µs (ZW-7000□/5000□)
200 µs (ZW-8000□)



Explanation of operations

(1) Turns ON SYNC input
(2) After SYNC input was turned ON, the image capture completion signals from the 2 measurement sensors synchronize and a measurement is performed.
(3) SYNCFLG output turns ON.
(4) The SYNC input is turned OFF.
(5) SYNCFLG output is turned OFF after SYNC input is turned OFF.

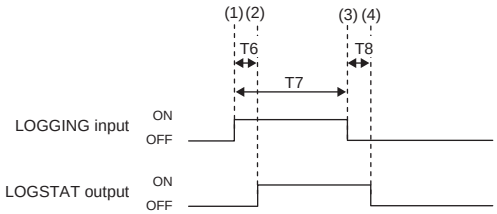
Example of minimum SYNC cycle

Measurement cycle T0	ZW-7000□/5000□		ZW-8000□	
	C = 5 µs	C = 100 µs	C = 5 µs	C = 100 µs
20 µs	450 µs	640 µs	610 µs	800 µs
40 µs	510 µs	700 µs	670 µs	860 µs
60 µs	570 µs	760 µs	730 µs	920 µs
80 µs	630 µs	820 µs	790 µs	980 µs
160 µs	870 µs	1060 µs	1030 µs	1220 µs
250 µs	1140 µs	1330 µs	1300 µs	1490 µs
500 µs	1890 µs	2080 µs	2050 µs	2240 µs

Internal logging

Item		Min.	Max.
T6	LOGGING ON - LOGSTAT ON maximum response time	–	T0 + C*1 + 30 µs
T7	LOGGING minimum input time	T0 + C*1 + 20 µs	–
T8	LOGGING OFF - LOGSTAT OFF maximum response time	–	T0 + C*1 + 250 µs

*1 C = Filter width of input signal



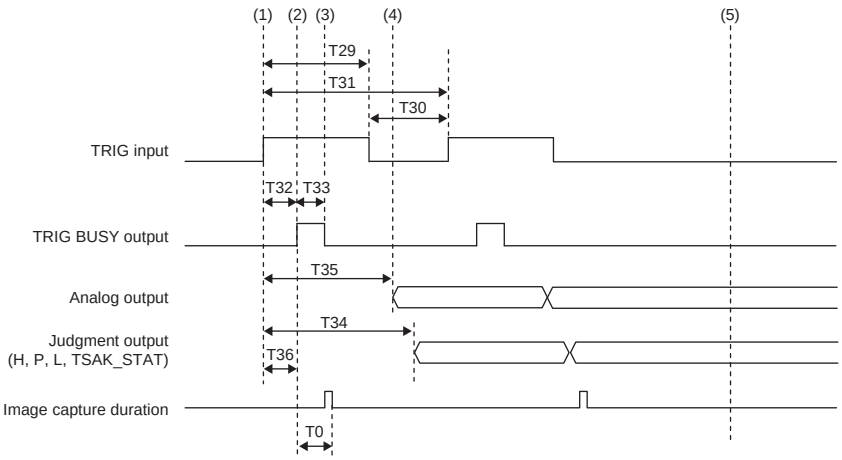
Explanation of operations

(1) Turns ON LOGGING input.
(2) Internal logging starts when LOGSTAT output is turned ON after LOGGING input is turned ON.
(3) Turns OFF the LOGGING input.
(4) Finishes the Internal logging when LOGSTAT output is turned OFF after LOGGING input is turned OFF. However, if an insufficient logging memory occurs, turns ON the LOGERR output. The LOGERR output is turns OFF simultaneously with the LOGGING input turned OFF.

External synchronous measurement mode

Item		Min.	Max.
T29	Minimum TRIG ON time	C[*1] + 20 µs	–
T30	Minimum TRIG OFF time	C[*1] + 60 µs	–
T31	Minimum TRIG cycle	T29 + T30	–
T32	TRIG - TRIGBUSY response	–	C[*1] + 30 µs
T33	TRIG_BUSY ON time	T0 + 100 µs	T0 + 200 µs
T34	TRIG - Judgment output response	–	T0 + T2 + T29
T35	TRIG - Analog output response	–	T0 + T4 + T29
T36	TRIG-Measurement cycle start time	–	T29

*1 C = Filter width of input signal



Explanation of operations

(1) Turns ON TRIG input.
(2) TRIG BUSY output turns ON and capturing images is started to perform a measurement.
(3) TRIG BUSY output turns OFF, allowing the next TRIG input to be received.
(4) After the measurement has been completed, the judgement result and analog output are updated.
(5) Image capture and measurement are not performed without TRIG input.

Example of minimum TRIG cycle

Measurement cycle T0	C = 5 µs	C = 100 µs
20 µs	120 µs	280 µs
40 µs	140 µs	280 µs
80 µs	180 µs	280 µs
160 µs	260 µs	280 µs
250 µs	350 µs	350 µs
500 µs	500 µs	600 µs

EtherCAT Connection

3-1 EtherCAT Connection

Overview of EtherCAT Networks

EtherCAT (Ethernet Control Automation Technology) is a high-performance industrial network system based on Ethernet system and can realize faster and more efficient communications.
Each node achieves a short communications cycle time by transmitting Ethernet frames at high speed. Furthermore, even though EtherCAT is a unique protocol, it offers excellent general-purpose applicability. For example, you can use Ethernet cables because EtherCAT utilizes standard Ethernet technology for the physical layer. And the effectiveness of EtherCAT can be fully utilized not only in large control systems that require high processing speeds and system integrity, but also in small and medium control systems.

Features of EtherCAT

EtherCAT has the following features.

● Extremely high-speed communications with speed of 100 Mbps

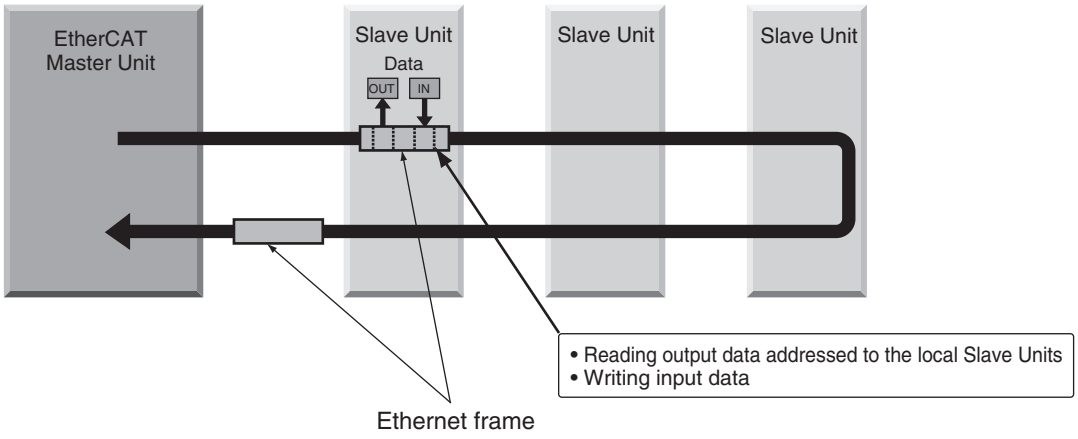
It dramatically shortens the I/O response time from generation of input signals to transmission of output signals. By fully utilizing the optimized Ethernet frame bandwidth to transfer data using a high-speed repeat method, it is possible to efficiently transmit a wide variety of data.

● Extremely High Compatibility with Ethernet

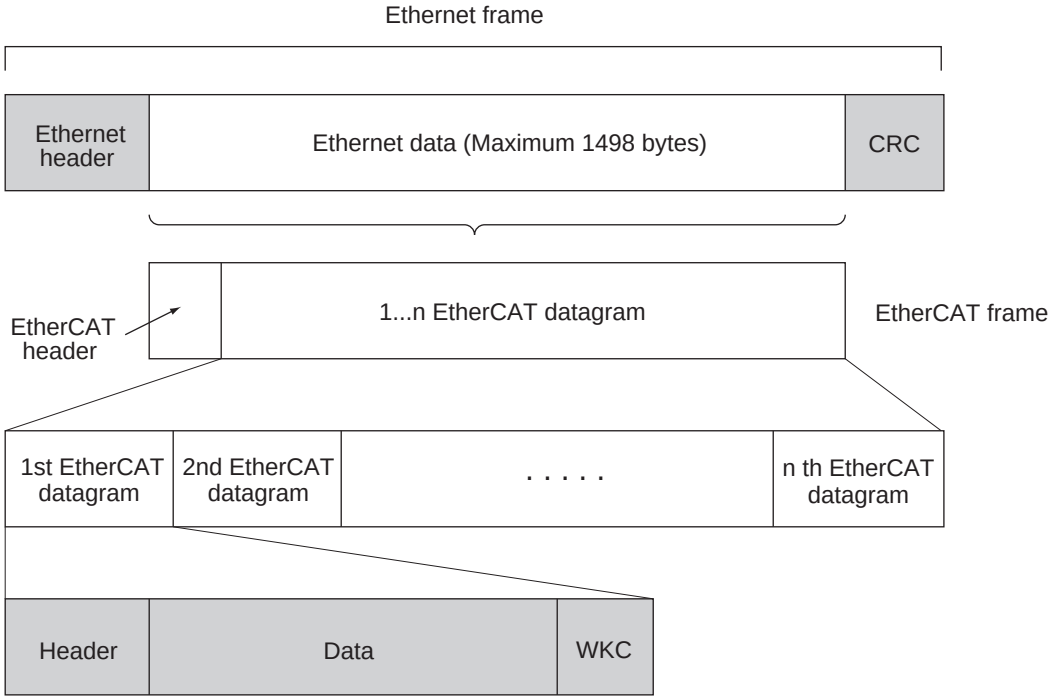
EtherCAT is an open network with extremely high compatibility with conventional Ethernet systems.

Structure of EtherCAT

EtherCAT does not send data to individual slave nodes on the network, instead, it passes Ethernet frames through all of the slave nodes.
When frame passes through a slave node, the slave node reads and writes data in the areas allocated to it in the frames in a few nanoseconds.
Ethernet frames sent from the EtherCAT Master Unit go through all the EtherCAT Slave Units without stopping on the way. Once they reach the final Slave Unit, they are sent back from the final Slave Unit, pass through all Slave Units again, and return to the EtherCAT Master Unit.
With this structure, EtherCAT secures high-speed and real-time data transmission.



It is the “EtherCAT datagram” stored directly in an Ethernet frame that exchanges data regularly between the EtherCAT Master Unit and Slave Units.
Each “EtherCAT datagram” is configured with header (data length, including address of one or more Slave Units, etc.), data, working counter (check bit).
When an Ethernet frame is compared to a “train”, an EtherCAT datagram can be considered as “railway car.”



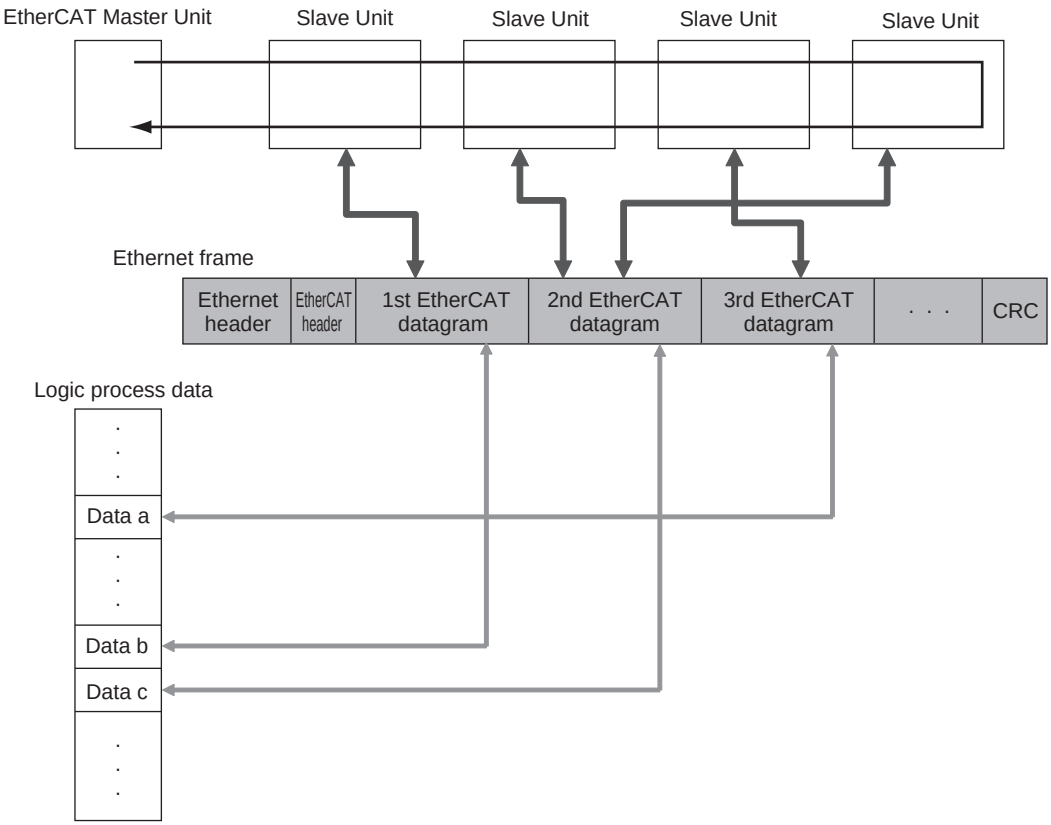
WKC : Working counter

Communications Types of EtherCAT

EtherCAT provides the following two types of communication functions.
PDO communications are always updating data per communication cycle on EtherCAT, while SDO communications are processed in between those updates.

● Process data communications functions (PDO communications)

This communication function is used to transfer process data in real time in a fixed-cycle.
By mapping logical process data space to each node by the EtherCAT Master Unit, it achieves fixed-cycle communications among the EtherCAT Master Unit and Slave Units.



● Mailbox communications functions (SDO communications)

It refers to message communications.
At any timing, the EtherCAT Master Unit transmits commands to Slave Units and the Slave Units return responses to the EtherCAT Master Unit.
It performs the following data communications:

- Read and write process data
- Slave Unit Settings
- Monitoring the slave unit state

● Synchronization with Distributed Clocks

A mechanism called a distributed clock (DC) is used to synchronize EtherCAT communications.
The DC mode is used for ZW-8000/7000/5000 series to perform highly accurate control of measurement start timing.
In DC mode, the master and slaves are synchronized by sharing the same clock.
Interruptions (Sync0) are generated in the slaves at precise intervals based on this clock.
Displacement Sensor control is carried out at this precise timing.

Communications Cycle (DC Cycle)
The communications cycle is determined by setting the Sync0 signal output cycle.
Set the Output cycle 125µs, or longer. For details on the setting procedure, refer to "Sysmac Studio Version 1 Operation Manual" (W504).

Communication Methods for Measurement Sensor when Connected via EtherCAT

Communications between the EtherCAT master and the displacement sensor is performed over EtherCAT to enable control from the master by control signals and data output after measured values are applied.
When the displacement sensor is connected to an NX/NJ series CPU Unit via EtherCAT, Sysmac Studio (standard edition) is used to register the ZW to the EtherCAT slave configuration on the network configuration edit pane.
For details on registration methods, refer to *Sysmac Studio Version 1 Operation Manual* (W504) “4-2 Controller Configuration/Setting.”

Important

- Up to 32 measurement sensors can be connected via EtherCAT.
- If EtherCAT is set to enables to perform communications over EtherCAT, the EtherNet/IP communications setting is disabled and EtherNet/IP communications is no longer possible.

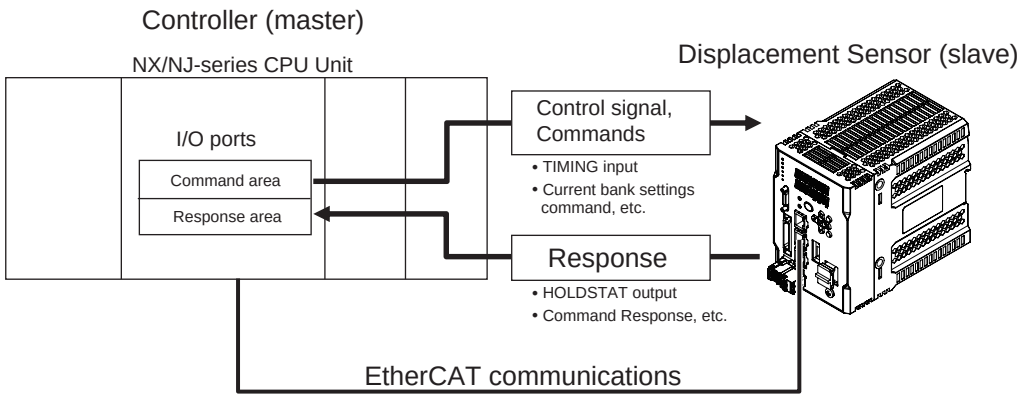
Setting Communications Specifications (EtherCAT Communications) p.51

Communications method using process data objects (PDO)

● Control of displacement sensors by control/status signals

With EtherCAT communications, process data objects (PDO) are used to perform PDO communications (cyclic communications). Control of the displacement sensor is performed by storing control signals/command from the master to the displacement sensor, status signals from the displacement sensor to the master, and command responses to the I/O ports (or I/O memory) (*1)of the Controller.

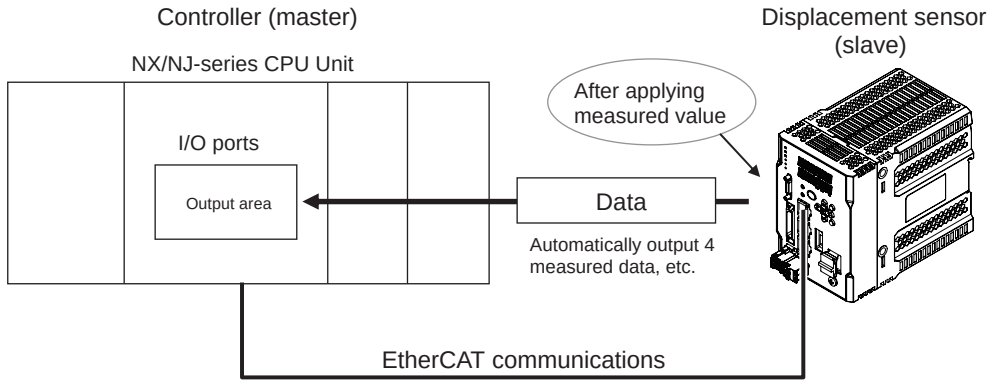
*1: When connected to the NX/NJ series, “I/O ports” are used, and when connected to the CJ series, “I/O memory” is used. Explanations from here on are for when the connection is to the NX/NJ series.



The Controller sends the instruction to the displacement sensor over EtherCAT by switching the control signal bit assigned with control to be executed to ON.
The displacement sensor executes the instruction, and updates the status signal bit according to the result to return it over EtherCAT. ÅB
When instructions are executed by control commands, control commands are sent to the displacement sensor over EtherCAT by writing the control command, for example, to I/O port Command and then turning the control command execution (EXE) bit ON.
The displacement sensor executes that control command, and returns the response to the Controller over EtherCAT. The Controller stores the response to I/O port Response, for example.

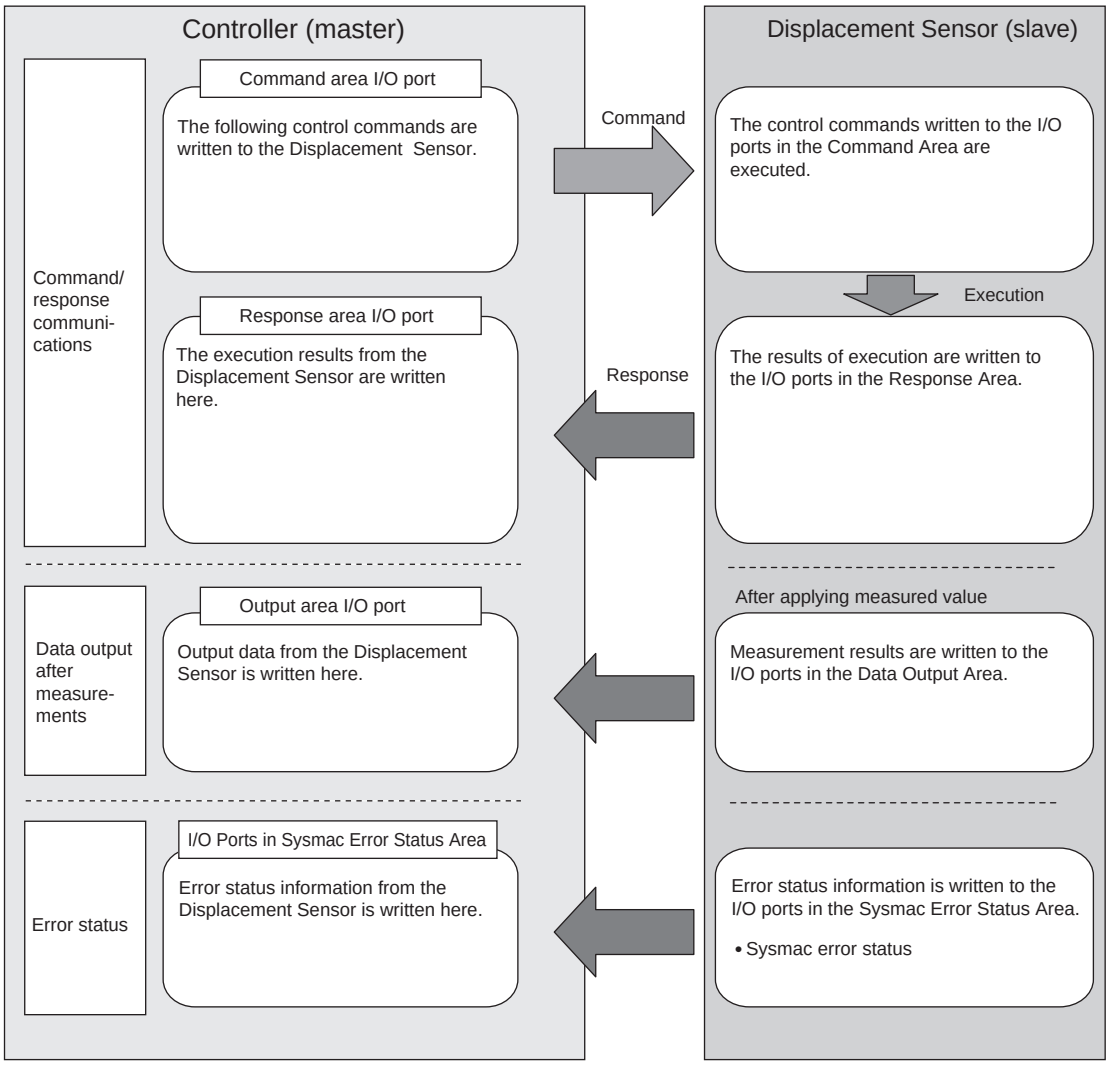
● **Output of displacement sensor measurement data to output area**

The measurement data of all tasks is automatically output from the displacement sensor to I/O port Measurement Value of Output data1 to 4 immediately after the measured value is applied.
This enables the measurement results of all tasks to be easily handed over to the Controller.



With EtherCAT communications, communications is performed via the I/O ports of the following four area on the Controller. Sysmac error status area I/O ports are used only when an NX/NJ series CPU unit is connected as the master.

Control by control/ status signals	(1) I/O ports of instruction area	I/O ports to which the user writes control signals to be executed on the displacement sensor and control commands
	(2) I/O ports of response area	I/O ports to which the displacement sensor writes the control signals written to the instruction area and the result of executing control commands
Data output after application of measured value	(3) I/O ports of output area	I/O ports to which the displacement sensor writes the output data accompanying measurement after application of the measured value
For error status	(4) I/O ports of Sysmac error status area	I/O ports to which the displacement sensor writes the error status



Communications method using service data objects (SDO)

The ZW series supports SDO communications. SDO communications is used for setting objects and monitoring the status of the ZW series. Objects can be set or the status monitored by reading and writing data to entries in the object dictionary of the host Controller.

Setting Communications Specifications (EtherCAT Communications)

Setting default settings for EtherCAT communications

Set the default settings for EtherCAT communications.

Item	Description	Range
Fieldbus	Select whether to use EtherNet/IP communications or EtherCAT communications.	OFF EtherNet/IP EtherCAT (default value)
GATE signal ON time	Set the output time of the GATE signal for notifying the timing that the measured value was updated when hold is output.	0 to 100ms 1ms (default value)

▶ Multi View Explore : [Device Group] | [(Sensor Name)] | [System] | [System Data] (double-click)

→ Edit pane : [Ethernet Communications Settings] icon ( )

1 **Set the fieldbus settings.**
Select [EtherCAT] at [Fieldbus].

2 **Set the output time of the GATE signal.**
Set the value at [GATE signal ON time].

Note

The setting of default settings for EtherCAT communications can also be set by the operating keys on the Sensor Controller.

Setting Fieldbus p.175
Setting GATE Signal ON Time p.176

Important

- This setting contemns will be effected when launch the Sensor Controller.
- Save the setting data after changing this setting, and then restart to the Sensor Controller.

List of I/O Ports for Each Area (PDO Mapping) and Memory Assignments

When connection destination is an NX/NJ series Controller

This section describes the respective I/O ports of the instruction area, response area, output area, and Sysmac error status area.

● I/O ports of instruction area

Controller (master) → Displacement sensor (slave)

I/O port name	Signal	Signal name	Function
Sensor Head Control Signal1		Sensor head control signal1	
EXE	EXE	Control command execution	Turns ON when the user (Controller) instructs execution of control commands to the displacement sensor. (Turns ON after the control command code and parameters are set.)
			Is returned to OFF on condition (input condition) that the user (Controller) turns the control command completion signal (FLG signal) from the displacement sensor ON.
SYNC	SYNC	Measurement synchronous start	Turns ON when the user (Controller) instructs measurement synchronization to the displacement sensor.
			Is returned to OFF on condition (input condition) that the user (Controller) turns the measurement synchronization completion signal (SYNCFLG signal) ON.
ERCLR	ERCLR	Error clear	Turns ON when the displacement sensor error signal (ERR signal) turns OFF.
			Is returned to OFF on condition (input condition) that the user (Controller) turns the error signal (ERR signal) OFF.
Sensor Head Control Signal2		Sensor head control signal2	
TIMING	TIMING	Timing	Turns ON when the user (Controller) instructs start of hold sampling to the displacement sensor.
			Turns OFF when the user (Controller) instructs end of hold sampling to the displacement sensor.
RESET	RESET	Reset	Turns ON when the user (Controller) instructs judgment processing and output reset to the displacement sensor. If the hold function is used, the state in effect before the hold function was set will be restored.
			Turns OFF when the user (Controller) ends judgment processing and output reset to the displacement sensor.
LIGHTOFF	LIGHTOFF	Light metering OFF	Turns ON when the user (Controller) instructs logical beam OFF to the displacement sensor.
			Turns OFF when the user (Controller) instructs logical beam ON to the displacement sensor.
ZERO_T1 to 4	ZERO_T1 to 4	Zero reset execution	Turns ON when the user (Controller) instructs execution of zero reset of TASK1 to 4 to the displacement sensor.
			Is returned to OFF on condition (input condition) that the user (Controller) turns the zero reset completion signal (ZEROSTAT signal) from the displacement sensor ON.
ZEROCLR_T1 to 4	ZEROCLR_T1 to 4	Zero reset cancel	Turns ON when the user (Controller) instructs zero reset cancel of TASK1 to 4 to the displacement sensor.
			Is returned to OFF on condition (input condition) that the user (Controller) turns the zero reset completion signal (ZEROSTAT signal) from the displacement sensor OFF.

I/O port name	Signal	Signal name	Function
Command	Command code	Command code	Stores the command code.
Command Parameter 1 to 3	Parameter 1-3	Command parameter	Stores the command parameter.

Note

- In the FUNC mode, control signals other than ERCLR and LIGHTOFF cannot be executed.
- Multiple control signals cannot be executed in the same cycle. Note, however, that when zero reset execution/ cancellation are performed simultaneously on multiple tasks, ZERO_T1 to 4 and ZEROCLR_T1 to 4 can be executed in the same cycle. Also, all control signals can be executed in the same cycle on ERCLR and LIGHTOFF.
- When the status of control signals differs from that of the input status of parallel I/O, processing is executed of one of the statuses is ON.
- SYNC can be used only in EtherCAT communications. It cannot be used in EtherNet/IP communications.

● I/O ports of response area

Displacement sensor (slave) → Controller (master)

I/O port name	Signal	Signal name	Function
Sensor Head Status Signal1		Sensor Head Status Signal1	
FLG	FLG	Control command completion	Turns ON when the displacement sensor completes control command execution. (Turns ON after the control command code, response code and response status are stored.)
			Automatically turns OFF if the control command execution signal (EXE signal) from the user (Controller) turns OFF.
SYNCFLG	SYNCFLG	Measurement synchronization completion	Turns ON when the displacement sensor executes measurement synchronization processing and the state changes to one where normal measured values can be output.
			Automatically turns OFF if the measurement synchronization signal (SYNC signal) from the user (Controller) turns OFF.
READY	READY	Ready	Turns OFF when the displacement sensor cannot execute control commands or measurement synchronization processing.
			Turns ON when the displacement sensor can execute control commands or measurement synchronization processing.
SEQUENCE	SEQUENCE	Measurement execution status	Turns ON from OFF when the Vision Sensor starts to capture at the timing of the Sync0 of EtherCAT.
			Turns OFF from ON when the output processing which outputs the measurement result to the output area is completed.
RUN	RUN	Run screen	Turns ON when the displacement sensor is in the RUN mode.
			Turns OFF when the displacement sensor is in the FUNC mode.
ERR	ERR	Error	Turns ON when a displacement sensor error is detected.
			Turns OFF when the displacement sensor is normal. After it turns ON, it never turns OFF until the error clear signal (ERCLR signal) from the user (Controller) turns ON.
BANKOUT_A to E	BANKOUT_A to E	Current bank number	This outputs the currently specified bank number. It expresses the bank number in combinations of BANKOUTx_A to E. (For details of combinations, see **Note** .)

I/O port name	Signal	Signal name	Function
Sensor Head Status Signal2		Sensor Head Status Signal2	
HOLDSTAT	HOLDSTAT	Hold execution status	Turns ON when the displacement sensor is in the hold sampling period.
			Turns OFF when the displacement sensor is outside the hold sampling period.
RESETSTAT	RESETSTAT	Reset execution state	Turns ON when the displacement sensor is in the reset execution state.
			Turns OFF when the displacement sensor is in the reset non-execution state.
LIGHT	LIGHT	Logical beam lighting state	Turns ON when the logical beam is lit.
			Turns OFF when the logical beam is out.
STABILITY	STABILITY	Measurement position	Turns ON when the measured value is in the measuring range.
			Turns OFF when the measured value is outside the measuring range.
ENABLE	ENABLE	Measurement state	Turns ON when the displacement sensor is ready for measurement.
			Turns OFF when the displacement sensor cannot measure (excessive or insufficient received light, outside measuring range, Calibration ROM not mounted, during FUNC mode non-measurement).
GATE	GATE	Data output completed	Turns ON when the displacement sensor completes control data output when hold is set.
			The displacement sensor automatically turns OFF one Gate period after turning ON.
OR	OR	Overall judgment result	Turns ON when even one of the judgment result of the displacement sensor TASK1 to 4 is other than PASS.
			Turns OFF when all of the judgment result of the displacement sensor TASK1 to 4 is PASS.
HIGH_T1 to 4	HIGH_T1-4	HIGH output	Turns ON when the judgment result of the displacement sensor TASK1 to 4 is HIGH (HIGH threshold < measured value).
			Turns OFF when the judgment result of the displacement sensor TASK1 to 4 is other than HIGH.
PASS_T1 to 4	PASS_T1-4	PASS Output	Turns ON when the judgment result of the displacement sensor TASK1 to 4 is PASS (LOW threshold ≤ measured value ≤HIGH threshold).
			Turns OFF when the judgment result of the displacement sensor TASK1 to 4 is other than PASS.
LOW_T1 to 4	LOW_T1-4	LOW output	Turns ON when the judgment result of the displacement sensor TASK1 to 4 is LOW (LOW threshold > measured value).
			Turns OFF when the judgment result of the displacement sensor TASK1 to 4 is other than LOW.
ZEROSTAT_T1 to 4	ZEROSTAT_T1-4	Zero reset state	Turns ON when the displacement sensor TASK1 to 4 is in the zero reset execution state.
			Turns OFF when the displacement sensor TASK1 to 4 is in the zero reset non-execution state.
TASKSTAT_T1 to 4	TASK_STATUS1-4	TASK status	Turns ON when the measurement data is finalized for each TASK1 to 4.
Response	Command code	Command code	The executed command code is returned.
Response Code	Response code	Response code	The response code of the executed command is stored.
Response Data	Response data	Response data	The response data of the executed command is stored.

Note

- The results of processing execution by parallel I/O also are reflected in the status signals.
- The table below shows the combinations of bank numbers and BANKOUTx_A to E.
  (BANK9 to 32 are used only in the judgment value mode. In the normal mode, BANKOUTx_D to E are OFF at all times.)

Bank number	BANKOUTx_A	BANKOUTx_B	BANKOUTx_C	BANKOUTx_D	BANKOUTx_E
BANK1	OFF	OFF	OFF	OFF	OFF
BANK2	ON	OFF	OFF	OFF	OFF
BANK3	OFF	ON	OFF	OFF	OFF
BANK4	ON	ON	OFF	OFF	OFF
BANK5	OFF	OFF	ON	OFF	OFF
BANK6	ON	OFF	ON	OFF	OFF
BANK7	OFF	ON	ON	OFF	OFF
BANK8	ON	ON	ON	OFF	OFF
BANK9	OFF	OFF	OFF	ON	OFF
BANK10	ON	OFF	OFF	ON	OFF
BANK11	OFF	ON	OFF	ON	OFF
BANK12	ON	ON	OFF	ON	OFF
BANK13	OFF	OFF	ON	ON	OFF
BANK14	ON	OFF	ON	ON	OFF
BANK15	OFF	ON	ON	ON	OFF
BANK16	ON	ON	ON	ON	OFF
BANK17	OFF	OFF	OFF	OFF	ON
BANK18	ON	OFF	OFF	OFF	ON
BANK19	OFF	ON	OFF	OFF	ON
BANK20	ON	ON	OFF	OFF	ON
BANK21	OFF	OFF	ON	OFF	ON
BANK22	ON	OFF	ON	OFF	ON
BANK23	OFF	ON	ON	OFF	ON
BANK24	ON	ON	ON	OFF	ON
BANK25	OFF	OFF	OFF	ON	ON
BANK26	ON	OFF	OFF	ON	ON
BANK27	OFF	ON	OFF	ON	ON
BANK28	ON	ON	OFF	ON	ON
BANK29	OFF	OFF	ON	ON	ON
BANK30	ON	OFF	ON	ON	ON
BANK31	OFF	ON	ON	ON	ON
BANK32	ON	ON	ON	ON	ON

● I/O ports of output area

Displacement sensor (slave) → Controller (master)

I/O port name	Signal	Signal name	Size of output data	Function
Output Data1	Output Data1	OUT1 data	4 bytes	The Measurement result of OUT1 is output.
Output Data2	Output Data2	OUT2 data	4 bytes	The Measurement result of OUT2 is output.
Output Data3	Output Data3	OUT3 data	4 bytes	The Measurement result of OUT3 is output.
Output Data4	Output Data4	OUT4 data	4 bytes	The Measurement result of OUT4 is output.

● I/O ports of sysmac error status area

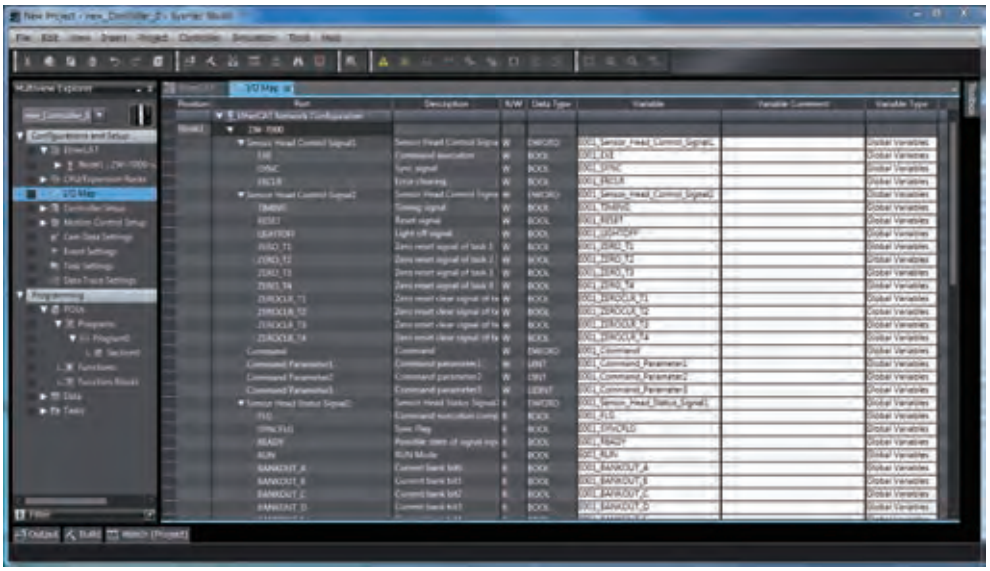
Displacement sensor (slave) → Controller (master)
The Sysmac error status is mapped only when the connection destination is the NX/NJ series.

I/O port name		Signal	Signal name	Function
Sysmac Error Status		Sysmac Error Status	Sysmac error status	Indicates the Sysmac error status.
	Observation	Observation	Monitor error	Turns ON when a monitor error occurs on the displacement sensor.
	Minor Fault	Minor Fault	Light fault level error	Turns ON when a light fault level error occurs on the displacement sensor.

Assigning Device Variables to I/O Ports (PDO Mapping)

When connected to an NX/NJ-series CPU Unit, the data for PDO communications in the Vision Sensor is displayed with I/O port names on the Sysmac Studio. You can assign device variables to the I/O ports in the Sysmac Studio I/O map to perform programming and monitoring.

▶ Multi View Explore (Connected to NX/NJ-series CPU Unit): [Configurations and Setup] | [I/O Map] (Double-click)



Right-click a slave or I/O port in the I/O map and select [Create Device Variable]. The device variable name is automatically created as a combination of the device name and the I/O port name. You can also select an I/O port and enter a variable name in the [Variable] column.

You can also select a registered variable from the variable table to use as a device variable. Refer to the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504) for details on registering device variables.

When the connection destination is a CJ series PLC

This section describes the respective area assignments of the instruction area, response area and output area.

● Instruction area

PLC (master) → Displacement sensor (slave)

Top channel	Bit																Description
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
+0	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	SYNC	EXE	Sensor Head Control signal1 (32bit)
+1	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	ERCLR	
+2	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	LIGHT OFF	RESET	TIMING	Sensor Head Control signal2 (32bit)
+3	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	ZERO-CLR_T4	ZERO-CLR_T3	ZERO-CLR_T2	ZERO-CLR_T1	ZERO_T4	ZERO_T3	ZERO_T2	ZERO_T1	
+4	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Data (parameter) (32bit)
+5	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	
+6	Command code																Command code (32bit)
+7																	
+8	Parameter 1																Data (parameter1) (16bit)
+9	Parameter 2																Data (parameter2) (16bit)
+10	Parameter 3																Data (parameter3) (32bit)
+11																	

Signal	Signal name	Function
EXE	Control command execution	Turns ON when the user (PLC) instructs execution of control commands to the displacement sensor. (Turns ON after the control command code and parameters are set.)
		Is returned to OFF on condition (input condition) that the user (PLC) turns the control command completion signal (FLG signal) from the displacement sensor ON.
SYNC*	Measurement synchronous start	Turns ON when the user (Controller) instructs measurement synchronization to the displacement sensor.
		Is returned to OFF on condition (input condition) that the user (Controller) turns the measurement synchronization completion signal (SYNCFLG signal) ON.
ERCLR	Error clear	Turns ON when the displacement sensor error signal (ERR signal) turns OFF.
		Is returned to OFF on condition (input condition) that the user (PLC) turns the error signal (ERR signal) OFF.
TIMING	Timing	Turns ON when the user (PLC) instructs start of hold sampling to the displacement sensor.
		Turns OFF when the user (PLC) instructs end of hold sampling to the displacement sensor.
RESET	Reset	Turns ON when the user (PLC) instructs judgment processing and output reset to the displacement sensor. If the hold function is used, the state in effect before the hold function was set will be restored.
		Turns OFF when the user (PLC) ends judgment processing and output reset to the displacement sensor.

Signal	Signal name	Function
LIGHTOFF	Light metering OFF	Turns ON when the user (PLC) instructs logical beam OFF to the displacement sensor.
		Turns OFF when the user (PLC) instructs logical beam ON to the displacement sensor.
ZERO_T1 to 4	Zero reset execution	Turns ON when the user (PLC) instructs execution of zero reset of TASK1 to 4 to the displacement sensor.
		Is returned to OFF on condition (input condition) that the user (PLC) turns the zero reset completion signal (ZEROSTAT signal) from the displacement sensor ON.
ZEROCLR_T1 to 4	Zero reset cancel	Turns ON when the user (PLC) instructs zero reset cancel of TASK1 to 4 to the displacement sensor.
		Is returned to OFF on condition (input condition) that the user (PLC) turns the zero reset completion signal (ZEROSTAT signal) from the displacement sensor OFF.
Command code	Command code	Stores the command code.
Parameter 1-3	Command parameter	Stores the command parameter.

* SYNC signal's area is disabled in External synchronous measurement mode.

Note

- In the FUNC mode, control signals other than ERCLR and LIGHTOFF cannot be executed.
- Multiple control signals cannot be executed in the same cycle. Note, however, that when zero reset execution/ cancellation are performed simultaneously on multiple tasks, ZERO_T1 to 4 and ZEROCLR_T1 to 4 can be executed in the same cycle.
- When the status of control signals differs from that of the input status of parallel I/O, processing is executed of one of the statuses is ON.
- TRIG input signal, which is newly added to the ZW-8000/7000/5000 can be controlled from I/O signals. The input from PDO map is not possible.

● Response area

Displacement sensor (slave) → PLC (master)

Top channel	Bit																Description
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
+0	BANK1_E	BANK1_D	BANK1_C	BANK1_B	BANK1_A	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	RUN	SEQUENCE	READY	SYNC FLG	FLG	Sensor Head Status signal1 Reserved
+1	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	ERR	
+2	Reserved	Reserved	Reserved	Reserved	TASKSTAT_T4	TASKSTAT_T3	TASKSTAT_T2	TASKSTAT_T1	Reserved	OR	GATE	ENABLE	STABILITY	LIGHT	RESET STAT	HOLD STAT	Sensor Head Status signal2 (32bit)
+3	LOW_T4	PASS_T4	HIGH_T4	LOW_T3	PASS_T3	HIGH_T3	LOW_T2	PASS_T2	HIGH_T2	LOW_T1	PASS_T1	HIGH_T1	ZERO STAT_T4	ZERO STAT_T3	ZERO STAT_T2	ZERO STAT_T1	
+4	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Data (parameter) (32bit)
+5	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	
+6	Command code																Response code (32bit)
+7																	
+8	Response code																Response data (32bit)
+9																	
+10	Response data																
+11																	

Signal	Signal name	Function
FLG	Control command completion	Turns ON when the displacement sensor completes control command execution. (Turns ON after the control command code, response code and response status are stored.)
		Automatically turns OFF if the control command execution signal (EXE signal) from the user (PLC) turns OFF.
SYNCFLG*	Measurement synchronization completion	Turns ON when the displacement sensor executes measurement synchronization processing and the state changes to one where normal measured values can be output.
		Automatically turns OFF if the measurement synchronization signal (SYNC signal) from the user (Controller) turns OFF.
READY	Ready	Turns OFF when the displacement sensor cannot execute control commands or measurement synchronization processing.
		Turns ON when the displacement sensor can execute control commands or measurement synchronization processing.
SEQUENCE	Measurement execution status	Turns ON from OFF or OFF from ON when the measurement results from sync0 of EtherCAT are reflected in the PDO data of EtherCAT while in PDO synchronized mode.
RUN	Run screen	Turns ON when the displacement sensor is in the RUN mode.
		Turns OFF when the displacement sensor is in the FUNC mode.
ERR	Error	Turns ON when a displacement sensor error is detected.
		Turns OFF when the displacement sensor is normal. After it turns ON, it never turns OFF until the error clear signal (ERCLR signal) from the user (Controller) turns ON.
BANKOUT_A to E	Current bank number	This outputs the currently specified bank number. It expresses the bank number in combinations of BANKOUTx_A to E. (For details of combinations, see Reference.)
HOLDSTAT	Hold execution status	Turns ON when the displacement sensor is in the hold sampling period.
		Turns OFF when the displacement sensor is outside the hold sampling period.
RESETSTAT	Reset execution state	Turns ON when the displacement sensor is in the reset execution state.
		Turns OFF when the displacement sensor is in the reset non-execution state.
LIGHT	Logical beam lighting state	Turns ON when the logical beam is lit.
		Turns OFF when the logical beam is out.
STABILITY	Measurement position	Turns ON when the measured value is in the measuring range.
		Turns OFF when the measured value is outside the measuring range.
ENABLE	Measurement state	Turns ON when the displacement sensor is ready for measurement.
		Turns OFF when the displacement sensor cannot measure (excessive or insufficient received light, outside measuring range, Calibration ROM not mounted, during FUNC mode non-measurement).
GATE	Data output completed	Turns ON when the displacement sensor completes control data output when hold is set.
		The displacement sensor automatically turns OFF one Gate period after turning ON.
OR	Overall judgment result	Turns ON when even one of the judgment result of the displacement sensor TASK1 to 4 is other than PASS.
		Turns OFF when all of the judgment result of the displacement sensor TASK1 to 4 is PASS.
HIGH_T1-4	HIGH output	Turns ON when the judgment result of the displacement sensor TASK1 to 4 is HIGH (HIGH threshold < measured value).
		Turns OFF when the judgment result of the displacement sensor TASK1 to 4 is other than HIGH.

Signal	Signal name	Function
PASS_T1-4	PASS Output	Turns ON when the judgment result of the displacement sensor TASK1 to 4 is PASS (LOW threshold ≤ measured value ≤ HIGH threshold).
		Turns OFF when the judgment result of the displacement sensor TASK1 to 4 is other than PASS.
LOW_T1-4	LOW output	Turns ON when the judgment result of the displacement sensor TASK1 to 4 is LOW (LOW threshold > measured value).
		Turns OFF when the judgment result of the displacement sensor TASK1 to 4 is other than LOW.
ZEROSTAT_T1-4	Zero reset state	Turns ON when the displacement sensor TASK1 to 4 is in the zero reset execution state.
		Turns OFF when the displacement sensor TASK1 to 4 is in the zero reset non-execution state.
TASKSTAT_T1-4	TASK status	Turns ON when the measurement data is finalized for each TASK.
Command code	Command code	The executed command code is returned.
Response code	Response code	The response code of the executed command is stored.
Response data	Response data	The response data of the executed command is stored.

* SYNC signal's area is disabled in External synchronous measurement mode.

Note

- The results of processing execution by parallel I/O also are reflected in the status signals.
- The table below shows the combinations of bank numbers and BANKOUTx_A to E.
  (BANK9 to 32 are used only in the judgment value mode. In the normal mode, BANKOUTx_D to E are OFF at all times.)

Bank number	BANKOUTx_A	BANKOUTx_B	BANKOUTx_C	BANKOUTx_D	BANKOUTx_E
BANK1	OFF	OFF	OFF	OFF	OFF
BANK2	ON	OFF	OFF	OFF	OFF
BANK3	OFF	ON	OFF	OFF	OFF
BANK4	ON	ON	OFF	OFF	OFF
BANK5	OFF	OFF	ON	OFF	OFF
BANK6	ON	OFF	ON	OFF	OFF
BANK7	OFF	ON	ON	OFF	OFF
BANK8	ON	ON	ON	OFF	OFF
BANK9	OFF	OFF	OFF	ON	OFF
BANK10	ON	OFF	OFF	ON	OFF
BANK11	OFF	ON	OFF	ON	OFF
BANK12	ON	ON	OFF	ON	OFF
BANK13	OFF	OFF	ON	ON	OFF
BANK14	ON	OFF	ON	ON	OFF
BANK15	OFF	ON	ON	ON	OFF
BANK16	ON	ON	ON	ON	OFF
BANK17	OFF	OFF	OFF	OFF	ON
BANK18	ON	OFF	OFF	OFF	ON
BANK19	OFF	ON	OFF	OFF	ON
BANK20	ON	ON	OFF	OFF	ON
BANK21	OFF	OFF	ON	OFF	ON
BANK22	ON	OFF	ON	OFF	ON
BANK23	OFF	ON	ON	OFF	ON
BANK24	ON	ON	ON	OFF	ON
BANK25	OFF	OFF	OFF	ON	ON
BANK26	ON	OFF	OFF	ON	ON
BANK27	OFF	ON	OFF	ON	ON
BANK28	ON	ON	OFF	ON	ON
BANK29	OFF	OFF	ON	ON	ON
BANK30	ON	OFF	ON	ON	ON
BANK31	OFF	ON	ON	ON	ON
BANK32	ON	ON	ON	ON	ON

● **Output area**

Displacement sensor (slave) → PLC (master)

Top channel	Bit																Description
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
+0	Output Data 1																Output data 0 (32bit)
+1																	
+2	Output Data 2																Output data 1 (32bit)
+3																	
+4	Output Data 3																Output data 2 (32bit)
+5																	
+6	Output Data 4																Output data 3 (32bit)
+7																	

Signal	Signal name	Function
Output Data1	OUT1 data	The Measurement result of OUT1 is output.
Output Data2	OUT2 data	The Measurement result of OUT2 is output.
Output Data3	OUT3 data	The Measurement result of OUT3 is output.
Output Data4	OUT4 data	The Measurement result of OUT4 is output.

Note

For assigning of OUT1 to OUT4, refer to the following:

Refer to Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362) "4-5 I/O Settings".

I/O Memory Assignment Method (PDO Mapping)

If you connect the Displacement Sensor to a CJ-series PLC, the OMRON CJ1W-NC□82 Position Control Unit is used as the EtherCAT master. This section describes the assignments in the I/O memory of the PLC for the Command, Response, and Data Output Areas for the Vision Sensor.
The areas for the Vision Sensor correspond to the areas for the Position Control Unit as shown in the following table.

Vision Sensor area	Position Control Unit area	Maximum number of words
Command area	Remote I/O Output Memory Area	12
Response area	Remote I/O Input Memory Area	12
Output area	Remote I/O Input Memory Area	8

The I/O memory assignment method is described below.

1. Network Settings

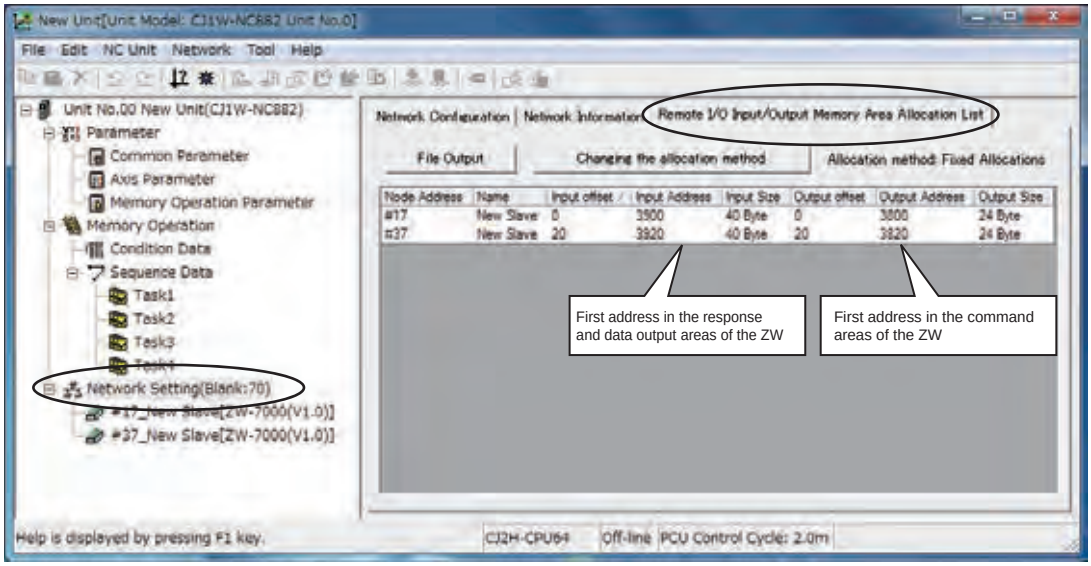
Double-click [I/O Table and Unit Setup] in the CX-Programmer, right-click CJ1W-NC□82, and select [Edit SIO Unit Parameters].

2. Setting Common Parameters

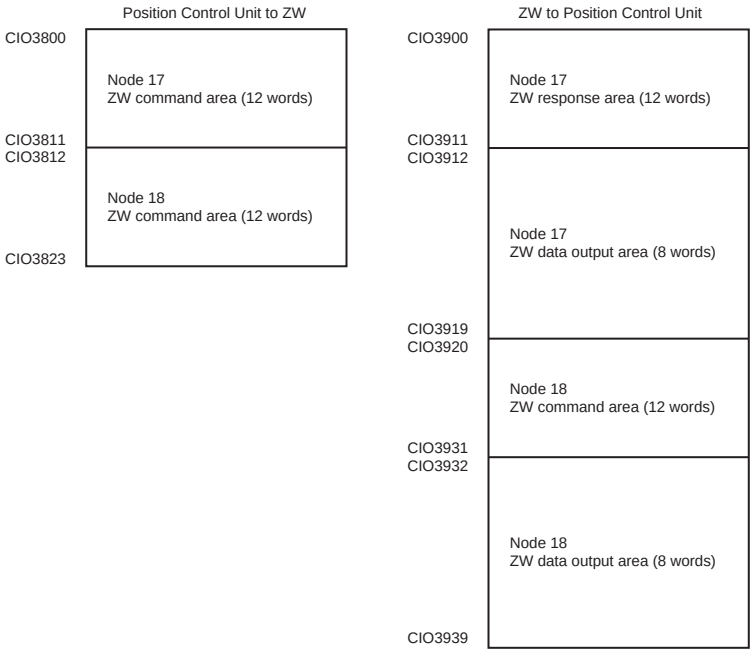
The Support Software for Position Control Units will start. Set the areas and the first words for the Remote I/O Output Memory Area, the Axis Status Memory Area, and the Remote I/O Input Memory Area.

3. Checking the Remote I/O Area

Select [Network] and then click the [Remote I/O Assignment] Tab to check the I/O addresses that are set for remote I/O. (You can manually change the input offset and output offset.) In the following example, CIO 3800 is set as the first word of the remote I/O output area and CIO 3900 is set as the first word of the remote I/O input area.



In the case in the figure above, the memory map will be as follows.



Refer to the *CJ-series Position Control Units Operation Manual* (Cat. No. W487) for details on I/O memory assignment methods.

If you connect more than one ZW Sensor to an OMRON Position Control Unit, the following addresses in the memory map are assigned in order for the I/O areas.
Set the node address setting switches on the Sensors to 0 to automatically set up the network. Node addresses 17 and higher will be automatically set for the remote I/O.

For the Position Control Unit, the areas are set only for node 17 (which has the first area for each of the three memory areas).
To access data from another node from a ladder program, add the correct offset from the first word of the first area for node 17 and access the resulting address.

Command List

This list explains each of the commands used by EtherCAT.

● Utility commands

Command area Top channel (Hex)		Command name	Function	Reference (Pages)
+7	+6			
0010	3011	Data save	Saves the current system data and bank data to the main unit.	p.67
0010	E000	Sensor Head calibration	Calibrate the Sensor Head.	p.68
0010	F010	Restart	Restarts the displacement sensor.	p.68

● Bank control command

Command area Top channel (Hex)		Command name	Function	Reference (Pages)
+7	+6			
0030	8000	Current bank settings	Replace the current bank number by the specified bank number.	p.69

● Data acquisition/setting commands

Command area Top channel (Hex)		Command name	Function	Reference (Pages)
+7	+6			
0040	1000	Processing unit data acquisition	Acquires the measurement data and setting data of the processing unit.	p.71
0050	1000	Processing unit data setting	Change the setting data of the processing unit.	p.72
0040	4000	System data acquisition	Acquires the system data.	p.73
0050	4000	System data settings	Sets the system data.	p.74

Command details

● Data save (command code: 3011 0010)

Command (Controller → displacement sensor)

Command area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	0011	0000	0001	0001	Command code (32-bit)
+7	0000	0000	0001	0000	

Response (Controller ← displacement sensor)

Response area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	0011	0000	0001	0001	Command code (32-bit) Stores the command code targeted for a response.
+7	0000	0000	0001	0000	
+8	0000	0000	0000	0000	Response code (32-bit) Command execution result OK
+9	0000	0000	0000	0000	
+8	0000	0000	0000	0001	Response code (32-bit) Command execution result NG (no corresponding command)
+9	1111	1111	1111	1111	
+8	0000	0000	0000	0010	Response code (32-bit) Command execution result NG (wrong parameter)
+9	1111	1111	1111	1111	
+8	0000	0000	0000	0100	Response code (32-bit) Command execution result NG (processing execution error)
+9	1111	1111	1111	1111	
+8	0000	0000	0000	1000	Response code (32-bit) Command execution result NG (mode error)
+9	1111	1111	1111	1111	

● Sensor head calibration (command code: E000 0010)

Command (Controller → displacement sensor)

Command area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	1110	0000	0000	0000	Command code (32-bit)
+7	0000	0000	0001	0000	

Response (Controller ← displacement sensor)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	1110	0000	0000	0000	Command code (32-bit) Stores the command code targeted for a response.
+7	0000	0000	0001	0000	
+8	0000	0000	0000	0000	Response code (32-bit) Command execution result OK
+9	0000	0000	0000	0000	

+8	0000	0000	0000	0001	Response code (32-bit) Command execution result NG (no corresponding command)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	0010	Response code (32-bit) Command execution result NG (wrong parameter)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	0100	Response code (32-bit) Command execution result NG (processing execution error)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	1000	Response code (32-bit) Command execution result NG (mode error)
+9	1111	1111	1111	1111	

● Restart (command code: F010 0010)

Command (Controller → displacement sensor)

Command area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	1111	0000	0001	0000	Command code (32-bit)
+7	0000	0000	0001	0000	

Response (Controller ← displacement sensor)

Response area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
There is no response since the Controller is restarted.					

● Current bank setting (command code: 8000 0030)

Command (Controller → displacement sensor)

Command area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	1000	0000	0000	0000	Command code (32-bit)
+7	0000	0000	0011	0000	
+8	0000	0000	0000	0000	Bank number (16-bit: value obtained by subtracting 1 from bank number) **Note** This is set to 0 when bank 1 is switched to.

Response (Controller ← displacement sensor)

Response area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	1000	0000	0000	0000	Command code (32-bit) Stores the command code targeted for a response.
+7	0000	0000	0011	0000	
+8	0000	0000	0000	0000	Response code (32-bit) Command execution result OK
+9	0000	0000	0000	0000	

+8	0000	0000	0000	0001	Response code (32-bit) Command execution result NG (no corresponding command)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	0010	Response code (32-bit) Command execution result NG (wrong parameter)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	0100	Response code (32-bit) Command execution result NG (processing execution error)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	1000	Response code (32-bit) Command execution result NG (mode error)
+9	1111	1111	1111	1111	

Response (Controller ← displacement sensor)

Response area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	1000	0000	0000	0000	Command code (32-bit) Stores the command code targeted for a response.
+7	0000	0000	0011	0000	
+8	0000	0000	0000	0000	Response code (32-bit) Command execution result OK
+9	0000	0000	0000	0000	

+8	0000	0000	0000	0001	Response code (32-bit) Command execution result NG (no corresponding command)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	0010	Response code (32-bit) Command execution result NG (wrong parameter)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	0100	Response code (32-bit) Command execution result NG (processing execution error)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	1000	Response code (32-bit) Command execution result NG (mode error)
+9	1111	1111	1111	1111	

● **Processing unit data acquisition (command code: 1000 0040)**

Command (Controller → displacement sensor)

Command area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	0001	0000	0000	0000	Command code (32-bit)
+7	0000	0000	0100	0000	
+8	0000	0000	0000	0000	Unit number (16-bit) 8-1 Processing Item Data List p.202
+9	0000	0000	0000	0000	Data number (16-bit) 8-1 Processing Item Data List p.202

Response (Controller ← displacement sensor)

Response area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	0001	0000	0000	0000	Command code (32-bit) Stores the command code targeted for a response.
+7	0000	0000	0100	0000	
+8	0000	0000	0000	0000	Response code (32-bit) Command execution result OK
+9	0000	0000	0000	0000	
+10	0000	0000	0000	0000	Response data (32-bit) Acquired data
+11	0000	0000	0000	0000	

+8	0000	0000	0000	0001	Response code (32-bit) Command execution result NG (no corresponding command)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	0010	Response code (32-bit) Command execution result NG (wrong parameter)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	0100	Response code (32-bit) Command execution result NG (processing execution error)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	1000	Response code (32-bit) Command execution result NG (mode error)
+9	1111	1111	1111	1111	

● Processing unit data setting (command code: 1000 0050)

Command (Controller → displacement sensor)

Command area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	0001	0000	0000	0000	Command code (32-bit)
+7	0000	0000	0101	0000	
+8	0000	0000	0000	0000	Unit number (16-bit) 8-1 Processing Item Data List p.202
+9	0000	0000	0000	0000	Data number (16-bit) 8-1 Processing Item Data List p.202
+10	0000	0000	0000	0000	Setting data (UDINT)
+11	0000	0000	0000	0000	

Response (Controller ← displacement sensor)

Response area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	0001	0000	0000	0000	Command code (32-bit) Stores the command code targeted for a response.
+7	0000	0000	0101	0000	
+8	0000	0000	0000	0000	Response code (32-bit) Command execution result OK
+9	0000	0000	0000	0000	

+8	0000	0000	0000	0001	Response code (32-bit) Command execution result NG (no corresponding command)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	0010	Response code (32-bit) Command execution result NG (wrong parameter)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	0100	Response code (32-bit) Command execution result NG (processing execution error)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	1000	Response code (32-bit) Command execution result NG (mode error)
+9	1111	1111	1111	1111	

● **System data acquisition (command code: 4000 0040)**

Command (Controller → displacement sensor)

Command area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	0100	0000	0000	0000	Command code (32-bit)
+7	0000	0000	0100	0000	
+8	0000	0000	0000	0000	See data number (16-bit). 8-2 System data list p.212

Response (Controller ← displacement sensor)

Response area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	0100	0000	0000	0000	Command code (32-bit) Stores the command code targeted for a response.
+7	0000	0000	0100	0000	
+8	0000	0000	0000	0000	Response code (32-bit) Command execution result OK
+9	0000	0000	0000	0000	
+10	0000	0000	0000	0000	Response data (32-bit) Acquired data
+11	0000	0000	0000	0000	

+8	0000	0000	0000	0001	Response code (32-bit) Command execution result NG (no corresponding command)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	0010	Response code (32-bit) Command execution result NG (wrong parameter)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	0100	Response code (32-bit) Command execution result NG (processing execution error)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	1000	Response code (32-bit) Command execution result NG (mode error)
+9	1111	1111	1111	1111	

● System data setting (command code: 4000 0050)

Command (Controller → displacement sensor)

Command area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	0100	0000	0000	0000	Command code (32-bit)
+7	0000	0000	0101	0000	
+8	0000	0000	0000	0000	Data number (16-bit) 8-2 System data list p.212
+9	0000	0000	0000	0000	Fixed at “0”
+10	0000	0000	0000	0000	Setting data (32-bit)
+11	0000	0000	0000	0000	

Response (Controller ← displacement sensor)

Response area Top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+6	0100	0000	0000	0000	Command code (32-bit) Stores the command code targeted for a response.
+7	0000	0000	0101	0000	
+8	0000	0000	0000	0000	Response code (32-bit) Command execution result OK
+9	0000	0000	0000	0000	

+8	0000	0000	0000	0001	Response code (32-bit) Command execution result NG (no corresponding command)
+9	1111	1111	1111	1111	

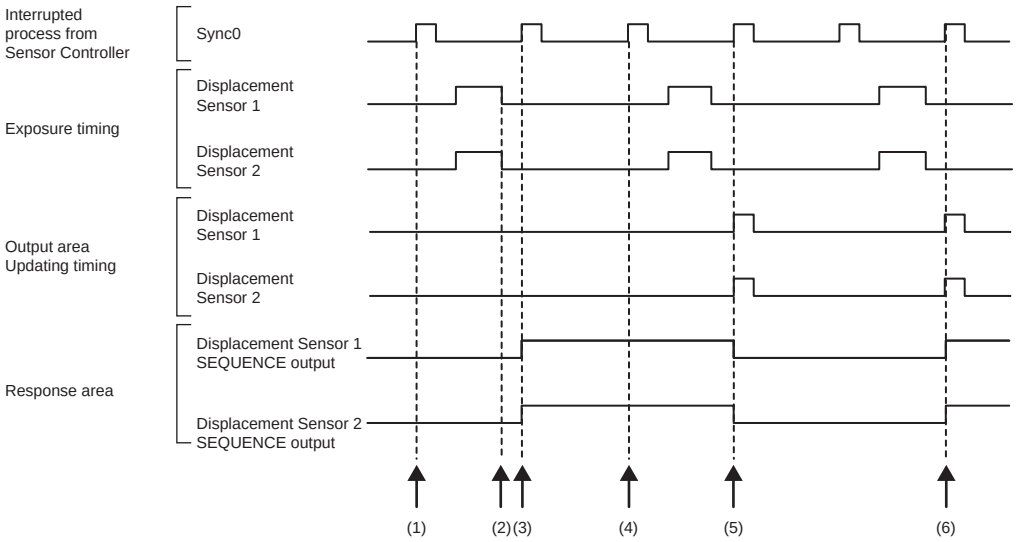
+8	0000	0000	0000	0010	Response code (32-bit) Command execution result NG (wrong parameter)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	0100	Response code (32-bit) Command execution result NG (processing execution error)
+9	1111	1111	1111	1111	

+8	0000	0000	0000	1000	Response code (32-bit) Command execution result NG (mode error)
+9	1111	1111	1111	1111	

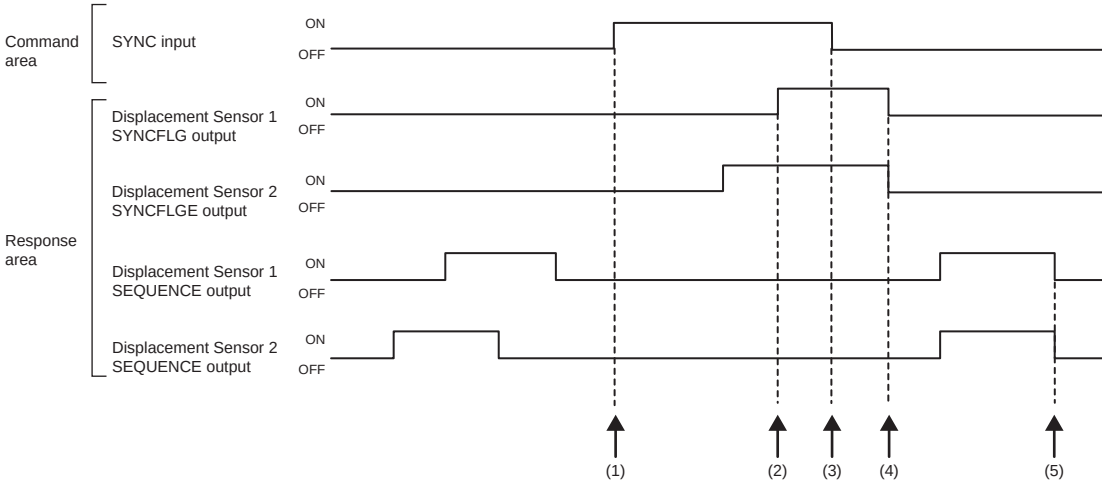
Timing Chart (EtherCAT)

● **Basic operation of PDO synchronized mode**



(1) Controller sends the interrupted process of Sync0.
(2) All of the Displacement Sensors which receives the signal of step 1 start to measure in synchronization with the Exposure end timing.
(3) When the Displacement Sensor receives the next interrupted process of Sync0, turns the SEQUENCE output ON from OFF.
(4) When the Displacement Sensor receives the interrupted process of Sync0 which is immediately after the completion of the measurement process, all of the Displacement Sensor start to the next measurement. At that time, SEQUENCE output has held ON.
(5) When updates the measurement result of the step 2. the Displacement Sensor turns the SEQUENCE output OFF from ON.
(6) When all of the Displacement Sensors start the measurement when receive the interrupted process of Sync0 while the SEQUENCE output has held OFF, turns SEQUENCE output ON from OFF at the received timing of the next interrupted process of Sync0.

When the ON/OFF switching timing of the SEQUENCE output differs between Displacement Sensor 1 and Displacement Sensor 2, synchronization may be deviating, so turn the SYNC input to ON from OFF and execute synchronous measurement.



(1) The Controller changes the state of the SYNC input signal from OFF to ON.
(2) Synchronization of the displacement sensor ends.
(3) The Controller makes sure that the SYNCFLG output signal has turned ON, and then changes the state of the SYNC input signal from ON to OFF.
(4)The Displacement Sensor makes sure that the SYNC input signal has turned OFF, and then automatically changes the state of the SYNCFLG output signal to OFF.
(5) The rising edge and falling edge of the SEQUENCE signal of the Displacement Sensor are synchronized.

Important

- Set the all of the Displacement Sensor's Measurement cycle to same.
- When the Synchronization of the Exposure start timing is necessary, set the Exposure mode to Manual.
- The delay of the PDO communication cycle when from the Displacement Sensor starts the measurement after receiving of the interrupted process of Sync0 until sends the measurement result to output area is the following:
  The cycle is while SEQUENCE output is turned ON + 1 cycle
  When you need the synchronization with a data which except the Displacement Sensor slave output, refer to this values.
- If PDO communication is not started while all Displacement Sensors are set the same and measurement is possible, synchronization may deviate (the SEQUENCE signal ON/OFF switching timings differ). In this case, the Controller needs to turn the SYNC input signal from OFF to ON to OFF and execute synchronous measurement. In PDO synchronized mode, even if the SYNC input signal is turned to ON from OFF< the TASKSTAT signal does not turn OFF.
- A synchronous delay may be occurred during run mode depending on the combination of the PDO communication cycle and the measurement cycle of the Displacement Sensor. To avoid these delay, consider 2 cycles of the PDO communication and measurement by referring the below table.
  Additionally, we recommend that you to check all of the Displacement Sensors are set the SEQUENCE output timing to same.

Note

Refer to the following information for measurement cycles without occurrences of synchronization deviation.

■ ZW-7000□/5000□

Cycle delay of the PDO communi-cation	PDO communication cycle (us)							
	125	250	500	750	1000	1250	1500	1750
2 cycle	35 or shorter	160 or shorter	410 or shorter	660 or shorter	910 or shorter	1160 or shorter	1410 or shorter	1660 or shorter
3 cycle	85 to 160	210 to 410	460 to 910	710 to 1410	960 to 1600	1210 to 1600	1460 to 1600	–
4 cycle	210 to 285	460 to 660	960 to 1410	1460 to 1600	–	–	–	–
5 cycle	335 to 410	710 to 910	1460 to 1600	–	–	–	–	–
6 cycle	460 to 535	960 to 1160	–	–	–	–	–	–
7 cycle	585 to 660	1210 to 1410	–	–	–	–	–	–
8 cycle	710 to 785	1460 to 1600	–	–	–	–	–	–
9 cycle	835 to 910	–	–	–	–	–	–	–
10 cycle	960 to 1035	–	–	–	–	–	–	–
11 cycle	1085 to 1160	–	–	–	–	–	–	–
12 cycle	1210 to 1285	–	–	–	–	–	–	–
13 cycle	1335 to 1410							
14 cycle	1460 to 1535	–	–	–	–	–	–	–
15 cycle	1585 to 1660	–	–	–	–	–	–	–

- Descried as – means a condition which any measurement cycle delays do not occur.
- There is no condition which the PDO communication cycle delay until the output area is updated becomes 1 cycle.

Note

Refer to the following information for measurement cycles without occurrences of synchronization deviation.

■ ZW-8000□

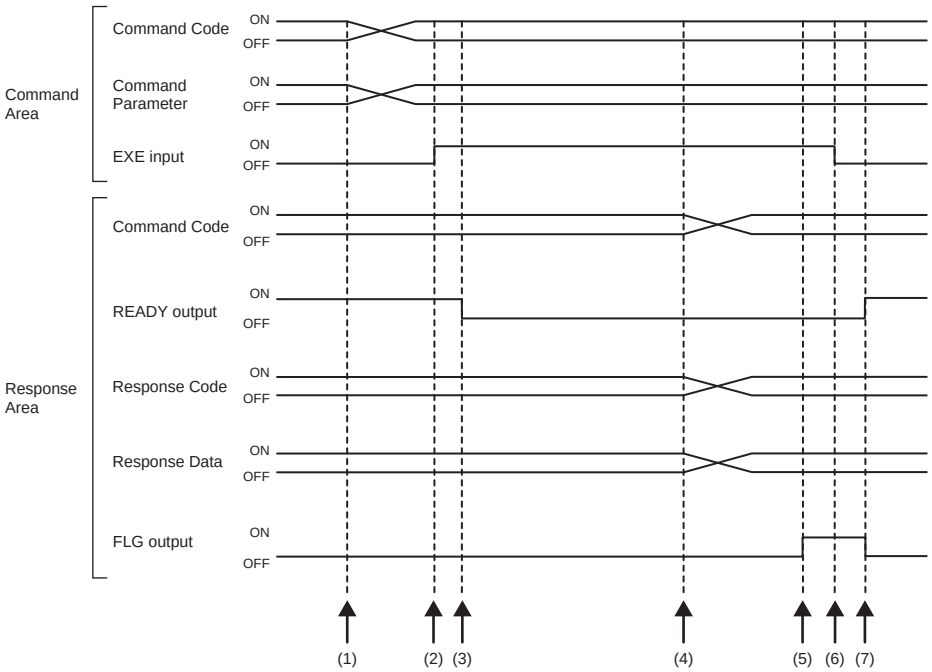
Cycle delay of the PDO communi-cation	PDO communication cycle (µs)							
	125	250	500	750	1000	1250	1500	1750
2 cycle	×	60	310 or shorter	560 or shorter	810 or shorter	1060 or shorter	1310 or shorter	1560 or shorter
3 cycle	60	160 to 310	410 to 810	660 to 1310	910 to 1810	1160 to 2310	1410 to 2810	1660 to 3310
4 cycle	160 to 185	410 to 560	910 to 1310	1410 to 2060	1910 to 2810	2410 to 3560	2910 to 4310	3410 to 5060
5 cycle	285 to 310	660 to 810	1410 to 1810	2160 to 2810	2910 to 3810	3660 to 4810	4410 to 5810	5160 to 6810
6 cycle	410 to 435	910 to 1060	1910 to 2310	2910 to 3560	3910 to 4810	4910 to 6060	5910 to 7310	6910 to 7500
7 cycle	535 to 560	1160 to 1310	2410 to 2810	3660 to 4310	4910 to 5810	6160 to 7310	7410 to 7500	–
8 cycle	660 to 685	1410 to 1560	2910 to 3310	4410 to 5060	5910 to 6810	7410 to 7500	–	–
9 cycle	785 to 810	1660 to 1810	3410 to 3810	5160 to 5810	6910 to 7500	–	–	–
10 cycle	910 to 935	1910 to 2060	3910 to 4310	5910 to 6560	–	–	–	–
11 cycle	1035 to 1060	2160 to 2310	4410 to 4810	6660 to 7310	–	–	–	–
12 cycle	1160 to 1185	2410 to 2560	4910 to 5310	7410 to 7500	—	—	–	–
13 cycle	1285 to 1310	2660 to 2810	5410 to 5810	—	—	—	–	–
14 cycle	1410 to1435	2910 to 3060	5910 to 6310	—	—	—	–	–
15 cycle	1535 to1560	3160 to 3310	6410 to 6810	—	—	—	–	–

- X indicates no condition
- With ZW-8000□, the following formulas can be used to calculate measurement cycles without occurrences of synchronization deviation when the PDO communication cycle delay is 16 cycles or more.

  Measurement cycle lower limit [µs] = PDO communication cycle × (PDO cycle delay - 1) - 90

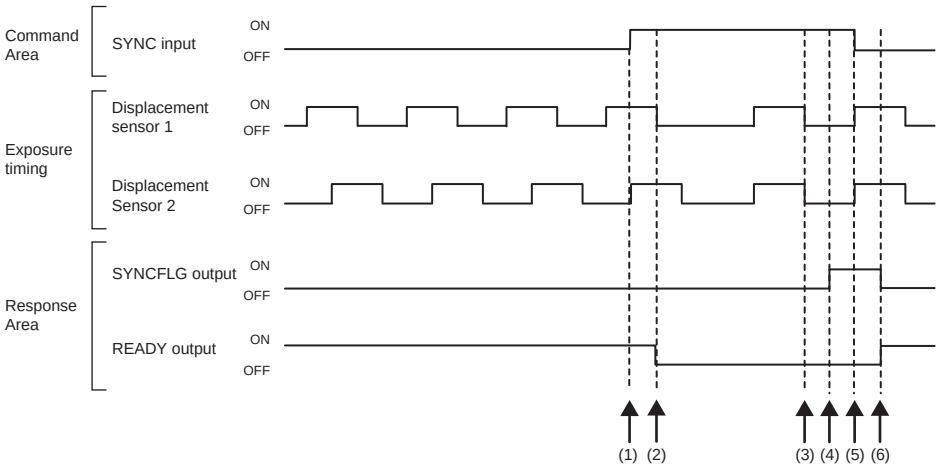
  Measurement value upper limit [µs] = PDO communication cycle × PDO cycle delay - 190
- There is no condition which the PDO communication cycle delay until the output area is updated becomes 1 cycle.

● Control command execution



(1) The command code and command parameter are set from the Controller.
(2) The EXE input signal state is changed from OFF to ON. Execution is instructed to the displacement sensor.
(3) When the displacement sensor receives the execution instruction, the READY output signal turns OFF and the command is executed.
(4) When the displacement sensor completes execution, the command code, response code and response data are set.
(5) The FLG output signal turns ON.
(6) The Controller makes sure that the FLG output signal has turned ON, and then returns the EXE input signal to OFF.
(7) The displacement sensor makes sure that the EXE input signal has turned OFF, and the FLG and READY output signals automatically turn OFF and ON, respectively.

● **Measurement synchronization**

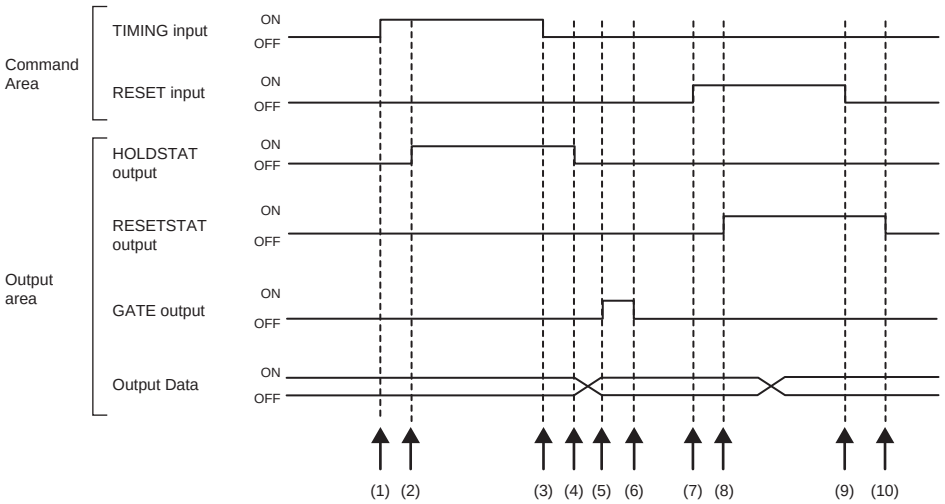


(1) The Controller changes the state of the SYNC input signal from OFF to ON.
(2) When receives the SYNC input signal, the displacement sensor turns off the READY output signal, and starts the measurement synchronization processing.
(3) All displacement sensors that have received the SYNC input signal are synchronized with the end of exposure and measurement is resumed.
(4) After the end of synchronization, the displacement sensor changes the state of the SYNCFLG output signal from OFF to ON.
(5) The Controller makes sure that the SYNCFLG output signal has turned ON, and then changes the state of the SYNC input signal from ON to OFF.
(6) The displacement sensor makes sure that the SYNC input signal has turned OFF, and the SYNCFLG and READY output signals automatically turn OFF and ON, respectively.

Important

- Set measurement cycle the same for all displacement sensors for which measurement is to be synchronized.
- If the synchronization with the exposure start timing is necessary, set the Exposure mode to Manual.
- By way of reference, the time from acceptance of the SYNC input up to when SYNCFLG output turns ON becomes “currently set measurement cycle + PDO communication cycle x 3”.
- After multiple displacement sensors are synchronized, they gradually go out of sync. At most 1 μs of difference generates EtherCAT communication between the slave. Input SYNC input signals periodically. The maximum deviation time can be calculated with the following formula.
  Difference in EtherCAT + specified Measurement cycle × Average number of repetitions × 24 ppm
  Difference of EtherCAT + specified Measurement cycle × Average × 24ppm
  Example: Measurement cycle: 400 μs, average number of repetitions: 64
  1 μs + 400 μs × 64 × 24/1000000 = 1.614 μs
  The maximum deviation time will be 1.614 μs.
- The displacement sensor starts resetting the filtering process after receiving a SYNC signal. If the average number is set to 128 times, please note that the measurement value will not be finalized until the measurement is done 128 times. You can check whether the measurement value is finalized if either of HIGH, PASS or LOW signal turns on in the response area, or TASK_ENABLE signal turns ON.

● **Execution of hold (peak/bottom/peak to peak/average) and reset of hold value**

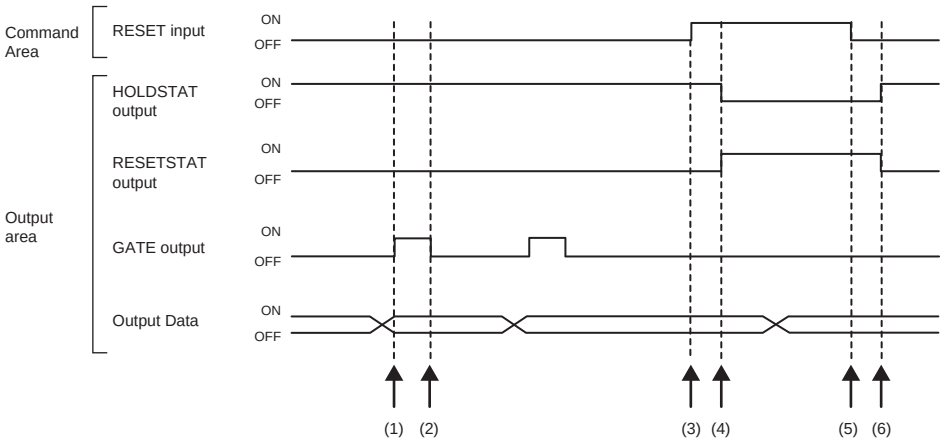


(1) The Controller changes the state of the TIMING input signal from OFF to ON. At the rising edge of the TIMING input signal, the displacement sensor starts sampling.
(2) At start of sampling, the displacement sensor changes the state of the HOLDSTAT output signal from OFF to ON.
(3) The Controller turns the state of the TIMING input signal from ON to OFF. At the falling edge of the TIMING input signal, the displacement sensor end sampling.
(4) At end of sampling, the displacement sensor changes the state of the HOLDSTAT output signal from ON to OFF.
(5) When the hold value is applied, the displacement sensor changes the state of the GATE output signal from OFF to ON. The Controller makes sure that the GATE output signal has turned ON, and then captures the output data.
(6) The displacement sensor turns OFF after the GATE signal ON duration has elapsed since the GATE output signal turned ON.
(7) The Controller changes the state of the RESET input signal from OFF to ON. At the rising edge of the RESET input signal, the displacement sensor starts the measured value reset period.
(8) At the start of the measured value reset period, the displacement sensor changes the state of the RESETSTAT output signal from OFF to ON. Measurement value is reset.
(9) The Controller changes the state of the RESET input signal from ON to OFF. At the falling edge of the RESET input signal, the displacement sensor end the measured value reset period.
(10) At the end of the measured value reset period, the displacement sensor changes the state of the RESETSTAT output signal from ON to OFF.

Important

When hold is being performed by multiple tasks, HOLDSTAT output signal turns ON when even one task enters the sampling period and GATE output signal turns ON when the measured value is applied.

● **Execution of hold (auto peak, auto bottom, auto peak to peak) and reset of hold value**



(1) When the peak value is applied, the displacement sensor changes the state of the GATE output signal from OFF to ON. The Controller makes sure that the GATE output signal has turned ON, and then captures the output data.

(2) The displacement sensor turns OFF after the GATE signal ON duration has elapsed since the GATE output signal turned ON.

(3) The Controller turns the state of the RESET input signal from OFF to ON. At the rising edge of the RESET input signal, the displacement sensor starts the measured value reset period.

(4) At the start of the measured value reset period, the displacement sensor changes the state of the HOLDSTAT output signal from ON to OFF and the RESETSTAT from OFF to ON. Measurement value is reset.

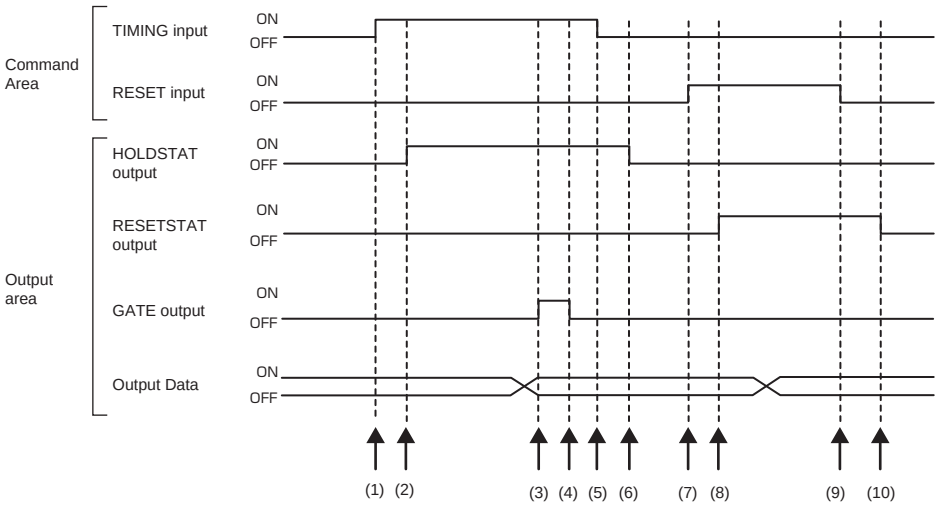
(5) The Controller changes the state of the RESET input signal from ON to OFF. At the falling edge of the RESET input signal, the displacement sensor end the measured value reset period.

(6) At the end of the measured value reset period, the displacement sensor changes the state of the HOLDSTAT output signal from OFF to ON and the RESETSTAT from ON to OFF.

Important

When hold is being performed by multiple tasks, HOLDSTAT output signal turns ON when even one task enters the sampling period and GATE output signal turns ON when the measured value is applied.

● **Execution of hold (sample) and reset of hold value**

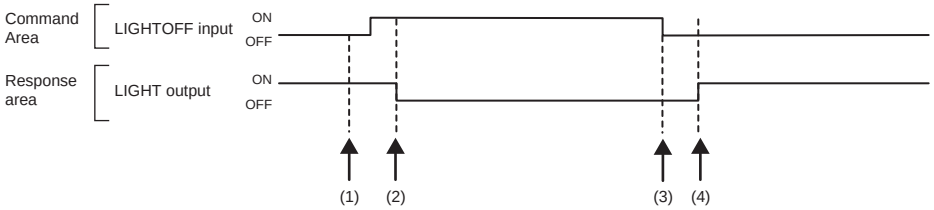


(1) The Controller changes the state of the TIMING input signal from OFF to ON. At the rising edge of the TIMING input signal, the displacement sensor starts sampling.
(2) At start of sampling, the displacement sensor changes the state of the HOLDSTAT output signal from OFF to ON.
(3) When the hold value is applied, the displacement sensor changes the state of the GATE output signal from OFF to ON. The Controller makes sure that the GATE output signal has turned ON, and then captures the output data.
(4) The displacement sensor turns OFF after the GATE signal ON duration has elapsed since the GATE output signal turned ON.
(5) The Controller turns the state of the TIMING input signal from ON to OFF. At the falling edge of the TIMING input signal, the displacement sensor end sampling.
(6) At end of sampling, the displacement sensor changes the state of the HOLDSTAT output signal from ON to OFF.
(7) The Controller changes the state of the RESET input signal from OFF to ON. At the rising edge of the RESET input signal, the displacement sensor starts the measured value reset period.
(8) At the start of the measured value reset period, the displacement sensor changes the state of the RESETSTAT output signal from OFF to ON. Measurement value is reset.
(9) The Controller changes the state of the RESET input signal from ON to OFF. At the falling edge of the RESET input signal, the displacement sensor end the measured value reset period.
(10) At the end of the measured value reset period, the displacement sensor changes the state of the RESETSTAT output signal from ON to OFF.

Important

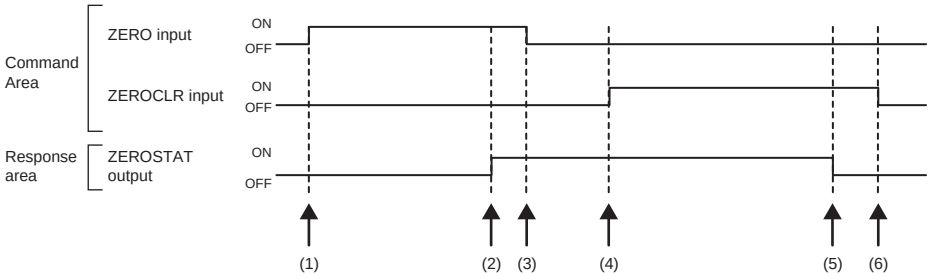
When hold is being performed by multiple tasks, HOLDSTAT output signal turns ON when even one task enters the sampling period and GATE output signal turns ON when the measured value is applied.

● **Measurement light source out**



(1) The Controller changes the state of the LIGHTOFF input signal from OFF to ON. At the rising edge of the LIGHTOFF input signal, the displacement sensor turns the measurement light source out.
(2) At measurement light source out, the displacement sensor changes the state of the LIGHT output signal from ON to OFF.
(3) The Controller turns the state of the LIGHTOFF input signal from ON to OFF. At the falling edge of the LIGHTOFF input signal, the displacement sensor lights the measurement light source.
(4) At measurement light source on, the displacement sensor returns the LIGHT output signal to ON.

● **Zero reset execution/zero reset cancel**

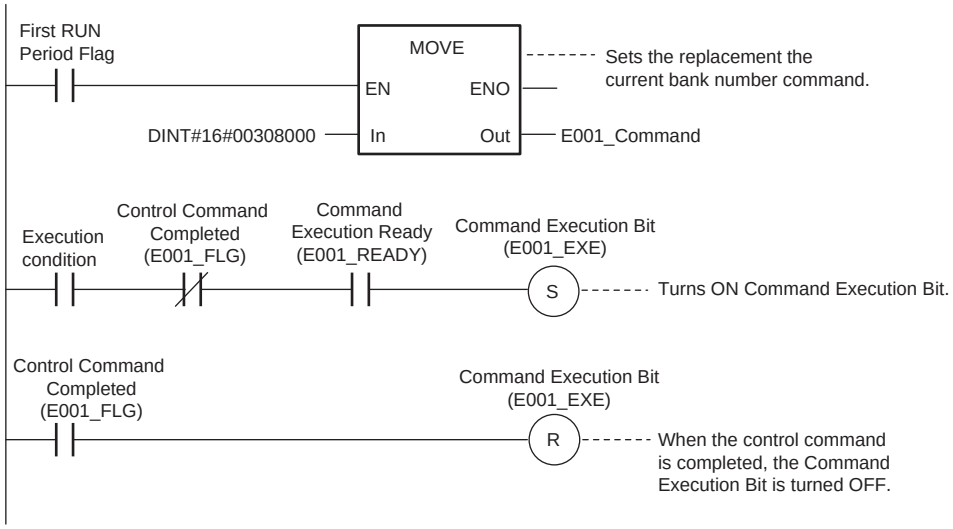


(1) The Controller changes the state of the ZERO_T1 to 4 input signals from OFF to ON. The displacement sensor makes sure that ZERO_T1 to 4 input signals have turned ON, and then executes the zero reset.
(2) At execution of zero reset, the displacement sensor changes the state of the ZEROSTAT_T1 to 4 output signal from OFF to ON.
(3) The Controller makes sure that the ZEROSTAT_T1 to 4 output signals have turned ON, and then returns the ZERO_T1 to 4 input signals to OFF.
(4) The Controller changes the state of the ZEROCLR_T1 to 4 input signals from OFF to ON. The displacement sensor makes sure that ZEROCLR_T1 to 4 input signals have turned ON, and then executes the zero reset cancel.
(5) At the zero reset cancel, the displacement sensor returns the ZEROSTAT_T1 to 4 output signals to ON.
(6) The Controller makes sure that the ZEROSTAT_T1 to 4 output signals have turned OFF, and then returns the ZEROCLR_T1 to 4 input signals to OFF.

Sample Ladder Program (EtherCAT)

● Command/Response Communications

The following sample program is used to perform replacement the current bank number.
The replacement the current bank number command (lower bytes: #8000, upper bytes: #0030) is sent to the Displacement Sensor.



Important

Create the ladder program to control the EXE signal so that it does not turn ON while the READY signal is ON. If not, a EXE input error will occur and the ERR signal will turn ON.

Sysmac Device Features (EtherCAT)

The control device product designed according to standardized communications and user interface specifications for OMRON control devices are called a Sysmac Device.
And the features available with such a Device is called Sysmac Device Features.
This section describes the features the ZW series Displacement Sensor provides when combined with a Machine Automation Controller such as NX/NJ series and automation software.

Sysmac Error Status

Because, in Sysmac Devices, errors that may occur in slaves are systematized, you can check the causes and remedies for errors with a common procedure.
The status of an error can be monitored in the Sysmac Error Status (2002-01 hex). To display the error status detected by the FQ-M series Vision Sensor in Sysmac Studio, the Sysmac Error Status (2002-01 hex) must be mapped to the PDO. Sysmac Studio, by default, uses the 512th transmit PDO Mapping assignment to map the Sysmac Error Status (2002-01 hex) automatically to the PDO.

Note

- For the Sysmac Error status (2002-01 hex), refer to 8-3 Object Dictionary p.214.
- For errors displayed in Sysmac Studio, refer to *NJ-series Troubleshooting Manual* (Cat. No. W503).

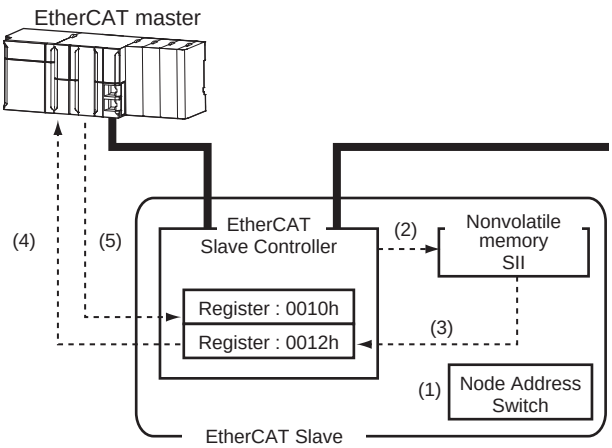
Saving the Node Address Setting

When the node address switch setting is “00” (Software Setup mode), the node address value you set in Sysmac Studio is enabled. If the node address switches are set to any other value, the value that is set on the switches is used as the node address.

In the Software Setup mode, in Sysmac Studio, execute [Write Slave Node Address] on the [EtherCAT Edit] screen to save the slave node address setting in the nonvolatile memory of the ZW series Displacement Sensor.

● Software Setting

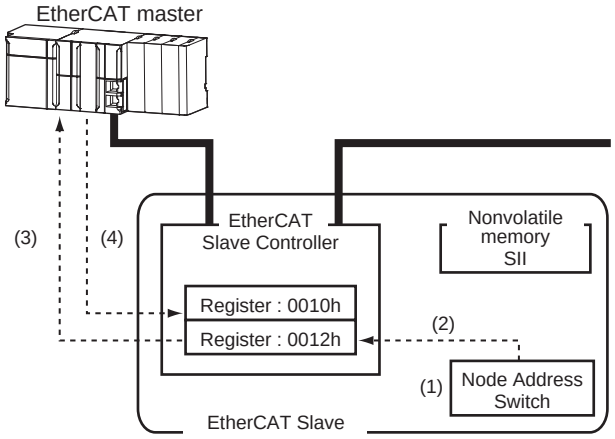
The set value saved as Slave Information Interface (SII) information in the nonvolatile memory of the slave is the node address.



(1) The Node Address Switch is set to “00” at power OFF.
(2) Write a node address set value to Slave SII from the master.
(3) The value of the node address setting is applied to Register: 0012 hex by the software, when the slave power is ON.
(4) EtherCAT master reads the set value of Register: 0012 hex.
(5) EtherCAT master writes the value of 0012 hex address to 0010 hex address as the node address value.

● **Node Address Switch Setting**

The value set on the node address switches is the node address.



(1) The Node Address Switch is set at power OFF.
(2) The value of Node Address Switch is applied to Register: 0012 hex, when the slave power is ON.
(3) EtherCAT master reads the set value of Register: 0012 hex.
(4) EtherCAT master writes the value of 0012 hex address to 0010 hex address as the node address value.

Serial Number Display

The serial number saved in the nonvolatile memory of the Displacement Sensor is displayed in the Serial Number (1018-04 hex). Controllers that support Sysmac Device Features can use this serial number to check the network configuration. To enable this check, in Sysmac Studio, set [Serial No. Check Condition] to [Set Value = Actual Unit] on the [EtherCAT Edit] screen. If the set condition is not met, a Network Configuration Check Error will occur.

Note

This network configuration check detects any slave devices that have been replaced, which prevents you from forgetting to set parameters on those slaves.

Compliance with ESI Specification (ETG.2000 S (R) V1.0.1)

The ESI Specification is a set of specifications that define the entries required in an EtherCAT Slave Information (ESI) file.

SII Data Check

The Slave Information Interface (SII) is an interface area in the nonvolatile memory of an EtherCAT slave that stores the configuration information specific to that EtherCAT slave.
Sysmac Device EtherCAT slaves check the SII information from the slave side.
If one of these slaves finds that SII information with which it cannot operate was written, it generates an SII Check Error (Error No. 88.3).If this error persists even after turning OFF and then ON the power again, contact your OMRON sales representative.

Important

Do not use third-party or any other configuration tools to edit the SII information.

MEMO

EtherNet/IP Connection

4-1 EtherNet/IP Connection

Introduction to EtherNet/IP

EtherNet/IP is an industrial multi-vendor network that uses Ethernet.
The EtherNet/IP specifications are open standards managed by the ODVA (Open DeviceNet Vendor Association). EtherNet/IP is used by a wide range of industrial devices.
Because EtherNet/IP uses standard Ethernet technology, various general-purpose Ethernet devices can be used in the network.
EtherNet/IP has mainly the following features.

● High-speed, High-capacity Data Exchange through Tag Data Links

The EtherNet/IP protocol supports implicit communications, which allows cyclic communications called tag data links with EtherNet/IP devices.

● Tag Data Links at Specified Communications Cycle for Each Application Regardless of the Number of Nodes

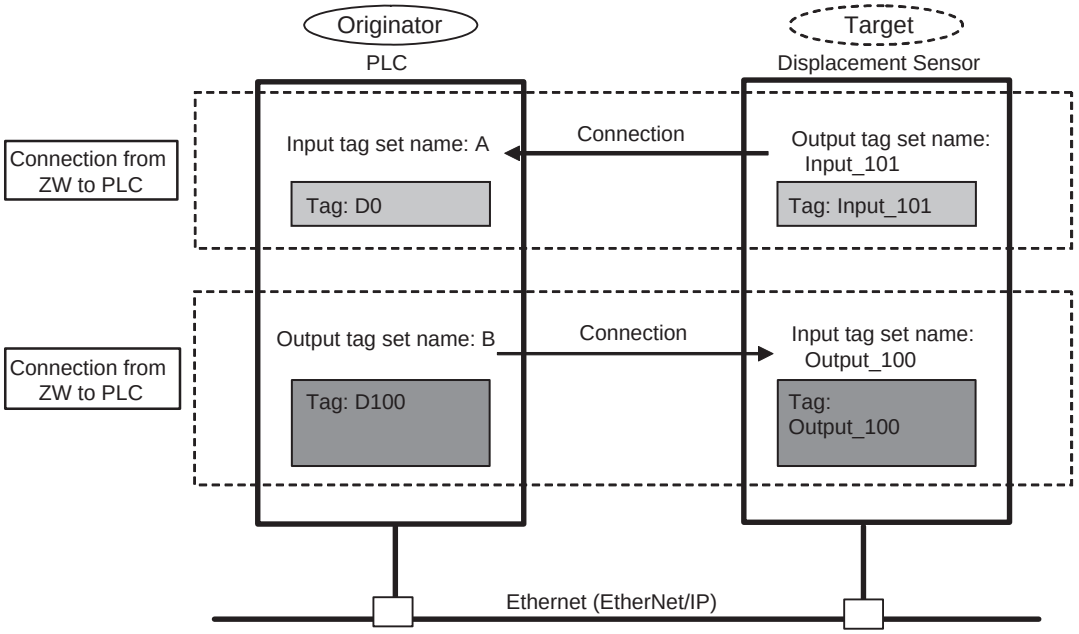
Tag data links (cyclic communications) operate at the cyclic period that is specified for each application, regardless of the number of nodes. Data is exchanged over the network at the refresh cycle that is set for each connection. The communications refresh cycle will not increase even if the number of nodes is increased, i.e., the concurrency of the connection's data is maintained.
Because the refresh cycle can be set for each connection, each application can communicate at its ideal refresh cycle. For example, interprocess interlocks can be transferred at high speed, while the production commands and the status monitor information are transferred at low speed.

Important

On a network to which many devices are connected, performance may drop (e.g., responses may be delayed or packets lost) or communications errors may occur when there is temporarily high traffic on the network. Test the operation under actual conditions before you start actual operation of the system.

Data Exchange with EtherNet/IP

Data is exchanged cyclically between Ethernet devices on the EtherNet/IP network using tag data links as shown below.



● Data Exchange Method

To exchange data, a connection is opened between two EtherNet/IP devices.
One of the nodes requests the connection to open a connection with a remote node.
The node that requests the connection is called the originator, and the node that receives the request is called the target.

● Data Exchange Memory Locations

The memory locations that are used to exchange data across a connection are specified as tags.
You can specify memory addresses or variables for tags.
A group of tags consists of an output tag set and an input tag set.

Communication Methods for Measurement Sensor when Connected via EtherNet/IP

You can use EtherNet/IP tag data links to communicate between the PLC and the Displacement Sensor to perform control via command/response communications or to output data after measurements.
ZW-8000□/7000□/5000□ is supported EtherNet/IP Ver. CT12 conformance test.

To connect to OMRON Controllers and communicate through EtherNet/IP, you use the Network Configurator to set up tag data links (i.e., tags, tag sets, and connection settings).
Refer to the following manuals for details on the tag data link settings that are made with the Network Configurator.

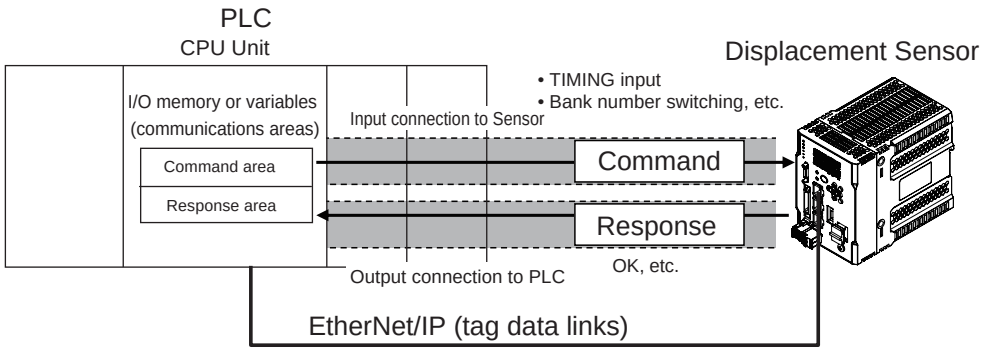
- NJ-series CPU Unit Built-in EtherNet/IP Port User's Manual (Cat. No. W506)
- CS/CJ-series EtherNet/IP Units Operation Manual (Cat. No. W465)
- CJ-series EtherNet/IP Units Operation Manual for NJ-series CPU Unit (Cat. No. W495)

Types of Communications

● Command/Response Communications

With EtherNet/IP communications, cyclic tag data link communications are performed with the connections that are set between the PLC and Displacement Sensor.
Command/response control signals are handled by storing control commands from the PLC to the Displacement Sensor and responses from the Displacement Sensor to the PLC in the I/O memory of the PLC. This allows you to control the operation of the Displacement Sensor (e.g., perform continuous measurements or change the scene) without using special communications instructions.

- Input Connection to Sensor (PLC to Displacement Sensor)
  The commands that are stored in the I/O memory of the PLC are sent to the Displacement Sensor.
- Output Connection to PLC (Displacement Sensor to PLC)
  Responses from the Displacement Sensor to the control commands are stored in the PLC I/O memory addresses or variables that are specified for the response area.

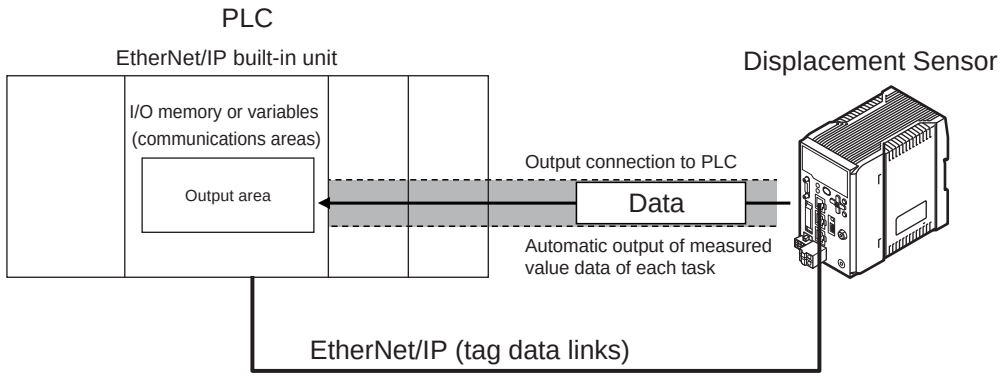


To send a control command, you write a control command to the command area (i.e., a variable or I/O memory address in the PLC) that is specified for the output tag, and then turn ON the Command Execution (EXE) Bit. As a result, the control command is sent through the input connection from the PLC to the Displacement Sensor.
A control command does not need to be sent to execute measurements for the TRIG bit.
The measurement is executed simply by turning ON the TRIG bit.

The Displacement Sensor executes the control command and sends a response back to the PLC through the output connection from the Displacement Sensor to the PLC.
The PLC stores the response in the response area (i.e., I/O memory addresses or variable) that is specified for the input tag in the PLC.

● **Data Output after Measurements**

Immediately after the measured value has been applied, the measured value data of each task is output automatically to the specified I/O memory of the PLC specified to the input tag.



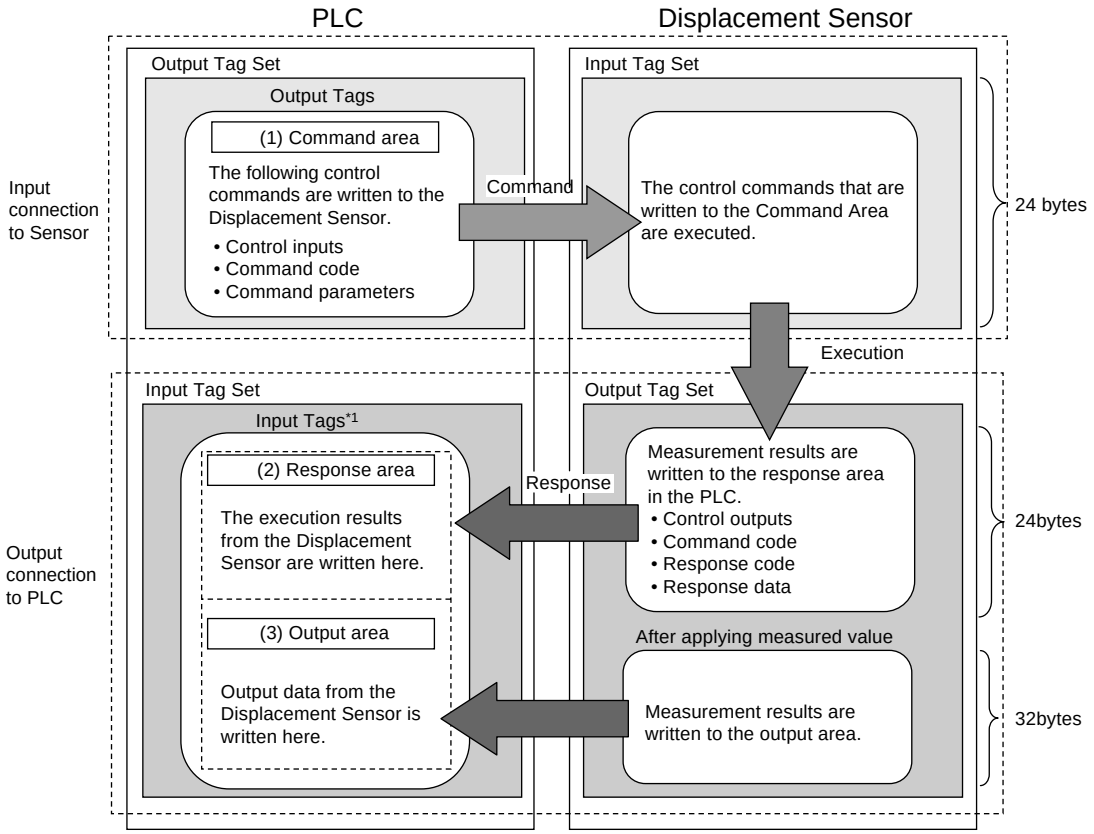
To output data, specify the I/O memory area or a variable (output area) on the PLC for storing that data in advance to the input tag.

Types of Communications Areas

For EtherNet/IP communications, the following three communications areas are used in the PLC to perform communications.

Areas Used for the Different Control Methods

Command/ response communications	(1) Command area	This is the area to which you write control commands for the Displacement Sensor to execute.
	(2) Response area	This is the area to which the Displacement Sensor writes the results of control commands executed from the command area.
Data output method after application of measured value	(3) Output area	The area to which the displacement sensor writes the measured value data of each task after application of the measured value.



*1 The response area (2) and output area (3) are assigned to continuous memory addresses or to a variable.

Connectable Controller Models

Series	CPU Unit	Interface	
		Built-in port in CPU Unit	EtherNet/IP Unit
SYSMAC NX	NX701	Compatible	---
SYSMAC NJ	NJ501, NJ301, or NJ101	Compatible	CJ1W-EIP21
SYSMAC CJ2	CJ2H or CJ2M	Compatible (model with built-in port only)	CJ1W-EIP21
SYSMAC CJ1	CJ1H or CJ1G	---	CJ1W-EIP21
	CJ1M	---	CJ1W-EIP21
SYSMAC CS	CS1H, CS1D, or CS1G	---	CS1W-EIP21

Setting Communications Specifications (EtherNet/IP)

Network Settings of the Sensor

This section describes how to set the network settings in the Displacement Sensor.

▶ **Multi View Explore : [Device group] | Sensor name | [System] | [System data] (Double-click)**
→ Edit Pane : [Ethernet communication settings] Icon | [Ethernet settings]

The following items can be set.

Item	Description	Setting range
IP address	Set the IP address of the Displacement Sensor.	a.b.c.d a: 1 to 223, b: 0 to 255, c: 0 to 255, d: to 254 (Default: 192.168.250.50)
Subnet mask	Set the subnet mask.	0.0.0.0 to 255.255.255.255 (Default: 255.255.255.0)
Default Gateway	Sets the default gateway.	0.0.0.0 to 255.255.255.255 (Default: 0.0.0.0)

Note

The network settings of the sensor can also be set with key operations on the Sensor Controller.

Network Settings of the Sensor p.177

Setting EtherNet/IP communication

▶ Multi View Explore : [Device group] | Sensor name | [System] | [System data] (Double-click)

→ Edit pane : [Ethernet Communications Settings] icon ( )

1 **Select [EtherNet/IP] at [Fieldbus].**

2 **Set the output time of GATE signal.**

Enter the value in [GATE signal ON time].

Important

To enable the settings, restart the Controller.

Note

The setting of default settings for EtherNet/IP communications can also be set by the operating keys on the Sensor Controller.

Setting Fieldbus p.175

Setting GATE Signal ON Time p.176

Tag Data Link Setting Methods

This section describes how to set data links for EtherNet/IP.
The communications areas in the PLC for which data links are created to the Sensor are specified as tags and tag sets, and the connections are set for tag data link communications.
Tags, tag sets, and connections are set from the Network Configurator.
Refer to the following manuals for details on the tag data link settings that are made with the Network Configurator.

- NJ-series CPU Unit Built-in EtherNet/IP Port User's Manual (Cat. No. W506)
- CS/CJ-series EtherNet/IP Units Operation Manual (Cat. No. W465)
- CJ-series EtherNet/IP Units Operation Manual for NJ-series CPU Unit (Cat. No. W495)

Important

- To connect the ZW to an NJ/CJ-series CPU Unit, install the EDS file that defines the connection information for the ZW in the Network Configurator. Download the EDS file from the OMRON website.
- After tag data links are set, the Displacement Sensor will automatically be restarted to enable the settings.

Tags, Tag Sets, and Connection Settings

The communications areas in the PLC are set as tag data link connections as shown in the following table.

- Tag and Tag Set Settings in the PLC

Parameter	Settings	
	Command area	Response area and output area
Type of tags and tag set	Output tag set	Input tag set
Tag and tag set names	I/O memory addresses or variable names	I/O memory addresses or variable names*1
Data size	24 bytes	56 bytes (total size of response area and output area)

*1 Specify the I/O memory address of the first word in the response area.
The output area is assigned immediately after the response area.
If you specify a variable name, the variable is assigned for both the response area and output area.
Refer to Accessing Communications Areas Using Variables with NX/NJ-series Controllers on p. 105 for information on how to access the signals in the communications areas from the user program when variables are assigned.

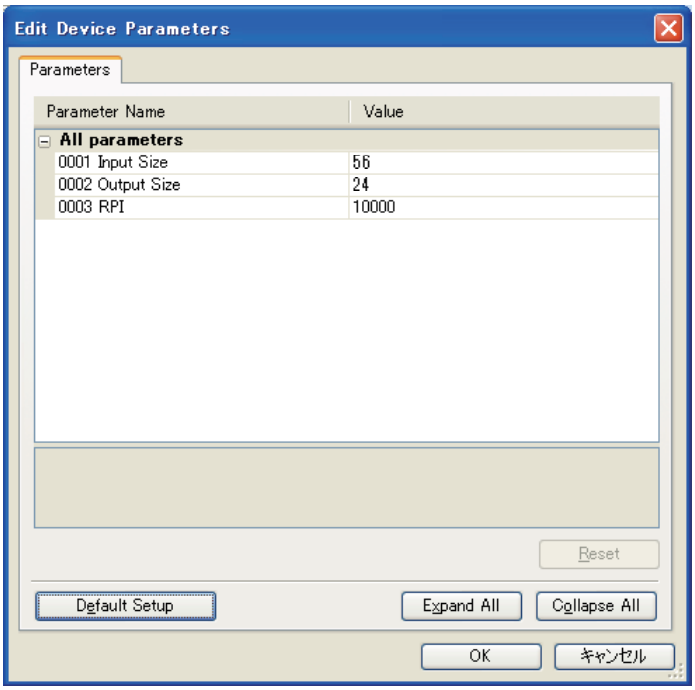
● Settings in the ZW (Device Parameter Settings)

Parameter name	Value	Setting range
001 Input Size	The total size of response area and output area	56
002 Output Size	The data size of command area	24
003 RPI*	The requested packet interval	10000

* The packet interval (RPI) is set in the connection settings between the PLC and the Sensor. No setting is required here.

1 **Right-click the ZW in the network on the Network Configurator and select [Parameter] - [Edit].**

2 **The Edit Device Parameters Dialog Box will be displayed. Make the required settings.**



● Connection Settings

Parameter			Setting
Originator device (PLC)	Input tag set		*PLC_tag_set_name*-[56Byte]
		Connection type	Any (default: multi-cast connection)*1
	Output tag set		*PLC_tag_set_name*-[24Byte]
Target device (Displacement Sensor)	Output tag set		Input_101-[56 Byte]
	Input tag set		Output_100-[24Byte]
Packet interval (RPI)			Any (default: 20.0)*2

*1 If multi-cast connections are used, however, use an Ethernet switch that has multi-cast filtering, unless the tag set is received by all nodes in the network.
*2 Set the same value as you set for the refreshing task period in the EtherNet/IP communications settings.

Important

- If I/O memory addresses are specified for the communications areas, the information in the communications areas will be cleared when the operating mode of the PLC changes unless addresses in the CIO Area, which are maintained, are specified.
- The following assembly object is required to specify instances when the EDS file is not used.

Assembly Object Settings

Parameter name	Setting	Remarks
Instance ID	100	Output connection
	101	Input connection

Memory Assignments and Commands

Memory assignments

The following describes assignment of input connection instruction area to the sensor, output connection response area to the PLC and the output area.

● Input connection (PLC (originator)) to sensor → Displacement sensor (target)

• Instruction area

Top channel	Bit																Description
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
+0	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	EXE	Sensor head control signal1 (32bit)
+1	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	ERCLR	
+2	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	LIGHT OFF	RESET	TIMING	Sensor head control signal2 (32bit)
+3	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	ZERO CLR_T4	ZERO CLR_T3	ZERO CLR_T2	ZERO CLR_T1	ZERO_ T4	ZERO_ T3	ZERO_ T2	ZERO_ T1	
+4	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Extended area (32bit)
+5	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	
+6	Command code																Command code (32bit)
+7																	
+8	Parameter 1																Parameter 1 (16bit)
+9	Parameter 2																Parameter 2 (16bit)
+10	Parameter 3																Parameter 3 (32bit)
+11																	

Signal	Signal name	Function
EXE	Control command execution	Turns ON when the user (PLC) instructs execution of control commands to the displacement sensor. (Turns ON after the control command code and parameters are set.)
		Is returned to OFF on condition (input condition) that the user (PLC) turns the control command completion signal (FLG signal) from the displacement sensor ON.
ERCLR	Error clear	Turns ON when the displacement sensor error signal (ERR signal) turns OFF.
		Is returned to OFF on condition (input condition) that the user (PLC) turns the error signal (ERR signal) OFF.
TIMING	Timing	Turns ON when the user (PLC) instructs start of hold sampling to the displacement sensor.
		Turns OFF when the user (PLC) instructs end of hold sampling to the displacement sensor.
RESET	Reset	Turns ON when the user (PLC) instructs judgment processing and output reset to the displacement sensor. If the hold function is used, the state in effect before the hold function was set will be restored.
		Turns OFF when the user (PLC) ends judgment processing and output reset to the displacement sensor.

Signal	Signal name	Function
LIGHTOFF	Light metering OFF	Turns ON when the user (PLC) instructs logical beam OFF to the displacement sensor.
		Turns OFF when the user (PLC) instructs logical beam ON to the displacement sensor.
ZERO_T1 to 4	Zero reset execution	Turns ON when the user (PLC) instructs execution of zero reset of TASK1 to 4 to the displacement sensor.
		Is returned to OFF on condition (input condition) that the user (PLC) turns the zero reset completion signal (ZEROSTAT signal) from the displacement sensor ON.
ZEROCLR_T1 to 4	Zero reset cancel	Turns ON when the user (PLC) instructs zero reset cancel of TASK1 to 4 to the displacement sensor.
		Is returned to OFF on condition (input condition) that the user (PLC) turns the zero reset completion signal (ZEROSTAT signal) from the displacement sensor OFF.
Command code	Command code	Stores the command code.
Parameter 1-3	Command parameter	Stores the command parameter.

Note

- In the FUNC mode, control signals other than ERCLR cannot be executed.
- Multiple control signals cannot be executed in the same cycle. Note, however, that when zero reset execution/ cancellation are performed simultaneously on multiple tasks, ZERO_T1 to 4 and ZEROCLR_T1 to 4 can be executed in the same cycle.
- When the status of control signals differs from that of the input status of parallel I/O, processing is executed of one of the statuses is ON.

● Output connection (displacement sensor (originator)) to PLC → PLC (target)

- Response area

Top channel	Bit																Description
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
+0	BANK1_E	BANK1_D	BANK1_C	BANK1_B	BANK1_A	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	RUN	Reserved	READY	Reserved	FLG	Sensor head common control signal (32bit)
+1	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	ERR	
+2	Reserved	Reserved	Reserved	Reserved	TASKSTAT_T4	TASKSTAT_T3	TASKSTAT_T2	TASKSTAT_T1	Reserved	OR	GATE	ENABLE	STABILITY	LIGHT1	RESETSTAT	HOLDSTAT	Sensor head 1 control signal (32bit)
+3	LOW_T4	PASS_T4	HIGH_T4	LOW_T3	PASS_T3	HIGH_T3	LOW_T2	PASS_T2	HIGH_T2	LOW_T1	PASS_T1	HIGH_T1	ZEROSTAT_T4	ZEROSTAT_T3	ZEROSTAT_T2	ZEROSTAT_T1	
+4	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Extended area (32bit)
+5	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	
+6	Command code																Command code (32bit)
+7																	
+8	Response code																Response code (32bit)
+9																	
+10	Response data																Response data (32bit)
+11																	

Signal	Signal name	Function
FLG	Control command completion	Turns ON when the displacement sensor completes control command execution. (Turns ON after the control command code, response code and response status are stored.)
		Automatically turns OFF if the control command execution signal (EXE signal) from the user (PLC) turns OFF.

Signal	Signal name	Function
READY	Ready	Turns OFF when the displacement sensor cannot execute control commands.
		Turns ON when the displacement sensor can execute control commands.
RUN	Run screen	Turns ON when the displacement sensor is in the RUN mode.
		Turns OFF when the displacement sensor is in the FUNC mode.
ERR	Error	Turns ON when a displacement sensor error is detected.
		Turns OFF when the displacement sensor is normal. After it turns ON, it never turns OFF until the error clear signal (ERCLR signal) from the user (Controller) turns ON.
BANKOUT_A to E	Current bank number	This outputs the currently specified bank number. It expresses the bank number in combinations of BANKOUTx_A to E. (For details of combinations, see Note.)
HOLDSTAT	Hold execution status	Turns ON when the displacement sensor is in the hold sampling period.
		Turns OFF when the displacement sensor is outside the hold sampling period.
RESETSTAT	Reset execution state	Turns ON when the displacement sensor is in the reset execution state.
		Turns OFF when the displacement sensor is in the reset non-execution state.
LIGHT	Logical beam lighting state	Turns ON when the logical beam is lit.
		Turns OFF when the logical beam is out.
STABILITY	Measurement position	Turns ON when the 1 surface is in the measuring range.
		Turns OFF when the measured value is outside the measuring range.
ENABLE	Measurement state	Turns ON when the displacement sensor is ready for measurement.
		Turns OFF when the displacement sensor cannot measure (excessive or insufficient received light, outside measuring range, Calibration ROM not mounted, during FUNC mode non-measurement).
GATE	Data output completed	Turns ON when the displacement sensor completes control data output when hold is set.
		The displacement sensor automatically turns OFF one Gate period after turning ON.
OR	Overall judgment result	Turns ON when even one of the judgment result of the displacement sensor TASK1 to 4 is other than PASS.
		Turns OFF when all of the judgment result of the displacement sensor TASK1 to 4 is PASS.
HIGH_T1-4	HIGH output	Turns ON when the judgment result of the displacement sensor TASK1 to 4 is HIGH (HIGH threshold < measured value).
		Turns OFF when the judgment result of the displacement sensor TASK1 to 4 is other than HIGH.
PASS_T1-4	PASS Output	Turns ON when the judgment result of the displacement sensor TASK1 to 4 is PASS (LOW threshold ≤ measured value ≤ HIGH threshold).
		Turns OFF when the judgment result of the displacement sensor TASK1 to 4 is other than PASS.
LOW_T1-4	LOW output	Turns ON when the judgment result of the displacement sensor TASK1 to 4 is LOW (LOW threshold > measured value).
		Turns OFF when the judgment result of the displacement sensor TASK1 to 4 is other than LOW.
ZEROSTAT_T1-4	Zero reset state	Turns ON when the displacement sensor TASK1 to 4 is in the zero reset execution state.
		Turns OFF when the displacement sensor TASK1 to 4 is in the zero reset non-execution state.
TASKSTAT_T1-4	TASK status	Turns ON when the measurement data of each tasks is defined.
Command code	Command code	The executed command code is returned.
Response code	Response code	The response code of the executed command is stored.
Response data	Response data	The response data of the executed command is stored.

Note

- The results of processing execution by parallel I/O also are reflected in the status signals.
- The table below shows the combinations of bank numbers and BANKOUTx_A to E.
  (BANK9 to 32 are used only in the judgment value mode. In the normal mode, BANKOUTx_D to E are OFF at all times.)

Bank number	BANKOUTx_A	BANKOUTx_B	BANKOUTx_C	BANKOUTx_D	BANKOUTx_E
BANK1	OFF	OFF	OFF	OFF	OFF
BANK2	ON	OFF	OFF	OFF	OFF
BANK3	OFF	ON	OFF	OFF	OFF
BANK4	ON	ON	OFF	OFF	OFF
BANK5	OFF	OFF	ON	OFF	OFF
BANK6	ON	OFF	ON	OFF	OFF
BANK7	OFF	ON	ON	OFF	OFF
BANK8	ON	ON	ON	OFF	OFF
BANK9	OFF	OFF	OFF	ON	OFF
BANK10	ON	OFF	OFF	ON	OFF
BANK11	OFF	ON	OFF	ON	OFF
BANK12	ON	ON	OFF	ON	OFF
BANK13	OFF	OFF	ON	ON	OFF
BANK14	ON	OFF	ON	ON	OFF
BANK15	OFF	ON	ON	ON	OFF
BANK16	ON	ON	ON	ON	OFF
BANK17	OFF	OFF	OFF	OFF	ON
BANK18	ON	OFF	OFF	OFF	ON
BANK19	OFF	ON	OFF	OFF	ON
BANK20	ON	ON	OFF	OFF	ON
BANK21	OFF	OFF	ON	OFF	ON
BANK22	ON	OFF	ON	OFF	ON
BANK23	OFF	ON	ON	OFF	ON
BANK24	ON	ON	ON	OFF	ON
BANK25	OFF	OFF	OFF	ON	ON
BANK26	ON	OFF	OFF	ON	ON
BANK27	OFF	ON	OFF	ON	ON
BANK28	ON	ON	OFF	ON	ON
BANK29	OFF	OFF	ON	ON	ON
BANK30	ON	OFF	ON	ON	ON
BANK31	OFF	ON	ON	ON	ON
BANK32	ON	ON	ON	ON	ON

• Output area

The output area is assigned to I/O memory area continuously from the response area.

Top channel	Bit																Description
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
+0	Output Data1																Output data 0 (32bit)
+1																	
+2	Output Data2																Output data 1 (32bit)
+3																	
+4	Output Data3																Output data 2 (32bit)
+5																	
+6	Output Data4																Output data 3 (32bit)
+7																	
+8	Reserved																Output data 4 (32bit)
+9																	
+10	Reserved																Output data 5 (32bit)
+11																	
+12	Reserved																Output data 6 (32bit)
+13																	
+14	Reserved																Output data 7 (32bit)
+15																	

Signal	Signal name	Function
Output Data1	OUT1 data	The Measurement result of OUT1 is output.
Output Data2	OUT2 data	The Measurement result of TOUT2 is output.
Output Data3	OUT3 data	The Measurement result of OUT3 is output.
Output Data4	OUT4 data	The Measurement result of OUT4 is output.

Note

For assigning of OUT1 to OUT4, refer to the following:

Refer to Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362) "4-5 I/O Settings".

Accessing Communications Areas Using Variables with NX/NJ-series Controllers

With an NX/NJ-series Controller, only variables can be used to access from the user program the I/O memory addresses that are assigned to the communications areas.
Use the following settings.

● Using Network Variables for Access

Create user-defined variables that match the structures of the communications areas of the Sensor.
Use the Sysmac Studio to define the variables.
Refer to the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504) for Sysmac Studio operating procedures.

1 Defining the Data Types of the Variables

Define data types for variables that match the structures of the communications areas.

(1) Defining a Data Type for Signal Access

First, define a BOOL array data type to access the control signals and status signals.
Here, a data type called “U_EIPFlag” is defined.
Name of data type : U_EIPFlag
Type of derivative data type : Union

Name of data type	Data type	
U_EIPFlag	UNION	
F	ARRAY[0..31]OF BOOL	·····Specifies an array of BOOL data from 0 to 31.
W	DWORD	·····32-bit bit string data

(2) Defining Data Types for Communications Area Access

Data types are defined to access the communications areas, with one data type for the command area and another data type for the response and output areas.
Here, data types called “S_EIPOutput” and “S_EIPInput” are defined.

• Data Type to Access the Command Area

Name of data type : S_EIPOutput
Type of derivative data type : Structure

Name of data type	Data type	
S_EIPOutput	STRUCT	
SensorHeadControlFlag1	U_EIPFlag	·····The data type that was defined above (1)
SensorHeadControlFlag2	U_EIPFlag	·····The data type that was defined above (1)
SensorHeadControlReserve	U_EIPFlag	·····The data type that was defined above (1) (extended area)
CommandCode	DWORD	·····32-bit bit string data
CommandParam1	UINT	·····16-bit integer data
CommandParam2	UINT	·····16-bit integer data
CommandParam3	DINT	·····32-bit integer data

• Assignment Example for Variable Data Type That Matches the Command Area

			Bits (–: Reserved)															
			15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
S_EIP Output	SensorHead-ControlFlag1	+0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	EXE
		+1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	ERCLR
	SensorHead-ControlFlag2	+2	–	–	–	–	–	–	–	–	–	–	–	–	–	LIGHT OFF	RESET	TIMING
		+3	–	–	–	–	–	–	–	–	ZERO CLR_T4	ZERO CLR_T3	ZERO CLR_T2	ZERO CLR_T1	ZERO _T4	ZERO _T3	ZERO _T2	ZERO _T1
	SensorHead-ControlReserve	+4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		+5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	CommandCode	+6	Command code															
		+7																
	CommandParam1	+8	Parameter 1															
	CommandParam2	+9	Parameter 2															
	CommandParam3	+10	Parameter 3															
		+11																

• Data Type to Access the Response and Output Areas

Name of data type : S_EIPInput

Type of derivative data type : Structure

Name of data type	Data type	
S_EIPInput	STRUCT	
SensorHeadStatusFlag1	U_EIPFlag	·····The data type that was defined above (1)
SensorHeadStatusFlag2	U_EIPFlag	·····The data type that was defined above (1)
SensorHeadStatusReserve	U_EIPFlag	·····The data type that was defined above (1) (extended area)
CommandCodeEcho	DWORD	·····32-bit bit string data
ResponseCode	UDINT	·····32-bit integer data
ResponseData	DINT	·····32-bit integer data
OutputData	ARRAY[0..7]OF DINT	·····Specifies an array of DINT data from 0 to 7.

• Assignment Example for Variable Data Type That Matches the Response and Output Areas

Response Area

		Bits (–: Reserved)															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
S_EIP Input / SensorHead-StatusFlag1	+0	BANK1_E	BANK1_D	BANK1_C	BANK1_B	BANK1_A	–	–	–	–	–	–	RUN	–	READY	–	FLG
	+1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	ERR
SensorHead-StatusFlag2	+2	–	–	–	–	TASKSTAT_T4	TASKSTAT_T3	TASKSTAT_T2	TASKSTAT_T1	–	OR	GATE	ENABLE	STABILITY	LIGHT	RESETSTAT	HOLDSTAT
	+3	LOW_T4	PASS_T4	HIGH_T4	LOW_T3	PASS T3	HIGH_T3	LOW_T2	PASS_T2	HIGH_T2	LOW_T1	PASS_T1	HIGH_T1	ZEROSTAT_T4	ZEROSTAT_T3	ZEROSTAT_T2	ZEROSTAT_T1
SensorHead-StatusReserve	+4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	+5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CommandCode Echo	+6	Command code															
	+7																
Response Code	+8	Response code															
	+9																
Response Data	+10	Response data															
	+11																

Output Area

		Bits (–: Reserved)															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
S_EIP Input / Output Data	+13	Output Data1															
	+14																
	+15	Output Data2															
	+16																
	+17	Output Data3															
	+18																
	+19	Output Data4															
	+20																
	+21	–															
	+22																
		⋮															
	+26	–															
	+27																

2 Defining the Variables

Define variables for the data links for the communications area data that is used in EtherNet/IP communications.

These variables use the data types that were defined above in procedure 1.

Variable	Variable type	Network Publish attribute	Data type	Application
EIPOutput	Global variable	Output	S_EIPOutput	For data links to the command area
EIPInput	Global variable	Input	S_EIPInput	For data links to the response and output areas

3 Exporting the Variables That Were Defined on Sysmac Studio

Export the variables that you defined so that you can use them on the Network Configurator.

An exported CSV file is created.

4 Network Configurator Settings

(1) Import to the Network Configurator the CSV file that you exported from the Sysmac Studio.
The variables that are imported will automatically be registered as tags.

(2) Set the connections as shown in the following table.

Originator device (PLC) settings	Target device (Sensor) settings
Input tag set: EIP Input	Output tag set: Input101
Output tag set: EIP Output	Input tag set: Output100

5 Accessing the Communications Areas from the User Program

The defined variables are used to access the communications areas for the Sensor using the following notation.

• Command Area

Signal name	Variable name
EXE	EIPOutput.SensorHeadControlFlag1.F[0]
ERCLR	EIPOutput.SensorHeadControlFlag1.F[16]
TIMING	EIPOutput.SensorHeadControlFlag2.F[0]
RESET	EIPOutput.SensorHeadControlFlag2.F[1]
LIGHTOFF	EIPOutput.SensorHeadControlFlag2.F[2]
ZERO_T1	EIPOutput.SensorHeadControlFlag2.F[16]
ZERO_T2	EIPOutput.SensorHeadControlFlag2.F[17]
ZERO_T3	EIPOutput.SensorHeadControlFlag2.F[18]
ZERO_T4	EIPOutput.SensorHeadControlFlag2.F[19]
ZEROCLR_T1	EIPOutput.SensorHeadControlFlag2.F[20]
ZEROCLR_T2	EIPOutput.SensorHeadControlFlag2.F[21]
ZEROCLR_T3	EIPOutput.SensorHeadControlFlag2.F[22]
ZEROCLR_T4	EIPOutput.SensorHeadControlFlag2.F[23]
Command code	EIPOutput.CommandCode
Command parameter 1	EIPOutput.CommandParam1
Command parameter 2	EIPOutput.CommandParam2
Command parameter 3	EIPOutput.CommandParam3

• Response Area

Signal name	Variable name
FLG	EIPInput.SensorHeadStatusFlag1.F[0]
READY	EIPInput.SensorHeadStatusFlag1.F[2]
RUN	EIPInput.SensorHeadStatusFlag1.F[4]
BANK1_A	EIPInput.SensorHeadStatusFlag1.F[11]
BANK1_B	EIPInput.SensorHeadStatusFlag1.F[12]
BANK1_C	EIPInput.SensorHeadStatusFlag1.F[13]
BANK1_D	EIPInput.SensorHeadStatusFlag1.F[14]
BANK1_E	EIPInput.SensorHeadStatusFlag1.F[15]
ERR	EIPInput.SensorHeadStatusFlag1.F[16]
TASKSTAT_T1	EIPInput.SensorHeadStatusFlag2.F[8]
TASKSTAT_T2	EIPInput.SensorHeadStatusFlag2.F[9]
TASKSTAT_T3	EIPInput.SensorHeadStatusFlag2.F[10]
TASKSTAT_T4	EIPInput.SensorHeadStatusFlag2.F[11]
HOLDSTAT	EIPInput.SensorHeadStatusFlag2.F[0]
RESETSTAT	EIPInput.SensorHeadStatusFlag2.F[1]
LIGHT	EIPInput.SensorHeadStatusFlag2.F[2]
STABILITY	EIPInput.SensorHeadStatusFlag2.F[3]
ENABLE	EIPInput.SensorHeadStatusFlag2.F[4]
GATE	EIPInput.SensorHeadStatusFlag2.F[5]
OR	EIPInput.SensorHeadStatusFlag2.F[6]
ZEROSTAT_T1	EIPInput.SensorHeadStatusFlag2.F[16]
ZEROSTAT_T2	EIPInput.SensorHeadStatusFlag2.F[17]
ZEROSTAT_T3	EIPInput.SensorHeadStatusFlag2.F[18]
ZEROSTAT_T4	EIPInput.SensorHeadStatusFlag2.F[19]
HIGH_T1	EIPInput.SensorHeadStatusFlag2.F[20]
PASS_T1	EIPInput.SensorHeadStatusFlag2.F[21]
LOW_T1	EIPInput.SensorHeadStatusFlag2.F[22]
HIGH_T2	EIPInput.SensorHeadStatusFlag2.F[23]
PASS_T2	EIPInput.SensorHeadStatusFlag2.F[24]
LOW_T2	EIPInput.SensorHeadStatusFlag2.F[25]
HIGH_T3	EIPInput.SensorHeadStatusFlag2.F[26]
PASS_T3	EIPInput.SensorHeadStatusFlag2.F[27]
LOW_T3	EIPInput.SensorHeadStatusFlag2.F[28]
HIGH_T4	EIPInput.SensorHeadStatusFlag2.F[29]
PASS_T4	EIPInput.SensorHeadStatusFlag2.F[30]
LOW_T4	EIPInput.SensorHeadStatusFlag2.F[31]
Command code	EIPInput.CommandCodeEcho
Response code	EIPInput.ResponseCode
Response data	EIPInput.ResponseData

• Output Area

Signal name	Variable name
Output Data1	EIPInput.OutputData[0]
Output Data2	EIPInput.OutputData[1]
Output Data3	EIPInput.OutputData[2]
Output Data4	EIPInput.OutputData[3]

● Accessing Communications Areas by Specifying I/O Memory Addresses

AT specifications can be set for variables to individually specify the I/O memory addresses that are assigned in the communications areas.

1 **Setting Tag Sets (Network Configurator)**

Specify the tag names in the PLC directly by using the I/O memory addresses that are assigned in the communications areas. (Output tags are specified for the input connections to the Sensor and input tags are specified for output connections to the PLC.)

Setting Examples
Output tag : D0
Input tag : D100

2 **Setting Variables (Sysmac Studio)**

Define variables with AT specifications to the I/O memory addresses that are assigned in the communications areas as shown below.

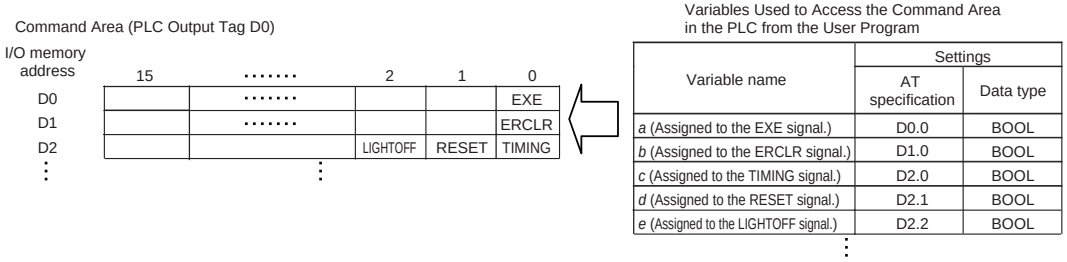
Setting Examples
Variable: *a* (AT specification: D0.0)
Variable: *b* (AT specification: D1.0)
Variable: *c* (AT specification: D2.0)
Variable: *d* (AT specification: D2.1)
Variable: e (AT specification: D2.2)
.
.
.

3 **Setting Connections**

Set the connections as shown in the following table.

Originator device (PLC) settings	Target device (Sensor) settings
Input tag set: D0	Output tag set: Input101
Output tag set: D100	Input tag set: Output100

Example: Setting Example for Variables to Access the Command Area



Variables Used to Access the Command Area in the PLC from the User Program

Variable name	Settings	
	AT specification	Data type
a (Assigned to the EXE signal.)	D0.0	BOOL
b (Assigned to the ERCLR signal.)	D1.0	BOOL
c (Assigned to the TIMING signal.)	D2.0	BOOL
d (Assigned to the RESET signal.)	D2.1	BOOL
e (Assigned to the LIGHTOFF signal.)	D2.2	BOOL

List of Commands (EtherNet/IP)

This list explains each of the commands used by EtherNet/IP.

● Utility commands

Instruction area Top channel (Hex)		Command name	Function	Reference (Pages)
+7	+6			
0010	3011	Data save	Saves the current system data and bank data to the main unit.	p.67
0010	E000	Sensor Head calibration	Calibrate the Sensor Head.	p.68
0010	F010	Restart	Restarts the displacement sensor.	p.68

● Bank control command

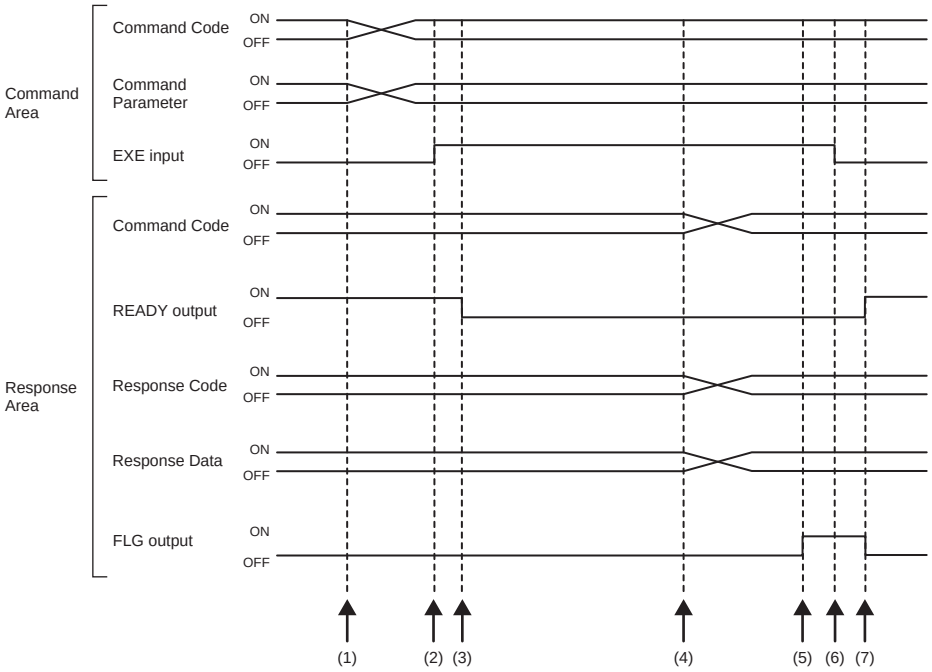
Instruction area Top channel (Hex)		Command name	Function	Reference (Pages)
+7	+6			
0030	8000	Current bank settings	Replace the current bank number by the specified bank number.	p.69

● Data acquisition/setting commands

Instruction area Top channel (Hex)		Command name	Function	Reference (Pages)
+7	+6			
0040	1000	Processing unit data acquisition	Acquires the measurement data and setting data of the processing unit.	p.71
0050	1000	Processing unit data setting	Change the setting data of the processing unit.	p.72
0040	4000	System data acquisition	Acquires the system data.	p.73
0050	4000	System data settings	Sets the system data.	p.74

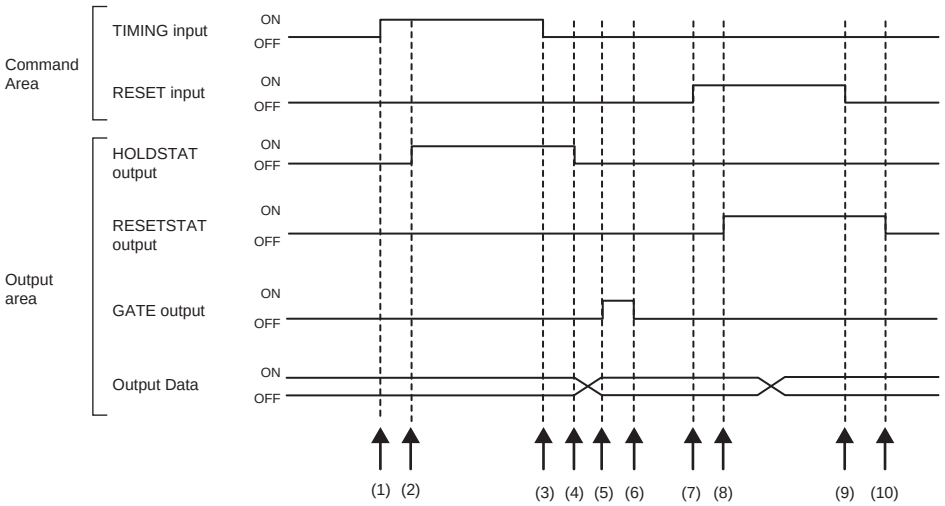
Timing Chart (EtherNet/IP)

● **Control command execution**



(1) The command code and command parameter are set from the Controller.
(2) The EXE input signal state is changed from OFF to ON. Execution is instructed to the displacement sensor.
(3) When the displacement sensor receives the execution instruction, the READY output signal turns OFF and the command is executed.
(4) When the displacement sensor completes execution, the command code, response code and response data are set.
(5) The FLG output signal turns ON.
(6) The Controller makes sure that the FLG output signal has turned ON, and then returns the EXE input signal to OFF.
(7) The displacement sensor makes sure that the EXE input signal has turned OFF, and the FLG and READY output signals automatically turn OFF and ON, respectively.

● **Execution of hold (peak/bottom/peak to peak/average) and reset of hold value**

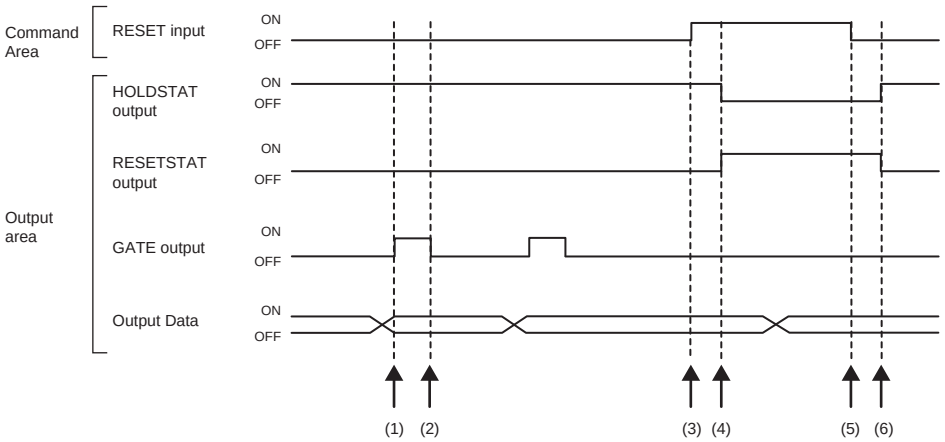


(1) The Controller changes the state of the TIMING input signal from OFF to ON. At the rising edge of the TIMING input signal, the displacement sensor starts sampling.
(2) At start of sampling, the displacement sensor changes the state of the HOLDSTAT output signal from OFF to ON.
(3) The Controller turns the state of the TIMING input signal from ON to OFF. At the falling edge of the TIMING input signal, the displacement sensor end sampling.
(4) At end of sampling, the displacement sensor changes the state of the HOLDSTAT output signal from ON to OFF.
(5) When the hold value is applied, the displacement sensor changes the state of the GATE output signal from OFF to ON. The Controller makes sure that the GATE output signal has turned ON, and then captures the output data.
(6) The displacement sensor turns OFF after the GATE signal ON duration has elapsed since the GATE output signal turned ON.
(7) The Controller changes the state of the RESET input signal from OFF to ON. At the rising edge of the RESET input signal, the displacement sensor starts the measured value reset period.
(8) At the start of the measured value reset period, the displacement sensor changes the state of the RESETSTAT output signal from OFF to ON. Measurement value is rested.
(9) The Controller changes the state of the RESET input signal from ON to OFF. At the falling edge of the RESET input signal, the displacement sensor end the measured value reset period.
(10) At the end of the measured value reset period, the displacement sensor changes the state of the RESETSTAT output signal from ON to OFF.

Important

When hold is being performed by multiple tasks, HOLDSTAT output signal turns ON when even one task enters the sampling period and GATE output signal turns ON when the measured value is applied.

● **Execution of hold (auto peak, auto bottom, auto peak to peak) and reset of hold value**



(1) When the peak value is applied, the displacement sensor changes the state of the GATE output signal from OFF to ON. The Controller makes sure that the GATE output signal has turned ON, and then captures the output data.

(2) The displacement sensor turns OFF after the GATE signal ON duration has elapsed since the GATE output signal turned ON.

(3) The Controller turns the state of the RESET input signal from OFF to ON. At the rising edge of the RESET input signal, the displacement sensor starts the measured value reset period.

(4) At the start of the measured value reset period, the displacement sensor changes the state of the HOLDSTAT output signal from ON to OFF and the RESETSTAT from OFF to ON. Measurement value is rested.

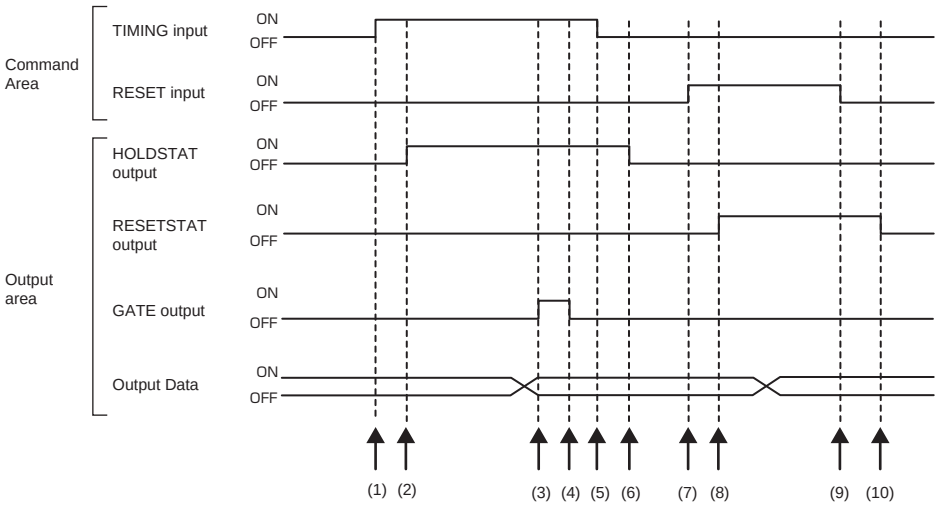
(5) The Controller changes the state of the RESET input signal from ON to OFF. At the falling edge of the RESET input signal, the displacement sensor end the measured value reset period.

(6) At the end of the measured value reset period, the displacement sensor changes the state of the HOLDSTAT output signal from OFF to ON and the RESETSTAT from ON to OFF.

Important

When hold is being performed by multiple tasks, HOLDSTAT output signal turns ON when even one task enters the sampling period and GATE output signal turns ON when the measured value is applied.

● **Execution of hold (sample) and reset of hold value**

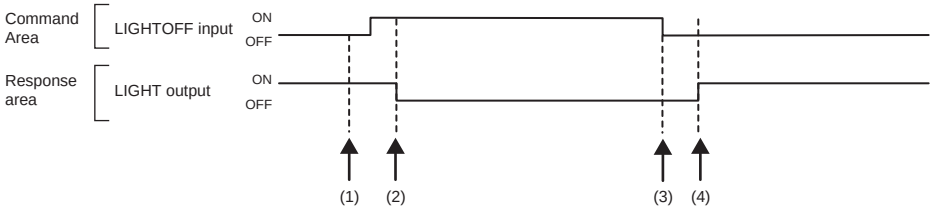


(1) The Controller changes the state of the TIMING input signal from OFF to ON. At the rising edge of the TIMING input signal, the displacement sensor starts sampling.
(2) At start of sampling, the displacement sensor changes the state of the HOLDSTAT output signal from OFF to ON.
(3) When the hold value is applied, the displacement sensor changes the state of the GATE output signal from OFF to ON. The Controller makes sure that the GATE output signal has turned ON, and then captures the output data.
(4) The displacement sensor turns OFF after the GATE signal ON duration has elapsed since the GATE output signal turned ON.
(5) The Controller turns the state of the TIMING input signal from ON to OFF. At the falling edge of the TIMING input signal, the displacement sensor end sampling.
(6) At end of sampling, the displacement sensor changes the state of the HOLDSTAT output signal from ON to OFF.
(7) The Controller changes the state of the RESET input signal from OFF to ON. At the rising edge of the RESET input signal, the displacement sensor starts the measured value reset period.
(8) At the start of the measured value reset period, the displacement sensor changes the state of the RESETSTAT output signal from OFF to ON. Measurement value is rested.
(9) The Controller changes the state of the RESET input signal from ON to OFF. At the falling edge of the RESET input signal, the displacement sensor end the measured value reset period.
(10) At the end of the measured value reset period, the displacement sensor changes the state of the RESETSTAT output signal from ON to OFF.

Important

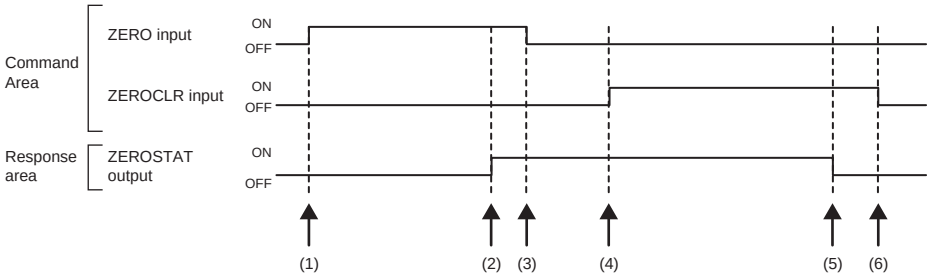
When hold is being performed by multiple tasks, HOLDSTAT output signal turns ON when even one task enters the sampling period and GATE output signal turns ON when the measured value is applied.

● **Measurement light source out**



(1) The Controller changes the state of the LIGHTOFF input signal from OFF to ON. At the rising edge of the LIGHTOFF input signal, the displacement sensor turns the measurement light source out.
(2) At measurement light source out, the displacement sensor changes the state of the LIGHT output signal from ON to OFF.
(3) The Controller turns the state of the LIGHTOFF input signal from ON to OFF. At the falling edge of the LIGHTOFF input signal, the displacement sensor lights the measurement light source.
(4) At measurement light source on, the displacement sensor returns the LIGHT output signal to ON.

● **Zero reset execution/zero reset cancel**

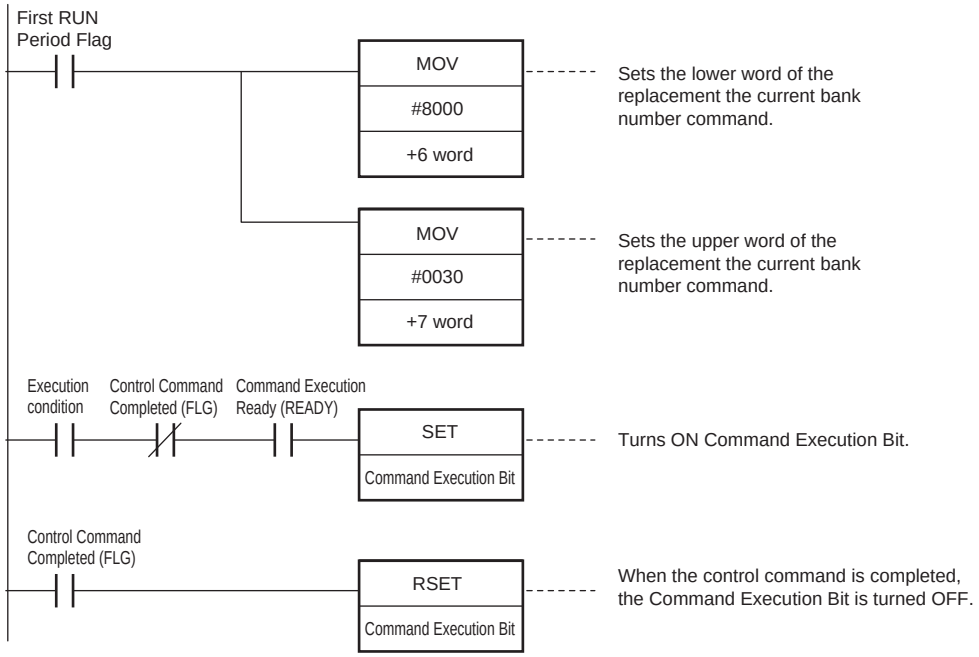


(1) The Controller changes the state of the ZERO_T1 to 4 input signals from OFF to ON. The displacement sensor makes sure that ZERO_T1 to 4 input signals have turned ON, and then executes the zero reset.
(2) At execution of zero reset, the displacement sensor changes the state of the ZEROSTAT_T1 to 4 output signal from OFF to ON.
(3) The Controller makes sure that the ZEROSTAT_T1 to 4 output signals have turned ON, and then returns the ZERO_T1 to 4 input signals to OFF.
(4) The Controller changes the state of the ZEROCLR_T1 to 4 input signals from OFF to ON. The displacement sensor makes sure that ZEROCLR_T1 to 4 input signals have turned ON, and then executes the zero reset cancel.
(5) At the zero reset cancel, the displacement sensor returns the ZEROSTAT_T1 to 4 output signals to ON.
(6) The Controller makes sure that the ZEROSTAT_T1 to 4 output signals have turned OFF, and then returns the ZEROCLR_T1 to 4 input signals to OFF.

Sample Ladder Program (EtherNet/IP)

● Command/Response Communications

The following sample program is used to perform replacement the current bank number.
The replacement the current bank number command (lower bytes: #8000, upper bytes: #0030) is sent to the Displacement Sensor.



Important

Create the ladder program to control the EXE signal so that it does not turn ON while the READY signal is ON. If not, a EXE input error will occur and the ERR signal will turn ON.

MEMO

No-protocol Connection

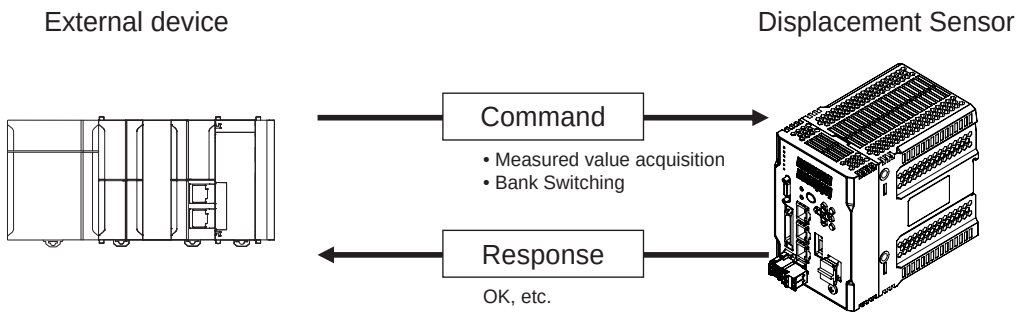
5-1 No-protocol Connection

Outline of No-protocol Communications

A system is possible where no-protocol communications is performed between the displacement sensor and an external device (e.g. PLC) and control from the external device (e.g. PLC) is performed by commands/responses.
Communications with the external device is possible over Ethernet or the RS-232C interface. This control system functions in the RUN mode. Communications is not possible in the FUNC mode. Also, when a system error occurs, commands from the external device are accepted, though setting commands are not executed.

● Command/response system

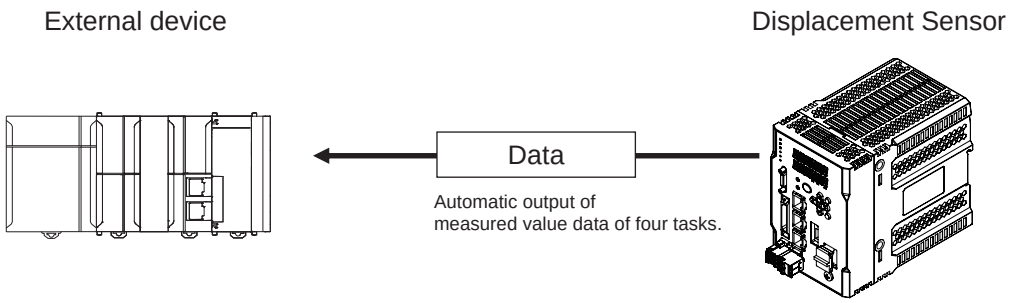
With no-protocol communications, a control command is sent to the displacement sensor from the external device (e.g. PLC) and the response is sent from the displacement sensor is received by the external device (e.g. PLC). By this, the measured value is acquired from the displacement value, and bank switch and various other controls are performed.



In actual terms, an ASCII character command (e.g. “MS” for acquiring the measured value) is issued from the external device (e.g. PLC). The displacement sensor returns responses such as “OK”, “NG” or a value.

● Serial data output method after application of measured value

When hold is set, immediately after the measured value has been applied, the measured value data from the displacement sensor is output automatically to the output device (e.g. PLC).
This enables the measurement value data for all tasks to be easily handed over to an external device (e.g. PLC).



Data can be output with Ethernet or with RS-232C. Measured value data can be sent to an external device (e.g. PLC) serially (continuously) in ASCII format or binary format. External device
There is no handshaking for whether or not an external device (e.g. PLC) can receive data.

Setting Communications Specifications (Ethernet Communications)

Setting Network Settings in the Sensor

This section describes how to set the network settings in the Displacement Sensor.

▶ **Multi View Explore : [Device group] | Sensor name | [System] | [System data] (Double-click)**
→ **Edit Pane : [Ethernet communication settings] icon ( ) | [Ethernet settings]**

The following items can be set.

Item	Description	Setting range
IP address	Set the IP address of the Displacement Sensor.	a.b.c.d a: 1 to 223, b: 0 to 255, c: 0 to 255, d: to 254 (Default: 192.168.250.50)
Subnet mask	Set the subnet mask.	0.0.0.0 to 255.255.255.255 (Default: 255.255.255.0)
Default Gateway	Sets the default gateway.	0.0.0.0 to 255.255.255.255 (Default: 0.0.0.0)

Important

The measurement sensor must be restarted in order for the IP address setting to take effect.

Initial Settings for No-protocol Communications

You must set the communications method, destination IP address, and I/O port number of the destination external device to perform no-protocol communications.

▶ Multi View Explore : [Device group] | Sensor name | [System] | [System data] (Double-click)
→ Edit Pane : [Ethernet communication settings] icon ( ) |
[No-Protocol data communication setting]

The following items can be set.

Item	Description	Setting range
Communication type	Select the communications method.	• OFF • TCP server • TCP client • UDP (Default: TCP server)
Port No. In	Sets the ZW port number when the UDP or TCP server is selected.	0 to 65,535 (Default: 9601) • The following port number is reserved and cannot be used: 9600, 9602
IP address	Set the IP address of the external device at the connection destination when the UDP or TCP client is selected. Set it in the form a.b.c.d. **Note** If you connect a PLC or other device over Ethernet, the following default IP address is assigned to the external device (such as a PLC). • IP address: 192.168.250.node_address	a: 1 to 223, b: 0 to 255, c: 0 to 255, d: to 254 (Default: 192.168.250.100)
Port No. Out	Set the I/O port number of the external device at the connection destination when the UDP or TCP client is selected. Set the value to between 0 and 65,535.	0 to 65,535 Default: 9,600 (Default: 9,601)

Important

When the communication type is set to non-procedural (TCP client), make sure that communication is possible with the external device that will function as the TCP server after the ZW starts (25 seconds after a voltage of 24V is applied to the circuit). In addition, if communication is interrupted and reconnecting becomes unavailable due to a disconnected Ethernet cable or other reasons, please restart the ZW.

Note

The initial setting for No-protocol Communications can also be set by the operating keys on the Sensor Controller.

Initial Settings for No-protocol Communications p.179

Setting Communications Specifications (RS-232C Communications)

Setting RS-232C communications on the sensor body

Set RS-232C communications on the displacement sensor body.

▶ Multi View Explore : [Device Group] | [(Sensor Name)] | [System] | [System Data] (double-click)

→ Edit pane : [RS-232C Communications Settings] icon ( )

Item	Description	Range
Baud rate	Sets the data transfer speed.	9600bps, 19200bps, 38400bps (default value), 57600bps, 115200bps
Data length	Sets the data length.	8 bits (default value), 7 bits
Parity	Sets the parity bit (error detection sign).	None (default value), odd, even
Stop bit	Sets the stop bit.	1bit (default), 2bit
Delimiter	Sets the delimiter (data delimiter).	CR (default), LF, CR+LF
CS/RS	Sets the flow control.	OFF(default value)/ON

Note

- With the ZW-8000/7000/5000 Series, communication cannot be established under the following condition.
  Data length: 7-bit and Parity: None
- The RS-232C communication specifications can also be set with key operations on the Sensor Controller.

6-4 Connecting by No-protocol Communications p.179

When the Mesurement cycle is short or use conveniently other communication processing, enable the flow control for surely RS-232C communication.

Setting for serial data output after application of measured value

The defined Measurement result of OUT1 to OUT4 can be output automatically when Holding value is specified.

Data that can be output

The data to be output is Measurement result applied at the time that the output cause occurs.

Timing for outputting data

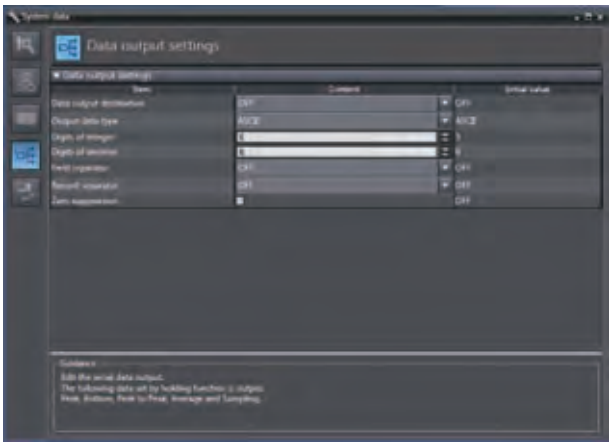
When hold (peak, bottom, peak-to-peak, average, sampling) is set, the Measurement result data is output when a measured value is applied for even one of the four tasks. For the Hold trigger method, External input, Selfup trigger, Selfdown trigger, and Self-trigger (valid value) are supported.

Setting the data output destination

Serial data can be output from Ethernet or RS-232C. This section describes the procedure for the setting.

Item	Setting item	Description	Range
Data output settings	Data output destination	Sets the interface for serial data output.	OFF (default value)/Ethernet/RS-232C

▶ Multi View Explore : [System] (double-click)
→ Edit pane : [Data output settings] icon ( )



Note

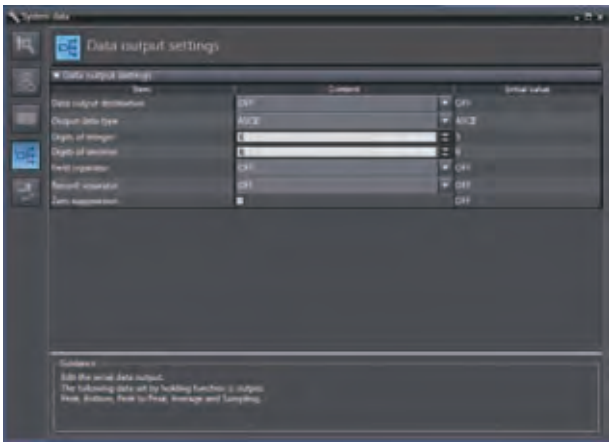
- When the output timing is such that multiple records are buffered, data for up to 10 records is output together.
- When output data is buffered faster than it is output, the outputting cannot keep up and an overflow occurs in the ZW. If this happens, “OUT.OVR” appears on the main segment. You can recover from the error display by pressing the ESC/ZERORST key.
- Up to 128 records of output can be buffered.
- Data output destination can also be set by the operating keys on the Sensor Controller.
- When "RESET input ON", "Bank switching", "Bank data update" or "Clamp value input" is performed with TIMING input ON, the measurement value is updated to a non-measurement state, serial data output is executed.
- Serial data is output each time the measurement value is determined. When sampling is set, serial data output is executed when TIMING is turned ON. For other settings, serial data output is executed when TIMING is turned OFF.
  If an abnormal measured value is input while TIMING is ON with the non-measurement setting set to "CLAMP", serial data output is executed when the abnormal measured value is input.

Setting Serial Data Output p.181

Setting the output format

Item	Setting item	Description	Range
Data output settings	Output data type	Select the output format.	ASCII, Binary (default value: ASCII)
	Digits of integer	Select the number of digits in the integer part.	1 to 5 [digits] (default value: 5 digits)
	Digits of decimal	Select the number of digits in the fractional part.	0 to 6 [digits] (default value: 6 digits)
	Zero suprression	Select whether or not to suppress leading zeros.	ON/OFF (default value: ON)
	Field separator	Select the type of field separator.	OFF, comma, tab, space, CR, LF, CR+LF, semicolon (default value: OFF)
	Record separator	Select the type of record separator.	OFF, comma, tab, space, CR, LF, CR+LF, semicolon (default value: OFF)

▶ Multi View Explore : [System] (double-click)
→ Edit pane : [Data output setting] icon ( )



Note

The output format can also be set by the operating keys on the Sensor Controller.

Setting Serial Data Output p.181

• When the output format is ASCII

Set the number of digits in the integer section, number of digits in the fraction section, negative number expression, zero suppression, field separator, and record separator items.

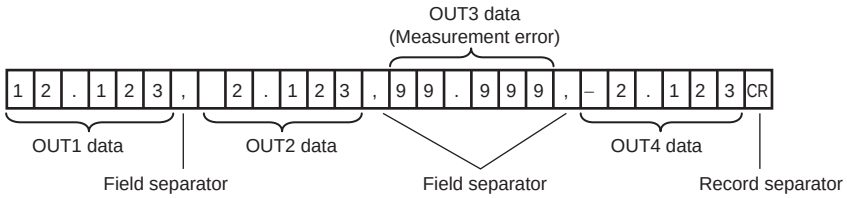
• Output Format

OUT1 data	,	OUT2 data	,	・・・	OUT4 data	CR

Note

The output format, number of digits and the data separator, etc. can be changed if necessary.

Example) Integer digits: “2 digits”, fractional digits: “3 digits”, zero suppression: “No”, field separator: “comma”, record separator: “CR”



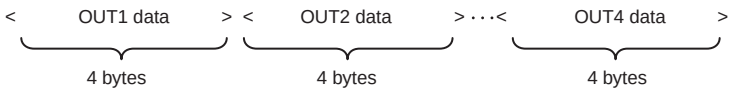
Note

If the measurement result is an abnormal value, the maximum value that can be expressed with the number of integer and fractional digits is output.
If the measurement result cannot be expressed because of the number of digits, the maximum value or minimum value that can be expressed is output.

• When the output format is binary

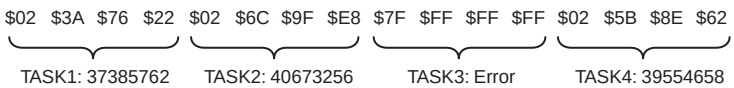
Set the numeric expression.
Select whether fixed decimal point or floating decimal point.

• Output Format



Measurement values expressed in mm are output continuously with 4 bytes per each data item.
Negative numbers are output in 2's complement format.

(Example) TASK1 to TASK4 are assigned to OUT1 to OUT4. When TASK1 is “37.385762 mm”, TASK2 is “40.673256 mm”, TASK3 is “Measurement value error”, and TASK4 is “39.554658 mm”.



Note

- If the measurement result is abnormal value, selected value in CRAMP is output.
- Unlike ASCII output, binary output has no separators between data such as field separators or record separators, etc.

Command List

This table lists no-protocol communications commands.
The available commands are listed as follows.

Command name	Format	Return value *1	Description	Pages
MS	MS <Task number> <Delimiter>	<Measured value> <Delimiter>	Acquires the current measured value. If the <task number> is omitted, the measured value displayed is acquired. If “4” is set for the <task number>, the measured values for all tasks are obtained.	p.130
JG	JG <Task number> <Delimiter>	<Judgment result> <Delimiter>	Acquires the judgment result of the specified task. If the <task number> is omitted, the result of the task of which the result is currently displayed is acquired. If “4” is set for the <task number>, the judgment results for all tasks are obtained.	p.131
DG	DG <unit number> <Data number> <Delimiter>	<Data> <Delimiter>	Acquires the measurement data and setting data of the processing unit.	p.132
DS	DS <unit number> <Data number> <Measured value> <Delimiter>	OK <Delimiter>	Change the setting data of the processing unit.	p.133
BG	BG <Delimiter>	<Bank number> <Delimiter>	Acquire the current bank number.	p.134
BS	BS <Bank number> <Delimiter>	OK <Delimiter>	Replace the current bank number by the specified bank number.	p.135
ZR	ZR <Task number> <Delimiter>	OK <Delimiter>	Execute a zero reset for the specified task. If the <task number> is omitted, the zero reset is executed for the task of which the result is currently displayed. If “4” is set for the <task number>, this is executed for all tasks.	p.136
ZC	ZC <Task number> <Delimiter>	OK <Delimiter>	Cancel the zero reset of the specified task. If the <task number> is omitted, the zero reset is executed for the task of which the result is currently displayed. If “4” is set for the <task number>, this is executed for all tasks.	p.137
TM	TM <0:OFF/ 1:ON> 0<Delimiter>	OK <Delimiter>	Executes TIMING input. * Calculates OR with the parallel input.	p.138
RT	RT <0:OFF/ 1:ON> 0<Delimiter>	OK <Delimiter>	Executes RESET input. * Calculates OR with the parallel input.	p.138
LD	LD <0: Lit/ 1: Out> 0<Delimiter>	OK <Delimiter>	Turns the logical beam ON/OFF.	p.139
VR	VR <Delimiter>	<Model/Version> <Delimiter>	Acquire the system version information. (Example) ZW-7000 2.100 <Delimiter>	p.139
CA	CA 0 <Delimiter>	OK <Delimiter>	Calibrate the Sensor Head.	p.140
LS	LS <Save intervals> <Number of saves> <Delimiter>	OK <Delimiter>	Start the internal logging of the data.	p.140
LE	LE <Delimiter>	OK <Delimiter>	End the internal logging of the data.	p.141

Command name	Format	Return value *1	Description	Pages
LO	LO <Out number> <First data number> <Output data count> <Delimiter>	<Internal logging data > <Delimiter>	Acquires the internal logging data. If the <OUT number> cannot be omitted. internal logging data acquisition is executed for the task of which the result is currently displayed. If the <first data number> is omitted, internal logging data acquisition is executed from first data number “0”. If the <output data count> is omitted, all internal logging data acquisition is executed.	p.141
LG	LG <Label number> <OUT number> <First data number> <Output data count>	<Internal logging data> <Delimiter>	Acquires the internal logging data with the specified label number. <OUT number> cannot be omitted. If the <first data number> is omitted, the internal logging data acquisition is executed from the first specified label number. If the <output data count> is omitted, the internal logging data acquisition is executed for all the specified label numbers.	p.144
LC	LC <Delimiter>	OK <Delimiter>	Clear the internal logging data.	p.145
LI	LI <Label number> <Delimiter>	<Operation status> <Label count> <Logging data count> <Delimiter>	Acquire the internal logging information. When the <label number> is specified, information of that label number is acquired. When the <label number> is omitted, all internal logging data information is acquired.	p.146
DV	DV <Delimiter>	OK <Delimiter>	Save all bank data and system settings to EEPROM.	p.147
YG	YG <Data number>	<Numerical value data> <Delimiter>	Acquires the system data.	p.148
YS	YS <Data number> <Setting value>	OK <Delimiter>	Sets the system data.	p.149
IG	IG <Delimiter>	<IP address> <Delimiter>	Acquires the Ethernet IP address.	p.150
IS	IS <IP address>	OK <Delimiter>	Sets the Ethernet IP address.	p.150
KG	KG <delimiter>	<Subnet mask> <Delimiter>	Acquires the subnet mask.	p.151
KS	KS <subnet mask >	OK <Delimiter>	Sets the subnet mask.	p.151
GG	GG <delimiter>	<Default gateway> <Delimiter>	Acquires the default gateway.	p.152
GS	GS <default gateway>	OK <Delimiter>	Sets the default gateway.	p.152
OG	OG <Socket No.>	<OUT IP address> <Delimiter>	Acquires the OUT IP address of the specified socket number.	p.153
OS	OS <Socket No.> <OUT IP address>	OK <Delimiter>	Sets the OUT IP address of the specified socket number.	p.154
MI	MI <Delimiter>	<MAC ADDRESS> <Delimiter>	Acquires the MAC address.	p.155
HS	HS 0 <Delimiter>	<Head serial information> <Delimiter>	Acquires the head serial information.	p.155
RS	RS <Delimiter>	OK <Delimiter>	Restarts	p.156
EI	EI <Delimiter>	<Errornumber> <Delimiter>	Acquires the system error number.	p.156
GT	GT <Delimiter>	<Energization time> <Delimiter>	Acquires the energization time.	p.157
SI	SI <Delimiter>	OK <Delimiter> ER <Delimiter>	Executes sensor initialization.	p.158

*1: If the command was not successfully processed, “ER <delimiter>” is returned.

Command Format

Measurement command <MS command>

Acquires the current measured value.
* The same can be processed with the M, MEASURE command, which is in a ZS series format.

<Command format>

M	S		*	CR

↑ Space
↑ Task number

<Response format>

Normal measurement (Task numbers 0 to 3)

(Example) -30.719923mm

		–	3	0	7	1	9	9	2	3	CR

• The return value is right-aligned and 11 characters + delimiter.
• The unit of the measured values is nm.
• Spaces will fill any missing portion from the left.
• If the task number is omitted, the measured value displayed is acquired.

Normal measurement (Task number 4)

(Example) TASK1 -3.071992mm, TASK2 -2.998122mm, TASK3 2.345678mm, and TASK4 2.471249mm

			–	3	0	7	1	9	9	2	,
			–	2	9	9	8	1	2	2	,
				2	3	4	5	6	7	8	,
				2	4	7	1	2	4	9	CR

When measurement is not possible

–	–	–	–	–	–	–	–	–	–	–	CR

When a command was not successfully processed

E	R	CR

<Parameter explanation>

Parameter	Description
Task number	Specifies the number of the task of which the measurement value is to be output. 0: TASK1 1: TASK2 2: TASK3 3: TASK4 4: TASK1 to 4

Judgment result acquisition command <JG command>

Acquires the judgment result of the specified task.

<Command format>

J	G		*	CR

↑ Space

↑ Task number

<Response format>

Normal processing (Task numbers 0 to 3)

(Example) When the judgment result is “HIGH”

1	CR

↑ Judgment result

Normal processing (Task number 4)

(Example) TASK1 judgment result “HIGH”, TASK2/TASK3 judgment result “PASS”, TASK4 judgment result “LOW”

1	,	0	,	0	,	2	CR

When a command was not successfully processed

E	R	CR

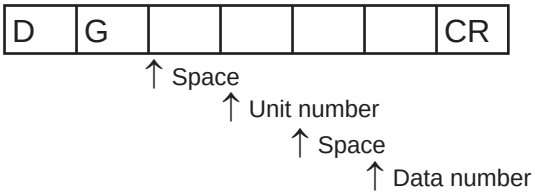
<Parameter explanation>

Parameter	Description
Task number	Specifies the number of the task of which the judgment result is to be output. 0: TASK1 1: TASK2 2: TASK3 3: TASK4 4: TASK1 to 4
Judgment result	Displays the judgment result. PASS: 0 HIGH: 1 LOW: 2 ERROR: 3

Processing unit data acquisition command <DG command>

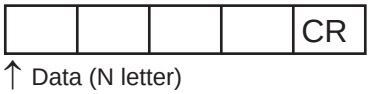
Acquires the measurement data and setting data of the processing unit.

<Command format>



<Response format>

Normal processing



When a command was not successfully processed

<Parameter explanation>

Parameter	Description
Unit number	Specifies the unit number (0 to 255) to be acquired.
Data number	Specifies the data number (0 to 255) to be acquired.

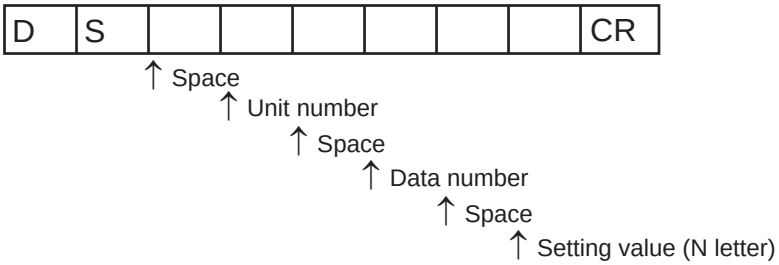
Important

For unit numbers and data numbers, refer to “8-1 Processing Item Data List” (p.202).

Processing unit data setting command <DS command>

Change the setting data of the processing unit.

<Command format>



<Response format>

Normal processing

When a command was not successfully processed

<Parameter explanation>

Parameter	Description
Unit number	Specifies the unit number (0 to 255) to be acquired.
Data number	Specifies the data number (0 to 255) to be acquired.
Setting value	This is the setting value of the specified data.

Important

For unit numbers and data numbers, refer to “8-1 Processing Item Data List” (p.202).

Current bank data acquisition command <BG command>

Acquire the current bank number.

<Command format>

B	G	CR

<Response format>

Normal processing

	CR

↑ Bank number

When a command was not successfully processed

E	R	CR

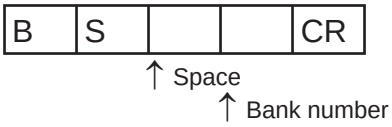
<Parameter explanation>

Parameter	Description
Bank number	Normal 0: BANK1 1: BANK2 : 7: BANK8 Judgment value mode 0: BANK1 1: BANK2 : 31: BANK32

Current bank data setting command <BS command>

Replace the current bank number by the specified bank number.

<Command format>



<Response format>

Normal processing

When a command was not successfully processed

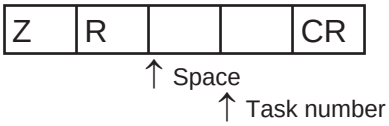
<Parameter explanation>

Parameter	Description
Bank number	Normal 0: BANK1 1: BANK2 : 7: BANK8 Judgment value mode 0: BANK1 1: BANK2 : 31: BANK32

Zero reset execution command <ZR command>

Execute a zero reset for the specified task.

<Command format>



<Response format>

Normal processing

• If the task number is omitted, the zero reset is executed for the task of which the result is currently displayed.
• If “4” is set for the task number, the zero reset is executed for all tasks.

When a command was not successfully processed

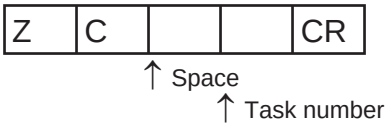
<Parameter explanation>

Parameter	Description
Task number	Specifies the number of the task for which the zero reset is to be executed. 0: TASK1 1: TASK2 2: TASK3 3: TASK4 4: TASK1 to 4

Zero reset cancel command <ZC command>

Cancel the zero reset of the specified task.

<Command format>



<Response format>

Normal processing

- If the task number is omitted, the zero reset is canceled for the task of which the result is currently displayed.
- If “4” is set for the task number, the zero reset is canceled for all tasks.

When a command was not successfully processed

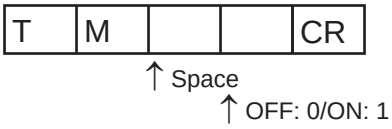
<Parameter explanation>

Parameter	Description
Task number	Specifies the number of the task for which the zero reset is to be cancelled. 0: TASK1 1: TASK2 2: TASK3 3: TASK4 4: TASK1 to 4

TIMING input command <TM command>

Executes TIMING input.

<Command format>



<Response format>

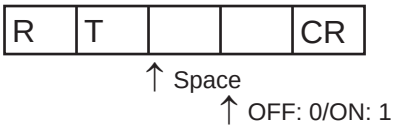
Normal processing

When a command was not successfully processed

RESET input command <RT command>

Executes RESET input.

<Command format>



<Response format>

Normal processing

When a command was not successfully processed

LIGHT OFF input command <LD command>

Turns the logical beam ON/OFF.

<Command format>

L	D			CR

↑ Space

↑ON: 0/OFF: 1

<Response format>

Normal processing

O	K	CR

When a command was not successfully processed

E	R	CR

Version information acquisition command <VR command>

Acquire the system version information.

<Command format>

V	R	CR

<Response format>

Normal processing

Z	W	–	7		2	.	0	0	0	CR

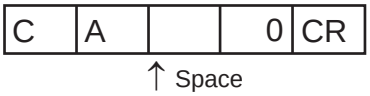
When a command was not successfully processed

E	R	CR

Sensor head calibration command <CA command>

Calibrate the Sensor Head.

<Command format>



<Response format>

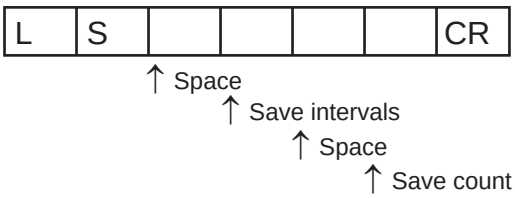
Normal processing

When a command was not successfully processed

Internal logging start command <LS command>

Start the internal logging of the data.

<Command format>



<Response format>

Normal processing

When a command was not successfully processed

<Parameter explanation>

Parameter	Description
Save intervals	Sets the intervals(0 to 1000) to be internally logged. If “1” is set , all measured data is stored, and “2” is set, one measured data is stored every two measurement. If “0” is set, only the applied measured data is stored when hold is set.
Save count*	Sets the maximum data count (0 to 2,000,000) to be internally logged. The internal logging process ends when the number of internal logging data reaches the maximum.

* The label data count is not included in the save count.
* The maximum amount of internal logging data that can be saved is 2000000 (total of label data count and internal logging data count).

Internal logging end command <LE command>

End the internal logging of the data.

<Command format>

L	E	CR

<Response format>

Normal processing

O	K	CR

When a command was not successfully processed/When internal logging is not started

E	R	CR

• The internal logging process ends without sending LE command when the number of internal logging data reaches the maximum.

Internal logging data acquisition command <LO command>

Acquires the internal logging data.

<Command format>

L	O							CR

↑ Space ↑ Space ↑ Space ↑ Output data count
↑ Out number ↑ First data number

• <OUT number> cannot be omitted.
• If the <first data number> is omitted, internal logging data acquisition is executed from first data number “0”.
• If the <output data count> is omitted, all internal logging data acquisition is executed.

<Response format>

When completed successfully (with the label insert mode OFF)

The internal logging data is output.

(Example)
Assuming the acquisition of four internal logging data, where in the first logging, the 0th data is -3.071992mm and the 1st data, -2.998122mm, and in the second logging, the 0th data is 2.345678mm and the 1st data, 2.471249mm.

■ When the output data format is ASCII

			−	3	0	7	1	9	9	2	,
			−	2	9	9	8	1	2	2	,
				2	3	4	5	6	7	8	,
				2	4	7	1	2	4	9	CR

- The character format is ASCII.
- The return value is right-aligned and 11 characters + delimiter.
- The unit of the measured values is nm.
- Spaces will fill any missing portion from the left.

■ When the output data format is Binary.
The size per data is 4 bytes.

FF D1 20 08	FF A4 81 2D	00 23 CA CE	00 25 B5 51
1st logging 0th data	1st logging 1st data	2nd logging 0th data	2nd logging 1st data

Important

Unlike ASCII, comma and CR are not added when the output format is binary.

with the label insert mode OFF
The internal logging data is output.
(Example) Assuming the acquisition of four internal logging data, where in the first logging, the 0th data is -3.071992mm and the 1st data, -2.998122mm, and in the second logging, the 0th data is 2.345678mm and the 1st data, 2.471249mm.

■ When the output data format is ASCII

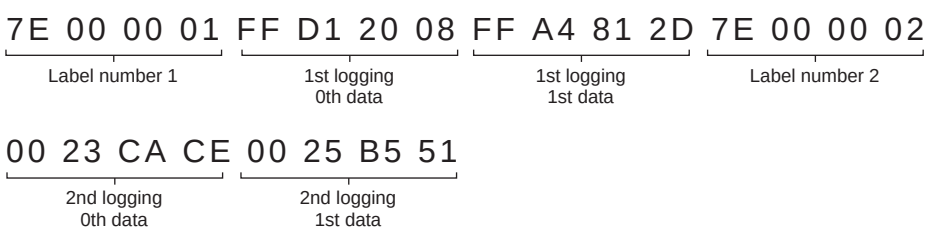
L	__	0	0	0	0	0	0	0	0	1	,
			−	3	0	7	1	9	9	2	,
			−	2	9	9	8	1	2	2	,
L	__	0	0	0	0	0	0	0	0	2	,
				2	3	4	5	6	7	8	,
				2	4	7	1	2	4	9	CR

- The character format is ASCII.
- The numbers that start with "L_" are the label numbers.

• The return value is right-aligned and 11 characters.
• The unit of the measurement values is nm.
• Spaces will fill any missing portion from the left.

■ When the output format is binary

The size per data is 4 bytes.



• The numbers that start with "7E" are the label numbers.
• Unlike ASCII, comma and CR are not added when the output format is binary.

When a command was not successfully processed/When internal logging is not stopped

E	R	CR

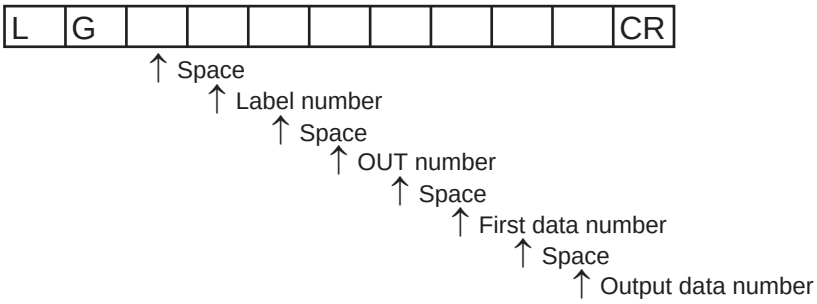
<Parameter explanation>

Parameter	Description
Task number	Sets the Out number under which to obtain internal log data. 0: OUT1 1: OUT2 2: OUT3 3: OUT4
First data number	Sets the first logging data number (1 to 2000000) that is acquired from beginning. Beginning data number is “0”.
Output data count	Sets the logging data count (1 to 2000000) that is acquired. If stored internal logging data count is lower than setting, all logging data is acquired. If nothing is stored, command response is ER.

Internal logging output command (for labels) <LG command>

Acquires the internal logging data by specifying the label number.

<Command format>



<Response format>

Normal processing

The internal logging data is output.

(Example) Assuming the acquisition of four internal logging data, where in the first logging, the 0th data is -3.071992mm and the 1st data, -2.998122mm, and in the second logging, the 0th data is 2.345678mm and the 1st data, 2.471249mm.

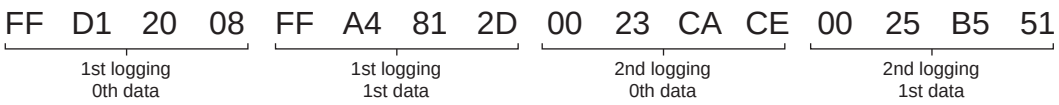
■ When the output data format is ASCII

			−	3	0	7	1	9	9	2	,
			−	2	9	9	8	1	2	2	,
				2	3	4	5	6	7	8	,
				2	4	7	1	2	4	9	CR

- The character format is ASCII.
- The return value is right-aligned and 11 characters + delimiter.
- The unit of the measured values is nm.
- Spaces will fill any missing portion from the left.

■ When the output data format is ASCII

The size per data is 4 bytes.



When a command was not successfully processed/When internal logging is not stopped/When the applicable label number data does not exist

E	R	CR

<Parameter explanation>

Parameter	Description
Label number	Sets the label number under which to obtain internal logging data. The first label is the 1st. When 0 is set, all logging data is output and <start label> is added on the dividing lines between the labels. ER is returned when an unknown label is specified.
Out number	Sets the OUT number under which to obtain internal logging data. 0: OUT1 1: OUT2 2: OUT3 3: OUT4
First data number	Sets the first logging data number (0 to 1999998) that is acquired from beginning. Beginning data number is “0”.
Output data count	Sets the data count (1 to 1999999) to be acquired. Outputs all the internal logging data if the logging data for the specified label number does not meet the output data count. (The internal logging data for the next label number is not output.) However, ER is returned if there is no logging data.

<OUT number> cannot be omitted.

If the <first data number> is omitted, the internal logging data acquisition is executed from the first specified label number.

If the <output data count> is omitted, the internal logging data acquisition is executed for all the specified label numbers.

Only the internal logging data with the specified label number is output.

One label is equivalent to one internal logging data in memory. As a result, when label insert mode is ON, one label is always inserted making the maximum logging data count 1999999.

The <output data count> is the internal logging data count and does not include the label data count.

Internal logging data clear command <LC command>

Clear the internal logging data.

<Command format>

L	C	CR

<Response format>

Normal processing

O	K	CR

When a command was not successfully processed/When internal logging is not stopped

E	R	CR

- If internal logging is started without clearing logging data, data is saved end of last logging data.
- When ZW internal memory size is not enough, internal logging is automatically ended. Overwrite is not executed.

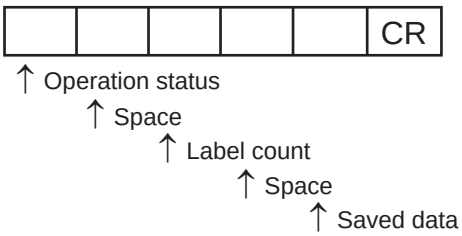
Internal logging data information acquisition command <LI command>

Acquire the internal logging information.

<Command format>

<Response format>

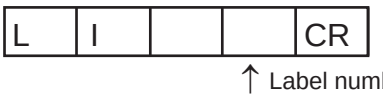
When completed successfully



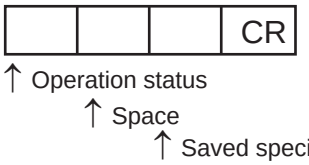
When a command was not successfully processed

with the label insert mode ON

<Command format>



<Response format>



When a command was not successfully processed / When the applicable label number data does not exist

<Parameter explanation>

Parameter	Description
Operation status	Displays the internal logging process status. 0: Internal logging stopped state 1: Internal logging in progress
Saved data count	Displays the number of saved logging data (0 and more).
Label number	Displays the label number (1 -).

Data save command <DV command>

Save all bank data and system settings to EEPROM.

<Command format>

D	V	CR

<Response format>

Normal processing

O	K	CR

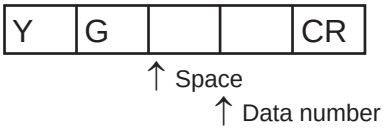
When a command was not successfully processed

E	R	CR

System data acquisition <YG command>

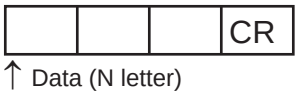
Acquires the system data.

<Command format>



<Response format>

Normal processing



When a command was not successfully processed

<Parameter explanation>

Parameter	Description
Data number	Specifies the data number (0 to 255) to be acquired.

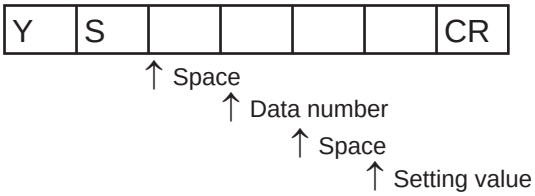
Note

For data numbers, refer to “8-2 System data list.”

System data setting <YS command>

Sets the system data.

<Command format>



<Response format>

Normal processing

When a command was not successfully processed

<Parameter explanation>

Parameter	Description
Data number	Specifies the data number to be acquired.
Setting value	This is the setting value of the specified data.

Note

For data numbers, refer to “8-2 System data list.”

IP address acquisition <IG command>

Acquires the IP address.

<Command format>

I	G	CR

<Response format>

Normal processing

(Example) When the IP address of the ZW is 192.168.250.50

1	9	2	.	1	6	8	.	2	5	0	.	5	0	CR

When a command was not successfully processed

E	R	CR

IP address setting <IS command>

Sets the IP address.

<Command format>

I	S		1	9	2	.	1	6	8	.	2	5	0	.	5	0	CR

↑ Space

<Response format>

Normal processing

O	K	CR

When a command was not successfully processed

E	R	CR

Subnet mask acquisition <KG command>

Acquires the subnet mask.

<Command format>

K	G	CR

<Response format>

Normal processing

(Example) When the ZW subnet mask is 255.255.255.0

2	5	5	.	2	5	5	.	2	5	5	.	0	CR

When a command was not successfully processed

E	R	CR

Subnet mask setting <KS command>

Sets the subnet mask.

<Command format>

(Example) When setting subnet mask 255.255.255.0 for the ZW

K	S		2	5	5	.	2	5	5	.	2	5	5	.	0	CR

↑ Space

<Response format>

Normal processing

O	K	CR

When a command was not successfully processed

E	R	CR

Default gateway acquisition <GG command>

Acquires the default gateway.

<Command format>

G	G	CR

<Response format>

Normal processing

(Example) When the ZW default gateway is 0.0.0.0

0	.	0	.	0	.	0	CR

When a command was not successfully processed

E	R	CR

Default gateway setting <GS command>

Sets the default gateway.

<Command format>

(Example) When setting the default gateway 0.0.0.0 for the ZW

G	S		0	.	0	.	0	.	0	CR

↑ Space

<Response format>

Normal processing

O	K	CR

When a command was not successfully processed

E	R	CR

OUT IP address acquisition of the specified socket number <OG command>

Acquires the OUT IP address.

<Command format>

O	G			CR

↑ Space

↑ Socket number

<Response format>

Normal processing

(Example) When the OUT IP address of the ZW is 192.168.250.100

1	9	2	.	1	6	8	.	2	5	0	.	1	0	0	CR

When a command was not successfully processed

E	R	CR

<Parameter explanation>

Parameter	Description
Socket number	Specifies the socket number of which the serial data is to be output. 1: Socket 1 (fixed at 192.168.250.100) 2: Socket 2 3: Socket 3 (fixed at 192.168.250.100) 4: Socket 4 (fixed at 192.168.250.100) (*) Sockets 3 and 4 are not used for serial data output.

OUT IP address setting of the specified socket number <OS command>

Sets the OUT IP address.

<Command format>

O	S				1	9	2	.	1	6	8	.	2	5	0	.	1	0	0	CR

↑ Space ↑ Space

↑ Socket number

<Response format>

Normal processing

O	K	CR

When a command was not successfully processed

E	R	CR

<Parameter explanation>

Parameter	Description
Socket number	Specifies the socket number of which the serial data is to be output. 1: Socket 1 (fixed at 192.168.250.100) 2: Socket 2 3: Socket 3 (fixed at 192.168.250.100) 4: Socket 4 (fixed at 192.168.250.100) (*1) Sockets 3 and 4 are not used for serial data output. (*2) Sockets 1, 3 and 4 are fixed and cannot be set by this command. Note, however, that OK is returned as the response.

MAC address acquisition <MI command>

Acquires the MAC address.

<Command format>

M	I	CR

<Response format>

(Example) When the MAC address of the ZW is 00.00.0A.75.00.00

Normal processing

0	0	:	0	0	:	0	A	:	7	5	:	0	0	:	0	0	CR

When a command was not successfully processed

E	R	CR

Head serial information acquisition <HS command>

Acquires the head serial information.

<Command format>

H	S		0	CR

↑ Space

<Response format>

Normal processing

(Example) When the head serial information is 1234567

1	2	3	4	5	6	7	CR

When a command was not successfully processed

E	R	CR

Restart <RS command>

Restarts the Sensor Controller

<Command format>

R	S	CR

<Response format>

Normal processing

O	K	CR

When a command was not successfully processed

E	R	CR

System error number acquisition command <EI command>

Acquires the system error number.

<Command format>

E	I	CR

<Response format>

Normal processing (Example: Error number 06 is returned.)

O	6	CR

Normal processing (Example: No error.)

O	O	CR

When a command was not successfully processed.

E	R	CR

Energization time acquires <GT command>

Acquires the energization time.

<Command format>

G	T	CR

<Response format>

Normal processing (Example: 12000 hours are returned.)

						1	2	0	0	0	CR

The return value is right-aligned and 11 characters + delimiter.
The unit is "Time".
Spaces will fill any missing portion from the left.

When a command was not successfully processed.

E	R	CR

<SI command>

Executes sensor setting initialization.
This command has the same processing content as setting initialization by HMI operation (SYSTEM → INT).

<Command format>

S	I	CR

<Response format>

Normal processing

O	K	CR

When a command was not successfully processed

E	R	CR

Sensor Controller Operations

6-1 Connecting Parallel I/O

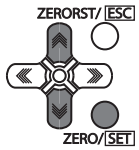
Settings for Analog Output

Setting the analog output destination

Setting the analog output destination p.23

As an example, here is an explanation of the procedure for outputting the voltage.

Operating procedure

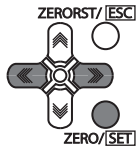
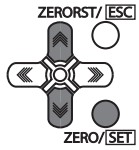
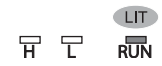
Steps	Key operation	Display	Description
1			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the FUNC mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the details on the functions of the Mode switching key.
2			Press the ◀◀/▶▶ keys to select "I/O" and press the ZERO/SET key.
3			Press the ◀◀/▶▶ keys to select "ANALOG" and press the ZERO/SET key.
4			Press the ◀◀/▶▶ keys to select "V OR C" and press the ZERO/SET key.
5			Select the output destination. VOLT: Voltage CUR: Current The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. In this example, select "VOLT" and press the ZERO/SET key.
6			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.

Assigning Analog Output

Assigning Analog Output p.25

As an example, here is an explanation of the procedure for outputting the results of TASK1 as analog.

Operating procedure

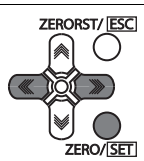
Steps	Key operation	Display	Description
1 to 3	For moving to “ANALOG”, see steps 1 to 3 in p.160.		
4			Press the ◀◀/▶▶ keys to select “OUTPUT” and press the ZERO/SET key.
5			Select the task to output. TASK1 to TASK4/OFF The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. In this example, select “TASK1” and press the ZERO/SET key.
6			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User’s Manual (Z362)" for the method to save the settings.

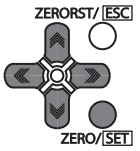
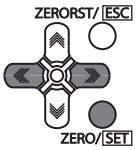
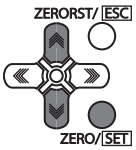
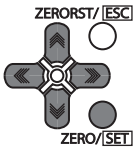
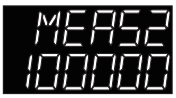
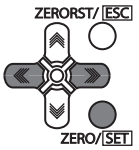
Setting Monitor Focus

Setting Monitor Focus p.26

The following describes the procedure when setting 4 mA output (Point1) for measured value of 0 mm and 20 mA output for measured value of 1mm (Point2).

Operating procedure

Steps	Key operation	Display	Description
1 to 3	For moving to “ANALOG”, see steps 1 to 3 in p.160.		
4			Press the ◀◀/▶▶ keys to select “FOCUS” and press the ZERO/SET key.

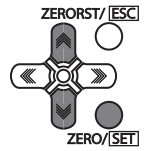
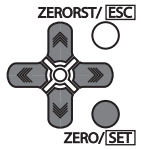
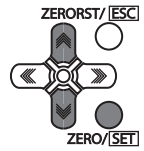
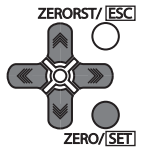
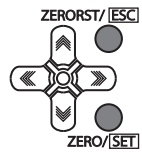
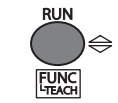
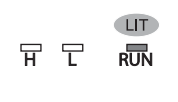
Steps	Key operation	Display	Description
5			Select monitor focus ON/OFF. The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. In this example, select “ON” and press the ZERO/SET key.
6			Set the distance value of the 1st point. The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. In this example, select “4mA” and press the ZERO/SET key.
7			Set the output value of the 1st point. The current setting value is displayed on the sub-display. Press ZERO/SET key to enter the editing mode, and the sub-display blinks. To edit numerical values, use the ▲/▼/◀/▶ keys. In this example, input “0”, then press the ZERO/SET key.
8			The decimal point is displayed. Press the ◀/▶ key to move the decimal point. Determine the decimal point and then press the ZERO/SET key.
9			Set the distance value of the 2nd point. The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. In this example, select “20mA” and press the ZERO/SET key.
10			Set the output value of the 2nd point. The current setting value is displayed on the sub-display. Press ZERO/SET key to enter the editing mode, and the sub-display blinks. To edit numerical values, use the ▲/▼/◀/▶ keys. In this example, input “6”, then press the ZERO/SET key.
11			The decimal point is displayed. Press the ◀/▶ key to move the decimal point. Determine the decimal point and then press the ZERO/SET key.
12			“OK/CAN” is displayed on the sub-display. Press the ZERO/SET key to reflect the settings or the ZERORST/ESC key to cancel.
13			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.

Adjusting the analog output value

Adjusting the analog output value p.27

As an example, the following explains the procedure for correcting 4 mA output (Point1) and 20 mA output (Point2).

Operating procedure

Steps	Key operation	Display	Description
1 to 3	For moving to “ANALOG”, see steps 1 to 3 in p.160.		
4			Press the ◀◀/▶▶ keys to select “CALIB” and press the ZERO/SET key.
5			Select analog output correction ON/OFF. The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. In this example, select “ON” and press the ZERO/SET key.
6			Set the reference value of the point1. The current set value for the point1 is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. In this example, select “4mA” and press the ZERO/SET key.
7			Set the adjustment value of the point1. Press the ▲/▼/◀◀/▶▶ keys to input the adjustment value [mA], and then press the ZERO/SET key. Next, check the ammeter value and press the ZERO/SET key. To re-adjust, press the ZERORST/ESC key.
8			Set the reference value of the point2. The current set value for the point2 is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. In this example, select “20mA” and press the ZERO/SET key.
9			Set the adjustment value of the point2. Press the ▲/▼/◀◀/▶▶ keys to input the adjustment value and press the ZERO/SET key. Next, check the ammeter value and press the ZERO/SET key. To re-adjust, press the ZERORST/ESC key.
10			“OK/CAN” is displayed on the sub-display. Press the ZERO/SET key to execute correction or ZERORST/ESC key to cancel.
11			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.

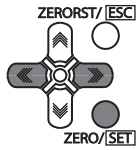
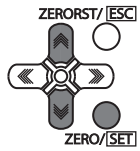
Settings for Judgment Output

Assigning judgment output

Assigning judgment output p.29

As an example, the following explains the procedure for outputting the judgment results for TASK1.

Operating procedure

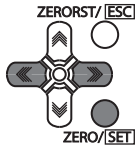
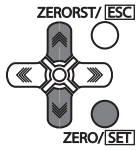
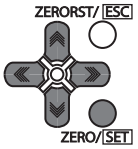
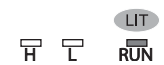
Steps	Key operation	Display	Description
1			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the FUNC mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the details on the functions of the Mode switching key.
2			Press the ◀◀/▶▶ keys to select "I/O" and press the ZERO/SET key.
3			Press the ◀◀/▶▶ keys to select "JUDGE" and press the ZERO/SET key.
4			Press the ◀◀/▶▶ keys to select "OUTPUT" and press the ZERO/SET key.
5			Select the task for which to output the judgment result. The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. In this example, select "TASK1" and press the ZERO/SET key.
6			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.

Setting Operation at Judgment Output

Setting Operation at Judgment Output p.30

As an example, the following explains the procedure for setting the timer type to “1 SHOT” and the timer duration to “10ms”.

Operating procedure

Steps	Key operation	Display	Description
1 to 3	For moving to “JUDGE”, see steps 1 to 3 in p.164.		
4			Select the judgment output setting item. HYS: Hysteresis width TIMER: Timer mode In this example, press the ◀◀/▶▶ keys, select “TIMER” and press the ZERO/SET key.
5			Select the timer mode. OFF: Not set OFF.DLY: Off Delay ONDLY: On Delay 1SHOT: One Shot Select “1SHOT” as the judgment output type. The current setting value is displayed on the sub-display. Press the ▲/▼ keys to enter the editing mode, and the sub-display blinks. Select “1SHOT” and press the ZERO/SET key.
6			Set the timer duration. The current setting value is displayed on the sub-display. Press ZERO/SET key to enter the editing mode, and the sub-display blinks. To edit numerical values, use the ▲/▼/◀◀/▶▶ keys. In this example, input “10”, then press the ZERO/SET key.
7			Press and hold the RUN/FUNC key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.

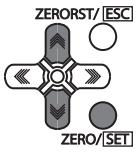
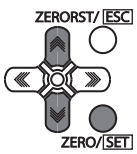
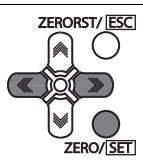
Settings for Processing When Measurement Is Not Possible

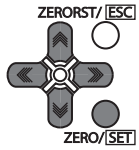
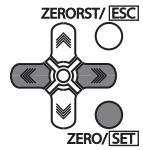
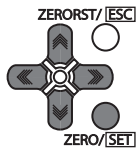
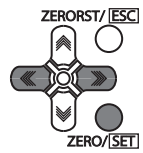
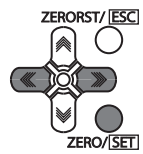
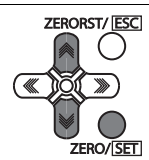
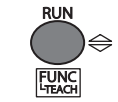
Setting operation when measurement is not possible

Refer to Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual(Z362) "4-5 I/O Settings".

As an example, the following explains the procedure for setting processing for when measurement is not possible to “KEEP”.

Operating procedure

Steps	Key operation	Display	Description
1			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the FUNC mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User’s Manual (Z362)" for the details on the functions of the Mode switching key.
2			Press the ◀◀/▶▶ keys to select “I/O” and press the ZERO/SET key.
3			Press the ZERO/SET key when "HLD.RST" is displayed on the main display. Select the ◀◀/▶▶ key if it is not displayed.
4			Select the operation when measurement is not possible. KEEP: KEEP CLAMP: CLAMP The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. In this example, select “CLAMP” and press the ZERO/SET key.
5			Press the ZERO/SET key when "KEEP.EN" is displayed on the main display. Select the ◀◀/▶▶ key if it is not displayed. (ZW-8000□ only)
6			Set the keep count enabled flag. Press ▲/▼ key to enter editing mode and the sub-display blinks. In this example, select “ON” and press the ZERO/SET key. (ZW-8000□ only)
7			Press the ZERO/SET key when "KEEP.CN" is displayed on the main display. Select the ◀◀/▶▶ key if it is not displayed. (ZW-8000□ only)

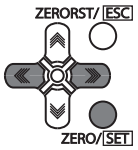
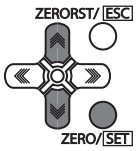
Steps	Key operation	Display	Description
8			Set the keep count. (ZW-8000□ only) The current setting value is displayed on the sub-display. The system enters editing mode at the same time the display operates and the sub-display blinks. To edit numerical values, use the ▲/▼/◀/▶ keys. In this example, select “10” and press the ZERO/SET key.
9			Press the ◀/▶ keys to select “RESR.CN” and press the ZERO/SET key. (ZW-8000□ only)
10			Set the restore count. (ZW-8000□ only) The current setting value is displayed on the sub-display. Press ZERO/SET key to enter editing mode and the sub-display blinks. To edit numerical values, use the ▲/▼/◀/▶ keys. In this example, select “10” and press the ZERO/SET key.
11			Press the ZERORST/ESC key to return to the previous menu.
12			Press the ◀/▶ keys to select “CLP.CON” and press the ZERO/SET key. (ZW-8000□ only)
13			Set the non-measurement condition. Press the ◀/▶ keys to select “REF.POW” and press the ZERO/SET key. (ZW-8000□ only)
14			Set the saturation to the non-measurement condition. Press ▲/▼ key to enter editing mode and the sub-display blinks. In this example, select “ON” and press the ZERO/SET key. (ZW-8000□ only)
15			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User’s Manual (Z362)" for the method to save the settings.

Setting the Clamp Value

Refer to Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual(Z362) "4-5 I/O Settings".

As an example, the following explains the procedure for setting the clamp value to “analog voltage output 10V”.

Operating procedure

Steps	Key operation	Display	Description
1 to 4	For moving to “HLD.RST” - “CLAMP”, see steps 1 to 4 in p.166.		
5			Press the ◀◀/▶▶ keys to select “ANALOG” and press the ZERO/SET key.
6			Set the clamp value. The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. Select “10V” and press the ZERO/SET key.
7			Press and hold the RUN/FUNC key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User’s Manual (Z362)" for the method to save the settings.

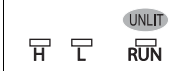
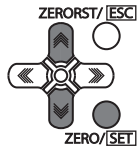
Settings for Digital Output

Select the Output Data

Refer to Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362) "4-5 I/O Settings".

As an example, the following explains the procedure for setting the OUT2 output value to "Peak amount of received light (PEAK.CT)".

Operating procedure

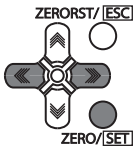
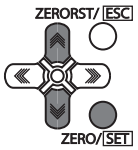
Steps	Key operation	Display	Description
1			Press and hold the RUN key for two seconds or more to enter the FUNC mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the details on the functions of the Mode switching key.
2			Press the ◀◀/▶▶ key to select "I/O" and press the ZERO/SET key.
3			Press the ◀◀/▶▶ key to select "DIGITAL" and press the ZERO/SET key.
4			Press the ◀◀/▶▶ key to select "OUT2" and press the ZERO/SET key.
5			Select the output data. The current setting value is displayed on the sub-display. Press the ▲/▼ keys to enter the editing mode, and the sub-display blinks. In this example, select "PEAK.CT" and press the ZERO/SET key.
6			Press and hold the RUN key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.

Setting the Clamp Value

Refer to Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362) "4-5 I/O Settings".

As an example, the following explains the procedure for setting the clamp value to "0x7FFFFFFF(MAX)".

Operating procedure

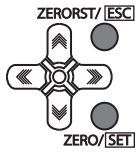
Steps	Key operation	Display	Description
1 to 3	Refer to steps 1 through 3 on p.188 for the transition from RUN "I/O" to "DIGITAL" when pressing the key for 2 seconds.		
4			Press the ◀◀/▶▶ key to select "CLAMP" and press the ZERO/SET key.
5			Set the clamp value. The current setting value is displayed on the sub-display. Press the ▲/▼ keys to enter the editing mode, and the sub-display blinks. Select "MAX", then press the ZERO/SET key.
6			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.

Settings for Parallel Input

Settings for Parallel Input p.22

The following explains the procedure for setting the width of the input signal filter.

Operating procedure

Steps	Key operation	Display	Description
1			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the FUNC mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the details on the functions of the Mode switching key.
2			Press the ◀◀/▶▶ key to select "SYSTEM" and press the ZERO/SET key.
3			Press the ◀◀/▶▶ key to select "FLT.WDT" and press the ZERO/SET key.
4			Set the width of the input signal filter. The current setting value is displayed on the sub-display. Press the ▲/▼ keys to enter the editing mode, and the sub-display blinks. Select "100US" and press the ZERO/SET key.
5			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.

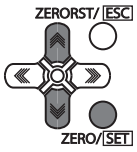
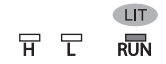
Settings for TIMING Input Mode

TIMING Input Mode

"Setting TIMING Input Mode" of "ZW-8000/7000/5000 series User's Manual (Z362) for Fiber Coaxial Measurement Sensor".

As an example, the following explains the procedure for setting the TIMING input mode to "specify timing to exposure".

Operating procedure

Steps	Key operation	Display	Description
1			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the FUNC mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the details on the functions of the Mode switching key.
2			Press the ◀◀/▶▶ key to select "I/O" and press the ZERO/SET key.
3			Press the ◀◀/▶▶ key to select "TIME.MOD" and press the ZERO/SET key.
4			Select the TIMING input mode. MEAS: Specify timing to measure EXPOSE: Specify timing to exposure The current setting value is displayed on the sub-display. Press the ▲/▼ keys to enter the editing mode, and the sub-display blinks. In this example, select "EXPOSE" and press the ZERO/SET key.
5			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.

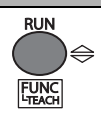
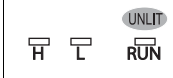
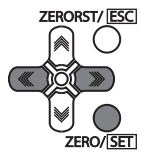
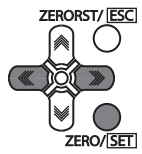
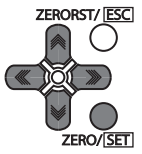
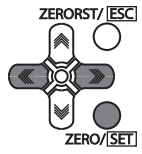
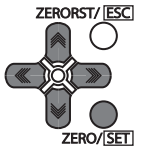
Setting for Internal Logging

Setting LOGGING save count and LOGGING save intervals

"3-8 Performing internal logging" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Cat. No.Z362) for internal logging functions

As an example, here is an explanation of the procedure for setting save intervals to “1” and save count to “100”.

Operating procedure

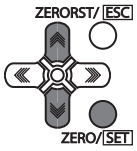
Steps	Key operation	Display	Description
1			Press and hold the RUN key for two seconds or more to enter the FUNC mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the details on the functions of the Mode switching key.
2			Press the ◀◀/▶▶ keys to select “SYSTEM” and press the ZERO/SET key.
3			Press the ◀◀/▶▶ keys to select “LOGGING” and press the ZERO/SET key.
4			Select the save intervals. Press the ◀◀/▶▶ keys to select “INTRVL” and press the ZERO/SET key.
5			Set the save intervals. The current setting value is displayed on the sub-display. Press ZERO/SET key to enter the editing mode, and the sub-display blinks. To edit numerical values, use the ▲/▼/◀◀/▶▶ keys. In this example, input “1”, then press the ZERO/SET key.
6			Press the ZERORST/ESC key to return to the previous menu.
7			Select the save count. Press the ◀◀/▶▶ keys to select “COUNT” and press the ZERO/SET key.
8			Set the save count. The current setting value is displayed on the sub-display. Press ZERO/SET key to enter the editing mode, and the sub-display blinks. To edit numerical values, use the ▲/▼/◀◀/▶▶ keys. In this example, input “100”, then press the ZERO/SET key.

Steps	Key operation	Display	Description
9			Press and hold the  key for two seconds or more to enter the FUNC mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the details on the functions of the Mode switching key.

Setting Fieldbus

Setting default settings for EtherCAT communications p.51

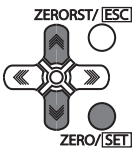
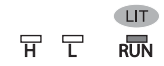
Operating procedure

Steps	Key operation	Display	Description
1			Press and hold the RUN key for two seconds or more to enter the FUNC mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the details on the functions of the Mode switching key.
2			Press the ◀◀/▶▶ keys to select "SYSTEM" and press the ZERO/SET key.
3			Press the ◀◀/▶▶ keys to select "COM" and press the ZERO/SET key.
4			Press the ◀◀/▶▶ keys to select "MEMLNK" and press the ZERO/SET key.
5			Select the Fieldbus. E-CAT: EtherCAT communications EIP: EtherNet/IP communications OFF: OFF The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. Select "E-CAT" and press the ZERO/SET key.
6			Press and hold the RUN key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.

Setting GATE Signal ON Time

Setting default settings for EtherCAT communications p.51

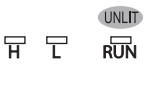
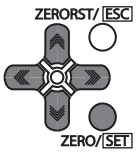
Operating procedure

Steps	Key operation	Display	Description
1			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the FUNC mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the details on the functions of the Mode switching key.
2			Press the ◀◀/▶▶ keys to select "SYSTEM" and press the ZERO/SET key.
3			Press the ◀◀/▶▶ keys to select "COM" and press the ZERO/SET key.
4			Press the ◀◀/▶▶ keys to select "GATE.TM" and press the ZERO/SET key.
5			Select the GATE signal ON time. The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. To edit numerical values, use the ▲/▼/◀◀/▶▶ keys. In this example, input "1", then press the ZERO/SET key.
6			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.

Network Settings of the Sensor

Setting Network Settings in the Sensor p.121

Operating procedure

Steps	Key operation	Display	Description
1			Press and hold the RUN key for two seconds or more to enter the FUNC mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the details on the functions of the Mode switching key.
2			Press the ◀◀/▶▶ keys to select "SYSTEM" and press the ZERO/SET key.
3			Press the ◀◀/▶▶ keys to select "COM" and press the ZERO/SET key.
4			Press the ◀◀/▶▶ keys to select "ETN" and press the ZERO/SET key.
5			Select the IP address from the setting item. Press the ◀◀/▶▶ keys to select "IPADDR" and press the ZERO/SET key.
6			Press the ◀◀/▶▶ keys to select "IP1" and press the ZERO/SET key.
7			Set the value of P1. The current setting value is displayed on the sub-display. Press the ▲/▼/◀◀/▶▶ keys to enter the editing mode, and the sub-display blinks. Input the value of IP1, then press the ZERO/SET key.
8			Press the ZERORST/ESC key to return to the previous menu.
9	Repeat steps 6 to 8 to enter the "IP2", "IP3" and "IP4" setting values.		
10			Press the ZERORST/ESC key twice to return to the menu before last.
11			Select the subnet mask from the setting item. Press the ◀◀/▶▶ keys to select "SUBNET" and press the ZERO/SET key.

Steps	Key operation	Display	Description
12	Perform the same steps to set the subnet mask.		
13			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.

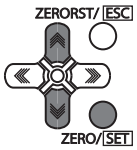
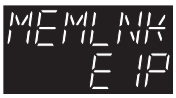
Important

- The default gateway cannot be set from the Sensor Controller.
- To enable the settings, restart the Sensor Controller.

Setting Fieldbus

Network Settings of the Sensor p.95

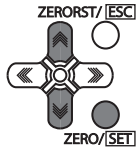
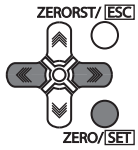
Operating procedure

Steps	Key operation	Display	Description
1			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the FUNC mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the details on the functions of the Mode switching key.
2			Press the ◀◀/▶▶ keys to select "SYSTEM" and press the ZERO/SET key.
3			Press the ◀◀/▶▶ keys to select "COM" and press the ZERO/SET key.
4			Press the ◀◀/▶▶ keys to select "MEMLNK" and press the ZERO/SET key.
5			Select the Fieldbus. E-CAT: EtherCAT communications EIP: EtherNet/IP communications OFF: OFF The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. Select "EIP" and press the ZERO/SET key.
6			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.

Initial Settings for No-protocol Communications

Initial Settings for No-protocol Communications p.122

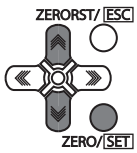
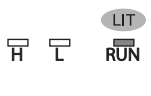
Operating procedure

Steps	Key operation	Display	Description
1 to 3	For moving to “COM”, see steps 1 to 3 in p.177.		
4			Press the ◀◀/▶▶ keys to select “RS232C” and press the ZERO/SET key.
5			Select the setting item: IPADDR: IP address SUBNET: Subnet mask PROTCL: Protocol OUTIP: Output IP address PORT.IN: Port number PORT.OT: Output destination port number In this example, press the ◀◀/▶▶ keys, select “PROTCL” and press the ZERO/SET key.
6			Selects the protocol. The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. Select “TCP.SV” and press the ZERO/SET key.
7			Press the ZERORST/ESC key to return to the previous menu.
8			Press the ◀◀/▶▶ keys to select “OUTIP” and press the ZERO/SET key.
9	Repeat steps 6 to 8 to set other items.		
10			Press and hold the RUN/FUNC key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.

Setting Communications Specifications (RS-232C Communications)

Setting Communications Specifications (RS-232C Communications) p.123

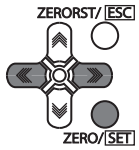
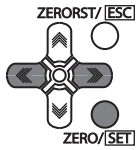
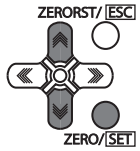
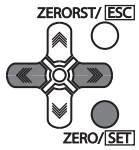
Operating procedure

Steps	Key operation	Display	Description
1 to 3	For moving to “COM”, see steps 1 to 3 in p.177.		
4			Press the ◀◀/▶▶ keys to select “RS232C” and press the ZERO/SET key.
5			Select the setting item: BAUD.RT: baud rate DATA: data length PARITY: parity STOP: stop bit CS/RS: CS/RS control In this example, press the ◀◀/▶▶ keys, select “DATA” and press the ZERO/SET key.
6			Selects the data length. The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. Select the data length, and press the ZERO/SET key.
7			Press the ZERORST/ESC key to return to the previous menu.
8			Press the ◀◀/▶▶ keys to select “PARITY” and press the ZERO/SET key.
9	Repeat steps 6 to 8 to set other items.		
10			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User’s Manual (Z362)" for the method to save the settings.

Setting Serial Data Output

Setting the data output destination p.125

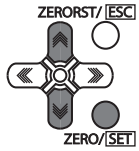
Operating procedure

Steps	Key operation	Display	Description
1			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the FUNC mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the details on the functions of the Mode switching key.
2			Press the ◀◀/▶▶ keys to select "I/O" and press the ZERO/SET key.
3			Press the ◀◀/▶▶ keys to select "COM.OUT" and press the ZERO/SET key.
4			Select the setting item: OUTPUT: Data output destination FORMAT: Output data type INT.NUM: Digits of integer DEC.NUM: Digits of decimal ZEROSP: Zero suprression FIELD: Field separator RECORD: Record separator In this example, press the ◀◀/▶▶ keys, select "OUTPUT" and press the ZERO/SET key.
5			Automatically Following the Range of Measurement Area2 The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. Select the data length, and press the ZERO/SET key.
6			Press the ZERORST/ESC key to return to the previous menu.
7			Select the save count. Press the ◀◀/▶▶ keys to select "FORMAT" and press the ZERO/SET key.
8	Repeat steps 5 to 7 to set other items.		
9			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.

Set the delimiter

Setting Communications Specifications (RS-232C Communications) p.123

Operating procedure

Steps	Key operation	Display	Description
1 to 3	For moving to “COM”, see steps 1 to 3 in p.177.		
4			Press the ◀◀/▶▶ keys to select “DELIMI” and press the ZERO/SET key.
5			Select the delimiter. The current setting value is displayed on the sub-display. Press ▲/▼ key to enter editing mode and the sub-display blinks. Select the delimiter, and press the ZERO/SET key.
6			Press and hold the RUN/FUNC/TEACH key for two seconds or more to enter the RUN mode. Refer to "7-3 Functions of Operating Keys" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User’s Manual (Z362)" for the method to save the settings.

Troubleshooting

7-1 Error Messages

Errors for EtherCAT Connection (Sysmac Error Status)

The Sysmac Studio Standard Version displays errors that occur in the EtherCAT system (including Sensor errors) as Sysmac error status.

Sysmac Error Status Table

This section provides a table of Sysmac error status that is related to the Sensor and describes the event codes.

Event levels are given as following in the tables.

Abbreviation	Name
Maj	Major fault level
Prt	Partial fault level
Min	Minor fault level
Obs	Observation
Info	Information

A version in parentheses in the Event code column is the unit version of the CPU Unit when the event was added.
Refer to the *NJ-series Troubleshooting Manual* (Cat. No. W503) for all NJ-series event codes.

Event Code	Event name	Meaning	Assumed cause	Level (*1)					Reference (Pages)
				Maj	Prt	Min	Obs	Info	
04D00000Hex ALARM	Hardware error	Some abnormality occurred on the displacement sensor hardware.	• Hardware damage			√			p.189
14B00000Hex ALARM	Linearity correction data error	The linearity correction data of the displacement sensor is damaged.	• Calibration ROM damage			√			p.189
14B10000Hex ALARM	Linearity correction data read error	Reading of the displacement sensor linearity correction data was not executed correctly.	• Calibration ROM not inserted • Calibration ROM damage			√			p.190
14B20000Hex ALARM	System setting error	The system settings saved to the displacement sensor are corrupt.	• The displacement sensor power was turned OFF during saving/loading of system settings.			√			p.190
14B40000Hex ALARM	Bank data error	The bank data saved to the displacement sensor is corrupt.	• The displacement sensor power was turned OFF during saving/loading of bank data.			√			p.191
14B40000Hex ALARM	Type mismatch	Combination of Sensor Head is not correct.	• A calibration ROM except ZW-7000/5000 series is inserted.			√			p.191
24810000Hex ALARM	Ethernet communication parameter error	An invalid IP address is set for the displacement sensor.	• Invalid IP address setting			√			p.192

Event Code	Event name	Meaning	Assumed cause	Level (*1)					Reference (Pages)
				Maj	Prt	Min	Obs	Info	
74900000 Hex	Multiple control signal input error	Multiple control signals turned ON in the same cycle.	• Multiple control signals turned ON in the same cycle.			√			p.192
74910000 Hex	EXE input error	EXE input processing was not executed correctly.	• EXE input turned ON in the FUNC mode. • EXE input turned ON with READY output OFF.			√			p.193
74920000 Hex	SYNC input error	SYNC input processing was not executed correctly.	• SYNC input turned ON in the FUNC mode.			√			p.193
74930000 Hex	TIMING input error	TIMING input processing was not executed correctly.	• TIMINGx input turned ON in the FUNC mode.			√			p.194
74940000 Hex	RESET input error	RESET input processing was not executed correctly.	• RESETx input turned ON in the FUNC mode.			√			p.194
74950000 Hex	ZERO input error	ZERO input processing was not executed correctly.	• ZEROx input turned ON in the FUNC mode.			√			p.195
74960000 Hex	ZEROCLR input error	ZEROCLR input processing was not executed correctly.	• ZEROCLRx input turned ON in the FUNC mode.			√			p.195

Note When error marked by ALARM occur, the ALARM output of parallel I/O turns ON, and “SYSERR” and error code are displayed on the main and sub-displays, respectively.

*1: Fault Levels

- Major Fault Level
  These errors prevent control operations for the entire Controller. If a major fault level error is detected, user program execution is stopped immediately and the loads for all slaves (including remote I/O) are turned OFF. You cannot reset major fault level errors from the user program, the Sysmac Studio, or an NS-series PT. To recover from a major fault level error, remove the cause of the error, and either cycle the power supply to the Controller or reset the Controller from the Sysmac Studio.
- Partial Fault Level
  These errors prevent control operations in a certain function module in the Controller. The NX/NJ-series CPU Unit continues to execute the user program even after a partial fault level error occurs. After you remove the cause of the error, execute one of the following to return to normal status.
  - Reset the error from the user program, the Sysmac Studio, or an NS-series PT.
  - Cycle the power supply to the Controller.
  - Reset the Controller from the Sysmac Studio.
- Minor Fault Level
  These errors prevent part of the control operations in a certain function module in the Controller. The troubleshooting for minor fault level errors is the same as the processing for partial fault level errors.
- Observations
  These errors do not affect the control operations of the Controller. Observations serve as warnings to the user so that the error does not develop into an error at a higher level.
- Information
  Events that are classified as information do not indicate errors.

Checking Sysmac Error Status

You can use the troubleshooting functions of the Sysmac Studio Standard Version to check the Sysmac error status. Refer to the *NJ-series Troubleshooting Manual* (Cat. No. W503) for information on troubleshooting functions.

1 **Select [Troubleshooting] from the Tools Menu while online. You can also click the [Troubleshooting] Button in the toolbar.**
The Troubleshooting Dialog Box is displayed.

2 **Click the [Controller Errors] Tab.**
A list of the current Sysmac error status and corresponding event codes will be displayed.

Clearing the Sysmac Error Status

1 **Remove the cause of the error and then click the [Reset All] Button on the [Controller Errors] Tab Page of the [Troubleshooting] Pane.**

Note

Even if you reset the Sysmac error status, the errors will remain on the [Controller Event Log] Tab Page.

Emergency Message Detection Event

When the NJ/NX series CPU unit or NY series industrial PC detects an emergency message transmission from the ZW-8000/7000/5000, the "Emergency Message Detection (Sysmac Event Code: 64200000Hex)" event is emitted.
At this time, the emergency message content, including the emergency error code, can be confirmed through "Additional information 1 through 3" in the "Emergency message detection" troubleshooting screen by connecting Sysmac Studio to the NJ/NX series CPU unit or NY series industrial PC while online.
Also, when the emergency message detection event is emitted, the variable defined by the system "_EC_SlavEmergErr" (emergency message detection) turns ON. As a result, you can confirm that the slave issued an emergency message through the user program.

Emergency Message Content

The emergency message consists of the following 8 bytes of data.

Byte	0	1	2	3	4	5	6	7
Content	Emergency error code		Reserved		Sysmac event code			

Emergency Error Code List

The meaning of the emergency error codes used for the ZW-8000/7000/5000 and the corresponding Sysmac error status code is shown below. Refer to the solutions for the corresponding Sysmac error status code for how to handle emergency codes.

Emergency error codes (Hex)	Meaning	Corresponding Sysmac Error Status Event Code
FF00	Hardware error	04D00000Hex
FF01	Calibration ROM damage	14B00000Hex
FF02	Calibration ROM not inserted	14B10000Hex
FF03	System setting error	14B20000Hex
FF04	Bank data error	14B30000Hex
FF06	Ethernet communication parameter error	24810000Hex
FF07	Type mismatch error	14B40000Hex
FF50	Multiple control signal input error	74900000Hex
FF51	EXE signal input error	74910000Hex
FF52	SYNC signal input error	74920000Hex
FF53	TIMING signal input error	74930000Hex
FF54	RESET signal input error	74940000Hex
FF55	ZERO signal input error	74950000Hex
FF56	ZEROCLR signal input error	74960000Hex

Error History

The "Date and time", "Importance", "Source of malfunction", "Generation source details", "Event name", "Sysmac event code", "Detailed information", "Additional information 1 through 4", and "Remedy" can be confirmed on the "Controller Event Log" tab of Sysmac Studio.

Important

When confirming the event log, be sure to set "512th transmit PDO Mapping" (Sysmac Error Status) as a candidate for I/O assignment beforehand on the Sysmac Studio PDO mapping settings.

Note

Error history count

You can record 8 records in the event log. If an event is emitted and the record limit is exceeded, the oldest information is overwritten.

Refer to "NJ/NX series troubleshooting manual (W503)", "NY series troubleshooting manual (SBCA-368)" or "Sysmac Studio Version 1 operation manual (W504)" for details on the contents of the items you can confirm and the error confirmation method.
Refer to "10-2-2 Sysmac event code handling method list" for the Sysmac event code contents.

Note

- Events that are not supported by Sysmac Studio may be emitted when Sysmac Studio is not the latest version. If an event that is not supported is emitted, the generation source is "Unknown" and the event name is "Unknown event". The Sysmac event code and additional information are still shown.
  In order to confirm the event contents from Sysmac Studio, use the latest version of Sysmac Studio.
- Refer to the appendix for "NJ/NX series troubleshooting manual (W503)" or "NY series troubleshooting manual (SBCA-368)" for the specifications in order to confirm the EtherCAT slave terminal malfunction due to our display.

Error Descriptions

The items that are used to describe individual errors (events) are described in the following copy of an error table.

<table>
<tr><td>Event name</td><td colspan="3">Gives the name of the error.</td><td>Event code</td><td colspan="2">Gives the code of the error.</td></tr>
<tr><td>Meaning</td><td colspan="6">Gives a short description of the error.</td></tr>
<tr><td>Source</td><td colspan="2">Gives the source of the error.</td><td>Source details</td><td>Gives details on the source of the error.</td><td>Detection timing</td><td>Tells when the error is detected.</td></tr>
<tr><td>Error attributes</td><td>Level</td><td>Tells the level of influence on control.*1</td><td>Recovery</td><td>Gives the recovery method.*2</td><td>Log category</td><td>Tells which log the error is saved in.*3</td></tr>
<tr><td>Effects</td><td>User program</td><td>Tells what will happen to execution of the user program.*4</td><td>Operation</td><td colspan="3">Provides special information on the operation that results from the error.</td></tr>
<tr><td>Indicators</td><td colspan="6">This is the status of the indicators for the EtherCAT port that is built into the NX/NJ-series Controller. Indicator status is given only for errors in the EtherCAT Master Function Module and the EtherNet/IP Function Module.</td></tr>
<tr><td rowspan="2">System-defined variables</td><td colspan="2">Variable</td><td>Data type</td><td colspan="3">Name</td></tr>
<tr><td colspan="6">Lists the variable names, data types, and meanings for system-defined variables that provide direct error notification, that are directly affected by the error, or that contain settings that cause the error.</td></tr>
<tr><td rowspan="2">Cause and correction</td><td colspan="2">Assumed cause</td><td>Correction</td><td colspan="3">Prevention</td></tr>
<tr><td colspan="6">Lists the possible causes, corrections, and preventive measures for the error.</td></tr>
<tr><td>Attached information</td><td colspan="6">This is the attached information that is displayed by the Sysmac Studio or an NS-series PT.</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="6">Provides precautions, restrictions, and supplemental information.</td></tr>
</table>

*1: One of the following:
Major fault: Major fault level
Partial fault: Partial fault level
Minor fault: Minor fault level
Observation
Information

*2 One of the following:
Automatic recovery: Normal status is restored automatically when the cause of the error is removed.
Error reset: Normal status is restored when the error is reset after the cause of the error is removed.
Cycle the power supply: Normal status is restored when the power supply to the Controller is turned OFF and then back ON after the cause of the error is removed.
Controller reset: Normal status is restored when the Controller is reset after the cause of the error is removed.
Depends on cause: The recovery method depends on the cause of the error.

*3 One of the following:
System: System event log
Access: Access event log

*4 One of the following:
Continues: Execution of the user program will continue.
Stops: Execution of the user program stops.
Starts: Execution of the user program starts.

Event name	Hardware error			Event code	04D00000Hex	
Meaning	Some abnormality occurred on the displacement sensor hardware.					
Source	EtherCAT master function module		Source details	Slave	Detection timing	At generation of hardware error
Error attributes	Level	Minor fault	Recovery	Error reset (cancellation of slave error)	Log category	System
Effects	User program	Continues	Operation	An error message is displayed on the displacement sensor's digital display, and the ALARM output of parallel I/O turns ON. The displacement sensor is in a stopped state until it is restarted.		
Indicators	EtherCAT NET RUN		EtherCAT NET ERR		EtherCAT LINK/ACT	
	–		–		–	
System-defined variables	Variable		Data type		Name	
	None		–		–	
Cause and correction	Assumed cause		Correction		Prevention	
	Hardware damage		Displacement sensor may be broken. Please contact an OMRON branch or sales office.		–	
Attached information	None					
Precautions/ Remarks	None					

Event name	Linearity correction data error			Event code	14B00000Hex	
Meaning	The linearity correction data of the displacement sensor is damaged.					
Source	EtherCAT master function module		Source details	Slave	Detection timing	At displacement sensor startup
Error attributes	Level	Minor fault	Recovery	Error reset (after cancellation of slave error)	Log category	System
Effects	User program	Continues	Operation	An error message is displayed on the displacement sensor's digital display, and the ALARM output of parallel I/O turns ON. The displacement sensor is in a stopped state until it is restarted.		
Indicators	EtherCAT NET RUN		EtherCAT NET ERR		EtherCAT LINK/ACT	
	–		–		–	
System-defined variables	Variable		Data type		Name	
	None		–		–	
Cause and correction	Assumed cause		Correction		Prevention	
	Calibration ROM damage		Calibration ROM may be broken. Please contact an OMRON branch or sales office.		–	
Attached information	None					
Precautions/ Remarks	As a provisional measure, the measurement can be resumed using the data of the previously read Calibration ROM. <Operation method> With error code 3 displayed on the sub-display, hold down the Mode switching key, then when [OK/CAN] is displayed, press the ZERO/SET key. <Cautions> • When using this method, always check the serial number of the previously read Calibration ROM in “controller information,” then check that it matches the Sensor Head side serial number. Measurement will not be correct unless they match. • When restarting the main unit, perform the same operations again. • This operation is disabled for a displacement sensor into which no Calibration ROM has ever been inserted and started up.					

Event name	Linearity correction data read error			Event code	14B10000 Hex	
Meaning	Reading of the displacement sensor linearity correction data was not executed correctly.					
Source	EtherCAT master function module		Source details	Slave	Detection timing	At displacement sensor startup
Error attributes	Level	Minor fault	Recovery	Error reset (after cancellation of slave error)	Log category	System
Effects	User program	Continues	Operation	An error message is displayed on the displacement sensor's digital display, and the ALARM output of parallel I/O turns ON. The displacement sensor is in a stopped state until it is restarted.		
Indicators	EtherCAT NET RUN		EtherCAT NET ERR		EtherCAT LINK/ACT	
	–		–		–	
System-defined variables	Variable		Data type		Name	
	None		–		–	
Cause and correction	Assumed cause		Correction		Prevention	
	Calibration ROM not inserted		Turn the displacement sensor OFF, insert the Calibration ROM and turn the sensor ON again.		–	
	Calibration ROM damage		Calibration ROM may be broken. Please contact an OMRON branch or sales office.		–	
Attached information	None					
Precautions/ Remarks	As a provisional measure, the measurement can be resumed using the data of the previously read Calibration ROM. <Operation method> With error code 3 displayed on the sub-display, hold down the Mode switching key, then when [OK/CAN] is displayed, press the ZERO/SET key. <Cautions> • When using this method, always check the serial number of the previously read Calibration ROM in “controller information,” then check that it matches the Sensor Head side serial number. Measurement will not be correct unless they match. • When restarting the main unit, perform the same operations again. • This operation is disabled for a displacement sensor into which no Calibration ROM has ever been inserted and started up.					

Event name	System setting error			Event code	14B20000 Hex	
Meaning	The system settings saved to the displacement sensor are corrupt.					
Source	EtherCAT master function module		Source details	Slave	Detection timing	At displacement sensor startup
Error attributes	Level	Minor fault	Recovery	Error reset (after cancellation of slave error)	Log category	System
Effects	User program	Continues	Operation	An error message is displayed on the displacement sensor's digital display, and the ALARM output of parallel I/O turns ON. The displacement sensor is in a stopped state until it is restarted.		
Indicators	EtherCAT NET RUN		EtherCAT NET ERR		EtherCAT LINK/ACT	
	–		–		–	
System-defined variables	Variable		Data type		Name	
	None		–		–	
Cause and correction	Assumed cause		Correction		Prevention	
	The displacement sensor power was turned OFF during saving/ loading of system settings.		After holding down the Mode switching key, press the ZERO/SET key to clear the system settings and the bank data, then resume the starting process.		Do not turn the displacement sensor OFF during saving/loading of system settings.	
Attached information	None					
Precautions/ Remarks	None					

Event name	Bank data error			Event code	14B30000Hex	
Meaning	The bank data saved to the displacement sensor is corrupt.					
Source	EtherCAT master function module		Source details	Slave	Detection timing	At displacement sensor startup
Error attributes	Level	Minor fault	Recovery	Error reset (after cancellation of slave error)	Log category	System
Effects	User program	Continues	Operation	An error message is displayed on the displacement sensor's digital display, and the ALARM output of parallel I/O turns ON. The displacement sensor is in a stopped state until it is restarted.		
Indicators	EtherCAT NET RUN		EtherCAT NET ERR		EtherCAT LINK/ACT	
	–		–		–	
System-defined variables	Variable		Data type		Name	
	None		–		–	
Cause and correction	Assumed cause		Correction		Prevention	
	The displacement sensor power was turned OFF during saving/ loading of bank data.		After holding down the Mode switching key, press the ZERO/SET key to clear the system settings and the bank data, then resume the starting process.		Do not turn the displacement sensor OFF during saving/loading of bank data.	
Attached information	None					
Precautions/ Remarks	None					

Event name	Type mismatch			Event code	14B40000Hex	
Meaning	The combination of the Sensor Head and the Sensor Controller is not correct.					
Source	EtherCAT master function module		Source details	Slave	Detection timing	At displacement sensor startup
Error attributes	Level	Minor fault	Recovery	Error reset (after cancellation of slave error)	Log category	System
Effects	User program	Continues	Operation	An error message is displayed on the displacement sensor's digital display, and the ALARM output of parallel I/O turns ON. The displacement sensor is in a stopped state until it is restarted.		
Indicators	EtherCAT NET RUN		EtherCAT NET ERR		EtherCAT LINK/ACT	
	–		–		–	
System-defined variables	Variable		Data type		Name	
	None		–		–	
Cause and correction	Assumed cause		Correction		Prevention	
	A calibration ROM except ZW-8000/7000/5000 series is inserted.		Insert the calibration ROM for ZW-8000/7000/5000 series, and then retry to turn ON the Displacement Sensor.		-	
Attached information	None					
Precautions/ Remarks	None					

Event name	Ethernet communication parameter error			Event code	24810000 Hex	
Meaning	An invalid IP address is set for the displacement sensor.					
Source	EtherCAT master function module		Source details	Slave	Detection timing	All times
Error attributes	Level	Minor fault	Recovery	Error reset (after cancellation of slave error)	Log category	System
Effects	User program	Continues	Operation	An error message is displayed on the displacement sensor's digital display, and the ALARM output of parallel I/O turns ON. The displacement sensor is in a stopped state until it is restarted.		
Indicators	EtherCAT NET RUN		EtherCAT NET ERR		EtherCAT LINK/ACT	
	–		–		–	
System-defined variables	Variable		Data type		Name	
	None		–		–	
Cause and correction	Assumed cause		Correction		Prevention	
	Invalid IP address setting		Change to the correct IP address.		Do not set an invalid IP address such as “0.0.0.0”.	
Attached information	None					
Precautions/ Remarks	None					

Event name	Multiple control signal input error			Event code	74900000 Hex	
Meaning	Multiple control signals turned ON in the same cycle.					
Source	EtherCAT master function module		Source details	Slave	Detection timing	When instructed by the user
Error attributes	Level	Minor fault	Recovery	Error reset (after cancellation of slave error)	Log category	System
Effects	User program	Continues	Operation	Control signal ON is disabled, and the instruction is not executed.		
Indicators	EtherCAT NET RUN		EtherCAT NET ERR		EtherCAT LINK/ACT	
	–		–		–	
System-defined variables	Variable		Data type		Name	
	None		–		–	
Cause and correction	Assumed cause		Correction		Prevention	
	Multiple control signals turned ON in the same cycle.		Modify the program so that multiple control signals do not turn ON in a single cycle.		Program so that multiple control signals do not turn ON in a single cycle.	
Attached information	None					
Precautions/ Remarks	The following cases are not judged to be errors: • ZEROx_T1 to 4 multiple signals turn ON in the same cycle. • ZEROCLRx_T1 to 4 multiple signals turn ON in the same cycle. • ERCLR and LIGHTOFFx turn ON in the same cycle as other signals.					

Event name	EXE input error			Event code	74910000 Hex	
Meaning	EXE input processing was not executed correctly.					
Source	EtherCAT master function module		Source details	Slave	Detection timing	When instructed by the user
Error attributes	Level	Minor fault	Recovery	Error reset (after cancellation of slave error)	Log category	System
Effects	User program	Continues	Operation	EXE input processing is not executed.		
Indicators	EtherCAT NET RUN		EtherCAT NET ERR		EtherCAT LINK/ACT	
	–		–		–	
System-defined variables	Variable		Data type		Name	
	None		–		–	
Cause and correction	Assumed cause		Correction		Prevention	
	EXE input turned ON in the FUNC mode.		Switch to the RUN mode, and turn EXE input ON.		–	
Attached information	EXE input turned ON with READY output OFF.		Modify the program so that EXE input does not turn ON when the READY signal is OFF.		Program so that EXE input does not turn ON when the READY signal is OFF.	
	None					
Precautions/ Remarks	None					

Event name	SYNC input error			Event code	74920000 Hex	
Meaning	SYNC input processing was not executed correctly.					
Source	EtherCAT master function module			Slave		When instructed by the user
Error attributes	Level	Minor fault		Error reset (after cancellation of slave error)		System
Effects	User program	Continues		SYNC input processing is not executed.		
Indicators	EtherCAT NET RUN		EtherCAT NET ERR		EtherCAT LINK/ACT	
	–		–		–	
System-defined variables	Variable		Data type		Name	
	None		–		–	
Cause and correction	Assumed cause		Correction		Prevention	
	SYNC input turned ON in the FUNC mode.		Switch to the RUN mode, and turn SYNC input ON.		–	
Attached information	None					
Precautions/ Remarks	None					

Event name	TIMING input error			Event code	74930000 Hex	
Meaning	TIMING input processing was not executed correctly.					
Source	EtherCAT master function module		Source details	Slave	Detection timing	When instructed by the user
Error attributes	Level	Minor fault	Recovery	Error reset (after cancellation of slave error)	Log category	System
Effects	User program	Continues	Operation	TIMING input processing is not executed.		
Indicators	EtherCAT NET RUN		EtherCAT NET ERR		EtherCAT LINK/ACT	
	–		–		–	
System-defined variables	Variable		Data type		Name	
	None		–		–	
Cause and correction	Assumed cause		Correction		Prevention	
	TIMINGx input turned ON in the FUNC mode.		Switch to the RUN mode, and turn TIMINGx input ON.		–	
	TIMINGx input turned ON or OFF while RESETx input was ON.		Modify the program so that TIMINGx input turns ON or OFF when RESETx input is OFF.		Program so that TIMINGx input turns ON or OFF when RESETx input is OFF.	
	TIMINGx input turned ON in a non-measurement state.		Modify the program so that TIMINGx input turns ON when the sensor is ready for measurement.		Program so that TIMINGx input turns ON when the sensor is ready for measurement.	
	TIMINGx input turned ON before the “delay time + sampling time” elapsed.		Modify the program so that the “delay time + sampling time” is shorter than the TIMING input interval.		Program so that the “delay time + sampling time” is shorter than the TIMING input interval.	
Attached information	None					
Precautions/ Remarks	None					

Event name	RESET input error			Event code	74940000 Hex	
Meaning	RESET input processing was not executed correctly.					
Source	EtherCAT master function module		Source details	Slave	Detection timing	When instructed by the user
Error attributes	Level	Minor fault	Recovery	Error reset (after cancellation of slave error)	Log category	System
Effects	User program	Continues	Operation	RESET input processing is not executed.		
Indicators	EtherCAT NET RUN		EtherCAT NET ERR		EtherCAT LINK/ACT	
	–		–		–	
System-defined variables	Variable		Data type		Name	
	None		–		–	
Cause and correction	Assumed cause		Correction		Prevention	
	RESETx input turned ON in the FUNC mode.		Switch to the RUN mode, and turn RESETx input ON.		–	
Attached information	None					
Precautions/ Remarks	None					

Event name	ZERO input error			Event code	74950000 Hex	
Meaning	ZERO input processing was not executed correctly.					
Source	EtherCAT master function module		Source details	Slave	Detection timing	When instructed by the user
Error attributes	Level	Minor fault	Recovery	Error reset (after cancellation of slave error)	Log category	System
Effects	User program	Continues	Operation	ZERO input processing is not executed.		
Indicators	EtherCAT NET RUN		EtherCAT NET ERR		EtherCAT LINK/ACT	
	–		–		–	
System-defined variables	Variable		Data type		Name	
	None		–		–	
Cause and correction	Assumed cause		Correction		Prevention	
	ZEROx input turned ON in the FUNC mode.		Switch to the RUN mode, and turn ZEROx input ON.		–	
	ZEROx input turned ON in a non-measurement state.		Modify the program so that ZEROx input turns ON when the sensor is ready for measurement.		Program so that ZEROx input turns ON when the sensor is ready for measurement.	
	ZEROx input turned ON for a task whose status is OFF.		Modify the program so that the task that turns ZEROx input ON turns the status ON.		Program so that the task that turns ZEROx input ON turns the status ON.	
Attached information	None					
Precautions/ Remarks	None					

Event name	ZEROCLR input error			Event code	74960000 Hex	
Meaning	ZEROCLR input processing was not executed correctly.					
Source	EtherCAT master function module		Source details	Slave	Detection timing	When instructed by the user
Error attributes	Level	Minor fault	Recovery	Error reset (after cancellation of slave error)	Log category	System
Effects	User program	Continues	Operation	ZEROCLR input processing is not executed.		
Indicators	EtherCAT NET RUN		EtherCAT NET ERR		EtherCAT LINK/ACT	
	–		–		–	
System-defined variables	Variable		Data type		Name	
	None		–		–	
Cause and correction	Assumed cause		Correction		Prevention	
	ZEROCLRx input turned ON in the FUNC mode.		Switch to the RUN mode, and turn ZEROCLRx input ON.		–	
Attached information	None					
Precautions/ Remarks	None					

Errors for EtherCAT Connection (SDO)

Abort Codes

The following table lists the abort codes for SDO communication error occurs.

Code	Meaning
05030000h	Toggle bit not changed.
05040000h	SDO protocol timeout.
05040001h	Client/Server command specified not valid or unknown.
05040005h	Out of memory.
06010000h	Unsupported access to an object.
06010001h	Attempt to read a write only object.
06010002h	Attempt to write to a read only object.
06020000h	The object does not exist in the object dictionary.
06040041h	The object cannot be mapped into the PDO.
06040042h	The number and length of the objects to be mapped would exceed the PDO length.
06040043h	General parameter incompatibility reason.
06040047h	General internal incompatibility in the device.
06060000h	Access failed due to a hardware error.
06070010h	Data type does not match, length of service parameter does not match.
06070012h	Data type does not match, length of service parameter too high.
06070013h	Data type does not match, length of service parameter too low.
06090011h	Subindex does not exist
06090030h	Value range of parameter exceeded (only for write access).
06090031h	Value of parameter written too high.
06090032h	Value of parameter written too low.
06090036h	Maximum value is less than minimum value.
08000000h	General error.
08000020h	Data cannot be transferred or stored to the application.
08000021h	Data cannot be transferred or stored to the application because of local control.
08000022h	Data cannot be transferred or stored to the application because of the present device state.
08000023h	Object dictionary dynamic generation fails or no object dictionary is present.

Errors for Ethernet or EtherNet/IP Connection

The error log for the following errors that occur in Ethernet or EtherNet/IP communications can be checked on the digital displays.
Also, when the same error as “Sysmac error status” occurs during EtherNet/IP communications, the ERR output signal of the corresponding area turns ON. (Note, however, that the error code cannot be checked.)

Error Code	Name	Description	Cause	Remedy
0211 Hex ALARM	IP address overlap error	Incorrect IP address is set.	IP address setting is not correct.	Set the correct IP address.
03D0 Hex ALARM	Ethernet communication parameter error	An invalid IP address is set.	Invalid IP address setting	Change to the correct IP address.
03D3 Hex	Ethernet link not detected	The Ethernet link cannot be detected.	Link with switching hub not detected	Inspect the following items: • Are cables connected? • Are cables disconnected or loose? • Is there a lot of noise?
03D5 Hex	Tag data link error	Tag data link communications cannot be executed correctly.	Timeout occurred on the tag data link	Inspect the following items: • Are connection-registered nodes turned ON? • Are cables connected? • Are cables disconnected or loose? • Is there a lot of noise?

Note When error marked by ALARM occur, the ALARM output of parallel I/O turns ON, and “SYSERR” and error code are displayed on the main and sub-displays, respectively.

If an error code other than the one listed above is displayed, the displacement sensor may be broken. Please contact an OMRON branch or sales office.
The error history only shows the above error codes. Occurrences of other errors are not logged into the error history.
These error codes are shown only on the digital display of the Sensor Controller.

Note

- Up to 64 errors are shown in the error history.
- You can confirm the error history on the Sensor Controller's digital display.
  To confirm the error history, set the FUNC mode and switch the following menu.
  System setting [SYSTEM] - Controller information [C.INFO] - Error history [ERR.LOG] - Error history display [LOG.DSP]
  When you want to delete the error history, execute the error clear.
  System setting [SYSTEM] - Controller information [C.INFO] - Error history [ERR.LOG] - Error clear [LOG.CLR]

Errors Common to All Communication States

These errors occur in common regardless of communication state. When these errors occur, the ALARM output of parallel I/O turns ON, and “SYSERR” and error code are displayed on the main and sub-displays, respectively.
The acquired error number of EI command is showed in the number in parentheses.

Error Code	Name	Description	Cause	Remedy
BRK.ROM (02)	Linearity correction data error	The linearity correction data is corrupted.	Calibration ROM damage	Check to make sure that the Calibration ROM is correctly inserted. If correctly inserted, the Calibration ROM or displacement sensor may be broken. Please contact an OMRON branch or sales office. (*1)
NO.ROM (03)	Linearity correction data read error	Reading of the linearity correction data was not executed correctly.	Calibration ROM not inserted	
BRK.SYS (07)	System setting error	The system settings saved to the Sensor Controller are corrupt.	The displacement sensor power was turned OFF during saving/loading of system settings.	After holding down the Mode switching key, press the ZERO/SET key to clear the system settings and the bank data, and then resume the starting process.
BRK.BNK (08)	Bank data error	The bank data saved to the Sensor Controller is corrupt.	The displacement sensor power was turned OFF during saving/loading of bank data.	
BRK.TIM (12)	Energization time error	The energization time data saved to the Sensor Controller is corrupt.	The energization time is corrupt due to a hardware malfunction.	After holding down the Mode switching key, press the ZERO/SET key to resume. (The energization time function becomes disabled.)
OVER.IP (23)	IP address overlap error	The same address as that of the displacement sensor exists on the network. Note: If a network hub is not used, this error may not appear.	The settings of IP addresses are invalid.	Change the IP address so that the IP address does not overlap with devices on the network.
MIS.IP (25)	Ethernet communication parameter error	An invalid IP address is set.	Invalid IP address setting	Change to the correct IP address.
MIS.TYP (60)	Type mismatch	The Sensor Head and Sensor Controller types do not match.	The Sensor Head and the Sensor Controller are not the correct pair. Both must be either the ZW-7000 series or ZW-5000 series.	Replace with the correct calibration ROM. After replacing the calibration ROM, turn ON themeasurement sensor power again.
MIS.SET (61)	Set model mismatch	For the set model type, the Sensor Controller and Calibration ROM are not matched.	A calibration ROM except ZW-7000 series is inserted.	Insert the calibration ROM for ZW-7000 series, and then retry to turn ON the Displacement Sensor.
MIS.BNK (81)	Bank data error	The opened bank data is abnormal.	Occurs as a result of software downgrade.	To recover from the error, press and hold ↑ key or ↓key to clear the bank data.

If an error codes other than the one listed above is displayed, the displacement sensor may be broken. Please contact an OMRON branch or sales office.

*1: As a provisional measure, the measurement can be resumed using the data of the previously read Calibration ROM.
<Operation method>
With error code NO.ROM displayed on the sub-display, hold down the Mode switching key, and then when [OK/CAN] is displayed, press the ZERO/SET key.
<Cautions>
- When using this method, always check the serial number of the previously read Calibration ROM in "controller information," then check that it matches the Sensor Head side serial number. Measurement will not be correct unless they match.
- When restarting the main unit, perform the same operations again.
This operation is disabled for a displacement sensor into which no Calibration ROM has ever been inserted and started up.

7-2 Troubleshooting

For troubleshooting minor hardware problems, refer to the following manual:

"8-2 Troubleshooting" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)"

MEMO

Appendices

8-1 Processing Item Data List

Unit number	Processing Item	Data number	Parameter	default value	Setting range/output range	Acquisition Yes/No	Setting Yes/No	Supported type
0	Image input	12	Area 1 Upper Line	This value change depending on the Sensor Head.	-3750 to 3750 (µm)	Yes	Yes	All types
		14	Area 1 Lower Line	This value change depending on the Sensor Head.	-3750 to 3750 (µm)	Yes	Yes	
		22	2 area mode	0	0: OFF 1: ON	Yes	Yes	
		23	Area follow mode	0	0: OFF 1: Follow upper line 2: Follow lower line 3: Follow upper + lower lines	Yes	Yes	
		24	Measuring area 2 upper line	This value changes depending on the Sensor Head.	-3750 to 3750 (µm)	Yes	Yes	
		26	Measuring area 2 lower line	This value changes depending on the Sensor Head.	-3750 to 3750 (µm)	Yes	Yes	
		30	Start direction of count measurement surfaces	0	0: NEAR 1: FAR	Yes	Yes	
		39	Reference edge of Area follow	0	0: SUR.1ST 1: SUR.2ND 2: SUR.3RD 3: SUR.4TH 4: LIGHT PEAK	Yes	Yes	
		40	Following edge of Area follow	1	0: SUR.1ST 1: SUR.2ND 2: SUR.3RD 3: SUR.4TH 4: LIGHT PEAK	Yes	Yes	
		48	Area Teach	-	1: Execute	No	Yes	

Unit number	Processing Item	Data number	Parameter	default value	Setting range/output range	Acquisition Yes/No	Setting Yes/No	Supported type
1	Exposure time control (1 area mode)	0	Exposure time control mode	0	0: Auto 1: Fixed	Yes	Yes	All types
		2	Surface subject to exposure time control	4	0: SUR.1ST 1: SUR.2ND 2: SUR.3RD 3: SUR.4TH 4: LIGHT PEAK	Yes	Yes	
		6	Exposure time fixed value	10000	1 to 10000 (1div: 0.01%)	Yes	Yes	
		14	Exposure time upper limit	10000	1 to 10000 (1div: 0.01%)	Yes	Yes	
		13	Exposure time lower limit	1	1 to 10000 (1div: 0.01%)	Yes	Yes	
	Exposure time control (1 area mode)	17	EdgeTracks enabled flag	0	0: OFF 1: ON	Yes	Yes	ZW-8000□ only
		18	Edge1 Track Width	This value changes depending on the Sensor Head.	0 to 65535 (µm)	Yes	Yes	
		19	Edge2 Track Width	This value changes depending on the Sensor Head.	0 to 65535 (µm)	Yes	Yes	
		20	Edge3 Track Width	This value changes depending on the Sensor Head.	0 to 65535 (µm)	Yes	Yes	
		21	Edge4 Track Width	This value changes depending on the Sensor Head.	0 to 65535 (µm)	Yes	Yes	
4	Exposure time control mode (2 area mode area 1)	0	Energization time error	0	0: Auto 1: Fixed	Yes	Yes	All types
		2	Surface subject to exposure time control	4	0: SUR.1ST 1: SUR.2ND 2: SUR.3RD 3: SUR.4TH 4: LIGHT PEAK	Yes	Yes	
		6	Amount of emitted light (fixed)	10000	1 to 10000 (1div: 0.01%)	Yes	Yes	
		14	Amount of emitted light (upper limit)	10000	1 to 10000 (1div: 0.01%)	Yes	Yes	
		13	Amount of emitted light (lower limit)	1	1 to 10000 (1div: 0.01%)	Yes	Yes	
5	Exposure time control mode (2 area mode area 2)	0	Exposure time control mode	0	0: Auto 1: Fixed	Yes	Yes	
		2	Surface subject to exposure time control	4	0: SUR.1ST 1: SUR.2ND 2: SUR.3RD 3: SUR.4TH 4: LIGHT PEAK	Yes	Yes	
		6	Amount of emitted light (fixed)	10000	1 to 10000 (1div: 0.01%)	Yes	Yes	
		14	Amount of emitted light (upper limit)	10000	1 to 10000 (1div: 0.01%)	Yes	Yes	
		13	Amount of emitted light (lower limit)	1	1 to 10000 (1div: 0.01%)	Yes	Yes	

Unit number	Processing Item	Data number	Parameter	default value	Setting range/output range	Acquisition Yes/No	Setting Yes/No	Supported type
20	Measurement object	0	Measurement cycle	Refer to "Setting the Measurement Cycle" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the method to save the settings.		Yes	Yes	All types
		1	Material	0	0: Normal 1: Mirror surface 2: Diffusion surface	Yes	Yes	
		3	Average Number of Times	2	0: 1 pixcel 1: 3 pixcel 2: 5 pixcel 3: 7 pixcel 4: 9 pixcel			
		4	Background removal level	For ZW-7000/5000: 100 For ZW-8000: 300	0 to 1500 (Gradation)	Yes	Yes	
40	Measurement point	0	MEASUREMENT ITEM	1: TASK 1 0: TASK 2 to 4	0: None 1: Height 2: Thickness of transparent object 3: Calculation	Yes	Yes	
		1	Measurement surface 1	4	0: SUR.1ST 1: SUR.2ND 2: SUR.3RD 3: SUR.4TH 4: LIGHT PEAK	Yes	Yes	
		2	Measurement surface 2	4	0: SUR.1ST 1: SUR.2ND 2: SUR.3RD 3: SUR.4TH 4: LIGHT PEAK	Yes	Yes	
		3	Calculation parameter X	0	0: None 1: TASK 1 2: TASK 2 3: TASK 3 4: TASK 4	Yes	Yes	
		4	Calculation parameter Y	0 Measurement value is rested.	0: None 1: TASK 1 2: TASK 2 3: TASK 3 4: TASK 4	Yes	Yes	
		5	Calculation parameter K	0	-999999999 to 999999999	Yes	Yes	
		6	Calculation parameter m	0	-100 to 100 (1 div: 0.1)	Yes	Yes	
		7	Calculation parameter n	0	-100 to 100 (1 div: 0.1)	Yes	Yes	
		13	Area selection	0	0: Area1 1: Area2	Yes	Yes	

Unit number	Processing Item	Data number	Parameter	default value	Setting range/output range	Acquisition Yes/No	Setting Yes/No	Supported type
41	Scaling	2	Scaling mode	0	0: OFF 1: Height auto 2: Manual 3: Thickness auto 4: Multi-point scaling (ZW-8000□ only)	Yes	Yes	All types
		3	Span value	10000	-100000 to 100000 (1 div: 0.1)	Yes	Yes	
		4	Offset value	0	-999999999 to 999999999 (nm)	Yes	Yes	
41	Scaling	70	Adjustment point for multipoint scaling	2	2 to 10	Yes	Yes	ZW-8000□ only
		71	Multipoint height settings value 1	0	-999999999 to 999999999 (nm)	Yes	Yes	
		72	Multipoint height settings value 2	0	-999999999 to 999999999 (nm)	Yes	Yes	
		73	Multipoint height settings value 3	0	-999999999 to 999999999 (nm)	Yes	Yes	
		74	Multipoint height settings value 4	0	-999999999 to 999999999 (nm)	Yes	Yes	
		75	Multipoint height settings value 5	0	-999999999 to 999999999 (nm)	Yes	Yes	
		76	Multipoint height settings value 6	0	-999999999 to 999999999 (nm)	Yes	Yes	
		77	Multipoint height settings value 7	0	-999999999 to 999999999 (nm)	Yes	Yes	
		78	Multipoint height settings value 8	0	-999999999 to 999999999 (nm)	Yes	Yes	
		79	Multipoint height settings value 9	0	-999999999 to 999999999 (nm)	Yes	Yes	
		80	Multipoint height settings value 10	0	-999999999 to 999999999 (nm)	Yes	Yes	
		101	Multipoint height measurement value 1	0	-999999999 to 999999999 (nm)	Yes	Yes	
		102	Multipoint height measurement value 2	0	-999999999 to 999999999 (nm)	Yes	Yes	
		103	Multipoint height measurement value 3	0	-999999999 to 999999999 (nm)	Yes	Yes	
		104	Multipoint height measurement value 4	0	-999999999 to 999999999 (nm)	Yes	Yes	
		105	Multipoint height measurement value 5	0	-999999999 to 999999999 (nm)	Yes	Yes	
		106	Multipoint height measurement value 6	0	-999999999 to 999999999 (nm)	Yes	Yes	
		107	Multipoint height measurement value 7	0	-999999999 to 999999999 (nm)	Yes	Yes	
		108	Multipoint height measurement value 8	0	-999999999 to 999999999 (nm)	Yes	Yes	
		109	Multipoint height measurement value 9	0	-999999999 to 999999999 (nm)	Yes	Yes	
		110	Multipoint height measurement value 10	0	-999999999 to 999999999 (nm)	Yes	Yes	

Unit number	Processing Item	Data number	Parameter	default value	Setting range/output range	Acquisition Yes/No	Setting Yes/No	Supported type
42	MEDIAN	2	Median filter mode	0	0: OFF 1: 3 times 2: 9 times 3: 15 times 4: 31 times	Yes	Yes	All types
43	AVERAGE	2	Average (Internal synchronous measurement mode)	10:1024 times	0: 1 1: 2 2: 4 3: 8 4: 16 5: 32 6: 64 7: 128 8: 256 9: 512 10: 1024 11: 2048 12: 4096 13: 8192 14: 16384	Yes	Yes	All types
		11	Average (External/PDO synchronous measurement mode)	0:1	0: 1 1: 2 2: 4 3: 8 4: 16 5: 32 6: 64 7: 128 8: 256 9: 512 10: 1024 11: 2048 12: 4096 13: 8192 14: 16384	Yes	Yes	
44	Frequency filter	2	Filter type	0	0: OFF 1: High pass filter 2: Low pass filter 3: Band pass filter	Yes	Yes	
		3	Lowpass cut-off frequency	Refer to "Setting the Frequency Filter" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User's Manual (Z362)" for the methodo save the settings.		Yes	Yes	
		4	Lowpass cut-off frequency (upper)			Yes	Yes	
		5	Lowpass cut-off frequency (lower)			Yes	Yes	
		6	Highpass cut-off frequency			Yes	Yes	
45	DIFFERENTIAL	2	Differential mode	0	0: OFF 1: ON	Yes	Yes	
		3	Number of differential cycles	20	20 to 5000000 (1div: 0.001ms)	Yes	Yes	
		4	Differentiation Cycle (External/PDO synchronous measurement mode)	1	1 to 50000	Yes	Yes	

Unit number	Processing Item	Data number	Parameter	default value	Setting range/output range	Acquisition Yes/No	Setting Yes/No	Supported type
46	Hold	2	Hold mode	0	0: OFF 1: Peak 2: Bottom 3: Peak to peak 4: Auto peak 5: Auto bottom 6: AUTO PEAK TO PEAK 7: Average 8: Sample	Yes	Yes	All types
		3	Trigger method	0	0: External 1: Self-up trigger 2: Self-down trigger 3: Valid value trigger	Yes	Yes	
		4	Trigger level	0	-999999999 to 999999999 (nm)	Yes	Yes	
		5	TRIGGER HYSTERESIS	0.05% of measuring range	0 to 999.999999 (mm)	Yes	Yes	
		6	Trigger delay time (Internal synchronous measurement mode)	20	20 to 5000000 (1div: 0.001ms)	Yes	Yes	
		7	Sampling time (Internal synchronous measurement mode)	100000	20 to 5000000 (1div: 0.001ms)	Yes	Yes	
		8	Trigger delay mode	0	0: OFF 1: ON	Yes	Yes	
		11	Trigger delay time (External/ PDO synchronous measurement mode)	1	1 to 50000	Yes	Yes	
		12	Sampling time (External/ PDO synchronous measurement mode)	1	1 to 50000	Yes	Yes	
47	Zero reset	5	Offset when a zero reset is executed Offset	0	-999999999 to 999999999 (nm)	Yes	Yes	
		7	ZERO RESET MODE	0	0: Real 1: Hold	Yes	Yes	
		64	Zero reset execution enabled/disabled (Status)	1	0: OFF 1: ON	Yes	Yes	
49	Judgment output	2	LOW threshold value	-25% of measuring range	-999999999 to 999999999 (nm)	Yes	Yes	
		3	HIGH threshold value	+25% of measuring range	-999999999 to 999999999 (nm)	Yes	Yes	

Unit numbers 40 to 49 are parameters for the TASK 1 processing unit. To reference the parameters for the processing unit for TASK N, add 20 × (N - 1) to the unit number you want to reference.
(Example)
To change the average processing for TASK 2, reference the parameters for
Processing unit number = 43 + 20 × (2 - 1) = 63
Data number = 2

Unit number	Processing Item	Data number	Parameter	default value	Setting range/output range	Acquisition Yes/No	Setting Yes/No	Supported type
120	Judgment processing	0	Hysteresis width	0.05% of measuring range	0 to 999999999 (nm)	Yes	Yes	All types
		1	Timer mode	0	0: OFF 1: Off delay 2: On delay 3: One shot	Yes	Yes	
		2	Delay time	200	200 to 5000000 (1div: 0.001ms)	Yes	Yes	
121	Non-measurement processing	0	Mode at non-measurement	For ZW-7000/5000: 1 For ZW-8000: 0	0: Keep 1: Clamp	Yes	Yes	
		2	Digital clamp output	0	0: -2147.483648 (0x80000000) 1: -999.999999 (0xC4653601) 2: 0 3: 999.999999 (0x3B9AC9FF) 4: 2147.483647 (0x7FFFFFFF)	Yes	Yes	
		4	Keep count	For ZW-7000/5000: 1 For ZW-8000: 8	1 to 16382	Yes	Yes	ZW-8000□ only
		5	Number of restorations	1	1 to 16382	Yes	Yes	
		6	Keep count specification flag	For ZW-7000/5000: 0 For ZW-8000: 1	0: OFF 1: ON	Yes	Yes	
		10	Non-measurement conditions flag, reflection power	0	0: OFF 1: ON	Yes	Yes	

Unit number	Processing Item	Data number	Parameter	default value	Setting range/output range	Acquisition Yes/No	Setting Yes/No	Supported type
122	Analog output	2	Monitor focus mode	0	0: OFF 1: ON	Yes	Yes	All types
		3	Monitor focus output position 1	- (measuring range)/2	-999999999 to 999999999 (nm)	Yes	Yes	
		4	Monitor focus output position 2	+ (measuring range)/2	-999999999 to 999999999 (nm)	Yes	Yes	
		5	Monitor focus current lower limit	4	4 to 20 (mA)	Yes	Yes	
		6	Monitor focus current upper limit value	20	4 to 20 (mA)	Yes	Yes	
		7	Monitor focus voltage lower limit value	-10	-10 to 10 (V)	Yes	Yes	
		8	Monitor focus voltage upper limit value	10	-10 to 10 (V)	Yes	Yes	
		21	Output object task	1	0: None 1: TASK 1 2: TASK 2 3: TASK 3 4: TASK 4	Yes	Yes	
		23	Output level during clamping	0	At current output 0: MAX (approx. 21 mA) 1: 20 mA 2: 19 mA : 16: 5 mA 17: 4 mA 18: MIN (approx. 3 mA) At voltage output 0: MAX (approx. 10.8 V) 1: 10 V 2: 9 V : 20: -9 V 21: -10V 22: MIN (approx. -10.8 V)	Yes	Yes	

Unit number	Processing Item	Data number	Parameter	default value	Setting range/output range	Acquisition Yes/No	Setting Yes/No	Supported type
124	Digital output	1	OUT1	1	0: None 1: TASK1 Measurement value 2: TASK2 Measurement value 3: TASK3 Measurement value 4: TASK4 Measurement value 5: Amount of emitted light (Area1) 6: Peak amount of received light (Area1) 7: Amount of received light (1st surface in Area1) 8: Amount of received light (2nd surface in Area1) 9: Amount of received light (3rd surface in Area1) 10: Amount of received light (4th surface in Area1) 19: Light power (Area 2) 20: Peak amount of received light (Area2) 21: Amount of received light (1st surface in Area2) 22: Amount of received light (2nd surface in Area2) 23: Amount of received light (3rd surface in Area2) 24: Amount of received light (4th surface in Area2)	Yes	Yes	All types
					25: Measurement state 57: Reflection power (Area 1) 63: Reflection power (Area 2)	Yes	Yes	ZW-8000□ only
		2	OUT2	2	Same as the above	Yes	Yes	Same as the above
		3	OUT3	3	Same as the above	Yes	Yes	
		4	OUT4	4	Same as the above	Yes	Yes	
125	Parallel output	6	Target TASK of Judgment output	1	1: TASK1 2: TASK2 3: TASK3 4: TASK4	Yes	Yes	All types
126	Measurement state	0	Condition for number of Edge	0	0 to 4: surface 5: 5 edges or more	Yes	Yes	ZW-8000□ only
		1	Comparison condition of number of Edge	0	0: (Condition for number of Edge) = (Number of measured edges) 1: (Condition for number of Edge) ≤ (Number of measured edges) 2: (Condition for number of Edge) ≥ (Number of measured edges)	Yes	Yes	
		2	Reflective power threshold	10	1 to 100	Yes	Yes	

Unit number	Processing Item	Data number	Parameter	default value	Setting range/output range	Acquisition Yes/No	Setting Yes/No	Supported type
240	Control input	4	TIMING input mode	0	0: Specify timing to measure 1: Specify timing to exposure	Yes	Yes	All types

8-2 System data list

Data number	Parameter	default value	Setting range/output range	Acquisition Yes/No	Setting Yes/No
100	RS-232C data length	1	0: 7 bit 1: 8 bit	Yes	Yes
101	RS-232C parity	0	0: None 1: Odd 2: Even	Yes	Yes
102	RS-232C stop bit	0	0: 1 bit 1: 2 bit	Yes	Yes
103	RS-232C baud rate	2	0: 9600 1: 19200 2: 38400 3: 57600 4: 115200	Yes	Yes
104	Flow control	0	0: None 1: ON	Yes	Yes
260	Ethernet protocol	1	0: None 1: TCP server 2: TCP client 3: UDP	Yes	Yes
261	IN port number	9601	0 to 65535	Yes	Yes
262	OUT port number	9601	0 to 65535	Yes	Yes
300	Fieldbus	2	0: OFF 1: Ethernet/IP 2: EtherCAT	Yes	Yes
301	Communications delimiter	0	0: CR 1: LF 2: CR+LF	Yes	Yes
302	GATE period	1	0 to 100	Yes	Yes
400	Serial data output destination	0	0: OFF 1: Ethernet 2: RS-232C	Yes	Yes
401	Serial data output data format	0	0: ASCII 1: BINARY	Yes	Yes
402	Serial data output number of integer digits	5	1 to 5	Yes	Yes
403	Serial data output number of digits past decimal point	6	0 to 6	Yes	Yes
405	Serial data output field delimiter	0	0: None 1: Comma 2: Tab 3: Space 4: CR 5: LF 6: CR+LF 7: Semi-colon	Yes	Yes
406	Serial data output record delimiter	0	0: None 1: Comma 2: Tab 3: Space 4: CR 5: LF 6: CR+LF 7: Semi-colon	Yes	Yes
407	Serial data output zero suppress	0	0: None 1: ON	Yes	Yes

Data number	Parameter	default value	Setting range/output range	Acquisition Yes/No	Setting Yes/No
408	Serial data output Zero suppression target	0	0: Serial data output 1: Serial data output + M command	Yes	Yes
500	Analog output destination	0	0: Voltage 1: Current	Yes	Yes
600	Bank mode	0	0: Normal 1: Judgment value	Yes	Yes
601	Current bank number	0	0 to 7 (Bank number at the launch) 0 to 31 (Bank number of jugement value at the launch)	Yes	Yes
750	Logging data size	100000	0 to 2000000	Yes	Yes
751	Buffer interval	1	0 to 1000	Yes	Yes
756	Output data format	0	0: ASCII 1: BINARY	Yes	Yes
757	Overwrite mode	0	0: OFF 1: ON	Yes	Yes
758	Label insert mode	0	0: OFF 1: ON	Yes	Yes
900	Number of digits displayed past decimal point	1	0 to 5: 0 to 5 digits	Yes	Yes
901	Key lock	0	0: OFF 1: ON	Yes	Yes
902	Timing/reset key input control	0	0: OFF 1: ON	Yes	Yes
1000	Zero reset memory	0	0: OFF 1: ON	Yes	Yes
1110	Width of input signal filter	4	0: 5 µs 1: 10 µs 2: 20 µs 3: 50 µs 4: 100 µs 5: 200 µs 6: 500 µs 7: 1000 µs	Yes	Yes
1120	Trigger mode	0	0: Internal synchronous measurement mode 1: External synchronous measurement mode 2: PDO synchronous measurement mode	Yes	Yes
1130	Extension Fiber Cable Length	0	0: - 1: 2m 2: 5m 3: 10m 4: 20m 5: 30m	Yes	Yes

8-3 Object Dictionary

Object Dictionary Area

The CAN application protocol over EtherCAT (CoE) is based on the object dictionary of the CAN application protocol. All objects are assigned a 4-digit hex index and comprise the following areas.

Index	Area	Description
0000 hex to 0FFF hex	Data type area	Definition of data type
1000 hex to 1FFF hex	CoE communications area	Definition of variables that can be used for all servers intended for exclusive communications
2000 hex to 2FFF hex	Manufacturer unique area 1	Variables defined in common to all OMRON products
3000 hex to 5FFF hex	Manufacturer unique area 2	Variables defined on ZW-8000/7000/5000 Series EtherCAT slaves
6000 hex to 9FFF hex	Device profile area	Unused (not supported)
A000 hex to FFFF hex	Reserved area	Area reserved for use in the future

Data type

The following data types are used by this profile.

Data type	Abbreviation	Size	Range
Boolean	BOOL	1 bit	true (1), false (0)
Unsigned 8	U8	1 byte	0 to 255
Unsigned 16	U16	2 bytes	0 to 65535
Unsigned 32	U32	4 bytes	0 to 4294967295
Integer 8	INT8	1 byte	-128 to 127
Integer 16	INT16	2 bytes	-32768 to 32767
Integer 32	INT32	4 bytes	-2147483648 to 2147483647
Visible string	VS	–	–

Description Format of Objects

This manual describes objects in the following format.

Object description format

<Index>	<Object name>		
Setting range: <Setting range>	Unit: <Unit>	Factory setting: <Factory setting>	Data attribute: <Data attribute>
Size: <Size>	Access: <Access>	PDO map: <Yes/No>	

Object description format when objects have a sub-index

<Index>	<Object name>		
Sub-index 0			
Setting range: <Setting range>	Unit: <Unit>	Factory setting: <Factory setting>	Data attribute: <Data attribute>
Size: <Size>	Access: <Access>	PDO map: <Yes/No>	
. . .			
Sub-index N			
Setting range: <Setting range>	Unit: <Unit>	Factory setting: <Factory setting>	Data attribute: <Data attribute>
Size: <Size>	Access: <Access>	PDO map: <Yes/No>	

<> indicates the data. Data details are shown as follows.

- Index : Index of object indicated as a 4-digit hex number
- Object name : Object name
- Range : Range of numerical values that can be set
- Unit : Physical unit
- Factory setting : Default value set at shipment of product from the factory
- Data attributes : Timing that changes are enabled by writable objects
  - A : Enabled at all times
  - B : Count stopped → operation timing
  - C : Pre-operational state → safe operational state timing
  - D : Pre-operational state → initialization state timing
  - R : Power reset
  - – : Not writable
- Size : The size of objects is indicated in bytes.
- Access : Indicates read-only or read/write.
  - RO : Read-only
  - RW : Read/write
- PDO map : Indicates mappability to PDO.

1000 hex	Device Type		
Setting range: –	Unit: –	Factory setting: 00000000 hex	Data attributes: –
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

• The ZW-8000/7000/5000 Series does not support device profiles.

1001 hex	Error Register		
Setting range: –	Unit: –	Factory setting: 00 hex	Data attributes: –
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	

• Indicates the error type that occurred on the slave.

Bit	Name	Bit	Name
0	General error	4	Communication error
1	Current error	5	Error unique to device profile
2	Voltage error	6	(Reserved)
3	Temperature error	7	Manufacturer unique error

1008 hex	Manufacturer Device Name		
Setting range: –	Unit: –	Factory setting: For each slave type*	Data attributes: –
Size: 20 bytes (VS)	Access: RO	PDO map: Not possible	

• Displays the model of the slave.

1009 hex	Manufacturer Hardware Version		
Setting range: –	Unit: –	Factory setting: For each slave type*	Data attributes: –
Size: 20 bytes (VS)	Access: RO	PDO map: Not possible	

• Displays the hardware version of the slave.

100A hex	Manufacturer Software Version		
Setting range: –	Unit: –	Factory setting: For each slave type*	Data attributes: –
Size: 20 bytes (VS)	Access: RO	PDO map: Not possible	

• Displays the software version of the slave.

*: The device type, device name, hardware version, and software version factory settings are as follows according to the slave.

Model	Manufacuturer device name	Manufacturer hardware version	Manufacturer software version
ZW-8000 ZW-8000T	ZW-8000x	Space (20 hex) 20 characters	Space (20 hex) 15 characters
ZW-7000 ZW-7000T	ZW-7000x	Space (20 hex) 20 characters	Space (20 hex) 15 characters
ZW-5000 ZW-5000T	ZW-5000x	Space (20 hex) 20 characters	Space (20 hex) 15 characters

1011 hex	Restore Default Parameters		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 01 hex	Data attributes: –
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Restore Default Parameters			
Setting range: –	Unit: –	Factory setting: 00000001 hex	Data attribute: A
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	

- Returns parameters to their factory setting values.
- Parameters are restored only when a specific numerical value is written to sub-index 1 so that parameters are not restored by mistake.
- Specific numerical value means “load”.

MSB LSB

d	a	o	l
64 hex	61 hex	6F hex	6C hex

- The ABORT code is indicated when a value other than the specific numerical value is written.
- During a read, 0000 0001 hex (command enabled) is indicated.

1018 hex	Identity Object		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 04 hex	Data attributes: –
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Vendor ID			
Setting range: –	Unit: –	Factory setting: 00000083 hex	Data attributes: –
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	
Sub-index 2: Product Code			
Setting range: –	Unit: –	Factory setting: For each slave type*	Data attributes: –
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	
Sub-index 3: Revision Number			
Setting range: –	Unit: –	Factory setting: For each slave type*	Data attributes: –
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	
Sub-index 4: Serial Number			
Setting range: –	Unit: –	Factory setting: For each unit	Data attributes: –
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

- This object indicates the device information.
- Sub-index 1 (Vendor ID) indicates the manufacturer identifier.
- For sub-index 2 (Product Code), a value assigned to each slave type is indicated.
- For sub-index 3 (Revision Number), the revision number of the unit is indicated.
- Bits 0 to 15: Minor revision number of device
- Bits 16 to 31: Major revision number of device
- For sub-index 4 (Serial Number), the serial number given to each product is indicated.
- In unit version Ver.1.0, the serial number is always indicated as 00000000 hex.

* The value of Identity object is as follows according to the slave.

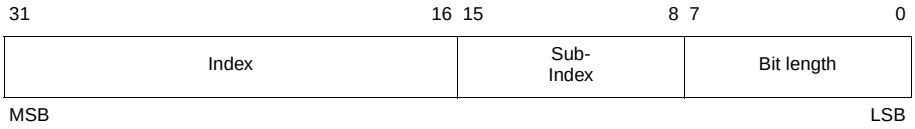
Model	Product Code (hex)	Revision Number (hex)
ZW-7000 ZW-7000T	000000C5 000000C4	00010000 00010001
ZW-5000 ZW-5000T	000000E6 000000E5	00010001
ZW-8000 ZW-8000T	000000F8 000000F9	00010002

10F3Hex	Diagnosis History (Diagnosis History)		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 0DHex	Data attributes: –
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Maximum Messages			
Setting range: –	Unit: –	Factory setting: 00Hex	Data attributes: –
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 2: Newest Message			
Setting range: –	Unit: –	Factory setting: –	Data attributes: –
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 5: Flags			
Setting range: 0000Hex-0001Hex	Unit: –	Factory setting: 0000Hex	Data attributes: –
Size: 2 bytes (U16)	Access: RW	PDO map: Not possible	
Sub-index 6-13: Diagnosis Message 1-8			
Setting range: –	Unit: –	Factory setting: –	Data attributes: –
Size: 23 bytes (VS)	Access: RO	PDO map: Not possible	

- This object indicates a maximum of 8 diagnosis histories. It also sets emergency message enabled/disabled.
- Sub-index 1 (Maximum Messages) indicates the number of error messages.
- Sub-index 2 (Newest Messages) indicates the sub-index number of the latest diagnosis history.
- Sub-index 5 (Flags) is the control flag of the diagnosis history. This sets whether or not to notify error messages as emergency messages. 0001 hex sets to notify as an emergency message, and 0000 hex sets not to notify as an emergency message. When the power is started up, the setting is 0000 hex (Emergency non-notification).
- Sub-index 6 to 13 (Diagnosis message 1 to 8) indicates the diagnosis history.
  From Sub-index 6 (Diagnosis message 1) to sub-index 13 (Diagnosis message 8), 8 errors are stored successively. For the 9th error, sub-index 6 (Diagnosis message 1) is returned to and an error is stored there.

PDO Mapping Object

From index 1600 hex to 17FF hex and from 1A00 hex to 1BFF hex are used for setting receive PDO mapping and transmit PDO mapping, respectively. Sub-index 1 onwards indicate the information of application objects to be mapped.



Bits 0 to 7 : Bit length of mapped object
(For example, in the case of 32 bits, 20 hex is indicated.)

Bits 8 to 15 : Sub-index of mapped object

Bits 16 to 31 : Index of mapped object

1700 hex	257th receive PDO Mapping		
Sub-index 0: Number of objects			
Setting range: –	Unit: –	Factory setting: 20 hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1 to 32: 1st-32th Output Object to be mapped			
Setting range: –	Unit: –	Factory setting: 30000201 to 30002101 hex	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

- Mapping for applications that use displacement sensor functions.
- 3000 hex (control signal) is mapped in 1-byte units.

1701 hex	258th receive PDO Mapping		
Sub-index 0: Number of objects			
Setting range: –	Unit: –	Factory setting: 01 hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: 1st Output Object to be mapped			
Setting range: –	Unit: –	Factory settings: 30010120Hex	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

1704Hex	261th receive PDO		
Sub-Index 0: Number of objects			
Setting range: –	Unit: –	Factory settings: 20Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-Index 1-32: 1st-32th Output Object to be mapped			
Setting range: –	Unit: –	Factory settings: 30010201-30012101Hex	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

1706Hex	263th receive PDO		
Sub-index 0: Number of objects Not possible			
Setting range: –	Unit: –	Factory setting: -04Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: PDO Entry 1(1st Output Object to be mapped)			
Setting range: –	Unit: –	Factory setting: -30030020Hex	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	
Sub-index 2: PDO Entry 2(2nd Output Object to be mapped)			
Setting range: –	Unit: –	Factory setting: -30040110Hex	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	
Sub-index 3: PDO Entry 3(3rd Output Object to be mapped)			
Setting range: –	Unit: –	Factory setting: -30040210Hex	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	
Sub-index 4: PDO Entry 4(4th Output Object to be mapped)			
Setting range: –	Unit: –	Factory settings: -30040320Hex	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

1B00 hex	257th transmit PDO Mapping		
Sub-index 0: Number of objects			
Setting range: –	Unit: –	Factory setting: 20 hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1 to 32: 1st-32th Input Object to be mapped			
Setting range: –	Unit: –	Factory setting: 30010201 to 30012101 hex	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

- Mapping for applications that use displacement sensor functions.
- 3001 hex (status signal) is mapped in 1-byte units.

1B01 hex	258th transmit PDO Mapping		
Sub-index 0: Number of objects			
Setting range: –	Unit: –	Factory settings: 01 hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: 1st Input Object to be mapped			
Setting range: –	Unit: –	Factory settings: 30110120 hex	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

1B03Hex	260th transmit PDO		
Sub-index 0: Number of objects			
Setting range: –	Unit: –	Factory settings: 20Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1 to 32: 1st-32th Input Object to be mapped (1st-32th Input Object to be mapped)			
Setting range: –	Unit: –	Factory settings: 30100201-30102101Hex	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

1B04Hex	261th transmit PDO		
Sub-index 0: Number of objects			
Setting range: –	Unit: –	Factory settings: 20Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1st-32th Input Object to be mapped			
Setting range: –	Unit: –	Factory settings: 30110201-30112101Hex	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

1B06Hex	263th transmit PDO		
Sub-index 0: Number of objects			
Setting range: –	Unit: –	Factory setting: 03 hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: 1st Input Object to be mapped			
Setting range: –	Unit: –	Factory setting: 30130020 hex	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	
Sub-index 2: 2nd Input Object to be mapped			
Setting range: –	Unit: –	Factory setting: 30140020 hex	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	
Sub-index 3: 3rd Input Object to be mapped			
Setting range: –	Unit: –	Factory setting: 30150120 hex	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

1B07 Hex	264th transmit PDO		
Sub-index 0: Number of objects			
Setting range: –	Unit: –	Factory setting: 04 Hex	
Size:1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1-4: 1st-4th Input Object to be mapped			
Setting range: –	Unit: –	Factory setting: 30200120-30200420 Hex	
Size:4 byte (U32)	Access: RO	PDO map: Not possible	

1BFE Hex	511th transmit PDO		
Sub-index 0: Number of objects			
Setting range: –	Unit: –	Factory setting: 02 Hex	
Size:1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: 1st Input Object to be mapped			
Setting range: 10F30401 Hex	Unit: –	Factory setting: 10F30401 Hex	
Size:4 byte (U32)	Access: RO	PDO map: Not possible	
Sub-index 2: 2nd Input Object to be mapped			
Setting range: 07Hex	Unit: –	Factory setting: 07 Hex	
Size:4 byte (U32)	Access: RO	PDO map: Not possible	

1BFF hex	512th transmit PDO Mapping		
Sub-index 0: Number of objects in this PDO			
Setting range: –	Unit: –	Factory setting: 01 hex	Data attributes: –
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: 1st Input Object to be mapped			
Setting range: –	Unit: –	Factory setting: 20020108 hex	Data attributes: –
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

- This object is mapping for the slave to notify that it detected an error.
- 2002 hex to 01 hex: Sysmac error status is mapped.
- When connected to the machine automation controller NJ series, 1C13 hex:
  This object is assigned to the Sync Manager 3PDO assignment.
  By the Sysmac Studio default setting, this object is automatically assigned.

Sync Manager Communication Object

Memory for EtherCAT is set by objects from 1C00 hex to 1C13 hex.

1C00 hex	Sync Manager Communication Type		
Sub-index 0: Number of used SM channels			
Setting range: –	Unit: –	Factory setting: 04 hex	Data attributes: –
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Communication Type Sync Manager 0			
Setting range: –	Unit: –	Factory setting: 01 hex	Data attributes: –
Size: 4 bytes (U8)	Access: RO	PDO map: Not possible	
Sub-index 2: Communication Type Sync Manager 1			
Setting range: –	Unit: –	Factory setting: 02 hex	Data attributes: –
Size: 4 bytes (U8)	Access: RO	PDO map: Not possible	
Sub-index 3: Communication Type Sync Manager 2			
Setting range: –	Unit: –	Factory setting: 03 hex	Data attributes: –
Size: 4 bytes (U8)	Access: RO	PDO map: Not possible	
Sub-index 4: Communication Type Sync Manager 3			
Setting range: –	Unit: –	Factory setting: 04 hex	Data attributes: –
Size: 4 bytes (U8)	Access: RO	PDO map: Not possible	

- Sync Manager is set as follows:
  - SM0: Mailbox receive (EtherCAT master → slave)
  - SM1: Mailbox transmit (slave → EtherCAT master)
  - SM2: Process data output EtherCAT master → slave)
  - SM3: Process data output (slave → EtherCAT master)

1C10 hex	Sync Manager 0 PDO Assignment		
Sub-index 0: Number of assigned PDOs			
Setting range: 00 hex	Unit: –	Factory setting: 00 hex	Data attributes: –
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	

- Indicates the number of PDO mappings used by this Sync Manager.
- The mailbox receive Sync Manager does not have PDOs.

1C11 hex	Sync Manager 1 PDO Assignment		
Sub-index 0: Number of assigned PDOs			
Setting range: 00 hex	Unit: –	Factory setting: 00 hex	Data attributes: –
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	

- Indicates the number of PDO mappings used by this Sync Manager.
- The mailbox transmit Sync Manager does not have PDOs.

1C12 hex	Sync Manager 2 PDO Assignment		
Sub-index 0: Number of assigned receiving PDOs			
Setting range: –	Unit: –	Factory setting: 02Hex	Data attributes: –
Size: 1 byte (U8)	Access: RW*	PDO map: Not possible	
Sub-index 1 to 2: 1st-2nd PDO Mapping Object Index of assigned PDO			
Setting range: –	Unit: –	Factory setting: For each slave type*	Data attributes: –
Size: 2 bytes (U16)	Access: RW*	PDO map: Not possible	

*: When no receive PDO is held, access becomes “RO”.

• Indicates the receive PDO used by this Sync Manager.

1C13 hex	Sync Manager 3 PDO Assignment		
Sub-index 0: Number of assigned transmit PDOs			
Setting range: –	Unit: –	Factory setting: 05 hex	Data attributes: –
Size: 1 byte (U8)	Access: RW*	PDO map: Not possible	
Sub-index 1 to 5: 1st-5th PDO Mapping Object Index of assigned PDO			
Setting range: –	Unit: –	Factory setting: For each slave type*	Data attributes: –
Size: 2 bytes (U16)	Access: RW*	PDO map: Not possible	

*: When no transmit PDO is held, access becomes “RO”.

• Indicates the transmit PDO used by this Sync Manager.

*: The factory settings of Sync manager 2 PDO assignment and Sync manager 3 PDO assignment differ for OMRON tools and tools made by other manufacturers. Factory settings are as follows.

Factory settings for OMRON tools (when an NJ series Controller is used in Sysmac Studio)

Model			ZW-7000□/5000□ (all models)
Sync manager 2 PDO assignment (Hex)	Number of assignment RxPDO		02 hex
	Assigned PDO	1	1700Hex (257th receive PDO Mapping)
		2	1701 hex (258th receive PDO Mapping)
		3	1706Hex (263th receive PDO Mapping)
		4	–
Sync manager 3 PDO assignment (Hex)	Number of assignment RxPDO		04 hex
	Assigned PDO	1	1B00Hex (257th transmit PDO Mapping)
		2	1B01 hex (258th transmit PDO Mapping)
		3	1B06HEx (263th transmit PDO Mapping)
		4	1B07Hex (264th transmit PDO Mapping)
		5	1BFEHex(511th transmit PDO Mapping)
		6	1BFF hex (512th transmit PDO Mapping)

OMRON tool (when the position control unit CJ1W-NC□8□ is used in CX-Programmer)

Model			ZW-7000□/5000□ (all models)
Sync manager 2 PDO assignment (Hex)	Number of assigned RxPDOs		02 hex
	Assigned PDO	1	1700Hex (257th receive PDO Mapping)
		2	1701 hex (258th receive PDO Mapping)
		3	1706Hex (263th receive PDO Mapping)
		4	–
Sync manager 3 PDO assignment (Hex)	Number of assigned RxPDOs		03 hex
	Assigned PDO	1	1B00Hex (257th transmit PDO Mapping)
		2	1B01 hex (258th transmit PDO Mapping)
		3	1B06HEx (263th transmit PDO Mapping)
		4	1B07Hex (264th transmit PDO Mapping)
		5	–

Tools made by other manufacturers

Model			ZW-7000□/5000□ (all models)
Sync manager 2 PDO assignment (Hex)	Number of assignment RxPDO		02 hex
	Assigned PDO	1	1700 hex (257th receive PDO Mapping)
		2	1701 hex (258th receive PDO Mapping)
		3	1706Hex (263th receive PDO Mapping)
		4	–
Sync manager 3 PDO assignment (Hex)	Number of assignment RxPDO		03 hex
	Assigned PDO	1	1B00 hex (257th transmit PDO Mapping)
		2	1B01 hex (258th transmit PDO Mapping)
		3	1B06HEx (263th transmit PDO Mapping)
		4	1B07Hex (264th transmit PDO Mapping)
		5	–

Manufacturer Unique Objects

This section describes the CiA401 generic I/O module device profile mounted on ZW-8000/7000/5000 series EtherCAT slaves and mounted objects that are unique to ZW-8000/7000/5000 series EtherCAT slaves.

Sysmac device common objects

• Manufacturer unique area 1

2002 hex	Sysmac Error		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 02 hex	Data attributes: –
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Sysmac Error Status			
Setting range: –	Unit: –	Factory setting: 00 hex	Data attributes: –
Size: 1 byte (U8)	Access: RO	PDO map: Possible	
Sub-index 2: Sysmac Error Status Clear			
Setting range: –	Unit: –	Factory setting: 00 hex	Data attribute: A
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	

- Notifies and clears Sysmac error status.
- Sub-index 1: Sysmac Error Status
  - This object is for the slave to notify that it detected an error.
  - When connected to a machine automation controller NJ series, this object is mapped to the PDO.
- Sub-index 2: Sysmac Error Status Clear
  - This object is for the Controller of the Sysmac device to reset the error occurring on the slave.

Note

With the Sysmac studio default setting, sub-index 1: System Error Status is automatically mapped to the PDO by the assignment of 1BFF hex: 512th transmit PDO mapping.

2200 hex	Communication Error Setting		
Setting range: 00 hex to 0F hex	Unit: Times	Factory setting: 01 hex	Data attribute: C
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	

- This object is mounted only on slaves running in the DC mode.
- This object sets the continuous number of times that a communications error is detected.
- The setting range is 00 to 0Fh, and the detection count is “set count +1”.
- When the slave is running in the DC mode, values can be rewritten. However, the slave runs at the preset value when the state migrates from pre-operational to save operational. The newly rewritten value is read as the read value at this time.

Note

With the factory setting of 01 hex, an error is detected when a communications error is detected twice consecutively.

2201 hex	Sync Not Received Timeout Setting		
Setting range: 0000 hex to 0258 hex	Unit: s	Factory setting: 0000 hex	Data attribute: C
Size: 2 bytes (U16)	Access: RW	PDO map: Not possible	

- This object is mounted only on slaves running in the DC mode.
- This object sets the standby time until the first sync interrupt signal (SYNC 0) is input after the state migrates to safe operational (state in which DC mode operation is determined).
- If no initial interrupt signal (SYNC 0) is input during this preset time, a sync error occurs.
- The setting range is 0000 hex to 0258 hex (600 s), and operation is performed at 120 s when 0000 hex is set.
- When the slave is running in the DC mode, values can be rewritten. However, the slave runs at the preset value when the state migrates from pre-operational to save operational. The newly rewritten value is read as the read value at this time.

Displacement Sensor Specific Objects

• Object specifications (PDO)

3000 hex	Sensor Head Control Signal1	
Sub-index 0: Number of entries		
Setting range: –	Unit: –	Factory setting: 21Hex
Size: 1 byte (U8)	Access: RO	PDO map: Not possible
Sub-index 1: Sensor Head Control Signal1		
Setting range: –	Unit: –	Factory setting: 00000000 hex
Size: 4 bytes (U32)	Access: RW	PDO map: R
Sub-index 2: EXE Bit		
Setting range: True (1) or False (0)	Unit: –	Setting range: False (0)
Size: 1 bit (BOOL)	Access: RW	PDO map: R
Sub-index 3: SYNC Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: False (0)
Size: 1 bit (BOOL)	Access: RW	PDO map: R
Sub-index 4 to 17: Common Control Reserve Bit 02 to 15		
Setting range: True (1) or False (0)	Unit: –	Setting range: False (0)
Size: 1 bit (BOOL)	Access: RW	PDO map: R
Sub-index 18: ERRCLR Bit		
Setting range: True (1) or False (0)	Unit: –	Setting range: False (0)
Size: 1 bit (BOOL)	Access: RW	PDO map: R
Sub-index 19 to 33: Common Control Reserve Bit 17 to 31		
Setting range: True (1) or False (0)	Unit: –	Setting range: False (0)
Size: 1 bit (BOOL)	Access: RW	PDO map: R

- This object controls the displacement sensor.
- EXE Bit: This is set to execute a command.
- ERRCLR bit: This is set to clear the ERR bit.

3001 hex	Sensor Head Control Signal2		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 21Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Sensor Head Control Signal2			
Setting range: –	Unit: –	Factory setting: 00000000 hex	
Size: 4 bytes (U32)	Access: RW	PDO map: R	
Sub-index 2: TIMING Bit			
Setting range: True (1) or False (0)	Unit: –	Setting range: False (0)	
Size: 1 bit (BOOL)	Access: RW	PDO map: R	
Sub-index 3: RESET Bit			
Setting range: True (1) or False (0)	Unit: –	Setting range: False (0)	
Size: 1 bit (BOOL)	Access: RW	PDO map: R	
Sub-index 4: LIGHTOFF Bit			
Setting range: True (1) or False (0)	Unit: –	Setting range: False (0)	
Size: 1 bit (BOOL)	Access: RW	PDO map: R	
Sub-index 5 to 8: TASK1 to 4 STAT bit			
Setting range: True(1) or False(0)	Unit: –	Factory settings: False(0)	
Size: 1 bit (BOOL)	Access: RW	PDO map: R	
Sub-index 5 to 17: Sensor Head Control Signal2 Reserve Bit 3 to 15			
Setting range: True (1) or False (0)	Unit: –	Setting range: False (0)	
Size: 1 bit (BOOL)	Access: RW	PDO map: R	
Sub-index 18 to 21: ZERO_T1 to T4 Bit			
Setting range: True (1) or False (0)	Unit: –	Setting range: False (0)	
Size: 1 bit (BOOL)	Access: RW	PDO map: R	
Sub-index 22 to 25: ZEROCLR_T1 to T4 Bit			
Setting range: True (1) or False (0)	Unit: –	Setting range: False (0)	
Size: 1 bit (BOOL)	Access: RW	PDO map: R	
Sub-index 26 to 33: Sensor Head Control Signal2 Reserve Bit 24 to 31			
Setting range: True (1) or False (0)	Unit: –	Setting range: False (0)	
Size: 1 bit (BOOL)	Access: RW	PDO map: R	

• This object controls the displacement sensor.

3003 hex	Command code	
Sub-index: –		
Setting range: –	Unit: –	Factory setting: –
Size: 4 bytes (U32)	Access: RW	PDO map: R

• Commands such as bank switching are stored.

3004 hex	Command parameter		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 03Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1 to 2: Command parameter 1 to 2			
Setting range: –	Unit: –	Factory setting: –	
Size: 2 bytes (U16)	Access: RW	PDO map: R	
Sub-index 3: Command parameter 3			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: R	

- Command parameters are stored. (Example: When the bank switching command is executed, the bank number is stored.)

3010 hex	Sensor Head Status Signal1	
Sub-index 0: Number of entries		
Setting range: –	Unit: –	Factory setting: 21Hex
Size: 1 byte (U8)	Access: RO	PDO map: Not possible
Sub-index 1: Sensor Head Status Signal1		
Setting range: –	Unit: –	Factory setting: –
Size: 4 bytes (U32)	Access: RO	PDO map: T
Sub-index 2: FLG Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 3: SYNCFLG Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 4: READY Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 5: Sensor Head Status Signal1 Reserve Bit 03		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 6: RUN Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 7 to 12: Sensor Head Status Signal1 Reserve Bit 05 to 10		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 13 to 17: BANKOUT 1_A to E Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T

Sub-index 18: ERR Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 19 to 33: Sensor Head Status Signal1 Reserve Bit 17 to 31		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T

• This object acquires the status of the displacement sensor.

3011 hex	Sensor Head Status Signal2	
Sub-index 0: Number of entries		
Setting range: –	Unit: –	Factory setting: 21Hex
Size: 1 byte (U8)	Access: RO	PDO map: Not possible
Sub-index 1: Sensor Head Status Signal2		
Setting range: –	Unit: –	Factory setting: –
Size: 4 bytes (U32)	Access: RO	PDO map: T
Sub-index 2: HOLDSTAT Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 3: RESETSTAT Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 4: LIGHT Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 5: STABILITY Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 6: ENABLE 1 Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 7: GATE Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 8: OR Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 9: Sensor Head Status Signal2 Reserve Bit 11		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 10 to 13: TASKSTAT_T1 to T4Bit (TASKSTAT_T1 to T4 Bit)		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T

Sub-index 14 to 17: Sensor Head Status Signal2 Reserve Bit 12 to 15		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: bit (BOOL)	Access: RO	PDO map: T
Sub-index 18 to 21: ZEROSTAT 1_T1 to T4 Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 22: HIGH_T1 Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 23: PASS_T1 Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 24: LOW_T1 Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 25: HIGH_T2 Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 26: PASS_T2 Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 27: LOW_T2 Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 28: HIGH_T3 Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 29: PASS_T3 Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 30: LOW_T3 Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 31: HIGH_T4 Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 32: PASS_T4 Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T
Sub-index 33: LOW_T4 Bit		
Setting range: True (1) or False (0)	Unit: –	Factory setting: –
Size: 1 bit (BOOL)	Access: RO	PDO map: T

• This object acquires the status of the displacement sensor.

3013 hex	Response		
Sub-index: –			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RO	PDO map: T	

• The executed command code is stored.

3014 hex	Response code		
Sub-index: –			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RO	PDO map: T	

• The execution result of the command is stored. (OK: 00000000 hex, NG: FFFFFFFF hex)

3015 hex	Response data		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 01Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Response data 1			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RO	PDO map: T	

• The response data of the command execution result is stored.
(Example: When the processing unit data acquisition command is executed, the acquired data is stored.)

3020 hex	Measurement Value		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 04Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1 to 4: Output Data 1 to 4			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RO	PDO map: T	

• The output data is stored.

• Object specifications (current bank)

3101 hex	Picture Input		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 2: Area 1 Upper Line			
Setting range: -32768 to 32767	Unit: µm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 3: Area 1 Lower Line			
Setting range: -32768 to 32767	Unit: µm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 5: Area Mode			
Setting range: 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 6: Area Follow Mode			
Setting range: 0 to 3	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 7: Area 2 Upper Line			
Setting range: -32768 to 32768	Unit: –	Factory setting: -	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 8: Area 2 Lower Line			
Setting range: -32768 to 32768	Unit: –	Factory setting: -	
Size: 4 bytes(U32)	Access: RW	PDO map: Not possible	
Sub-index 21: Start direction of count measurement surface			
Setting range: 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	

• Data relating to processing item “image input” is stored.

3102 hex	Exposure Time Control		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Exposure Mode			
Setting range: 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 2: Control Edge			
Setting range: 0 to 4	Unit: –	Factory setting: 4	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 3: Exposure Time (Fixed)			
Setting range: 1 to 10000	Unit: µs	Factory setting: 10000	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 4: Exposure time lower limit value (Exposure Time (Minimum))			
Setting range: 1 to 10000	Unit: –	Factory setting: 1	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 5: Exposure Time (Maximum)			
Setting range: 1 to 10000	Unit: µs	Factory setting: 10000	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index14: EdgeTracks enabled flag*			
Setting range: 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index15: Edge1 Track Width*			
Setting range: 0 to 65535	Unit: um	Factory setting: -	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index16: Edge2 Track Width*			
Setting range: 0 to 65535	Unit: um	Factory setting: -	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index17: Edge3 Track Width*			
Setting range: 0 to 65535	Unit: um	Factory setting: -	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index18: Edge4 Track Width*			
Setting range: 0 to 65535	Unit: um	Factory setting: -	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	

• Data relating to processing item “Exposure time control is stored.

* ZW-8000□ only

3103Hex	2 Area Mode Area 1 Exposure Time Control		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 14Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Exposure Mode			
Setting range: 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 2: Control Edge			
Setting range: 0 to 4	Unit: –	Factory setting: 4	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 3: Amount of emitted light (Fixed)			
Setting range: 1 to 10000	Unit: 0.01%	Factory setting: 10000	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 4: Amount of emitted light (Minimum)			
Setting range: 1 to 10000	Unit: 0.01%	Factory setting: 1	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 5: Amount of emitted light (Maximum)			
Setting range: 1 to 10000	Unit: 0.01%	Factory setting: 10000	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

• Data relating to processing item “Exposure time control is stored.

3104Hex	2 Area Mode Area 2 Exposure Time Control		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 14Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Exposure Mode			
Setting range: 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 2: Control Edge			
Setting range: 0 to 4	Unit: –	Factory setting: 4	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 3: Amount of emitted light (Fixed)			
Setting range:1 to 10000	Unit: 0.01%	Factory setting: 10000	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 4: Amount of emitted light (Minimum)			
Setting range:1 to 10000	Unit: 0.01%	Factory setting: 1	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 5: Amount of emitted light (Maximum)			
Setting range:1 to 10000	Unit: 0.01%	Factory setting: 10000	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

• Data relating to processing item “Exposure time control is stored.

3105 hex	Target to Measure		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Material			
Setting range: 0 to 2	Unit: –	Factory setting: 04Hex	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 2: Average Number of Times			
Setting range: 0 to 4	Unit: –	Factory setting: 2	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 3: Noise Cut Level			
Setting range: 0 to 1500	Unit: –	Factory setting: 300 (ZW-8000□), 100 (ZW-7000□/5000□)	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 6: Measurement cycle			
Setting range: 20 to 12000	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	

• Data relating to processing item “target to measure” is stored.

Note

Refer to below for the initial value/setting range of the measurement cycle.
"Setting Measurement Cycle" of "ZW-8000/7000/5000 series User’s Manual (Z362) for Fiber Coaxial Measurement Sensor"

3106 hex	Measuring Point (Task 1)		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 0CHex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Measurement Mode			
Setting range: 0 to 3	Unit: –	Factory setting: 1	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 2: Measurement Surface 1			
Setting range: 0 to 4	Unit: –	Factory setting: 4	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 4: Parameter X			
Setting range: 0 to 4	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 5: Parameter Y			
Setting range: 0 to 4	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 6: Parameter K			
Setting range: -999999999 to 999999999	Unit: –	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 7: Parameter M			
Setting range: -100 to 100	Unit: –	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 8: Parameter N			
Setting range: -100 to 100	Unit: –	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 13: Reference task*			
Setting range 1 to 4	Unit: –	Factory setting: 1	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 14: Adjustment task*			
Setting range 1 to 4	Unit: –	Factory setting: 1	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 15: Adjustment point*			
Setting range 0 to 5	Unit: Point	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 16: Reference value*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 17: Reference task value 1			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	

Sub-index 18: Reference task value 2*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 19: Reference task value 3*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 20: Reference task value 4*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 21: Reference task value 5*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 22: Adjustment task value 1*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 23: Adjustment task value 2*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 24: Adjustment task value 3*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 25: Adjustment task value 4*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 26: Adjustment task value 5*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 27: Interval 0 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 28: Interval 1 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 29: Interval 2 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	

Sub-index 30: Interval 3 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 31: Interval 4 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 32: Interval 5 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 33: Interval 0 offset value*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 34: Interval 1 offset value*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 35: Interval 2 offset value*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 36: Interval 3 offset value*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 37: Interval 4 offset value*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 38: Interval 5 offset value*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 39: Interval 0 start position*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 40: Interval 1 start position*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 41: Interval 2 start position*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	

Sub-index 42: Interval 3 start position*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 43: Interval 4 start position*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 44: Interval 5 start position*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	

- Data relating to TASK 1 processing item “measurement point” is stored.
- The measurement point data of TASK 2 to 4 is stored to:

  TASK 2: Index 3110 hex

  TASK 3: Index 311A hex

  TASK 4: Index 3124 hex

* ZW-8000□ only

3107 hex	Scaling (Task 1)		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 0CHex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Scaling Mode			
Setting range: 0 to 3	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 2: Span			
Setting range: -20000 to 20000	Unit: –	Factory setting: 10000	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 3: Offset			
Setting range: -999999999 to 999999999	Unit: –	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 14: Adjustment point for multipoint scaling*			
Setting range 2 to 40	Unit: Point	Factory setting: 2	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 15: Multipoint scaling height settings value 1*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 16: Multipoint scaling height settings value 2*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 17: Multipoint scaling height settings value 3*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 18: Multipoint scaling height settings value 4*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 19: Multipoint scaling height settings value 5*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 20: Multipoint scaling height settings value 6*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 21: Multipoint scaling height settings value 7*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	

Sub-index 22: Multipoint scaling height settings value 8*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 23: Multipoint scaling height settings value 9*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 24: Multipoint scaling height settings value 10*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 25: Multipoint scaling height measurement value 1*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 26: Multipoint scaling height measurement value 2*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 27: Multipoint scaling height measurement value 3*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 28: Multipoint scaling height measurement value 4*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 29: Multipoint scaling height measurement value 5*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 30: Multipoint scaling height measurement value 6*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 31: Multipoint scaling height measurement value 7*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 32: Multipoint scaling height measurement value 8*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 33: Multipoint scaling height measurement value 9*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible

Sub-index 34: Multipoint scaling height measurement value 10*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 35: Interval 0 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 36: Interval 1 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 37: Interval 2 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 38: Interval 3 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 39: Interval 4 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 40: Interval 5 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 41: Interval 6 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 42: Interval 7 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 43: Interval 8 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 44: Interval 9 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 45: Interval 10 span value*			
Setting range -100000 to 100000	Unit: –	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 46: Interval 0 offset value*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	

Sub-index 47: Interval 1 offset value*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 48: Interval 2 offset value*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 49: Interval 3 offset value*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 50: Interval 4 offset value*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 51: Interval 5 offset value*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 52: Interval 6 offset value*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 53: Interval 7 offset value*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 54: Interval 8 offset value*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 55: Interval 9 offset value*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 56: Interval 10 offset value*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 57: Interval 0 start position*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 58: Interval 1 start position*		
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible

Sub-index 59: Interval 2 start position*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 60: Interval 3 start position*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 61: Interval 4 start position*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 62: Interval 5 start position*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 63: Interval 6 start position*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 64: Interval 7 start position*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 65: Interval 8 start position*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 66: Interval 9 start position*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 67: Interval 10 start position*			
Setting range -999999999 to 999999999	Unit: nm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	

- Data relating to TASK 1 processing item “scaling” is stored.
- The scaling data of TASK 2 to 4 is stored to:
  TASK 2: Index 3111 hex
  TASK 3: Index 311B hex
  TASK 4: Index 3125 hex

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3108 hex	Median Filter (Task 1)		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 02Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Median Filter Mode			
Setting range: 0 to 3	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	

- Data relating to TASK 1 processing item “media” is stored.
- The media data of TASK 2 to 4 is stored to:
  TASK 2: Index 3112 hex
  TASK 3: Index 311C hex
  TASK 4: Index 3126 hex

3109 hex	Average Filter (Task 1)		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 07Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Average Number of Times (Internal sync)			
Setting range: 0 to 14	Unit: –	Factory setting: 10	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 7: Average Number of Times (External or PDO sync)			
Setting range: 0 to 14	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	

- Data relating to TASK 1 processing item “average” is stored.
- The average data of TASK 2 to 4 is stored to:
  TASK 2: Index 3113 hex
  TASK 3: Index 311D hex
  TASK 4: Index 3127 hex

310A hex	Frequency Filter (Task 1)		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 06Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Filter Mode			
Setting range: 0 to 3	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 2: Lowpass Cutoff Frequency			
Setting range: 1000 to 2372000	Unit: MHz	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 3: Bandpass Cutoff Frequency (Upper Limit)			
Setting range: 16000 to 2372000	Unit: MHz	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 4: Bandpass Cutoff Frequency (Lower Limit)			
Setting range: 16000 to 2372000	Unit: MHz	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 5: Highpass Cutoff Frequency			
Setting range: 16000 to 2372000	Unit: nm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RO	PDO map: Not possible	

- Data relating to TASK 1 processing item “frequency filter” is stored.
- The frequency filter data of TASK 2 to 4 is stored to:
  TASK 2: Index 3114 hex
  TASK 3: Index 311E hex
  TASK 4: Index 3128 hex

Note

Refer to below for the initial value/setting range of the cutoff frequency.
"Setting the Frequency Filter" described in "Displacement Sensor ZW-8000/7000/5000 series Confocal Fiber Type Displacement Sensor User’s Manual (Z362)"

310B hex	Differentiation Filter (Task 1)		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 04Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Differentiation Mode			
Setting range: 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 2: Differentiation Cycle (Internal sync)			
Setting range: 20 to 5000000	Unit: µs	Factory setting: 20	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 4: Differentiation Cycle (External or PDO sync)			
Setting range: 1to 50000	Unit: times	Factory setting: 1	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	

- Data relating to TASK 1 processing item “differentiation” is stored.
- The differentiation data of TASK 2 to 4 is stored to:
  TASK 2: Index 3115 hex
  TASK 3: Index 311F hex
  TASK 4: Index 3129 hex

310C hex	Hold (Task 1)		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 0AHex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Hold Mode			
Setting range: 0 to 8	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 2: Trigger Method			
Setting range: 1 to 2	Unit: ms	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 3: Trigger Level			
Setting range: -999999999 to 999999999	Unit: nm	Factory setting: 0	
Size: 4 bytes (INT32)	Access: RO	PDO map: Not possible	
Sub-index 4: Trigger Hysteresis			
Setting range: 0 to 999999999	Unit: nm	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 5: Trigger Delay Time (Internal sync)			
Setting range: 20 to 5000000	Unit: µs	Factory setting: 20	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 6: Sampling Time (Internal sync)			
Setting range: 20 to 5000000	Unit: µs	Factory setting: 100000	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	

Sub-index 7: Trigger Delay Mode		
Setting range: 0 to 1	Unit: –	Factory setting: 0
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible
Sub-index 9: Trigger Delay Time (External or PDO sync)		
Setting range: 1 to 50000	Unit: times	Factory setting: 1
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible
Sub-index 10: Sampling Time (External or PDO sync)		
Setting range: 1 to 50000	Unit: times	Factory setting: 1
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible

- Data relating to TASK 1 processing item “hold” is stored.
- The hold data of TASK 2 to 4 is stored to:
  TASK 2: Index 3116 hex
  TASK 3: Index 3120 hex
  TASK 4: Index 312A hex

310D hex	Zero Reset (Task 1)	
Sub-index 0: Number of entries		
Setting range: –	Unit: –	Factory setting: 09Hex
Size: 1 byte (U8)	Access: RO	PDO map: Not possible
Sub-index 2: Zero Reset Offset		
Setting range: -999999999 to 999999999	Unit: nm	Factory setting: 0
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 3: Zero Reset Type		
Setting range: 0 to 1	Unit: –	Factory setting: 0
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible
Sub-index 5: Zero Reset Execution Enabled/Disabled Status		
Setting range: 0 to 1	Unit: –	Factory setting: 0
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible

- Data relating to TASK 1 processing item “zero reset” is stored.
- The zero reset data of TASK 2 to 4 is stored to:
  TASK 2: Index 3117 hex
  TASK 3: Index 3121 hex
  TASK 4: Index 312B hex

310F hex	Judgment Output (Task 1)		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: LOW Threshold			
Setting range: -999999999 to 999999999	Unit: nm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 2: HIGH Threshold			
Setting range: -999999999 to 999999999	Unit: nm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	

- Data relating to TASK 1 processing item “judgment output” is stored.
- The judgment output of TASK 2 to 4 is stored to:

  TASK 2: Index 3119 hex

  TASK 3: Index 3123 hex

  TASK 4: Index 312D hex

312E hex	Judgment Processing	
Sub-index 0: Number of entries		
Setting range: –	Unit: –	Factory setting: 08Hex
Size: 1 byte (U8)	Access: RO	PDO map: Not possible
Sub-index 1: Hysteresis Width		
Setting range: 0 to 999999999	Unit: nm	Factory setting: –
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible
Sub-index 2: Timer Mode		
Setting range: 0 to 3	Unit: –	Factory setting: 0
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible
Sub-index 3: Delay Time		
Setting range: 200 to 5000000	Unit: µs	Factory setting: 200
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible

- Data relating to processing item “judgment processing” is stored.

312F hex	Non-Measurement Setting		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 03Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Non-Measurement Mode			
Setting range: 0 to 1	Unit: –	Factory setting: 1	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 4: Keep count*			
Setting range 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 5: Number of restorations*			
Setting range 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 6: Keep count specification flag*			
Setting range 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 7: Non-measurement conditions flag_DARK*			
Setting range 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 8: Non-measurement conditions flag_received light saturation*			
Setting range 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 9: Non-measurement conditions flag_Fluctuation in amount of received light*			
Setting range 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 10:Non-measurement conditions flag_Fluctuation in amount of emitted light*			
Setting range 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 11: Non-measurement conditions flag_Shape collapse of waveform*			
Setting range 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 12: Non-measurement conditions flag_Number of Edge*			
Setting range 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	

• Data relating to processing item “processing at non-measurement” is stored.

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3130 hex	Analog Output		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 2BHex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Monitor Focus Mode			
Setting range: 0 to 1	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 2 to 3: Monitor Focus Output Position 1 to 2			
Setting range: -999999999 to 999999999	Unit: nm	Factory setting: –	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 4: Monitor Focus Current Low Limit			
Setting range: 4 to 20	Unit: mA	Factory setting: 4	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 5: Monitor Focus Current High Limit			
Setting range: 4 to 20	Unit: mA	Factory setting: 20	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 6: Monitor Focus Voltage Low Limit			
Setting range: -10 to 10	Unit: V	Factory setting: -10	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 7: Monitor Focus Voltage High Limit			
Setting range: -10 to 10	Unit: V	Factory setting: 10	
Size: 4 bytes (INT32)	Access: RW	PDO map: Not possible	
Sub-index 17: Output Object			
Setting range: 0 to 4	Unit: –	Factory setting: 1	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 18: Output Level During Clamping			
Setting range: –	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	

• Data relating to processing item “analog output” is stored.

3132Hex	Digital Output		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 04Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Logging Output Data1			
Setting range: 0 to 24*	Unit: –	Factory setting: 1	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 2: Logging Output Data2			
Setting range: 0 to 24*	Unit: –	Factory setting: 2	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 3: Logging Output Data3			
Setting range: 0 to 24*	Unit: –	Factory setting: 3	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 4: Logging Output Data4			
Setting range: 0 to 24*	Unit: –	Factory setting: 4	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	

• Data relating to processing item "digital output" is stored.

* With ZW-8000□, up to 25 can be set

3133 hex	Parallel Output		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 01Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Parallel Output Target			
Setting range: 0 to 4	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 2: Parallel Output Result			
Setting range: 0 to 4	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

• Data relating to processing item “parallel output” is stored.

3134Hex	Parallel Input		
Sub-index0: Number of entries			
Setting range: –	Unit: –	Factory setting: 20Hex	
Size: 1 byte(U8)	Access: RO	PDO map: Not possible	
Sub-index3: TIMING Input Mode			
Setting range: 0 to 1	Unit: –	Factory setting: 0	
4 bytes (U32)	Access: RW	PDO map: Not possible	

3136Hex	Measurement state		
Sub-index 0: Number of objects*			
Setting range	Unit: –	Factory setting: 0	
Size: 1 byte(U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Number of Edge*			
Setting range 0 to 5	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 2: Condition for number of Edge*			
Setting range 0 to 2	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 3: Reflective power threshold			
Setting range: 1 to 10000	Unit: –	Factory setting: 10	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 4: Reflection power (Area 1)			
Setting range:	Unit: –	Factory setting:	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	
Sub-index 4: Reflection power (Area 2)			
Setting range:	Unit: –	Factory setting:	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

* ZW-8000□ only

3150 hex	Unit Data Read Execution		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 02Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Unit No			
Setting range: 0 to #xFFFF	Unit: –	Factory setting: –	
Size: 2 bytes (U16)	Access: RW	PDO map: Not possible	
Sub-index 2: Data No			
Setting range: 0 to #xFFFF	Unit: –	Factory setting: –	
Size: 2 bytes (U16)	Access: RW	PDO map: Not possible	

3151 hex	Unit Data Read Result		
Sub-index: –			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

3152 hex	Unit Data Write Execution		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 03Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Unit No			
Setting range: 0 to #xFFFF	Unit: –	Factory setting: –	
Size: 2 bytes (U16)	Access: RW	PDO map: Not possible	
Sub-index 2: Data No			
Setting range: 0 to #xFFFF	Unit: –	Factory setting: –	
Sub-index 3: Write Data			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	

• Object specifications (system information)

3200 hex	Controller System Information		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 15Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Controller Serial No.			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RO	PDO map: Not possible	
Sub-index 2: Model			
Setting range: –	Unit: –	Factory setting: –	
Size: 16 bytes (VS)	Access: RO	PDO map: Not possible	
Sub-index 3: Type			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	
Sub-index 13: Mac Address			
Setting range: –	Unit: –	Factory setting: –	
Size: –	Access: RO	PDO map: Not possible	
Sub-index 14: Port No.			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	
Sub-index 15: Ethernet Protocol			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	
Sub-index 17: Host Major Version			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	
Sub-index 17: Host Minor Version			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

3201 hex	Sensor Head Information		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 6CHex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Sensor Serial No.			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 2: Model			
Setting range: –	Unit: –	Factory setting: –	
Size: 16 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 3: Type			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 4: Work Distance			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 5: Measurement Range			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 13 to 54: Linearity Calibration Data 1 to 42			
Setting range: –	Unit: –	Factory setting: –	
Size: –	Access: RW	PDO map: Not possible	

• Object specifications (other information)

3203 hex	Controller Information		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: LED Information			
Setting range: –	Unit: –	Factory setting: –	
Size: 2 bytes (U16)	Access: RO	PDO map: Not possible	
Sub-index 3: Controller Version			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RO	PDO map: Not possible	
Sub-index 4: Controller Type			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 8: RUN/FUNC Mode			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	

3205 hex	Measuring cycle		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 02Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 2: Measurement Cycle Time			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RO	PDO map: Not possible	

3206 hex	Operation instruction		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: 03Hex	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1 to 2: Parameter 1 to 2			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 3: Command			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	

3207 hex	Command Execution Status	
Sub-index: –		
Setting range: –	Unit: –	Factory setting: –
Size: 2 bytes (U16)	Access: RO	PDO map: Not possible

• The same error code is stored as the Compoway error response code.

• System data

3204 hex	System Data	
Sub-index 0: Number of entries		
Setting range: –	Unit: –	Factory setting: 78Hex
Size: 1 byte (U8)	Access: RO	PDO map: Not possible
Sub-index 2: Data Length		
Setting range: 0 to 1	Unit: –	Factory settings: 1
Size: 1 byte (U8)	Access: RW	PDO map: Not possible
Sub-index 3: Parity		
Setting range: 0 to 2	Unit: –	Factory setting: 0
Size: 1 byte (U8)	Access: RW	PDO map: Not possible
Sub-index 4: Stop Bit		
Setting range: 0 to 1	Unit: –	Factory setting: 0
Size: 1 byte (U8)	Access: RW	PDO map: Not possible
Sub-index 5: Baud Rate		

Setting range: 0-4	Unit: –	Factory settings: 2
Size: 1 byte (U8)	Access: RW	PDO map: Not possible
Sub-index 6: Cs/Rs		
Setting range: 0 to 1	Unit: –	Factory setting: 0
Size: 1 byte (U8)	Access: RW	PDO map: Not possible
Sub-index 14: Port No. Out		
Setting range: 0 to 65536	Unit: –	Factory settings: 9600
Size: 2 bytes (U16)	Access: RW	PDO map: Not possible
Sub-index 15: Port No. In		
Setting range: 0 to 65536	Unit: –	Factory settings: 9600
Size: 2 bytes (U16)	Access: RW	PDO map: Not possible
Sub-index 16: Ethernet Protocol		
Setting range: 0 to 3	Unit: –	Factory settings: 1
Size: 1 byte (U8)	Access: RW	PDO map: Not possible
Sub-index 35: Delimiter		
Setting range: 0 to 2	Unit: –	Factory setting: 0
Size: 1 byte (U8)	Access: RW	PDO map: Not possible
Sub-index 36: Memory Link		
Setting range: 0 to 2	Unit: –	Factory settings: 2
Size: 1 byte (U8)	Access: RW	PDO map: Not possible
Sub-index 37: Gate Time		
Setting range: 0 to 100	Unit: ms	Factory setting: 0
Size: 1 byte (U8)	Access: RW	PDO map: Not possible
Sub-index 39: Serial Data Output		
Setting range: 0 to 3	Unit: –	Factory settings: 0
Size: 1 byte (U8)	Access: RW	PDO map: Not possible
Sub-index 40: Data Type		
Setting range: 0 to 1	Unit: –	Factory settings: 0
Size: 1 byte (U8)	Access: RW	PDO map: Not possible
Sub-index 41: Integer Digit		
Setting range: 1 to 5	Unit: –	Factory settings: 5
Size: 1 byte (U8)	Access: RW	PDO map: Not possible
Sub-index 42: Decimal Point		
Setting range: 0 to 6	Unit: –	Factory settings: 6
Size: 1 byte (U8)	Access: RW	PDO map: Not possible
Sub-index 44: Separation Field		
Setting range: 0 to 7	Unit: –	Factory settings: 0
Size: 1 byte (U8)	Access: RW	PDO map: Not possible
Sub-index 45: Separation Record		
Setting range: –	Unit: –	Factory settings: 0
Size: 1 byte (U8)	Access: RW	PDO map: Not possible
Sub-index 46: Zero Suppress		

Setting range: 0 to 1	Unit: –	Factory settings: 0	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 48: Analog Output Direction			
Setting range: 0 to 1	Unit: –	Factory settings: 0	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 50: Bank Mode			
Setting range: 0 to 1	Unit: –	Factory settings: 0	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 51: Current Bank No.			
Setting range: 0 to 7	Unit: –	Factory settings: 0	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 52: Current Judgment Bank No.			
Setting range: 0 to 31	Unit: –	Factory settings: 0	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 61: Internal Logging Data Size			
Setting range: 0 to 2000000	Unit: –	Factory settings: 1000	
Size: 2 bytes (U16)	Access: RW	PDO map: Not possible	
Sub-index 62: Internal Logging Sampling Interval			
Setting range: 0 to 1000	Unit: –	Factory setting: 0	
Size: 2 bytes (U16)	Access: RW	PDO map: Not possible	
Sub-index 64: Model of Output Data			
Setting range: 0 to 1	Unit: –	Factory setting: 0	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 65: Overwrite Mode			
Setting range: 0 to 1	Unit: –	Factory setting: 0	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 78: Decimal Point Digit			
Setting range: 0 to 5	Unit: –	Factory settings: 1	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 79: Key Lock			
Setting range: 0 to 1	Unit: –	Factory settings: 0	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 80: Timing/Reset Key Input			
Setting range: 0 to 1	Unit: –	Factory settings: 0	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 83: Zero Reset Memory			
Setting range: 0 to 1	Unit: –	Factory settings: 1	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 88: Sensor Head Model			
Setting range: –	Unit: –	Factory settings: ZW-7000	
Size: 32 byte (VS)	Access: RW	PDO map: Not possible	

• The system data is stored.

• Standard bank

3301 hex	Bank Data 1		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Identification String			
Setting range: –	Unit: –	Factory settings: ZW-C BANK 1010	
Size: 16 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 2: Bank Name			
Setting range: –	Unit: –	Factory settings: BANK 1	
Size: 30 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 4: Picture Input 1			
Setting range: –	Unit: –	Factory setting: –	
Size: 30 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 5: Picture Input 2			
Setting range: –	Unit: –	Factory setting: –	
Size: 2 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 6: Exposure Time Control (2 Areas Mode off)			
Setting range: –	Unit: –	Factory setting: –	
Size: 25 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 7: Exposure Time Control Buffer			
Setting range: –	Unit: –	Factory setting: –	
Size: 7 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 10: Target to Measure			
Setting range: –	Unit: –	Factory setting: –	
Size: 24 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 11: Measuring Point (Task 1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 29 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 12: Measuring Point Buffer (Task 1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 3 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 13: Scaling (Task 1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 16 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 14: Median Filter (Task 1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 15: Average Filter (Task 1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	

Sub-index 16: Frequency Filter (Task 1)		
Setting range: –	Unit: –	Factory setting: –
Size: 24 bytes (VS)	Access: RW	PDO map: Not possible
Sub-index 17: Differentiation Filter (Task 1)		
Setting range: –	Unit: –	Factory setting: –
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible
Sub-index 18: Hold 1 (Task 1)		
Setting range: –	Unit: –	Factory setting: –
Size: 30 bytes (VS)	Access: RW	PDO map: Not possible
Sub-index 19: Hold 2 (Task 1)		
Setting range: –	Unit: –	Factory setting: –
Size: 10 bytes (VS)	Access: RW	PDO map: Not possible
Sub-index 20: Zero Reset (Task 1)		
Setting range: –	Unit: –	Factory setting: –
Size: 24 bytes (VS)	Access: RW	PDO map: Not possible
Sub-index 21: Non-Measurement Setting (Task 1)		
Setting range: –	Unit: –	Factory setting: –
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible
Sub-index 22: Judgment Output (Task 1)		
Setting range: –	Unit: –	Factory setting: –
Size: 24 bytes (VS)	Access: RW	PDO map: Not possible
Sub-index 23: Measuring Point (Task 2)		
Setting range: –	Unit: –	Factory setting: –
Size: 29 bytes (VS)	Access: RW	PDO map: Not possible
Sub-index 24: Measuring Point Buffer (Task 2)		
Setting range: –	Unit: –	Factory setting: –
Size: 3 bytes (VS)	Access: RW	PDO map: Not possible
Sub-index 25: Scaling (Task 2)		
Setting range: –	Unit: –	Factory setting: –
Size: 16 bytes (VS)	Access: RW	PDO map: Not possible
Sub-index 26: Median Filter (Task 2)		
Setting range: –	Unit: –	Factory setting: –
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible
Sub-index 27: Average Filter (Task 2)		
Setting range: –	Unit: –	Factory setting: –
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible
Sub-index 28: Frequency Filter (Task 2)		
Setting range: –	Unit: –	Factory setting: –
Size: 24 bytes (VS)	Access: RW	PDO map: Not possible
Sub-index 29: Differentiation Filter (Task 2)		
Setting range: –	Unit: –	Factory setting: –
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible

Sub-index 30: Hold 1 (Task 2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 30 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 31: Hold 2 (Task 2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 10 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 32: Zero Reset (Task 2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 33: Non-Measurement Setting (Task 2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 34: Judgment Output (Task 2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 35: Measuring Point (Task 3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 29 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 36: Measuring Point Buffer (Task 3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 3 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 37: Scaling (Task 3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 16 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 38: Median Filter (Task 3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 39: Average Filter (Task 3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 40: Frequency Filter (Task 3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 41: Differentiation Filter (Task 3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 42: Hold 1 (Task 3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 30 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 43: Hold 2 (Task 3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 10 bytes (VS)	Access: RW	PDO map: Not possible	

Sub-index 44: Zero Reset (Task 3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 45: Non-Measurement Setting (Task 3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 46: Judgment Output (Task 3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 47: Measuring Point (Task 4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 29 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 48: Measuring Point Buffer (Task 4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 3 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 49: Scaling (Task 4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 16 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 50: Median Filter (Task 4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 51: Average Filter (Task 4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 52: Frequency Filter (Task 4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 53: Differentiation Filter (Task 4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 54: Hold 1 (Task 4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 30 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 55: Hold 2 (Task 4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 10 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 56: Zero Reset (Task 4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 57: Non-Measurement Setting (Task 4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	

Sub-index 58: Judgment Output (Task 4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 59: Judgment Processing			
Setting range: –	Unit: –	Factory setting: –	
Size: 16 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 60: Non-Measurement Setting			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 61: Analog Output 1			
Setting range: –	Unit: –	Factory setting: –	
Size: 30 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 62: Analog Output 2			
Setting range: –	Unit: –	Factory setting: –	
Size: 10 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 63: Binary Output 1*			
Setting range: –	Unit: –	Factory setting: –	
Size: 30 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 64: Binary Output 2*			
Setting range: –	Unit: –	Factory setting: –	
Size: 10 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 65: Logging			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 66: Parallel Output			
Setting range: –	Unit: –	Factory setting: –	
Size: 16 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 67: Stub			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 68: Parallel Input			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 69: Line Bright			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 70: Test Item			
Setting range: –	Unit: –	Factory setting: –	
Size: 8 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 76: Byte Count of Parameter			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	

Sub-index 77: Sum			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 78: Xor			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	

- This is bank data 1 for backup use.
- The indexes for bank data 2 onwards are as follows:
  Bank data 2: 3302 hex
  Bank data 3: 3303 hex
  Bank data 4: 3304 hex
  Bank data 5: 3305 hex
  Bank data 6: 3306 hex
  Bank data 7: 3307 hex
  Bank data 8: 3308 hex

*: ZW-7000□ does not output sub-indexes 63/64.

33F0 hex	Bank Data Binary Setting		
Sub–index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub–index 1: Bank No			
Setting range: 0 to 7	Unit: –	Factory setting: 0	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	

33F1Hex	Bank Data Binary		
Sub–index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub–index 1: Identification String			
Setting range: –	Unit: –	Factory setting: –	
Size: 16bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 2: Bank Name			
Setting range: –	Unit: –	Factory setting: –	
Size: 30bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 4: Picture Input1			
Setting range: –	Unit: –	Factory setting: –	
Size: 30bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 5: Picture Input2			
Setting range: –	Unit: –	Factory setting: –	
Size: 2bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 6: Exposure Time Control (2 Area Mode Off)			
Setting range: –	Unit: –	Factory setting: –	
Size: 25bytes (VS)	Access: RW	PDO map: Not possible	

Sub–index 7: Exposure Time Control Buffer			
Setting range: –	Unit: –	Factory setting: –	
Size: 7bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 8: Exposure Time Control (Area 1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 9: Exposure Time Control (Area 2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 10: Target to Measure			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 11: Measuring Point (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 29bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 12: Measuring Point Buffer (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 3bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 13: Measuring Point 2 (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 14: Measuring Point 3 (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 20bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 15: Measuring Point Buffer_2 (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 16: Scaling (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 16bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 17: Scaling 2 (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 18: Scaling 3 (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 19: Scaling 4 (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 20: Scaling Buffer (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 4bytes (VS)	Access: RW	PDO map: Not possible	

Sub–index 21: Median Filter (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 22: Average Filter (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 23: Frequency Filter (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 24: Differentiation Filter (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 25: Hold 1 (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 30bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 26: Hold 2 (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 10bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 27: Zero Reset (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 28: Non–Measurement Setting (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 29: Judgement Output (Task1)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 30: Measuring Point (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 29bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 31: Measuring Point Buffer (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 3bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 32: Measuring Point 2 (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 33: Measuring Point 3 (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 20bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 34: Measuring Point Buffer_2 (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	

Sub–index 35: Scaling (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 16bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 36: Scaling 2 (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 37: Scaling 3 (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 38: Scaling 4 (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 39: Scaling Buffer (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 4bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 40: Median Filter (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 41: Average Filter (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 42: Frequency Filter (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 43: Differentiation Filter (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 44: Hold 1 (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 30bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 45: Hold 2 (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 10bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 46: Zero Reset (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 47: Non–Measurement Setting (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 48: Judgement Output (Task2)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	

Sub–index 49: Measuring Point (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 29bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 50: Measuring Point Buffer (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 3bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 51: Measuring Point 2 (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 52: Measuring Point 3 (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 20bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 53: Measuring Point Buffer_2 (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 54: Scaling (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 16bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 55: Scaling 2 (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 56: Scaling 3 (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 57: Scaling 4 (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 58: Scaling Buffer (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 4bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 59: Median Filter (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 60: Average Filter (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 61: Frequency Filter (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 62: Differentiation Filter (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	

Sub–index 63: Hold 1 (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 30bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 64: Hold 2 (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 10bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 65: Zero Reset (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 66: Non–Measurement Setting (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 67: Judgement Output (Task3)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 68: Measuring Point (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 29bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 69: Measuring Point Buffer (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 3bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 70: Measuring Point 2 (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 71:Measuring Point 3 (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 20bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 72: Measuring Point Buffer_2 (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 73: Scaling (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 16bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 74: Scaling 2 (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 75: Scaling 3 (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 76: Scaling 4 (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 28bytes (VS)	Access: RW	PDO map: Not possible	

Sub–index 77: Scaling Buffer (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 4bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 78: Median Filter (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 79: Average Filter (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 80: Frequency Filter (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 81: Differentiation Filter (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 82: Hold 1 (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 30bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 83: Hold 2 (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 10bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 84: Zero Reset (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 85: Non–Measurement Setting (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 86: Judgement Output (Task4)			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 87: Judgement Processing			
Setting range: –	Unit: –	Factory setting: –	
Size: 16bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 88: Non–Measurement Setting			
Setting range: –	Unit: –	Factory setting: –	
Size: 24bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 89: Analog Output1			
Setting range: –	Unit: –	Factory setting: –	
Size: 30bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 90: Analog Output2			
Setting range: –	Unit: –	Factory setting: –	
Size: 10bytes (VS)	Access: RW	PDO map: Not possible	

Sub–index 91: Binary Output1			
Setting range: –	Unit: –	Factory setting: –	
Size: 30bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 92: Binary Output2			
Setting range: –	Unit: –	Factory setting: –	
Size: 10bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 93: Logging			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 94: Parallel Output			
Setting range: –	Unit: –	Factory setting: –	
Size: 16bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 95: Measure Condition			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 96: Stab			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 97: Parallel Input			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 98: Line Bright			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 99: Test Item			
Setting range: –	Unit: –	Factory setting: –	
Size: 8bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 111: Byte Count of Parameter			
Setting range: –	Unit: –	Factory setting: –	
Size: 4bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 112: Sum			
Setting range: –	Unit: –	Factory setting: –	
Size: 4bytes (VS)	Access: RW	PDO map: Not possible	
Sub–index 113: Xor			
Setting range: –	Unit: –	Factory setting: –	
Size: 4bytes (VS)	Access: RW	PDO map: Not possible	

• Judgment value bank

3401 hex	Bank Data1 (Judge Mode)		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Identification String			
Setting range: –	Unit: –	Factory setting: –	
Size: 16 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 2: Name of Bank			
Setting range: –	Unit: –	Factory setting: –	
Size: 30 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 4 to 7: TASK 1 to 4			
Setting range: –	Unit: –	Factory setting: –	
Size: 12 bytes (VS)	Access: RW	PDO map: Not possible	
Sub-index 9: SUM			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	
Sub-index 10: XOR			
Setting range: –	Unit: –	Factory setting: –	
Size: 4 bytes (U32)	Access: RW	PDO map: Not possible	

- This is bank data for backup use when the bank mode is Judgment Value. The following also must be backed up in addition to the bank data. (When the bank mode is Normal, all 0's are stored.)
- The indexes for bank data (Judgment Value) 2 onwards are as follows:
  Bank data (Judgment Value) 2: 3402 hex
  Bank data (Judgment Value) 3: 3403 hex
  .
  .
  .
  Bank data (Judgment Value) 32: 3420 hex

• Line bright (measurement waveform)

3500 hex	Line Bright		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Taking Sensor Head Channel			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	
Sub-index 2: Taking Line Bright Area			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RW	PDO map: Not possible	

• The line bright data is stored.

3501 hex	Line Bright (Normal)		
Sub-index 0: Number of entries			
Setting range: –	Unit: –	Factory setting: –	
Size: 1 byte (U8)	Access: RO	PDO map: Not possible	
Sub-index 1 to 39: Line Bright Data1 to 40			
Setting range: –	Unit: –	Factory setting: –	
Size: 30 bytes (VS)	Access: RO	PDO map: Not possible	

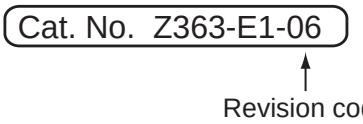
• The line bright data is stored.

• Only sub-index 40, size is 2 bytes (VS).

Index

Revision History

A manual revision code appears as a suffix to the catalog number at the bottom of the front and back covers of this manual.



Revision code	Date	Revision Contents
01	April 2016	First edition
02	July 2016	Add PDO synchronization mode and correct error descriptions.
03	April 2017	Compatible with ZW-5000 series and correct error descriptions.
04	May 2017	Correct error descriptions.
05	May 2018	Compatible with ZW-8000 series and correct error descriptions.
06	November 2019	Correct error descriptions.

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