

OMRON



Sensor Communication Unit

E3X-CRT (CompoNet)

User's Manual

Introduction	Application Considerations (Please Read)
Section 1	Overview
Section 2	Installation and Connection
Section 3	CompoNet Communication Settings
Section 4	APPENDIX

User's Manual

Communication Unit
for Digital Type Sensor
E3X-CRT (CompoNet)

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Meanings of Signal Words

The following signal words are used in this manual.

WARNING

Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.

Alert statements in this Manual

The following alert statements apply to the products in this manual. Each alert statement also appears at the locations needed in this manual to attract your attention.

WARNING

Configure the safety circuits, such as emergency stop circuits, interlock circuits, and limit circuits, with external control circuits in order to remain the safety of the entire system when a failure due to a product failure or an external factor occurs. If not, the failure may cause a serious incident.

Precautions for Safe Use

Please observe the following precautions for safe use of E3X-CRT.

- Do not use the product in environments where it can be exposed to inflammable/explosive gas.
- Do not use the product where to be exposed to water, oil, chemical fumes or steam.
- Do not disassemble, repair or modify this product.
- Do not wire the product when the power is ON.
- Do not drop, or subject to excessive shock or vibration. It may cause a failure or abnormal operation.
- Use the specified communications cables.
- Wire communications within the specified distance.
- Do not wire the communications cables near or in parallel with high-voltage or high-current lines.
- Do not bend cables past their natural bending radius or pull on cables.
- Check all wiring carefully and completely before supplying power.
- Confirm that the correct polarity has been used in wiring the terminals and that the communications and power lines have been otherwise wired correctly. Incorrect wiring may result in failure.
- Do not connect or disconnect connectors while the power supply is turned ON. Doing so may result in failure or malfunction.
- Use the specified power supply voltage.
- Do not turn ON or OFF the power supply to the Mobile Console during communications. Doing so may result in communications errors.
- Make sure that screws for the communication connector are tightened firmly. (0.5 N·m to 0.6N·m)
- Do not use this product if the case is damaged.
- Dispose this product as industrial waste.

Precautions for Correct Use

Please install this product correctly according to this manual.

- Do not install the product in locations subjected to the following conditions:
 - Direct sunlight
 - Ambient temperature and humidity outside the rating
 - Rapid temperature transition and condensation
 - Excessive dust, saline air or metal powder
 - Direct vibration or shock

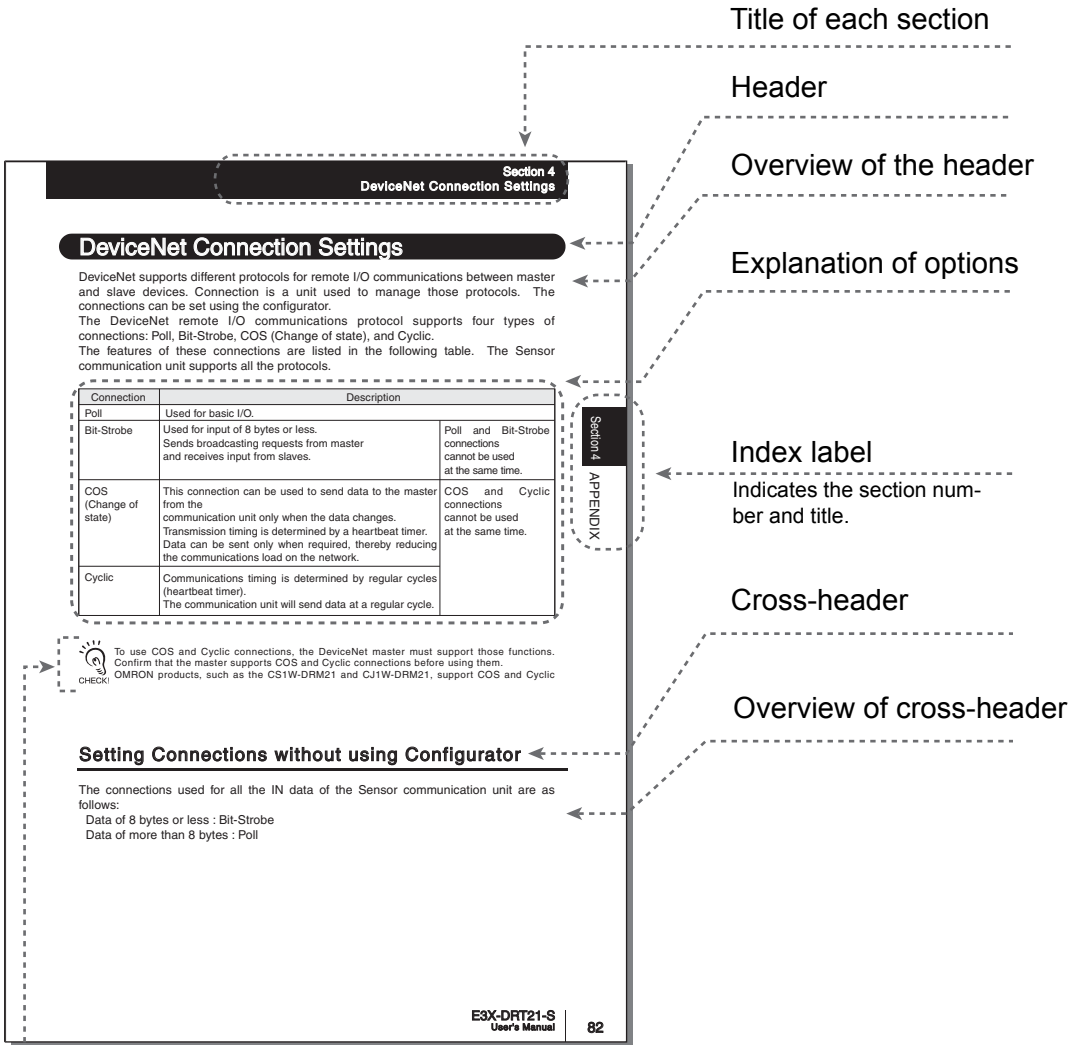
- Use appropriate shielding when using this product in the following places.
 - Presence of noise such as static electric
 - Strong magnetic or electric field
 - Subject to possible expose to radiation
 - Near power supply lines

- Do not clean with organic solvents, such as paint thinner. Organic solvents will dissolve and discolor the surface of the product.

- Take measures to stabilize the power supply to conform to the rated supply (the voltage, frequency, etc.) if it is not stable.

Editor's Note

Page Format



Supplementary Explanation

Helpful information regarding operation and reference pages introduced here using symbols.



* This page does not exist.

? Meaning of Symbols

Menu items that are displayed on the Amplifier Unit's LCD screen are indicated enclosed by brackets [].

? Visual Aids



CHECK!

Indicates points that are important to ensure full product performance, such as operational precautions and application procedures.



Indicates pages where related information can be found.



Indicates information helpful in operation.

EXP MENU

Indicates functions that can be set only when the setup menu has been switched to EXP menu.

MEMO

Contents

Meanings of Signal Words	5
Precautions for Safe Use	6
Precautions for Correct Use	7
Editor's Note	8
Page Format	8
Contents	11
Section 1 Overview	15
Features and System Configuration	16
Overview	16
Features	17
System Configuration	18
Section 2 Installation and Connection	19
Specifications and External Dimensions	20
Specifications	20
External Dimensions	21
Connecting Sensors	22
Connectable Sensors	22
Number of Connectable Sensors	23
Connecting and Identifying Sensors (Unit Number)	23
Registering the Number of Connected Sensors	24
Sensor Reset Switch	24
Installation	25
Installation Procedures	25
Removing Procedures	26
Precautions for Replacing Units	26


Section 3 CompoNet Communication Settings	27
<hr/>	
Overview of CompoNet Communication Type	28
Overview	28
Overview of Communication Functions of CompoNet Communication Type	29
Example of Remote I/O Communications	32
Example of Explicit Message Communications	33
Part Names	34
Part Names and Functions	34
How to Use Units	37
How to Use Units	37
Wiring CompoNet Communication Type	39
CompoNet Remote I/O Communications	40
Allocating to Master	40
Explicit Message Communications	44
Basic Format of Explicit Messages	44
Read Commands	46
Write Commands	60
Operation Instruction Commands	70
Error Code List	72
Example of Explicit Message Functions	74
Sensor Setting/Monitoring/Operating Functions from Configurator	76
Overview	76
Setting the Communication Unit and Sensors, and Downloading	78
Uploading to Communication Unit and Monitoring/Setting Parameters Online	80
Operation Instructions for Each Sensor (Fiber Amplifier Unit)	81
Online Monitoring	82
Sensor Maintenance	82

Section 4 APPENDIX	83
Communications Timing	84
Communications Timing	84
Errors and Countermeasures	86
CompoNet Connection Settings	88
Setting Connections without Using Configurator	88
Changing Connections Using the Configurator	89
CompoNet Device Profile	95
Device Profile	95
Mounted Objects	96
Index	97
Revision History	100

MEMO

Section 1

Overview

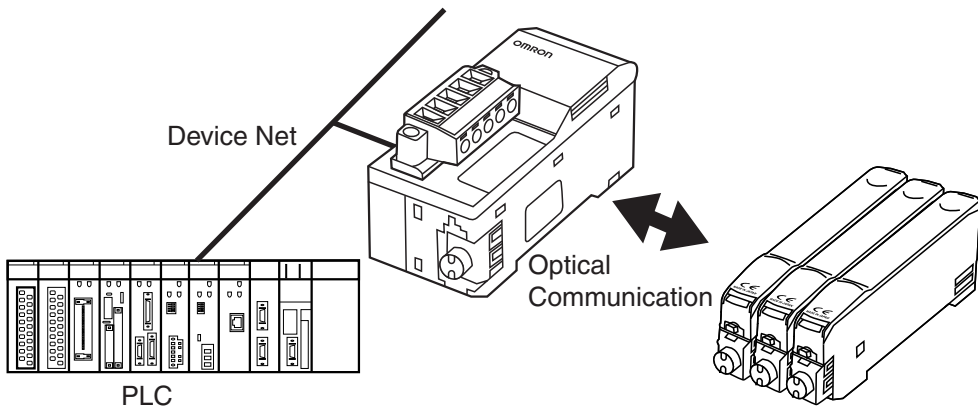
 Features and System Configuration	16
Overview	16
Features	17

Features and System Configuration

Overview

The Communication Unit (E3X-CRT) is a communication slave that performs the ON/OFF output for sensors, monitoring the detection level, writing parameters, and an operation between Digital Type Sensors and PLCs via CompoNet communication. (Supported sensors are: Fiber Sensors E3X-DA0-S/DAC0-S/MDA0, Separate Amplifier Laser Sensors E3X-LDA0, and Separate Amplifier Proximity Sensor E2C-EDA0.)

The ON/OFF output and monitoring the detection level can be performed using remote I/O communications without any programming. Moreover, reading and writing any parameters using Explicit messages, and batch-transfer and monitoring any parameters using a configurator are possible.



Features

- **This unit enables a communication interface between OMRON's PLCs (CS, CJ, SYSMAC and other series) or other manufacturer's PLCs that support CompoNet, and Digital Type Sensors.**

- **Remote I/O communication slave**

Data such as ON/OFF output and the detection level on Digital Type Sensors can be sent to the upper (master) PLCs via remote I/O communication without any programming.

- **Message communications**

Sending commands (Explicit messages) from the PLC allows reading and writing parameters such as settings of the detection level, threshold and each function, and various teaching operations.

Section 2

Installation and Connection

☒ Specifications and External Dimensions	21
Specifications	21
External Dimensions	22
☒ Connecting Sensors	23
Connectable Sensors	23
Number of Connectable Sensors	24
Connecting and Identifying Sensors (Unit Number)	24
Registering the Number of Connected Sensors	25
Sensor Reset Switch	24
☒ Installation	27
Installation Procedures	27
Removing Procedures	28
Precautions for Replacing Units	28

Specifications and External Dimensions

Specifications

Item		Description
Communications method		CompoNet Communications
Communi- cations	Remote I/O communications	ON/OFF output, status, and monitoring the detection level (details of the digital display)
	Message communications	Setting parameters using Explicit messages
	Configurator	Editing parameters for slave devices using a configurator/It depends on device monitoring functions
Power supply		Supplies from CompoNet communications connector (Power is supplied to all Sensors being connected via wire-saving connectors.)
Maximum number of connected Sensors		15 or 16 (depending on the operating I/O-mode)
Connectable Sensors		Fiber Sensors Separate Amplifier Laser Sensors Separate Amplifier Proximity Sensors Refer to <i>Connectable Sensors</i> on page 23 for details.
Power supply voltage		DC14 to 26.4V
Current consumption *1		70 mA max.
Operating ambient temperature		-20 to +55°C
Operating ambient humidity		35% to 85% (with no condensation)
Storage ambient temperature		-30 to +70°C
Size (mm)		41.5 (W) x 32.5 (H) x 102 (D)
Weight **packed state		Approx. 250 g

*1. The current supplied to the Sensors is not included.

External Dimensions

Connecting Sensors

Connectable Sensors

The Communication Unit can be connected with the following Sensors.

Type	Model	Types	Threshold value
Fiber Sensors	E3X-DA0-S	Hi-grade type	2
	E3X-DAC0-S	Color type	2
	E3X-MDA0	Sensor 2CH type	2
Separate Amplifier Laser Sensors	E3C-LDA0	Two-output type	2
Separate Amplifier Proximity Sensors	E2C-EDA0	Two-output type	2



Maximum number of connected any sensors can be connected is same.

Number of Connectable Sensors

The number of connectable Sensors depends on the settings of communication units.

Type	Setting	Number of Connectable Sensors
CompoNet Communication Type (E3X-CRT)	Remote I/O communications in 2CH mode	Max. 15
	Remote I/O communications in 4CH and out 4 CH mode	Max. 16

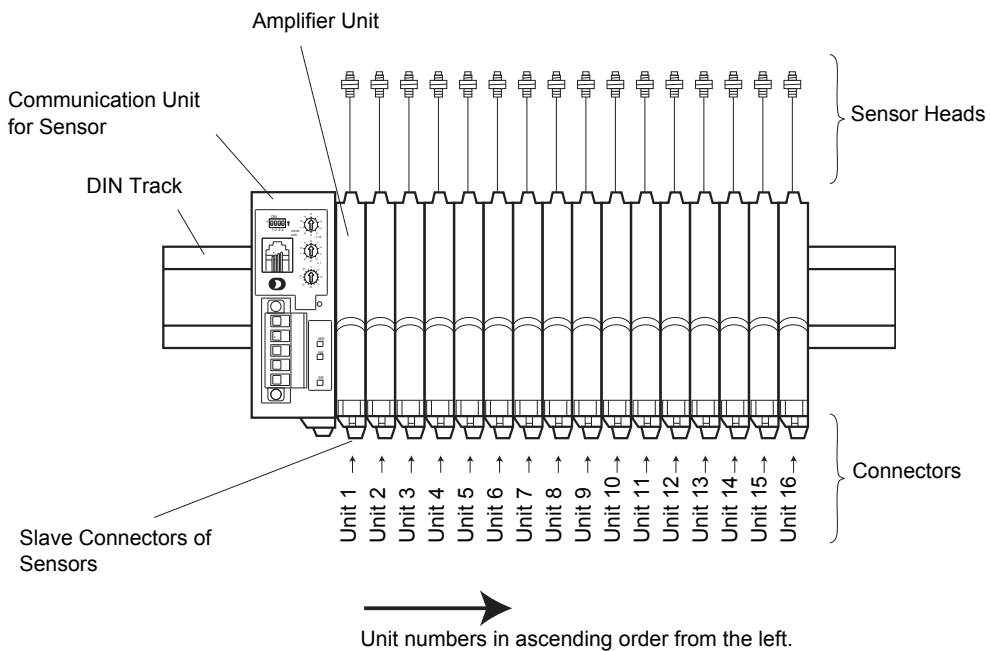


Maximum number of connected any sensors can be connected is same.

Connecting and Identifying Sensors (Unit Number)

The Sensors are gang-mounted to the right side of the Communication Unit, as shown in the following diagram. DIN track must be used for installing.

Power to the connected Sensors is supplied from the Communication Unit.



The Communication Unit identifies the connected Sensors according to the unit numbers. Unit numbers of sensors are assigned to the units from unit number 1 starting from the communication unit side. Note that some Sensors occupy two unit numbers.

Registering the Number of Connected Sensors

To detect whether communications between communication units and Sensors are normal, the number of connected Sensors must be registered.

By registering the number of Sensors connected, when there is no response on the optical communications of Sensors due to damage to the Sensors and so on, errors can be detected from the difference between the number of Sensors that can be communicated with and the number of Sensors registered.

When there is a difference between the number of Sensors connected and the number of Sensors registered, it is indicated as follows:

- The SS LED lights red.
- [Sensor Communication Error] Flag turns ON.

Setting the Number of Connected Sensors

Type	Setting method
E3X-CRT (CompoNet communications type)	Registering using rotary switch.

Dummy Sensor Registering

The sensor amplifier is not implemented is the ability to register as a dummy sensor. If you want to add more in the future sensor amplifiers, pre-set area (dummy sensor area) is secured. Thus, when the actual expansion, eliminating the need for significant changes in the ladder program.

Or CX-Integrator, and you can check the contents set by the explicit message or CX-integrator.

The setting way refer to explicit message in chapter 3.

ex) Without dummy sensor setting

Connected 5 Real sensors

E3X-CRT	Unit 1 Real Sensor	Unit 2 Real Sensor	Unit 3 Real Sensor	Unit 4 Real sensor	Unit 5 Real Sensor
---------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

ex) With dummy sensor setting

Connected 5 Real sensors

And

Dummy sensor setting: Unit No. 4 and 5

E3X-CRT	Unit 1 Real Sensor #1	Unit 2 Real Sensor #2	Unit 3 Real Sensor #3	Unit 4 Dummy Sensor	Unit 5 Dummy Sensor	Unit 6 Real sensor #4	Unit 7 Real Sensor #5
---------	--------------------------------	--------------------------------	--------------------------------	---------------------------	---------------------------	--------------------------------	--------------------------------



The registration number of connected Sensors (sensor number Rotary SW) include dummy sensors.

The maximum number of “real sensors + dummy sensors” is 15 (I/O mode1) or 16(I/O mode2).

Do not use empty Unit setting.

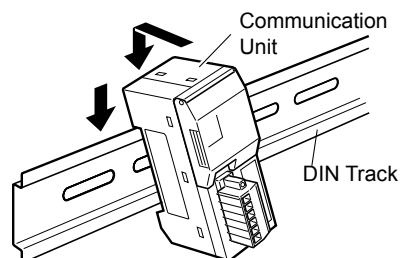
For example Real sensor number is 1 and dummy sensor setting is No3 or greater.

Installation

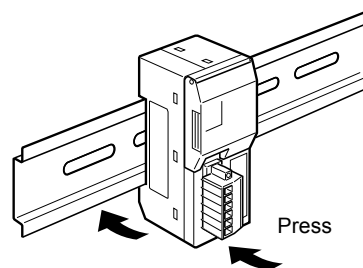
Installation Procedures

Installation procedures are as follows:

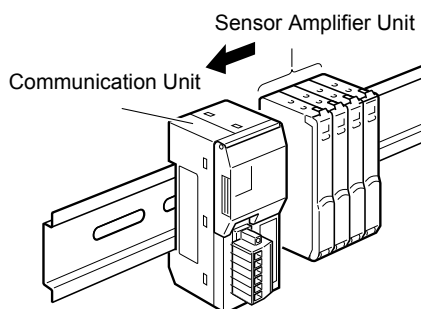
1. Install the front part of the unit on the DIN track.



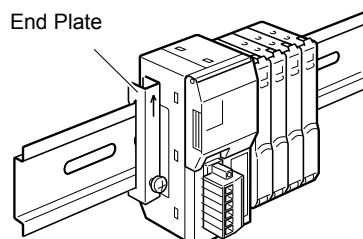
2. Press the rear part of the unit onto the DIN track.



3. Slide the Sensor Amplifier Unit to fit the hook of the connector to the communication unit, and keep pushing until you hear it snap into place.



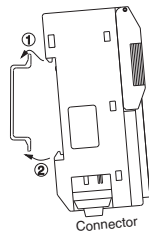
4. Fix the both ends firmly with End Plate (PFP-M, sold separately).



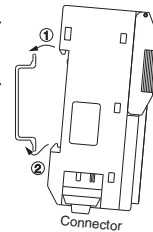


CHECK!

The order of steps 1 and 2 in the installation method described above must be followed correctly. Mounting strength may decrease if the order is not correct.



Order of step (1) to step (2)

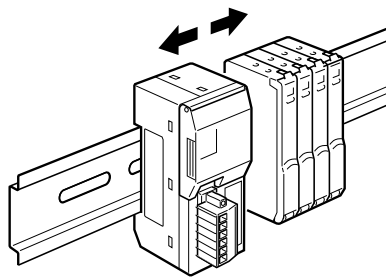


NG as the order of step (2) to step (1)

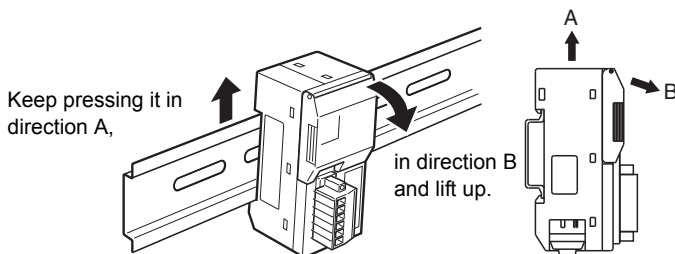
Removing Procedures

Removing procedures are as follows:

1. Slide the Sensor Amplifier Unit to remove it from the communication unit.



2. Keep pressing the communication unit in direction A and lift it up in direction B to remove.



Precautions for Replacing Units

The following parameters have been stored into the internal memory of the communications unit. If the default value have been changed, these parameters must be set again when replacing units.

- Number of connected Sensors
- Number of monitors for the detection level

Section 3

CompoNet Communication Settings

☒	Overview of CompoNet Communication Type	29
	Overview	29
	Overview of Communication Functions of CompoNet Communication Type	30
	Example of Remote I/O Communications	33
	Example of Explicit Message Communications	34
☒	Part Names	35
	Part Names and Functions	35
☒	How to Use Units	38
	How to Use Units	38
☒	Wiring CompoNet Communication Type	38
☒	CompoNet Remote I/O Communications	39
	Allocating to Master	39
☒	Explicit Message Communications	44
	Basic Format of Explicit Messages	44
	Read Commands	47
	Write Commands	59
	Operation Instruction Commands	68
	Error Code List	70
	Example of Explicit Message Functions	72
☒	Sensor Setting/Monitoring/Operating Functions from Configurator	75
	Overview	75
	Setting the Communication Unit and Sensors, and Downloading	77
	Uploading to Communication Unit and Monitoring/Setting Parameters Online	79
	Operation Instructions for Each Sensor (Fiber Amplifier Unit)	80
	Online Monitoring	81
	Sensor Maintenance	81

Overview of CompoNet Communication Type

Overview

A CompoNet Communication Type is a communication unit to output CompoNetON/OFF data of multiple fiber sensors, monitor the detection level, write parameters, and operate the unit via CompoNet.

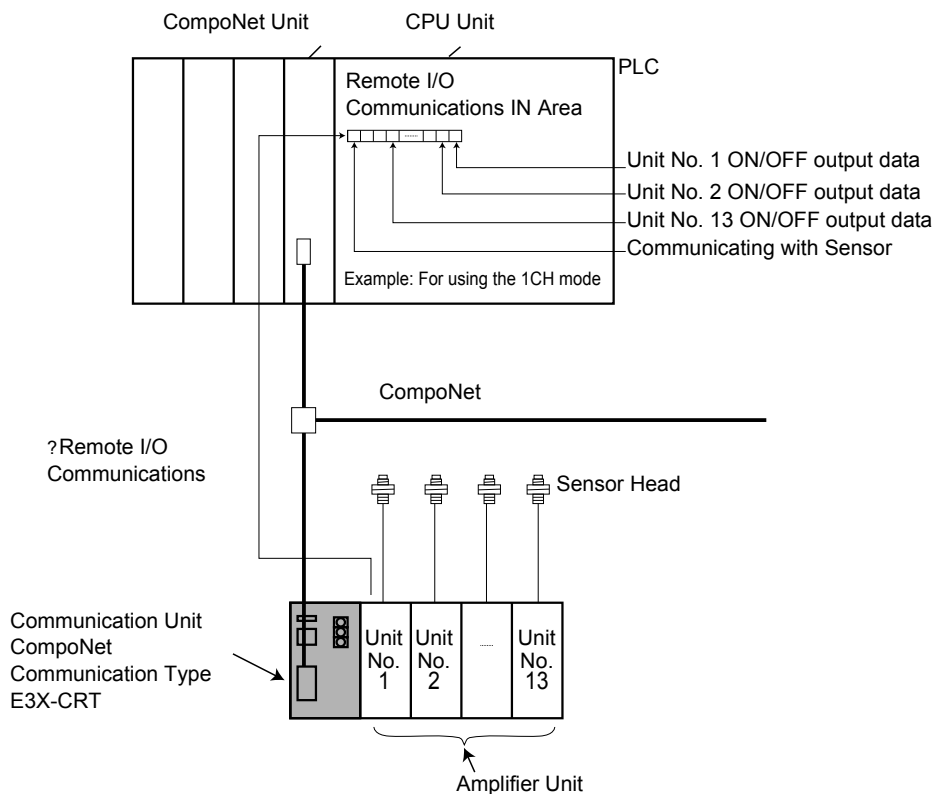
The ON/OFF output and monitoring the detection level can be performed using remote I/O communications without any programming. Moreover, reading and writing any parameters using Explicit messages, and batch-transfer and monitoring any parameters using a configurator are possible.

When using this product, also refer to the following manuals:
"CompoNet Slave Manual" (No. ??????????????)

Overview of Communication Functions of CompoNet Communication Type

Remote I/O Communications

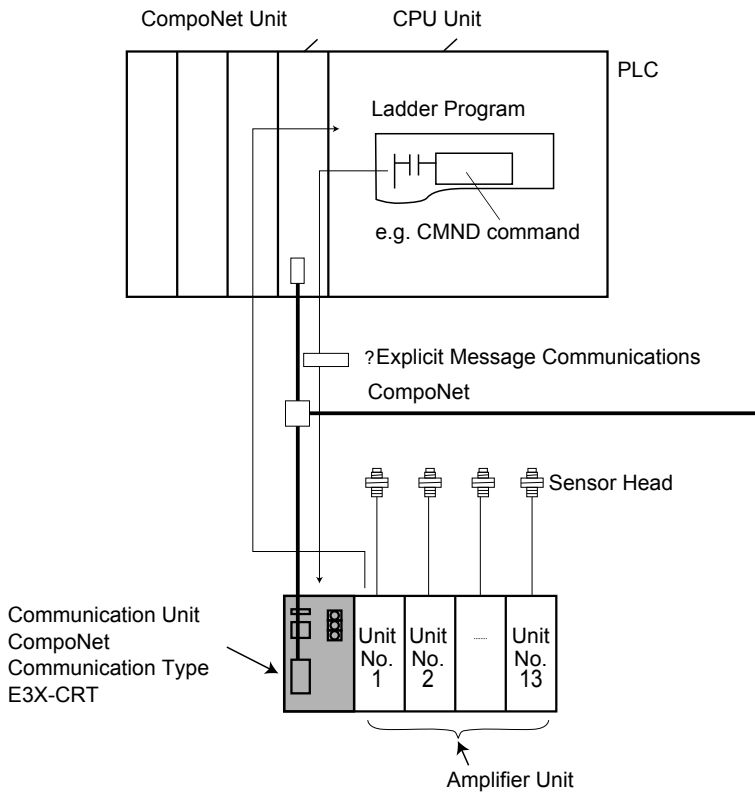
The Communication Unit, E3X-CRT, can allocate sensor ON/OFF output data, status, and the detection level to the master IN area.



Communication Mode	Occupied CH	Communication Data	Number of Sensors That Can Be Connected	Master Unit
I/O Mode 1 Remote I/O Communications IN 2CH mode	IN Area 2CH	Sending the following data to the master unit: - ON/OFF output data for maximum 15 units - Sensor Communication Error - Sensor Communication Busy - Read and write Sensor setting by explicit.	Max. 15	For PLC Master Unit
I/O Mode 2 Remote I/O Communication IN OUT 4CHmode	IN Area 4CH + OUT Area 4CH	Sending the following data to the master unit: - ON/OFF output data for maximum 16 units - Sensor Communication Error - Sensor Communication Busy - Read and write Sensor setting by original I/O command. So It can be changed the setting, by not using explicit. - Read and write Sensor setting by explicit.	Max. 16	For Gateway

Explicit Message Communications

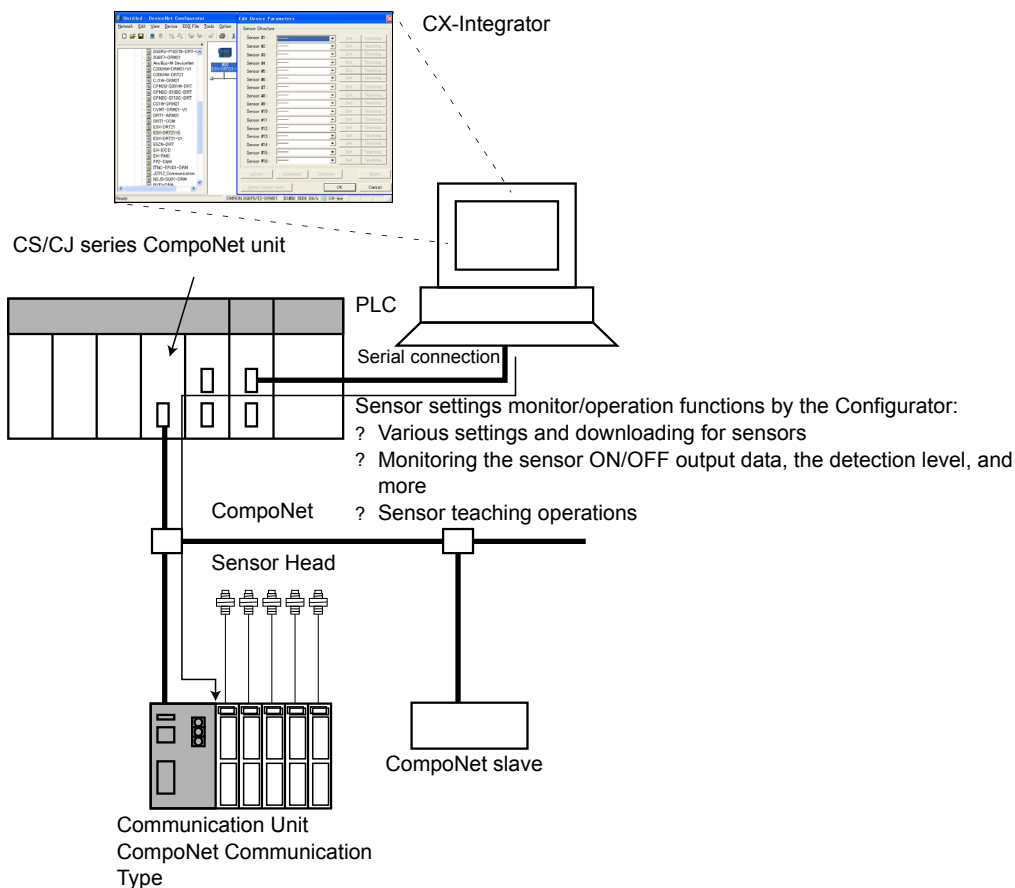
Any parameters of the connected sensors can be read or written by issuing commands of Explicit messages to the Communication Unit (E3X-CRT).



Type	Communication Data	Condition
Sends an Explicit Read command	Reads any parameters such as the ON/OFF output data, the detection level, and threshold values	Not allowed when connected with the Mobile Console.
Sends an Explicit Write command	Writes (sets) any parameters such as threshold values	
Sends an Explicit Operation Instruction command	Various operations such as teaching	

Transferring, Monitoring, and Operating from the Configurator

A CX-Integrator can be used to read and write Sensor parameters from a personal computer.



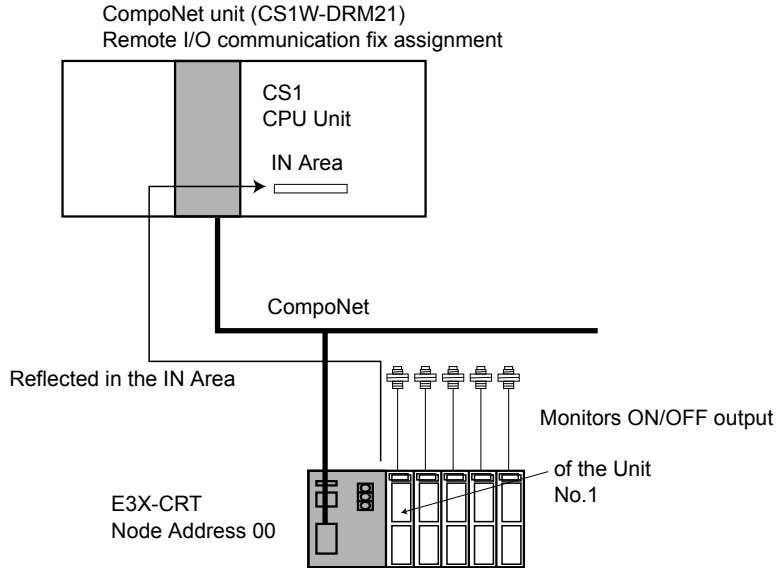
Type	Communication Data	Condition
Sensor parameter setting	Writes (sets) any parameters such as threshold values	Not allowed when connected with the Mobile Console
Sensor monitoring	Reads any parameters such as the ON/OFF output data, the detection level, and threshold values	
Sensor teaching	Performs various teaching operations	

Example of Remote I/O Communications

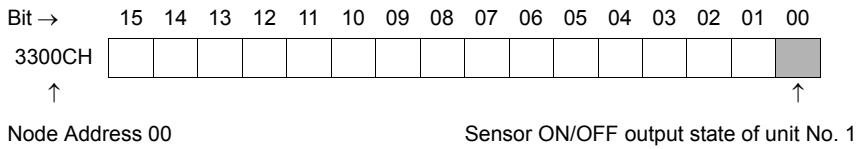
Example: When monitoring sensor ON/OFF output state of unit No. 1

When using the I/O Mode 1

When E3X-CRT CompoNet node address is 00.

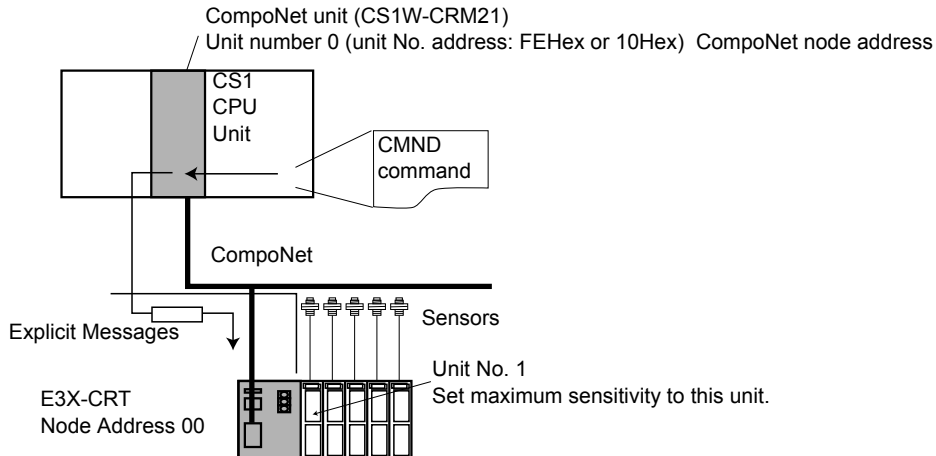


IN Area (Fix Assignment 1)



Example of Explicit Message Communications

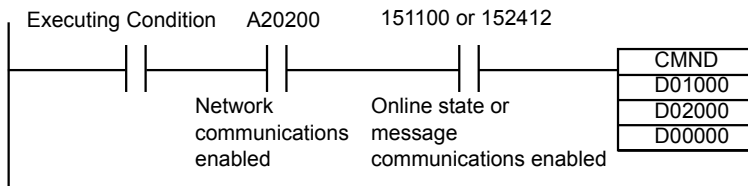
Example: When setting maximum sensitivity to unit No. 1



• Command Format for Setting Maximum Sensitivity

Send the following Explicit messages:

Destination Node Address	Service Code	Class ID	Instance ID	Attribute ID
00Hex	16 Hex	009EHex	0001Hex	30Hex



Command data of 10 bytes from D01000 is sent to destination node address 05, then its response data of 10 bytes is stored into D02000 of the local node (D00000 is control data)

S:	D01000	2	8	0	1	Command code
	D01001	0	0	1	6	Slave node address: 00, ServiceCode: 16Hex
	D01002	0	0	9	C	ClassID: 009CHex
	D01003	0	0	0	1	InstanceID: 0001Hex (unit No.)
	D01003	3	0	0	0	Data: 30Hex (Fixed)
D:	D02000					Head CH number for response store
C:	D00000	0	0	0	9	Byte length of command data: 9
	D00001	0	0	0	A	Byte length of response data
	D00002	0	0	0	1	Destination network address: 1
	D00003	0	5	F	E	Destination CompoNet node address: 05Hex Destination unit No. address: FEHex (10Hex is also acceptable)
	D00004	0	0	0	0	Response required, communication port No. 0, retry number: 0Hex
	D00005	0	0	C	8	Response monitoring timer: 20 seconds

Part Names

Part Names and Functions

DIP switch

Rotary Switches

Sensor Reset Switch

By turning ON the connected sensors, you can reset them.

Display

Power Supply Connector

Since electricity is supplied from a communication connector for E3X-CRT, there is no cable for power supply.

Communication Connector

This is a CompoNet communication connector.

Indicator (LED)

The following table shows the operation of the indicators.

LED Name	Name	LED Color	Status	Description
MS	Module Status	Green	Lit	Normal operation
			Flashing	Not set
		Red	Lit	Fatal error
			Flashing	Non-fatal error
		—	Not lit.	Power OFF
NS	Network Status	Green	Lit	CompoNet online/connected
			Flashing	CompoNet online/not-connected
		Red	Lit	CompoNet fatal communication error
			Flashing	CompoNet non-fatal communication error
		—	Not lit.	CompoNet offline/power OFF
SS	Sensor Communication Status	Green	Lit	Communicating with Sensor
		Red	Lit	Sensor communications error
		—	Not lit.	Waiting for communications with the sensors/ power OFF

Normal State of LEDs

MS	Green is lit when normal
NS	Green is lit: normal (online/connected)
SS	Green is lit when communicating with a sensor

Switches

Rotary Switches



x10



x 1

CompoNet node address setting
Sets the CompoNet node address.
Range: Between 00 and 63 (cannot be set between 64 and 99)



Registering the Number of Connected Sensors
Registers the number of sensors to be connected. Registering the number of the sensors enables you to detect configuration failure when it occurs.



The Sensors that are allocated two unit numbers must be counted as two units when counting the number of sensors.

CHECK!

DIP switch

- I/O Mode Settings

This switch set the I/O mode. However, data type assigned to the master IN area varies on the operating mode. For details, see "CompoNet Remote I/O Communications" on p. 39.





I/O mode	Operating Mode Settings	Number of Sensors that Can Be Connected
1	Remote I/O communications IN 2CH mode	Max. 15
2	Remote I/O communications IN 4CH OUT 4CH mode	Max. 16



In E3X-CRT, CompoNet baud rate is automatically changed to baud rate of the master. Therefore, the DIP switch is not required to set the baud rate.

How to Use Units

How to Use Units

Step	Item	Description	
1	Mount the Communication Unit to the DIN Track	Mount this unit to the DIN track. After the Sensor Amplifier Unit is mounted to the DIN track, gang-mount the Sensor Amplifier Unit.  When you dismount a unit from the track, slide the body, disconnect the connection, and then dismount it from the DIN track. CHECK!	
2	Connect Sensors to the Communication Unit	Slide the Communication Unit, touch its edge clip onto the sensor amplifier unit, and then stick it to the amplifier unit tightly until a clinking noise is heard.	
3	Set the Sensors to "RUN" Mode	By using the mode switch, set "RUN" mode.	
4	CompoNet Connecting a Communication Connector	Connect a connector for CompoNet communication.  CompoNet Communication Power Supply provides DC electricity to the Communication Unit and all connected sensors. CHECK!	
5	Set the Rotary Switches	Two upper switches	Set the CompoNet node address (between 0 and 62).
		One lower switch	Set the number of connected sensors (between 1 and 16)  The Sensors that are allocated two unit numbers must be counted as two units when counting the number of sensors. CHECK!
6	Set the DIP Switches	I/O mode1	IN 2CH Mode
		I/O mode2	IN 4CH + OUT 4CH Mode
7	DC Power Supply Turn on CompoNet Communication Power Supply	 • Set the sensors to [RUN] mode. CHECK!	
8	Check the LEDs	MS	Green is lit when normal
		NS	Green is lit: normal (CompoNet online/connected)
		SS	Green is lit when communicating with a sensor
9	Communications Start	When remote I/O communications	Enable the scan list of the master side to change PLC to [Running] mode.
		When Explicit message communications	Send Explicit messages from the master side.

CompoNet Remote I/O Communications

Allocating to Master

Data of E3X-CRT is stored in the IN area of the CompoNet master.
Select one of the following three modes using the DIP switch

I/O mode	Operating Mode Settings	Number of Sensors that Can Be Connected
1	Remote I/O communications IN 2CH mode	Max. 15
2	Remote I/O communications IN 4CH OUT 4CH mode	Max. 16

Remote I/O Communications IN 2CH Mode (I/O Mode = 1)

Up to 15 sensors can be connected. The IN area occupies 2CH of the master. Unit numbers of sensors are automatically assigned to the units from unit number 1 starting from the communication unit side (left).

M CH Bit	Description
00	Unit No. 1 ON/OFF output1 data
01	Unit No. 1 ON/OFF output2 data
02	Unit No. 2 ON/OFF output1 data
03	Unit No. 2 ON/OFF output2 data
04	Unit No. 3 ON/OFF output1 data
05	Unit No. 3 ON/OFF output2 data
06	Unit No. 4 ON/OFF output1 data
07	Unit No. 4 ON/OFF output2 data
08	Unit No. 5 ON/OFF output1 data
09	Unit No. 5 ON/OFF output2 data
10	Unit No. 6 ON/OFF output1 data
11	Unit No. 6 ON/OFF output2 data
12	Unit No. 7 ON/OFF output1 data
13	Unit No. 7 ON/OFF output2 data
14	Unit No. 8 ON/OFF output1 data
15	Unit No. 8 ON/OFF output2 data

M+1 CH Bit	Description
00	Unit No. 9 ON/OFF output1 data
01	Unit No. 9 ON/OFF output2 data
02	Unit No. 10 ON/OFF output1 data
03	Unit No. 10 ON/OFF output2 data
04	Unit No. 11 ON/OFF output1 data
05	Unit No. 11 ON/OFF output2 data
06	Unit No. 12 ON/OFF output1 data
07	Unit No. 12 ON/OFF output2 data
08	Unit No. 13 ON/OFF output1 data
09	Unit No. 13 ON/OFF output2 data
10	Unit No. 14 ON/OFF output1 data
11	Unit No. 14 ON/OFF output2 data
12	Unit No. 15 ON/OFF output1 data
13	Unit No. 15 ON/OFF output2 data
14	Busy (Communicating with Sensor)
15	Sensor communications error

- **Busy (Communicating with Sensor):**
When the communication with a sensor is established, it is turned ON.
- **Sensor communications error:**
When the registered number of connected sensors doesn't match the number of sensors that can be communicated, or when communications with a sensor fail after the connection with the sensor is established, it is turned ON.

Remote I/O Communications IN 4CH + OUT 4CH Mode (I/O Mode = 2)

Up to 16 sensors can be connected.

Sensor setting can be changed by only using I/O area.(Without explicit).

IN m CH, m + 1 CH

M CH Bit	Description
00	Unit No. 1 ON/OFF output1 data
01	Unit No. 1 ON/OFF output2 data
02	Unit No. 2 ON/OFF output1 data
03	Unit No. 2 ON/OFF output2 data
04	Unit No. 3 ON/OFF output1 data
05	Unit No. 3 ON/OFF output2 data
06	Unit No. 4 ON/OFF output1 data
07	Unit No. 4 ON/OFF output2 data
08	Unit No. 5 ON/OFF output1 data
09	Unit No. 5 ON/OFF output2 data
10	Unit No. 6 ON/OFF output1 data
11	Unit No. 6 ON/OFF output2 data
12	Unit No. 7 ON/OFF output1 data
13	Unit No. 7 ON/OFF output2 data
14	Unit No. 8 ON/OFF output1 data
15	Unit No. 8 ON/OFF output2 data

M+1 CH Bit	Description
00	Unit No. 9 ON/OFF output1 data
01	Unit No. 9 ON/OFF output2 data
02	Unit No. 10 ON/OFF output1 data
03	Unit No. 10 ON/OFF output2 data
04	Unit No. 11 ON/OFF output1 data
05	Unit No. 11 ON/OFF output2 data
06	Unit No. 12 ON/OFF output1 data
07	Unit No. 12 ON/OFF output2 data
08	Unit No. 13 ON/OFF output1 data
09	Unit No. 13 ON/OFF output2 data
10	Unit No. 14 ON/OFF output1 data
11	Unit No. 14 ON/OFF output2 data
12	Unit No. 15 ON/OFF output1 data
13	Unit No. 15 ON/OFF output2 data
14	Unit No. 16 ON/OFF output1 data
15	Unit No. 16 ON/OFF output2 data

IN m + 2 CH, m + 3 CH

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
m + 2CH	S-ERR	BUSY_MS_G	BU_S_Y_I_O	Reserved			Norm_res	Err_re_s	Error Data							
m + 3CH	Response Data															

OUT

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
m CH	TRG	Reserved														
m + 1CH	Sensor Unit No.								Sensor Output1/ Output2							
m + 2CH	Command															
m + 3CH	Command Data															

Input

- S-ERR: Sensor communications error:
When the registered number of connected sensors doesn't match the number of sensors that can be communicated, or when communications with a sensor fail after the connection with the sensor is established, it is turned ON.S-ERR
- Busy-MSG (Communicating with Sensor by explicit message):
When the communication with a sensor is established, it is turned ON.
- Busy-IO (Communicating with Sensor by I/O):
When the communication with a sensor is established, it is turned ON.
- Norm-RES (Normal end and Response DATA):
When the communication with a sensor success and return data, it is turned ON.
- ERR-RES (Error end and Response Error DATA):
When the communication with a sensor didn't success and return error data, it is turned ON.
- ERR-DATA (Error DATA):
Error reason data.
- Response DATA

Response data from E3X-CRT or Sensor Amplifier.

The data pattern is same as Explicit message Response data.

Output

- TRG: Command Execute Trigger
When this bit is turned ON E3X-CRT Execute command, conform to "Sensor Unit No.", "Output1/2", "Command", "Command Data".
- Sensor Unit No.
This area assign Sensor Unit No. from 01 to 10
- Sensor Output1/Output2
This area assign Sensor Output 1 or 2
- Command
This area assign command. Refer to next page.
- Command Data
This area assign command data. The data is same as explicit message.
-

Command List

Command	Read	Write	Operate
Read status	00	-	-
Read detection level	20	-	-
Continuous read detection level	21	-	-
When detected (ON) read detection level	22	-	-
When detected (ON) continuous read detection level	23	-	-
When detected (OFF) read detection level	24	-	-
When detected (OFF) continuous read detection level	25	-	-
Threshold Settings	80	C0	-
Differentiation Threshold Settings	85	C5	-
Difference Threshold Settings	8D	CD	-
Operating Mode Settings	86	C6	-
Detection Function Settings	88	C8	-
Differentiation Edge Settings	89	C9	-
Differentiation mode Response Time	8A	CA	-
Timer Function Settings	8B	CB	-
Timer Time Settings	8C	CC	-
Display Switching Settings	8F	CF	-
MODE Key Settings	90	D0	-
Display Direction Settings	91	D1	-
Power Tuning Target Value Settings	92	D2	-
Output Settings	93	D3	-
Teaching Level Settings without a Workpiece	96	D6	-
Power Tuning Threshold Settings	97	D7	-
ATC Function at Power Supply ON Settings	98	D8	-
ATC Function Settings	99	D9	-
"Eco" Mode Settings	9A	DA	-
Zero Reset Level	26	-	-
Power tuning situation	27	-	-
Threshold Ratio Settings	9B	DB	-
Key Lock Settings	9D	DD	-
Number of Connected Sensors	01	-	-
Set maximum sensitivity	-	-	40
Teaching without a Reflective Type Workpiece	-	-	41
Teaching without a Through-beam Type Workpiece	-	-	42
Teaching with the workpiece or without a workpiece(the First Point)	-	-	43
Teaching with the workpiece or without a workpiece (the Second Point)	-	-	44
Position Teaching(DA7 is executed by Teaching with the workpiece or without a workpiece)	-	-	45
Start Auto Teaching	-	-	46
Stop Auto Teaching	-	-	47

Command	Read	Write	Operate
Execute Power Tuning	-	-	48
Cancel Power Tuning	-	-	49
Execute Zero Reset	-	-	4A
Cancel Zero Reset	-	-	4B
Execute Projection Lighting Off	-	-	4C
Cancel Projection Lighting Off	-	-	4D
Sensor Reset	-	-	02

Explicit Message Communications

Sending a CompoNet Explicit message from the master to the Communication Unit enables reading and writing any parameters of the specified sensor. The Communication Unit processes the command sent from the master and then returns a response.

Basic Format of Explicit Messages

The basic format of each command and response is shown below:

Command Format

Destination Node Address	Service Code	Class ID	Instance ID	Attribute ID	Data
--------------------------	--------------	----------	-------------	--------------	------

[Destination Node Address]

Specify a node address of the unit that an Explicit message (command) is sent to. The node address must be a single byte in hexadecimal.

[ServiceCode], [Class ID], [Instance ID], [Attribute ID]

These are parameters to specify a command type, process target, and process details.

The Communication Unit uses the [Instance ID] to specify to sensors for which the command is intended (Sensor number.) Each sensor has 2 sensor number(output1 and output2). So Sensor number 5 means Unit number 3, output 1. Some commands do not require an [Attribute ID].



Depending on the master, each length of [Class ID], [Instance ID], and [Attribute ID] might be different. When a message is sent from an Omron CompoNet master, specify a [Class ID] and an [Instance ID] in two bytes as four digits, and an [Attribute ID] in a single byte as two digits.

CHECK!

[Data]: Data is not required when using a Read command.

Response Format

- Normal

Number of Received Bytes	Source Node Address	Service Code	Data
--------------------------	---------------------	--------------	------

- Failure

Number of Received Bytes: 0004Hex (Fixed)	Source Node Address	Service Code	Error Code
---	---------------------	--------------	------------

[Number of Received Bytes]

The number of the received data starting from the [Source Node Address] is returned in hexadecimal. When an error response is returned to the Explicit message, the value always will be 0004Hex.

[Source Node Address]

The node address of the node that sent the command is returned in hexadecimal.

[ServiceCode]


When the command is completed normally, the leftmost bit of the [ServiceCode] specified in the command is turned ON and stored as follows:

ServiceCode of the Command	ServiceCode of the Response
10 Hex	90 Hex
0E Hex	8E Hex
16 Hex	96 Hex
06 Hex	86 Hex
07 Hex	87 Hex
05 Hex	85 Hex

When an error message is returned to the Explicit message, the value always will be 94Hex.

[Data]: The read data is stored only when a read command has been sent.

[Error Code]: An error code for the Explicit message.

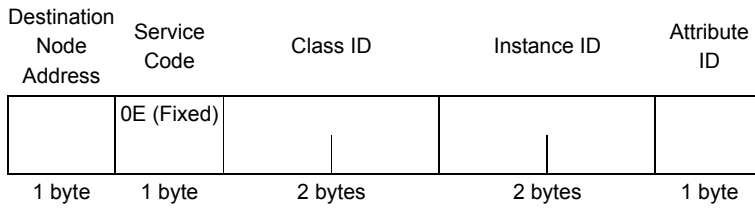
 ?Error Code List? on p. 70

Read Commands

A Read command reads data of a connected sensor or communication unit.

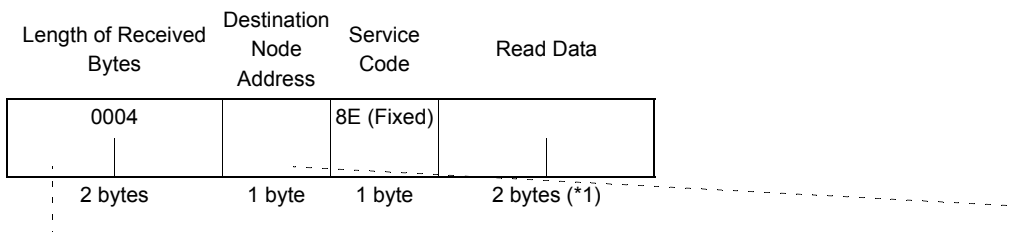
When using an OMRON master, command/response formats are shown as follows:

Command Format

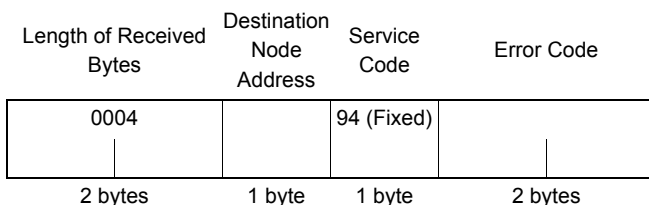


Response Format

- Normal



- Error



Read Command List

A list of Explicit Message Read commands is shown below.

[Supported Models]

E3X-DA0-S: DA, E3X-MDA0: MDA

E3C-LDA0: LDA

E2C-EDA0: EDA

Explicit Messages	Functions	Command			Supported Model
		Class ID	Instance ID	Attribute ID	
Read status	Reads the status of the sensor communication unit.	9F	0	AA	—
Read detection level	With specifying a Unit No. with the Instance ID, reads the digital detection level.	9F	Sensor Number	82	All models
When detected (ON) Read detection level	With specifying a Unit No. with the Instance ID, reads the detection level when detected (ON).	9F	Sensor Number	96	All models
When detected (ON) Read detection level	With specifying a Unit No. with the Instance ID, reads the detection level when not detected (OFF).	9F	Sensor Number	97	All models
Read Threshold Settings	With specifying a Unit No. with the Instance ID, reads the threshold value.	9C	Sensor Number	11	All models
Read Differentiation Threshold Settings	With specifying a Unit No. with the Instance ID, reads the differentiation mode threshold.	9C	Sensor Number	10	Except MDA
Read Difference Threshold Settings	With specifying a Unit No. with the Instance ID, reads the threshold value when the difference outputs.	9C	Sensor Number	12	MDA
Read Operating Mode Settings	With specifying a Unit No. with the Instance ID, reads the operating mode.	9C	Sensor Number	20	All models

Explicit Messages	Functions	Command			Supported Model
		Class ID	Instance ID	Attribute ID	
Read Detection Function Settings	With specifying a Unit No. with the Instance ID, reads the detection mode.	9C	Sensor Number	21	All models
Read Differentiation Edge Settings	With specifying a Unit No. with the Instance ID, reads the differentiation edge.	9C	Sensor Number	22	Except MDA
Differentiation mode Read Response Time	With specifying a Unit No. with the Instance ID, reads the differentiation mode response time.	9C	Sensor Number	23	Except MDA
Read Timer Function Settings	With specifying a Unit No. with the Instance ID, reads the timer function.	9C	Sensor Number	24	All models
Read Timer Time Settings	With specifying a Unit No. with the Instance ID, reads the timer time.	9C	Sensor Number	25	All models
Read Display Switching Settings	With specifying a Unit No. with the Instance ID, reads the display switching settings.	9C	Sensor Number	26	All models
Read MODE Key Settings	With specifying a Unit No. with the Instance ID, reads the MODE key settings.	9C	Sensor Number	27	All models
Read Display Direction Settings	With specifying a Unit No. with the Instance ID, reads the display direction settings.	9C	Sensor Number	28	All models
Read Power Tuning Target Value Settings	With specifying a unit No. with the Instance ID, reads the power tuning target value.	9C	Sensor Number	29	All models
Read Output Settings	With specifying a Unit No. with the Instance ID, reads the output settings.	9C	Sensor Number	2A	All models
Read Teaching Level Settings without a Workpiece	With specifying a Unit No. with the Instance ID, reads the teaching level settings without a workpiece.	9C	Sensor Number	4B	All models
Read Power Tuning Threshold Settings	With specifying a Unit No. with the Instance ID, reads the power tuning threshold settings.	9C	Sensor Number	40	All models
Read ATC Function at Power Supply ON Settings	With specifying a Unit No. with the Instance ID, reads ATC function at power supply ON settings.	9C	Sensor Number	42	DA
Read ATC Function Settings	With specifying a Unit No. with the Instance ID, reads ATC function settings.	9C	Sensor Number	44	DA
Read "Eco" Mode Settings	With specifying a Unit No. with the Instance ID, reads the "Eco" mode settings.	9C	Sensor Number	45	All models
Read Zero Reset Level	With specifying a Unit No. with the Instance ID, reads the zero reset level.	9C	Sensor Number	48	All models
Read Threshold Ratio Settings	With specifying a Unit No. with the Instance ID, reads threshold ratio settings.	9C	Sensor Number	4E	DA
Read Key Lock Settings	With specifying a Unit No. with the Instance ID, reads the key lock settings.	9C	Sensor Number	50	All models
Read Number of Connected Sensors	Reads the number of connected sensors.	9C	0	57	—

Explicit Messages	Functions	Command			Supported Model
		Class ID	Instance ID	Attribute ID	
Read Dummy units setting	Read Dummy units setting	9C	0	71	
Read dummy response setting	Read dummy response setting	9C	0	70	

A range of unit Nos. in the Instance ID should be between 0001Hex and 0020Hex.

Data format of each item is shown below:

Read Status

Bit	Description
00	Number of connected sensors (2 ⁰)
01	Number of connected sensors (2 ¹)
02	Number of connected sensors (2 ²)
03	Number of connected sensors (2 ³)
04	Number of connected sensors (2 ⁴)
05	Reserved
06	Reserved
07	Reserved

Bit	Description
08	Number of sensors that can be communicated with (2 ⁰)
09	Number of sensors that can be communicated with (2 ¹)
10	Number of sensors that can be communicated with (2 ²)
11	Number of sensors that can be communicated with (2 ³)
12	Number of sensors that can be communicated with (2 ⁴)
13	Reserved
14	Sensor communications error
15	Communicating with Sensor

- **Number of connected sensors:**

The number of current connected sensors that are already registered is shown in hexadecimal.

- **Number of sensors that can be communicated with:**

The number of current sensors that can be communicated with is shown in hexadecimal. When failure occurs, you can confirm how many sensors are communicating successfully.

- **Communicating with Sensor:**

When the communication with a sensor is established, it is turned ON.

- **Sensor communications error:**

When the registered number of connected sensors doesn't match the number of sensors that can be communicated, or when communications with a sensor fail after the connection with the sensor is established, it is turned ON.

**Read the detection level/read the detection level on detected (ON)/
 read the detection level on undetected (OFF)**

These commands read the detection level of the sensor with the unit No. specified with the Instance ID.

Those data is shown in hexadecimal as a four-digit value (two bytes).

If the data is negative, the 12th bit is 1 (on).

Detection level															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 09	Bit 08	Bit 07	Bit 06	Bit 05	Bit 04	Bit 03	Bit 02	Bit 01	Bit 00
0 Fixed			0: + / 1: -	The detection level (000Hex to FA0Hex)											

Read Detection level on Detected (ON) and Read Detection level on Undetected (OFF) can read the detection level only when the display switching settings are peak on detected and bottom on undetected.

Also, its data range is between F831Hex (complement of 2) and 0FA0Hex.

Read threshold settings/read threshold settings on differentiation mode/read threshold settings on difference outputs

These commands read threshold settings of the sensor with the unit No. specified with the Instance ID. Data is shown in hexadecimal, and the data for each single unit is 16-bits long. If the data is negative, the 12th bit is 1 (on).

Threshold settings

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 09	Bit 08	Bit 07	Bit 06	Bit 05	Bit 04	Bit 03	Bit 02	Bit 01	Bit 00
0 Fixed			0: + / 1: -	Threshold setting (0000Hex to 0FA0Hex)											

Depending on the sensor type, [Read Differentiation Threshold Settings] and [Read Difference Threshold Settings] might not be able to be performed correctly.

Read Operating Mode Settings

It reads the operating mode settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Operating mode	E3X, E3C: 0: L/ON, 1: D/ON; E2C: 0: NO, 1: NC
01 to 15	No data	Always 0

Read Detection Function Settings

It reads the operating mode settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Detection mode	0: STAND, 1: HI-RESO, 2: Differentiation, 4: High speed, 6: Tough(DA7)
01		
02		
03 to 15	No data	Always 0

Note that some models cannot be set to the high speed mode.

Read Differentiation Edge Settings

It reads the differentiation edge settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Operating mode	0: Single-end edge, 1: Double-end edge
01 to 15	No data	Always 0

Read Differentiation Response Speed Settings

It reads the differentiation response speed settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Differentiation response time	1: Differentiation response speed setting 1
01		2: Differentiation response speed setting 2
02		3: Differentiation response speed setting 3
03		4: Differentiation response speed setting 4
04 to 15	No data	5: Differentiation response speed setting 5
		Always 0

Read Timer Function Settings

It reads the timer function settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Timer function	0: Timer function disabled
01		1: OFF-delay timer 2: ON-delay timer 3: One-shot timer 4: ON-delay and OFF-delay timer
02 to 15	No data	Always 0

Read Timer Time Settings/Read ON-Delay timer time Settings/Read OFF-Delay timer time Settings

It reads the timer time settings of the sensor with the unit No. specified with the Instance ID.

Its read data is expressed in hexadecimal and its length is two bytes; the data range is between 0000hex (0) and 1388hex (5000).

When the timer function setting is OFF, [Read Timer Time Settings] command fails if the command is sent.

Read Display Switching

It reads the display switching settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Display switching setting	0: Detection level and detection level (MDA)
01		1: Detection level and threshold
02		2: Detection level ratio and threshold
03		3: Peak on detected and bottom on undetected
		4: Detection level at peak and detection level at bottom (time update) (E3X, E3C are bottom on detected and peak on undetected)
		5: Analog bar
		6: Detection level and peak digital values
		7: Detection level and channel number
		8: Count value (RM, LDARM)
04 to 15	No data	Always 0

Read MODE Key Settings

It reads the MODE key settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	MODE key setting	0: E3X, E3C: Power tuning, E2C: Fine positioning 1: Zero reset 2: Counter reset (RM, LDARM) 3: Position teaching (E2C) 4: Teaching with the workpiece or without a workpiece
01		
02		
03 to 15	No data	Always 0

Read Display Direction Settings

It reads the MODE key settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Display direction setting	0: Normal, 1: Vertical reverse
04 to 15	No data	Always 0

Read Power Tuning Target Value Settings

It reads the power tuning target value settings of the sensor with the unit No. specified with the Instance ID. Its read data is expressed in hexadecimal and its length is two bytes; the data range is between 0064hex (100) and 0F3Chex (4000).

Read Output Settings

It reads the output settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Output settings	0: Output for each channel
01		1: Area output (TW, LDATW, EDATW)
02		2: Self diagnosis output (TW, LDATW, EDATW)
03		3: AND output (MDA)
		4: OR output (MDA)
		5: Difference output (MDA)
		6: Rising edge sync output (MDA)
		7: Down edge sync output (MDA)
		8: Head error output (E2C)
04 to 15	No data	Always 0

Read Output Setting Timer Function Settings

It reads the output setting timer function settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Output setting timer function	0: Timer function disabled
01		1: OFF-delay timer 2: ON-delay timer 3: One-shot timer
02 to 15	No data	Always 0

Read Output Setting Timer Time Settings

It reads the output timer time settings of the sensor with the unit No. specified with the Instance ID.

Its read data is expressed in hexadecimal and its length is two bytes; the data range is between 0000hex (0) and 1388hex (5000).

When the output setting timer function setting is OFF, [Output Setting Timer Time Settings] command fails if the command is sent.

Read Teaching Level Settings without a Workpiece

It reads the teaching level settings without a workpiece of the sensor with the unit No. specified with the Instance ID.

Its read data is expressed in hexadecimal and its length is two bytes; the data range is between 00hex (0) and 63hex (99).

Read Power Tuning (Fine Positioning) Settings

It reads the power tuning (fine positioning) settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Power tuning (fine positioning) setting	0: OFF (inactive), 1: ON (active)
01 to 15	No data	Always 0

Read Power Tuning Threshold Settings

It reads the power tuning threshold settings of the sensor with the unit No. specified with the Instance ID. Its read data is expressed in hexadecimal and its length is two bytes; the data range is between 0000hex (0) and 0FA0hex (4000).

Read ATC Function at Power Supply ON Settings

It reads the ATC Function at Power Supply ON settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	ATC Function at Power Supply ON settings	0: OFF, 1: ATC-Start,
01		2: Power tuning and ATC-Start
02 to 15	No data	Always 0

Read Power Tuning (Fine Positioning) Settings

It reads the power tuning (fine positioning) settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Power tuning (fine positioning) setting	0: OFF (inactive), 1: ON (active)
01 to 15	No data	Always 0

Read ATC Function Settings

It reads the ATC Function settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	ATC Function at Power Supply ON settings	0: OFF, 1: ATC-Start,
01		2: Power tuning and ATC-Start
02 to 15	No data	Always 0

Read Eco Mode Settings

It reads the Eco mode settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	ATC settings	0: OFF, 1:ON
01 to 15	No data	Always 0

Read Zero Reset Level

It reads the zero reset level of the sensor with the unit No. specified with the Instance ID. Its read data is expressed in hexadecimal and its length is two bytes; the data range is between 0000hex (0) and 0FA0hex (4000).

Read Threshold Ratio Settings

It reads the threshold ratio settings of the sensor with the unit No. specified with the Instance ID.

Threshold ratio settings																
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 09	Bit 08	Bit 07	Bit 06	Bit 05	Bit 04	Bit 03	Bit 02	Bit 01	Bit 00	
0 Fixed			0: + / 1: -	0 Fixed				Threshold ratio settings (00Hex to 63Hex)								

Read Setting Number of Units for Mutual Interference Prevention

It reads the setting number of units for mutual interference prevention of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Setting number of mutual interference prevention	0: OFF
01		1: 1 unit, 2: 2 units, 3: 3 units,
02		4: 4 units, 5: 5 units
03 to 15	No data	Always 0

Read Dummy unit Settings

Bit	Description	Data
00	Unit No.1 Dummy Unit setting	0: OFF, 1: Dummy Unit
01	Unit No.2 Dummy Unit setting	0: OFF, 1: Dummy Unit
02	Unit No.3 Dummy Unit setting	0: OFF, 1: Dummy Unit
13	Unit No.14 Dummy Unit setting	0: OFF, 1: Dummy Unit
14	Unit No.15 Dummy Unit setting	0: OFF, 1: Dummy Unit
15	Unit No.16 Dummy Unit setting	0: OFF, 1: Dummy Unit

Read Dummy Response Settings

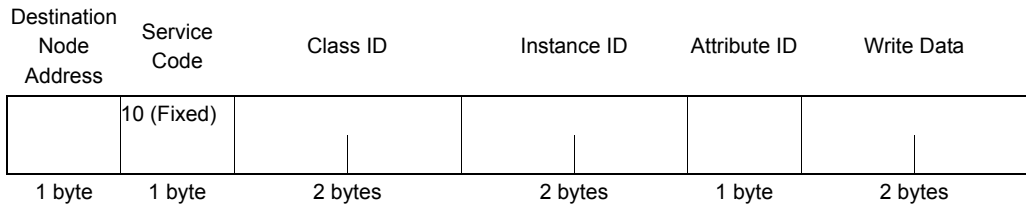
Bit	Description	Data
00	When access Dummy Unit. The response is error or normal (data is always 00)	0: error response , 1:normal response
01 to 15	No data	Always 0

Write Commands

A write command writes its data to a connected sensor or communication unit.

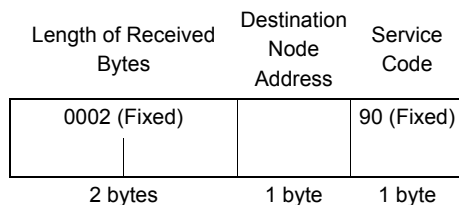
When using an OMRON master, command/response formats are shown as follows:

Command Format

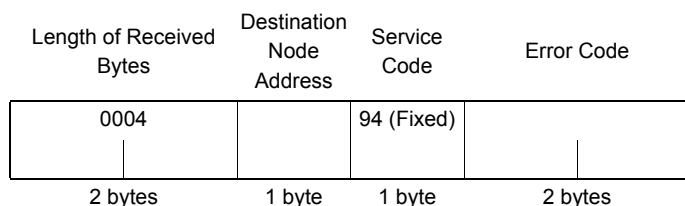


Response Format

- Normal



- Error



Write Command List

A list of Explicit Message Write commands is shown below.

[Supported Models]

E3X-DA0-S: DA, E3X-MDA0: MDA

E3C-LDA0: LDA

E2C-EDA0: EDA

Explicit Messages	Functions	Command			Supported Model
		Class ID	Instance ID	Attribute ID	
Write Threshold Settings	With specifying a Unit No. with the Instance ID, writes the threshold value.	9C	Sensor Number	11	All models
Write Differentiation Threshold Value Settings	With specifying a Unit No. with the Instance ID, writes the differentiation mode threshold.	9C	Sensor Number	10	Except MDA
Write Difference Threshold Settings	With specifying a Unit No. with the Instance ID, writes the threshold value when the difference outputs.	9C	Sensor Number	12	MDA
Write Operating Mode Settings	With specifying a Unit No. with the Instance ID, writes the operating mode.	9C	Sensor Number	20	All models
Write Detection Mode Settings	With specifying a Unit No. with the Instance ID, writes the detection mode.	9C	Sensor Number	21	All models
Write Differentiation Edge Settings	With specifying a Unit No. with the Instance ID, writes the differentiation edge.	9C	Sensor Number	22	Except MDA
Write Differentiation Mode Response Time	With specifying a Unit No. with the Instance ID, writes the differentiation mode response time.	9C	Sensor Number	23	Except MDA
Write Timer Function Settings	With specifying a Unit No. with the Instance ID, writes the timer function.	9C	Sensor Number	24	All models

Explicit Messages	Functions	Command			Supported Model
		Class ID	Instance ID	Attribute ID	
Write Timer Time Settings	With specifying a Unit No. with the Instance ID, writes the timer time.	9C	Sensor Number	25	All models
Write Display Switching Settings	With specifying a Unit No. with the Instance ID, writes the display switching settings.	9C	Sensor Number	26	All models
Write MODE Key Settings	With specifying a Unit No. with the Instance ID, writes the MODE key settings.	9C	Sensor Number	27	All models
Write Display Direction Settings	With specifying a Unit No. with the Instance ID, writes the display direction settings.	9C	Sensor Number	28	All models
Write Power Tuning Target Value Settings	With specifying a unit No. with the Instance ID, writes the power tuning target value.	9C	Sensor Number	29	Except EDA
Write Output Settings	With specifying a Unit No. with the Instance ID, writes the output settings.	9C	Sensor Number	2A	All models
Write Output Setting Timer Function	With specifying a Unit No. with the Instance ID, writes the output setting timer function.	9C	Sensor Number	2B	MDA
Write Output Setting Timer Time	With specifying a Unit No. with the Instance ID, writes the output setting timer time.	9C	Sensor Number	2D	MDA
Write Teaching Level Settings without a Workpiece	With specifying a Unit No. with the Instance ID, writes the teaching level settings without a workpiece.	9C	Sensor Number	4B	All models
Write Power Tuning Threshold Settings	With specifying a Unit No. with the Instance ID, writes the power tuning threshold settings.	9C	Sensor Number	40	Except EDA
Write ATC Function at Power Supply ON Settings	With specifying a Unit No. with the Instance ID, writes ATC function at power supply ON settings.	9C	Sensor Number	42	DA
Write ATC Function Settings	With specifying a Unit No. with the Instance ID, writes ATC function settings.	9C	Sensor Number	44	DA
Write Threshold Ratio Settings	With specifying a Unit No. with the Instance ID, writes threshold ratio settings.	9C	Sensor Number	4E	DA
Write Eco Mode Settings	With specifying a Unit No. with the Instance ID, writes the "Eco" mode settings.	9C	Sensor Number	45	All models
Write Number of Mutual Interference Prevention Units	With specifying a Unit No. with the Instance ID, writes the number of mutual interference prevention units.	9C	Sensor Number	4D	EDA
Write Dummy units setting	Write Dummy units setting	9C	0	71	

Explicit Messages	Functions	Command			Supported Model
		Class ID	Instance ID	Attribute ID	
Write dummy response setting	Write dummy response setting	9C	0	70	

A range of unit Nos. in the Instance ID should be between 0001Hex and 0020Hex.



CHECK!

When a write command is executed, the setting values are written into the internal memory. How many times the internal memory can be written is limited; if writing data in the memory one million times or more per sensor per parameter is attempted, the internal memory might be destroyed. When a write command is used, therefore, make sure to create a communication program that writing times don't exceed one million times per sensor per parameter.

**Write Threshold Settings/Write Differentiation Threshold Settings/
Write Difference Threshold Settings**

It writes threshold settings of the sensor with the unit No. specified with the Instance ID.
Data is shown in hexadecimal, and the data for each single unit is 16-bits long.
If the data is negative, the 12th bit is 1 (on).

Threshold settings															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 09	Bit 08	Bit 07	Bit 06	Bit 05	Bit 04	Bit 03	Bit 02	Bit 01	Bit 00
0 Fixed			0: + / 1: -	Threshold setting (0000Hex to 0FA0Hex)											

Depending on a sensor type, [Write Differentiation Threshold Settings] and [Write Difference Threshold Settings] might not be able to be performed correctly.

Write Operating Mode Settings

It writes the operating mode settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Operating mode	E3X, E3C: 0: L/ON, 1: D/ON E2C: 0: NO, 1:NC
01 to 15	No data	Always 0

Write Detection Mode Settings

It writes the operating mode settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Detection mode	0: STAND, 1: HI-RESO, 2: Differentiation, 4: High speed, 6: Tough(DA7)
01		
02		
03 to 15	No data	Always 0

Note that some models do not support high speed writing.

Write Differentiation Edge Settings

It writes the differentiation edge settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Operating mode	0: Single-end edge, 1: Double-end edge
01 to 15	No data	Always 0

Write Differentiation Response Speed Settings

It writes the differentiation response time settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Differentiation response time	1: Differentiation response speed setting 1
01		2: Differentiation response speed setting 2
02		3: Differentiation response speed setting 3
03		4: Differentiation response speed setting 4
04 to 15	No data	5: Differentiation response speed setting 5
		Always 0

Write Timer Function Settings

It writes the timer function settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Timer function	0: Timer function disabled
01		1: OFF-delay timer 2: ON-delay timer 3: One-shot timer 4: ON-delay and OFF-delay timer
02 to 15	No data	Always 0

Write Timer Time Settings

It writes the timer time settings of the sensor with the unit No. specified with the Instance ID.

Its write data is expressed in hexadecimal and its length is two bytes; the data range is between 0000hex (0) and 1388hex (5000).

When the timer function setting is OFF, [Write Timer Time Settings] command fails if the command is sent.

Write Display Switching

It writes the display switching settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Display switching setting	0: Detection level and detection level (MDA)
01		1: Detection level and threshold
02		2: Detection level ratio and threshold
03		3: Peak on detected and bottom on undetected
		4: Detection level at peak and detection level at bottom (time update) (E3X, E3C are bottom on detected and peak on undetected)
		5. Analog bar
		6: Detection level and peak digital values
		7: Detection level and channel number
		8: Count value (RM, LDARM)
04 to 15	No data	Always 0

Write MODE Key Settings

It writes the MODE key settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	MODE key setting	0: E3X, E3C: Power tuning E2C: Fine positioning 1: Zero reset 2: Counter reset (RM, LDARM) 3: Position teaching (E2C) 4: Teaching with the workpiece or without a workpiece
01		
02		
03 to 15	No data	Always 0

Write Display Direction Settings

It writes the MODE key settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Display direction setting	0: Normal, 1: Vertical reverse
04 to 15	No data	Always 0

Write Power Tuning Target Value Settings

It writes the power tuning target value settings of the sensor with the unit No. specified with the Instance ID. Its write data is expressed in hexadecimal and its length is two bytes; the data range is between 0064hex (100) and 0F3Chex (4000).

Write Output Settings

It writes the output settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Output settings	0: Output for each channel
01		1: Area output (TW, LDATW, EDATW)
02		2: Self diagnosis output (TW, LDATW, EDATW)
03		3: AND output (MDA)
		4: OR output (MDA)
		5: Difference output (MDA)
		6: Rising edge sync output (MDA)
		7: Down edge sync output (MDA)
		8: Head error output (E2C)
04 to 15	No data	Always 0

Write Output Setting Timer Function Settings

It writes the output timer function settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Output setting timer function	0: Timer function disabled
01		1: OFF-delay timer 2: ON-delay timer 3: One-shot timer
02 to 15	No data	Always 0

Write Teaching Level Settings without a Workpiece

It writes the teaching level settings without a workpiece of the sensor with the unit No. specified with the Instance ID.

Its write data is expressed in hexadecimal and its length is two bytes; the data range is between 00hex (0) and 63hex (99).

Write Power Tuning Threshold Settings

It writes the power tuning threshold settings of the sensor with the unit No. specified with the Instance ID.

Its write data is expressed in hexadecimal and its length is two bytes; the data range is between 0000hex (0) and 0FA0hex (4000).

Write ATC Function at Power Supply ON Settings

It writes the ATC Function at Power Supply ON settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	ATC Function at Power Supply ON settings	0: OFF, 1: ATC-Start, 2: Power tuning and ATC-Start
01		
02 to 15	No data	Always 0

Write ATC Function Settings

It writes the ATC Function settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	ATC settings	0: OFF, 1: ON
01 to 15	No data	Always 0

Write Threshold Ratio Settings

It writes the threshold ratio settings of the sensor with the unit No. specified with the Instance ID.

Threshold ratio settings																
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 09	Bit 08	Bit 07	Bit 06	Bit 05	Bit 04	Bit 03	Bit 02	Bit 01	Bit 00	
0 Fixed			0: + / 1: -	0 Fixed				Threshold ratio settings (00Hex to 63Hex)								

Write Eco Mode Settings

It writes the Eco mode settings of the sensor with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Eco mode settings	0: OFF, 1: ECO1, 2: ECO2
01		
02 to 15	No data	Always 0

Write Setting Number of Mutual Interference Prevention Units

It writes the setting number of mutual interference prevention units with the unit No. specified with the Instance ID.

Bit	Description	Data
00	Setting number of units for mutual interference prevention	0: OFF
01		1: 1 unit, 2: 2 units, 3: 3 units, 4: 4 units, 5: 5 units
02		
03 to 15	No data	Always 0

Write Dummy unit Settings

Bit	Description	Data
00	Unit No.1 Dummy Unit setting	0: OFF, 1: Dummy Unit
01	Unit No.2 Dummy Unit setting	0: OFF, 1: Dummy Unit
02	Unit No.3 Dummy Unit setting	0: OFF, 1: Dummy Unit
13	Unit No.14 Dummy Unit setting	0: OFF, 1: Dummy Unit
14	Unit No.15 Dummy Unit setting	0: OFF, 1: Dummy Unit
15	Unit No.16 Dummy Unit setting	0: OFF, 1: Dummy Unit



When dummy unit setting is changed, E3X-CRT needs power off and on before the setting data is valid.

CHECK!

Write Dummy Response Settings

Bit	Description	Data
00	When access Dummy Unit. The response is error or normal (data is always 00)	0: error response , 1:normal response
01 to 15	No data	Always 0

Operation Instruction Commands

Executes an operation instruction such as teaching for connected sensors.

When using an OMRON master, command/response formats are shown as follows:

Command Format

Destination Node Address	Service Code	Class ID	Instance ID	Attribute ID
	16 (Fixed)	009E (Fixed)		
1 byte	1 byte	2 bytes	2 bytes	1 byte

Response Format

- Normal

Length of Received Bytes	Destination Node Address	Service Code
0002		96 (Fixed)
2 bytes	1 byte	1 byte

- Error

Length of Received Bytes	Destination Node Address	Service Code	Error Code
0004		94 (Fixed)	
2 bytes	1 byte	1 byte	2 bytes

Operation Instruction Command List

A list of Explicit Message Operation Instruction commands is shown below.

[Supported Models]

E3X-DA0-S: DA, E3X-MDA0: MDA

E3C-LDA0: LDA

E2C-EDA0: EDA

Explicit Messages	Functions	Command			Supported Model
		Class ID	Instance ID	Attribute ID	
Set maximum sensitivity	With specifying a Unit No. with the Instance ID, sets the maximum sensitivity by issuing the command.	9E	Sensor Number	30	E3X
Teaching without a Reflective Type Workpiece	With specifying a Unit No. with the Instance ID, performs teaching without a reflective type workpiece by issuing the command.	9E	Sensor Number	31	All models
Teaching without a Through-beam Type Workpiece	With specifying a Unit No. with the Instance ID, performs teaching without a through-beam type workpiece by issuing the command.	9E	Sensor Number	32	E3X, E3C
Teaching with the workpiece or without a workpiece (the First Point)	With specifying a Unit No. with the Instance ID, performs teaching for the first point with the workpiece or without a workpiece by issuing the command.	9E	Sensor Number	33	All models
Teaching with the workpiece or without a workpiece (the Second Point)	With specifying a Unit No. with the Instance ID, performs teaching for the second point with the workpiece or without a workpiece by issuing the command.	9E	Sensor Number	34	All models

Explicit Messages	Functions	Command			Supported Model
		Class ID	Instance ID	Attribute ID	
Position Teaching (DA7 is executed by Teaching with the workpiece or without a workpiece)	With specifying a Unit No. with the Instance ID, performs position teaching by issuing the command	9E	Sensor Number	37	E2C
Start Auto Teaching	With specifying a Unit No. with the Instance ID, starts auto teaching by issuing the command.	9E	Sensor Number	35	All models
Stop Auto Teaching	With specifying a Unit No. with the Instance ID, stops auto teaching by issuing the command.	9E	Sensor Number	36	All models
Execute Power Tuning	With specifying a Unit No. with the Instance ID, executes the power tuning by issuing the command.	9E	Sensor Number	40	All models
Cancel Power Tuning	With specifying a Unit No. with the Instance ID, cancels the power tuning by issuing the command.	9E	Sensor Number	43	All models
Execute Zero Reset	With specifying a Unit No. with the Instance ID, executes the zero reset by issuing the command.	9E	Sensor Number	56	All models
Cancel Zero Reset	With specifying a Unit No. with the Instance ID, cancels the zero reset by issuing the command.	9E	Sensor Number	57	All models
Execute Projection Lighting Off	With specifying a Unit No. with the Instance ID, turns off the projection lighting by issuing the command.	9E	Sensor Number	58	E3X, E3C
Cancel Projection Lighting Off	With specifying a Unit No. with the Instance ID, cancels the projection lighting that is turned off, by issuing the command.	9E	Sensor Number	59	E3X, E3C
Sensor Setting Initialization	With specifying a Unit No. with the Instance ID, resets all of the settings in the sensor to the default settings by issuing the command.	9E	Sensor Number	45	All models
Reset	When the command is sent, all off the connected sensors are turned OFF and then turned ON to reset.	9E	Sensor Number	6F	All models

Note 1: A range of unit Nos. in the Instance ID should be between 0001Hex and 0020Hex.



When two-point teaching and position teaching are performed, sending a command for the second point fails if no command for the first point is sent. Send a command for the second point after a command for the first point is sent.



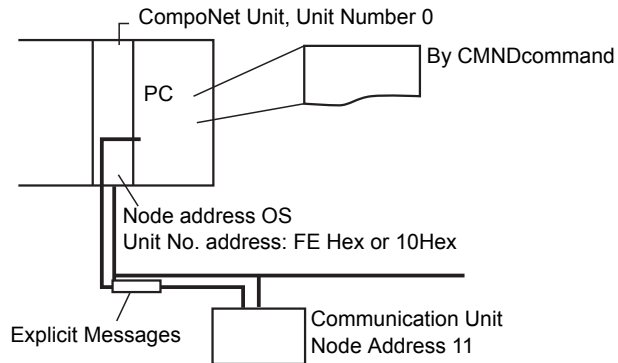
The sensor setting initialization command resets the settings of each sensor to the default. The sensor reset command turns OFF the sensors and then turns them ON to reset the power.

Error Code List

Response Code	Error Name	Cause
08FF	Service not supported	An error is detected in the service code.
14FF	Invalid Attribute value	The specified Attribute value is not supported. The written data is out of the range. <ul style="list-style-type: none"> • Number of connected sensors is no within 1 to 16 or no sensors are connected • Number of units to be monitored for the detection level is not within 1 to 16 or no units to be monitored
16FF	Object does not exist	The specified Instance ID is not supported. <ul style="list-style-type: none"> • The unit No. specified with the Instance ID is bigger than the number of mounted sensors.
15FF	Too much data	Data is longer than the specified size.
13FF	Not enough data	Data is shorter than the specified size.
0CFF	Object state conflict	Cannot execute the specified command. <ul style="list-style-type: none"> • The Mobile Console is connected. • Communications with a sensor fail. • The sensor mode is not RUN. • When two-point teaching and position teaching are performed, a command for the second point has been sent without a command for the first point. • A command that is not supported has been sent.(For example, a command to read digital values to a terminal unit is sent.)
20FF	Invalid Parameter	The specified operation instruction data is not supported.
0EFF	Attribute not settable	Write service code was sent to the Attribute ID that supports read only.

Example of Explicit Message Functions

An example of issuing Explicit messages using CS1W-DRM21 is shown below.



Operations

- It writes threshold values for the sensor (unit No. 1) connected to the communication unit.
- Use the [Send Explicit Message] command (28 01) to read data.
- Command data is written starting at D01000 of the PC body, and the response data is stored starting at D02000.
- When the command fails, the terminate code is stored in D00006, and then the same send command is resent.

Command Details

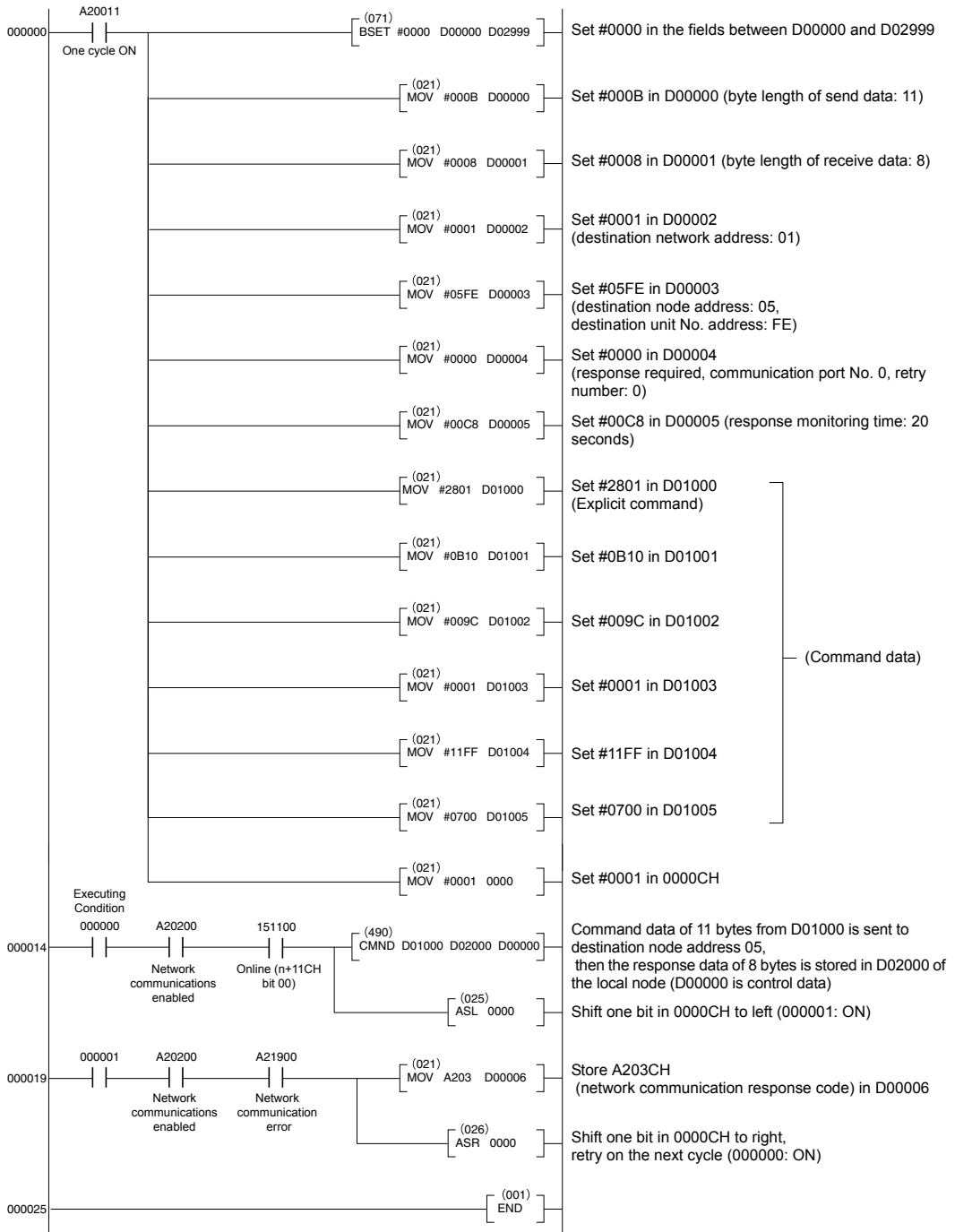
[CMND S D C]

- S D01000+0 : 2801 Hex Command code
 - +1 : 0B10 Hex Communication unit node address 11, ServiceCode 10 Hex
 - +2 : 009C Hex ClassID 009C Hex
 - +3 : 0001 Hex InstanceID 0001 Hex
 - +4 : 11FF Hex AttributeID 11 Hex + write data lower byte FF Hex
 - +5 : 0700 Hex Write data upper byte 07 Hex
- D D02000 : Head CH number for response store
- C D00000+0 : 000B Hex Byte length of command data
 - +1 : 0008 Hex Byte length of response data
 - +2 : 0001 Hex Target (destination) network address 1
 - +3 : 05FE Hex Target (destination) node address: 5, target (destination) unit No. address: FE Hex (10Hex is also acceptable)
 - +4 : 0000 Hex Response required, communication port No. 0, retry number: 0 Hex
 - +5 : 00C8 Hex Response monitoring time: 20 seconds

Response

D 02000 +0 : 2801 Hex
+1 : 0000 Hex
+2 : 0002 Hex
+3 : 0B90 Hex Response source node address: 11 (0BHex), normal
completion: 90Hex



Program Example



END

Section 4


APPENDIX

 Errors and Countermeasures	84
<hr/>	
 CompoNet Device Profile	85
<hr/>	
Device Profile	86
Mounted Objects	87

Errors and Countermeasures

The following table describes the LED statuses, probable causes and countermeasures.

LED status	Probable causes	Countermeasure
MS and NS LED not lit.	Power is not supplied to the Unit.	Supply the communications power to the Unit through the CompoNet communications connector.
	Supply voltage is outside the permissible range.	Use the supply voltage within the permissible range.
	The Unit is damaged.	Replace the Unit.
MS LED lit red.	The Unit is damaged.	Replace the Unit.
MS LED lit green. NS LED flashing green.	CompoNet Communications The Unit is waiting for connection to CompoNet communications.	Check the following items and then restart the Unit. <ul style="list-style-type: none"> • Are cable lengths (trunk/branch lines) appropriate? • Are cables shorted, broken, or loose? • Is the wiring correct? • Is terminating resistance connected to both ends of the trunk line only? • Is there too much noise? • Is the power turned ON to the master?
	The Unit is damaged.	Replace the Unit.
MS LED lit green. NS LED lit red.	CompoNet is in Busoff status.	Check the following items and then restart the Unit. <ul style="list-style-type: none"> • Are cable lengths (trunk/branch lines) appropriate? • Are cables shorted, broken, or loose? • Is terminating resistance connected to both ends of the trunk line only? • Is there too much noise?
	The same node address has been assigned to two or more nodes.	Set the node addresses correctly.
	The Unit is damaged.	Replace the Unit.
MS LED lit green. NS LED flashing red.	A communications timeout error has occurred.	Check the following items and then restart the Unit. <ul style="list-style-type: none"> • Are cable lengths (trunk/branch lines) appropriate? • Are cables shorted, broken, or loose? • Is terminating resistance connected to both ends of the trunk line only? • Is there too much noise?
	The Unit is damaged.	Replace the Unit.
SS LED not lit.	No Sensors are connected.	Connect the Sensors correctly.
	The Sensors adjacent to the communication unit are damaged.	Replace the Unit adjacent to the communication unit.
	The power is turned ON while the Mobile Console was connected.	Temporarily disconnect the Mobile Console.
	The Unit is damaged.	Replace the Unit.

LED status	Probable causes	Countermeasure
SS LED lit red.	One or more of the connected Sensors are damaged.	Replace the Sensors. Determine which Sensors are damaged by checking the number of Sensors that can be communicated with.
	One or more of the connected Sensors has been connected improperly.	Connect the Sensors correctly. Determine the Sensor error location by checking the number of Sensors that can be communicated with.
	The number of registered Sensors is incorrect.	Register the number of Sensors correctly.
	Sensors with unsupported lot numbers are included.	Replace the unsupported Sensors with the supported Sensors.  ?Connecting Sensors? on p. 23
	The number of connected Sensors is more than the limit.	Connect a number of Sensors that is within the limit.
	The reset switch was pressed while the Mobile Console was connected.	Temporarily disconnect the Mobile Console.
	The Unit is damaged.	Replace the Unit.

Device Profile

General data	Vendor name / number	OMRON Corporation	Vendor ID = 47
	Device profile name / number	Communication Adapter	Profile number = 12
	Product revision	1.01	
Physical conformance data	Network current consumption	24 VDC, 70 mA max. (*1)	
	Connector type	Open plug	
	Physical insulation	None	
	Supported LEDs	Module, Network	
	MAC ID setting	DIP switch	
	Default MAC ID	0	
	Transmission baud rate setting	Automatic tracking	

(*1) The current supplied to Sensors is excluded.

Mounted Objects

•Identity Object (01 Hex)

Object class	Attribute	Not supported.
	Service	Not supported.

Object instance	Attribute	ID	Description	Get	Set	Value
		1	Vendor	Yes	No	47
		2	Product type	Yes	No	0C
		3	Product code	Yes	No	1743
		4	Revision	Yes	No	1.01
		5	Status (bits supported)	Yes	No	
		6	Serial number	Yes	No	Per unit
		7	Product name	Yes	No	E3X-CRT
		8	State	No	No	
	Service		CompoNet service	Parameter option		
		05	Reset	None		
		0E	Get_Attribute_Single	None		

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8. **Financial.** If the financial position of Buyer at any time becomes unsatisfactory to Omron, Omron reserves the right to stop shipments or require satisfactory security or payment in advance. If Buyer fails to make payment or otherwise comply with these Terms or any related agreement, Omron may (without liability and in addition to other remedies) cancel any unshipped portion of Products sold hereunder and stop any Products in transit until Buyer pays all amounts, including amounts payable hereunder, whether or not then due, which are owing to it by Buyer. Buyer shall in any event remain liable for all unpaid accounts.
9. **Cancellation; Etc.** Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Omron against all related costs or expenses.
10. **Force Majeure.** Omron shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.
11. **Shipping; Delivery.** Unless otherwise expressly agreed in writing by Omron:
 - a. Shipments shall be by a carrier selected by Omron; Omron will not drop ship except in "break down" situations.
 - b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
 - c. All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Omron), at which point title and risk of loss shall pass from Omron to Buyer; provided that Omron shall retain a security interest in the Products until the full purchase price is paid;
 - d. Delivery and shipping dates are estimates only; and
 - e. Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
12. **Claims.** Any claim by Buyer against Omron for shortage or damage to the Products occurring before delivery to the carrier must be presented in writing to Omron within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Products from Omron in the condition claimed.
13. **Warranties.** (a) **Exclusive Warranty.** Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied. (b) **Limitations.** OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) **Buyer Remedy.** Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty. See <http://www.omron247.com> or contact your Omron representative for published information.
14. **Limitation on Liability; Etc.** OMRON COMPANIES SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY. Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.
15. **Indemnities.** Buyer shall indemnify and hold harmless Omron Companies and their employees from and against all liabilities, losses, claims, costs and expenses (including attorney's fees and expenses) related to any claim, investigation, litigation or proceeding (whether or not Omron is a party) which arises or is alleged to arise from Buyer's acts or omissions under these Terms or in any way with respect to the Products. Without limiting the foregoing, Buyer (at its own expense) shall indemnify and hold harmless Omron and defend or settle any action brought against such Companies to the extent based on a claim that any Product made to Buyer specifications infringed intellectual property rights of another party.
16. **Property; Confidentiality.** Any intellectual property in the Products is the exclusive property of Omron Companies and Buyer shall not attempt to duplicate it in any way without the written permission of Omron. Notwithstanding any charges to Buyer for engineering or tooling, all engineering and tooling shall remain the exclusive property of Omron. All information and materials supplied by Omron to Buyer relating to the Products are confidential and proprietary, and Buyer shall limit distribution thereof to its trusted employees and strictly prevent disclosure to any third party.
17. **Export Controls.** Buyer shall comply with all applicable laws, regulations and licenses regarding (i) export of products or information; (ii) sale of products to "forbidden" or other proscribed persons; and (iii) disclosure to non-citizens of regulated technology or information.
18. **Miscellaneous.** (a) **Waiver.** No failure or delay by Omron in exercising any right and no course of dealing between Buyer and Omron shall operate as a waiver of rights by Omron. (b) **Assignment.** Buyer may not assign its rights hereunder without Omron's written consent. (c) **Law.** These Terms are governed by the law of the jurisdiction of the home office of the Omron company from which Buyer is purchasing the Products (without regard to conflict of law principles). (d) **Amendment.** These Terms constitute the entire agreement between Buyer and Omron relating to the Products, and no provision may be changed or waived unless in writing signed by the parties. (e) **Severability.** If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision. (f) **Setoff.** Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice. (g) **Definitions.** As used herein, "including" means "including without limitation"; and "Omron Companies" (or similar words) mean Omron Corporation and any direct or indirect subsidiary or affiliate thereof.

Certain Precautions on Specifications and Use

1. **Suitability of Use.** Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases but the following is a non-exhaustive list of applications for which particular attention must be given: (i) Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document. (ii) Use in consumer products or any use in significant quantities. (iii) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations. (iv) Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this Product. NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON'S PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
2. **Programmable Products.** Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.
3. **Performance Data.** Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.
4. **Change in Specifications.** Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.
5. **Errors and Omissions.** Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.



OMRON INDUSTRIAL AUTOMATION • THE AMERICAS HEADQUARTERS

Schaumburg, IL USA • 847.843.7900 • 800.556.6766 • www.omron247.com

OMRON CANADA, INC. • HEAD OFFICE

Toronto, ON, Canada • 416.286.6465 • 866.986.6766 • www.omron247.com

OMRON ELECTRONICS DE MEXICO • HEAD OFFICE

México DF • 52.55.59.01.43.00 • 001.800.556.6766 • mela@omron.com

OMRON ELECTRONICS DE MEXICO • SALES OFFICE

Apodaca, N.L. • 52.81.11.56.99.20 • 001.800.556.6766 • mela@omron.com

OMRON ELETRÔNICA DO BRASIL LTDA • HEAD OFFICE

São Paulo, SP, Brasil • 55.11.2101.6300 • www.omron.com.br

OMRON ARGENTINA • SALES OFFICE

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OTHER OMRON LATIN AMERICA SALES

54.11.4783.5300

OMRON EUROPE B.V. • Wegalaan 67-69, NL-2132 JD, Hoofddorp, The Netherlands. • Tel: +31 (0) 23 568 13 00

Fax: +31 (0) 23 568 13 88 • www.industrial.omron.eu