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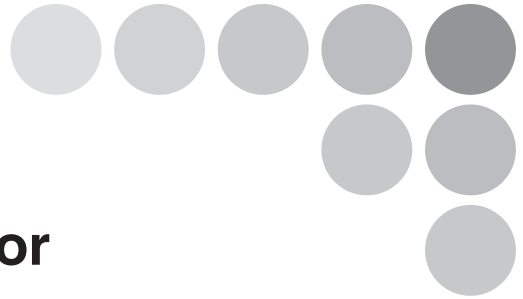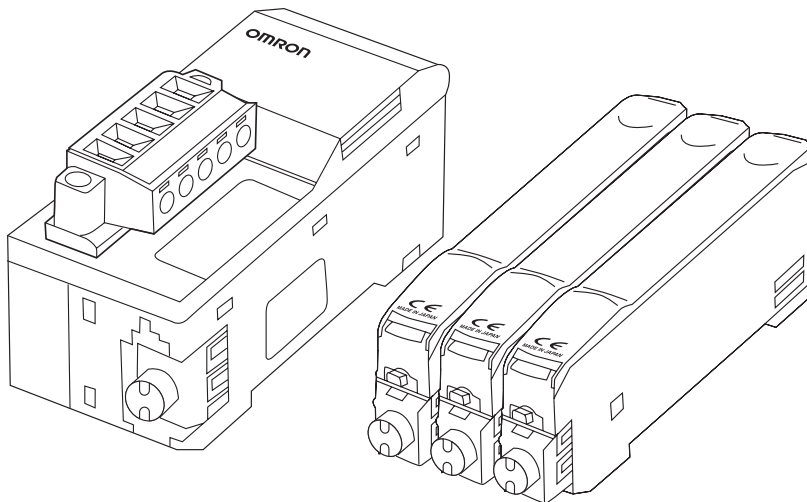
Contact us

OMRON

**Communication Unit
For Digital Type Sensor**

E3X-DRT21-S (DeviceNet)

User's Manual

Cat. No. Z223-E1-03

Introduction

This manual provides information regarding functions, performance and operating methods that are required for using Communication Unit for Digital Type Sensor E3X-DRT21-S (DeviceNet).
This communication unit is a communication unit to be used for Digital Type Sensor E3X-DA-S Series, E3X-MDA Series, Digital Separate Amplifier Laser Sensor E3C-LDA Series, and Digital Separate Amplifier Proximity Sensor E2C-EDA Series, which had been developed with Omron's advanced technologies and successful experience.

● 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.
- ・Note that this product must be used in the range of the general specifications.

● Version Upgrades

The software version will be upgraded as required. Versions are indicated in the model number as follows: E3X-DRT21-S Ver.□.

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User's Manual

**Communication Unit
for Digital Type Sensor
E3X-DRT21-S (DeviceNet)**

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Meanings of Signal Words

The following signal words are used in this manual.

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

Alert statements in this Manual

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

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

Precautions for Safe Use

Please observe the following precautions for safe use of E3X-DRT21-S.

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

Precautions for Correct Use

Please install this product correctly according to this manual.

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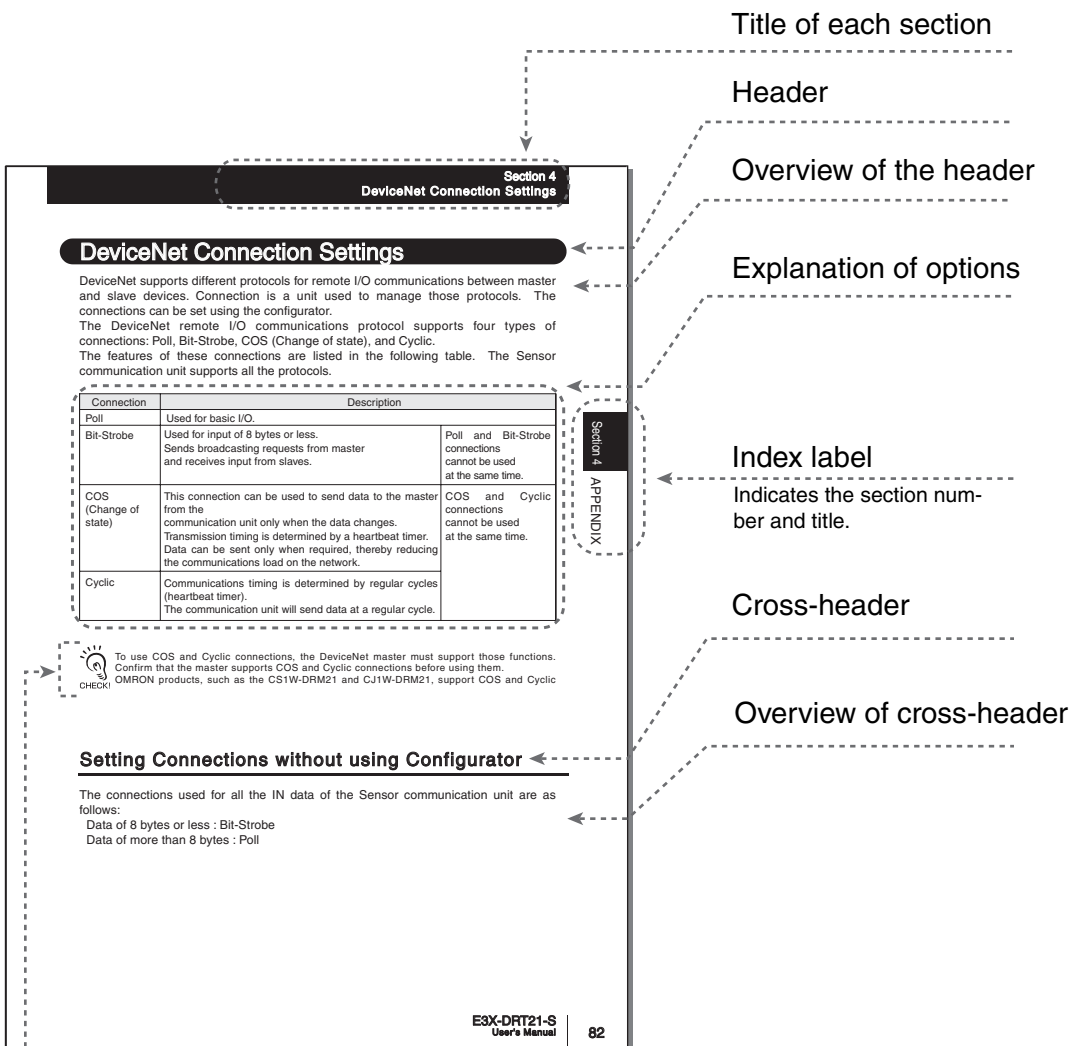   - Direct vibration or shock

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

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

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

Editor's Note

Page Format

Title of each section

Header

Overview of the header

Section 4
DeviceNet Connection Settings

DeviceNet Connection Settings

Explanation of options

DeviceNet supports different protocols for remote I/O communications between master and slave devices. Connection is a unit used to manage those protocols. The connections can be set using the configurator.

The DeviceNet remote I/O communications protocol supports four types of connections: Poll, Bit-Strobe, COS (Change of state), and Cyclic.

The features of these connections are listed in the following table. The Sensor communication unit supports all the protocols.

Connection	Description	
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 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.	

Section 4
APPENDIX

Index label

Indicates the section number and title.

CHECK! To use COS and Cyclic connections, the DeviceNet master must support those functions. Confirm that the master supports COS and Cyclic connections before using them. OMRON products, such as the CS1W-DRM21 and CJ1W-DRM21, support COS and Cyclic

Cross-header

Setting Connections without using Configurator

Overview of cross-header

The connections used for all the IN data of the Sensor communication unit are as follows:
Data of 8 bytes or less : Bit-Strobe
Data of more than 8 bytes : Poll

E3X-DRT21-S
User's Manual 82

Supplementary Explanation

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

CHECK!

* This page does not exist.

■ Meaning of Symbols

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

■ Visual Aids

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

Indicates pages where related information can be found.

Indicates information helpful in operation.

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

MEMO

Contents

Introduction

MEMO

S e c t i o n   1
# Overview

Features and System Configuration

Overview

The Communication Unit (E3X-DRT21-S) is a communication slave that performs the ON/ OFF output for sensors, monitoring the detection level, writing parameters, and an operation between Digital Type Sensors and PLCs via DeviceNet communication. (Supported sensors are: Fiber Sensors E3X-DA-S/MDA series, Separate Amplifier Laser Sensors E3X-LDA series, and Separate Amplifier Proximity Sensor E2C-EDA series.)

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

CHECK! If the Sensor is connected using a connector with a cable, external noise may prevent correct communication of ON/OFF signals to the Communication Unit. If a high level of reliability is required, use a cordless connector (E3X-CN02).

Device Net

Optical Communication

PLC
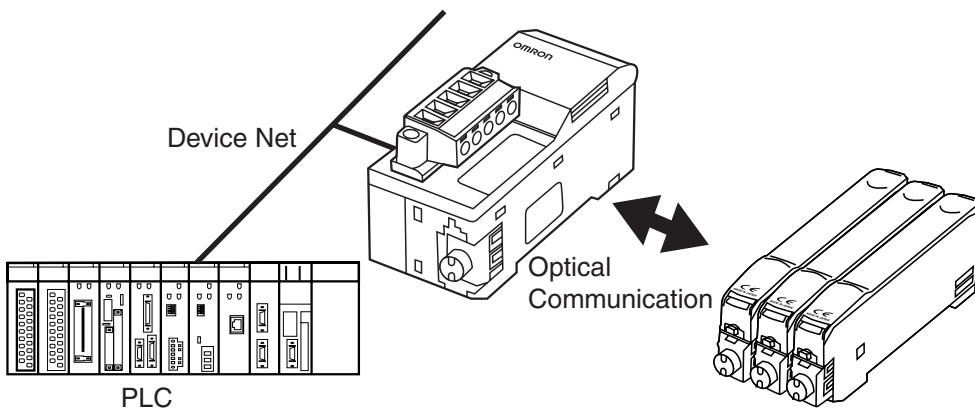
Features

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

● **Remote I/O communication slave**

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

● **Message communications**

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

● **Configurator**

By using configurators (version 2.10 or later) connected to the network on PCs, parameters for each device (DeviceNet-supported products including sensors, temperature controller, etc.) can be set to download them to all devices all at once.
Moreover, the ON/OFF output and monitoring the detection level for sensors, and teaching operations can be performed.

● **Monitoring sensor's operating time**

Operating time (Turn-on time) for Amplifier Unit of sensors and Sensor Heads can be monitored respectively by configurators.
By setting the warning time, it is possible to indicate a warning that operating time exceeds the limit of the setting.
It is useful for a maintenance design for sensors.
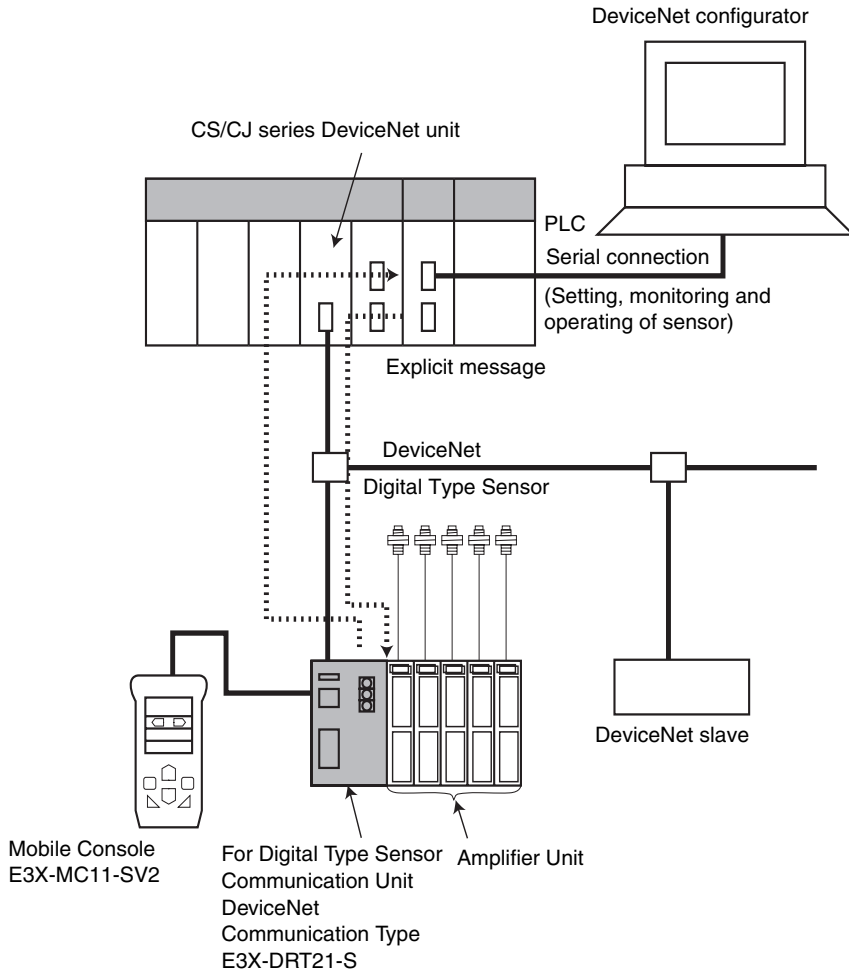
● **Mobile console connection**

Mobile console E3X-MC11-SV2 for Digital Type Sensors can be connected to the Communication Unit. (Head unit for connecting the mobile console is not required.)

The mobile console can be used in combination with monitoring ON/OFF output. However, it cannot be used in combination with monitoring the detection level, messages communications and device
CHECK! parameters transfer from the configurator.

System Configuration

DeviceNet configurator

CS/CJ series DeviceNet unit

PLC

Serial connection

(Setting, monitoring and operating of sensor)

Explicit message

DeviceNet

Digital Type Sensor

DeviceNet slave

Mobile Console
E3X-MC11-SV2

For Digital Type Sensor
Communication Unit
DeviceNet
Communication Type
E3X-DRT21-S

Amplifier Unit

CHECK!

Mobile console cannot be used at the same time as explicit messages communications and setting, monitoring, and operating from the configurator.

S e c t i o n 2
Installation and Connection

Specifications and External Dimensions

Specifications

Item		Description
Communications method		DeviceNet Communications
Communi-cations	Remote I/O communications	ON/OFF output, status, and monitoring the detection level (details of the digital display)
	Message communications	Setting parameters using Explicit messages
	Configurator	Editing parameters for slave devices using a configurator/It depends on device monitoring functions
Mobile console connection *2		E3X-MC11-SV2 can be connected (Note that it cannot be used in combination with monitoring detection level via remote I/O communications, Explicit message communications, and setting/monitoring/operating of Sensors from configurator)
Power supply		Supplies from DeviceNet communications connector (Power is supplied to all Sensors being connected via wire-saving connectors.)
Maximum number of connected Sensors		13 or 16 (depending on the operating mode) (Note that the Sensors that occupy the units for two must be counted as two units.)
Connectable Sensors		Fiber Sensors Separate Amplifier Laser Sensors Separate Amplifier Proximity Sensors Refer to *Connectable Sensors* on page 22 for details.
Power supply voltage		DC11 to 25 V
Current consumption *1		70 mA max.
Operating ambient temperature		-20 to +55°C
Operating ambient humidity		35% to 85% (with no condensation)
Storage ambient temperature		-30 to +70°C
Size (mm)		30.0 (W) x 34.6 (H) x 71.3 (D)
Weight **packed state		Approx. 150 g

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

*2. E3X-DA7-S and E3X-DA9-S cannot be used.

External Dimensions
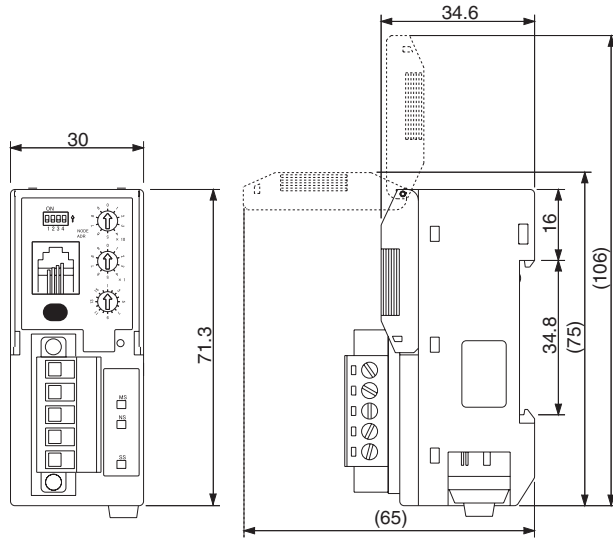
Connecting Sensors

Connectable Sensors

The Communication Unit can be connected with the following Sensors.

An optional reduced-wiring connector (i.e., slave connector or cordless connector) is required to connect the Sensor.

Type	Model	Types	Output type	Threshold value	Number of units occupied
Fiber Sensors	E3X-DA7-S	Hi-grade type	NPN	2	2
	E3X-DA9-S		PNP		
	E3X-DA6-S	Standard type	NPN	1	1
	E3X-DA8-S		PNP		
	E3X-DAB6-S	For mark-detecting (Blue LED)	NPN		
	E3X-DAB8-S		PNP		
	E3X-DAG6-S	For mark-detecting (Green LED)	NPN		
	E3X-DAG8-S		PNP		
	E3X-DAH6-S	Infrared LED	NPN		
	E3X-DAH8-S		PNP		
	E3X-DA6TW-S	Advanced Two-output type	NPN	2	2
	E3X-DA8TW-S		PNP		
	E3X-DA6RM-S	Advanced External input type	NPN	1	1
	E3X-DA8RM-S		PNP		
	E3X-MDA6	2CH type	NPN	2	2
	E3X-MDA8		PNP		
Separate Amplifier Laser Sensors	E3C-LDA6	Two-output type	NPN	2	2
	E3C-LDA8		PNP		
	E3C-LDA7	External input type	NPN	1	1
	E3C-LDA9		PNP		
Separate Amplifier Proximity Sensors	E2C-EDA6	Two-output type	NPN	2	2
	E2C-EDA8		PNP		
	E2C-EDA7	External input type	NPN	1	1
	E2C-EDA9		PNP		

- If the Sensor is connected using a connector with a cable, external noise may prevent correct communication of ON/OFF signals to the Communication Unit.
- Note that prewired models cannot be connected. Connecting these units will disable the power reset function.
- E3X-DA-N series cannot be connected.
- Lot No. of E3X-DRT21-S must use it since November 1, 2008 when you use the function only of shape E3X-DA7 and E3X-DA9.

Number of Connectable Sensors

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

| Type	Setting	Number of Connectable Sensors
DeviceNet Communication Type (E3X-DRT21-S)	Remote I/O communications in 1CH mode	Max. 13
	Remote I/O communications in 2CH mode or Remote I/O communications in 2CH mode with monitoring detection levels	Max. 16

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

CHECK!

Connecting and Identifying Sensors (Unit Number)

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

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

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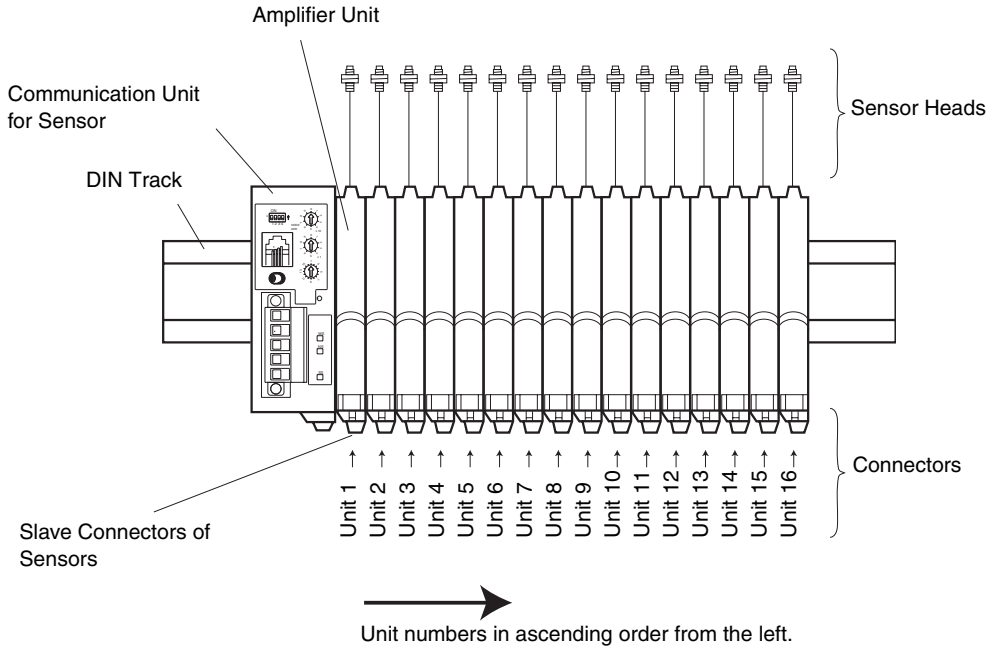
The Communication Unit identifies the connected Sensors according to the unit numbers. Unit numbers of sensors are assigned to the units from unit number 1 starting from the communication unit side. Note that some Sensors occupy two unit numbers.

Section 2 Installation and Connection