

E3X-DRT21 (DeviceNet)
E3X-SRT21 (CompoBus/S)
E3X-CIF11 (RS-422)
Fiber Amplifier Sensor
Communication Units


Operation Manual


Produced September 2001


Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

 **DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **Caution** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation “Ch,” which appears in some displays and on some OMRON products, often means “word” and is abbreviated “Wd” in documentation in this sense.

The abbreviation “PLC” means Programmable Controller.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1,2,3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

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About this Manual:

This manual describes the installation and operation of the E3X-DRT21 (DeviceNet), E3X-SRT21 (CompoBus/S), and E3X-CIF11 (RS-422) Fiber Amplifier Sensor Communication Units. These Units enable optical fiber communications for OMRON E3X-DA-N Digital Fiber Amplifiers and E39-TM1 Terminal Block Units.

Please read this manual carefully and be sure you understand the information provided before attempting to install or operate a Fiber Amplifier Sensor Communication Unit. Be sure to read the precautions provided in the following section.

Precautions provides general precautions for using a Fiber Amplifier Sensor Communication Unit and related devices.

Section 1 provides an overview of the Fiber Amplifier Sensor Communication Units for DeviceNet, CompoBus/S, and RS-422 communications, including their features, system configurations, specifications, and connection methods. This section also covers the differences between different models.

Section 2 provides details on the Fiber Amplifier Sensor Communication Unit for DeviceNet communications, including procedures and application examples for remote I/O communications and explicit messages used by the Unit, part names and functions, operation procedures, wiring, and applications available from the DeviceNet Configurator.


Section 3 provides details on the Fiber Amplifier Sensor Communication Unit for CompoBus/S communications, including procedures and application examples for CompoBus/S remote I/O communications used by the Unit, part names and functions, operation procedures, and wiring.

Section 4 provides details on the Fiber Amplifier Sensor Communication Unit for RS-422 communications, including information on the models, procedures, settings, and application examples of CompoWay/F message communications used by the Unit, part names and functions, operation procedures, and wiring.

Section 5 describes the procedure used to mount the Fiber Amplifier Sensor Communication Unit to DIN Track and provides the dimensions of the Units.

Section 6 provides information for each Communication Unit on the types of errors that may occur, including details on the indicator status, probable causes, and remedies.

The **Appendices** provide information on communications timing, monitoring incident light levels of E3X-DA6-P Sensors, DeviceNet connection settings, and the device protocol for DeviceNet.

 **WARNING** Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

PRECAUTIONS

This section provides general precautions for using the Fiber Amplifier Sensor Communication Units and related devices.

The information contained in this section is important for the safe and reliable application of the Fiber Amplifier Sensor Communication Units. You must read this section and understand the information contained before attempting to set up or operate a Fiber Amplifier Sensor Communication Unit.

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1 Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of installing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of managing FA systems and facilities.


2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.


Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

This manual provides information for installing and operating OMRON Fiber Amplifier Sensor Communication Units. Be sure to read this manual before operation and keep this manual close at hand for reference during operation.

 **WARNING** It is extremely important that a Fiber Amplifier Sensor Communication Unit be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying a Fiber Amplifier Sensor Communication Unit to the above mentioned applications.


3 Safety Precautions

 **WARNING** Provide external emergency stop circuits, interlock circuits, limit circuits, and other safety circuits in addition to any provided within the control system to ensure safety in the event of product failure or errors resulting from external causes. Incorrect or unexpected operation may result in serious accidents.

4 Operating Environment Precautions


Do not operate the control system in the following places.

- Where the Fiber Amplifier Sensor Communication Unit is exposed to direct sunlight.
- Where the ambient temperature or humidity exceed the specified ranges.
- Where condensation may occur due to radical temperature changes.
- Where there is any corrosive or inflammable gas.
- Where there is excessive dust, saline air, or metal powder.
- Where any water, oil, or chemical may splash on the Fiber Amplifier Sensor Communication Unit.
- Where the Fiber Amplifier Sensor Communication Unit is subject to direct vibration or shock.

 **Caution** The operating environment of the Fiber Amplifier Sensor Communication Unit can have a large effect on the longevity and reliability of the system. Improper operating environments can lead to malfunction, failure, and other unforeseeable problems with the Fiber Amplifier Sensor Communication Unit. Be sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.

5 Application Precautions

Observe the following precautions when using the Fiber Amplifier Sensor Communication Unit.

 **Caution** Failure to abide by the following precautions could lead to faulty operation of the Fiber Amplifier Sensor Communication Unit or the system or could damage the Fiber Amplifier Sensor Communication Unit. Always heed these precautions.

- Provide proper shielding when installing in the following locations:
 - Locations subject to static electricity or other sources of noise.
 - Locations subject to strong electromagnetic fields.
 - Locations subject to possible exposure to radiation.
 - Locations near power supply lines.
- Do not clean the Fiber Amplifier Sensor Communication Unit with organic solvents, such as paint thinner. Organic solvents will dissolve and discolor the surface of the Unit.
- Take measures to stabilize the power supply to conform to the rated supply (the voltage, frequency, etc.) if it is not stable.
- Do not attempt to take a Fiber Amplifier Sensor Communication Unit apart, to repair a Fiber Amplifier Sensor Communication Unit, or to modify a Fiber Amplifier Sensor Communication Unit in any way.
- Never attempt to wire a Fiber Amplifier Sensor Communication Unit while power is being supplied. Doing so may result in serious electrical shock or electrocution.
- Do not drop a Fiber Amplifier Sensor Communication Unit or subject it to excessive shock or vibration. Unit failure or malfunction may result.
- Use the specified communications cables.

- Wire communications within the specified distances.
- Do not wire 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 Unit failure.
- Do not connect or disconnect connectors while the power supply is turned ON. Doing so may result in Unit 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.
- Tighten the screws on the communications connector securely. The tightening torque is 0.5 to 0.6 N·m.

SECTION 1

Overview

This section provides an overview of the Fiber Amplifier Sensor Communication Units for DeviceNet, CompoBus/S, and RS-422 communications, including their features, system configurations, specifications, and connection methods. This section also covers the differences between different models.

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1-1 Features and System Configuration

1-1-1 Overview

The Fiber Amplifier Sensor Communication Units are Communication Units for E3X-DA-N-series Digital Fiber Amplifier Units or E39-TM1 Terminal Block Units. (See note.) The following three models are available.

- E3X-DRT21 for DeviceNet (functions as a DeviceNet slave)
- E3X-SRT21 for CompoBus/S (functions as a CompoBus/S slave)
- E3X-CIF11 for RS-422 (functions as a CompoWay/F slave)

Note In this manual, Digital Fiber Amplifier Units and Terminal Block Units are referred to collectively as Fiber Amplifier Units.

The Fiber Amplifier Sensor Communication Units can be connected to Fiber Amplifier Units with Connectors. Connecting a Fiber Amplifier Sensor Communication Unit to the left side of one or more Fiber Amplifier Units allows data to be exchanged with the Fiber Amplifier Sensor Units via optical communications.

Note When using a Fiber Amplifier Sensor Communication Unit for DeviceNet or CompoBus/S communications, however, a Slave Connector with Cord cannot be connected to a Fiber Amplifier Unit with a Connector. Use a Cordless Slave Connector instead.

The E3X-MC11 Mobile Console for Fiber Amplifier Units can also be connected to a Fiber Amplifier Sensor Communication Unit.

1-1-2 Features

Communications between a Host and Optical Sensors

The Fiber Amplifier Sensor Communication Unit enables communications between optical sensors and a host, such as an OMRON PLC (CS-series, CJ-series, C200HX/HG/HE, or other OMRON PLC), other manufacturer's PLCs that support DeviceNet, and personal computers.

Remote I/O Communications

Information on the Fiber Amplifier Unit's ON/OFF output signals and incident light levels can be sent to the host PLC (master) using remote I/O communications without any special programming (supported only for Fiber Amplifier Units for DeviceNet and CompoBus/S communications).

Message Communications

Sending commands from the PLC allows reading parameters (such as those for incident light levels), writing parameters (such as those for thresholds), and various teaching operations. (DeviceNet models use explicit messages, and RS-422 Communication Units use CompoWay/F commands.)

Setting, Monitoring, and Operating Sensors from the Configurator

With DeviceNet models, the DeviceNet Configurator (Ver. 2.10 or higher) can be used to set Fiber Amplifier Sensor Communication Unit parameters (Communication Unit settings and Sensor settings) and download them to the Communication Unit and Fiber Amplifier Unit as a batch.

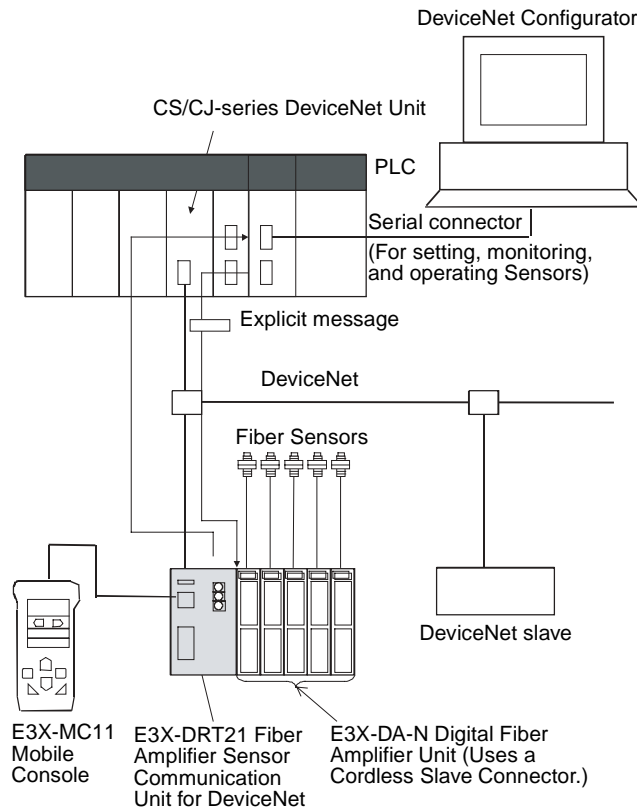
Mobile Console Connection

The E3X-MC11 Mobile Console for Fiber Amplifier Units can be connected to the Communication Unit. The head for connecting to the Mobile Console is not required when it is connected to a Communication Unit.

Note The Mobile Console can be used in conjunction with monitoring ON/OFF output signals through remote I/O communications. The Mobile Console cannot be used, however, in conjunction with remote I/O communications for monitoring incident light levels, message communications, and using the Configurator for transferring device parameters.

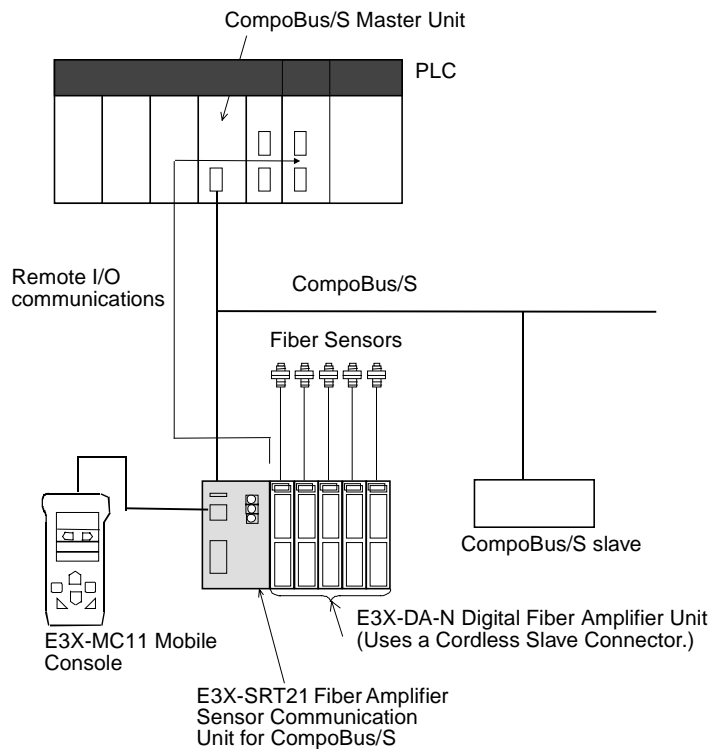
1-1-3 System Configuration

E3X-DRT21 for DeviceNet Communications



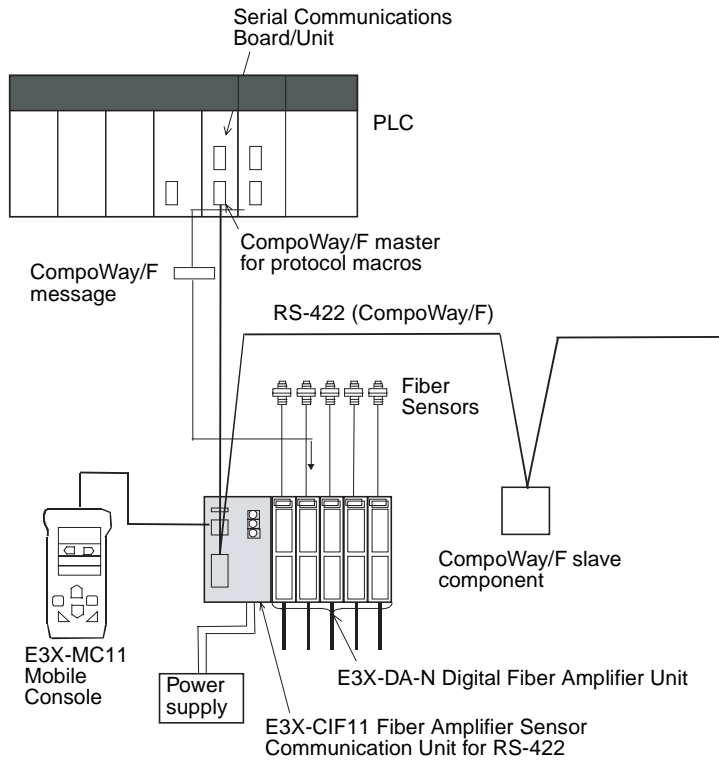
Note The Mobile Console cannot be used at the same time as explicit messages communications and setting, monitoring, and operating from Configurator.

E3X-SRT21 for CompoBus/S Communications



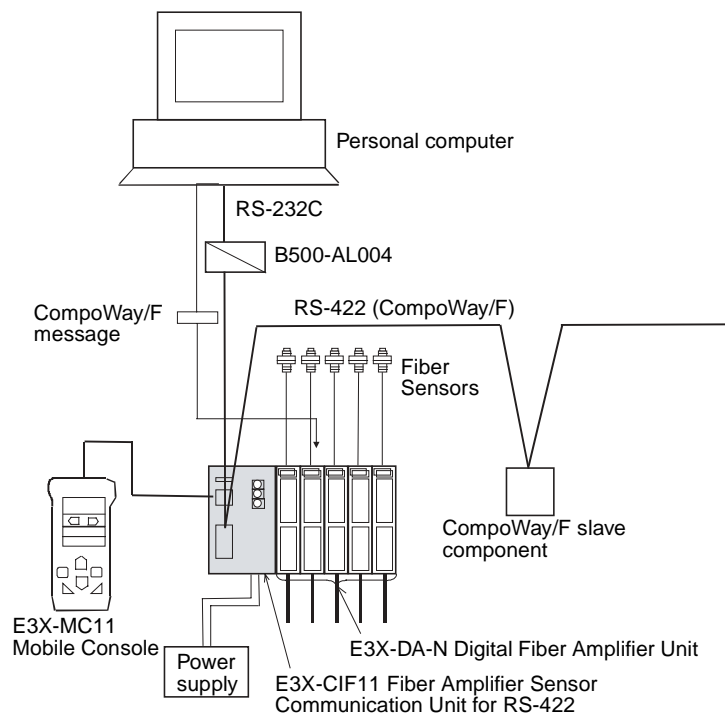
E3X-CIF11 for RS-422 Communications

With PLC as Master



Note The Mobile Console cannot be used at the same time as CompoWay/F message communications.

With Personal Computer as Master



Note The Mobile Console cannot be used at same time as CompoWay/F message communications.

1-2 Specifications

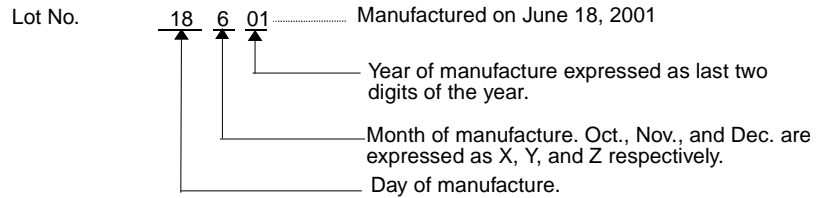
1-2-1 Performance Specifications

| Item | | Specification | | |
|--|--|---|--|---|
| | | E3X-DRT21 | E3X-SRT21 | E3X-CIF11 |
| Communications method | | DeviceNet | CompoBus/S | RS-422 |
| Communications | Remote I/O communications | ON/OFF data, status, and monitoring incident light levels (Functions as DeviceNet slave.) | ON/OFF data and status (Functions as CompoBus/S slave.) | No |
| | Messages communications | Explicit messages | No | Functions as CompoWay/F slave. |
| | Setting, monitoring, and operating Sensors from Configurator | Supported from DeviceNet Configurator (depends on the parameter editing and device monitoring functions of the slave). | No | No |
| Mobile Console connection | | Yes | | |
| | | Cannot be used at the same time as monitoring incident light levels from remote I/O communications, using explicit messages communications, or setting, monitoring, or operating Sensors from the Configurator. | --- | Cannot be used at the same time as CompoWay/F message communications. |
| Power supply (Shared by Communication Unit and all Fiber Amplifier Units connected to it.) | | From DeviceNet communications connector | From CompoBus/S communications connector | From power supply cable |
| Maximum number of Sensors that can be connected per Unit. (See note 1.) | | 13 or 16 (depending on the mode used) | 6 or 14 (depending on the setting for maximum number of Sensors) | 16 |
| Applicable Fiber Amplifier Units | | The following Fiber Amplifier Units with Connectors are supported (See note 2.): E3X-DA6 E3X-DAB6 E3X-DAG6 E3X-DA6TW E39-TM1 E3X-DA6-P E3X-DA8 E3X-DAB8 E3X-DAG8 E3X-DA8TW | | |
| Applicable Slave Connectors for Fiber Amplifier Units | | E3X-CN02 Cordless Slave Connector only | E3X-CN02 Cordless Slave Connector only | E3X-CN12 Slave Connector with Cord or E3X-CN02 Cordless Slave Connector |
| Power supply cable | | None | None | Provided. |

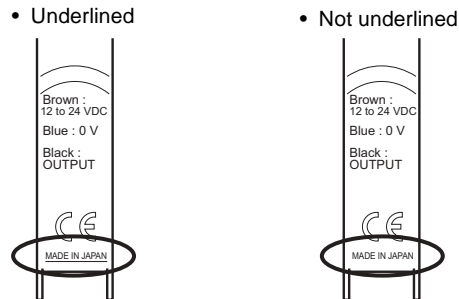
- Note**
1. Fiber Amplifier Units that are allocated two unit numbers must be counted as two Units when counting the number of connected Sensors.
 2. Prewired models (E3X-DA11/21/41/51-N, E3X-DAB11-N, etc.) and water-resistant models cannot be used. Connecting these Units will disable the power reset switch.

3. The following Fiber Amplifier Units can be connected to products from specific lots (or later) only:
 E3X-DA6, E3X-DA8, E3X-DAB6, E3X-DAB8, E3X-DAG6, E3X-DAG8, E3X-DA6TW, and E3X-DA8TW

Even one Unit from a previous lot cannot be connected. The Units that can be connected must have the following lot numbers or later.



Another method for distinguishing which Units can be connected is by checking whether the printed information “MADE IN JAPAN” on the front is underlined or not. This information is underlined for those Units that can be connected.



The printed information “MADE IN JAPAN” indicates whether connection is possible, as follows:

- Underlined: Can be connected to Communication Unit.
- Not underlined: Cannot be connected to Communication Unit.

1-2-2 General Specifications

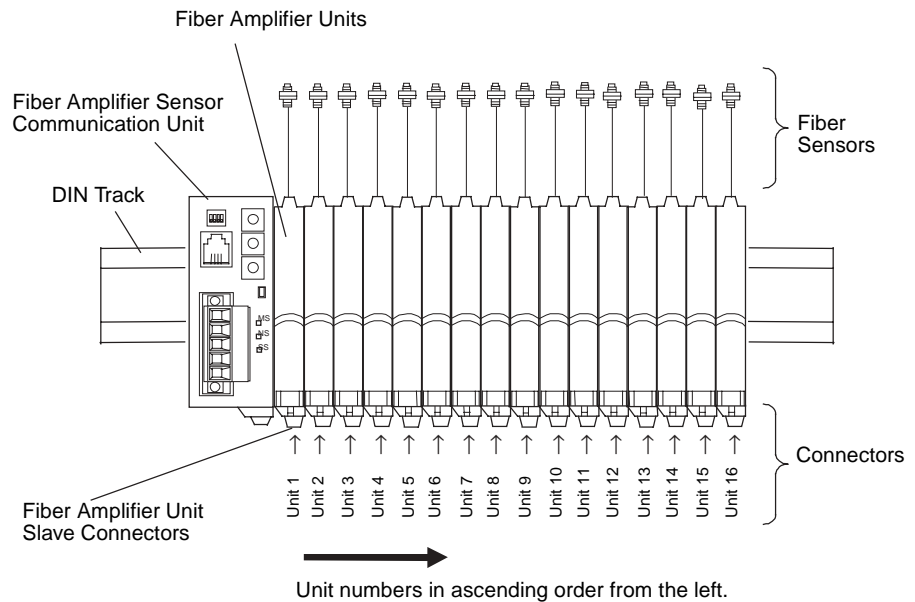
| Model | E3X-DRT21 | E3X-SRT21 | E3X-CIF11 |
|---|--|----------------|--|
| Communications method | DeviceNet | CompoBus/S | RS-422 |
| Power supply voltage | 11 to 25 VDC | 14 to 26.4 VDC | 11.4 to 26.4 VDC (12 VDC -5% to 24 VDC +10%) |
| Internal current consumption (per Communication Unit) (See note.) | 70 mA max. | 30 mA max. | 40 mA max. |
| Ambient temperature | -20 to 55°C | | |
| Ambient humidity | Operating and storage: 35% to 85% (with no condensation) | | |
| Storage temperature | -30 to 70°C | | |
| Dimensions | 30 × 34.6 × 71.3 mm (W × H × D) | | |
| Weight (packed state) | Approx. 150 g | Approx. 150 g | Approx. 200 g |

Note The current supplied to the Sensor is not included in the specification.

1-3 Connecting Fiber Amplifier Units

1-3-1 Identifying Sensors (Fiber Amplifier Units)

Fiber Amplifier Units are connected serially to the right side of the Fiber Amplifier Sensor Communication Unit, as shown in the following diagram.



The Fiber Amplifier Units connected to the Communication Unit are identified according to their unit numbers. Unit numbers are automatically assigned to the Units in order from unit number 1 starting from the Unit next to the Communication Unit.

Some Fiber Amplifier Units, i.e., the E3X-DA6TW and E3X-DA8TW, are assigned two unit numbers.

1-3-2 Number of Sensors Connected

The number of Sensors (i.e., the number of Fiber Amplifier Units) that can be connected depends on the type of Communication Unit used and its settings as follows:

| Model | Setting | Number of Sensors connected |
|---------------------------|---|-----------------------------|
| E3X-DRT21 for DeviceNet | Remote I/O communications (one-word mode) | 13 max. |
| | Remote I/O communications (two-word mode or two-word mode with incident light level monitoring) | 16 max. |
| E3X-SRT21 for Compo-Bus/S | One allocated node address | 6 max. |
| | Two allocated node addresses | 14 max. |
| E3X-CIF11 for RS-422 | --- | 16 max. |

Note Fiber Amplifier Units that are allocated two unit numbers (E3X-DA6TW, E3X-DA8TW) must be counted as two Units when counting the number Sensors.

1-3-3 Supported Fiber Amplifier Units

The Communication Unit can be connected to the following Fiber Amplifier Units.

| Model number | Unit type | Output type | Monitor output | Number of thresholds | Number of allocated unit numbers | | |
|--------------|--|-------------|----------------|----------------------|----------------------------------|-----|--|
| E3X-DA6 | Standard model | NPN | None | 1 | 1 | | |
| E3X-DA8 | | PNP | | | | | |
| E3X-DA6-P | ON/OFF incident light level-monitoring model (See note 1.) | NPN | | | | | |
| E3X-DA6TW | Twin-output model | NPN | | 2 | 2 | | |
| E3X-DA8TW | | PNP | | | | | |
| E3X-DAB6 | Mark-detecting model (blue LED) | NPN | | 1 | 1 | | |
| E3X-DAB8 | | PNP | | | | | |
| E3X-DAG6 | Mark-detecting models (green LED) | NPN | | | | | |
| E3X-DAG8 | | PNP | | | | | |
| E39-TM1 | Terminal Block Unit | NPN/PNP | --- | | | --- | |

- Note**
1. The incident light level can be monitored when Unit is turned ON or OFF.
 2. Prewired Units (E3X-DA11/21/41/51-N, E3X-DAB11-N, etc.) and Water-resistant Units (such as E3X-DA14V) cannot be used. Connecting these Units will disable the power reset switch.
 3. Connections of E3X-DA6/8, E3X-DAB6/8, E3X-DAG6/8, E3X-DA6TW, and E3X-DA8TW are restricted depending on the lot number. Refer to page 6 for details on restrictions.
 4. Install the E39-TM1 Terminal Block Unit as far away from the Communication Unit as possible.

1-3-4 Slave Connectors for Fiber Amplifier Units

Fiber Amplifier Units must be used with Slave Connectors (purchased separately). When connecting a Fiber Amplifier Sensor Communication Unit, however, the Slave Connector that can be connected to the Fiber Amplifier Unit is restricted according to the Communication Unit used, as shown in the following table.

(Yes: Can be used; No: Cannot be used)

| Fiber Amplifier Sensor Communication Unit | Slave Connector for Fiber Amplifier Unit | | |
|---|--|------------------|------------------|
| | Cordless | With 1-wire cord | With 2-wire cord |
| | E3X-CN02 | E3X-CN12 | E3X-CN22 |
| E3X-DRT21 (DeviceNet) | Yes | No | No |
| E3X-SRT21 (CompoBus/S) | Yes | No | No |
| E3X-CIF11 (RS-422) | Yes | Yes | No |

- Note** Do not use a E3X-CN11 or E3X-CN21 Master Connector with a Fiber Amplifier Unit.

1-3-5 Power Supply for Sensors

The Communication Unit supplies power to the Fiber Amplifier Units. The following table shows the methods used to supply power to the Communication Unit and all Fiber Amplifier Units connected to it.

| Model | Power supply method |
|------------------------|--|
| E3X-DRT21 (DeviceNet) | From DeviceNet communications power supply. |
| E3X-SRT21 (CompoBus/S) | From CompoBus/S communications power supply. |
| E3X-CIF11 (RS-422) | From power supply cable. |

1-3-6 Registering the Number of Sensors

To detect whether communications with Fiber Amplifier Units are normal, the number of Fiber Amplifier Units connected must be registered. When the number of Fiber Amplifier Units connected is registered, errors can be detected when there is no optical communications response from Sensors due to malfunctions in Fiber Amplifier Units. The errors can be detected by the difference between the number of Fiber Amplifier Units communicating and the number registered as connected.

A difference between the number of Fiber Amplifier Units connected and the number of registered Units is indicated as follows:

- The SS indicator lights red.
- The Sensor Communications Error Flag turns ON.

The following table shows the method used to set the number of Sensors connected to the Unit.

| Model | Setting method |
|------------------------|---|
| E3X-DRT21 (DeviceNet) | When pin 3 on the DIP switch is OFF: Use the rotary switch. When pin 3 on the DIP switch is ON: Use the Configurator or explicit messages. |
| E3X-SRT21 (CompoBus/S) | Use the rotary switch. |
| E3X-CIF11 (RS-422) | When pin 3 on the DIP switch is OFF: Use the rotary switch. When pin 3 on the DIP switch is ON: Use CompoWay/F messages. |

Note Fiber Amplifier Units that are allocated two unit numbers (E3X-DA6TW, E3X-DA8TW) must be counted as two Units when counting the number Sensors.

1-3-7 Sensor Reset Switch

The sensor reset switch is used to replace or add Fiber Amplifier Units without turning OFF power to the Fiber Amplifier Sensor Communication Unit.

With the Fiber Amplifier Sensor Communication Unit power ON, replace or perform required work on the Fiber Amplifier Units. After completing work, press the reset switch to reset all Fiber Amplifier Units and restart normal communications between the Fiber Amplifier Sensor Communication Unit and Fiber Amplifier Units.

SECTION 2

E3X-DRT21 for Device Net Communications

This section provides details on the Fiber Amplifier Sensor Communication Unit for DeviceNet communications, including procedures and application examples for remote I/O communications and explicit messages used by the Unit, part names and functions, operation procedures, wiring, and applications available from the DeviceNet Configurator.

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| 2-7-5 | Online Monitoring | 51 |

2-1 Overview of DeviceNet Communications Model

2-1-1 Introduction

The E3X-DRT21 for DeviceNet communications is a Communication Unit that uses the DeviceNet to communicate with one or more Fiber Optical Sensors through Fiber Amplifier Units, including monitoring ON/OFF output signals and incident light levels, writing parameters, and controlling operation.

Remote I/O communications can be used to monitor ON/OFF output signals and incident light levels without special programming. Explicit messages can be used to read and write parameters and the DeviceNet Configurator enables transferring and monitoring parameters as a batch.

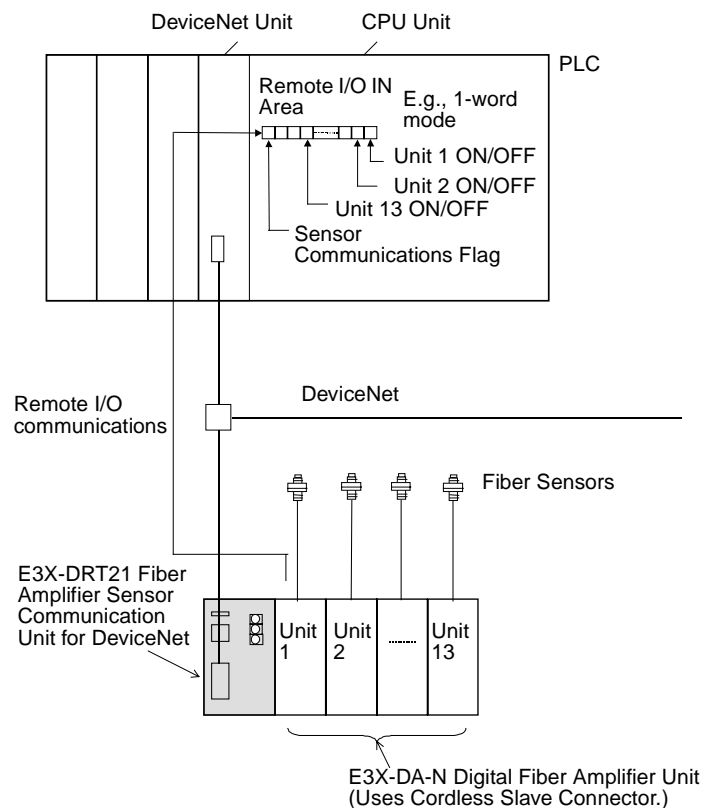
Note When DeviceNet Communication Units are used, however, Fiber Amplifier Units can output ON/OFF signals via communications only. (Fiber Amplifier Units can be connected to Cordless Slave Connectors only. They cannot be connected to Slave Connectors with Cords.)

Refer to the following manuals when using a DeviceNet Communication Unit:
DeviceNet Operation Manual (Cat. No. W267) and *DeviceNet Slave Manual* (Cat. No. W347).

2-1-2 DeviceNet Communications Overview

Remote I/O Communications

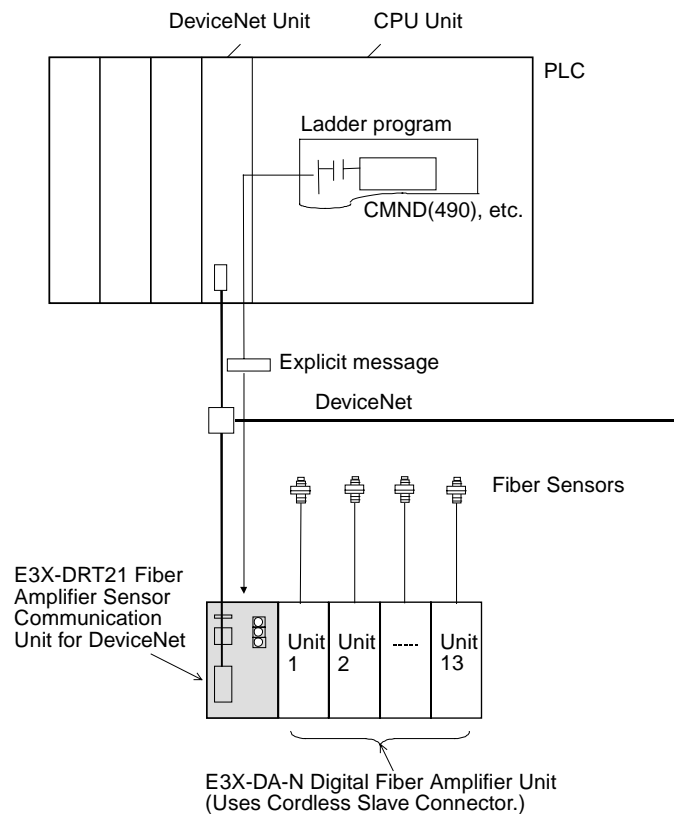
Words in the IN Area of the master can be allocated to the E3X-DRT21 Communication Unit for storage of the ON/OFF data, status data, and incident light levels of the Sensors.



| Communications mode | Words | Communications data | Number of Sensors | Conditions |
|--|---|---|-------------------|---|
| Remote I/O communications one-word mode | One word in IN Area | Sent to the master: ON/OFF output signals for up to 13 Sensors. | 13 max. | --- |
| Remote I/O communications, two-word mode | Two words in IN Area | Sent to the master: ON/OFF output signals for up to 16 Sensors. Number of Sensors able to communicate. Number of Sensors connected. | 16 max. | |
| Remote I/O communications two-word mode with incident light level monitoring | Two words in IN Area plus words for number of Sensors connected | Sent to the master: ON/OFF output signals for up to 16 Sensors. Number of Sensors able to communicate. Number of Sensors that are connected. Incident light levels of up to 16 Sensors. | 16 max. | Incident light levels cannot be monitored if Mobile Console is connected. |

Explicit Message Communications

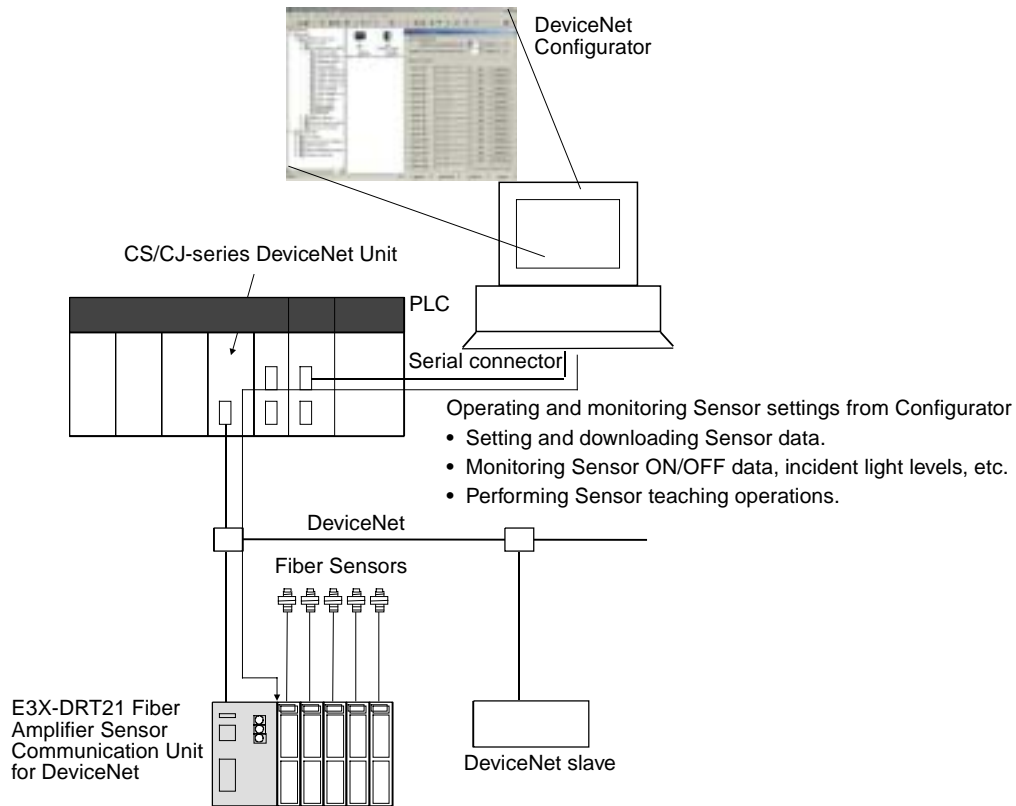
Sending explicit messages to the E3X-DRT21 Communication Unit enables reading and writing Sensor parameters.



| Message | Communication data | Conditions |
|----------------------------------|---|--|
| Sends EXPLICIT READ command | Reads parameters, including ON/OFF data, incident light levels, and thresholds. | Cannot be used when a Mobile Console is connected. |
| Sends EXPLICIT WRITE command | Writes parameters, including maximum sensitivity, and thresholds. | |
| Sends EXPLICIT OPERATION command | Performs various operations including teaching and fine tuning. | |

Transferring, Monitoring, and Operating from the DeviceNet Configurator

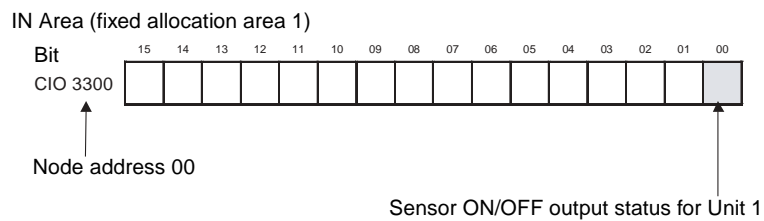
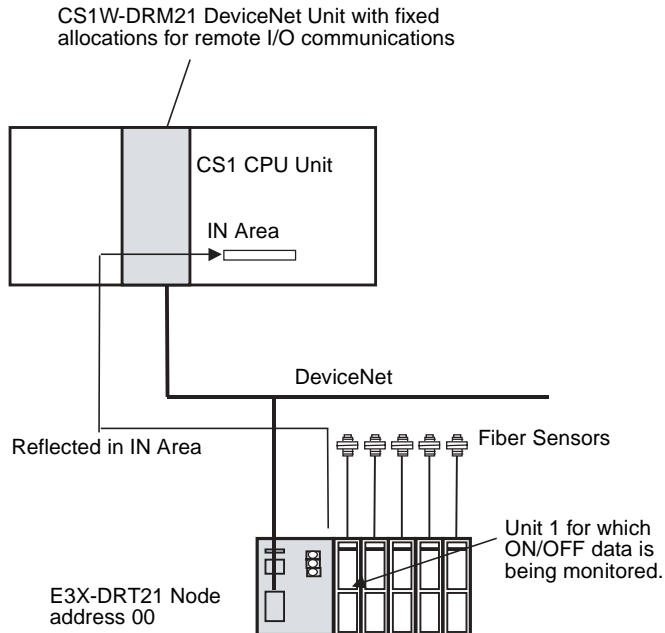
A DeviceNet Configurator (Ver. 2.10 or higher) can be used to read and write Sensor parameters from a personal computer.



| Type | Communications contents | Conditions |
|--------------------------|---|--|
| Sensor parameter setting | Writes any parameters, including maximum sensitivity, and thresholds. | Cannot be used when Mobile Console is connected. |
| Sensor monitoring | Reads any parameters, including ON/OFF data, incident light levels, and thresholds. | |
| Sensor teaching | Performs various teaching operations. | |

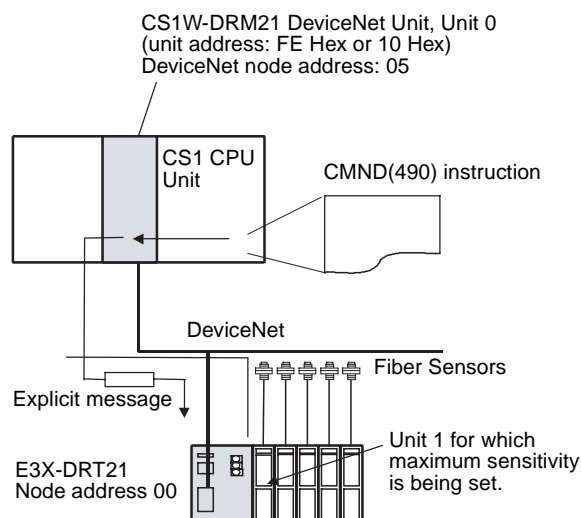
2-1-3 Using Remote I/O Communications: Example

The following example is for monitoring the ON/OFF output status of Fiber Amplifier Unit 1 using one-word mode (DIP switch pins 1 and 2 are OFF) and E3X-DRT21 DeviceNet node address 00.



2-1-4 Using Explicit Message Communications: Example

The following example is for setting the maximum sensitivity of Unit 1.



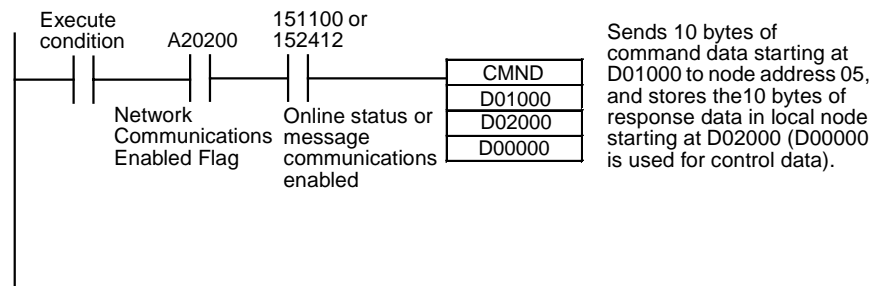
■ **Command Format for Setting Maximum Sensitivity**

Send the following explicit message.

| Destination node address | Service Code | Class ID | Instance ID | Attribute ID | Data |
|--------------------------|--------------|----------|-------------|--------------|--------|
| 00 Hex | 16 Hex | 009C Hex | 0001 Hex | None | 30 Hex |

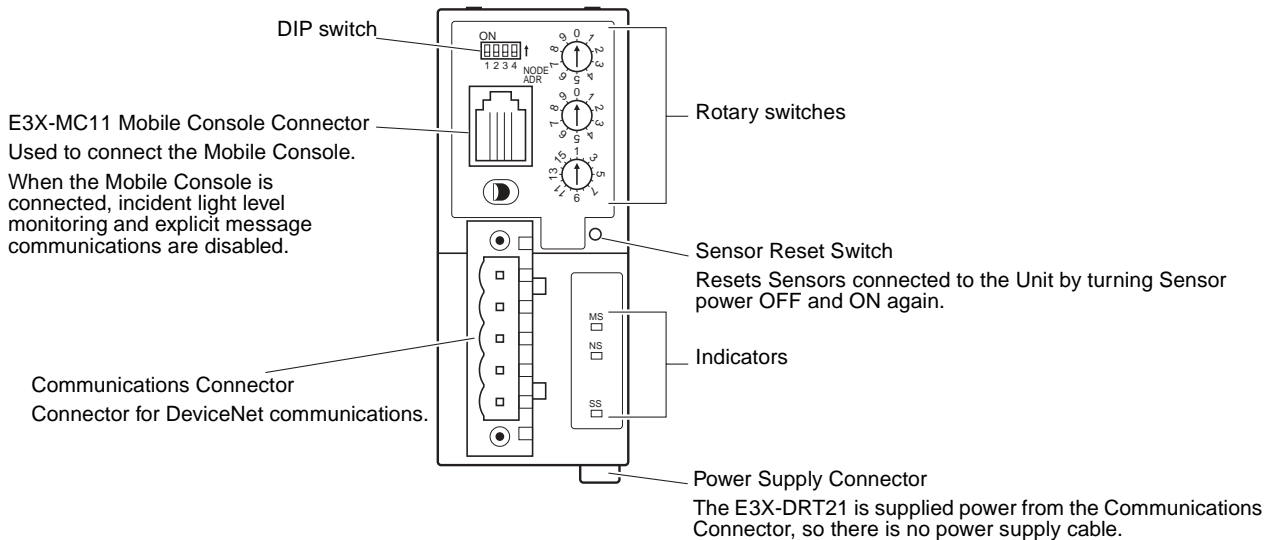
Note When using the CMND(490) instruction to send the attribute ID and data, set them in the rightmost byte (bits 00 to 07), and set the leftmost byte (bits 08 to 15) to 00 Hex. (In the above example, the data is set to 0030 Hex.)

When the explicit message has no attribute ID, omit the words for the attribute ID in the command data specified for the CMND(490) instruction.



| | | | | | | |
|---|--------|---|---|---|---|--|
| S | D01000 | 2 | 8 | 0 | 1 | Command code |
| | D01001 | 0 | 0 | 1 | 6 | Slave node address: 00, Service code: 16 Hex |
| | D01002 | 0 | 0 | 9 | C | Class ID: 009C Hex |
| | D01003 | 0 | 0 | 0 | 1 | Instance ID: 0001 Hex (unit number) |
| | D01003 | 3 | 0 | 0 | 0 | Data: 30 Hex (fixed) |
| D | D02000 | | | | | First word of response storage area. |
| C | D00000 | 0 | 0 | 0 | 9 | Command data bytes: 9 |
| | D00001 | 0 | 0 | 0 | A | Response data bytes |
| | D00002 | 0 | 0 | 0 | 1 | Destination network address: 1 |
| | D00003 | 0 | 5 | F | E | Destination DeviceNet node address: 05 Hex Destination unit address: FE Hex (or 10 Hex) |
| | D00004 | 0 | 0 | 0 | 0 | Response required, communications port No.: 0, retries: 0 Hex |
| | D00005 | 0 | 0 | 3 | C | Response monitoring time: 6 s |

2-2 DeviceNet Communication Unit Part Names and Functions



- Note**
- Do not turn ON the power to the Communication Unit when the Mobile Console is connected. Communications will not be established with the Sensors if the Mobile Console is already connected when the Unit power is turned ON.
 - Always set the Sensors to RUN mode when using the Fiber Amplifier Sensor Communication Unit for DeviceNet. When other modes (SET or ADJ) are set, the Fiber Amplifier Sensor Communication Unit cannot read or write Sensor data.
 - A Sensor communications error will occur under the following conditions after the Mobile Console is connected with its power turned ON.
 - When the power to the Mobile Console is turned OFF.
 - When the Mobile Console is left idle while connected, causing the power to automatically turn OFF.
 - When the Mobile Console battery goes low, causing the power to turn OFF.

Do not allow the above conditions to occur when using the Mobile Console, or use the Mobile Console when problems will not occur even if a Sensor communications error occurs.

Indicators

The following table shows the operation of the indicators.

| Indicator | Name | Color | Status | Meaning |
|-----------|---------------|-------|----------|---------------------------------|
| MS | Module status | Green | Lit | Operating normally. |
| | | | Flashing | Not set. |
| | | Red | Lit | A fatal error has occurred. |
| | | | Flashing | A non-fatal error has occurred. |
| | | --- | Not lit | The power is OFF. |

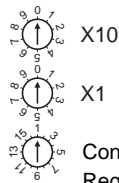
| Indicator | Name | Color | Status | Meaning |
|-----------|------------------------------|-------|----------|---|
| NS | Network status | Green | Lit | DeviceNet is online and communications are connected. |
| | | | Flashing | DeviceNet is online and communications are not connected. |
| | | Red | Lit | A fatal DeviceNet communications error has occurred. |
| | | | Flashing | A non-fatal DeviceNet communications error has occurred. |
| | | --- | Not lit | DeviceNet is offline or power is OFF. |
| SS | Sensor communications status | Green | Lit | Unit is communicating with Sensors. |
| | | Red | Lit | A Sensor communications error has occurred. |
| | | --- | Not lit | Sensor communications are on standby or power is OFF |

Normal Status of Indicators

| | |
|----|---|
| MS | Operation is normal when the MS indicator is lit green. |
| NS | Operation is normal when the NS indicator is lit green (online and communications connected). |
| SS | Sensors are communicating when the SS indicator is lit green. |

Switches

Rotary Switches



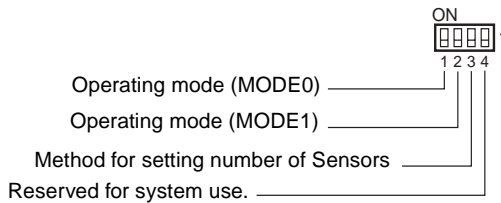
X10 } DeviceNet Node Address Setting
 X1 } Set the DeviceNet node address to between 00 and 63. (64 to 99 are not used.)

Connected Number of Sensors Setting
 Registers the number of Sensors connected. By setting the number of Sensors, errors can be detected in the configuration.

When the DIP switch pin 3 is turned ON, however, this rotary switch is disabled. Instead, the values set from the DeviceNet Configurator or using explicit messages are enabled.

Note Fiber Amplifier Units (E3X-DA6TW and E3X-DA8TW) that are allocated two unit numbers must be counted as two Units when counting the number of connected Sensors.

DIP Switch



■ Pins 1 and 2: Operating Mode Setting

These pins set the operating mode. The data allocated in the master's IN Area depends on the operating mode. For further details, refer to 2-5 DeviceNet Remote I/O Communications.

| Pin 1 (MODE0) | Pin 2 (MODE1) | Operating mode setting | Number of Sensors |
|---------------|---------------|--|-------------------|
| OFF | OFF | Remote I/O communications one-word mode | 13 max. |
| ON | OFF | Remote I/O communications two-word mode | 16 max. |
| OFF | ON | Remote I/O communications two-word mode with incident light level monitoring | 16 max. |
| ON | ON | Cannot be set. | --- |

Note Fiber Amplifier Units (E3X-DA6TW and E3X-DA8TW) that are allocated two unit numbers must be counted as two Units when counting the number of connected Sensors.

■ **Pin 3: Controlling the Setting of the Number of Connected Sensors**

The number of Sensors connected is registered by using either a rotary switch or the Configurator.

When pin 3 is ON, registering the number of Sensors is enabled from Configurator or by using explicit messages enabled, and the value for the number of Sensors enabled for communications that is stored in the internal memory of the Fiber Amplifier Sensor Communication Unit is used. The default value in the internal memory is 16. This value can be changed from the DeviceNet Configurator. The setting methods are shown in the following table.

| Pin 3 | Method for setting the number of Sensors |
|-------|--|
| OFF | Use rotary switch to register number of Sensors. |
| ON | Use Configurator or explicit messages to register number of Sensors. |

Note When DIP switch pin 3 is ON (registering from Configurator or using explicit messages), pin 1 is OFF, and pin 2 is ON (remote I/O communications two-word mode with incident light level monitoring), the value in the internal memory of the Fiber Amplifier Sensor Communication Unit for the number of Units being monitored for incident light levels is used. The default value in the internal memory is 16. This value can be set to a different value from the number of Sensors connected. When pin 3 is OFF (registering from rotary switch), pin 1 is OFF, and pin 2 is ON, the rotary switch setting applies to both the number of Sensors connected and the number of Units monitoring incident light level.

■ **Pin 4: Reserved for System Use**

This pin must always be OFF.

Sensor Reset Switch

Press this switch to reset the connected Sensors by executing power interruption processing. This switch is used in the following case.

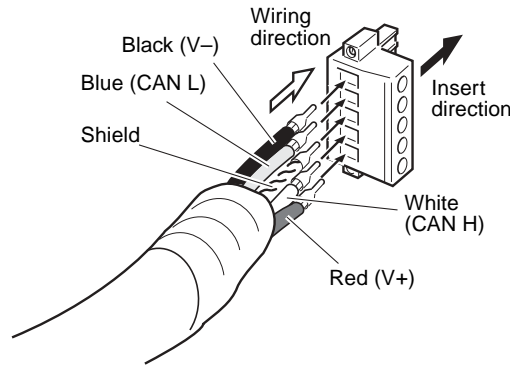
If the number of Sensors with communications enabled does not match the number of Sensors connected, one or more Sensors may have become disconnected. The power reset switch is required to enable the Sensors to be reconnected properly and for communications to be reestablished between Sensors. Turning OFF the power supply would disconnect the Fiber Amplifier Sensor Communication Unit from DeviceNet, which may effect the entire system. The Sensor reset switch is thus used to reestablish communications with the Sensors.

Note The E3X-DRT21 automatically uses the DeviceNet baud rate of the master. Therefore, the DIP switch is not required to set the baud rate.

2-3 Operating Procedure for DeviceNet Communication Unit

| Step | Item | Details | | | | |
|------|---|---|---|--|-----------------------------|--|
| 1 | Mount the Communication Unit to the DIN Track. | Mount the Unit to the DIN Track. After mounting the Fiber Amplifier Units to the DIN Track, connect the Units to each other. Note: To remove the Units from the DIN Track, first slide the Units apart to disconnect them, and then remove the Units from the DIN Track. | | | | |
| 2 | Connect the Fiber Amplifier Units to the Communication Unit. | Connect the Communication Unit to the Fiber Amplifier Units by sliding the Communication Unit until the clips on the end are aligned and a "click" sound is heard. | | | | |
| 3 | Set the Sensors to RUN mode. | Set the mode switches to RUN mode. | | | | |
| 4 | Connect the DeviceNet communications connector. | Connect the DeviceNet Communications Connector. Note: The DC power supply to the Communication Unit and all Fiber Amplifier Units connected to it is supplied from the DeviceNet communications power supply (V+, V-). | | | | |
| 5 | Set the rotary switches. | Two upper switches | Sets the DeviceNet node address (0 to 63). | | | |
| | | Lower switch | Sets the number of Sensors connected to the Unit (1 to 16). (Enabled when DIP switch pin 3 is OFF only.) Note 1: When DIP switch pin 3 is ON, set the number of Sensors connected using the Configurator or explicit messages. Note 2: Fiber Amplifier Units (E3X-DA6TW, E3X-DA8TW) that are allocated two unit numbers must be counted as two Units when counting the number of Sensors. | | | |
| 6 | Set the DIP switch. | Pin 1 | Pin 2 | Operating mode setting | Number of Sensors connected | |
| | | OFF | OFF | Remote I/O communications one-word mode | 13 max. | |
| | | ON | OFF | Remote I/O communications two-word mode | 16 max. | |
| | | OFF | ON | Remote I/O communications two-word mode with incident light level monitoring | 16 max. | |
| | | | | | | |
| | | Pin 3 | Method for setting the number of Sensors. | | | |
| | | OFF | Use the rotary switch to register setting. | | | |
| ON | Use the Configurator or explicit messages to register settings. | | | | | |
| 7 | Turn ON the DC power supply (V+, V- DeviceNet communications power supply). | Disconnect the E3X-MC11 Mobile Console before turning ON the DC power supply. | | | | |
| 8 | Check the indicators. | MS | Operating normally when lit green. | | | |
| | | NS | Operating normally when lit green (DeviceNet online and communications connected). | | | |
| | | SS | Communicating with Sensors when lit green. | | | |
| 9 | Start communications. | Remote I/O | Enable the scan list in the master and change the PLC to RUN mode. | | | |
| | | Explicit messages | Send explicit messages from the master. | | | |

2-4 Wiring the DeviceNet Model



- The following table shows the relationship between the cable colors and signals.

| Color | Signal | Symbol |
|-------|---|--------|
| Black | Communications power supply negative side | V- |
| Blue | Signal low side | CAN L |
| --- | Shield | S |
| White | Signal high side | CAN H |
| Red | Communications power supply positive side | V+ |

- Note**
1. The DeviceNet communications power supply provides power to the Communication Unit and all the Sensors (Amplifier Units) connected to it. Select a power supply for the Communication Unit so that it has sufficient capacity for the current consumption of the Sensors.
 2. The allowable current is 3 A for the DeviceNet thin cables and 8 A for the DeviceNet thick cables. For details on calculating the power supply for the DeviceNet system, refer to the *DeviceNet Operation Manual* (Cat. No. W267).

2-5 DeviceNet Remote I/O Communications

2-5-1 Master Word Allocations

The E3X-DRT21 data is stored in the IN Area of the DeviceNet master. Select one of the following three operating modes using the DIP switch.

| Pin 1 MODE0 | Pin 2 MODE1 | Operating mode setting | Number of Sensors |
|----------------|----------------|--|-------------------|
| OFF | OFF | Remote I/O communications one-word mode | 13 max. |
| ON | OFF | Remote I/O communications two-word mode | 16 max. |
| OFF | ON | Remote I/O communications two-word mode with incident light level monitoring | 16 max. |
| ON | ON | Cannot be set. | --- |

The DeviceNet Configurator can be used to set the connection type. The Fiber Amplifier Sensor Communication Unit supports bit-strobe, polling, COS, and cyclic connections. Refer to *Appendix C DeviceNet Connection Settings* for details.

Remote I/O Communications One-word Mode (Pins 1 and 2 OFF)

Up to 13 Sensors can be connected in this mode. One word is allocated to each Sensor in the IN Area of the master. Fiber Amplifier Units are automatically assigned unit numbers in ascending order starting from the Communication Unit (left side).

| Bit | Contents |
|-----|------------------------------------|
| 00 | Unit 1 ON/OFF data |
| 01 | Unit 2 ON/OFF data |
| 02 | Unit 3 ON/OFF data |
| 03 | Unit 4 ON/OFF data |
| 04 | Unit 5 ON/OFF data |
| 05 | Unit 6 ON/OFF data |
| 06 | Unit 7 ON/OFF data |
| 07 | Unit 8 ON/OFF data |
| 08 | Unit 9 ON/OFF data |
| 09 | Unit 10 ON/OFF data |
| 10 | Unit 11 ON/OFF data |
| 11 | Unit 12 ON/OFF data |
| 12 | Unit 13 ON/OFF data |
| 13 | Mobile Console Communications Flag |
| 14 | Sensor Communications Error Flag |
| 15 | Sensor Communications Flag |

■ Mobile Console Communications Flag

Bit 13 turns ON when the Mobile Console is connected to the Communication Unit. When the Mobile Console is connected, the DeviceNet Configurator or explicit message communications cannot be used to perform setting and monitoring operations.

■ Sensor Communications Error Flag

Bit 14 turns ON when the registered number of Sensors does not match the number of Sensors that are enabled to communicate, or when a communications error occurs after communications have been established with the Sensors.

■ **Sensor Communications Flag**

Bit 15 turns ON when communications are established with the Sensors.

Up to 16 Sensors can be connected in this mode. Two words are allocated to each Sensor in the IN Area of the master.

**Remote I/O
Communications
Two-word Mode
(Pin 1 ON, Pin 2
OFF)**

Word m

| Bit | Contents |
|-----|---------------------|
| 00 | Unit 1 ON/OFF data |
| 01 | Unit 2 ON/OFF data |
| 02 | Unit 3 ON/OFF data |
| 03 | Unit 4 ON/OFF data |
| 04 | Unit 5 ON/OFF data |
| 05 | Unit 6 ON/OFF data |
| 06 | Unit 7 ON/OFF data |
| 07 | Unit 8 ON/OFF data |
| 08 | Unit 9 ON/OFF data |
| 09 | Unit 10 ON/OFF data |
| 10 | Unit 11 ON/OFF data |
| 11 | Unit 12 ON/OFF data |
| 12 | Unit 13 ON/OFF data |
| 13 | Unit 14 ON/OFF data |
| 14 | Unit 15 ON/OFF data |
| 15 | Unit 16 ON/OFF data |

Word m+1

| Bit | Contents |
|-----|---|
| 00 | Number of Sensors connected, 2^0 |
| 01 | Number of Sensors connected, 2^1 |
| 02 | Number of Sensors connected, 2^2 |
| 03 | Number of Sensors connected, 2^3 |
| 04 | Number of Sensors connected, 2^4 |
| 05 | Method for setting number of Sensors |
| 06 | Always 0. |
| 07 | Always 0. |
| 08 | Number of Sensors that can communicate, 2^0 |
| 09 | Number of Sensors that can communicate, 2^1 |
| 10 | Number of Sensors that can communicate, 2^2 |
| 11 | Number of Sensors that can communicate, 2^3 |
| 12 | Number of Sensors that can communicate, 2^4 |
| 13 | Mobile Console Communications Flag |
| 14 | Sensor Communications Error Flag |
| 15 | Sensor Communications Flag |

■ **Number of Sensors Connected**

Bits 00 to 04 give the number of Sensors that are currently registered between 1 and 10 Hex (1 to 16 decimal).

■ Switching Method for Setting Number of Sensors Connected

Bit 05 gives the status of DIP switch pin 3, which controls the method for registering the number of Sensors connected. When this bit is OFF, pin 3 is OFF, and when the bit is ON, pin 3 is ON.

■ Number of Sensors That Can Communicate

Bits 08 to 12 give the number of Sensors that are currently able to communicate between 1 and 10 Hex (1 to 16 decimal). This setting enables the user to check how many Sensors are communicating normally when an error occurs.

■ Mobile Console Communications Flag

Bit 13 turns ON when the Mobile Console is connected to the Communication Unit. When the Mobile Console is connected, the Configurator or explicit message communications cannot be used to perform setting and monitoring operations.

■ Sensor Communications Error Flag

Bit 14 turns ON when the number of Sensors registered as connected does not match the number of Sensors that can communicate, or when a communications error occurs after communications have been established with the Sensors.

■ Sensor Communications Flag

Bit 15 turns ON when communications are established with the Sensors.

Note Fiber Amplifier Units (E3X-DA6TW, E3X-DA8TW) that are allocated two unit numbers are allocated two bits of ON/OFF data and are counted as two Units when counting the number of Sensors.

**Remote I/O
Communications
Two-word with
Incident Light
Level Monitoring
Mode (Pin 1 OFF,
Pin 2 ON)**

Up to 16 Sensors can be connected in this mode. The incident light level monitor default setting is to monitor all the Sensors that are connected. By turning ON pin 3 of the DIP switch, the number of Sensors being monitored for incident light levels can be changed from the DeviceNet Configurator or by using explicit messages.

When the number of Sensors to be monitored is set, the incident light level is monitored starting from the Unit next to the Fiber Amplifier Sensor Communication Unit up to the number of Sensors that is current set.

In addition to word m and word m+1, one word is allocated in the IN Area of the master for each Sensors to be monitored for incident light level.

Word m

| Bit | Contents |
|-----|---------------------|
| 00 | Unit 1 ON/OFF data |
| 01 | Unit 2 ON/OFF data |
| 02 | Unit 3 ON/OFF data |
| 03 | Unit 4 ON/OFF data |
| 04 | Unit 5 ON/OFF data |
| 05 | Unit 6 ON/OFF data |
| 06 | Unit 7 ON/OFF data |
| 07 | Unit 8 ON/OFF data |
| 08 | Unit 9 ON/OFF data |
| 09 | Unit 10 ON/OFF data |
| 10 | Unit 11 ON/OFF data |
| 11 | Unit 12 ON/OFF data |
| 12 | Unit 13 ON/OFF data |
| 13 | Unit 14 ON/OFF data |
| 14 | Unit 15 ON/OFF data |
| 15 | Unit 16 ON/OFF data |

Word m+1

| Bit | Contents |
|-----|---|
| 00 | Number of Sensors connected, 2^0 |
| 01 | Number of Sensors connected, 2^1 |
| 02 | Number of Sensors connected, 2^2 |
| 03 | Number of Sensors connected, 2^3 |
| 04 | Number of Sensors connected, 2^4 |
| 05 | Method for setting number of Sensors |
| 06 | Always 0. |
| 07 | Always 0. |
| 08 | Number of Sensors that can communicate, 2^0 |
| 09 | Number of Sensors that can communicate, 2^1 |
| 10 | Number of Sensors that can communicate, 2^2 |
| 11 | Number of Sensors that can communicate, 2^3 |
| 12 | Number of Sensors that can communicate, 2^4 |
| 13 | Mobile Console Communications Flag |
| 14 | Sensor Communications Error Flag |
| 15 | Sensor Communications Flag |

| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
|----------------|---------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Word m + 2 | Unit 1 incident light level | | | | | | | | | | | | | | | |
| Word m + 3 | Unit 2 incident light level | | | | | | | | | | | | | | | |
| Word m + 4 | Unit 3 incident light level | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | |
| Word m + n | Unit n – 1 incident light level | | | | | | | | | | | | | | | |
| Word m + n + 1 | Unit n incident light level | | | | | | | | | | | | | | | |

Number of Sensors for incident light level monitoring: n

- Note**
1. When the number of Sensors for incident light level monitoring is greater than the value set for the number of Sensors connected for communications, the incident light level for the Sensors that are not connected will be 0000.
 2. When the Mobile Console is connected, the incident light level data cannot be read and the data will be 7FFF.
 3. When an error occurs in communications with Sensors, the incident light level data for the Sensors not communicating will be 7FFF.
 4. The incident light level data for the E39-TM1 Terminal Block Units will be 7FFF. Monitoring incident light levels for Terminal Block Units causes a delay in the data refresh cycle. To speed up the refresh cycle, mount the Terminal Block Unit to the farthest position from the Fiber Amplifier Sensor Communication Unit, and use the DeviceNet Configurator or an explicit message to set the number of devices to be monitored for incident light level requirement so that the Terminal Block Unit is not monitored.
 5. The refresh timing of Sensor ON/OFF data and incident light level data is not synchronized. Even if incident light level data is read while monitoring the ON/OFF status, the incident light level data may not be indicated for the ON and OFF status. To read incident light level data at ON and OFF, use the E3X-DA6-P Sensor. For details on this Sensor, refer to *Appendix B Monitoring Incident Light Levels of E3X-DA6-P Sensors*.

2-6 Explicit Message Communications

Sending DeviceNet explicit messages from the master to the Communication Unit enables reading or writing any parameters of Fiber Amplifier Units. The Communication Unit processes the command sent from the master and returns a response.

2-6-1 Basic Format of Explicit Messages

The basic formats of command and response blocks are shown here.

Command Block

| | | | | | |
|--------------------------|--------------|----------|-------------|--------------|------|
| Destination node address | Service Code | Class ID | Instance ID | Attribute ID | Data |
|--------------------------|--------------|----------|-------------|--------------|------|

Destination Node Address

Specifies the node address of the Unit to which the explicit message (command) is to be sent as a 1-byte hexadecimal value.

Service Code, Class ID, Instance ID, Attribute ID

Specify the command type, the Unit to receive the command, and other processing details. The Fiber Amplifier Sensor Communication Unit uses the instance ID to specify to Sensors for which the command is intended (Sensor unit number). Some commands do not require an attribute ID.

Note The number of bytes specified for the class ID, instance ID, and attribute ID depend on the master used. When the command is sent from an OMRON DeviceNet Unit (master), the class ID and instance ID are specified as 2 bytes (4 digits) each, and the attribute ID as 1 byte (2 digits).

Data

Data is not required for the READ command.

Response Block

Normal Block

| | | | |
|--------------------------|---------------------|--------------|------|
| Number of received bytes | Source node address | Service Code | Data |
|--------------------------|---------------------|--------------|------|

Error Block

| | | | |
|--|---------------------|--------------|------------|
| Number of received bytes fixed at 0004 Hex | Source node address | Service Code | Error Code |
|--|---------------------|--------------|------------|

Number of Received Bytes

The number of data bytes received starting from the source node is returned as a hexadecimal value. When an error response is returned to an explicit message, this value will be 0004 Hex.

Source Node Address

Returns the node address of the node from which the command was sent as a hexadecimal value.

Service Code

When the command is completed normally, the value specified in the command with leftmost bit of the service code turned ON is stored as shown in the following table.

| Command service code | Response service code |
|----------------------|-----------------------|
| 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 response is returned to an explicit message, this value will be 94 Hex.

Data

Used to store read data only when a READ command has been sent.

Error Code

Specifies the explicit message error code. For details, refer to 2-6-5 *List of Error Codes*.

Note Set the DeviceNet message monitoring timer in the Fiber Amplifier Sensor Communication Unit to 6 s minimum.

The procedure for setting the timer is as follows:

Using a CS1W-DRM21 or CJ1W-DRM21

Use the following procedure to set the timer from the DeviceNet Configurator.

- 1,2,3... 1. Place the Configurator online by selecting **Network** and **Connection**.
2. Select and double-click either CS1W-DRM21 or CJ1W-DRM21.
3. Set the Fiber Amplifier Sensor Communication Unit node monitoring timer to 6,000 ms.



- Set the response monitoring time to 6,000 ms minimum using the CMND(490) instruction to send an explicit message.

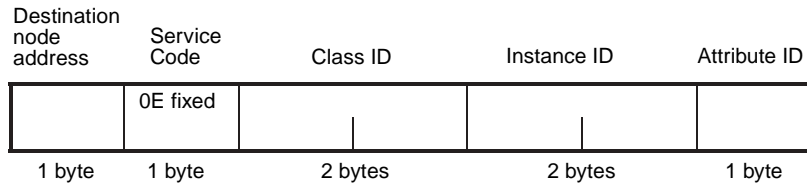
Using C200HW-DRM21 or CVM1-DRM21

Set the response monitoring time to 6,000 ms using the IOWR(223) instruction to send an explicit message. (The message monitoring timer does not need to be set with the DeviceNet Configurator.)

2-6-2 READ Command

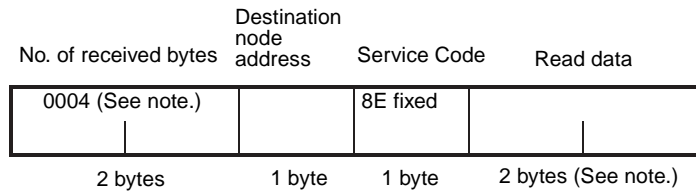
The READ command is used to read data from the Fiber Amplifier Sensor Communication Unit or the Sensors connected to it. When an OMRON master is used, the formats of the command and response blocks are as follows:

Command Block



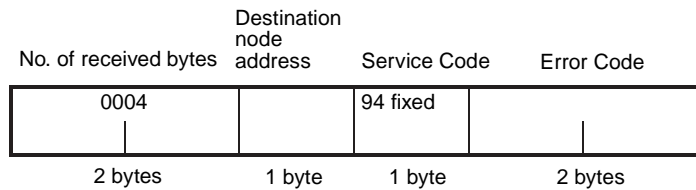
Response Block

Normal Format



Note The bytes of read data for Batch Read Incident Light Levels and Batch Read Threshold Settings is twice the number of Sensors being read. The number of received bytes is two plus twice the number of Sensors being read.

Error Format



List of READ Commands

The following table lists the explicit message READ commands.

| Explicit message | Function | Command | | |
|----------------------------------|--|----------|-------------|--------------|
| | | Class ID | Instance ID | Attribute ID |
| Read ON/OFF Data | Reads the ON/OFF status of connected Sensors | 009C | 0000 | 01 |
| Read Status | Reads the status of the Fiber Amplifier Sensor Communication Unit | 009C | 0000 | 02 |
| Read Incident Light Level | Specifies the unit number as the instance ID and reads the incident light level. | 009C | Unit number | 03 |
| Batch Read Incident Light Levels | Reads incident light levels of connected Sensors in a batch. | 009C | 0000 | 67 |

| Explicit message | Function | Command | | |
|---|---|----------|-------------|--------------|
| | | Class ID | Instance ID | Attribute ID |
| Read ON Incident Light Level (See note 2.) | Specifies the unit number as the instance ID and reads the incident light levels when Sensor is ON. | 009C | Unit number | 04 |
| Read OFF Incident Light Level (See note 2.) | Specifies unit number as the instance ID and reads the incident light level when Sensor is OFF. | 009C | Unit number | 05 |
| Batch Read ON Incident Light Levels (See note 2.) | Reads the ON incident light levels of connected Sensors in a batch. | 009C | 0000 | 68 |
| Batch Read OFF Incident Light Levels (See note 2.) | Reads the OFF incident light levels of connected Sensors in a batch. | 009C | 0000 | 69 |
| Read Threshold Setting | Specifies the unit number as the instance ID and reads the threshold value. | 009C | Unit number | 11 |
| Batch Read Threshold Settings | Reads the threshold values of the connected Sensors in a batch. | 009C | 0000 | 75 |
| Read Basic Settings | Specifies the unit number as the instance ID and reads basic settings. | 009C | Unit number | 12 |
| Read Timer Setting | Specifies the unit number as the instance ID and reads the timer. | 009C | Unit number | 13 |
| Read Hysteresis Width | Specifies the unit number as the instance ID and reads the hysteresis width. | 009C | Unit number | 16 |
| Read Custom Flags | Specifies the unit number as the instance ID and reads the Custom Flags. | 009C | Unit number | 17 |
| Read Special Flags (See note 3.) | Specifies the unit number as the instance ID and reads the Special Flags. | 009C | Unit number | 1C |
| Read Number of Sensors | Reads the number of Sensors connected. | 009C | 0000 | 30 |
| Read Number of Incident Light Level Monitor Units | Reads the number of Units monitoring incident light levels. | 009D | 0000 | 31 |

The unit number specified by the instance ID must be set between 0001 Hex and 0010 Hex.

- Note**
1. The E39-TM1 Terminal Block Unit has no parameters that can be read, so an error will occur if the unit number of a Terminal Block Unit is specified.
 2. An error will occur if the (Batch) Read ON/OFF Incident Light Levels command is executed when the unit number of a Unit other than an E3X-DA6-P is specified.
 3. An error will occur if the Read Special Flags command is executed when the unit number of a Unit other than an E3X-DA6TW or E3X-DA8TW is specified.

The following tables and explanations provide the data format for each item.

Read ON/OFF Data

| Bit | Contents |
|-----|---------------------|
| 00 | Unit 1 ON/OFF data |
| 01 | Unit 2 ON/OFF data |
| 02 | Unit 3 ON/OFF data |
| 03 | Unit 4 ON/OFF data |
| 04 | Unit 5 ON/OFF data |
| 05 | Unit 6 ON/OFF data |
| 06 | Unit 7 ON/OFF data |
| 07 | Unit 8 ON/OFF data |
| 08 | Unit 9 ON/OFF data |
| 09 | Unit 10 ON/OFF data |
| 10 | Unit 11 ON/OFF data |
| 11 | Unit 12 ON/OFF data |
| 12 | Unit 13 ON/OFF data |
| 13 | Unit 14 ON/OFF data |
| 14 | Unit 15 ON/OFF data |
| 15 | Unit 16 ON/OFF data |

Read Status

| Bit | Contents |
|-----|---|
| 00 | Number of Sensors connected, 2^0 |
| 01 | Number of Sensors connected, 2^1 |
| 02 | Number of Sensors connected, 2^2 |
| 03 | Number of Sensors connected, 2^3 |
| 04 | Number of Sensors connected, 2^4 |
| 05 | Method for setting number of Sensors |
| 06 | Always 0. |
| 07 | Always 0. |
| 08 | Number of Sensors that can communicate, 2^0 |
| 09 | Number of Sensors that can communicate, 2^1 |
| 10 | Number of Sensors that can communicate, 2^2 |
| 11 | Number of Sensors that can communicate, 2^3 |
| 12 | Number of Sensors that can communicate, 2^4 |
| 13 | Mobile Console Communications Flag |
| 14 | Sensor Communications Error Flag |
| 15 | Sensor Communications Flag |

■ **Number of Sensors Connected**

Bits 00 to 04 give in hexadecimal the number of Sensors that are currently registered.

■ **Switching Method for Setting Number of Sensors Connected**

Bit 05 gives the status of DIP switch pin 3, which controls the method for registering the number of Sensors connected. When this bit is set OFF, pin 3 is OFF, and when the bit is ON, pin 3 is ON.

■ **Number of Sensors That Can Communicate**

Bits 08 to 12 give the number of Sensors that are currently able to communicate in hexadecimal. This setting enables the user to check how many Sensors are communicating normally when an error occurs.

■ **Mobile Console Communications Flag**

Bit 13 turns ON when the Mobile Console is connected to the Communication Unit. When the Mobile Console is connected, explicit message communications cannot be used.

■ **Sensor Communications Error Flag**

Bit 14 turns ON when the number of Sensors registered as connected does not match the number of Sensors that can communicate, or when a communications error occurs after communications have been established with the Sensors.

■ **Sensor Communications Flag**

Bit 15 turns ON when communications are established with the Sensors.

Read (ON/OFF) Incident Light Level

Reads the incident light level of the Sensor for the unit number specified in the instance ID. The data is given as a 2-byte (4-digit) hexadecimal value, and negative data is expressed as its two's complement.

Data for the Read ON/OFF Incident Light Level commands can be read when using an E3X-DA6-P Sensor only. For details on ON/OFF incident light levels, refer to *Appendix B Monitoring Incident Light Levels of E3X-DA6-P Sensors*.

Batch Read (ON/OFF) Incident Light Levels

Reads as a batch the Sensor data starting from unit number 1 for the number of Sensors specified as connected. The data is given as hexadecimal values, with 16 bits of data for each Unit. Negative data is expressed as its two's complement.

| | | | | |
|---------------------------------------|---------------------------------------|-------|---|--|
| Unit number 1 incident light level | Unit number 2 incident light level | ----- | Unit number N + 1 incident light level | Unit number N incident light level |
|---------------------------------------|---------------------------------------|-------|---|--|

Units numbers specified as number of connected Sensors: N Units

The Batch Read Incident Light Level command cannot be used when one or more E39-TM1 Terminal Block Units is connected.

Data for the Batch Read ON/OFF Incident Light Level commands can be read only if all Sensors are E3X-DA6-P Sensors. The command cannot be used if one or more Sensors other than E3X-DA6-P Sensors are connected. For details on ON/OFF incident light levels, refer to *Appendix B Monitoring Incident Light Levels of E3X-DA6-P Sensors*.

Read Threshold Setting

Reads the threshold setting of the Sensor for the unit number specified in the instance ID. The data is given as a 2-byte (4-digit) hexadecimal value, and negative data is expressed as its two's complement.

Batch Read Threshold Settings

Reads as a batch the Sensor data starting from unit number 1 for the number of Sensors specified as connected. The data is given as hexadecimal values, with 2 bytes (4 digits) of data for each Unit. Negative data is expressed as its two's complement.

| | | | | |
|------------------------------------|------------------------------------|-------|--|---------------------------------------|
| Unit number 1 threshold setting | Unit number 2 threshold setting | ----- | Unit number N - 1 threshold setting | Unit number N threshold setting |
|------------------------------------|------------------------------------|-------|--|---------------------------------------|

Units numbers specified as number of connected Sensors: N Units

This command cannot be used if one or more E39-TM1 Terminal Block Units is connected.

Read Basic Settings

Reads the basic settings of the Sensor for the unit number specified in the instance ID. The data contents are as follows:

| Bit | Contents |
|-----|--|
| 00 | Display Contents: |
| 01 | 0: Digital incident level 1: Digital percentage 2: Analog incident level |
| 02 | Display Orientation: 0: Standard 1: Reversed |
| 03 | Hold Setting: |
| 04 | 0: OFF 2: Peak 3: Bottom |
| 05 | Flashing Setting: 0: OFF 1: ON |
| 06 | Sensing Setting: |
| 07 | 0: Standard 2: Super long-distance 3: Super high-speed |
| 08 | Timer Mode: |
| 09 | 1: OFF-delay 2: ON-delay 3: One-shot |
| 10 | Number of Display Digits: |
| 11 | 0: 4 digits |
| 12 | 1: 3 digits 2: 2 digits 3: 1 digit 4: 0 digits |
| 13 | Always 0. |
| 14 | Teaching during RUN 0: OFF 1: ON |
| 15 | Eco Mode 0: OFF 1: ON |

Read Timer Settings

Reads the OFF-delay, ON-delay, and one-shot timers of the Sensor for the unit number specified in the instance ID. The data is given as a 2-byte (4-digit) hexadecimal value. The value is given in ms.

Read Hysteresis Width

Reads the hysteresis width of the Sensor for the unit number specified in the instance ID. The data is given as a 3-digit hexadecimal value. Bits 14 and 15 are used to display the sensing setting.

| Bit | Contents |
|----------|--|
| 00 to 11 | Hysteresis Width |
| 12 | Always 0. |
| 13 | Always 0. |
| 14 | Sensing Setting: |
| 15 | 0: Standard 2: Super long-distance 3: Super high-speed |

Read Custom Flags

Reads whether the following settings for the Sensor of the unit number specified in the instance ID can be set or monitored from the sensor key switch.

| Bit | Contents |
|-----|--|
| 00 | Hold Setting: |
| 01 | 0: Enable 1: Not displayed 2: Disable |
| 02 | Flashing Setting: |
| 03 | 0: Enable 1: Not displayed 2: Disable |
| 04 | OFF-delay Timer Setting: |
| 05 | 0: Enable 1: Not displayed 2: Disable |
| 06 | Sensing Setting: |
| 07 | 0: Enable 1: Not displayed 2: Disable |
| 08 | Sensitivity Adjustment: 0: Enable 1: Disable |
| 09 | Teaching: 0: Enable 1: Disable |
| 10 | Display Contents: 0: Enable 1: Disable |
| 11 | Zero Reset: 0: Enable 1: Disable |
| 12 | Monitor Focus Range: |
| 13 | 0: Enable 1: Not displayed 2: Disable |
| 14 | Display Orientation: |
| 15 | 0: Enable 1: Not displayed 2: Disable |

Read Special Flags

Reads the status of the following settings for the Sensor of the unit number specified in the instance ID. This command is possible with E3X-DA6TW and E3X-DA8TW Sensors only. Executing this command for any other sensor will cause an error to occur.

| Bit | Contents |
|-----|--|
| 00 | 0 or 1 |
| 01 | 0 or 1 |
| 02 | Always 0. |
| 03 | Always 0. |
| 04 | Operating Mode Flag (one-word): 0: Dark-ON 1: Light-ON |
| 05 | Operating Mode Flag (two-word): 0: Dark-ON 1: Light-ON |
| 06 | Area Setting Flag: 0: AREA OFF 1: AREA ON |
| 07 | 0 or 1 |
| 08 | Always 0. |
| 09 | Always 0. |
| 10 | Always 0. |
| 11 | Always 0. |
| 12 | Always 0. |
| 13 | Always 0. |
| 14 | Always 0. |
| 15 | Always 0. |

Note Bits 00, 01, and 07 are read as 0 or 1 according to the internal status of the Sensor.

Read Number of Sensors

Reads the number of Sensors that are connected. The data is given as a 2-byte (4-digit) hexadecimal value. When pin 3 is ON (registration using explicit messages or Configurator), the values from the internal memory are read, and when pin 3 is OFF (registration using rotary switch), the setting from the rotary switch is read. The data range is from 0001 Hex to 0010 Hex.

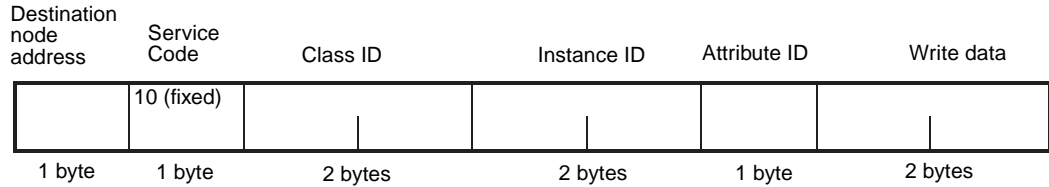
Read Number of Light Level Monitoring Units

Reads the number of Units monitoring incident light levels when using two-word mode with incident light level monitoring (i.e., when DIP switch pins 1 and 2 are OFF). The data is given as a 2-byte (4-digit) hexadecimal value. When pin 3 is ON, the values from the internal memory are read, and when pin 3 is OFF, the values from the rotary switch are read. The data range is from 0000 Hex to 0010 Hex.

2-6-3 WRITE Command

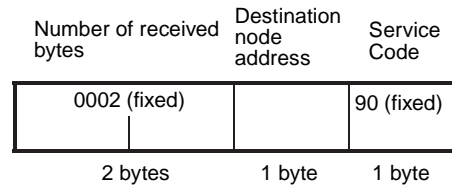
The WRITE command is used to write data to the Fiber Amplifier Sensor Communication Unit or the Sensors connected to it. When an OMRON master is used, the formats of the command and response blocks are as follows:

Command Block

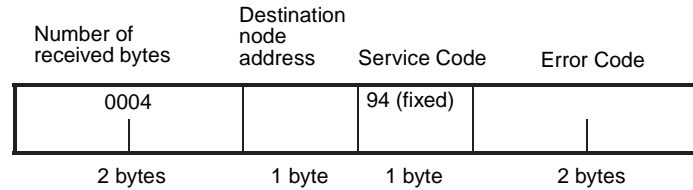


Response Block

Normal Format



Error Format



List of WRITE Commands

The following table lists the explicit message WRITE commands.

| Explicit message | Function | Command | | |
|---|---|----------|-------------|--------------|
| | | Class ID | Instance ID | Attribute ID |
| Write Threshold Setting | Specifies the unit number as the instance ID and writes threshold value. | 009C | Unit number | 11 |
| Write Basic Settings | Specifies the unit number as the instance ID and writes basic settings. | 009C | Unit number | 12 |
| Write Timer Setting | Specifies the unit number as the instance ID and writes timer. | 009C | Unit number | 13 |
| Write Hysteresis Width | Specifies the unit number as the instance ID and writes hysteresis width. | 009C | Unit number | 16 |
| Write Custom Flags | Specifies the unit number as the instance ID and writes Custom Flags. | 009C | Unit number | 17 |
| Write Special Flags | Specifies the unit number as the instance ID and writes Special Flags. | 009C | Unit number | 1C |
| Write Number of Sensors | Writes the number of Sensors connected. | 009C | 0000 | 30 |
| Write Number of Light Level Monitor Units | Writes the number of Units monitoring incident light levels. | 009D | 0000 | 31 |

- Note**
1. The unit number specified by the instance ID must be set between 0001 Hex and 0010 Hex.
 2. An error will occur if the unit number of an E39-TM1 Terminal Block Unit is specified.
 3. When WRITE commands are executed, the settings are written to the internal memory. The number of times that data can be written to the internal memory is limited. The internal memory may be corrupted if more than one million (1,000,000) write operations are performed for each Sensor and parameter. Therefore, when using WRITE commands, be sure to create a communications program that prevents the number of writing operations from exceeding one million (1,000,000) for each Sensor and parameter.
 4. Do not send commands for attribute ID that are not specified. Accidentally sending such commands may overwrite internal parameters. If the internal parameters of a connected Sensor are overwritten, execute the Initialize Sensor Settings operation command. If the internal parameters of the Fiber Amplifier Sensor Communication Unit are overwritten, write 0000 Hex for the following attribute ID settings to clear them.

| Explicit message | Command | | |
|----------------------|----------|-------------|--------------|
| | Class ID | Instance ID | Attribute ID |
| Internal parameter 1 | 009D | 0000 | 32 |
| Internal parameter 2 | 009D | 0000 | 33 |

The following explanations provide the data format for each item.

Write Threshold Setting

Writes the threshold setting of the Sensor for the unit number specified in the instance ID to the Sensor's internal memory. The data is given as a 2-byte (4-digit) hexadecimal value, and negative data is expressed as its two's complement.

- Note**
1. The Write Threshold Setting command cannot be executed when the Zero Reset setting is enabled. Disable Zero Reset to execute the Write Threshold Setting command.
 2. The setting range of Write Threshold Setting command changes when the Write Hysteresis Width command is executed. An error will occur if the value written is outside the setting range.

Write Basic Settings

Sets the basic settings of the Sensor for the unit number specified in the instance ID. The data contents is shown in the following table.

| Bit | Contents |
|-----|--|
| 00 | Display Contents: |
| 01 | 0: Digital incident level 1: Digital percentage 2: Analog incident level |
| 02 | Display Orientation: 0: Standard 1: Reversed |
| 03 | Hold Setting: |
| 04 | 0: OFF 2: Peak 3: Bottom |

| Bit | Contents |
|-----|---|
| 05 | Flashing Setting: 0: OFF 1: ON |
| 06 | Sensing Setting: 0: Standard 2: Super long-distance 3: Super high-speed |
| 07 | |
| 08 | Timer Mode: 1: OFF-delay 2: ON-delay 3: One-shot |
| 09 | |
| 10 | Number of Display Digits: 0: 4 digits 1: 3 digits 2: 2 digits 3: 1 digit 4: 0 digits |
| 11 | |
| 12 | |
| 13 | Always 0. |
| 14 | Teaching during RUN 0: OFF 1: ON |
| 15 | Eco Mode 0: OFF 1: ON |

Write Timer Setting

Writes the timer setting for the OFF-delay, ON-delay, or one-shot timer of the Sensor for the unit number specified in the instance ID. The data is given as a 2-byte (4-digit) hexadecimal value. The value is set in ms. The setting range is 0000 Hex to 00C8 Hex, but the possible settings are restricted as follows:

| Timer setting | Setting interval |
|---------------|------------------|
| 0 to 20 ms | 1-ms increments |
| 20 to 200 ms | 5-ms increments |

An error will occur if a value is written that does not meet the above setting interval conditions.

Write Hysteresis Width

Writes the hysteresis width of the Sensor for the unit number specified in the instance ID. The data is given as a 2-byte (4-digit) hexadecimal value.

Write Custom Flags

Set whether the following settings for the Sensor of the unit number specified in the instance ID can be set or monitored from the sensor key switch.

| Bit | Contents |
|-----|--|
| 00 | Hold Setting: 0: Enable 1: Not displayed 2: Disable |
| 01 | |
| 02 | |
| 03 | Flashing Setting: 0: Enable 1: Not displayed 2: Disable |
| 04 | |

| Bit | Contents |
|-----|---|
| 04 | OFF-delay Timer Setting: 0: Enable 1: Not displayed 2: Disable |
| 05 | |
| 06 | Sensing Setting: 0: Enable 1: Not displayed 2: Disable |
| 07 | |
| 08 | Teaching: 0: Enable 1: Disable |
| 09 | Sensitivity Adjustment: 0: Enable 1: Disable |
| 10 | Zero Reset: 0: Enable 1: Disable |
| 11 | Display Contents: 0: Enable 1: Disable |
| 12 | Monitor Focus Range: 0: Enable 1: Not displayed 2: Disable |
| 13 | |
| 14 | Display Orientation: 0: Enable 1: Not displayed 2: Disable |
| 15 | |

Write Special Flags

Writes the following settings for the Sensor of the unit number specified in the instance ID. This command is possible with E3X-DA6TW and E3X-DA8TW Sensors only. Writing this command for any other sensor will cause an error.

| Bit | Contents |
|-----|--|
| 00 | Always 0. |
| 01 | Always 0. |
| 02 | Always 0. |
| 03 | Always 0. |
| 04 | Operating Mode Flag (one-word): 0: Dark-ON 1: Light-ON |
| 05 | Operating Mode Flag (two-word): 0: Dark-ON 1: Light-ON |
| 06 | Area Setting Flag: 0: Area OFF 1: Area ON |
| 07 | Always 0. |
| 08 | Always 0. |
| 09 | Always 0. |

| Bit | Contents |
|-----|-----------|
| 10 | Always 0. |
| 11 | Always 0. |
| 12 | Always 0. |
| 13 | Always 0. |
| 14 | Always 0. |
| 15 | Always 0. |

Write Number of Sensors

Writes to the Fiber Amplifier Sensor Communication Unit's internal memory the number of Sensors that are connected. An error will occur if this command is executed when pin 3 is OFF. The data is given as a 2-byte (4-digit) hexadecimal value between 0001 Hex and 0010 Hex. The default setting is 16 Sensors.

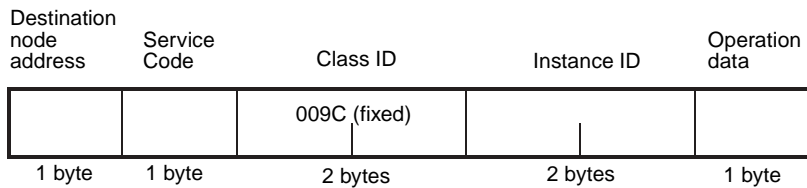
Write Number of Light Level Monitor Units

Writes to the Fiber Amplifier Sensor Communication Unit's internal memory the number of Units to be monitored for incident light levels when using two-word mode with incident light level monitoring (DIP switch pin 1 OFF and 2 ON). When pin 3 is ON, the value that was written for the number of Units to be monitored for incident light levels is enabled. The data is given as a 2-byte (4-digit) hexadecimal value between 0000 Hex and 0010 Hex. The default setting is 16 Units.

2-6-4 Operation Commands

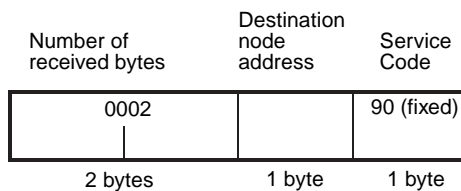
Executes teaching and other operations for the Sensors connected to the Communication Unit. When an OMRON master is used, the formats of the command and response blocks are as follows:

Command Block

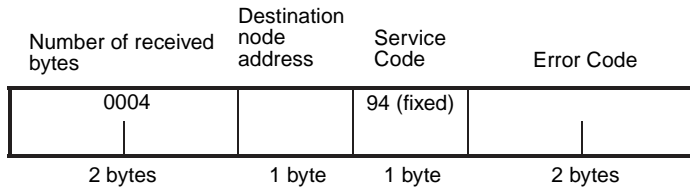


Response Block

Normal Format



Error Format



List of Operation Commands

The following table lists the explicit messages operation commands.

| Explicit message | Function | Command | | |
|----------------------------|---|--------------|-------------|------------------------|
| | | Service code | Instance ID | Operation command data |
| Adjust Maximum Sensitivity | Specifies the unit number as the instance ID, and sets the maximum sensitivity when the command is sent. | 16 | Unit number | 30 |
| Teach One Point | Specifies the unit number as the instance ID, and teaches one point when the command is sent. | 16 | Unit number | 31 |
| Teach First Point | Specifies the unit number as the instance ID, and teaches the first point of two-point teaching when the command is sent. | 16 | Unit number | 32 |
| Teach Second Point | Specifies the unit number as the instance ID, and teaches the second point of two-point teaching when the command is sent. | 16 | Unit number | 33 |
| Teach First Position | Specifies the unit number as the instance ID, and teaches the first position when the command is sent. | 16 | Unit number | 34 |
| Teach Second Position | Specifies the unit number as the instance ID, and teaches the second position when the command is sent. | 16 | Unit number | 35 |
| Start Zero Reset | Specifies the unit number as the instance ID, and starts the zero reset operation when the command is sent. | 06 | Unit number | 50 |
| Start Flashing | Specifies the unit number as the instance ID, and starts flashing when the command is sent. | 16 | Unit number | 53 |
| Disable Zero Reset | Specifies the unit number as the instance ID, and disables the zero reset operation when the command is sent. | 07 | Unit number | 60 |
| Stop Flashing | Specifies the unit number as the instance ID, and stops flashing when the command is sent. | 07 | Unit number | 63 |
| Initialize Sensor Settings | Specifies the unit number as the instance ID, and resets all the Sensor internal settings to the default settings when the command is sent. | 05 | Unit number | None |
| Reset | When the command is sent, all the connected Sensors are reset by turning the power OFF and then ON again. | 05 | 00 | None |

1. The unit number specified by the Instance ID must be set to between 0001 Hex and 0010 Hex.
2. An error will occur if the unit number of an E39-TM1 Terminal Block Unit is specified.

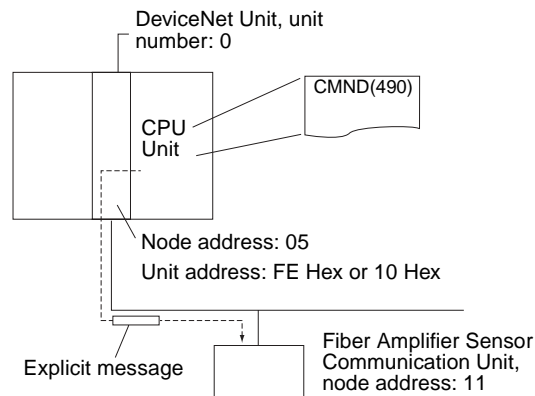
3. An error will occur when performing two-point teaching or two-position teaching if the command for the second point is sent without sending the command for the first point/position. Send the command for the first point/position before sending the command for the second one.
4. The Initialize Sensor Settings command will return the settings for each Sensor to its default value. The Sensor Reset command interrupts the power by turning the Sensor power OFF and ON again.

2-6-5 List of Error Codes

| Response codes | Error name | Cause |
|----------------|-------------------------|---|
| 08FF | Service not supported | There is an error in the service code. |
| 09FF | Invalid attribute value | The specified attribute ID is not supported. The write data is outside the data range. <ul style="list-style-type: none"> • Threshold setting is outside setting range. • Basic settings are outside setting range. • Timer is not set according to restrictions. • Hysteresis width is set outside range. • Custom Flags are set outside range. • Special Flags are set outside range. • Number of Sensors connected is not set between 1 and 16. • Number of Units monitoring incident light are not set between 1 and 16. |
| 16FF | Object does not exist | The specified instance ID is not supported. <ul style="list-style-type: none"> • Number of Units specified in instance ID is greater than number of Sensors connected. |
| 15FF | Too much data | Size of data is longer than specified size. |
| 13FF | Not enough data | Size of data is shorter than specified size. |
| 0CFF | Object state conflict | Specified command cannot be executed. <ul style="list-style-type: none"> • Mobile Console is connected. • Error has occurred in communications with Sensor. • Sensor is not set to RUN mode. • The command for the second point/position of a Two-point Teaching or Two-position Teaching commands was executed without executing the command for the first one. • An unsupported command was sent. (For example, a Read Incident Light Level command was sent to a Terminal Block Unit.) |
| 20FF | Invalid parameter | The specified operation data is not supported. |
| 0EFF | Attribute not settable | A write service code was specified for a read-only attribute ID. |

2-6-6 Using Explicit Messages: Example

The following example is for sending explicit messages using a CS1W-DRM21 DeviceNet Unit.



Operation

- The threshold of the Sensor for unit number 1 connected to the Fiber Amplifier Sensor Communication Unit is written.
- The EXPLICIT MESSAGE SEND (2801) command is used to read data.
- The command data is written starting at D01000 in the CPU Unit, and the response data is stored starting at D02000.
- When a command is not executed properly, the end code is stored in D00006, and the command is resent.

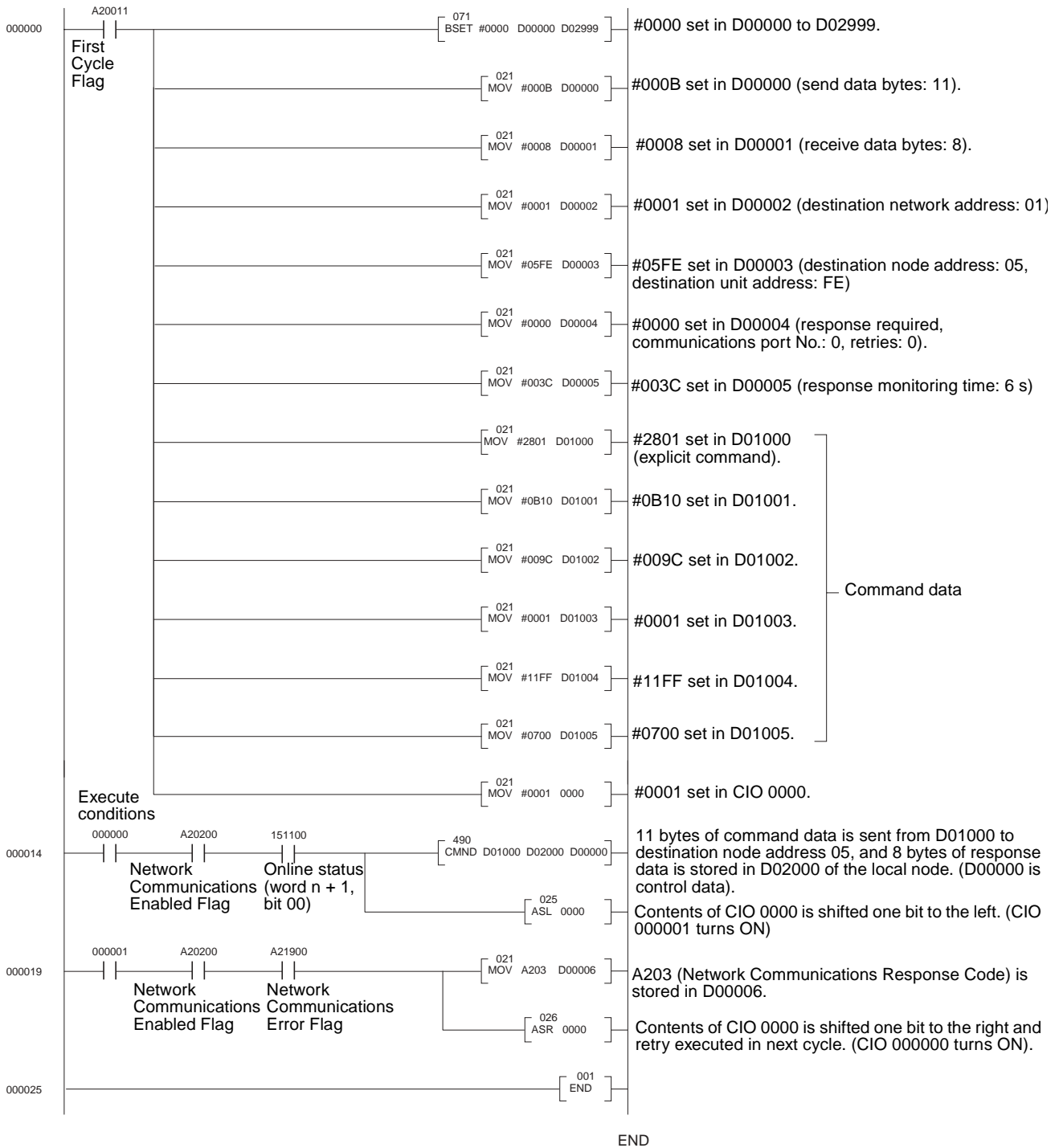
Command Details

| [CMND | S | D | C] |
|--------------|----------------------------------|---|----|
| S D01000+ 0: | 2801 Hex | Command code | |
| + 1: | 0B10 Hex | Fiber Amplifier Sensor Communication Unit, node address: 11, Service code: 10 Hex | |
| + 2: | 009C Hex | Class ID: 009C Hex | |
| + 3: | 0001 Hex | Instance ID: 0001 Hex | |
| + 4: | 11FF Hex | Attribute ID: 11 Hex and write data in rightmost byte: FF Hex | |
| + 5: | 0700 Hex | Write data in leftmost byte: 07 Hex | |
| D D02000: | First word where response stored | | |
| C D00000+ 0: | 000B Hex | Number of command data bytes | |
| + 1: | 0008 Hex | Number of response data bytes | |
| + 2: | 0001 Hex | Destination network address: 1 | |
| + 3: | 05FE Hex | Destination node address: 5 Destination unit address: FE Hex (or 10 Hex) | |
| + 4: | 0000 Hex | Response request, communications port No.: 0, retries: 0 Hex | |
| + 5: | 003C Hex | Response monitoring time: 6 s | |

Response

| | | |
|---------------|----------|--|
| D D02000 + 0: | 2801 Hex | |
| + 1: | 0000 Hex | |
| + 2: | 0002 Hex | |
| + 3: | 0B90 Hex | Response source node address: 11 (0B Hex) Normal completion: 90 Hex |

Ladder Program Example



2-7 Setting, Monitoring, and Operating Sensors from the DeviceNet Configurator

2-7-1 Overview

The DeviceNet Configurator (Ver. 2.10 or higher) can be used to edit and monitor device parameters to support the following setting, monitoring, and operating functions.

Setting and Downloading from the Communication Unit

- Setting the number of Sensors connected.
- Setting the number of Units monitoring incident light levels.

The above settings, however, are enabled only when pin 3 of the Communication Unit DIP switch is ON.

Setting and Downloading Sensor Settings

- Threshold settings
- Basic settings
- Timer setting
- Hysteresis width
- Custom Flags
- Special Flags (E3X-DA6TW and E3X-DA8TW)

Monitoring the Communication Unit

- Sensor ON/OFF data
- The following status:
 - Normal communications with E3X
 - Communications errors with E3X
 - Number of Sensors that can communicate
 - Switching method for setting number of Sensors connected
 - Number of Sensors connected

Sensor Operations

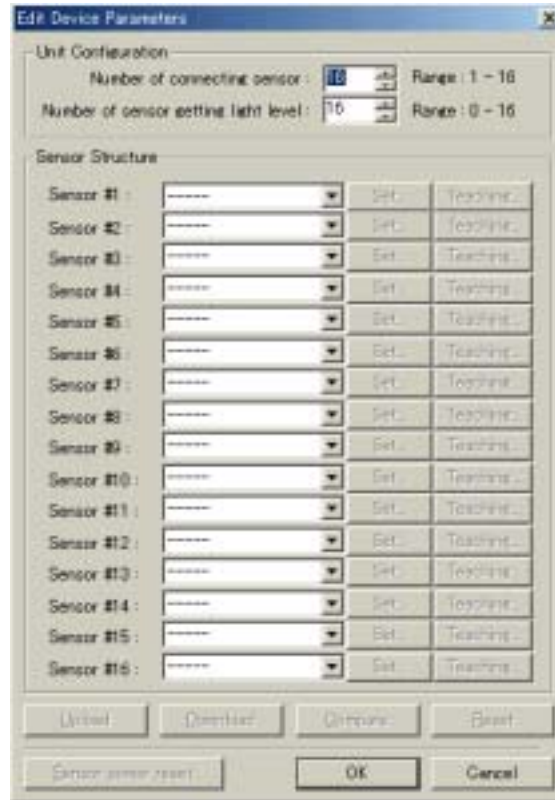
- Adjusting the maximum sensitive
- Teaching one point
- Teaching the first point for two-point teaching
- Teaching the second point for two-point teaching
- Teaching the first position for two-position teaching
- Teaching the second position for two-position teaching
- Starting a zero reset
- Disable zero reset
- Start flashing
- Stop flashing
- Initializing Sensor settings
- Reset

Note If the number of Sensors connected to the Communication Unit does not match the number of Sensors that are enabled to communicate, the response time is substantially delayed when the Configurator is put online and information uploaded from the Communication Unit.

2-7-2 Setting the Communication Unit and Sensors, and Downloading

Use the following procedure to set the Communication Unit and each Sensor.

- 1,2,3... 1. Select and double-click the applicable Communication Unit to display the following Edit Device Parameters Dialog Box.



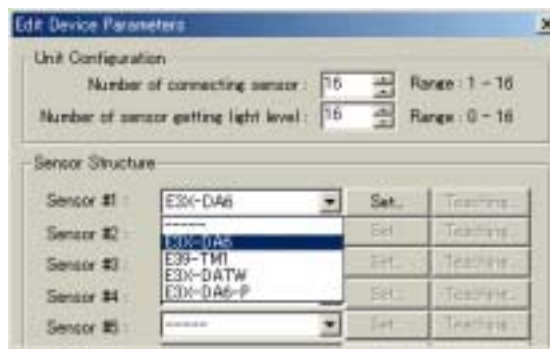
2. Edit the parameters.

Communication Unit Settings

Under *Unit Settings*, set the number of Sensors connected in the *Number of Sensors* Field and the number of Units monitoring incident light in the *Incident Light Monitoring Units* Field.

Sensor Settings

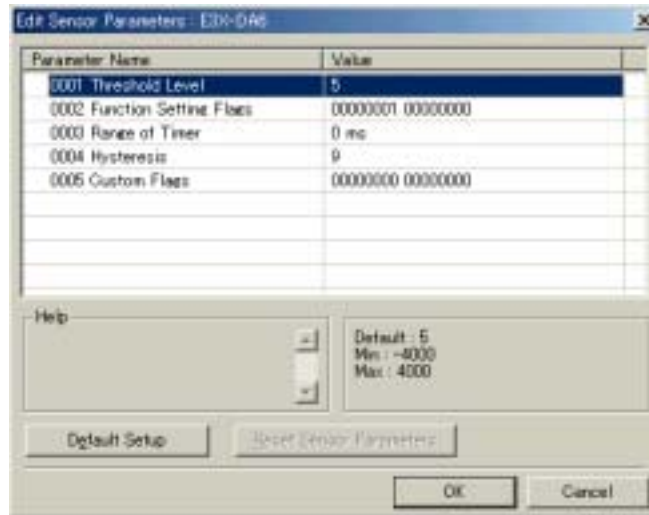
- a) Under *Sensor Structure*, select the field to the right of the relevant Sensor number (Sensor #□, where the box is the unit number), click the down arrow, and select the Fiber Amplifier Unit model number from the pull-down menu.



Note Select **E3X-DA6** for the E3X-DA8, E3X-DAB6, E3X-DAB8, E3X-DAG6, and E3X-DAG8. Select **E3X-DATW** for the E3X-DA6TW and E3X-DA8TW.

b) Click the **Settings** Button to the right of the registered Fiber Amplifier Unit to display the following Edit Sensor Parameters Dialog Box.

Note There are no settings for E39-TM1 Terminal Block Units, so the Settings Button is disabled.



c) Set the following items from the Edit Sensor Parameters Dialog Box. (The items displayed will vary according to the Fiber Amplifier Unit model used.)

- Threshold Level: Threshold Settings
- Function Setting Flags: Basic Settings
- Range of Time: Timer Setting
- Monitor Output Upper Limit
- Monitor Output Lower Limit
- Hysteresis: Hysteresis Width
- Custom Flags
- Special Flags

For Basic Settings (Function Setting Flags), double-click the **Function Setting Flags** Field to display the following dialog box. Set the basic settings, such as Eco Mode (see note below), for each Sensor.



Note “Eco Mode” is a power-saving mode and stands for “ecologically friendly” mode.

For Custom Flags, double-click the **Custom Flags** Field to display the following dialog box. Set the Sensor Custom Flags such as the Hold Setting (Hold function).



The screenshot shows a dialog box with the following settings:

- Hold function: Enable, Mode non-display, Disable
- Flashing function: Enable, Mode non-display, Disable
- Off delay timer function: Enable, Mode non-display, Disable
- Detection function: Enable, Mode non-display, Disable
- Teaching: Enable, Disable
- Sensitivity adjustment mode: Enable, Disable
- Zero reset: Enable, Disable
- Switching the display type: Enable, Disable
- Monitor focus range setting: Enable, Mode non-display, Disable
- Display direction setting: Enable, Mode non-display, Disable

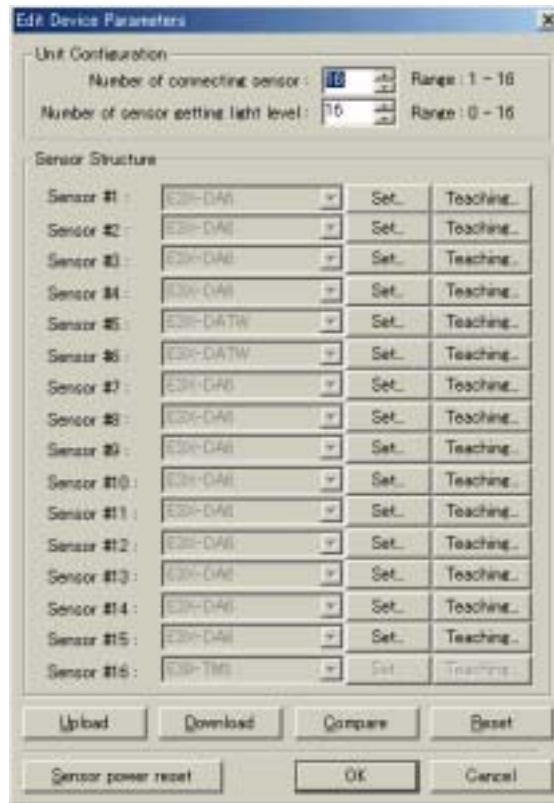
3. After completing all settings, return to the Edit Device Parameters Dialog Box.
4. Switch the Configurator to online mode by selecting **Network** and **Connection**.
5. Click the **Download** Button in the Edit Device Parameters Dialog Box.

2-7-3 Uploading to Communication Unit and Monitoring/Setting Parameters Online

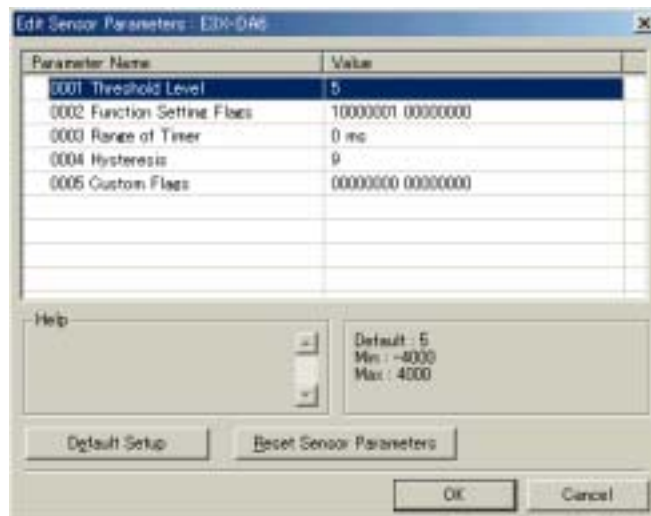
Use the following procedure to monitor the Communication Unit.

Communication Unit Monitoring

- 1,2,3... 1. Switch the Configurator to online mode by selecting **Network** and **Connection**.
2. Select **Network** and **Upload** to upload the network configuration.
3. Select and double-click the applicable Communication Unit.



4. Click the **Settings** Button to the right of the Fiber Amplifier Unit model to monitor the current settings.



5. Change the settings and then click the **Download** Button in the Edit Device Parameters Dialog Box.

2-7-4 Sensor Operations

- 1,2,3...
1. Switch the Configurator to online mode by selecting **Network** and **Connection**.
 2. Select and double-click the Communication Unit.
 3. From the Edit Device Parameters Dialog Box, click the **Teaching** Button to the right of the Fiber Amplifier Unit model.

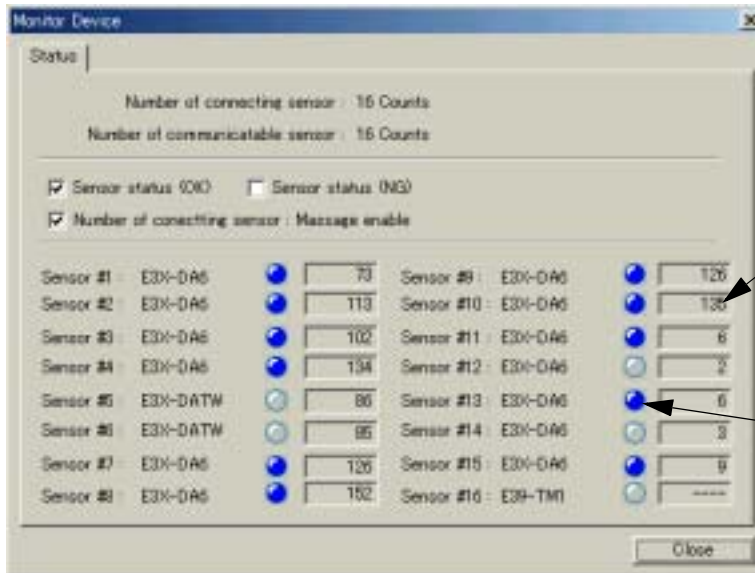


4. Set the following items from in the Sensor Teaching Dialog Box.
 - One-point Teaching
 - Maximum Sensitivity Adjustment
 - Zero Reset
 - Two-point Teaching
 - Pin-point Teaching
 - Flashing

2-7-5 Online Monitoring

Use the following procedure to monitor the Communication Unit.

- 1,2,3...
1. Switch the Configurator to online mode by selecting **Network** and **Connection**.
 2. Select the applicable Communication Unit, click the right mouse button, and select **Monitor**.
 3. Monitor the Units from the following screen.



Monitor incident light levels for each Sensor

Monitor ON/OFF statuses. Blue indicates ON status, and gray indicates OFF status.

SECTION 3

E3X-SRT21 for CompoBus/S Communications

This section provides details on the Fiber Amplifier Sensor Communication Unit for CompoBus/S communications, including procedures and application examples for CompoBus/S remote I/O communications used by the Unit, part names and functions, operation procedures, and wiring.

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3-1 Overview of CompoBus/S Communications Model

3-1-1 Introduction

The E3X-SRT21 for CompoBus/S communications is a Communication Unit that uses the CompoBus/S to monitor the ON/OFF output signals of one or more Fiber Optical Sensors through Fiber Amplifier Units. Remote I/O communications can be used to monitor ON/OFF output signals without any special programming.

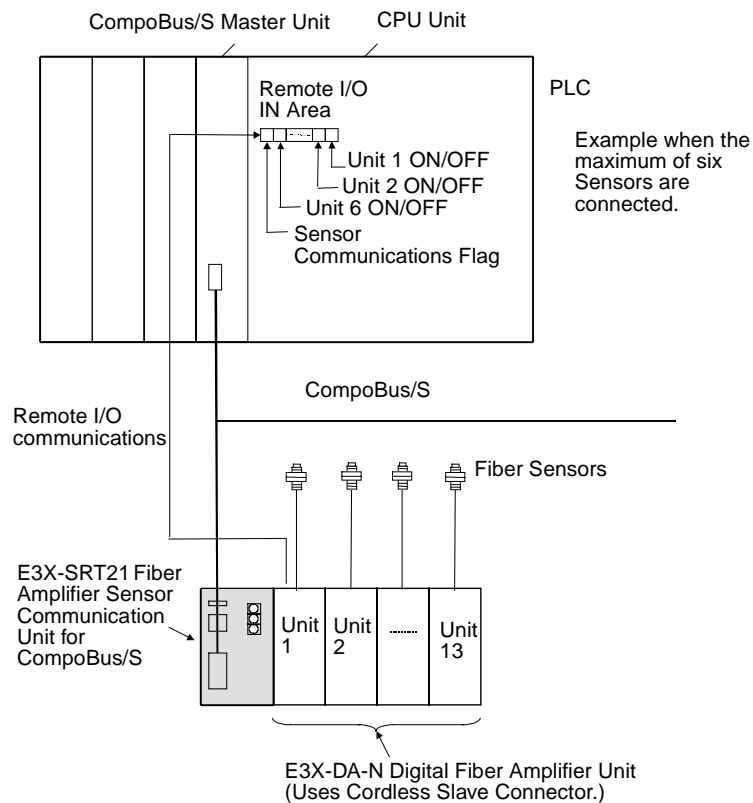
Note When using CompoBus/S Communication Units, do not read ON/OFF signals via the Fiber Amplifier Unit cable. (Fiber Amplifier Units can be connected to Cordless Slave Connectors only. They cannot be connected to Slave Connectors with Cords.)

Refer to the following manual when using the CompoBus/S Communication Unit:

CompoBus/S Operation Manual (W266).

3-1-2 CompoBus/S Communications Overview

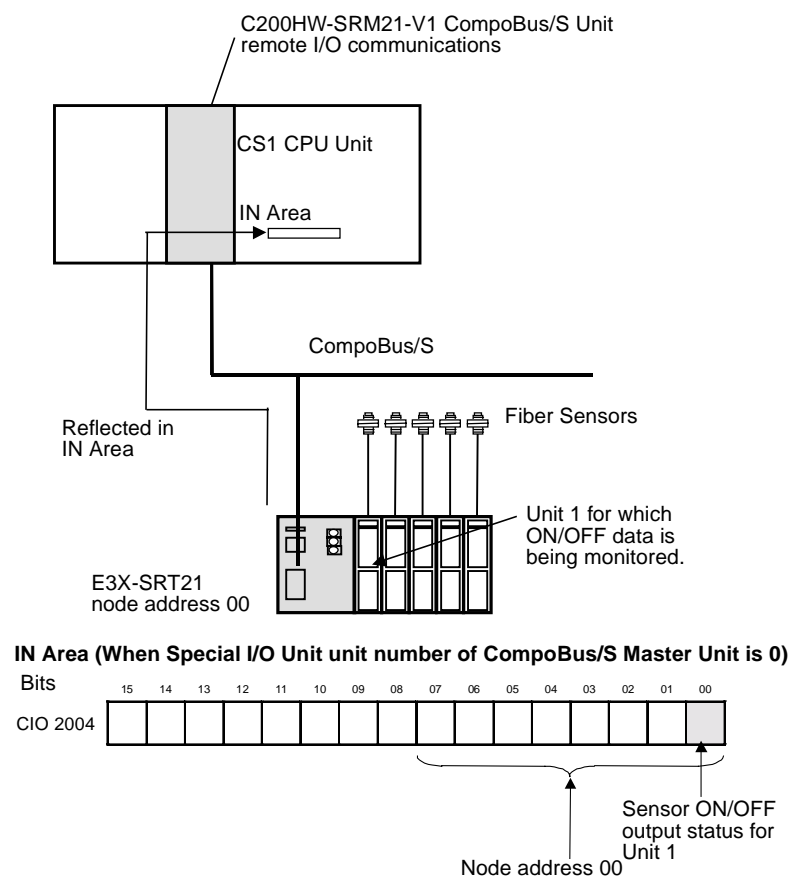
Words in the IN Area of the master can be allocated to the E3X-SRT21 Communication Unit for storage of the ON/OFF data and status data of the Sensors for CompoBus/S remote I/O communications.



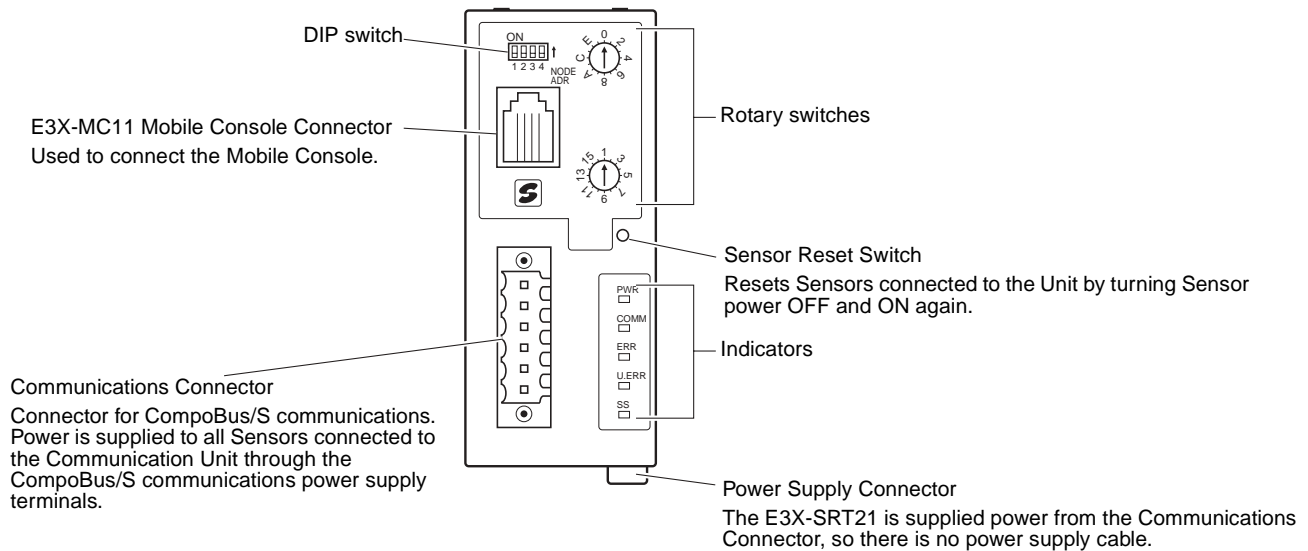
| Communications method | Communications mode | | Allocated words | Communications data | Number of Sensors |
|---|---------------------|------------------------------|----------------------|---|-------------------|
| Remote I/O communications (functions as CompoBus/S slave) | Up to 6 Sensors | High-speed communications | One node in IN Area | Sends following data to master: ON/OFF output signals for up to 6 Sensors | 6 max. |
| | | Long-distance communications | | | |
| | Up to 14 Sensors | High-speed communications | Two nodes in IN Area | Sends following data to master: ON/OFF output signals for up to 14 Sensors | 14 max. |
| | | Long-distance communications | | | |

3-1-3 Using CompoBus/S Remote I/O Communications: Example

The following example is for monitoring the ON/OFF output status of Fiber Amplifier Unit number 1, with DIP switch pin 1 OFF, E3X-SRT21 CompoBus/S node address 00, and CompoBus/S Master Unit Special I/O Unit number 0. The IN Area starts at CIO 2000 and runs through the rightmost byte (bits 00 to 07) of CIO 2004 (word n + 4) in the IN Area. The eight bits of the Communication Unit slave 00 are allocated bits 00 to 07 of CIO 2004.



3-2 CompoBus/S Communication Unit Part Names and Functions



- Note**
- Do not turn ON the power to the Communication Unit when the Mobile Console is connected. Communications will not be established with the Sensors if the Mobile Console is already connected when the Unit power is turned ON.
 - Always set the Sensors to RUN mode when using the Fiber Amplifier Sensor Communication Unit for CompoBus/S.
 - A Sensor communications error will occur under the following conditions after the Mobile Console is connected with its power turned ON.
 - When the power to the Mobile Console is turned OFF.
 - When the Mobile Console is left idle while connected, causing the power to automatically turn OFF.
 - When the Mobile Console battery goes low, causing the power to turn OFF.

Do not allow the above conditions to occur when using the Mobile Console, or use the Mobile Console when problems will not occur even if a Sensor communications error occurs.

Indicators

The following table shows the operation of the indicators

| Indicator | Name | Color | Display | Meaning |
|-----------|-----------------------|--------|---------|--|
| PWR | Power | Green | Lit | Communications power supply is ON. |
| | | | Not lit | Communications power supply is OFF. |
| COMM | Communi-cating | Yellow | Lit | CompoBus/S communications are normal. |
| | | | Not lit | A CompoBus/S communications error has occurred or communications are on standby. |
| ERR | Communi-cations error | Red | Lit | A CompoBus/S communications error has occurred. |
| | | | Not lit | CompoBus/S communications are normal or communications are on standby. |

| Indicator | Name | Color | Display | Meaning |
|-----------|------------------------------|-------|---------|---|
| U.ERR | Unit error | Red | Lit | An error has occurred in the Unit. |
| | | | Not lit | The Unit is communicating normally or on standby. |
| SS | Sensor communications status | Green | Lit | The Sensors are communicating. |
| | | Red | Lit | A Sensor communications error has occurred. |
| | | --- | Not lit | Sensor communications are on standby or power is OFF. |

Normal Status of Indicators

| | |
|-------|---|
| PWR | Communications power supply is ON when the PWR indicator is lit green. |
| COMM | CompoBus/S communications are normal when the COMM indicator is lit yellow. |
| ERR | Operation is normal when the ERR indicator is not lit (no CompoBus/S communications error). |
| U.ERR | Operation is normal when the U.ERR indicator is not lit (no Unit error). |
| SS | Sensors are communicating when the SS indicator is lit green. |

Switches

Rotary Switches



CompoBus/S Node Address Setting



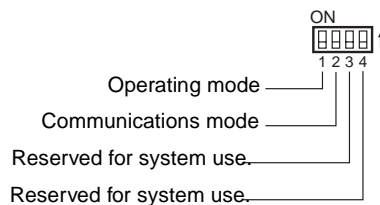
Connected Number of Sensors Setting

Registers the number of Sensors connected. By setting the number of Sensors, errors can be detected in the network configuration.

The maximum number of Fiber Amplifier Units that can be connected is 14, so an error will occur if the number of Sensors is set to 15 or 16.

Note Fiber Amplifier Units (E3X-DA6TW and E3X-DA8TW) that are allocated two unit numbers must be counted as two Units when counting the number of connected Sensors.

DIP Switch



Pin 1: Operating Mode

This pin sets the operating mode. The maximum number of Fiber Amplifier Units that can be connected and the number of allocated nodes depends on the operating mode, as shown in the following table.

| Pin 1 (MODE) | Number of Fiber Amplifier Units | Allocated nodes |
|--------------|---------------------------------|----------------------|
| OFF | 6 max. | One node in IN Area |
| ON | 14 max. | Two nodes in IN Area |

Note Fiber Amplifier Units (E3X-DA6TW and E3X-DA8TW) that are allocated two unit numbers must be counted as two Units when counting the number of connected Sensors.

Pin 2: Communications Mode

This pin selects the CompoBus/S communications mode.

| Pin 2 (DR) | Communications mode |
|------------|---------------------|
| OFF | High-speed mode |
| ON | Long-distance mode |

Reserved for System Use (Pins 3 and 4)

These pins must always be OFF.

Sensor Reset Switch

Press this switch to reset the connected Sensors by executing power interruption processing. This switch is used in the following case.

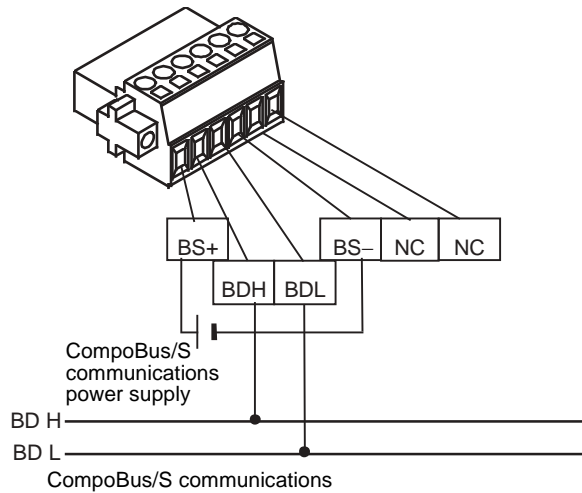
If the number of Sensors with communications enabled does not match the number of Sensors connected, one or more Sensors may have become disconnected. The power reset switch is required to enable the Sensors to be reconnected properly and for communications to be reestablished between Sensors. Turning OFF the power supply would disconnect the Fiber Amplifier Sensor Communication Unit from CompoBus/S, which may effect the entire system. The Sensor reset switch is thus used to reestablish communications with the Sensors.

3-3 Operating Procedure for CompoBus/S Communication Unit

| Step | Item | Details | | |
|------|--|---|---|------------------------|
| 1 | Mount the Communication Unit to the DIN Track. | Mount the Unit to the DIN Track. After mounting the Fiber Amplifier Units to the DIN Track, connect the Units to each other. Note: To remove the Units from the DIN Track, first slide the Units apart to disconnect them, and then remove the Units from the DIN Track. | | |
| 2 | Connect the Fiber Amplifier Units to the Communication Unit. | Connect the Communication Unit to the Fiber Amplifier Units by sliding the Communication Unit until the clips on the end are aligned and a "click" sound is heard. | | |
| 3 | Set the Sensors to RUN mode | Set the mode switches to RUN mode. | | |
| 4 | Connect the CompoBus/S communications connector. | The DC power supply to the Communication Unit and all Fiber Amplifier Units connected to it is supplied from the CompoBus/S communications power supply (BS+, BS-). | | |
| 5 | Set the rotary switches. | Upper switch | Sets the CompoBus/S node address (0 to F). | |
| | | Lower switch | Sets the number of Sensors connected to the Unit (1 to 14). | |
| 6 | Set the DIP switch | Pin 1 | Maximum number of Sensors connected | Allocated node address |
| | | OFF | 6 | One node in IN Area |
| | | ON | 14 | Two nodes in IN Area |
| | | Pin 2 | CompoBus/S communications mode | |
| | | OFF | High-speed mode | |
| | | ON | Long-distance mode | |
| 7 | Turn ON the DC power supply (BS+, BS- CompoBus/S communications power supply). | Disconnect the E3X-MC11 Mobile Console before turning ON the DC power supply. | | |
| 8 | Check the indicators. | PWR | Communications power supply is ON when the PWR indicator is lit green. | |
| | | COMM | CompoBus/S communications are normal when the COMM indicator is lit yellow. | |
| | | ERR | Operation is normal when the ERR indicator is not lit (no CompoBus/S communications error). | |
| | | U.ERR | Operation is normal when the U.ERR indicator is not lit (no Unit error). | |
| | | SS | Sensors are communicating when the SS indicator is lit green. | |
| 9 | Start communications | Remote I/O communications | Change the PLC to RUN mode. | |

3-4 Wiring the CompoBus/S Communication Unit

3-4-1 Wiring



Note The CompoBus/S communications power supply provides power to the Communication Unit and all the Sensors connected to it. Select a power supply for the Communication Unit so that it has sufficient capacity for the current consumption of the Sensors.

The Unit can be supplied power from the CompoBus/S Network. Power is supplied from a special Flat Cable. Be sure to confirm that the power supply capacity of the Flat Cable is not exceeded.

The following crimp terminals are recommended (from Weidmuller).

Sleeve (part No.: 046290)

Two-wire insertion type (part No.: 901851)



The following tool is recommended.

Manufacturer: Weidmuller

PZ1.5 Crimper (Part No. 900599)

Contact: Weidmuller Inc., Nihon Weidmuller Co.Ltd., phone: 03-5820-5748

The tightening torque is 0.2 to 0.4 N·m.

3-5 CompoBus/S Remote I/O Communications

3-5-1 Master Word Allocations

The E3X-SRT21 data is stored in the IN Slave Area of the CompoBus/S master. Select the data by setting pin 1 of the DIP switch as shown in the following table.

| Pin 1 | Maximum number of Sensors Connected | Number of allocated nodes |
|-------|-------------------------------------|---------------------------|
| OFF | 6 | One node in IN Area |
| ON | 14 | Two nodes in IN Area |

Note Fiber Amplifier Units (E3X-DA6TW and E3X-DA8TW) that are allocated two unit numbers must be counted as two Units when counting the number of connected Sensors.

Pin 1 OFF (Six Sensors Max.)

Up to six Sensors can be connected in this mode. The Sensors are allocated 8 bits of data as the IN Area, which functions as the area for the designated node address as follows:

| Bit | Contents |
|-----|----------------------------------|
| 00 | Unit 1 ON/OFF data |
| 01 | Unit 2 ON/OFF data |
| 02 | Unit 3 ON/OFF data |
| 03 | Unit 4 ON/OFF data |
| 04 | Unit 5 ON/OFF data |
| 05 | Unit 6 ON/OFF data |
| 06 | Sensor Communications Error Flag |
| 07 | Sensor Communications Flag |

Sensor Communications Error Flag

Bit 06 turns ON when the number of Sensors registered as connected does not match the number of Sensors able to communicate, or when a communications error occurs after communications have been established with the Sensors.

Sensor Communications Flag

Bit 07 turns ON when communications are established with the Sensors.

Pin 1 ON (14 Sensors Max.)

Up to 14 Sensors can be connected in this mode. The Sensors are allocated 16 bits of data as the IN Area, as follows:

| Node address setting | Node address used |
|----------------------|--|
| Odd number | From the designated node address -1 to the set node address |
| Even number | From the designated node address to the designated node address +1 |

| Node address: Odd number | Node address: Even number | Bit | Contents |
|-----------------------------|------------------------------|-----|----------------------------------|
| Node address - 1 | Node address | 00 | Unit 1 ON/OFF data |
| | | 01 | Unit 2 ON/OFF data |
| | | 02 | Unit 3 ON/OFF data |
| | | 03 | Unit 4 ON/OFF data |
| | | 04 | Unit 5 ON/OFF data |
| | | 05 | Unit 6 ON/OFF data |
| | | 06 | Unit 7 ON/OFF data |
| | | 07 | Unit 8 ON/OFF data |
| Node address | Node address +1 | 00 | Unit 9 ON/OFF data |
| | | 01 | Unit 10 ON/OFF data |
| | | 02 | Unit 11 ON/OFF data |
| | | 03 | Unit 12 ON/OFF data |
| | | 04 | Unit 13 ON/OFF data |
| | | 05 | Unit 14 ON/OFF data |
| | | 06 | Sensor Communications Error Flag |
| | | 07 | Sensor Communications Flag |

Note If DIP switch pin 1 is ON (up to 14 Sensors connected), the same internal processing is performed as for an Analog Terminal. Therefore, calculate the I/O response time as for the Analog Terminal. (Calculate the I/O response time as a normal Terminal when pin 1 is OFF.)

When DIP switch pin 1 is ON and the following masters are connected, the Sensor Communications Error Flag and Sensor Communications Flag are not synchronized with the ON/OFF data for Units 1 to 8.

- C200HW-SRM21 (pre-version 1) and CQM1-SRM21 (pre-version 1) Master Control Units.
- SRM1-C0□ (pre-version 1) and SRM1-C0□-V1 Programmable Controllers
- 3G8B3-SRM0□ VME Board
- C200PC-ISA□2-SRM SYSMAC Board
- SDD-CS1 Uniwire Send Unit (Manufactured by NKE Ltd.)

When a communications error occurs, for example, the data for Units 1 to 8 may be set to 0 before the Sensor Communications Error Flag has been turned ON. If this is a problem, do not use the Unit with pin 1 set to ON (up to 14 Sensors connected).

SECTION 4

E3X-CIF11 for RS-422 Communications

This section provides details on the Fiber Amplifier Sensor Communication Unit for RS-422 communications, including information on the models, procedures, settings, and application examples of CompoWay/F message communications used by the Unit, part names and functions, operation procedures, and wiring.

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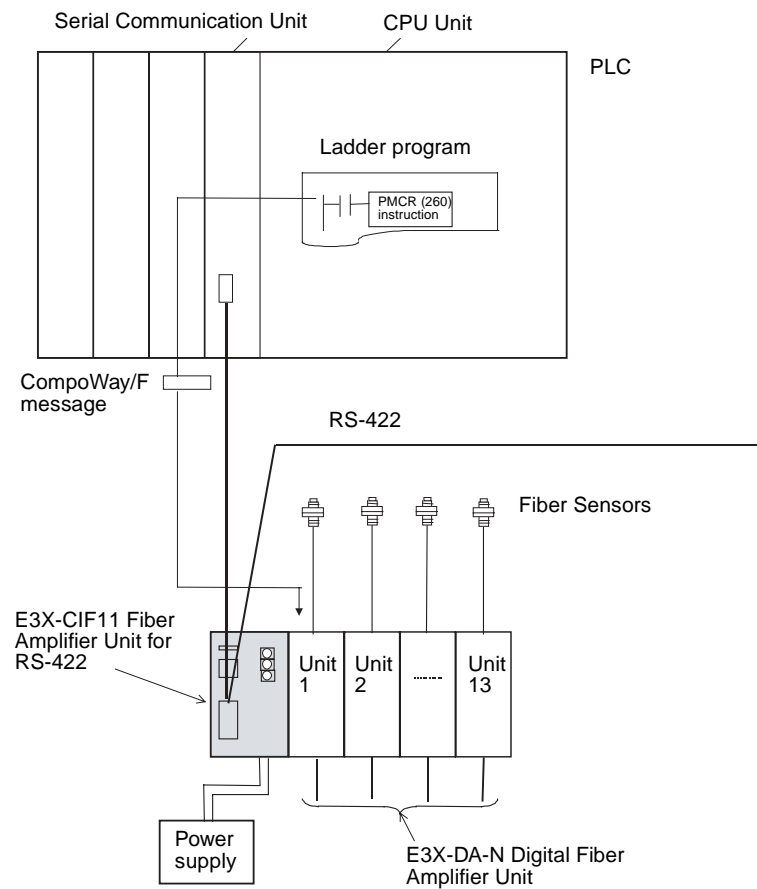
4-1 Overview of RS-422 Communication Unit

4-1-1 Introduction

The E3X-CIF11 for RS-422 communications is a Communication Unit that uses RS-422 to communicate with one or more Fiber Optical Sensors through Fiber Amplifier Units, including monitoring incident light levels, writing parameters, and controlling operation. Using CompoWay/F messages allows reading and writing parameters.

4-1-2 RS-422 Communications Overview

Sending CompoWay/F commands from the CompoWay/F master to the Communication Unit, which functions as a CompoWay/F slave, allows reading and writing of parameters for the connected Sensors using CompoWay/F message communications.



The following types of CompoWay/F messages communications are supported.

| Operation | Communications details | Number of Sensors | Conditions |
|--|---|-------------------|--|
| Reading from variable area, parameter area, and other data | Reads parameters, such as status data, incident light levels, and thresholds. | 16 max. | Not possible when Mobile Console is connected. |
| Writing to parameter area | Writes (sets) parameters, such as the maximum sensitivity and thresholds. | | |
| Operation commands | Perform operations such as teaching and fine-tuning | | |

Note The following table lists the CompoWay/F commands that can be sent to the Communication Unit.

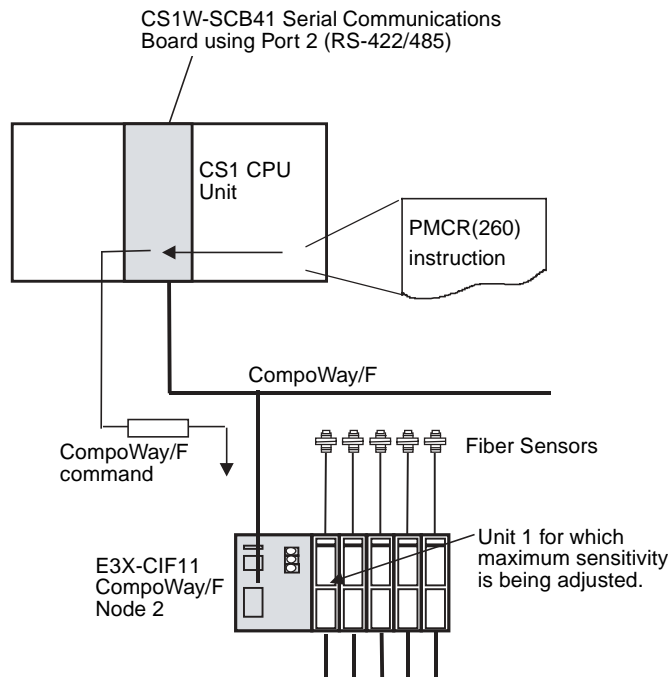
| Command | Details |
|--------------------------|---|
| Read from Variable Area | Executes Read Status Data, Read Incident Light Level, Read ON Incident Light Level, and Read OFF Incident Light Level. |
| Read from Parameter Area | Executes Read Number of Sensors Connected, Read Threshold Setting, Read Basic Settings, Read Timer Setting, Read Hysteresis Width, Read Custom Flags, and Read Special Flags. |
| Write to Parameter Area | Executes Write Number of Sensors Connected, Write Threshold Setting, Write Basic Settings, Write Timer Setting, Write Hysteresis Width, Write Custom Flags, and Write Special Flags. |
| Read Model Attributes | Reads Communication Unit model information. |
| Read Controller Status | Reads the operating status and the number of Sensors that can communicate. |
| Echoback Test | Executes Echoback Test. |
| Operation commands | Executes Adjust Maximum Sensitivity, Teach One Point, Teach First Point, Teach Second Point, Teach First Position, Teach Second Position, Start Zero Reset, Disable Zero Reset, Start Flashing, Stop Flashing, Initialize Sensor Settings, and Reset. |

Note When using a PLC as the master to send CompoWay/F message communications, CompoWay/F commands are executed from the Serial Communications Board or Unit using the following standard system protocol macros.

| Sequence No. | Communications sequence name | Summary |
|--------------|--|---|
| 600 | Send/receive with ASCII conversion (with response) | Converts the data following the specified command codes (MRC, SRC) into ASCII and sends it to the specified Unit. The response is converted into hexadecimal and stored in the specified words. |
| 601 | Broadcast with ASCII conversion (with no response) | Executes sequence number 600 as a broadcast without waiting for a response. |

4-1-3 Using RS-422 Communication Unit: Example

The following example is for executing Adjust Maximum Sensitivity for unit number 1.



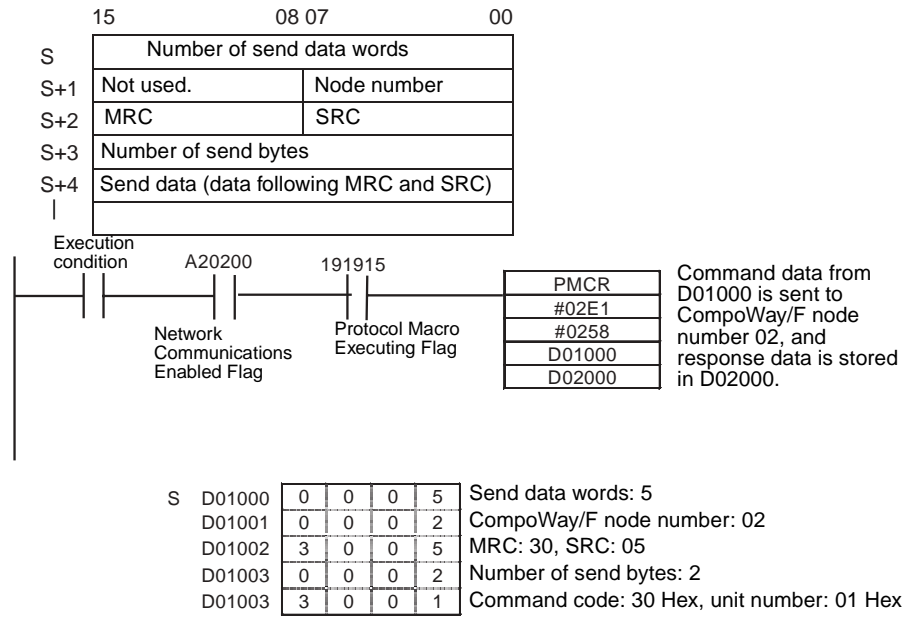
Adjust Maximum Sensitivity Command Block

The following CompoWay/F command block is executed.

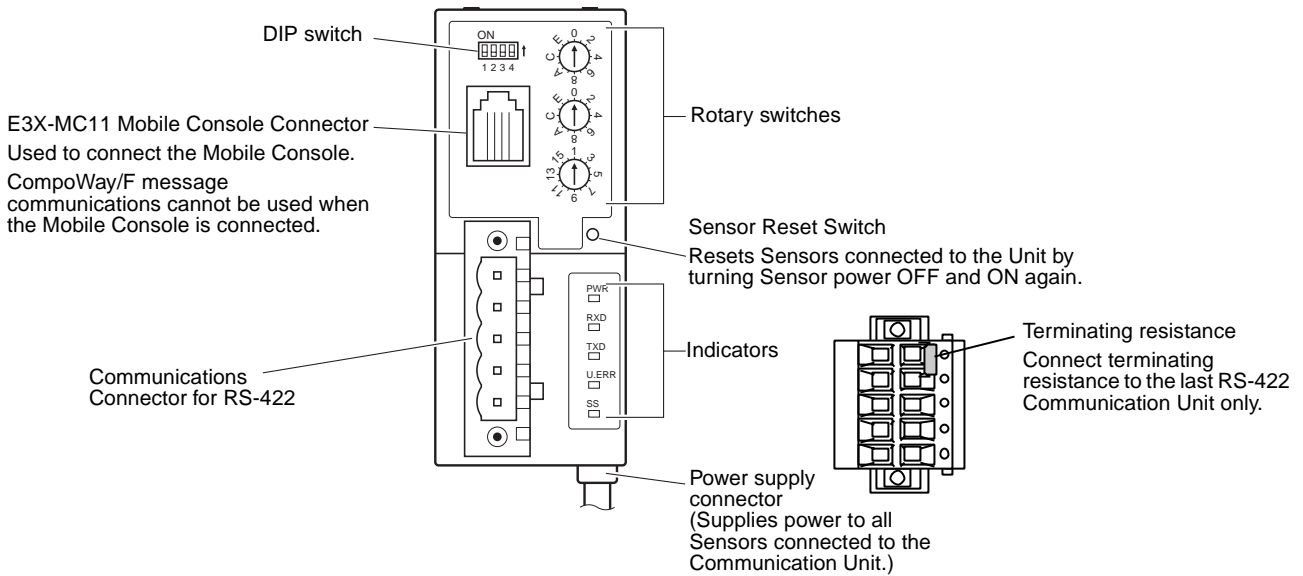
| STX | Compo-Way/F node No. | Sub-address | SID | MRC | SRC | Com-mand code | Related informa-tion |
|--------|----------------------|-------------|-----|------|------|---------------|----------------------|
| 02 Hex | "02" | "00" | "0" | "30" | "05" | "30" | Unit No. |

Note When using the PMCR(260) instruction to send messages, the data from the command block shown in bold is stored in word S onwards in the order shown in the following diagram.

Example: Sending communications sequence 600 (with ASCII conversion)



4-2 RS-422 Communication Unit Part Names and Functions



- Note**
- Do not turn ON the power to the Communication Unit when the Mobile Console is connected. Communications will not be established with the Sensors if the Mobile Console is already connected when the Unit power is turned ON.
 - Always set the Sensors to RUN mode when using the Fiber Amplifier Sensor Communication Unit for RS-422. When other modes (SET or ADJ) are set, the Fiber Amplifier Sensor Communication Unit cannot read or write Sensor data.
 - A Sensor communications error will occur under the following conditions after the Mobile Console is connected with its power turned ON.
 - When the power to the Mobile Console is turned OFF.
 - When the Mobile Console is left idle while connected, causing the power to automatically turn OFF.
 - When the Mobile Console battery goes low, causing the power to turn OFF.

Do not allow the above conditions to occur when using the Mobile Console, or use the Mobile Console when problems will not occur even if a Sensor communications error occurs.

Indicators

The following table shows the operation of the indicators.

| Indicator | Name | Color | Display | Meaning |
|-----------|------------------------------------|--------|---------|---|
| PWR | Power | Green | Lit | Power supply is ON. |
| | | | Not lit | Power supply is OFF. |
| RXD | Receiving serial communications | Yellow | Lit | Receiving serial communications. |
| | | | Not lit | Not receiving serial communications. |
| TXD | Transmitting serial communications | Yellow | Lit | Transmitting serial communications. |
| | | | Not lit | Not transmitting serial communications. |

| Indicator | Name | Color | Display | Meaning |
|-----------|------------------------------|-------|---------|--|
| U.ERR | Unit error | Red | Lit | An error has occurred in the Unit. |
| | | | Not lit | The Unit is communicating normally or is on standby. |
| SS | Sensor communications status | Green | Lit | The Sensors are communicating. |
| | | Red | Lit | A Sensor communications error has occurred. |
| | | --- | Not lit | Waiting for Sensor communications or power is OFF. |

Normal Status of Indicators

| | |
|-------|--|
| PWR | Communications power supply is ON when the PWR indicator is lit green. |
| RXD | Receiving serial communications when the RXD indicator is lit yellow. |
| TXD | Transmitting serial communications when the TXD indicator is lit yellow. |
| U.ERR | Operating normally when the U.ERR indicator is not lit (no Unit error). |
| SS | Sensors communicating when the SS indicator is lit green. |

Switches

Rotary Switches



CompoWay/F Node Number Setting

Sets the CompoWay/F node number. Set in combination with DIP switch pin 4.



CompoWay/F Communications Mode Setting

Sets the CompoWay/F communications mode.



Connected number of Sensors Setting

Registers the number of Sensors connected. By setting the number of Sensors, errors can be detected in the network configuration.

This switch is disabled when DIP switch pin 3 is ON. The value set using CompoWay/F message communications is enabled instead.

Note Fiber Amplifier Units (E3X-DA6TW and E3X-DA8TW) that are allocated two unit numbers must be counted as two Units when counting the number of connected Sensors.

CompoWay/F Node Number Setting

This switch sets the CompoWay/F node number. The CompoWay/F node number is set by setting the rotary switch in combination with DIP switch pin 4.

| Pin 4 | Rotary switch | CompoWay/F node number |
|-------|---------------|------------------------|
| OFF | 0 | 0 |
| OFF | 1 | 1 |
| OFF | 2 | 2 |
| OFF | 3 | 3 |
| OFF | 4 | 4 |
| OFF | 5 | 5 |
| OFF | 6 | 6 |
| OFF | 7 | 7 |
| OFF | 8 | 8 |
| OFF | 9 | 9 |
| OFF | A | 10 |
| OFF | B | 11 |
| OFF | C | 12 |
| OFF | D | 13 |
| OFF | E | 14 |
| OFF | F | 15 |

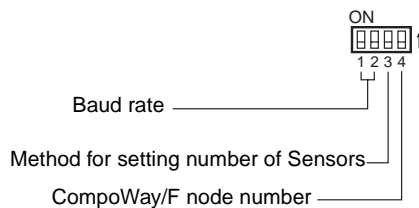
| Pin 4 | Rotary switch | CompoWay/F node number |
|-------|---------------|------------------------|
| ON | 0 | 16 |
| ON | 1 | 17 |
| ON | 2 | 18 |
| ON | 3 | 19 |
| ON | 4 | 20 |
| ON | 5 | 21 |
| ON | 6 | 22 |
| ON | 7 | 23 |
| ON | 8 | 24 |
| ON | 9 | 25 |
| ON | A | 26 |
| ON | B | 27 |
| ON | C | 28 |
| ON | D | 29 |
| ON | E | 30 |
| ON | F | 31 |

CompoWay/F Communications Mode Setting

This switch is used to select the settings for CompoWay/F data bits, parity, and stop bits according to the following table.

| Rotary switch | Communications mode | | |
|---------------|---------------------|--------|-----------|
| | Data bits | Parity | Stop bits |
| 0 | 7 | Even | 2 |
| 1 | 7 | Odd | 2 |
| 2 | 7 | None | 2 |
| 3 | 7 | Even | 1 |
| 4 | 7 | Odd | 1 |
| 5 | 7 | None | 1 |
| 6 | 8 | Even | 2 |
| 7 | 8 | Odd | 2 |
| 8 | 8 | None | 2 |
| 9 | 8 | Even | 1 |
| A | 8 | Odd | 1 |
| B | 8 | None | 1 |
| C to F | Must not be set. | | |

DIP Switch Settings



Pins 1 and 2: Baud Rate Setting

| Pin 1 (DR0) | Pin 2 (DR1) | Baud rate |
|-------------|-------------|------------|
| OFF | OFF | 9,600 bps |
| ON | OFF | 19,200 bps |
| OFF | ON | 38,400 bps |
| ON | ON | 57,600 bps |

Pin 3: Method for Setting the Number of Connected Sensors

This pin sets whether the number of Sensors connected is set from the rotary switch or by using CompoWay/F message communications. The CompoWay/F message used is the Write to Parameter Area command for Write Number of Sensors Connected (MRC = "02", SRC = "02", parameter type 4005).

When pin 3 is ON (registration using CompoWay/F messages), the value for the number of Sensors able to communicate that is stored in the internal memory of the Fiber Amplifier Sensor Communication Unit is enabled. The default value in the internal memory is 16 Sensors. This value can be changed using CompoWay/F message communications. The setting methods are shown in the following table.

| Pin 3 | Method for setting number of Sensors |
|-------|--|
| OFF | Use the rotary switch to register the number of Sensors. |
| ON | Use CompoWay/F messages to register the number of Sensors. |

Pin 4: CompoWay/F Node Number Setting

This pin sets the unit number when set in combination with the rotary switch.

Sensor Reset Switch

Press this switch to reset the connected Sensors by executing power interruption processing. This switch is used in the following case.

If the number of Sensors with communications enabled does not match the number of Sensors connected, one or more Sensors may have become disconnected. The power reset switch is required to enable the Sensors to be reconnected properly and for communications to be reestablished between Sensors. Turning OFF the power supply would result in no response to CompoWay/F, which may effect the entire system. The Sensor reset switch is thus used to reestablish communications with the Sensors.

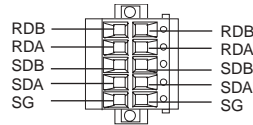
4-3 Operating Procedure for RS-422 Communication Unit

| Step | Item | Details | | |
|------|--|---|---|-------------------|
| 1 | Mount the Communication Unit to the DIN Track. | Mount the Unit to the DIN Track. After mounting the Fiber Amplifier Units to the DIN Track, connect the Units to each other. Note: To remove the Units from the DIN Track, first slide the Units apart to disconnect them, and then remove the Units from the DIN Track. | | |
| 2 | Connect the Fiber Amplifier Units to the Communication Unit. | Connect the Communication Unit to the Fiber Amplifier Units by sliding the Communication Unit until the clips on the end are aligned and a "click" sound is heard. Note: Turn OFF the DC power supply before connecting the Units. | | |
| 3 | Set the Sensors to RUN mode | Set the mode switches to RUN mode. | | |
| 4 | Connect the RS-422 connector. | Connect the connector for RS-422 communications. Note: Be sure to connect terminating resistance to the last Communication Unit for RS-422. | | |
| 5 | Set the rotary switches. | Upper switch | Sets the CompoWay/F node number (0 to 31); set in combination with pin 4 of the DIP switch. | |
| | | Middle switch | Sets the CompoWay/F communications mode (0 to F). | |
| | | Lower switch | Sets the number of Sensors for communications (1 to 16). This switch is enabled only when pin 3 of the DIP switch is OFF. Note: If pin 3 of the DIP switch is ON, the number of Sensors is set using a CompoWay/F message. | |
| 6 | Set the DIP switch. | Pin 1 | Pin 2 | Baud rate setting |
| | | OFF | OFF | 9,600 bps |
| | | OFF | ON | 19,200 bps |
| | | ON | OFF | 38,400 bps |
| | | ON | ON | 57,600 bps |
| | | Pin 3 | Method for setting number of Sensors connected | |
| | | OFF | Use the rotary switch to register the number of Sensors. | |
| ON | Use CompoWay/F messages to register the number of Sensors. | | | |
| 7 | Turn ON the DC power supply. | Disconnect the E3X-MC11 Mobile Console before turning ON the DC power supply. | | |
| 8 | Check the indicators. | PWR | Communications power supply is ON when the PWR indicator is lit green. | |
| | | RXD | Receiving serial communications when the RXD indicator is lit yellow. | |
| | | TXD | Transmitting serial communications when the TXD indicator is lit yellow. | |
| | | U.ERR | Operating normally when the U.ERR indicator is not lit (no Unit error). | |
| | | SS | Sensors communicating when the SS indicator is lit green. | |
| 9 | Start communications | CompoWay/F message communications | Sends CompoWay/F messages from the master. | |

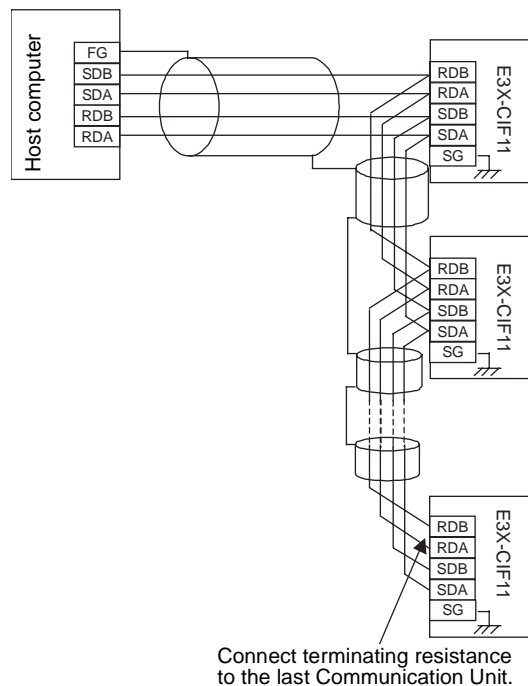
4-4 Wiring RS-422 Communication Units

4-4-1 RS-422 Communications Wiring

The RS-422 Connector pin arrangement is as follows:



- Multidrop wiring can be used. (The left and right terminals are internally connected to allow multidrop connections).
- Connect the RS-422 in a 1:1 or a 1: N configuration.
For a 1:N configuration, up to 32 nodes can be connecting, including the host computer or PLC.
- The total cable length is 500 m max.
- Use shielded, twisted-pair cables with a wire gauge of AWG24 to AWG12.

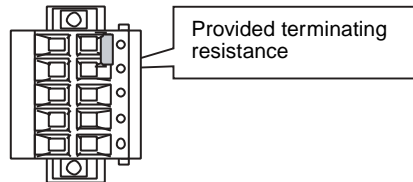


- Note**
1. The following crimp terminals are recommended for cables.
 - Phoenix Contact AI Series
AI0, 5-8 (AWG20) or other (Use a crimp terminal appropriate for the wire diameter)
The following tool is recommended.
ZA3 manufactured by Phoenix Contact
 - Nichifu TC Series
TME TC-1.25-11 (AWG22 to AWG16) or other (Use a crimp terminal appropriate for the wire diameter.)
The following tool is recommended.
NH-32 manufactured by Nichifu

2. The following Adaptors are recommended when converting from RS-232C to RS-422.
 - Connecting to PLC: OMRON NT-AL001 Link Adaptor
 - Connecting to computer: OMRON B500-AL004 Link Adapter

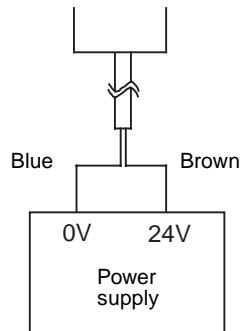
4-4-2 Connecting Terminating Resistance

Connect the provided terminating resistance ($220\ \Omega \pm 1\%$) between the RDA and RDB terminals of the last Communications Unit for RS-422. Do not connect terminating resistance to any other Unit.



4-4-3 Wiring the Power Supply

Wire the power supply as shown in the following diagram.



- Note**
1. The power supply provides power to the Communication Unit and all the Sensors that are connected to it. Select a power supply for the Communication Unit so that it has sufficient capacity for the current consumption of the Sensors.
 2. Do not remove the power supply connector.
Disconnecting the power supply connector and then accidentally connecting the E3X-CN11 Master Connector to the Fiber Amplifier Sensor Communication Unit or connecting the disconnected cables to the Fiber Amplifier Unit may damage the Fiber Amplifier Sensor Communication Unit or the Fiber Amplifier Unit.

4-5 CompoWay/F Message Communications

Sending CompoWay/F messages from the master to the Communication Unit allows reading and writing parameters of a specified Fiber Amplifier Unit. The Communication Unit processes the commands sent by the master and returns responses.

4-5-1 CompoWay/F Services: Command Text

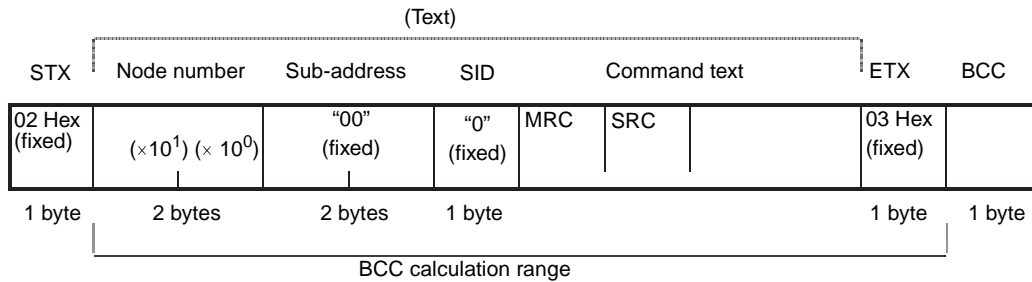
CompoWay/F allows the following services to be specified using the command text. The service is defined in the command text using the MRC (Main Request Code) and SRC (Sub-request Code) at the beginning of the command text.

| MRC | SRC | Service name | Processing |
|------|------|--------------------------|---|
| "01" | "01" | Read from Variable Area | Reads data from the variable area. |
| "02" | "01" | Read from Parameter Area | Reads data from the parameter area. |
| "02" | "02" | Write to Parameter Area | Writes data to the parameter area. |
| "05" | "03" | Read Unit Attributes | Reads model and version information. |
| "06" | "01" | Read Controller Status | Reads the operation status of the controller. |
| "08" | "01" | Echoback Test | Performs an echoback test. |
| "30" | "05" | Operation Command | Sends an operation command. |

4-5-2 Command and Response Formats

The formats of command and response blocks for CompoWay/F messages are shown here. Numeric values followed by Hex, such as 02 Hex, indicate hexadecimal values. Numeric values in double quotation marks, such as "02", or without any other indication are ASCII values.

Command Block



| | |
|------------------|--|
| STX | This code (02 Hex) indicates the beginning of the communications block. Always set these characters in the first byte. When STX is received again during reception, reception is repeated from the point where STX was received. |
| Node number | This number specifies the transmission destination. Specify an E3X-CIF11 CompoWay/F node number. |
| Sub-address | This is not used for the E3X-CIF11. Always set the sub-address to "0". |
| SID (Service ID) | This is not used for the E3X-CIF11. Always set the service ID to "00". |
| Command text | This is the command text area. |
| ETX | This code (03 Hex) indicates the end of the text. |
| BCC | Block Check Character The BCC result is obtained by calculating an exclusive OR (XOR) of the bytes from the node number up to the ETX. |

BCC Calculation Example

| | | | | | | |
|--------|--------------|--------------|-----------------|---|--------|--------|
| STX | Node number | Sub-address | SID | Command text | ETX | BCC |
| 02 Hex | "0" (30 Hex) | "0" (30 Hex) | "00" (3030 Hex) | "0" (30 Hex) "30053001" (3330303533303031 Hex) | 03 Hex | 37 Hex |

The calculation result 37 Hex is set as the BCC.

$$BCC = 30 \text{ Hex} + 30 \text{ Hex} + 30 \text{ Hex} + 30 \text{ Hex} + 30 \text{ Hex} + 33 \text{ Hex} + 30 \text{ Hex} + 30 \text{ Hex} + 35 \text{ Hex} + 33 \text{ Hex} + 30 \text{ Hex} + 30 \text{ Hex} + 31 \text{ Hex} + 03 \text{ Hex} = 37 \text{ Hex}$$
 The "+" indicates an exclusive OR (XOR).

Response Block

| | | | | | | |
|----------------|-------------------------------------|--------------|----------|--------------|----------------|--------|
| STX | Node number | Sub-address | End code | Command text | ETX | BCC |
| 02 Hex (fixed) | ($\times 10^1$) ($\times 10^0$) | "00" (fixed) | | MRC SRC | 03 Hex (fixed) | |
| 1 byte | 2 bytes | 2 bytes | 2 bytes | | 1 byte | 1 byte |

The response end codes are as follows:

| End code | Name | Description | Error detection priority |
|----------|-------------------|--|--------------------------|
| "00" | Normal completion | The command ended normally without error. | None |
| "0F" | Command error | The specified command could not be executed. The response code should indicate why the command could not be executed. | 8 |
| "10" | Parity error | A parity error occurred during reception of one of the characters. | 2 |
| "11" | Framing error | A framing error occurred during reception of one of the characters. | 1 |
| "12" | Overrun error | An overrun error occurred during reception of one of the characters. | 3 |

| End code | Name | Description | Error detection priority |
|----------|--------------------|---|--------------------------|
| "13" | BCC error | Received an incorrect BCC value. | 5 |
| "14" | Format error | <ul style="list-style-type: none"> The command text contains characters other than 0 to 9, or A to F. (This error is not applicable to the echoback test.) No SID and command text. No command text. No MRC/SRC included in command text. | 7 |
| "16" | Sub-address error | <ul style="list-style-type: none"> Received a block with an unsupported sub-address. No sub-address, SID, and command text. Sub-address is less than two characters, and there is no SID and command text. | 6 |
| "18" | Frame length error | The received frame length exceeds the fixed number of bytes. | 4 |

An end code is returned for each command block addressed to the local node. A response is not returned if the characters in the response block are incomplete up to the ETX and BCC. The error detection priority indicates the order by which errors are detected when multiple errors occur simultaneously.

- Note**
- Noise interference may prevent a response being returned or cause an error response to occur. Always perform retry processing from the master if noise interferes with responses.
 - The response time after sending a command can be as much as 6 s. If a response has not been returned, wait 6 s before sending the next command.

Examples of End Codes when Errors Occur

The following examples show an end codes for commands that did not end normally.

Example 1: Illegal Sub-address, No SID, and No Command Text

Command Block

| STX | Node number | Sub-address | ETX | BCC |
|--------|-------------|-------------|--------|-----|
| 02 Hex | | "0" "A" | 03 Hex | |

Response Block

| STX | Node number | Sub-address | End code | ETX | BCC |
|--------|-------------|-------------|----------|--------|-----|
| 02 Hex | | "0" "A" | "1" "6" | 03 Hex | |

The end code is 16 (sub-address error). This end code is used because the sub-address was received and the error detection priority of a sub-address error is higher than a format error.

Example 2: No Command Text

Command Block

| STX | Node number | Sub-address | SID | ETX | BCC |
|--------|-------------|-------------|-----|--------|-----|
| 02 Hex | | "0" "0" | "0" | 03 Hex | |

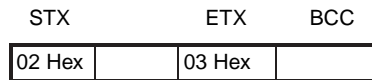
Response Block

| STX | Node number | Sub-address | End code | ETX | BCC |
|--------|-------------|-------------|----------|--------|-----|
| 02 Hex | | "0" "0" | "1" "4" | 03 Hex | |

The end code is 14 (format error).

Example 3: Node Number Missing

Command Block



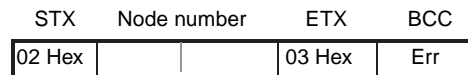
The node number is missing one character.

Response Block

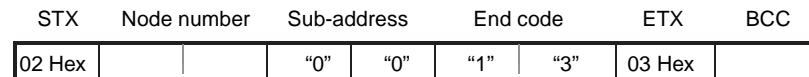
There is no response.

Example 4: No Sub-address and Incorrect BCC

Command Block



Response Block



The sub-address is 00 and the end code is 13 (BCC error).

4-5-3 Read from Variable Area (MRC = "01", SRC = "01")

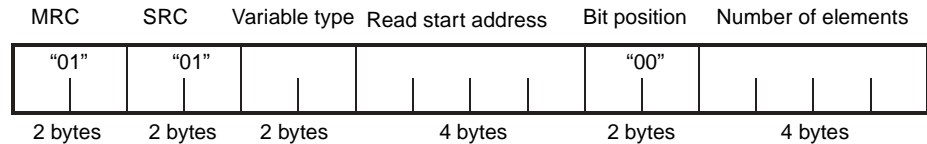
This service reads from the variable area.

| Item | Description | Variable type | Read start address | Bit position | Number of elements |
|---|--|---------------|--------------------|--------------|--------------------|
| Read Status | Reads status of Sensors. | "81" | "0000" | "00" | "0001" |
| Read Incident Light Level (See note 1.) | Specifies unit number in read start address and reads incident light levels for the specified number of elements. | "82" | Unit number | "00" | "0001" to "0010" |
| Read ON Incident Light Level (See note 2.) | Specifies unit number in read start address and reads ON incident light levels for the specified number of elements. | "83" | Unit number | "00" | "0001" to "0010" |
| Read OFF Incident Light Level (See note 2.) | Specifies unit number in read start address and reads OFF incident light levels for the number of elements. | "84" | Unit number | "00" | "0001" to "0010" |

- Note**
1. An error will occur if the Read Incident Light Level command is sent with the unit number of an E39-TM1 Terminal Block Unit.
 2. An error will occur if the Read ON/OFF Incident Light Level command is sent with the unit number for a Unit other than the E3X-DA6-P.

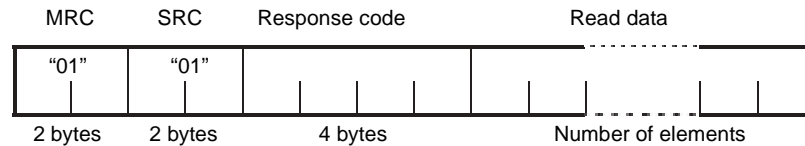
Command Block

The following diagram shows the command text in the CompoWay/F command block.



Response Block

The following diagram shows the command text in the CompoWay/F response block.



Read Start Address

Specifies as hexadecimal ASCII the unit number of the Sensor that is to be read from. For example, to specify unit number 10, set the address to "000A" (30303041 Hex). The read start address is always "0000" for commands that do not require a unit number to be specified.

Bit Position

Bit access is not supported by the E3X-CIF11. This setting is always "00".

Number of Elements

Specifies as hexadecimal ASCII the number of Units after the specified unit number that are to be read from. The number of elements for Read ON/OFF Data and Read Status can be set to "0001" only.

Read Data

Provides the data read in hexadecimal ASCII.

The following information describes the data format for each item.

Read Status

| Bit | Contents |
|-----|--|
| 00 | Number of Sensors connected, 2 ⁰ |
| 01 | Number of Sensors connected, 2 ¹ |
| 02 | Number of Sensors connected, 2 ² |
| 03 | Number of Sensors connected, 2 ³ |
| 04 | Number of Sensors connected, 2 ⁴ |
| 05 | Method for setting number of Sensors |
| 06 | Always 0. |
| 07 | Always 0. |
| 08 | Number of Sensors that can communicate, 2 ⁰ |
| 09 | Number of Sensors that can communicate, 2 ¹ |
| 10 | Number of Sensors that can communicate, 2 ² |
| 11 | Number of Sensors that can communicate, 2 ³ |
| 12 | Number of Sensors that can communicate, 2 ⁴ |
| 13 | Mobile Console Communications Flag |
| 14 | Sensor Communications Error Flag |
| 15 | Sensor Communications Flag |

Number of Sensors Connected

Bits 00 to 04 give the number of Sensors that are currently registered in hexadecimal.

Method for Setting Number of Sensors

Bit 05 gives the status of DIP switch pin 3, which determines the method for registering the number of Sensors connected. When this bit is OFF, pin 3 is OFF, and when the bit is ON, pin 3 is ON.

Number of Sensors That Can Communicate

Bits 08 to 12 gives the number of Sensors that are currently able to communicate in hexadecimal. This setting allows the user to check how many Sensors are communicating normally when an error occurs.

Mobile Console Communications Flag

Bit 13 turns ON when the Mobile Console is connected to the Communication Unit. Communications cannot be used when the Mobile Console is connected.

Sensor Communications Error Flag

Bit 14 turns ON when the number of Sensors registered as connected does not match the number of Sensors that can communicate, or when a communications error occurs after communications have been established with the Sensors.

Sensor Communications Flag

Bit 15 turns ON when communications are established with the Sensors.

Read (ON/OFF) Incident Light Level

Reads the incident light levels as a batch for the number of Units specified in the number of elements starting from the unit number specified in the read start address. The data is given in 16-bit (4-digit) hexadecimal data for each Unit. Negative data is expressed as its two's complement.

The incident light levels of E39-TM1 Terminal Block Units cannot be read. Do not specify the Terminal Block Unit when sending the Read Incident Light Level command.

Read ON Incident Light Level and Read OFF Incident Light Level can be sent when using E3X-DA6-P Sensors only. Do not specify any other model of Sensor when sending the Read ON/OFF Light Level commands. For details on ON and OFF incident light levels, refer to *Appendix B Monitoring Incident Light Levels of E3X-DA6-P Sensors*.

| | | | | |
|---------------------------------------|---|-------|--|--|
| Unit number N incident light level | Unit number N + 1 incident light level | ----- | Unit number N + M - 2 incident light level | Unit number N + M - 1 incident light level |
|---------------------------------------|---|-------|--|--|

Unit number specified for the read start address: Unit number N
 Number of Units specified in the number of elements: M Units

Response Codes

Normal Completion

| Response code | Name | Description |
|---------------|-------------------|------------------------|
| "0000" | Normal completion | No error has occurred. |

Error Completion

| Response code | Error name | Cause |
|---------------|----------------------------------|---|
| "1001" | Command too long | The command is too long. |
| "1002" | Command too short | The command is too short. |
| "1101" | Area type error | The area type is wrong. |
| "1103" | Start address out-of-range error | The read start address is out of range. <ul style="list-style-type: none"> The unit number of an unconnected Sensor is specified as the read start address. The bit position is set to other than "00". |
| "1104" | End address out-of-range error | The unit number of the Sensor specified as the read end address (the read start address + the number of elements) is not connected. |
| "2203" | Operation error | The specified command could not be executed. <ul style="list-style-type: none"> A Sensor communications error has occurred. The Sensors are not able to communicate (teaching in progress, etc.) The Mobile Console is connected. |

4-5-4 Read from Parameter Area (MRC = "02", SRC = "01")

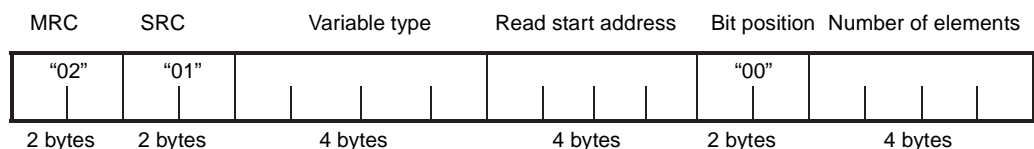
This service reads from the parameter area.

| Item | Variable type | Read start address | Number of elements |
|----------------------------------|---------------|--------------------|--------------------|
| Read Number of Sensors Connected | "8005" | "0000" | "8001" |
| Read Response Delay Time | "8006" | "0000" | "8001" |
| Read Threshold Setting | "8011" | Unit number | "8001" to "8010" |
| Read Basic Settings | "8012" | Unit number | "8001" |
| Read Timer Setting | "8013" | Unit number | "8001" |
| Read Hysteresis Width | "8016" | Unit number | "8001" |
| Read Custom Flags | "8017" | Unit number | "8001" |
| Read Special Flags | "801C" | Unit number | "8001" |

- Note**
1. An error will occur if the Read from Parameter Area command is sent with the unit number of an E39-TM1 Terminal Block Unit.
 2. An error will occur if the Read Special Flags command is sent with a unit number of a Unit other than the E3X-DA6TW or E3X-DA8TW.

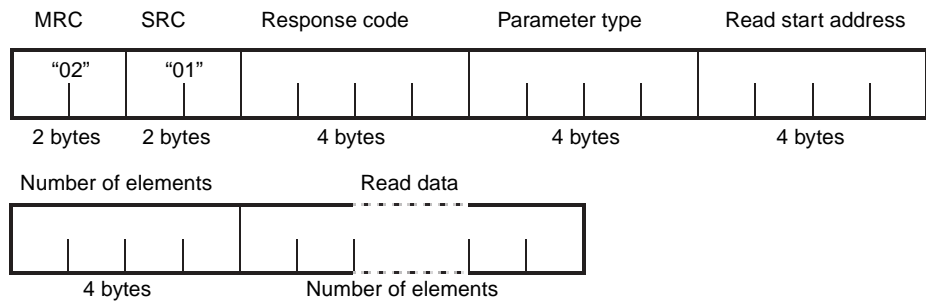
Command Block

The following diagram shows the command text in the CompoWay/F command block.



Response Block

The following diagram shows the command text in the CompoWay/F response block.



Number of Elements

Specifies as hexadecimal ASCII the number of Units starting from the specified unit number that are to be read from. The leftmost bit is set to 1. Therefore, the number of elements is set to "8001" to read one Unit. Unless executing Read Threshold Setting, the number of elements can be set to "8001" only.

Read Data

Gives the data read in hexadecimal ASCII.

The following information describes the data format for each item.

Read Number of Sensors Connected

| | | | | | | | | | | | | | | | |
|-----------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| Number of Sensors connected | | | | | | | | | | | | | | | |

Reads as a 4-digit hexadecimal value the number of Sensors connected. When DIP switch pin 3 is ON, the value is read from the internal memory, and when pin 3 is OFF, it is read from the rotary switch setting. The data range is 0001 Hex to 0010 Hex (1 to 16 Units).

Read Response Delay Time

Reads as a 4-digit hexadecimal value the Communication Unit's response delay time (time for a CompoWay/F response to be returned). The unit is ms. Some CompoWay/F masters, such as CQM1H Serial Communications Boards, cannot read responses that are returned too quickly. For such masters, the Communication Unit response delay time can be set by using the Write Response Delay Time command. The default setting is 0 ms.

Read Threshold Setting

Reads as a batch the threshold settings for the number of Sensors specified in the number of elements after the unit number specified in read start address. The data is given as a 2-byte (4-digit) hexadecimal value for each Unit, and negative data is expressed as its two's complement.

| | | | | |
|-------------------------|-----------------------------|-------|---------------------------------|---------------------------------|
| Unit number N Threshold | Unit number N + 1 Threshold | | Unit number N + M - 2 Threshold | Unit number N + M - 1 Threshold |
|-------------------------|-----------------------------|-------|---------------------------------|---------------------------------|

Unit number specified in the read start address: Unit number N
 Number of Units specified in the number of elements: M Units

Read Basic Settings

Reads the basic settings as shown in the following table.

| Bit | Contents |
|-----|--|
| 00 | Display Contents: |
| 01 | 0: Digital incident level 1: Digital percentage 2: Analog incident level |
| 02 | Display Orientation: 0: Standard 1: Reversed |
| 03 | Hold Setting: |
| 04 | 0: OFF 2: Peak 3: Bottom |
| 05 | Flashing Setting: 0: OFF 1: ON |
| 06 | Sensing Setting: |
| 07 | 0: Standard 2: Long-distance 3: High-speed |
| 08 | Timer Mode: |
| 09 | 1: OFF-delay 2: ON-delay 3: One-shot |
| 10 | Number of Display Digits: |
| 11 | 0: 4 digits |
| 12 | 1: 3 digits 2: 2 digits 3: 1 digit 4: 0 digits |
| 13 | Always 0. |
| 14 | Teaching during RUN 0: OFF 1: ON |
| 15 | Eco Mode 0: OFF 1: ON |

Read Timer Setting

Reads the timer setting of the OFF-delay, ON-delay, or one-shot timer as a 4-digit hexadecimal value. The value is set in ms.

Read Hysteresis Width

Reads the hysteresis width as a 3-digit hexadecimal value. Bits 14 and 15 are used to display the sensing setting.

| Bit | Contents |
|----------|--|
| 00 to 11 | Hysteresis Width |
| 12 | Always 0. |
| 13 | Always 0. |
| 14 | Sensing Setting: |
| 15 | 0: Standard 2: Long-distance 3: High-speed |

Read Custom Flags

Reads whether the following settings can be set or monitored from the sensor key switch.

| Bit | Contents |
|-----|---|
| 00 | Hold Setting: 0: Enable 1: Not displayed 2: Disable |
| 01 | |
| 02 | Flashing Setting: 0: Enable 1: Not displayed 2: Disable |
| 03 | |
| 04 | OFF-delay Timer Setting: 0: Enable 1: Not displayed 2: Disable |
| 05 | |
| 06 | Sensing Setting: 0: Enable 1: Not displayed 2: Disable |
| 07 | |
| 08 | Teaching: 0: Enable 1: Disable |
| 09 | Sensitivity Adjustment: 0: Enable 1: Disable |
| 10 | Zero Reset: 0: Enable 1: Disable |
| 11 | Display Contents: 0: Enable 1: Disable |
| 12 | Monitor Focus Range: 0: Enable 1: Not displayed 2: Disable |
| 13 | |
| 14 | Display Orientation: 0: Enable 1: Not displayed 2: Disable |
| 15 | |

Read Special Flags

Reads the status of the following setting items. This command is possible with E3X-DA6TW and E3X-DA8TW Sensors only. An error will occur if this command is executed for any other Sensor.

| Bit | Contents |
|-----|--|
| 00 | 0 or 1 |
| 01 | 0 or 1 |
| 02 | Always 0. |
| 03 | Always 0. |
| 04 | Operating Mode Flag (one-word): 0: Dark-ON 1: Light-ON |
| 05 | Operating Mode Flag (two-word): 0: Dark-ON 1: Light-ON |
| 06 | Area Setting Flag: 0: AREA OFF 1: AREA ON |
| 07 | 0 or 1 |
| 08 | Always 0. |
| 09 | Always 0. |
| 10 | Always 0. |
| 11 | Always 0. |
| 12 | Always 0. |
| 13 | Always 0. |
| 14 | Always 0. |
| 15 | Always 0. |

Note Bits 00, 01, and 07 are read as 0 or 1 according to the internal status of the Sensor.

Response Codes**Normal Completion**

| Response code | Name | Description |
|---------------|-------------------|------------------------|
| "0000" | Normal completion | No error has occurred. |

Error Completion

| Response code | Error name | Cause |
|---------------|--------------------------------------|--|
| "1001" | Command too long | The command is too long. |
| "1002" | Command too short | The command is too short. |
| "1003" | Number of elements/ data mismatch | The number of data does not match the number of elements. |
| "1101" | Area type error | The area type is wrong. |
| "1103" | Start address out-of-range error | The read start address is out of range. The unit number of an unconnected Sensor is specified as the read start address. The bit position is set to other than "00". |
| "1104" | End address out-of-range error | The specified number of elements is out of range. |

| Response code | Error name | Cause |
|---------------|-----------------|--|
| "2203" | Operation error | <ul style="list-style-type: none"> • A Sensor communications error has occurred. • The Sensor response indicated a communications prohibited error. • The Sensor did not respond. • The Mobile Console is connected. |

4-5-5 Write to Parameter Area (MRC = "02", SRC = "02")

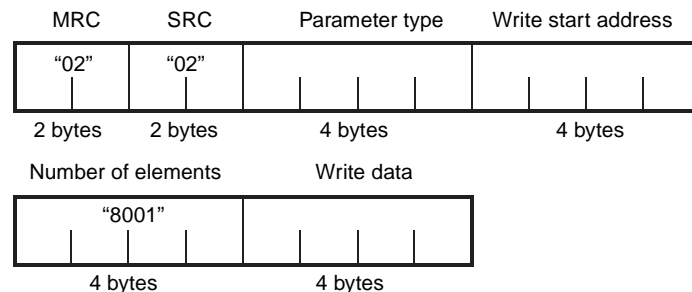
Writes the following data to the parameter area.

| Item | Variable type | Read start address | Number of elements |
|-----------------------------------|---------------|--------------------|--------------------|
| Write Number of Sensors Connected | "8005" | "0000" | "8001" |
| Write Response Delay Time | "8006" | "0000" | "8001" |
| Write Threshold Setting | "8011" | Unit number | "8001" |
| Write Basic Settings | "8012" | Unit number | "8001" |
| Write Timer Setting | "8013" | Unit number | "8001" |
| Write Hysteresis Width | "8016" | Unit number | "8001" |
| Write Custom Flags | "8017" | Unit number | "8001" |
| Write Special Flags | "801C" | Unit number | "8001" |

Note An error will occur if the unit number of an E39-TM1 Terminal Block Unit is specified.

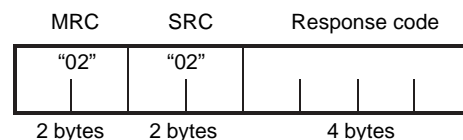
Command Block

The following diagram shows the command text in the CompoWay/F command block.



Response Block

The following diagram shows the command text in the CompoWay/F response block.



Note 1. When WRITE commands are executed, the settings are written to the internal memory. The number of times that data can be written to the internal memory is limited. The internal memory may be corrupted if more than one million (1,000,000) write operations are performed for each Sensor and parameter. Therefore, when using the Write to Parameter Area, be sure to create a communications program that prevents the number of writing operations from exceeding one million (1,000,000) for each Sensor and parameter

2. Do not send commands that are not specified for variable types. Accidentally sending such commands may cause internal parameters to be overwritten. If the internal parameters of a connected Sensor are overwritten, execute the Initialize Sensor Settings operation command.

Number of Elements

Specifies as hexadecimal ASCII the number of Units after the specified unit number that are to be written. The leftmost bit is set to 1. Therefore, the number of elements is set to "8001" to write one Unit. The number of elements for writing parameters can be set to "8001" only.

Write Data

Gives the write data in hexadecimal ASCII.

The following information describes the data format for each item.

Write Number of Sensors Connected

Writes as a 4-digit hexadecimal value the number of registered Sensors to the internal memory. The number of registered Sensors that is written to the internal memory is enabled when DIP switch pin 3 is ON. If a write operation is attempted when pin 3 is OFF, an error will occur. The data setting range is "0001" to "0010" (1 to 16 Units), and the default setting is 16 Units.

Write Response Delay Time

The Communication Unit's response delay time (time for a CompoWay/F response to be returned) is set as a 4-digit hexadecimal value. The unit is ms and the data setting range is "0000" to "0064" (0 to 100 ms). The default setting is 0 ms.

Some CompoWay/F masters, such as CQM1H Serial Communications Boards, cannot read responses that are returned too quickly. If using this type of master, set a response delay time (time taken by the Communication Unit to return a response). The default setting is 0 ms.

Write Threshold Setting

Writes the threshold value to the Sensor's internal memory as 4-digit hexadecimal value. Negative data is expressed as its two's complement.

- Note**
1. The Write Threshold Setting command cannot be executed when the Zero Reset setting is enabled. Disable Zero Reset to execute the Write Threshold Setting command.
 2. The setting range of Write Threshold Setting command changes when the Write Hysteresis Width command is executed. An error will occur if a value is written outside the setting range.

Write Basic Settings

The data contents are shown in the following table.

| Bit | Contents |
|-----|---|
| 00 | Display Contents: 0: Digital incident level 1: Digital percentage 2: Analog incident level |
| 01 | |
| 02 | Display Orientation: 0: Standard 1: Reversed |
| 03 | Hold Setting: 0: OFF 2: Peak 3: Bottom |
| 04 | |
| 05 | Flashing Setting: 0: OFF 1: ON |
| 06 | Sensing Setting: 0: Standard 2: Long-distance 3: High-speed |
| 07 | |
| 08 | Timer Mode: 1: OFF-delay 2: ON-delay 3: One-shot |
| 09 | |
| 10 | Number of Display Digits: 0: 4 digits 1: 3 digits 2: 2 digits 3: 1 digit 4: 0 digits |
| 11 | |
| 12 | |
| 13 | Always 0. |
| 14 | Teaching during RUN 0: OFF 1: ON |
| 15 | Eco Mode 0: OFF 1: ON |

Write Timer Setting

Writes the timer setting for the OFF-delay, ON-delay, or one-shot timer as a 4-digit hexadecimal value. The setting range is "0000" to "00C8" (0 to 200 ms), but the possible settings are restricted as follows:

| Timer setting | Setting interval |
|---------------|------------------|
| 0 to 20 ms | 1-ms increments |
| 20 to 200 ms | 5-ms increments |

An error will occur if a write operation is executed using a setting interval that does not meet the restrictions.

Write Hysteresis Width

Writes the hysteresis width as a 4-digit hexadecimal value.

Write Custom Flags

Sets whether the following settings can be set or monitored using the sensor key switch.

| Bit | Contents |
|-----|---|
| 00 | Hold Setting: 0: Enable 1: Not displayed 2: Disable |
| 01 | |
| 02 | Flashing Setting: 0: Enable 1: Not displayed 2: Disable |
| 03 | |
| 04 | OFF-delay Timer Setting: 0: Enable 1: Not displayed 2: Disable |
| 05 | |
| 06 | Sensing Setting: 0: Enable 1: Not displayed 2: Disable |
| 07 | |
| 08 | Teaching: 0: Enable 1: Disable |
| 09 | Sensitivity Adjustment: 0: Enable 1: Disable |
| 10 | Zero Reset: 0: Enable 1: Disable |
| 11 | Display Contents: 0: Enable 1: Disable |
| 12 | Monitor Focus Range: 0: Enable 1: Not displayed 2: Disable |
| 13 | |
| 14 | Display Orientation: 0: Enable 1: Not displayed 2: Disable |
| 15 | |

Write Special Flags

Writes the following settings for the Sensor of the specified unit number. This command is possible with E3X-DA6TW and E3X-DA8TW Sensors only. An error will occur if this command is written for any other Sensor.

| Bit | Contents |
|-----|--|
| 00 | Always 0. |
| 01 | Always 0. |
| 02 | Always 0. |
| 03 | Always 0. |
| 04 | Operating Mode Flag (one-word): 0: Dark-ON 1: Light-ON |
| 05 | Operating Mode Flag (two-word): 0: Dark-ON 1: Light-ON |
| 06 | Area Setting Flag: 0: AREA OFF 1: AREA ON |
| 07 | Always 0. |
| 08 | Always 0. |
| 09 | Always 0. |
| 10 | Always 0. |
| 11 | Always 0. |
| 12 | Always 0. |
| 13 | Always 0. |
| 14 | Always 0. |
| 15 | Always 0. |

Response Codes

Normal Completion

| Response code | Name | Description |
|---------------|-------------------|------------------------|
| "0000" | Normal completion | No error has occurred. |

Error Completion

| Response code | Error name | Cause |
|---------------|----------------------------------|---|
| "1001" | Command too long | The command is too long. |
| "1002" | Command too short | The command is too short. |
| "1003" | Number of elements/data mismatch | The number of data does not match the number of elements. |
| "1100" | Parameter error | The write data setting is out of range. <ul style="list-style-type: none"> • Threshold setting out of range. • Basic settings are out of range. • Timer setting is not within limits. • Hysteresis width is out of range. • Custom Flags are out of range. • Special Flags are out of range. • Number of Sensors connected is more than 16. • Response delay time is set to more than 100 ms. |

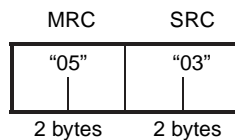
| Response code | Error name | Cause |
|---------------|----------------------------------|---|
| "1101" | Area type error | The area type is wrong. |
| "1103" | Start address out-of-range error | The write start address is out of range. The unit number of an unconnected Sensor is specified as the write start address. |
| "1104" | End address out-of-range error | The number of elements is not "8001". |
| "2203" | Operation error | <ul style="list-style-type: none"> • A Sensor communications error has occurred. • The Sensor response indicated a communications prohibited error. • The Sensor did not respond. • The Mobile Console is connected. • The Write Number of Sensors Connected command was sent with DIP switch pin 3 OFF. |

4-5-6 Read Model Attributes (MRC = "05", SRC = "03")

This service reads the model and version information for the Fiber Amplifier Sensor Communication Unit.

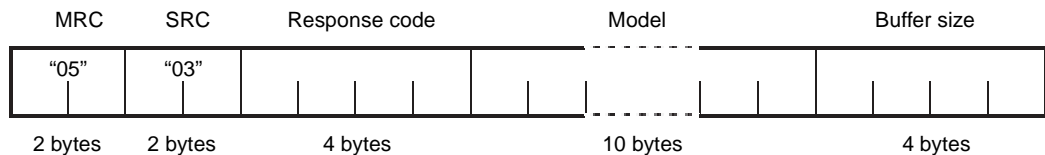
Command Block

The following diagram shows the command text in the CompoWay/F command block.



Response Block

The following diagram shows the command text in the CompoWay/F response block.



Model: The device model number is expressed in 10-byte ASCII.



The last byte is a space (20H).

Buffer size: The size the smaller of the CompoWay/F communications buffers is expressed as 4-digit hexadecimal and returned as 4-digit ASCII.

Response Codes

Normal Completion

| Response code | Name | Description |
|---------------|-------------------|------------------------|
| "0000" | Normal completion | No error has occurred. |

Error Completion

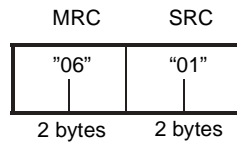
| Response code | Name | Description |
|---------------|-------------------|---------------------------|
| "1001" | Command too long | The command is too long. |
| "1002" | Command too short | The command is too short. |

4-5-7 Read Controller Status (MRC = "06", SRC = "01")

This service reads the operating status and number of Sensors able to communicate.

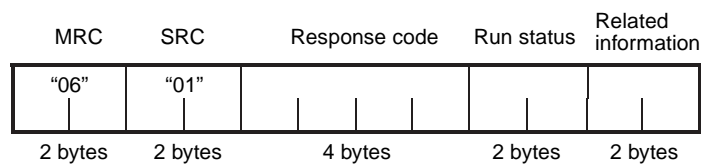
Command Block

The following diagram shows the command text in the CompoWay/F command block.



Response Block

The following diagram shows the command text in the CompoWay/F response block.



Operating Status

"00": Sensors communicating normally.

"01": Sensor communications error.

"02": Mobile Console is connected.

Related Information

The related information is 00 unless the operating status is "01".

The information varies according to the type of error, as follows:

| Code | Description |
|------|---|
| "00" | No response from unit number 1 onwards. |
| "01" | All Units up to unit number 1 are operating normally. No response from unit number 2 onwards. |
| "02" | All Units up to unit number 2 are operating normally. No response from unit number 3 onwards. |
| "03" | All Units up to unit number 3 are operating normally. No response from unit number 4 onwards. |
| "04" | All Units up to unit number 4 are operating normally. No response from unit number 5 onwards. |
| "05" | All Units up to unit number 5 are operating normally. No response from unit number 6 onwards. |
| "06" | All Units up to unit number 6 are operating normally. No response from unit number 7 onwards. |
| "07" | All Units up to unit number 7 are operating normally. No response from unit number 8 onwards. |
| "08" | All Units up to unit number 8 are operating normally. No response from unit number 9 onwards. |
| "09" | All Units up to unit number 9 are operating normally. No response from unit number 10 onwards. |
| "10" | All Units up to unit number 10 are operating normally. No response from unit number 11 onwards. |
| "11" | All Units up to unit number 11 are operating normally. No response from unit number 12 onwards. |
| "12" | All Units up to unit number 12 are operating normally. No response from unit number 13 onwards. |

| Code | Description |
|------|---|
| "13" | All Units up to unit number 13 are operating normally. No response from unit number 14 onwards. |
| "14" | All Units up to unit number 14 are operating normally. No response from unit number 15 onwards. |
| "15" | All Units up to unit number 15 are operating normally. No response from unit number 16 onwards. |
| "16" | All Units up to unit number 16 are operating normally onwards. |

Response Codes

Normal Completion

| Response code | Name | Description |
|---------------|-------------------|------------------------|
| "0000" | Normal completion | No error has occurred. |

Error Completion

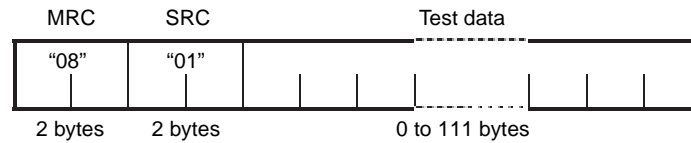
| Response code | Name | Description |
|---------------|-------------------|---------------------------|
| "1001" | Command too long | The command is too long. |
| "1002" | Command too short | The command is too short. |

4-5-8 Echoback Test (MRC = "08", SRC = "01")

This service performs the echoback test.

Command Block

The following diagram shows the command text in the CompoWay/F command block.

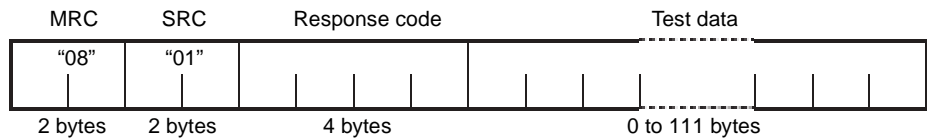


Test Data

Sets any test data from 0 to 111 bytes.

Response Block

The following diagram shows the command text in the CompoWay/F response block.



Response Codes

Normal Completion

| Response code | Name | Description |
|---------------|-------------------|------------------------|
| "0000" | Normal completion | No error has occurred. |

Error Completion

| Response code | Name | Description |
|---------------|-------------------|---------------------------|
| "1001" | Command too long | The command is too long. |
| "1002" | Command too short | The command is too short. |

4-5-9 Operation Commands (MRC = "30", SRC = "05")

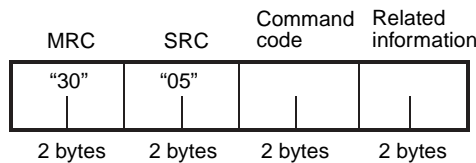
This service executes operation commands, such as Teach and Zero Reset commands.

| Command | Command code | Related information |
|----------------------------|--------------|---------------------|
| Adjust Maximum Sensitivity | "30" | Unit number |
| Teach One Point | "31" | Unit number |
| Teach First Point | "32" | Unit number |
| Teach Second Point | "33" | Unit number |
| Teach First Position | "34" | Unit number |
| Teach Second Position | "35" | Unit number |
| Start Zero Reset | "50" | Unit number |
| Disable Zero Reset | "60" | Unit number |
| Start Flashing | "53" | Unit number |
| Stop Flashing | "63" | Unit number |
| Initialize Sensor Settings | "36" | Unit number |
| Reset | "70" | None |

Note An error will occur if the unit number of an E39-TM1 Terminal Block Unit is specified.

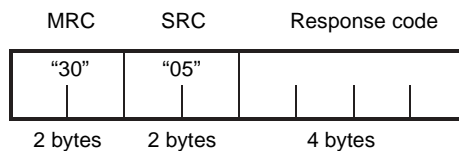
Command Block

The following diagram shows the command text in the CompoWay/F command block.



Response Block

The following diagram shows the command text in the CompoWay/F response block.



- Note**
- Teaching operations for the second point or position can only be performed after sending the commands for the first point/position. Be sure to send the command for the first point/position before sending that for the second one.
 - The Reset command will return the Sensor settings to their default values. The Reset command resets the Sensors by turning their power OFF and ON again.

Response Codes

Normal Completion

| Response code | Name | Description |
|---------------|-------------------|------------------------|
| "0000" | Normal completion | No error has occurred. |

Error Completion

| Response code | Error name | Cause |
|---------------|----------------------------------|--|
| "1001" | Command too long | The command is too long. |
| "1002" | Command too short | The command is too short. |
| "1101" | Area type error | The command code is wrong. |
| "1103" | Start address out-of-range error | The unit number of an unconnected Sensor is specified in the related information. |
| "2203" | Operation error | <ul style="list-style-type: none">• A Sensor communications error has occurred.• The Sensor response indicated a communications prohibited error.• The Sensor did not respond.• The Mobile Console is connected.• The WRITE command for the second point/position of Teach operations was sent before executing the command for the first one. |

SECTION 5

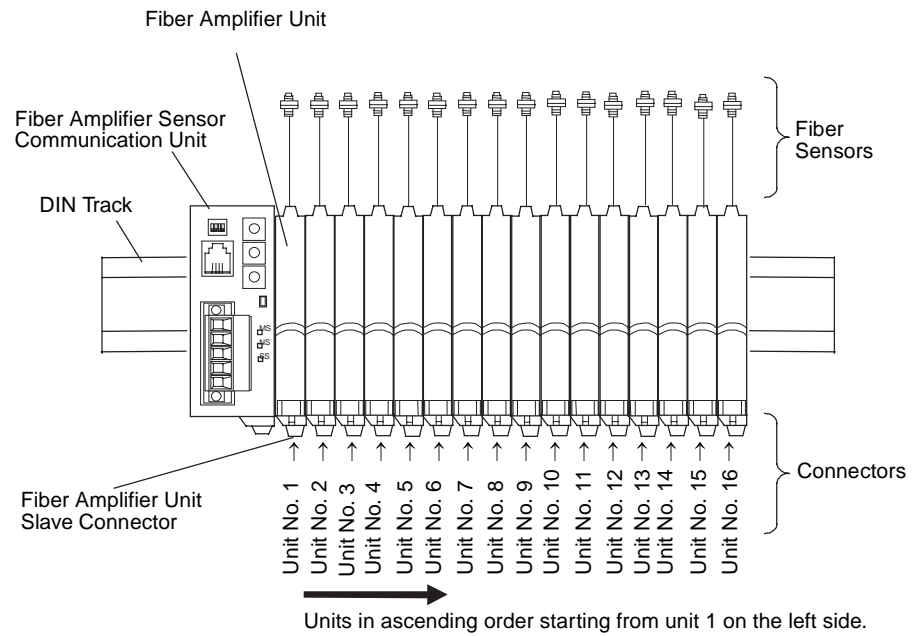
Installation and Dimensions

This section describes the procedure used to mount the Fiber Amplifier Sensor Communication Unit to DIN Track and provides the dimensions of the Units.

| | | |
|-------|--|-----|
| 5-1 | Mounting | 98 |
| 5-1-1 | Mounting Procedure | 99 |
| 5-1-2 | Removing the Units | 100 |
| 5-1-3 | Precautions for Replacing the Unit | 101 |
| 5-2 | Dimensions | 101 |

5-1 Mounting

Use DIN Track for mounting the Units.

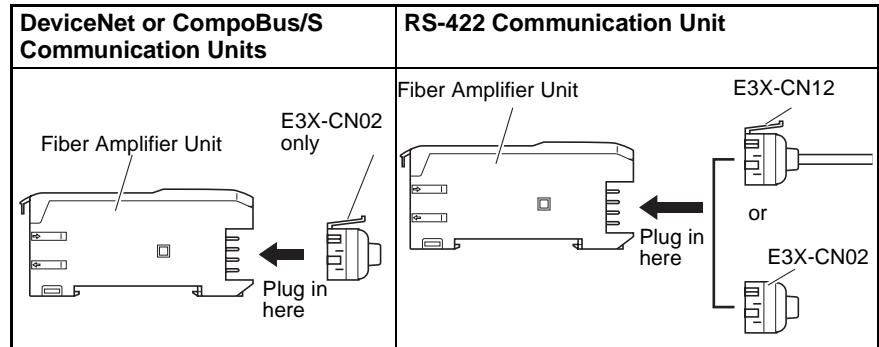


- Note**
1. The number of Fiber Amplifier Units that can be connected depends on the model of Communication Unit that is used.
 2. Connect the Communication Unit to the left side of the Fiber Amplifier Units.
 3. The Fiber Amplifier Units all function as slaves (the Fiber Amplifier Units connected to Slave Connectors). When connecting a Fiber Amplifier Sensor Communication Unit, the Slave Connector used to connect the Fiber Amplifier Units depends on the model of Fiber Amplifier Sensor Communication Unit.

Applicable Slave Connectors (Yes: Can be used; No: Cannot be used)

| Fiber Amplifier Sensor Communication Unit | Slave Connector for Fiber Amplifier Unit | | |
|---|--|------------------|-------------------|
| | Cordless | Cord with 1 wire | Cord with 2 wires |
| | E3X-CN02 | E3X-CN12 | E3X-CN22 |
| E3X-DRT21 (DeviceNet) | Yes | No | No |
| E3X-SRT21 (CompoBus/S) | Yes | No | No |
| E3X-CIF11 (RS-422) | Yes | Yes | No |

Always use the Slave Connectors specified in the above table. Do not use the Slave Connectors listed as not being applicable.

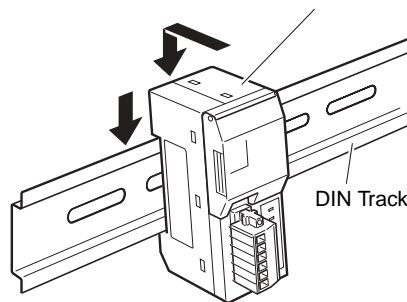


4. Connect the Fiber Amplifier Units to each other only after mounting the Units to the DIN Track.

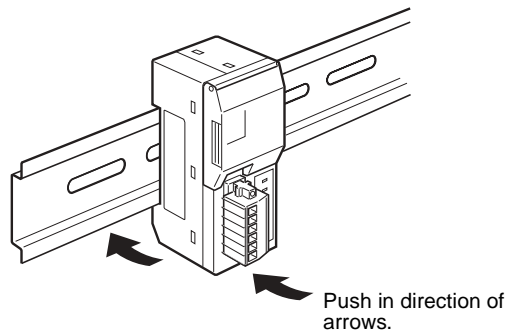
5-1-1 Mounting Procedure

Use the following procedure to mount the Fiber Amplifier Sensor Communication Unit.

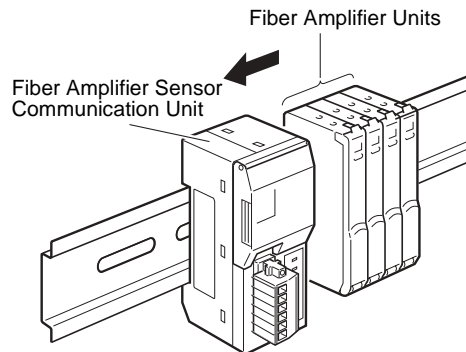
- 1,2,3... 1. Hook the top of the Unit onto the DIN Track.
Fiber Amplifier Sensor Communication Unit



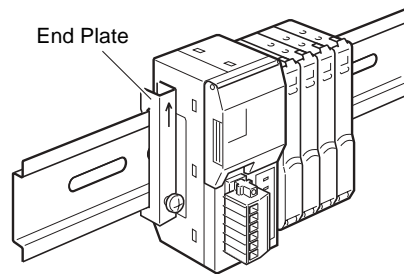
2. Push the bottom of the Unit onto the DIN Track.



3. Connect the Fiber Amplifier Units to the Communication Unit side by side by sliding the Fiber Amplifier Units until the clips on the end and the clips on the Connector are aligned with the Communication Unit and a “click” sound is heard.

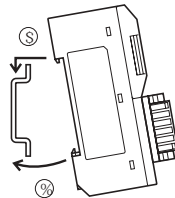


4. Use PFP-M End Plates (order separately) to secure both ends.



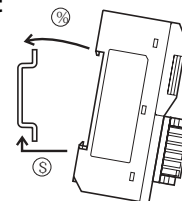
Note Use the correct procedure to mount the Units, performing step 1 before step 2. Reversing these steps may reduce the mounting strength.

Correct



Mounting point 1 before point 2 is the correct order.

Incorrect

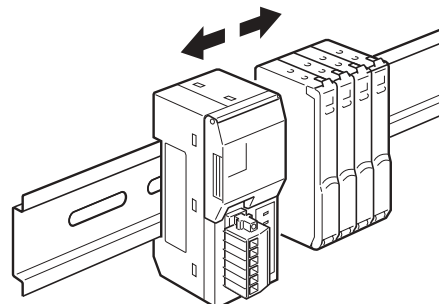


Do **NOT** mount point 1 before point 2.

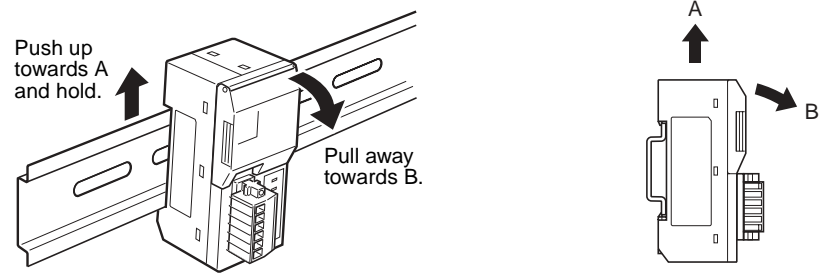
5-1-2 Removing the Units

Use the following procedure to remove the Units.

- 1,2,3... 1. Slide the Fiber Amplifier Units away from the Communication Unit to disconnect them.



2. Push the Communication Unit up towards A and hold in this position while pulling the Unit away towards B to remove it.



5-1-3 Precautions for Replacing the Unit

The following parameters for the E3X-DRT21 and E3X-CIF11 are stored in the internal memory of the Communication Unit. If parameters have been changed from the default values, be sure to reset the parameters after replacing the Unit.

E3X-DRT21

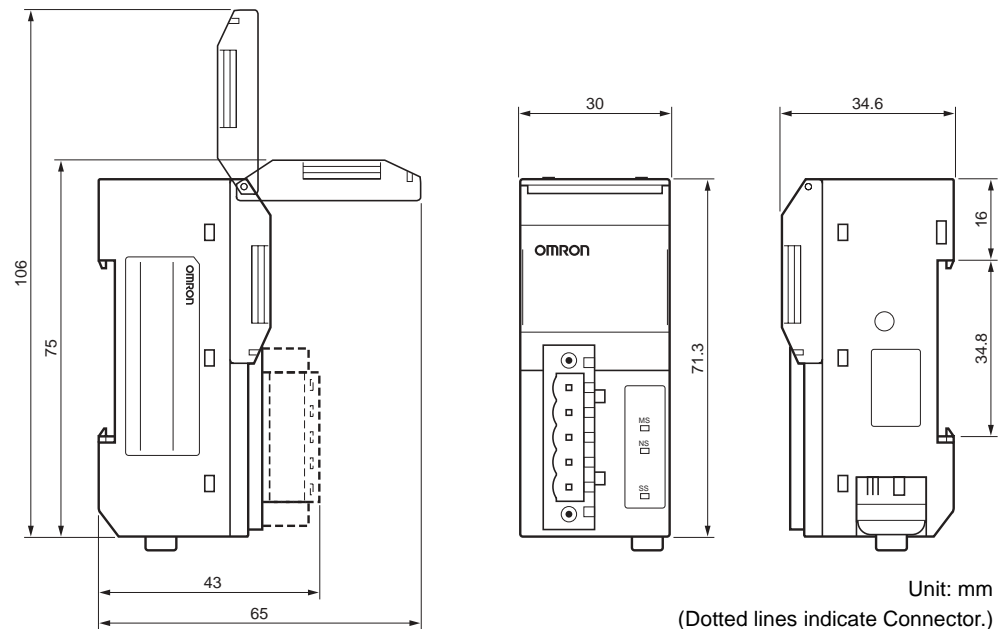
- Number of connected Sensors
- Number of Sensors being monitored for incident light levels

E3X-CIF11

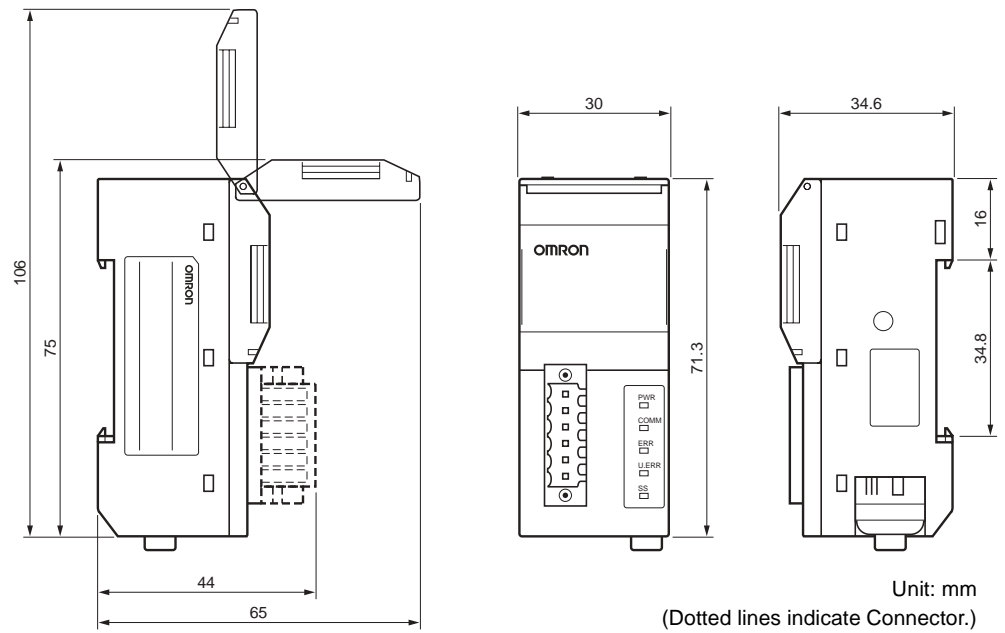
- Number of connected Sensors
- Response delay time

5-2 Dimensions

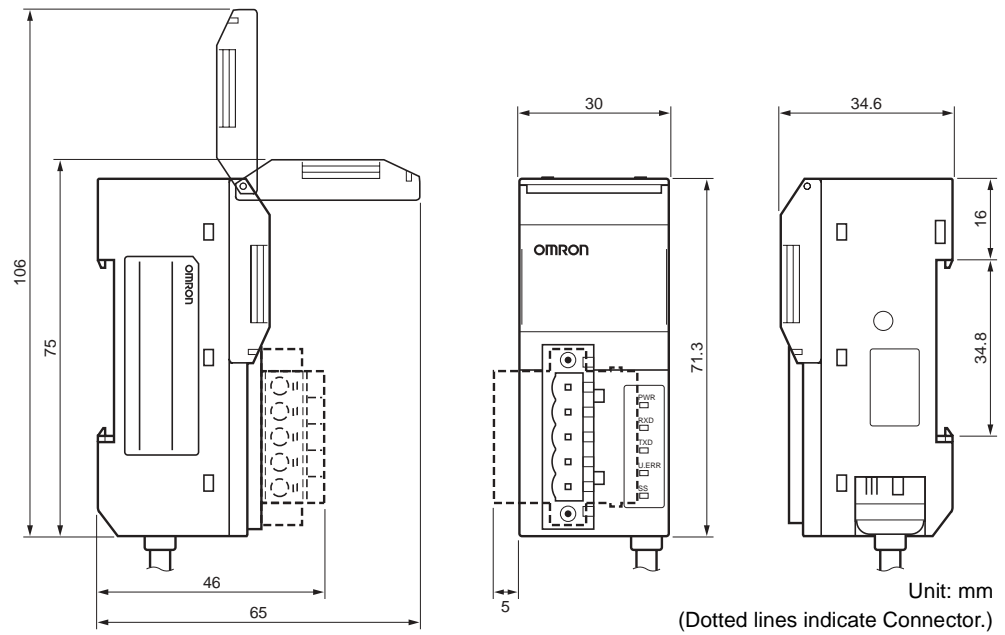
E3X-DRT21



E3X-SRT21



E3X-CIF11



SECTION 6

Errors and Troubleshooting

This section provides information for each Communication Unit on the types of errors that may occur, including details on the indicator status, probable causes, and remedies.

| | | |
|-------|-------------------------------------|-----|
| 6-1 | Errors and Troubleshooting. | 104 |
| 6-1-1 | Errors in the E3X-DRT21 | 104 |
| 6-1-2 | Errors in the E3X-SRT21 | 106 |
| 6-1-3 | Errors in the E3X-CIF11 | 107 |

6-1 Errors and Troubleshooting

The following tables list the indicator statuses, probable causes, and remedies for errors that may occur in each Communication Unit.

6-1-1 Errors in the E3X-DRT21

| Indicator status | Probable cause | Remedy |
|---|---|---|
| MS and NS indicators not lit. | Power is not supplied to the Unit. | Supply the communications power to the Unit through the DeviceNet Communications Connector. |
| | The current and voltage are outside the permissible range. | Use the current and voltage within the permissible range. |
| | The Unit is faulty. | Replace the Unit. |
| MS indicator lit red | The Unit is faulty. | Replace the Unit. |
| MS indicator lit green, NS indicator flashing green | The Unit is waiting for connection to DeviceNet communications. | Check the following items and then restart the Unit. <ul style="list-style-type: none"> • Are cable lengths (trunk/branch lines) suitable? • Are cables shorted, broken, or loose? • Is the wiring configuration 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 faulty. | Replace the Unit. |
| MS indicator lit green, NS indicator lit red | DeviceNet has gone into Busoff status. | Check the following items and then restart the Unit. <ul style="list-style-type: none"> • Are cable lengths (trunk/branch lines) suitable? • 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 allocated to two or more nodes. | Set the node addresses correctly. |
| | The Unit is faulty. | Replace the Unit. |
| MS indicator lit green, NS indicator 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) suitable? • 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 faulty. | Replace the Unit. |
| SS indicator not lit. | No Sensors are connected. | Connect the Sensors correctly. |
| | The Sensor adjacent to the Fiber Amplifier Sensor Communication Unit is faulty. | Replace the Unit adjacent to the Communication Unit. |
| | The power was turned ON while the Mobile Console was connected. | Temporarily disconnect the Mobile Console. |
| | The Unit is faulty. | Replace the Unit. |

| Indicator status | Probable cause | Remedy |
|-----------------------|---|--|
| SS indicator lit red. | One or more of the connected Sensors is faulty. | Replace the Sensor. Determine which Sensors are faulty by checking the number of Sensors able to communicate. |
| | One or more of the connected Sensors has been disconnected. | Connect the Sensors correctly. Determine the Sensor error location by checking the number of Sensors able to communicate. |
| | The number of registered Sensors is incorrect. | Register the number of Sensors correctly. |
| | Pin 3 of the DIP switch is incorrectly set. | Set DIP switch pin 3 correctly. Pin 3 OFF: Set using rotary switch. Pin 3 ON: Set using Configurator. |
| | One or more of the connected Fiber Amplifier Units is from an unsupported lot number. | Replace the unsupported Fiber Amplifier Units with those from supported lot numbers. (Refer to <i>1-3-3 Supported Fiber Amplifier Units.</i>) |
| | 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 faulty. | Replace the Unit. |

6-1-2 Errors in the E3X-SRT21

| Indicator status | Probable cause | Remedy |
|---|--|---|
| PWR indicator not lit. | Power is not supplied to the Unit. | Supply the communications power to the Unit through the CompoBus/S Communications Connector. |
| | The current and voltage are outside the permissible range. | Use the current and voltage within the permissible range. |
| | The Unit is faulty. | Replace the Unit. |
| U.ERR indicator lit red. | The Unit is faulty. | Replace the Unit. |
| ERR indicator lit red. | A communications error has occurred in a slave communicating on the CompoBus/S network, and the slave has been disconnected from communications. | Check the following items and then restart the Unit. <ul style="list-style-type: none"> • Are cable lengths (trunk/branch lines) suitable? • Are cables shorted, broken, or loose? • Is terminating resistance connected to the end of the communications line only? • Is there too much noise? |
| | The Unit is faulty. | Replace the Unit. |
| PWR indicator lit green, COMM, ERR, U.ERR indicators not lit. | A CompoBus/S communications error has occurred. | Check the following items and then restart the Unit. <ul style="list-style-type: none"> • Are cable lengths (trunk/branch lines) suitable? • Are cables shorted, broken, or loose? • Is the wiring configuration correct? • Is terminating resistance connected to both ends of the trunk line only? • Is there too much noise? • Is the node address setting correct? • Are the master and slave using the same communications mode? • Is the power turned ON to the master? |
| | The Unit is faulty. | Replace the Unit. |
| SS indicator not lit. | No Sensors are connected. | Connect the Sensors correctly. |
| | The Sensor adjacent to the Fiber Amplifier Sensor Communication Unit is faulty. | Replace the Unit adjacent to the Communication Unit. |
| | The power was turned ON while the Mobile Console was connected. | Temporarily disconnect the Mobile Console. |
| | The Unit is faulty. | Replace the Unit. |
| SS indicator lit red. | One or more of the connected Sensors is faulty. | Replace the Sensor. |
| | One or more of the connected Sensors has been disconnected. | Connect the Sensors correctly. |
| | The number of registered Sensors is incorrect. | Register the number of Sensors correctly. |
| | One or more of the connected Fiber Amplifier Units is from an unsupported lot number. | Replace the unsupported Fiber Amplifier Units with those from supported lot numbers. (Refer to 1-3-3 <i>Supported Fiber Amplifier Units</i> .) |
| | The number of Sensors connected is more than the permissible number. | 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 faulty. | Replace the Unit. |

6-1-3 Errors in the E3X-CIF11

| Indicator status | Probable cause | Remedy |
|---|---|--|
| PWR indicator not lit. | Power is not supplied to the Unit. | Supply the power to the Unit through the power supply cable. |
| | The current and voltage are outside the permissible range. | Use the current and voltage within the permissible range. |
| | The Unit is faulty. | Replace the Unit. |
| U.ERR indicator lit red. | The Unit is faulty. | Replace the Unit. |
| RXD indicator not lit. | The data to be received through serial communications has not arrived. | Check the following items and then restart the Unit. <ul style="list-style-type: none"> • Are communications commands being sent from the master? • Are cable lengths suitable? • Are cables shorted, broken, or loose? • Is the wiring configuration correct? • Is terminating resistance connected to both ends of the communications line only? • Is there too much noise? |
| | The Unit is faulty. | Replace the Unit. |
| RXD indicator flashing yellow, TXD indicator not lit. | A serial communications error has occurred. | Check the following items and then restart the Unit. <ul style="list-style-type: none"> • Is the unit number set correctly on the rotary switch? • Is the baud rate of the Unit the same as that of the master? • Are the communications settings of the Unit the same as that of the master? • Is the master sending the correct commands? • Is the response delay time too short? • Are cable lengths suitable? • Are cables shorted, broken, or loose? • Is the wiring configuration correct? • Is terminating resistance connected to both ends of the trunk line only? • Is there too much noise? |
| | The Unit is faulty. | Replace the Unit. |
| SS indicator not lit. | No Sensors are connected. | Connect the Sensors correctly. |
| | The Sensor adjacent to the Fiber Amplifier Sensor Communication Unit is faulty. | Replace the Unit adjacent to the Communication Unit. |
| | The power was turned ON while the Mobile Console was connected. | Temporarily disconnect the Mobile Console. |
| | The Unit is faulty. | Replace the Unit. |

| Indicator status | Probable cause | Remedy |
|-----------------------|---|--|
| SS indicator lit red. | One or more of the connected Sensors is faulty. | Replace the Sensors. Determine which Sensors are faulty by checking the number of Sensors able to communicate. |
| | One or more of the connected Sensors has been disconnected. | Connect the Sensors correctly. Determine the Sensor error location by checking the number of Sensors able to communicate. |
| | The number of registered Sensors is incorrect. | Register the number of Sensors correctly. |
| | Pin 3 of the DIP switch is incorrectly set. | Set DIP switch pin 3 correctly. Pin 3 OFF: Set using rotary switch. Pin 3 ON: Set using CompoWay/F message communications. |
| | One or more of the connected Fiber Amplifier Units is from an unsupported lot number. | Replace the unsupported Fiber Amplifier Units with those from supported lot numbers. (Refer to <i>1-3-3 Supported Fiber Amplifier Units</i> .) |
| | The number of Sensors connected is more than the permissible amount. | 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 faulty. | Replace the Unit. |

Appendix A

Communications Timing

Communications Timing

This appendix describes the internal processing times for the Fiber Amplifier Sensor Communication Unit. For details on communications timing for DeviceNet and CompoBus/S masters, refer to the relevant operation manuals.

Maximum ON/OFF Data Input Delay Time

The maximum delay time for the Fiber Amplifier Sensor Communication Unit is as follows:

E3X-SRT21

- With up to 8 Sensors connected:
Maximum ON/OFF data input delay time for Unit $n = 0.1 \times n + 1.5$ (ms)
- With 9 or more Sensors connected:
Maximum ON/OFF data input delay time for Unit $n = 0.2 \times n + 1.5$ (ms)

E3X-DRT21

- With up to 8 Sensors connected:
Maximum ON/OFF data input delay time for Unit $n = 0.1 \times n + 2.5$ (ms)
- With 9 or more Sensors connected:
Maximum ON/OFF data input delay time for Unit $n = 0.2 \times n + 2.5$ (ms)

Maximum Refresh Cycle of Incident Light Level Data (E3X-DRT21 Only)

The following tables list the maximum values for the refresh cycle of incident light level monitoring when the Unit is operating with remote I/O communications in two-word mode with incident light level monitoring (DIP switch pin 1 OFF and pin 2 ON). The maximum refresh cycle of incident light level monitoring depends on whether explicit messages are used and on the number of Sensors that are connected, as shown in the tables.

Using Explicit Messages

| Number of Sensors connected | Maximum refresh cycle of incident light level monitoring (ms) |
|-----------------------------|---|
| 1 | 50 |
| 2 | 100 |
| 3 | 160 |
| 4 | 240 |
| 5 | 330 |
| 6 | 430 |
| 7 | 540 |
| 8 | 670 |
| 9 | 2300 |
| 10 | 2500 |
| 11 | 3000 |
| 12 | 3300 |
| 13 | 3600 |
| 14 | 4200 |
| 15 | 4600 |
| 16 | 4900 |

Explicit messages are also used when the DeviceNet Configurator is connected.

Not Using Explicit Messages

| Number of Sensors connected | Maximum refresh cycle of incident light level monitoring (ms) |
|-----------------------------|---|
| 1 | 20 |
| 2 | 40 |
| 3 | 60 |
| 4 | 90 |
| 5 | 110 |
| 6 | 140 |
| 7 | 170 |
| 8 | 200 |
| 9 | 1500 |
| 10 | 1900 |
| 11 | 2000 |
| 12 | 2200 |
| 13 | 2300 |
| 14 | 2400 |
| 15 | 3000 |
| 16 | 3200 |

Note Normally, the incident light level refresh cycle is much shorter than the values listed in these tables. The refresh cycles can be extended, however, with some timing settings. Consider the maximum refresh cycle when designing the system.

Appendix B

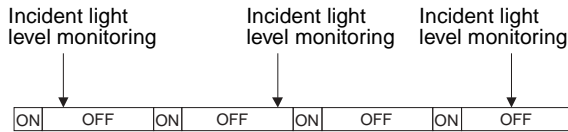
Monitoring Incident Light Levels of E3X-DA6-P Sensors

When E3X-DA6-P Sensors are used, the incident light levels for Sensor output ON and Sensor output OFF can be monitored along with standard incident light levels. The following table shows the typical values for ON/OFF incident light levels.

| Type | Mode | Typical value |
|--------------------------|------|---------------------------|
| ON incident light level | L.ON | ON interval peak value |
| | D.ON | ON interval bottom value |
| OFF incident light level | L.ON | OFF interval bottom value |
| | D.ON | OFF interval peak value |

Details on ON/OFF incident light level monitoring are provided below.

Note When incident light levels are read using standard incident light level monitoring through communications, the communications can cause a delay. When the Sensors ON/OFF switching interval is short, this delay can cause only Sensor OFF data to be read, for example, resulting in the inability to read ON data (in the same way, it is possible that only ON data is read, and OFF data cannot be read). When E3X-DA6-P Sensors are used, in addition to standard incident light levels, incident light levels for Sensor output ON and Sensor output OFF can also be monitored.

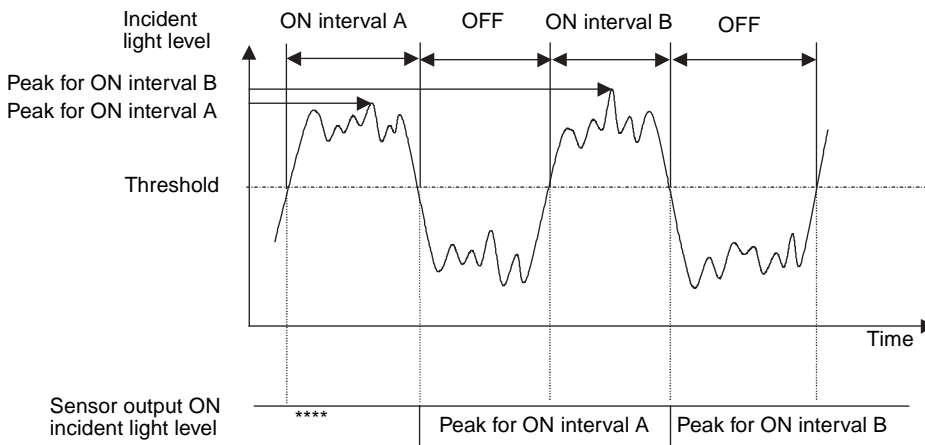


Sensor Output ON Incident Light Level Monitoring

This function distinguishes automatically whether the Sensor's operating mode switch is set to L.ON (light-ON) or D.ON (dark-ON).

- For L.ON (light-ON), the peak incident light level for when the Sensor output is ON is indicated as the Sensor output ON incident light level monitoring data.
- For D.ON (dark-ON), the bottom incident light level for when the Sensor output is ON is indicated as the Sensor output ON incident light level monitoring data.

The following graph shows the incident light levels when the Sensor output is ON and the Sensor is set to L.ON (light-ON).



The incident light level for D.ON (dark-ON) when the Sensor output is ON is the bottom instead of the peak. This operation is as follows:

1. The peak value in ON interval A is held.
2. The moment that the output turns OFF after the ON interval A ends the ON incident light level monitoring value is refreshed as the peak value for ON interval A.

Note The value of the ON incident light level for the period from the time the power is ON until the Sensor output turns ON and OFF again is as follows:

Light-ON: 0000, Dark-ON: 4000

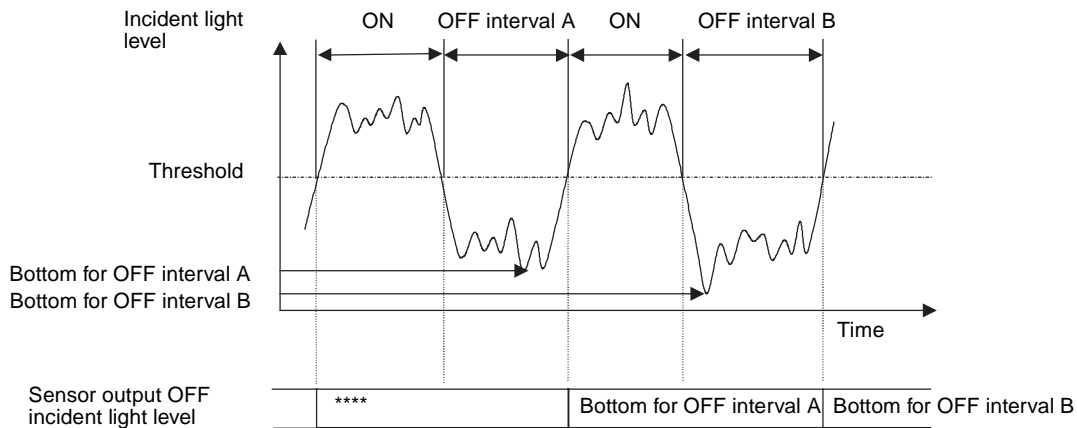
The above values will change, however, if Zero Reset is enabled.

Sensor Output OFF Light Incident Level Monitoring

This function distinguishes whether the Sensor’s operating mode switch is set to L.ON (light-ON) or D.ON (dark-ON).

- For L.ON (light-ON), the bottom incident light level for when the Sensor output is OFF is indicated as the Sensor output OFF incident light level monitoring data.
- For D.ON (dark-ON), the peak incident light level for when the Sensor output is OFF is indicated as the Sensor output OFF incident light level monitoring data.

The following graph shows the incident light levels when the Sensor output is OFF and the Sensor is set to L.ON (light-ON).



The incident light level for D.ON (dark-ON) when the Sensor output is OFF is the peak instead of the bottom.

This operation is as follows:

1. The bottom value for OFF interval A is held.
2. The moment that the output turns ON after the OFF interval A ends the OFF incident light level monitoring value is refreshed as the bottom value for OFF interval A.

Note The value of the OFF incident light level for the period from the time power is ON until the Sensor output turns OFF and ON again, is as follows:

Light-ON: 4000, Dark-ON: 0000

The above values will change, however, if Zero Reset is enabled.

Appendix C

DeviceNet Connection Settings

DeviceNet supports different protocols for remote I/O communications between master and slave devices. Connections are used to manage those protocols. The connections can be set from the DeviceNet Configurator. The DeviceNet remote I/O communications protocol supports four types of connection: Poll, bit-strobe, COS (change of state), and cyclic. The features of these connections are listed in the following table. The Communication Unit supports all of these.

| Connection | Contents | |
|--------------------------|---|--|
| Poll | Used for basic I/O. | |
| Bit-Strobe | Used for input of 8 bytes or less. Sends broadcasting requests from master and receives input from slaves. | Poll and Bit-Strobe connections cannot be used at the same time. |
| COS (Change of state) | This connection can be used to send data to the master from the Fiber Amplifier Sensor Communication Unit only when the data changes. Transmission timing is determined by a heartbeat timer. Data can be sent only when required, thereby reducing the communications load on the network. | COS and Cyclic connections cannot be used at the same time. |
| Cyclic | Communications timing is determined by regular cycles (heartbeat timer). The Communication Unit will send data at a regular cycle. | |

Note To use COS and cyclic connections with the Communication Unit, the DeviceNet master must also support them. Confirm that the master supports COS and cyclic connections before using them. OMRON masters, such as the CS1W-DRM21 and CJ1W-DRM21, support COS and cyclic connections.

Setting Connections without Using Configurator

The connections used for all the IN data of the Fiber Amplifier Sensor Communication Unit are as follows:

- Data of 8 bytes or less: Bit-Strobe
- Data of more than 8 bytes: Poll

Changing Connections Using the Configurator

When a CS1W-DRM21 is used as the DeviceNet master, the OMRON DeviceNet Configurator (Ver. 2.10 or higher) can be used to change the connections. The procedure is as follows:

Step 1: Connecting the Configurator

1. Connect the DeviceNet Configurator.
The parameters of the master as well as the Fiber Amplifier Sensor Communication Unit settings can be changed, so connect the master that will actually be used.
2. Turn ON the power, and put the Configurator online.
3. Upload the network configuration.

Step 2: Selecting the Group

The Fiber Amplifier Sensor Communication Unit divides IN data allocations into the following groups.

| Group | Data | Number of bytes | Connection path |
|-------|---|---|-----------------|
| 1 | ON/OFF data with status | Always 2 bytes. | 200424013003 |
| 2 | ON/OFF data | Always 2 bytes. | 200424023003 |
| 3 | Status data | Always 2 bytes. | 200424033003 |
| 4 | Incident light level data | 2 bytes × number of Units monitored for incident light levels | 200424043003 |
| 5 | ON/OFF data + status data | Always 4 bytes. | 200424053003 |
| 6 | Status data + incident light level data | 2 bytes + (2 bytes × number of Units monitored for incident light levels) | 200424063003 |
| 7 | ON/OFF data + status data + incident light level data | 4 bytes + (2 bytes × number of Units monitored for incident light levels) | 200424073003 |

The data contents for each group is as follows:

1. ON/OFF Data with Status

| Bit 15 | Bit 14 | Bit 13 | Bit 12 | Bit 11 | Bit 10 | Bit 9 | Bit 8 | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|----------------------------|----------------------------------|------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Sensor Communications Flag | Sensor Communications Error Flag | Mobile Console Communications Flag | Unit No. 13 ON/OFF data | Unit No. 12 ON/OFF data | Unit No. 11 ON/OFF data | Unit No. 10 ON/OFF data | Unit No. 9 ON/OFF data | Unit No. 8 ON/OFF data | Unit No. 7 ON/OFF data | Unit No. 6 ON/OFF data | Unit No. 5 ON/OFF data | Unit No. 4 ON/OFF data | Unit No. 3 ON/OFF data | Unit No. 2 ON/OFF data | Unit No. 1 ON/OFF data |

2. ON/OFF Data

| Bit 15 | Bit 14 | Bit 13 | Bit 12 | Bit 11 | Bit 10 | Bit 9 | Bit 8 | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Unit No. 16 ON/OFF data | Unit No. 15 ON/OFF data | Unit No. 14 ON/OFF data | Unit No. 13 ON/OFF data | Unit No. 12 ON/OFF data | Unit No. 11 ON/OFF data | Unit No. 10 ON/OFF data | Unit No. 9 ON/OFF data | Unit No. 8 ON/OFF data | Unit No. 7 ON/OFF data | Unit No. 6 ON/OFF data | Unit No. 5 ON/OFF data | Unit No. 4 ON/OFF data | Unit No. 3 ON/OFF data | Unit No. 2 ON/OFF data | Unit No. 1 ON/OFF data |

3. Status Data

| Bit 15 | Bit 14 | Bit 13 | Bit 12 | Bit 11 | Bit 10 | Bit 9 | Bit 8 | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|----------------------------|----------------------------------|------------------------------------|---|---|---|---|---|-----------|-----------|--------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| Sensor Communications Flag | Sensor Communications Error Flag | Mobile Console Communications Flag | Number of Sensors that can communicate, 2^4 | Number of Sensors that can communicate, 2^3 | Number of Sensors that can communicate, 2^2 | Number of Sensors that can communicate, 2^1 | Number of Sensors that can communicate, 2^0 | Always 0. | Always 0. | Method for setting number of Sensors | Number of Sensors connected, 2^4 | Number of Sensors connected, 2^3 | Number of Sensors connected, 2^2 | Number of Sensors connected, 2^1 | Number of Sensors connected, 2^0 |

4. Incident Light Level Data

| Bit 15 | Bit 14 | Bit 13 | Bit 12 | Bit 11 | Bit 10 | Bit 9 | Bit 8 | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | | | | | | | | | | | | |
|-------------|-----------------|-----------------|--------|--------|---------------------|---------------------|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------------------|--|-----------------------------|--|---|--|---|--|---------------------------------|--|-----------------------------|--|
| Word m | Word $m + 1$ | Word $m + 2$ | : | : | Word $m + n - 2$ | Word $m + n - 1$ | Unit 1 incident light level | | | | | | | | | Unit 2 incident light level | | Unit 3 incident light level | | : | | : | | Unit n – 1 incident light level | | Unit n incident light level | |

Number of Sensors for incident light level monitoring: n

5. ON/OFF Data + Status Data

| | Bit 15 | Bit 14 | Bit 13 | Bit 12 | Bit 11 | Bit 10 | Bit 9 | Bit 8 | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|------------|---|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Word m | ON/OFF data (Same contents as for Group 2) | | | | | | | | | | | | | | | |
| Word m + 1 | Status Data (Same contents as for Group 3) | | | | | | | | | | | | | | | |

6. Status + Incident Light Level Data

| | Bit 15 | Bit 14 | Bit 13 | Bit 12 | Bit 11 | Bit 10 | Bit 9 | Bit 8 | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|----------------|---|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Word m | Status data (Same contents as Group 3) | | | | | | | | | | | | | | | |
| Word m + 1 | Unit 1 incident light level | | | | | | | | | | | | | | | |
| Word m + 2 | Unit 2 incident light level | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | |
| Word m + n - 1 | Unit n - 1 incident light level | | | | | | | | | | | | | | | |
| Word m + n | Unit n incident light level | | | | | | | | | | | | | | | |

7. ON/OFF Data + Status Data + Incident Light Level Data

| | Bit 15 | Bit 14 | Bit 13 | Bit 12 | Bit 11 | Bit 10 | Bit 9 | Bit 8 | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|----------------|---|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Word m | ON/OFF data (Same contents as Group 2) | | | | | | | | | | | | | | | |
| Word m + 1 | Status data (Same contents as Group 3) | | | | | | | | | | | | | | | |
| Word m + 2 | Unit 1 incident light level | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | |
| Word m + n | Unit n - 1 incident light level | | | | | | | | | | | | | | | |
| Word m + n + 1 | Unit n incident light level | | | | | | | | | | | | | | | |

Number of Sensors for incident light level monitoring: n

Allocate any two of the groups as using a poll, bit-strobe, COS, or cyclic connection. Poll and bit-strobe, however, cannot be used at the same time. COS and cyclic also cannot be used at the same time. If bit-strobe is used, no more than 8 bytes of data can be allocated.

Example:

Bit-strobe: Group 2 ON/OFF data

COS: Group 6 status data + incident light level data

Step 3: Setting the Fiber Amplifier Sensor Communication Unit

1. Set the number of bytes for each connection.
2. Select the Fiber Amplifier Sensor Communication Unit to be set from the Configurator screen, and then click the right mouse button.
3. Select **Property** from the menu.
4. Select the **I/O Information** Tab.
5. Click the **Edit** Button.
6. The following dialog box will be displayed. Set the connection and number of bytes to be used.



Example:

Bit-strobe: ON/OFF data

COS: Status data + incident light level data

When number of Sensors for incident light level monitoring is 16, settings for this example are as follows:

Bit-strobe: 2 bytes

COS: 34 bytes (2 bytes × 16 units + 2 bytes)

Note The above items will be returned to the default settings when the Configurator is restarted or a configuration is uploaded. Therefore, errors may occur when operating the Configurator. Be sure to reset the above items to prevent errors from occurring.

Step 4: Setting the DeviceNet Master

1. Select and double-click the DeviceNet master.
2. Register the Fiber Amplifier Sensor Communication Unit if it has not been previously registered.
3. Select the Fiber Amplifier Sensor Communication Unit and click the **Advanced Setting** Button.
4. Click the **Connection** Tab.
5. The following dialog box will be displayed. Select **User Setup** and set the connection path.



Step 5: Setting the COS/Cyclic Heartbeat Timer

From the screen displayed in step 4, set the COS/Cyclic heartbeat timer.

1. For a cyclic connection, data is periodically sent by the slave in a cycle determined by this setting.
2. For a COS connection, data is periodically sent by the slave in a cycle determined by this setting even if the data has not changed, and checks that a communications error has not occurred. The higher the value, the lesser the load on the network. The time required to detect errors, however, is longer with higher values.

Step 6: Master I/O Allocations

1. Select **I/O Allocation (IN)** to display the following screen.
2. Select and double-click the Fiber Amplifier Sensor Communication Unit to be allocated.
3. The following screen will be displayed. Set the values for each field to allocate I/O. (If memory block 2 is used, click the **Setup** Button, and set the area.)



Appendix D

DeviceNet Device Profile

Device Profile

| | | | |
|---------------------------|--|---|---------------------|
| General data | Compatible DeviceNet specifications | Volume I - Release 2.0 Volume II - Release 2.0 | |
| | Vendor name | OMRON Corporation | Vendor ID = 47 |
| | Device profile name | Communication Adapter | Profile number = 12 |
| | Manufacturer catalog number | | |
| | Manufacturer revision | 1.01 | |
| Physical conformance data | Network current consumption | 24 VDC, 70 mA max. (See note.) | |
| | Connector type | Open plug | |
| | Physical insulation | No | |
| | Supported indicators | Module, Network | |
| | MAC ID setting | DIP switch | |
| | Default MAC ID | 0 | |
| | Baud rate setting | Automatic follow-up | |
| | Supported baud rates | 125 kbit/s, 250 kbit/s, and 500 kbit/s | |
| Communications data | Predefined master/slave connection set | Group 2 only server | |
| | Dynamic connection support (UCMM) | No | |
| | Explicit message fragmentation support | Yes | |

Note Excluding Sensor current supply.

Mounted Objects

Identify Object (01 Hex)

| | | |
|--------------|-----------|----------------|
| Object class | Attribute | Not supported. |
| | Service | Not supported. |

| Object instance | Attribute | ID | Contents | Get | Set | Value |
|-----------------|-------------------------|-------------------|----------------------|----------------------|-----|-------|
| | | 1 | Vendor | Yes | No | 47 |
| 2 | Product type | Yes | No | 12 | | |
| 3 | Product code | Yes | No | 145 | | |
| 4 | Revision | Yes | No | 1.01 | | |
| 5 | Status (bits supported) | Yes | No | --- | | |
| 6 | Serial number | Yes | No | Unique for each Unit | | |
| 7 | Product name | Yes | No | E3X-DRT21 | | |
| 8 | State | No | No | --- | | |
| | Service | DeviceNet service | | Parameter option | | |
| | | 05 | Reset | No | | |
| | | 0E | Get_Attribute_Single | No | | |

Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.

Cat. No. Z152-E1-01



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

| Revision code | Date | Revised content |
|---------------|----------------|---------------------|
| 01 | September 2001 | Original production |

Revision History
