OMRON

E3NW-CCL

CC-Link Digital Sensor Communications Unit

User's Manual

Cat. No. E431-E1-09

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Introduction

Thank you for purchasing the E3NW-CCL CC-Link Digital Sensor Communications Unit.
This manual contains information required to use the E3NW-CCL.
Please read this manual carefully and be sure you understand the information provided before attempting to use the E3NW-CCL.
After reading this manual, keep it in a safe and convenient location for future reference.

Intended Audience

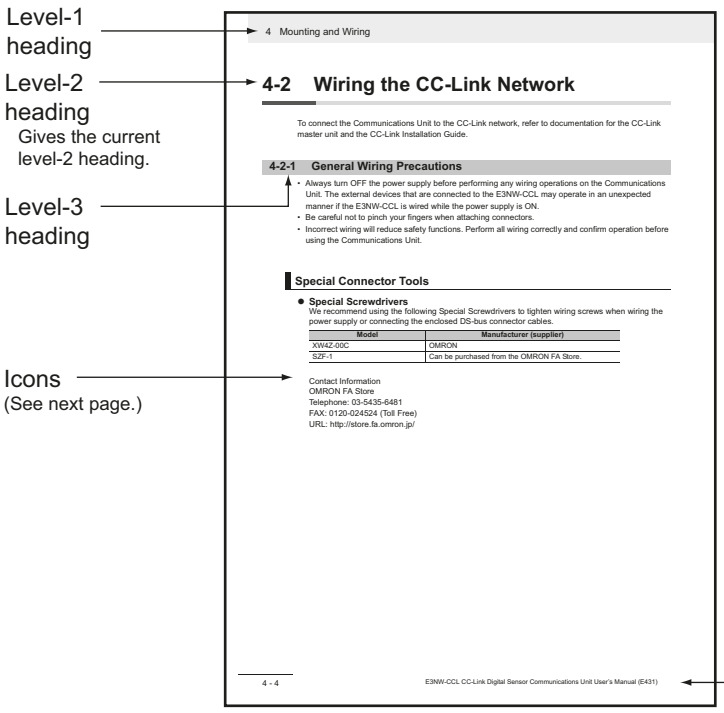
This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

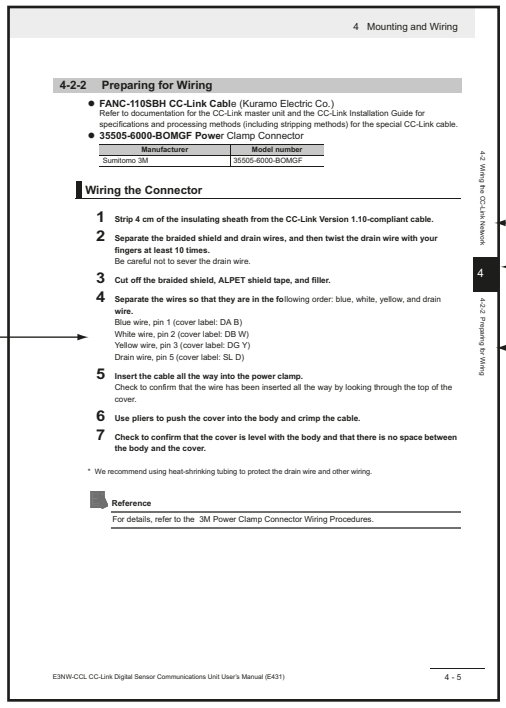
- Personnel in charge of installing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of managing FA facilities.

Reading This Manual

Page Structure

The following page structure is used in this manual.





Icons

The following icons are used in this manual.

Precautions for Safe Use

Precautions on what to do and what not to do to ensure using the product safely.

Precautions for Correct Use

Precautions on what to do and what not to do to ensure proper operation and performance.

Additional Information

Convenient information or information for reference in product application.

Structure of This Manual

This manual consists of the following sections.

Section		Description
Section 1	CC-Link Configuration Elements	Describes the features of CC-Link and the configuration elements in a network.
Section 2	About the E3NW-CCL	Provides an overview of the E3NW-CCL.
Section 3	Basic Application Procedures	Describes how to set up and use a Communications Unit based on a simple system setting example.
Section 4	Mounting and Wiring	Describes how to mount the E3NW-CCL and how to connect the CC-Link network, connect the power supply, and wire the E3NW-CCL.
Section 5	E3NW-CCL Hardware Specifications	Provides the hardware specifications of the E3NW-CCL.
Section 6	E3NW-CCL Function Specifications	Describes the functions of the E3NW-CCL.
Section 7	Troubleshooting and Maintenance	Describes troubleshooting and inspections for the person that will perform troubleshooting and routine inspections.
Appendices	Appendices	Describes executable commands, program examples, and the specifications of the E3NW-DS Distributed Sensor Unit.

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Safety Precautions

Definition of Precautionary Information

This manual uses the following signs and symbols to ensure safe operation of this product.
These signs and symbols are important for avoiding personal injury or damage to the product. Make sure that they are observed.

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally there may be severe property damage.
⚠ Caution	Indicate a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

Symbols

The circle and slash symbol indicates operations that you must not do.
The specific operation is shown in the circle and explained in text.
This example indicates prohibiting disassembly.

The triangle symbol indicates precautions (including warnings).
The specific operation is shown in the triangle and explained in text.
This example indicates a general precaution.

The filled circle symbol indicates operations that you must do.
The specific operation is shown in the circle and explained in text.
This example shows a general precaution for something that you must do.

⚠ WARNING

Do not touch the terminals or disassemble the Unit and touch any internal components while power is being supplied. Do not supply power while the cover is open.
Doing so may result in electric shock.

Do not attempt to disassemble, repair, or modify any Units. Any attempt to do so may result in electric shock.

Provide safety measures in external circuits, i.e., not in the Sensor Communications Unit, in order to ensure safety in the system if an abnormality occurs due to malfunction of the PLC or another external factor affecting the PLC operation. Not doing so may result in serious accidents.

(1) Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.

(2) The outputs from the Sensor Communications Unit may remain ON or OFF due to deposition or burning of the output relays or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.

Precautions for Safe Use

Observe the following precautions when using the Digital Sensor Communications Unit:

Power Supply

- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable.
- Always turn OFF the power supply to the PLC, Slave Units, and other Units before attempting any of the following.
  - Assembling the Units (Expansion Units)
  - Mounting or dismounting terminal blocks on Remote I/O Terminals
  - Replacing component relays
  - Setting DIP switches or node address switches
  - Connecting or wiring the cables

Installation

- Before touching the Unit, be sure to first touch a grounded metallic object in order to discharge any static buildup.
- Be sure that the terminal blocks, communications cables, and other items with locking devices are properly locked into place.
- Always use the enclosed End Plates to securely mount the Units to the DIN Track.
- Be sure that all the terminal screws and cable connector screws of the product are tightened to the torque specified in the relevant manuals.
- Be sure that the screws of the terminal block are tightened to the torque specified in the relevant manuals. Insufficient tightening torque may result in fire, malfunction, or failure.
- Always use specified communications cables and connectors.
- Abide by the specifications for the communications distance and the number of Units to be connected.
- When using cables in multiple systems, be sure to keep the distance of 5 mm or more between any two cables to avoid operational instability due to interference.

Wiring

- Confirm that the wiring and switch settings are correct before supplying power.
- Use the correct wiring tools to perform wiring.
- Confirm terminal polarity before wiring.
- Do not let a piece of metal enter the Units when wiring or installing.
- Be careful of the following when wiring communications cables.
  - Keep communications cables away from power lines and high-voltage lines.
  - Do not fold over communications cables.
  - Abide by the specifications for the communications cable distance.
  - Do not place objects on top of communications cables.
  - Always wire communications cables through a duct.

Handling

- Use the special packing box to transport the Unit. Also, protect the Unit from being exposed to excessive vibration or impact during transportation.
- Do not forcibly bend or pull the cables.
- Check the user program for proper execution before actually running it on the Unit.
- Confirm that no adverse effect will occur in the system before attempting any of the following.
  - Changing the operating mode of the PLC
  - Force-setting/force-resetting bits in memory
  - Changing the present value or any set value of any word from the user program
- Do not use thinner or similar solvent for cleaning. Use commercial alcohol.

External Circuits

- Install external breakers and take other safety measures against short-circuiting in external wiring.

Applicable standards

- EN61326-1
- Electromagnetic environment : Industrial electromagnetic environment
  (EN/IEC 61326-1 Table 2)

Precautions for Correct Use

- Install the Unit properly as shown in this manual. Not doing so may result in a failure of the Unit.
- Do not install the Digital Sensor Communications Unit in locations subject to the following conditions:
  - Locations subject to direct sunlight
  - Locations subject to temperatures or humidity outside the range specified in the specifications
  - Locations subject to condensation as the result of severe changes in temperature
  - Locations subject to corrosive or flammable gases
  - Locations subject to dust (especially iron dust) or salts
  - Locations subject to exposure to water, acid, oil, or chemicals
  - Locations subject to shock or vibration
- When you wire the power supply cable, always connect the frame ground (FG).
- Be sure to observe the voltage specifications when performing wiring between communications path and power supply, or at I/O crossovers. Wrong wiring may cause a failure of the Unit.
- Wire the Unit properly as indicated in this manual.
- Use the correct wiring parts to perform wiring.
- Take appropriate and sufficient countermeasures when using the Unit in the following locations:
  - Locations subject to static electricity or other forms of noise
  - Locations subject to strong electromagnetic fields
  - Locations subject to possible exposure to radioactivity
  - Locations close to power supplies
- Do not drop the Digital Sensor Communications Unit or expose it to any excessive vibration or shock. Doing so may result in damage to the Digital Sensor Communications Unit or malfunction.
- The Digital Sensor Communications Unit provides power to the connected Sensors. Therefore, the operation of the Sensors may become unstable if there are abnormalities in the power supply, such as a drop in the power supply voltage at startup. If Sensor operation is unstable, check the voltage specifications and wiring, and then cycle the power supply.

Conformance to EC Directives

Applicable Directives

- EMC Directive

Concepts

● EMC Directive

The Digital Sensor Communications Unit is an electrical device that is built into other machines. To enable more easily building it into other machines, it has been checked for conformity to EMC standards.*
EMC-related performance of the Unit will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which it is installed.
The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

* Note: Applicable EMC (Electromagnetic Compatibility) standards are as follows:
EMS (Electromagnetic Susceptibility): EN 61326-1
EMI (Electromagnetic Interference): EN 61326-1

Conformance to EC Directives

The Digital Sensor Communications Unit complies with EC Directives. To ensure that the machine in which the Unit is used complies with EC Directives, the Unit must be installed as follows:

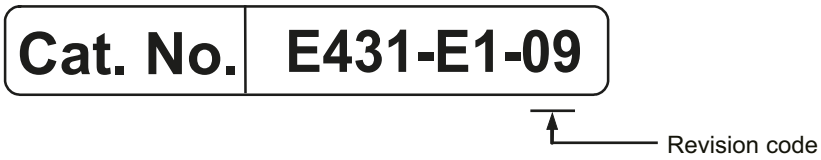
- The Unit must be installed within a control panel.
- You must use reinforced insulation or double insulation for the DC power supplies for communications, internal power, and I/O. The DC power supplies must provide stable power even when a momentary power interruption of 10 ms occurs in the input.
  We recommend using an OMRON S8JX-series Power Supply.*
- Products complying with EC Directives also conform to the Emission Standards (EN 61326-1). Radiated emission characteristics (10-m regulations) may vary depending on the configuration of the control panel used, other devices connected to the control panel, wiring, and other conditions. You must therefore confirm that the overall machine or equipment complies with EC Directives.
- Compliance was confirmed for I/O wiring of less than 30 m.

* Conformance with the EMC Directive was confirmed when using the recommended power supply.

Revision History

A manual revision code appears as a suffix to the catalog number at the bottom of the front and back covers of this manual.

Example



Revision code	Date	Revised content
01	September 2013	Original production.
02	October 2013	Page 4-6: Changed part of illustration. Page 7-4: Changed part of illustration.
03	July 2014	Page 5: Removed section from top of page. Pages 6-4 and 6-6: Changed signal name for RX(n+2)2. Page A-3: Removed row for command type 21. Pages 2-2, 2-3, 6-13, A-2 to A-7, and A-13: Added/updated information for E9NC-TA0. Page 4-5: Corrected Power Clamp Connector model number. Page 6-5: Corrected device numbers in the last table row.
04	April 2015	Added accessories. Deleted connector logo. Corrected minor errors.
05	July 2015	Page 11 : Added applicable standards. Corrected mistakes.
06	December 2017	E3NX-FA function added. E3NX-MA, FAH/E2NC-EA/E9NC-AA, VA added. Corrected mistakes.
07	May 2018	Added the E9NC-VD. Corrected mistakes.
08	February 2019	E3NX-FA and E3NX-MA function added.
09	March 2020	E9NC-TA function added. Corrected mistakes.

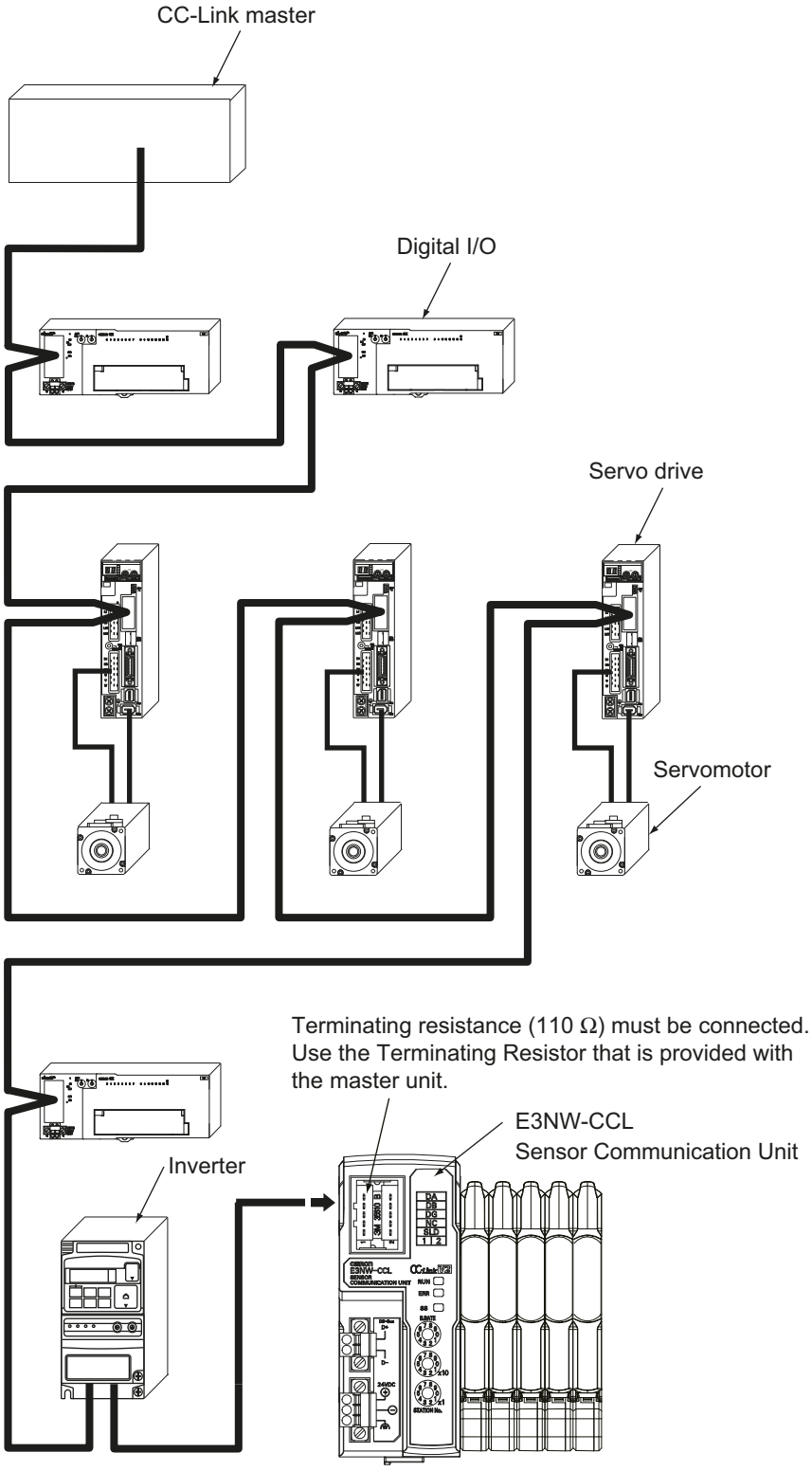
1

CC-Link Configuration Elements

This section provides an overview of a CC-Link network.

1-1 CC-Link Connection Example

The following figure shows a CC-Link network connection example.

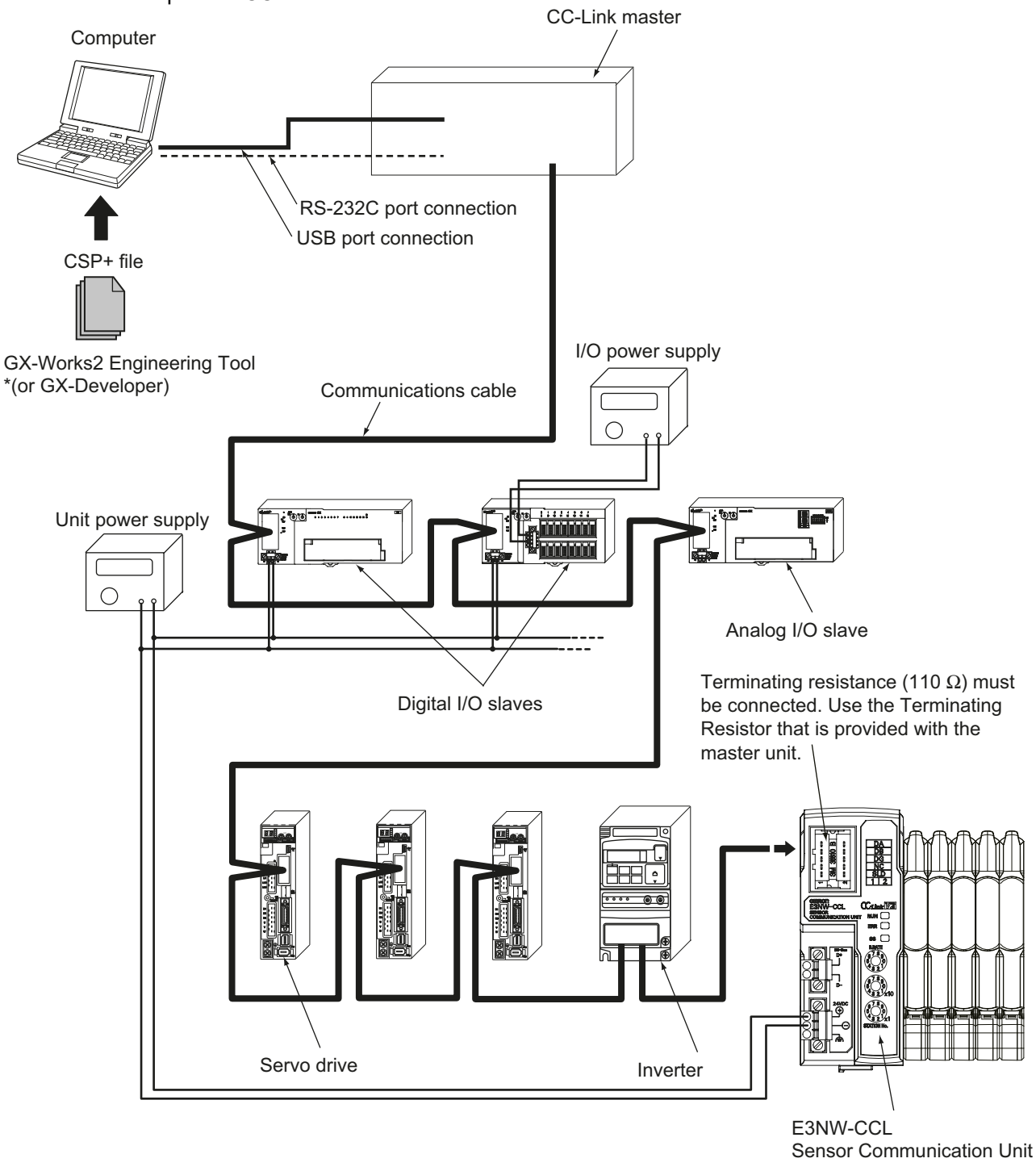


1-2 CC-Link Network Configuration Elements

This section describes the configuration devices that make up a CC-Link network and their uses.

1-2-1 CC-Link Network Configuration Devices

An example of a CC-Link network is shown below.



1-3 Outline of Configuration Devices

This section describes each of the devices in a CC-Link network.

CC-Link Master

The CC-Link master manages the CC-Link network, monitors the status of the slave units, and exchanges I/O data with slave units. Refer to CC-Link documentation from Mitsubishi Electric Corporation or other sources for details on CC-Link.

CC-Link Slaves

CC-Link slave units output data received from the CC-Link master unit over the CC-Link network, and send input data to the CC-Link master unit through the CC-Link network.
There are different types of slaves, such as digital I/O slaves and analog I/O slaves. The E3NW-CCL is also classified as a CC-Link slave unit.

Communications Cable

Refer to documentation for the CC-Link master unit and the *CC-Link Installation Guide* for the specifications and processing methods (including stripping methods) for CC-Link cable.

CSP+ (CC-Link System Profile Plus) File

CSP+ is an abbreviation for CC-Link Family System Profile. A CSP+ file contains a profile of all the information required to start, operate, and maintain a device compatible with CC-Link and CC-Link IE Field, such as network parameter and memory mapping information.
CC-Link Family users can use CSP+ files to easily set parameters from the same Engineering Tool. However, CSP+ can be used only when GX-Works2 is used for the Engineering Tool. The GX-Developer cannot be used.

Unit Power Supply

This is the power supply for slave communications and internal operations.
Separate the unit power supply from the I/O power supply.
For details on the E3NW-CCL Unit power supply, refer to *4-3 Connecting the Unit Power Supply* on page 4-8.

I/O Power Supply

This is the power supply for I/O operations with external devices connected to the slave units.
Separate the I/O power supply from the Unit power supply.
The E3NW-CCL does not require an I/O power supply.

2

About the E3NW-CCL

This section provides an overview of the E3NW-CCL CC-Link Digital Sensor Communications Unit.

2-1 E3NW-CCL Overview

This section provides an overview of the E3NW-CCL Sensor Communications Unit.

2-1-1 Features of the Sensor Communications Unit

The Sensor Communications Unit is used to monitor Sensor Amplifier Unit ON/OFF outputs and detection levels, write parameters, and perform operations between Digital Sensors and a PLC with a CC-Link communications interface.

2-1-2 E3NW-CCL Operating Modes

The E3NW-CCL has two operating modes. The operating mode is selected via the baud rate/operating mode setting switch.

Reduced I/O Mode: This mode allows for many devices to be connected by limiting the number of allocated stations and allocated points.

Monitor Mode: This mode allows for realtime monitoring and control to utilize Amplifier Unit settings and the monitoring.

Operating mode		Reduced I/O Mode	Monitor Mode
CC-Link mode		Remote Network Version 1 Mode Remote Network Version 2 Mode Remote Network Addition Mode	Remote Network Version 2 Mode Remote Network Addition Mode
Allocated station numbers		2	3
Number of allocated nodes	RX/RY	64	320
	RWr/RWw	8	48
Expanded cyclic setting		---	Quadruple setting
Maximum connectable Communications Units in one CC-Link system		32	21
Number of connectable Sensors*1		16	16
Maximum connectable Distributed Sensor Units		8	8
Sensor ON/OFF status transfer		OK	OK
Simultaneous writing of the same threshold value to more than one Sensor Amplifier Unit		OK	OK
Batch transfer of Sensor Amplifier Unit detection levels		NA	OK
Sensor Amplifier Unit detection level peak value and bottom value switching		NA	OK
Baud rate/operating mode setting switch		0: 156 kbps	5: 156 kbps
		1: 625 kbps	6: 625 kbps
		2: 2.5 Mbps	7: 2.5 Mbps
		3: 5 Mbps	8: 5 Mbps
		4: 10 Mbps	9: 10 Mbps

*1 This is the total number of Sensor Amplifier Units that can be connected to the Communications Unit and Distributed Sensor Units.

Symbols: OK: Supported, NA: Not supported.

2-2 Connectable Sensor Amplifier Units

This section describes the models and features of the Sensor Amplifier Units that can be connected to the E3NW-CCL.

2-2-1 List of Sensor Amplifier Units

Type	Model number	Features
Smart Fiber Amplifier Unit	E3NX-FA□0	A standard, easy to operate and easy to configure Fiber Amplifier Unit.
Smart Laser Amplifier Unit	E3NC-LA0	A Laser Sensor that can reliably detect workpieces even with a small spot diameter
Smart Laser Amplifier Unit (CMOS)	E3NC-SA0	A CMOS-type Laser Sensor that can reliably detect steps.
Contact-type Smart Sensor	E9NC-TA0	A durable contact-type sensor.
Smart Fiber Amplifier Unit	E3NX-MA0	Fiber Amplifier with Light Emission/Reception
Smart Fiber Amplifier Unit	E3NX-FAH0	Fiber Amplifier with Near Infrared Light Emission/Reception
Smart Amplifier Separation Proximity Unit	E2NC-EA□0	Proximity Sensor Amplifier
Smart Analog Input Unit	E9NC-AA□0	Current (4 to 20 mA) Input Amplifier
Smart Analog Input Unit	E9NC-VA□0	Voltage (1 to 5 V) Input Amplifier
Smart Analog Input Unit	E9NC-VD□0	Voltage Differential (–2 to 2 V) Input Amplifier

* Commands to the E9NC-TA0 are supported from E3NW-CCL Ver. 1100, and the E3NX-MA0, E2NC-EA□0, and E9NC-AA□0 / VA□0/ VD□0 are supported from E3NW-CCL Ver. 1160.
You can check the version with read command "B". (Refer to page A-2)

2-2-2 Number of Connected Sensor Amplifiers

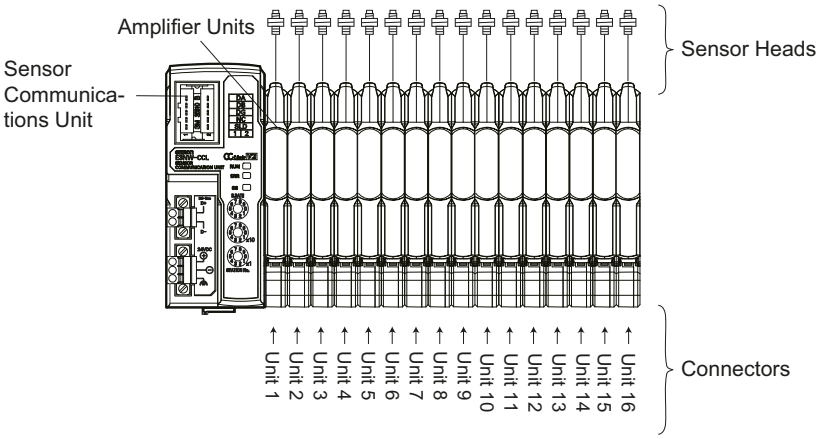
You can connect the Sensor Communications Unit to up to 16 Sensor Amplifier Units, including any Sensor Amplifier Units connected to Distributed Sensor Units.

Up to 10 Sensor Amplifier Units can be connected to a Distributed Sensor Unit.

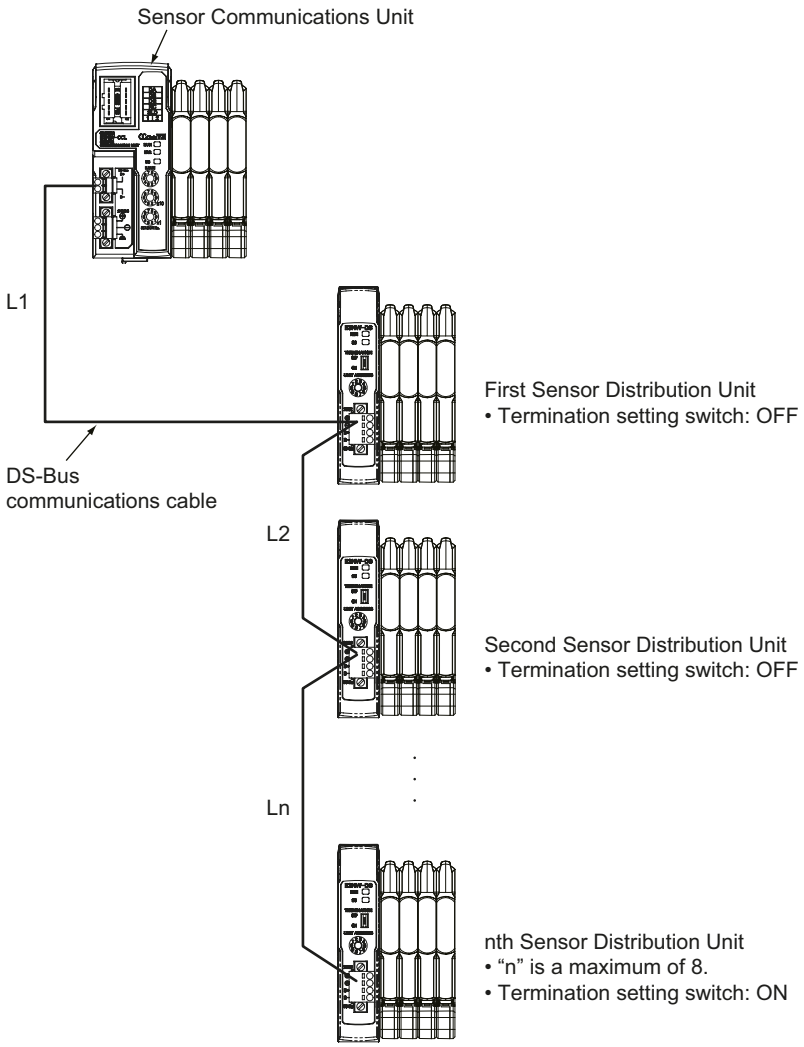
* Also refer to the Sensor Amplifier specifications, as the number of connected units varies depending on the Sensor Amplifier specifications.

The following are some connection examples.

Example 1: Communications Unit Only



Example 2: Connecting a Communications Unit and Distributed Sensor Units



3

Basic Application Procedures

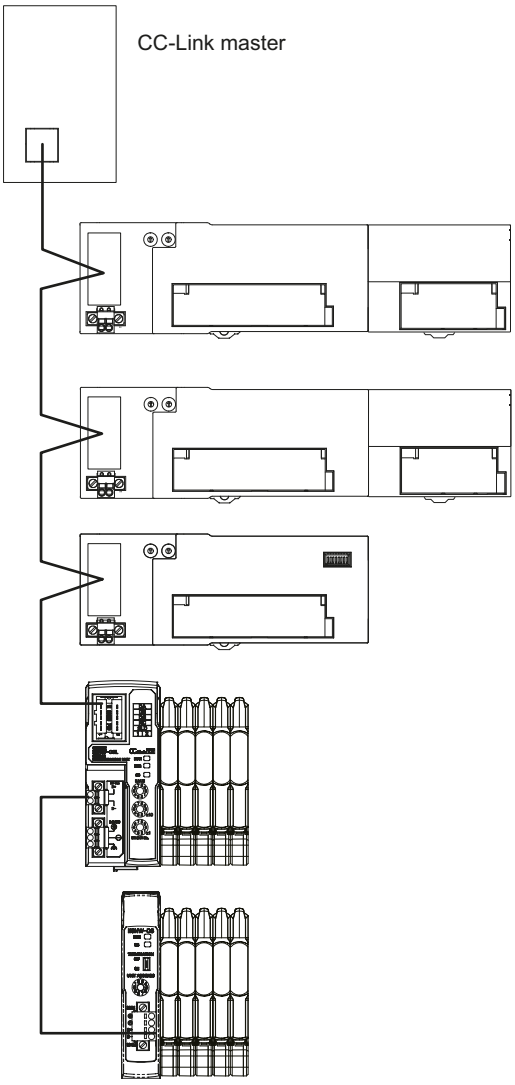
This section explains how to use E3NW-CCL CC-Link Digital Sensor Communications Units based on basic setting examples.

3-1 Setting Examples and Basic Procedures

This section describes how to set up a Sensor Communications Unit based on a simple system setting example.

3-1-1 System Setting Example

Connect each of the following slaves to the CC-Link master and configure the settings.



Digital I/O slave (16 inputs)
Set the station number to 1. (One station is allocated.)

Digital I/O slave (16 outputs)
Set the station number to 2. (One station is allocated.)

Analog Input Slave (4 inputs)
Set the station number to 3. (Three stations are allocated.)

E3NW-CCL Sensor Communications Unit

Set the station number to 6
(Reduced I/O Mode: Two stations are allocated,
Monitor Mode: Three stations are allocated.)

Up to eight E3NW-DS Units can be connected to one E3NW-CCL Unit. A maximum of 16 Sensor Amplifier Units can be connected to the E3NW-CCL, and a maximum of 10 Sensor Amplifier Units can be connected to each E3NW-DS. However, a total maximum of 16 Sensor Amplifier Units can be connected in one E3NW-CCL system.

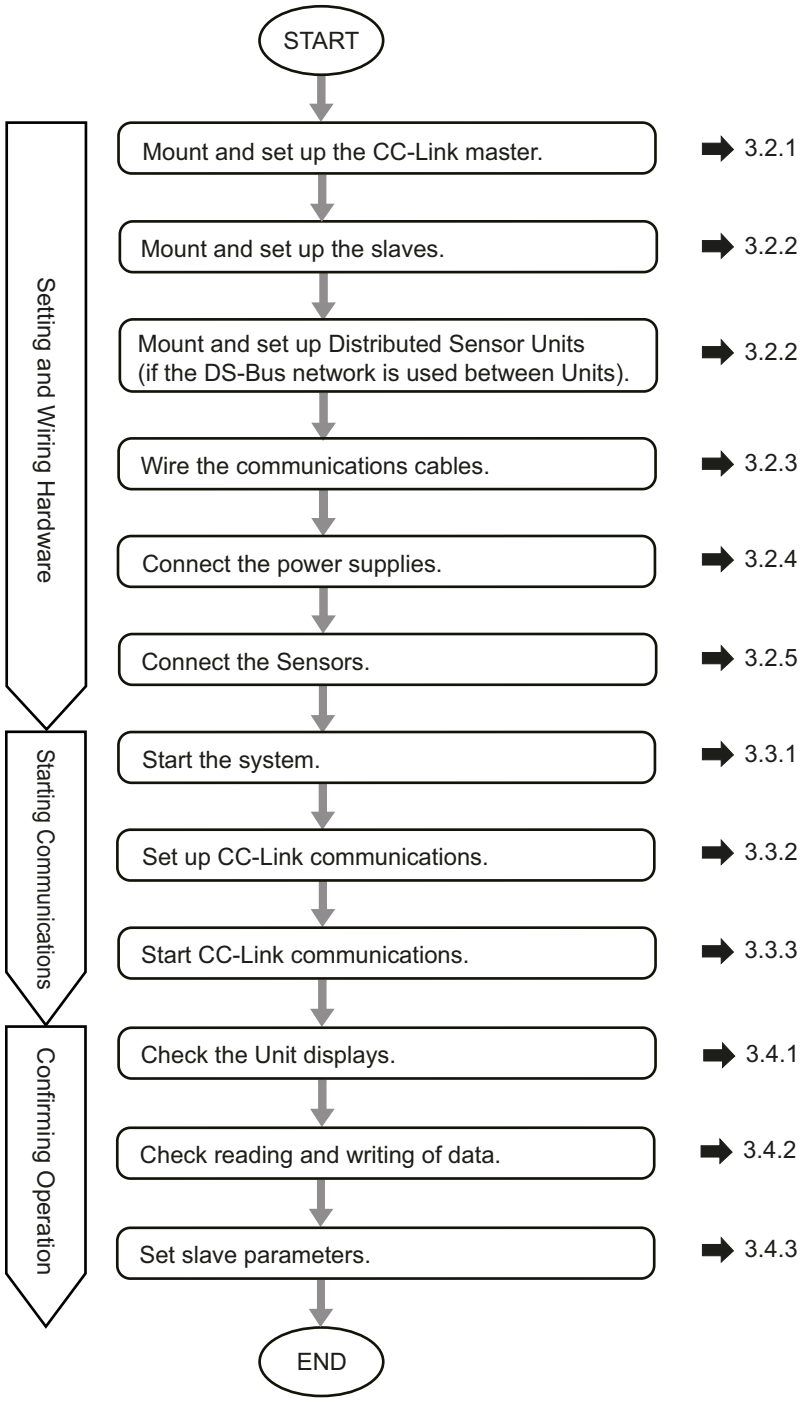
The Unit power supply and I/O power supply are not shown in the above figure. They must be provided separately.

Reference

The setting example provided here demonstrates the basic settings for the E3NW-CCL Sensor Communications Unit. If more detailed settings are required for actual operations, refer to the manual for your CC-Link master.
Or, if you are using any slaves other than the E3NW-CCL in your system configuration, refer to the manuals for those slaves before setting up the system.

3-1-2 Basic Procedures

The following figure shows the flow of procedures for this section.



3-2 Setting and Wiring Hardware

This section describes how to set up and wire the CC-Link master, Communications Units, and power supplies.

3-2-1 Mounting and Setting Up the CC-Link Master

Mount the CC-Link master at the specified location and set the unit number and other settings. For details, refer to the manual for your CC-Link master.

3-2-2 Mounting and Setting Communications Units

Mount each Communications Unit and Distributed Sensor Unit in the designated locations, then set the station numbers and other settings. For details, refer to the following items.

- **Installation**
  4-1 Mounting and Removal.

- **Hardware Settings**
  5-3-2 Setting Switches on page 5-6
  Set the baud rate, operating mode, and station number.

3-2-3 Wiring the Communications Cables

Connect communications cables to the CC-Link master, Communications Units, and Distributed Sensor Units. Refer to *4-2 Wiring the CC-Link Network* for wiring procedures.

3-2-4 Connecting the Power Supplies

Connect the Unit power supply to the CC-Link master, slaves, and the Distributed Sensor Units.
Connect the I/O power supply unit to each slave as required.
For connection method details, refer to *4-3 Connecting the Unit Power Supply* or refer to the wiring diagrams for each slave.

3-2-5 Connecting the Sensors

Connect the Sensor Amplifiers to the Sensors. For connection methods, refer to your Sensor Amplifier manual.

Reference

When using the Distributed Sensor Unit, refer to *A-4 Using the Distributed Sensor Unit* on page A-23 as well.

3-3 Starting Communications

Start the system, assign the E3NW-CCL I/O data, and then start CC-Link communications.

3-3-1 Starting the System

Turn ON the power supply to the Units in the following order.

1. E3NW-CCL Unit Power Supply
- If you are using Distributed Sensor Units, turn ON the power supply to the Distributed Sensor Units as well.
2. CC-Link Master Unit Power Supply

3-3-2 CC-Link Communications Settings

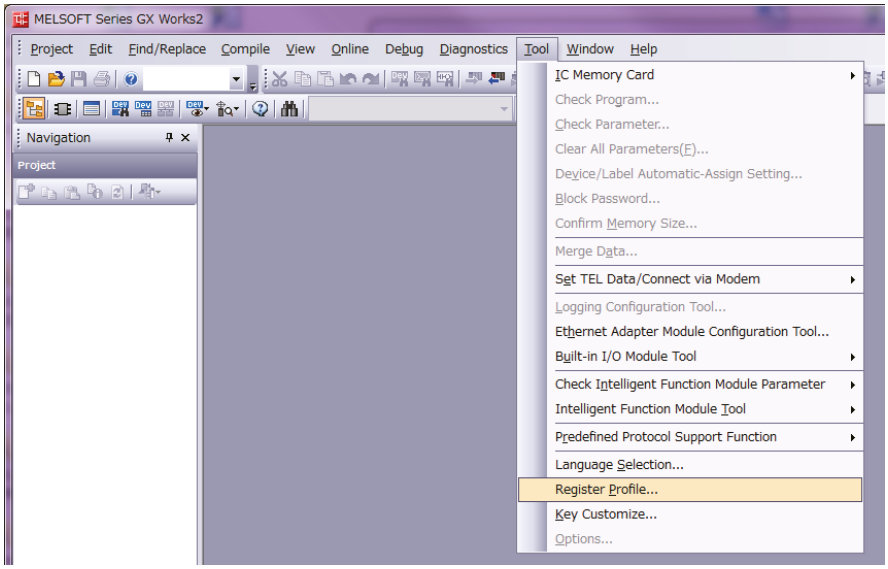
Using CSP+ to Configure Settings in GX-Works2

You can easily set up CC-Link communications for the Communications Unit by using CSP+ in GX-Works2. This section describes how to configure settings in GX-Works2 with CSP+.

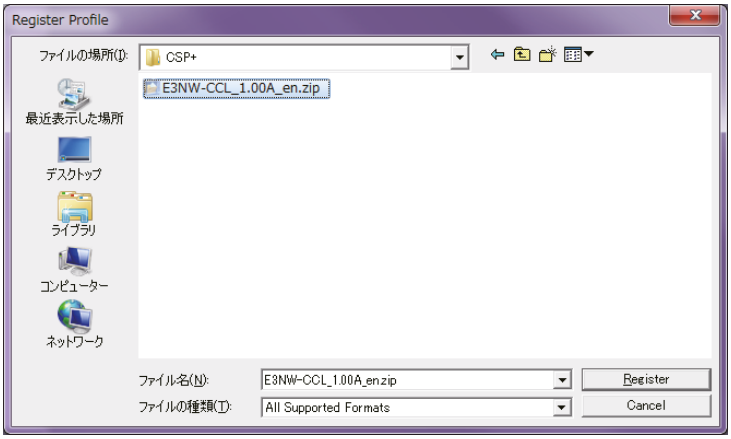
1 Start GX-Works2 on your computer.

2 Register the CSP+ profile in GX-Works2.

2-1. Select ***Tool*** – ***Register Profile***.



2-2. Register the CSP+ file that you have saved on your computer.
CSP+ can be downloaded from the CC-Link Partner Association website or an OMRON website, both listed below.
CC-Link association website: http://www.cc-link.org/jp/csp_plus/index.html
Download and extract "CSP+ File No. 5 Sensor Encoder", and save CSP+ for the E3NW-CCL.
OMRON website: http://www.fa.omron.co.jp/products/family/3177/download/software.html



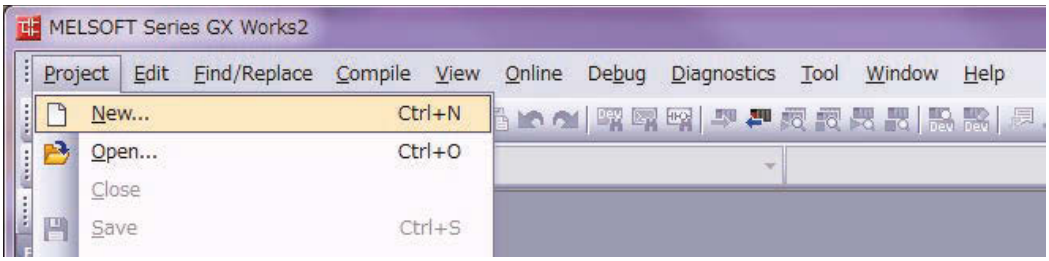
2-3. The registration process is finished when “Registration of the profile is completed.” is displayed.

Reference

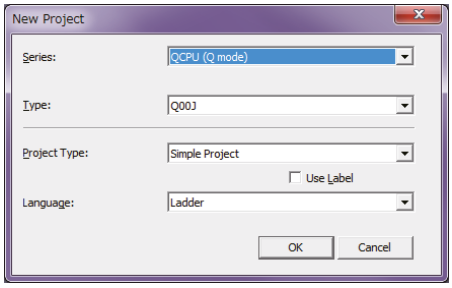
You need to register the CSP+ profile only once.

3 **Create a new project.**

3-1. Select ***Project*** – ***New***.

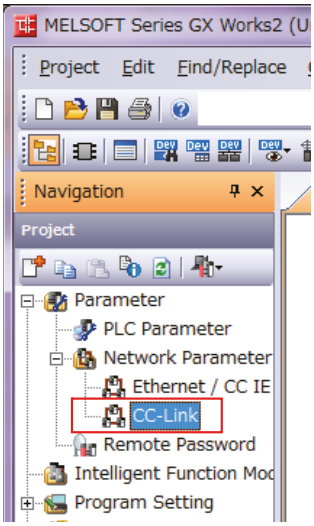


3-2. Set the computer series and type settings for your computer.

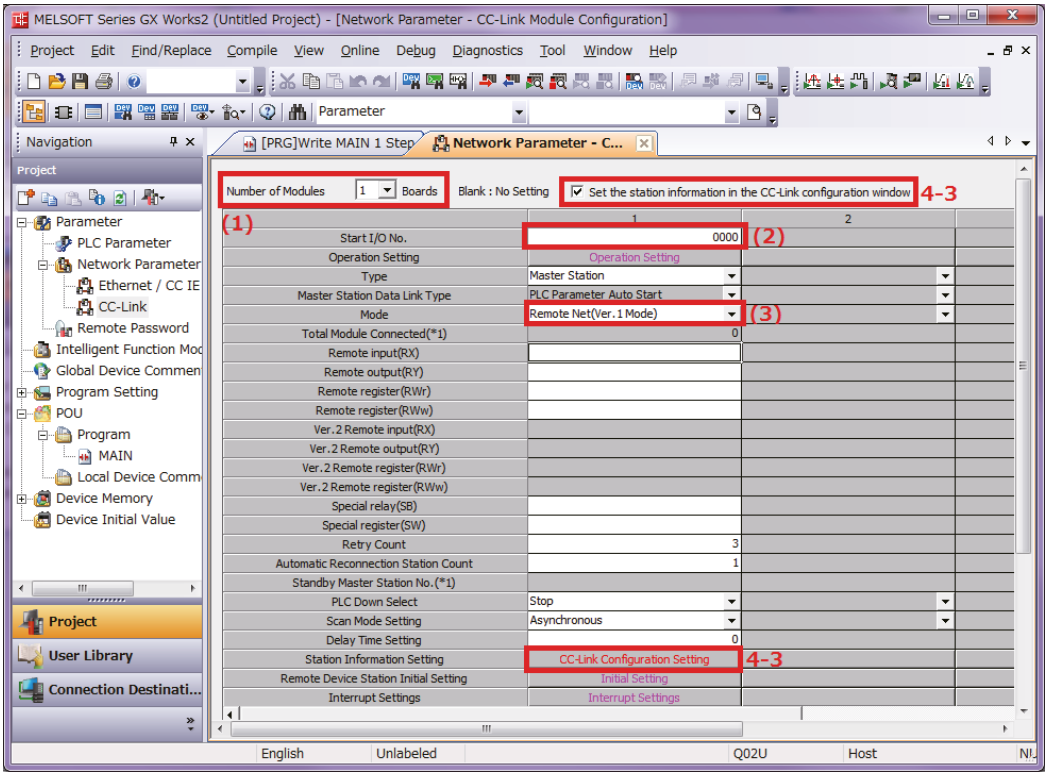


4 **Set the CC-Link network parameters.**

4-1. Select **Parameter** – **Network Parameter** – **CC-Link** under **Project** to display the parameters.



4-2. Set the parameters.



(1) Set the Number of Modules to 1.

(2) Set the Start I/O No. .

(3) Set the mode for the operating mode you want to use.

To use Reduced I/O Mode, set the mode to Remote Network Version 1 Mode.
To use Monitor Mode, set the mode to Remote Network Version 2 Mode.

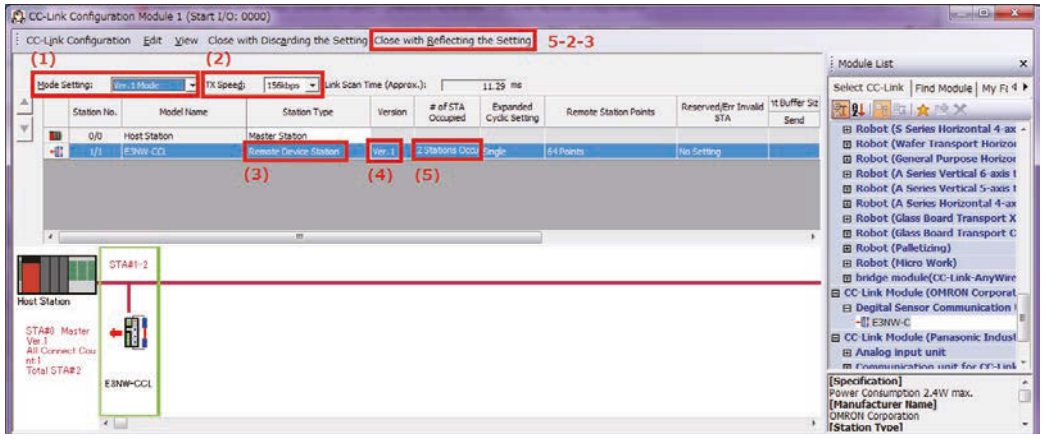
4-3. Select the *Set station information in the CC-Link Configuration Window* Check Box, and then select *CC-Link Configuration Settings*.

5 Set the CC-Link configuration.

5-1. Select the settings based on your CC-Link system configuration.
You can select and drag Units from the Unit List to make the settings.

5-2. Set the following settings based on the baud rate and operating mode settings for the E3NW-CCL.

5-2-1. Match the conditions shown in the following locations (in GX-Works2 and the E3NW-CCL setting switches).



5-2-2. Set the GX-Works2 settings ((1) to (5)) based on the mode you want to use.

Using Reduced I/O Mode

(1) Select the same mode that you selected for (3) in *4-2 Wiring the CC-Link Network*.
(2) Set the baud rate based on the baud rate set with the baud rate/operating mode switch on the E3NW-CCL.
(3) Set the station type to *Remote device station*.
(4) Set to *Ver. 1.*
(5) Set the exclusive station count to *2 Stations Occupied*.

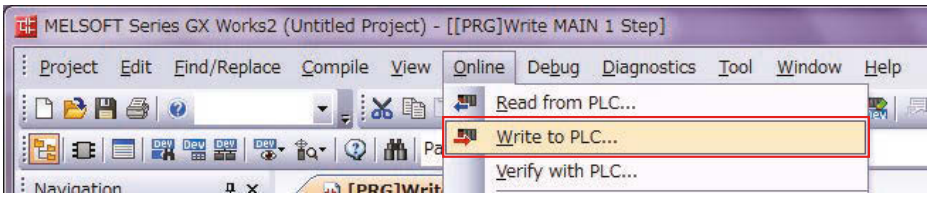
Using Monitor Mode

(1) Set to *Ver. 2 Mode.*
(2) Set the baud rate based on the baud rate set with the baud rate/operating mode switch on the E3NW-CCL.
(3) Set the station type to *Remote device station*.
(4) Set to *Ver. 2.*
(5) Set the exclusive station count to *3 Stations Occupied*.

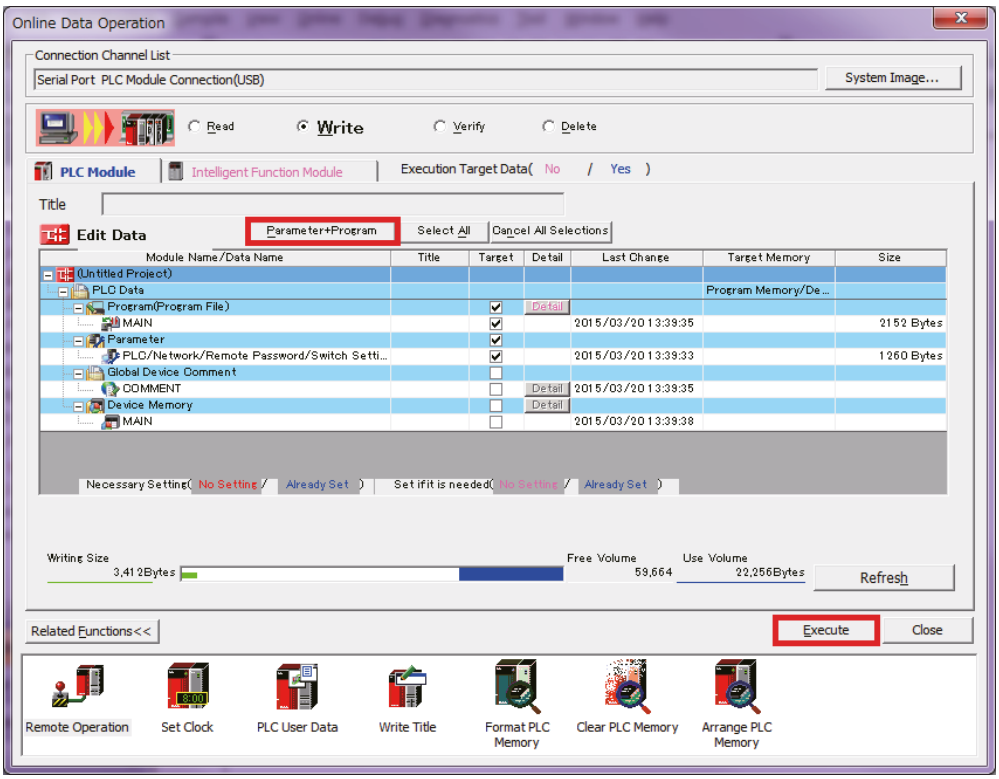
5-2-3. Click the Apply Settings and Close Button.

5-2-4. Click *End* at the bottom of the Network Parameters screen.

5-2-5. Write the settings to the master. Select *Online - Write to PLC.*



Click the **Parameter + Program** Button, and then click the **Execute** Button.
Settings are applied when the power supply to the master unit is cycled or when the master unit is reset.

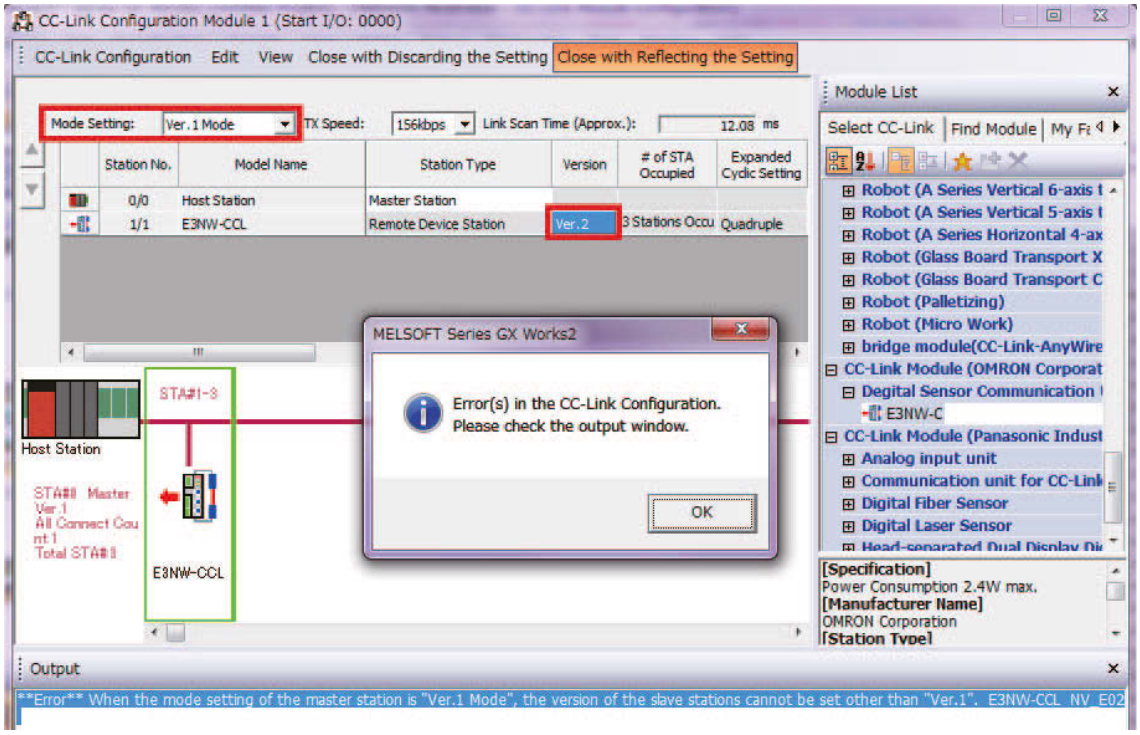


Reference

The setting method described here using CSP+ and GX-Works2 demonstrates the basic settings for the E3NW-CCL Sensor Communications Unit.
If more detailed settings are required for actual operation, refer to the manual for your CC-Link master and the manual for GX-Works2.

● Troubleshooting Communications Problems

If the following message is displayed on the computer, the selected Mode Setting does not match the version of the E3NW-CCL.
Correct the setting.



If the above error message is not displayed but communications are still not working (i.e., the RUN indicator on the E3NW-CCL does not light up), check to confirm that the switches for the baud rate, operating mode, and station number are all set correctly based on the parameters set for the master station.
Make sure that the station number is unique.
If you changed the baud rate / operating mode and station number switches after turning on the E3NW-CCL power, restart the E3NW-CCL.
Refer to *7-1 Troubleshooting* on page 7-2.

If communications still do not work after checking all of the above settings, refer to the troubleshooting section in the manual for your CC-Link master to determine the cause of the problem.

3-3-3 Starting CC-Link Communications

Enable CC-Link communications to start CC-Link communications.
Section 6 contains details on the data that can be obtained through communications.

3-4 Confirming Operation

If the CC-Link master and E3NW-CCL indicators are all normal, I/O data can be read and written normally.
If required, set the E3NW-CCL parameter settings.

3-4-1 Checking the Unit Displays

● CC-Link Master

Refer to the manual for your CC-Link master.

● Communications Unit

Make sure the status indicators on each Communications Unit are as described in the following table.

Indicator	State
RUN	Lit.
ERR	Not lit.
SS	Lit green. (The number of actual connections agrees with the number of connections that were detected when the Unit was started.) Lit red. (The number of actual connections does not agree with the number of connections that were detected when the Unit was started.)

● Distributed Sensor Unit

Make sure the status indicators on each Distributed Sensor Unit are as described in the following table.

Indicator	State
RUN	Lit.
SS	Lit green. (The number of actual connections agrees with the number of connections that were detected when the Unit was started.) Lit red. (The number of actual connections does not agree with the number of connections that were detected when the Unit was started.)

3-4-2 Checking Reading and Writing of Data

Read the input and output data of the CC-Link master to make sure the I/O data is being read and written correctly.

4

Mounting and Wiring

This section describes how to mount and wire the E3NW-CCL.

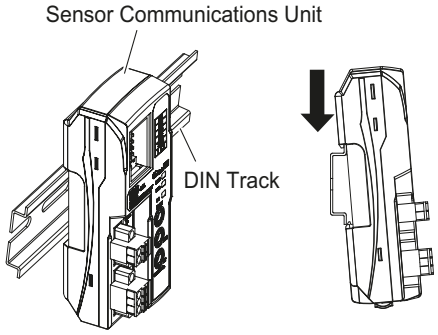
4-1 Mounting and Removal

This section describes how to mount the E3NW-CCL and Sensor Amplifier Units to a DIN Track and how to remove them.

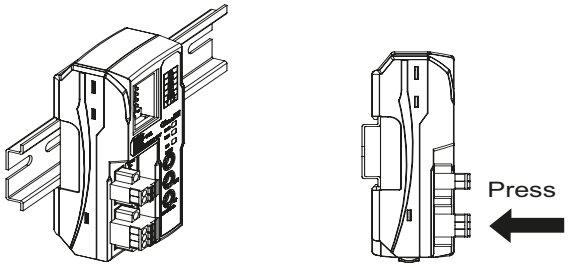
4-1-1 Mounting Procedure

Use the following procedure to mount the Units.

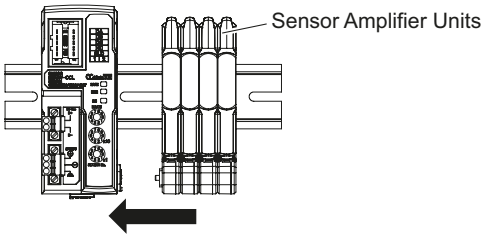
1 **Place the top part of the Unit onto the DIN Track.**



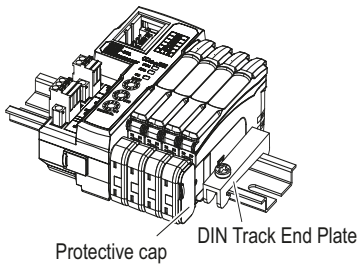
2 **Press the bottom part of the Unit onto the DIN Track.**



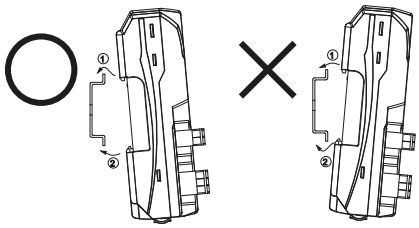
3 **Remove the protective cap from the right side of the Sensor Communications Unit. Then, slide the Sensor Amplifier Unit, align the connector with the Sensor Communications Unit, and press the Units together until you hear them lock into place.**



4 **Secure the enclosed DIN Track End Plates (PFP-M) onto the ends so that there is no space between them and the Units. Finally, attach the protective cap you removed in step 3 to the Sensor Amplifier Unit on the far right end.**



CHECK! Do not reverse the order of steps 1 and 2, above. Doing so may reduce the mounting strength on the DIN Track.



Do in order: step 1 and then step 2.

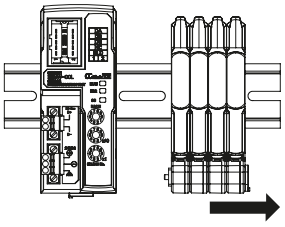
Do not perform step 2 first.

After you have completed the above procedure, check to make sure that the E3NW-CCL is mounted securely into place.

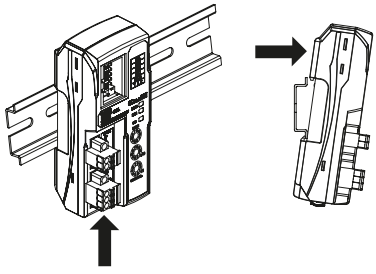
4-1-2 Removal Procedure

Use the following procedure to remove the Unit.

1 **Slide the Sensor Amplifier Units to separate them from the Sensor Communications Unit.**



2 **Press in on the Sensor Communications Unit toward the DIN Track and lift up to remove it.**



4-2 Wiring the CC-Link Network

To connect the Communications Unit to the CC-Link network, refer to documentation for the CC-Link master unit and the *CC-Link Installation Guide*.

4-2-1 General Wiring Precautions

- Always turn OFF the power supply before performing any wiring operations on the Communications Unit. The external devices that are connected to the E3NW-CCL may operate in an unexpected manner if the E3NW-CCL is wired while the power supply is ON.
- Be careful not to pinch your fingers when attaching connectors.
- Incorrect wiring will reduce safety functions. Perform all wiring correctly and confirm operation before using the Communications Unit.

Special Connector Tools

Special Screwdrivers

We recommend using the following Special Screwdrivers to tighten wiring screws when wiring the power supply or connecting the enclosed DS-bus connector cables.

Model	Manufacturer (supplier)
XW4Z-00C	OMRON
SZF1-0.6X3.5 Screwdriver	Can be purchased from the OMRON FA Store.

Contact Information
OMRON FA Store
Telephone: 03-6718-3565
FAX: 0120-024524 (Toll Free)
URL: http://store.fa.omron.co.jp/

4-2-2 Preparing for Wiring

- **FANC-110SBH CC-Link Cable (Kuramo Electric Co.)**
  Refer to documentation for the CC-Link master unit and the *CC-Link Installation Guide* for specifications and processing methods (including stripping methods) for the special CC-Link cable.
- **Network connector 35505-6000-B0MGF (Sumitomo 3M)**
  Two are provided as accessories.

Wiring the Connector

1. **Strip 4 cm of the insulating sheath from the CC-Link Version 1.10-compliant cable.**
2. **Separate the braided shield and drain wires, and then twist the drain wire with your fingers at least 10 times.**
   Be careful not to sever the drain wire.
3. **Cut off the braided shield, ALPET shield tape, and filler.**
4. **Separate the wires so that they are in the following order: blue, white, yellow, and drain wire.**
   Blue wire, pin 1 (cover label: DA B)
   White wire, pin 2 (cover label: DB W)
   Yellow wire, pin 3 (cover label: DG Y)
   Drain wire, pin 5 (cover label: SL D)
5. **Insert the cable all the way into the power clamp.**
   Check to confirm that the wire has been inserted all the way by looking through the top of the cover.
6. **Use pliers to push the cover into the body and crimp the cable.**
7. **Check to confirm that the cover is level with the body and that there is no space between the body and the cover.**

* We recommend using heat-shrinking tubing to protect the drain wire and other wiring.

Reference

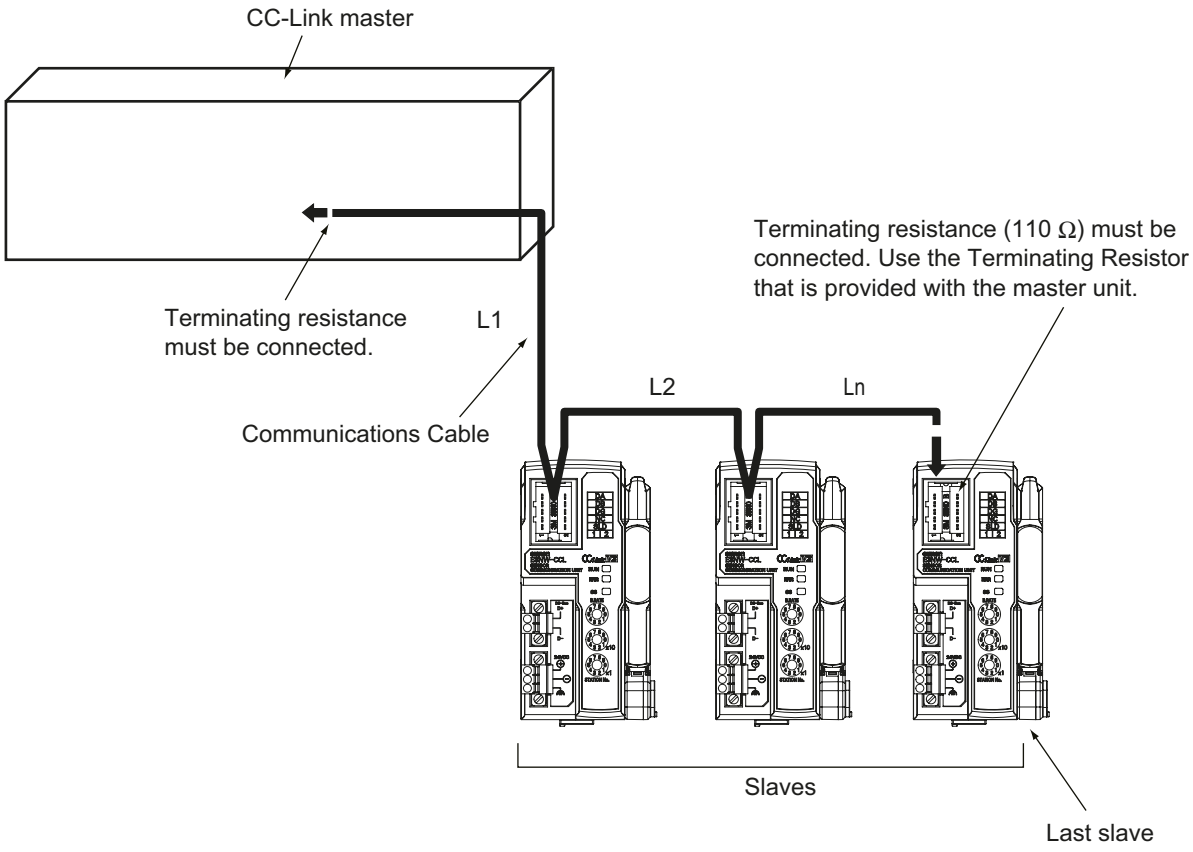
For details, refer to the *3M Power Clamp Connector Wiring Procedures*.

4-2-3 Connecting the Communications Cables

- For CC-Link system cable lengths and wiring methods, refer to the *CC-Link Installation Guide* published by the CC-Link Partner Association or the manual for your CC-Link master unit.

CC-Link networks can use any network topology, but the connections before and after an E3NW-CCL Sensor Communications CC-Link Slave Unit must be daisy chain connections.

Connect the communications cables from the CC-Link master to the first slave communications connector, and then from each slave to the next slave.

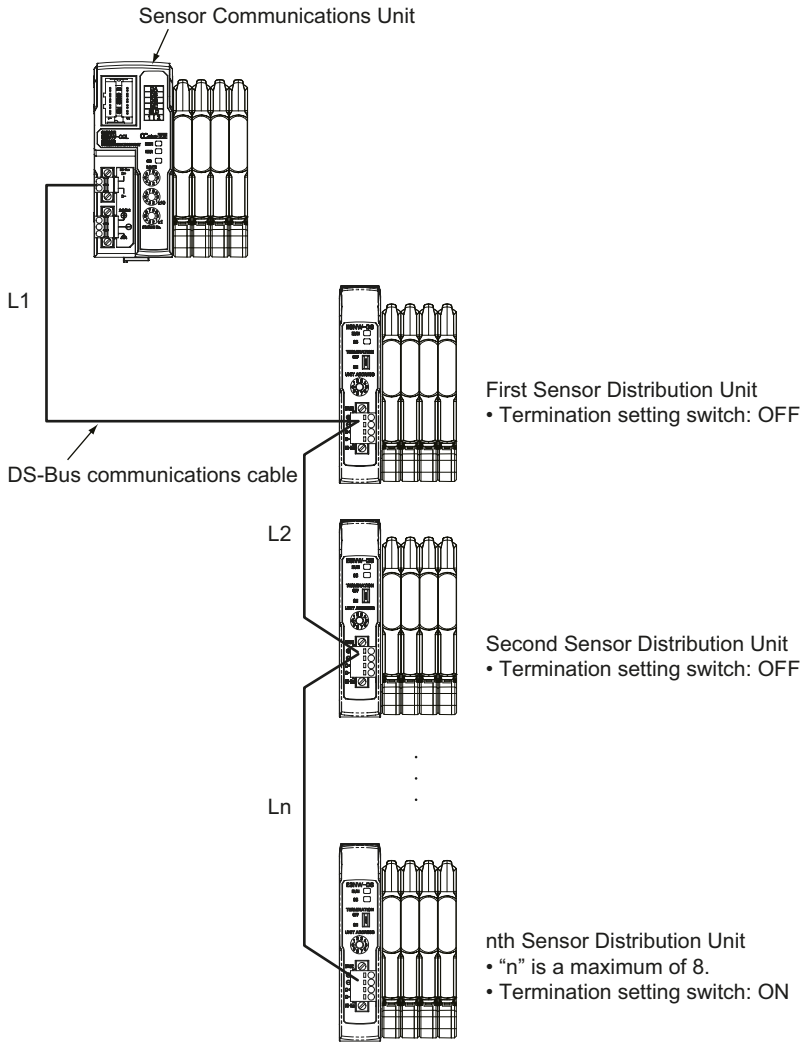


Precautions for Correct Use

- Keep the total length of cables between all slaves (L1, L2, ... Ln in the figure) to within 100 m.
- Connect the communications cable connectors until they click firmly into place.
- Refer to the specifications of the manufacturer of your cables for specifications, such as the allowed bending radius.

4-2-4 Connecting the Distributed Sensor Unit

The Sensor Communications Unit and Distributed Sensor Units are connected by a DS-Bus network. Connect the communications cable to the DS-Bus communications connector on the Communications Unit. Connect the Distributed Sensor Units with multidrop connections, i.e., connect the D+ and D- terminals between consecutive Units. Supply power to the Distributed Sensor Units from a Unit Power Supply (24 VDC). (Refer to *4-3 Connecting the Unit Power Supply*.)



Precautions for Correct Use

- You can connect up to eight Distributed Sensor Units to one Sensor Communications Unit.
- Keep the total length of DS-Bus communications cables (L1 + L2 + ... + Ln) to within 30 m.
- Turn ON the DS-Bus termination setting switch for the last Distributed Sensor Unit on the DS-Bus network. Turn this switch OFF for all other Distributed Sensor Units.

4-3 Connecting the Unit Power Supply

To connect the E3NW-CCL to the CC-Link network, the Unit power supply is required. The E3NW-CCL does not require an I/O power supply.

The method for supplying power to the Unit is described below.

4-3-1 Precautions on Supplying Unit Power

Consider the following points on the allowable current and voltage drop on cables and connectors and the placement of the power supply used to supply power to the Units.

- **Precaution on Cable Voltage Drop**
  Make sure that the power supply voltage to the slave farthest from the power supply is within the allowable fluctuation range.
- **Supplying Power to Units from Multiple Power Supplies**
  Using multiple power supplies to supply power can allow you to reduce the line current, reduce voltage drop, and decrease cable size.
  It also helps to maintain system stability in the event of a power supply problems.
- **Power Supply Problems**
  You must decide how to place your power supplies and how to group them depending on whether you want to stop the entire system when a power supply problem occurs or if you want to avoid stopping the entire system when possible.
  If you want to avoid stopping the entire system, install power supplies in multiple locations and divide the slaves into groups.
  This will also help to reduce voltage drop and enable you to use smaller cables.

4-3-2 Unit Power Supply Specifications

Use a standard power supply that meets the following specifications.

Item	Specification
Output voltage	24 VDC ±10%
Output ripple	600 mVp-p
Output current	Must be able to supply current that is higher than the total sum of the current consumed by all slaves.
Isolation	Between output and AC power supply and between output and frame ground

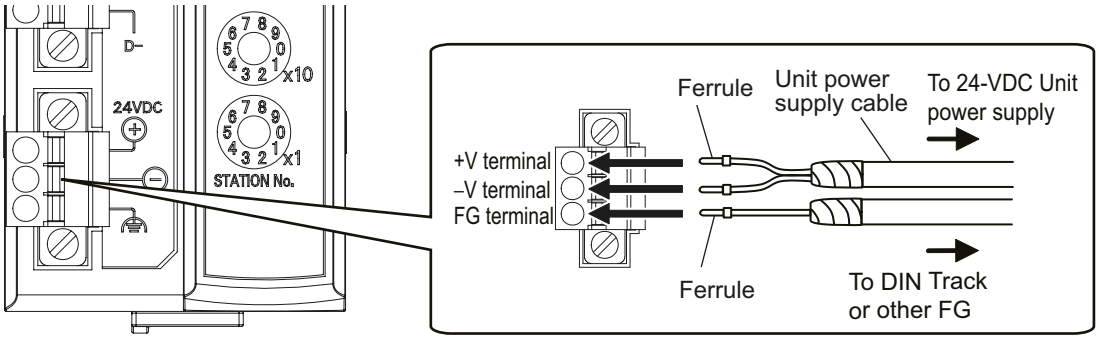
We recommend using an OMRON S8JX-series power supply for the Unit power supply to the slaves.

Precautions for Correct Use

- The Unit power supply also provides the I/O power for the inputs on slaves with e-CON connectors.
  When calculating the output current for the Unit power supply, always include the current consumption of the E3NW-CCL and the current consumption of all Sensor Amplifier Units in the Unit power supply consumption current.
- Make sure that the power supply has sufficient capacity to handle the inrush current when the system is started.

4-3-3 Connecting the Unit Power Supply

Connect a cable from the Unit power supply (24 VDC) to the power supply connectors on each slave.



Securely attach ferrules to the Unit power supply cable wires. Do not wire a power supply to the communications path of the Distributed Sensor Units. The Units may be damaged.

● Recommended Parts

We recommend using the following ferrules for the Unit power supply cable.

Model number	Applicable wire size	Crimp tool	Manufacturer
AI0,5-10WH	0.5mm^2/AWG20	CRIMPFOX UD6 (product No. 1204436) or CRIMPFOX ZA3 Series	Phoenix Contact Co., Ltd.
H0.5/16 orange	0.5mm^2/AWG20	Crimper PZ1.5 (product No. 900599)	Weidmueller Japan Co., Ltd.

We recommend the following screwdriver for the removal of ferrules.

Model number	Manufacturer
XW4Z-00C	OMRON Corporation

5

E3NW-CCL Hardware Specifications

This section gives the CC-Link communications specifications, general specifications, and hardware specifications.

5-1 CC-Link Communications Specifications

This section gives the communications specifications of the E3NW-CCL Sensor Communications Unit.

Item	Specification
Communications protocol	CC-Link protocol
Communications method	Broadcast polling
Baud rate	156 Kbps, 625 kbps, 2.5 Mbps, 5 Mbps, 10 Mbps
Physical layer	Bus (Conforms to EIA RS-485.)
Topology	Daisy chain (T-junctions are allowed.)
Communications media	CC-Link cable
Communications distance	Distance between stations: 20 cm min. Maximum cable length With baud rate of 156 Kbps: 1,200 m With baud rate of 625 Kbps: 900 m With baud rate of 2.5 Mbps: 400 m With baud rate of 5 Mbps: 160 m With baud rate 10 Mbps: 100 m
Noise immunity	Conforms to IEC 61000-4-4, 1 kV or higher.
Address setting method	Decimal rotary address switch
Address range	64 max., must meet the following conditions: 1) Total Number of Stations (a+a2+a4+a8)+(b+b2+b4+b8)×2+(c+c2+c4+c8)×3+(d+d2+d4+d8)×4≤64 2) Total Number of Remote I/O (a×32+a2×32+a4×64+a8×128)+(b×64+b2×96+b4×192+b8×384) +(c×96+c2×160+c4×320+c8×640)+(d×128+d2×224+d4×448+d8×896)≤8192 3) Total Number of Remote Registers (a×4+a2×8+a4×16+a8×32)+(b×8+b2×16+b4×32+b8×64) +(c×12+c2×24+c4×48+c8×96)+(d×16+d2×32+d4×64+d8×128)≤2048 a: Number of single-setting units allocated one station b: Number of single-setting units allocated two stations c: Number of single-setting units allocated three stations d: Number of single-setting units allocated four stations a2: Number of double-setting units allocated one station b2: Number of double-setting units allocated two stations c2: Number of double-setting units allocated three stations d2: Number of double-setting units allocated four stations a4: Number of quadruple-setting units allocated one station b4: Number of quadruple-setting units allocated two stations c4: Number of quadruple-setting units allocated three stations d4: Number of quadruple-setting units allocated four stations a8: Number of octal-setting units allocated one station b8: Number of octal-setting units allocated two stations c8: Number of octal-setting units allocated three stations d8: Number of octal-setting units allocated four stations 4) Number of Connected Nodes 16×A+54×B+88×C≤2304 A: Number of remote I/O stations (64 max.) B: Number of remote device stations (42 max.) C: Number of local stations and intelligent device stations (26 max.)

Item	Specification
Synchronous mode	Cyclic transmissions (synchronized)

* The range varies depending on the CC-Link master that is used. For details, refer to *5-3-2 Setting Switches* on page 5-6.

5-2 General Specifications

This section gives the general specifications of the CC-Link Sensor Communications Unit.

Item	Specification and performance
Unit power supply voltage	24 VDC (20.4 to 26.4 V)
Power and current consumption	2.4 W max. (Does not include power supplied to Sensors.) 100 mA max. (Does not include current supplied to Sensors.) at 24 VDC
Indicators	RUN indicator (green), ERROR indicator (red), and SS (Sensor Status) indicator (green/red)
Maximum connectable Sensors	16*1
Maximum connectable Distributed Sensor Units	8
Vibration resistance (destruction)	10 to 60 Hz with a 0.7-mm double amplitude, 50 m/s^2 at 60 to 150 Hz, for 1.5 hours each in X, Y, and Z directions
Shock resistance (destruction)	150 m/s^2 for 3 times each in X, Y, and Z directions
Dielectric strength	500 VAC at 50/60 Hz for 1 min
Insulation resistance	20 MΩ min. (at 500 VDC)
Ambient temperature range	Operating: 0 to 55°C*2 Storage: –30 to 70°C (with no condensation or icing)
Ambient humidity range	Operating and storage: 25% to 85% (with no condensation)
Installation method	35-mm DIN Track-mounting
Weight (packed state/Unit only)	Approx. 180 g/approx. 80 g
Materials	Polycarbonate
Accessories	Power Supply Connector, E3NW-DS Connector, DIN Track End Plates (2), and Instruction Manual, Network connectors (2)

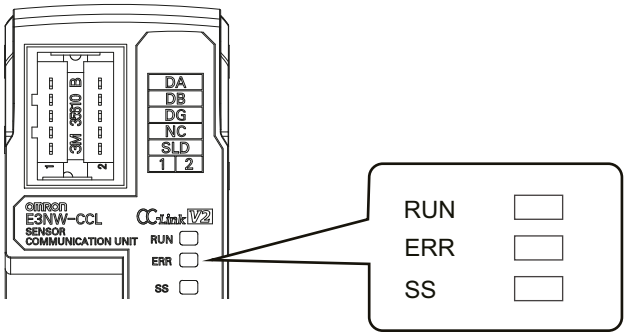
*1 You can connect up to 16 Sensor Amplifier Units total to the Sensor Communications Unit and Distributed Sensor Units.

*2 Temperature Limitations Based on Number of Connected Amplifier Units:
Groups of 1 or 2 Amplifier Units: 0 to 55°C, Groups of 3 to 10 Amplifier Units: 0 to 50°C, Groups of 11 to 16 Amplifier Units: 0 to 45°C

5-3 Hardware Specifications

5-3-1 Status Indicators

These indicators show the current status of the E3NW-CCL.



RUN Indicator

This indicator shows the operating status.

Color	State	Description
Green	Not lit.	CC-Link communications are disconnected or the Unit is being reset.
	Lit.	CC-Link communications are in progress.

ERR Indicator

This indicator displays errors.

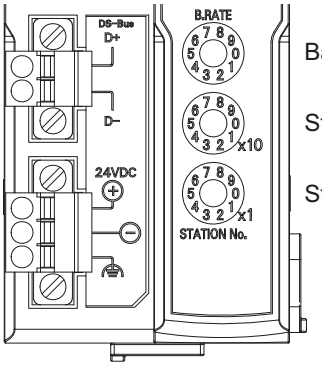
Color	State	Description
Red	Not lit.	Normal transmission
	Flashing	The station setting switch or baud rate setting/operating mode setting switch was changed during communications.
	Lit.	Communications error or station number setting out of range

SS Indicator

This indicator compares the number of Sensor Units connected when power was turned ON to the number of Sensor Units actually connected and indicates the Sensor connection status.

Color	State	Description
	Not lit.	No Sensor Amplifier Units are connected or initialization is being performed after the power supply was turned ON.
Green	Lit.	Normal: The number of connected Sensor Units when power was turned ON matches the actual number of connected Sensor Units
Red	Lit.	Error: The number of connected Sensor Units when power was turned ON does not match the actual number of connected Sensor Units

5-3-2 Setting Switches



Baud rate/operating mode setting

Station number setting (x10)

Station number setting (x1)

Baud Rate/Operating Mode Setting Switch

This switch sets the CC-Link baud rate and operating mode.
The following table describes the settings.
Set the same baud rate as is set by the rotary switch on the master station unit.

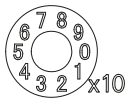
<table>
<tr><th>Switch</th><th>Appearance /Display</th><th colspan="3">Setting</th></tr>
<tr><td rowspan="13">Baud rate/operating mode setting switch</td><td rowspan="13">  </td><td colspan="3">This switch sets the CC-Link baud rate and operating mode.</td></tr>
<tr><td>Switch setting</td><td>Baud rate</td><td>Operating mode</td></tr>
<tr><td>0</td><td>156k</td><td rowspan="5">Reduced I/O Mode (Ver. 1 Mode)</td></tr>
<tr><td>1</td><td>625k</td></tr>
<tr><td>2</td><td>2.5M</td></tr>
<tr><td>3</td><td>5M</td></tr>
<tr><td>4</td><td>10M</td></tr>
<tr><td>5</td><td>156k</td><td rowspan="5">Monitor Mode (Ver. 2 Mode)</td></tr>
<tr><td>6</td><td>625k</td></tr>
<tr><td>7</td><td>2.5M</td></tr>
<tr><td>8</td><td>5M</td></tr>
<tr><td>9</td><td>10M</td></tr>
<tr><td colspan="3">An error will occur if the operating mode does not match the CC-Link mode set in the master station’s CC-Link parameters and the ERR indicator will light up.</td></tr>
</table>

Precautions for Correct Use

- The settings of the setting switches are read only once when the power is turned ON. Changing this setting after the power is turned ON will have no effect until after the next time the power is turned ON.
- If these switches are changed after the power is turned ON, the ERR indicator will light.

Station Number Switch

Sets the station number (decimal value) of the E3NW-CCL on the CC-Link network.
Use the middle station number setting switch to set the tens digit, and use the bottom station number setting switch to set the ones digit. The following table gives the setting ranges.

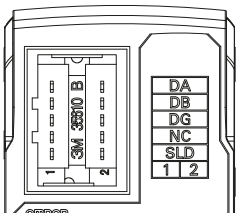
Switch	Appearance/ Display	Setting		
Station number switch	 	Sets the CC-Link station number.		
		Operating mode	Reduced I/O Mode (Ver. 1 Mode)	Monitor Mode (Ver. 2 Mode)
		Setting range	1 to 63	1 to 62
		If the valid setting range is exceeded, a station number setting error will occur and the ERR indicator will light. The maximum number of connectable Units depends on the types of devices that are connected to the CC-Link network. *Refer to the manual for your master station for details about the maximum number of connections.		

Precautions for Correct Use

- The settings of the setting switches are read only once when the power is turned ON. Changing this setting after the power is turned ON will have no effect until after the next time the power is turned ON.
- An error will occur if the same station number is used more than once and operation will stop.
- If these switches are changed after the power is turned ON, the ERR indicator will light.

5-3-3 Communications Connectors

Connect the CC-Link communication cable.



The specifications are given below.

- Electrical Characteristics

Item	Standard	Conditions
Dielectric strength	There must be no insulation breakdown for a leakage current of 1 mA or less.	A voltage of 1,000 Vrms AC is applied between adjacent contacts for 1 minute.
Insulation resistance	1,000 MΩ min.	Measurement is performed after applying 600 VDC between adjacent contacts for 1 minute.
Momentary interruption	Power must not be interrupted for more than 1 μs during testing.	Use 3M Sequence 2 for vibration testing.

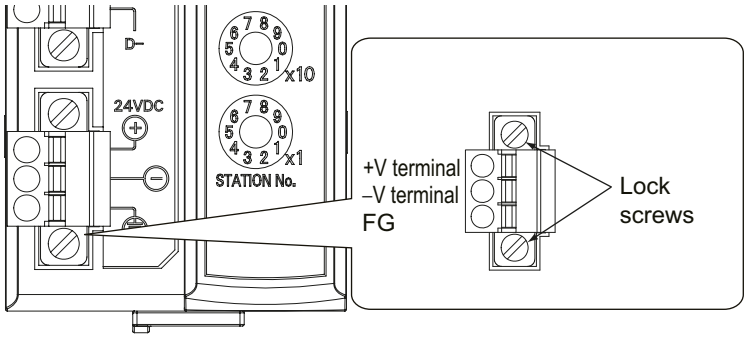
Item	Standard	Conditions
Contact resistance	Initial contact resistance: 50 mΩ max. The increase in contact resistance after each environmental test is performed must be no more than 25 mΩ.	Perform measurements with a resistance measurement current of 1 mA and open voltage of 20 mV using the 4-terminal method. (This assumes that applicable OMRON connectors are used and includes contact bulk resistance.) • 3M Sequence 1: 50 hot-swaps -> Humidity resistance testing -> Saltwater spray testing • 3M Sequence 2: Thermal shock testing -> Humidity testing -> Vibration testing • 3M Sequence 3: High-temperature lifetime testing • H_2S Gas Sequence: 50 hot-swaps -> H_2S gas testing • Hot-swap durability testing: 500 hot-swaps * Refer to *Table 1* for the environmental testing conditions.

- Connector configuration: RJ45 8-pin modular connector (ISO 8877 standard)
- Terminal Arrangement

Name	Function
DA	Communications signal
DB	Communications signal
DG	Communications signal
NC	Not used.
SLD	Connect the CC-Link connection cable's shield wire.

5-3-4 Unit Power Supply Connector

Connect the Unit power supply (24 VDC).



Name	Specifications
+V	24 VDC
–V	0 VDC
FG	Functional ground terminal

- Connector type: Two-pin spring cage connector with lock screws
- Applicable ferrule diameter: 0.25 to 0.5 mm^2 (AWG24 to AWG20) (Using ferrules with insulating sleeves)

Refer to *4-3-3 Connecting the Unit Power Supply* for the recommended ferrules.

6

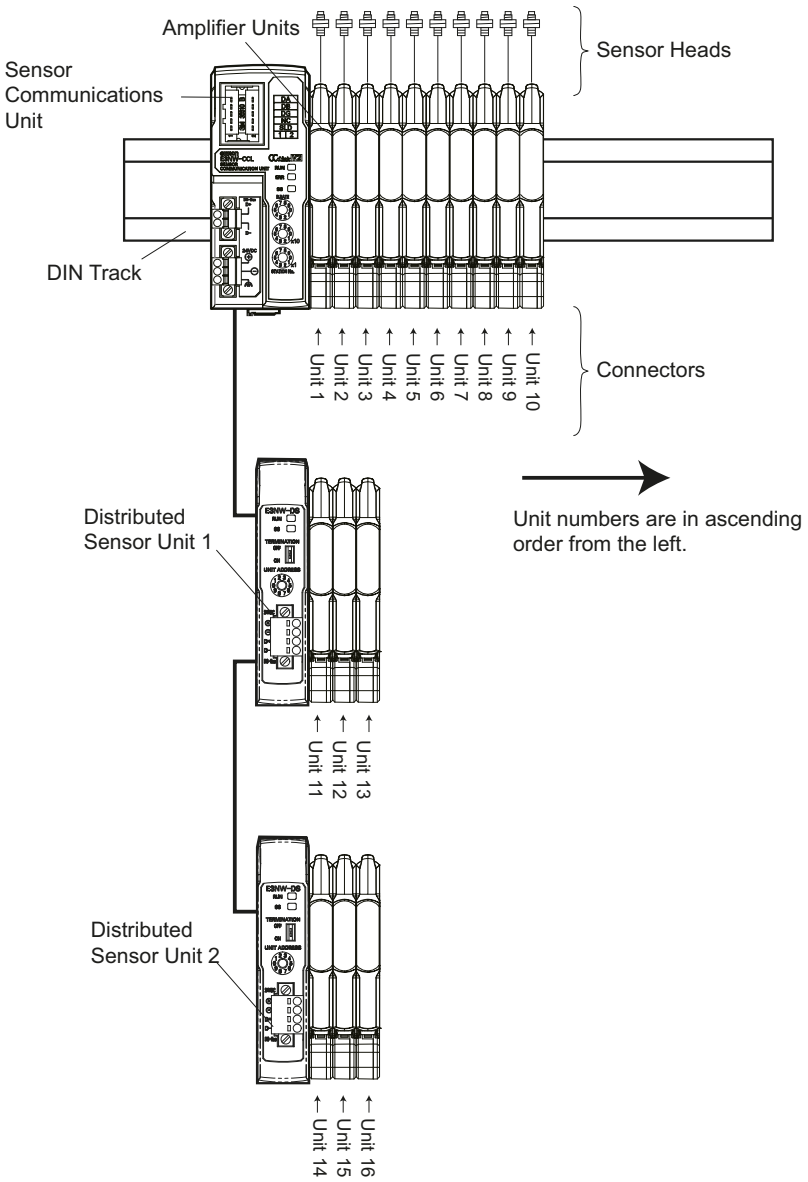
E3NW-CCL Function Specifications

This section describes the functions of the E3NW-CCL CC-Link Digital Sensor Communications Unit.

6-1 I/O Data Assignments

6-1-1 Input Data Assignments

Sensor Unit Numbers



The Sensor Communications Unit identifies the connected Sensor Amplifier Units according to their unit numbers.
Unit numbers of Sensor Amplifier Units are assigned to the units from unit number 1 starting from the Sensor Communications Unit.
Each Sensor Amplifier that is assigned a unit number has an input 1 (Sensor output 1) and input 2 (Sensor output 2).

The unit numbers of the Sensor Amplifiers that are connected to a Distributed Sensor Unit are numbered sequentially, in the order shown below, following the unit numbers of the Sensor Amplifiers that are connected to the Sensor Communications Unit.
Sensor Communications Unit -> Distributed Sensor Unit 1 -> Distributed Sensor Unit 2 -> ... -> Distributed Sensor Unit 8

You can connect a maximum of 16 Sensor Amplifiers.
(Refer to *2-2-2 Number of Connected Sensor Amplifiers* on page 2-3.)
You can connect a maximum of eight Distributed Sensor Units to the E3NW-CCL.

I/O Data Assignments

Use the link devices shown in the following tables to send and receive data between the E3NW-CCL and the CC-Link master station.

● Reduced I/O Mode

I/O signal assignments		
Bit data		
Signal direction	Signal direction: E3NW-CCL to master Example: Sensor output ON/OFF data	Signal direction: Master to E3NW-CCL Example: Error Reset Request Flag
Link devices	RX (input link relays)	RY (output link relays)
Number of assigned bits	64	64
Number of used bits	38	3

Read/write register assignments		
Word data		
Signal direction	Read area: E3NW-CCL to master Example: Sensor status monitor	Write area: Master to E3NW-CCL Example: Command settings
Link devices	RWr (input link registers)	RWw (output link registers)
Number of assigned words	8	8
Number of used words	5	5

● Monitor Mode

I/O signal assignments		
Bit data		
Signal direction	Signal direction: E3NW-CCL to master Example: Sensor output ON/OFF data	Signal direction: Master to E3NW-CCL Example: Error Reset Request Flag
Link devices	RX (input link relays)	RY (output link relays)
Number of assigned bits	320	320
Number of used bits	38	3

Read/write register assignments		
Word data		
Signal direction	Read area: E3NW-CCL to master Example: Sensor status monitor	Write area: Master to E3NW-CCL Example: Command settings
Link devices	RWr (input link registers)	RWw (output link registers)
Number of assigned words	48	48
Number of used words	40	8

The following tables list the items that you can assign to the E3NW-CCL. Refer to the specific manual for your master for information on changing the mappings.

This section describes the data that can be exchanged through cyclic transmissions.

● I/O Signal Assignments in Reduced I/O Mode

Signal direction: E3NW-CCL to master		Signal direction: Master to E3NW-CCL	
Device No.	**Signal name**	**Device No.**	**Signal name**
RXn0	Sensor No. 1 ON/OFF Output Data 1	RYn0	Do not use.
RXn1	Sensor No. 1 ON/OFF Output Data 2	RYn1	
RXn2	Sensor No. 2 ON/OFF Output Data 1	RYn2	
RXn3	Sensor No. 2 ON/OFF Output Data 2	RYn3	
RXn4	Sensor No. 3 ON/OFF Output Data 1	RYn4	
RXn5	Sensor No. 3 ON/OFF Output Data 2	RYn5	
RXn6	Sensor No. 4 ON/OFF Output Data 1	RYn6	
RXn7	Sensor No. 4 ON/OFF Output Data 2	RYn7	
RXn8	Sensor No. 5 ON/OFF Output Data 1	RYn8	
RXn9	Sensor No. 5 ON/OFF Output Data 2	RYn9	
RXnA	Sensor No. 6 ON/OFF Output Data 1	RYnA	
RXnB	Sensor No. 6 ON/OFF Output Data 2	RYnB	
RXnC	Sensor No. 7 ON/OFF Output Data 1	RYnC	
RXnD	Sensor No. 7 ON/OFF Output Data 2	RYnD	
RXnE	Sensor No. 8 ON/OFF Output Data 1	RYnE	
RXnF	Sensor No. 8 ON/OFF Output Data 2	RYnF	
RX(n+1)0	Sensor No. 9 ON/OFF Output Data 1	RY(n+1)0	
RX(n+1)1	Sensor No. 9 ON/OFF Output Data 2	RY(n+1)1	
RX(n+1)2	Sensor No. 10 ON/OFF Output Data 1	RY(n+1)2	
RX(n+1)3	Sensor No. 10 ON/OFF Output Data 2	RY(n+1)3	
RX(n+1)4	Sensor No. 11 ON/OFF Output Data 1	RY(n+1)4	
RX(n+1)5	Sensor No. 11 ON/OFF Output Data 2	RY(n+1)5	
RX(n+1)6	Sensor No. 12 ON/OFF Output Data 1	RY(n+1)6	
RX(n+1)7	Sensor No. 12 ON/OFF Output Data 2	RY(n+1)7	
RX(n+1)8	Sensor No. 13 ON/OFF Output Data 1	RY(n+1)8	
RX(n+1)9	Sensor No. 13 ON/OFF Output Data 2	RY(n+1)9	
RX(n+1)A	Sensor No. 14 ON/OFF Output Data 1	RY(n+1)A	
RX(n+1)B	Sensor No. 14 ON/OFF Output Data 2	RY(n+1)B	
RX(n+1)C	Sensor No. 15 ON/OFF Output Data 1	RY(n+1)C	
RX(n+1)D	Sensor No. 15 ON/OFF Output Data 2	RY(n+1)D	
RX(n+1)E	Sensor No. 16 ON/OFF Output Data 1	RY(n+1)E	
RX(n+1)F	Sensor No. 16 ON/OFF Output Data 2	RY(n+1)F	
RX(n+2)0	Command Normal Completion Flags	RY(n+2)0	Trigger Request Flags
RX(n+2)1	Command Error Completion Flags	RY(n+2)1	Do not use.
RX(n+2)2	Busy Flag	RY(n+2)2	
RX(n+2)3	Sensor Error Flags	RY(n+2)3	
RX(n+2)4	Do not use.	RY(n+2)4	
RX(n+2)5	Warning Reset Completed Flags	RY(n+2)5	Warning Reset Flags
RX(n+2)6 ⋮ RX(n+3)9	Do not use.	RY(n+2)6 ⋮ RY(n+3)9	Do not use.
RX(n+3)A	Error Status Flags	RY(n+3)A	Error Reset Request Flags
RX(n+3)B	Remote Ready Flags	RY(n+3)B	Do not use.
RX(n+3)C	Do not use.	RY(n+3)C	
RX(n+3)D		RY(n+3)D	
RX(n+3)E		RY(n+3)E	
RX(n+3)F		RY(n+3)F	

n: The address assigned to the master station in the station number settings

- On the E3NX-FA10/40, E2NC-EA10/40, E9NC-AA10/40, E9NC-VA10/40, and E9NC-VD20/50, output data 1 and 2 of sensor numbers 1 to 16 are both fixed at "0".

● Read/Write Register Assignments in Reduced I/O Mode

Read area: E3NW-CCL to master		
Device No.	**Description**	**Remarks**
RWrm	Sensor Warning Flags (1 to 16)	
RWrm+1	Do not use.	
RWrm+2	Received Data 1 Area	
RWrm+3	Received Data 2 Area	
RWrm+4	Number of Mounted Sensors (including Dummy Slaves)	
RWrm+5	Error Information Storage Area	Error type Refer to *6-2-3 Error History*.
RWrm+6 and 7	Do not use.	

m: The address assigned to the master station in the station number settings

Write area: Master to E3NW-CCL		
Device No.	**Description**	**Remarks**
RWwn	Command Unit Number Setting Area	
RWwn+1	Command Sensor Channel Setting Area	
RWwn+2	Command Type Setting Area	Refer to *A-1 Using Commands for Communications*.
RWwn+3	Do not use.	
RWwn+4	Command data 1	
RWwn+5	Command data 2	
RWwn+6 and 7	Do not use.	

n: The address assigned to the master station in the station number settings

● I/O Signal Assignments in Monitor Mode

Signal direction: E3NW-CCL to master		Signal direction: Master to E3NW-CCL	
Device No.	**Signal name**	**Device No.**	**Signal name**
RXn0	Sensor No. 1 ON/OFF Output Data 1	RYn0	Do not use.
RXn1	Sensor No. 1 ON/OFF Output Data 2	RYn1	
RXn2	Sensor No. 2 ON/OFF Output Data 1	RYn2	
RXn3	Sensor No. 2 ON/OFF Output Data 2	RYn3	
RXn4	Sensor No. 3 ON/OFF Output Data 1	RYn4	
RXn5	Sensor No. 3 ON/OFF Output Data 2	RYn5	
RXn6	Sensor No. 4 ON/OFF Output Data 1	RYn6	
RXn7	Sensor No. 4 ON/OFF Output Data 2	RYn7	
RXn8	Sensor No. 5 ON/OFF Output Data 1	RYn8	
RXn9	Sensor No. 5 ON/OFF Output Data 2	RYn9	
RXnA	Sensor No. 6 ON/OFF Output Data 1	RYnA	
RXnB	Sensor No. 6 ON/OFF Output Data 2	RYnB	
RXnC	Sensor No. 7 ON/OFF Output Data 1	RYnC	
RXnD	Sensor No. 7 ON/OFF Output Data 2	RYnD	
RXnE	Sensor No. 8 ON/OFF Output Data 1	RYnE	
RXnF	Sensor No. 8 ON/OFF Output Data 2	RYnF	
RX(n+1)0	Sensor No. 9 ON/OFF Output Data 1	RY(n+1)0	
RX(n+1)1	Sensor No. 9 ON/OFF Output Data 2	RY(n+1)1	
RX(n+1)2	Sensor No. 10 ON/OFF Output Data 1	RY(n+1)2	
RX(n+1)3	Sensor No. 10 ON/OFF Output Data 2	RY(n+1)3	
RX(n+1)4	Sensor No. 11 ON/OFF Output Data 1	RY(n+1)4	
RX(n+1)5	Sensor No. 11 ON/OFF Output Data 2	RY(n+1)5	
RX(n+1)6	Sensor No. 12 ON/OFF Output Data 1	RY(n+1)6	
RX(n+1)7	Sensor No. 12 ON/OFF Output Data 2	RY(n+1)7	
RX(n+1)8	Sensor No. 13 ON/OFF Output Data 1	RY(n+1)8	
RX(n+1)9	Sensor No. 13 ON/OFF Output Data 2	RY(n+1)9	
RX(n+1)A	Sensor No. 14 ON/OFF Output Data 1	RY(n+1)A	
RX(n+1)B	Sensor No. 14 ON/OFF Output Data 2	RY(n+1)B	
RX(n+1)C	Sensor No. 15 ON/OFF Output Data 1	RY(n+1)C	
RX(n+1)D	Sensor No. 15 ON/OFF Output Data 2	RY(n+1)D	
RX(n+1)E	Sensor No. 16 ON/OFF Output Data 1	RY(n+1)E	
RX(n+1)F	Sensor No. 16 ON/OFF Output Data 2	RY(n+1)F	
RX(n+2)0	Command Normal Completion Flags	RY(n+2)0	Trigger Request Flags
RX(n+2)1	Command Error Completion Flags	RY(n+2)1	Do not use.
RX(n+2)2	Busy Flag	RY(n+2)2	
RX(n+2)3	Sensor Error Flags	RY(n+2)3	
RX(n+2)4	Do not use.	RY(n+2)4	
RX(n+2)5	Warning Reset Completed Flags	RY(n+2)5	Warning Reset Flags
RX(n+2)6 ⋮ RX(n+13)9	Do not use.	RY(n+2)6 ⋮ RY(n+13)9	Do not use.
RX(n+13)A	Error Status Flags	RY(n+13)A	Error Reset Request Flags
RX(n+13)B	Remote Ready Flags	RY(n+13)B	Do not use.
RX(n+13)C to F	Do not use.	RY(n+13)C to F	

n: The address assigned to the master station in the station number settings

- On the E3NX-FA10/40, E2NC-EA10/40, E9NC-AA10/40, E9NC-VA10/40, and E9NC-VD20/50, output data 1 and 2 of sensor numbers 1 to 16 are both fixed at "0".

● Read/Write Register Assignments in Monitor Mode

Read area: E3NW-CCL to master		
Device No.	**Description**	**Remarks**
RWrm	Sensor Warning Flags (1 to 16)	
RWrm+1	Do not use.	
RWrm+2	Received Data 1 Area	
RWrm+3	Received Data 2 Area	
RWrm+4	Number of Mounted Sensors (including Dummy Slaves)	
RWrm+5	Error Information Storage Area	Error type Refer to *6-2-3 Error History*.
RWrm+6 to 7	Do not use.	
RWrm+8	Sensor No. 1 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+9	Sensor No. 1 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+A	Sensor No. 2 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+B	Sensor No. 2 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+C	Sensor No. 3 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+D	Sensor No. 3 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+E	Sensor No. 4 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+F	Sensor No. 4 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+1 0	Sensor No. 5 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+1 1	Sensor No. 5 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+1 2	Sensor No. 6 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+1 3	Sensor No. 6 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+1 4	Sensor No. 7 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+1 5	Sensor No. 7 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+1 6	Sensor No. 8 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+1 7	Sensor No. 8 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+1 8	Sensor No. 9 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+1 9	Sensor No. 9 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+1 A	Sensor No. 10 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+1 B	Sensor No. 10 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+1 C	Sensor No. 11 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+1 D	Sensor No. 11 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+1 E	Sensor No. 12 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+1 F	Sensor No. 12 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+2 0	Sensor No. 13 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+2 1	Sensor No. 13 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+2 2	Sensor No. 14 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+2 3	Sensor No. 14 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+2 4	Sensor No. 15 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+2 5	Sensor No. 15 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+2 6	Sensor No. 16 IN1/IN2 Detection Level/Threshold Value Area 1 *1	
RWrm+2 7	Sensor No. 16 IN1/IN2 Detection Level/Threshold Value Area 2 *1	
RWrm+2 8	Detection Level/Threshold Value Switch Confirmation Area	ON = Threshold value, OFF = Detection level
RWrm+2 9	IN1/IN2 Switch Confirmation Area *2	ON = IN2, OFF = IN1

Read area: E3NW-CCL to master		
Device No.	**Description**	**Remarks**
RWrm+2 A	Detection Level Confirmation Area *2	2 = Detection level peak, 1 = Detection level bottom, 0 = Current value
RWrm+2 B to 2F	Do not use.	

m: The address assigned to the master station in the station number settings

*1 The E9NC-TA0/AA□0/VA□0/VD□0 uses 32 bits at the same time for Sensor No. □□ IN1/IN2 Detection Level/Threshold Value Areas 1 and 2.

*2 Not used on the E9NC-TA0/AA□0/VA□0/VD□0. Set to "0"

Precautions for Correct Use

The detection level obtained above is the actual detection level used for judgement. It may not match the detection level displayed on the digital display of the Sensor Amplifier Unit.

The data that are read out to the "IN1/2 Detection Level/Threshold Value Area" with the settings of the Detection Level/Threshold Value Switch Confirmation Area and "IN1/IN2 Switching Confirmation Area" are shown in the table below.

FA□0/LA0/SA0/MA0/FAH0/EA□0

Detection Level/Threshold Value Switch Confirmation Area	IN1/2 Detection Level/Threshold Value	IN1/IN2 Switch Confirmation Area	
		OFF = IN1	ON = IN2
ON = Threshold value*1	(1)	OUT1 normal detection threshold value OUT1 area output LOW threshold value	OUT2 threshold value OUT2 area output LOW threshold value
	(2)	Not used	Not used
OFF = Detection level*2	(1)	2-byte detection level	2-byte detection level
	(2)	2-byte detection level	2-byte detection level

*1 The HIGH threshold value cannot be specified during OUT1/OUT2 area output. Use a command to read this value.

*2 The same data is read in all cases, regardless of (1)/(2) and IN1/IN2.

TA0/AA□0/VA□0/VD□0

Detection Level/Threshold Value Switch Confirmation Area	IN1/2 Detection Level/Threshold Value	IN1/IN2 Switch Confirmation Area	
		OFF = IN1	ON = IN2
ON = Threshold value*1	(1)	Area detection LOW threshold value (lower 2 bytes) Normal detection threshold value (lower 2 bytes)	Not used
	(2)	Area detection LOW threshold value (upper 2 bytes) Normal detection threshold value (upper 2 bytes)	Not used
OFF = Detection level*2	(1)	4-byte detection level (lower 2 bytes)	4-byte detection level (lower 2 bytes)
	(2)	4-byte detection level (upper 2 bytes)	4-byte detection level (upper 2 bytes)

*1 The HIGH threshold value cannot be specified during area output. Use a command to read this value.
*2 The same data is read, regardless of IN1/IN2.

Write area: Master to E3NW-CCL		
Device No.	**Description**	**Remarks**
RWwn	Command Unit Number Setting Area	
RWwn+1	Command Sensor Channel Setting Area	
RWwn+2	Command Type Setting Area	Refer to *A-1 Using Commands for Communications*.
RWwn+3	Do not use.	
RWwn+4	Command data 1	
RWwn+5	Command data 2	
RWwn+6 to 7	Do not use.	
RWwn+8	Detection Level/Threshold Value Switch Setting Area	ON = Threshold value, OFF = Detection level
RWwn+9	IN1/IN2 Switch Setting Area *1	ON = IN2, OFF = IN1
RWwn+A	Detection Level Setting Area*1	2 = Detection level peak, 1 = Detection level bottom, 0 = Detection level/Threshold value
RWwn+B to 2F	Do not use.	

n: The address assigned to the master station in the station number settings
*1 Cannot be used on the E9NC-TA0/AA□0/VA□0/VD□0. Set to "0".

6-2 E3NW-CCL Functions

6-2-1 Dummy Sensor Registration

Outline of Function

- **Application**

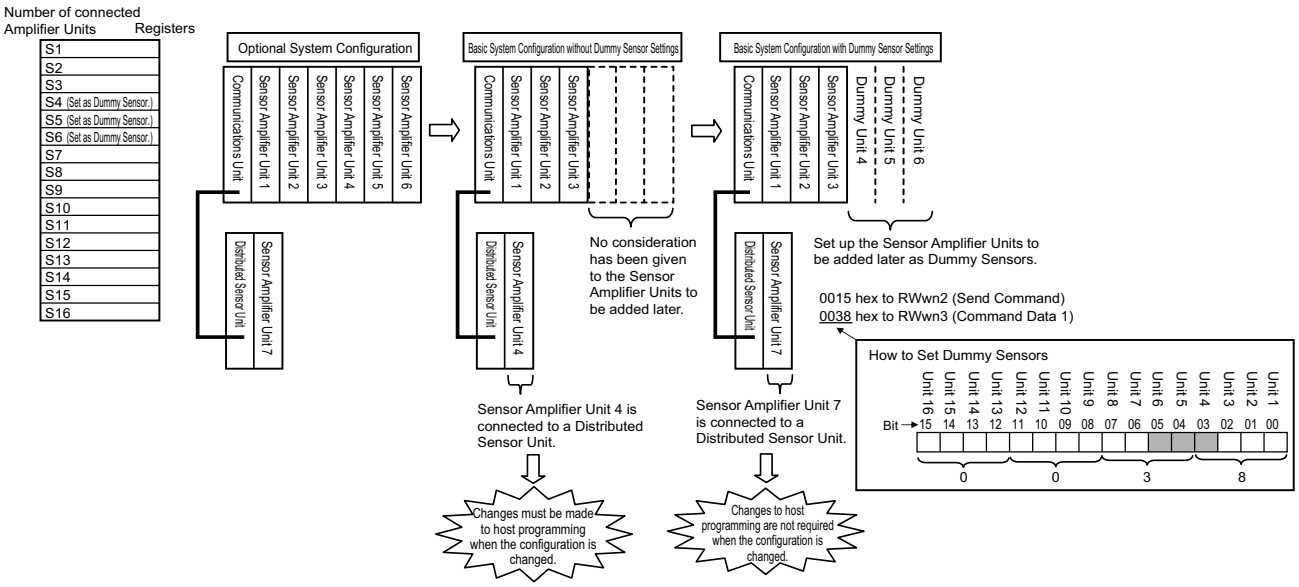
If the number of used Sensor Units or Sensor Unit numbers are changed (e.g., when device options are changed), the I/O assignments for the host device would also change, which requires modifications to host programming.
By registering Dummy Sensors you can prevent these changes in I/O assignments and eliminate the effect changing Sensor Unit numbers might have on host programming.

The following is an application example.

1. Registers are always allocated to detect 16 connected Amplifier Units.
2. If this function is not used and there are no Amplifier Unit reservations, the data for Amplifier Units 1 to 3 are assigned to registers S1 to S3.
3. If Amplifier Units 4, 5, and 6 (temporary names) are added next to Amplifier Unit 2, the register assignments will change. (The data for Amplifier Unit 3 will no longer be stored in register S3, but in register S7 instead.)

You can use Dummy Sensors to prevent the location of existing Amplifier Unit data from being moved when an Amplifier Unit are added as shown in the above example.

If you want to add Amplifier Units in the future as shown in the figure below, you can set Dummy Sensors to registers S4 to S6 to eliminate the need for any changes to host device programming when the additional Amplifier Units are actually installed.



Setting Method

Dummy Sensors are set using commands.

● Dummy Sensor Position Setting

This sets the position of the Dummy Sensor. After the position is set, the Dummy Sensor is enabled.

To execute the command, set the Command Type Setting Area write register (RWwn+2) to 15 hex (as shown in *List of Write Commands*).
Set the Command Data 1 write register (RWwn+4) to n (the unit number you want to set for the Dummy Sensor).

● How to Set Dummy Sensors

Set the bit that corresponds to the required unit number to 1.
To set the Dummy Sensors as units 4 to 6, as shown in the usage example above, set the Command Data 1 write register (RWwn+4) to 0000 0000 0011 1000 binary or 38 hex.
To cancel a Dummy Sensor setting, set the corresponding bit to 0. To cancel all set Dummy Sensors, set the Command Data 1 write register (RWwn+4) to 0000 0000 0000 0000 binary or 00 hex.
For detailed setting instructions, refer to *6-1-1 Input Data Assignments*.

6-2-2 Command Communications with the E3NW-DS

The E3NW-CCL Communications Unit can be connected to a E3NW-DS with an E3NW-DS Connector. Sensor Amplifier Units can be connected to an E3NW-DS and the PV, ON/OFF information, and command response information from those Sensor Amplifier Units can be sent to the E3NW-CCL.
Up to 8 E3NW-DS Units can be connected, and up to 10 Sensor Amplifier Units can be connected to each E3NW-DS. However, the maximum number of connectable Sensor Amplifier Units in the entire system configuration is still 16, even when E3NW-DS Units are used.
You must set the unit number for any connected E3NW-DS through the unit number setting switches on the E3NW-DS.
In the I/O map for the E3NW-CCL, the order for output values will be mapped as follows: Sensor Amplifier Units connected to the E3NW-CCL followed by Sensor Amplifier Units connected to E3NW-DS Units in ascending order of E3NW-DS unit numbers.

6-2-3 Error History

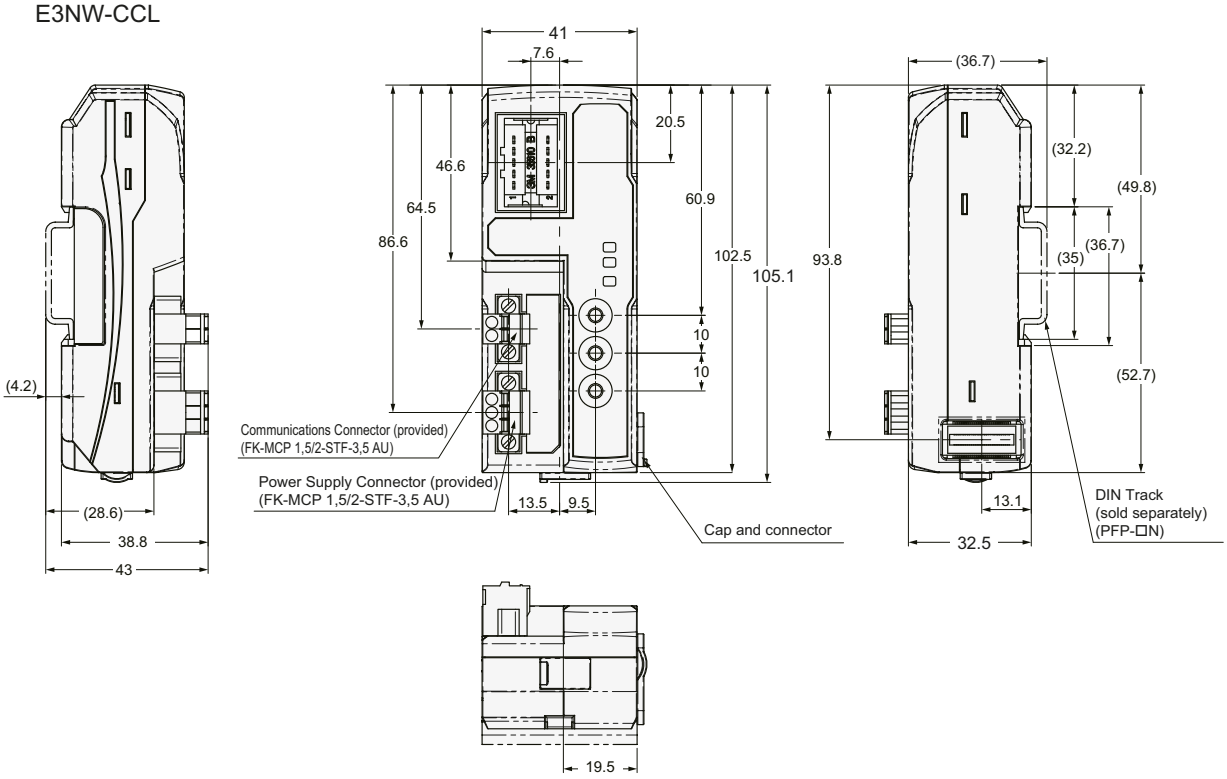
When an error occurs in the Communications Unit, information is stored in the error history in the EEPROM.
Information for up to eight errors can be saved in the error history. When more errors occur, the oldest entry in the error history is overwritten by the latest error information.
You can read the error history with a read command or clear the error history with a clear command.
If multiple errors occur at the same time, the priorities at which errors are stored in the error history are listed in the following table.

Priority	Error type	Description	Meaning	Solution	Response from Sensor Amplifier Unit	Judged at Communications Unit
Low ↓ High	00	No error	Initial status	---	OK	OK
	0×01	Communications Error	Checksum error, timeout error, etc.	• Retry. • Check communications with the Sensor Unit.	OK	OK
	0×02	Set Value Error	Invalid command data value (e.g., out of range) • Tuning failed. • Hysteresis width data is out of range. • Timer data is out of range.	Set the correct data.	OK	---
	0×04	Status Error	The Sensor Amplifier is currently not in a state that can accept the command. • Command was received in Setting Mode. • A command for the second point for two-point tuning was received, but not for the first point. • A command for the second point for positioning tuning was received, but not for the first point.	Send the commands at the correct time.	OK	---
	0×08	Command Error	An unsupported command was sent to the Sensor Amplifier Unit. • A command that could not be executed was sent. • A channel that does not exist was specified. • A read command was executed at the same time for more than one Sensor.	Set the correct command.	OK	---
	0×10	TRG Error	TRG was turned OFF before processing was finished.	Keep TRG ON until processing is finished.	---	OK

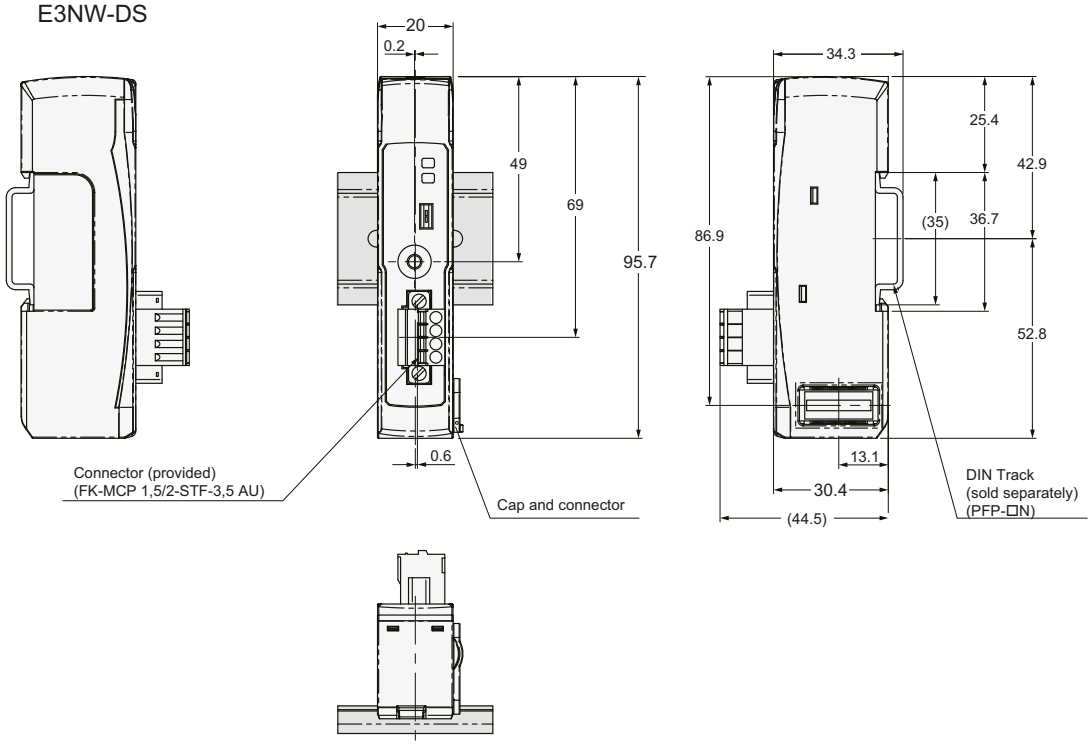
6-3 Dimensional Diagrams

The following figures show the product dimensions.

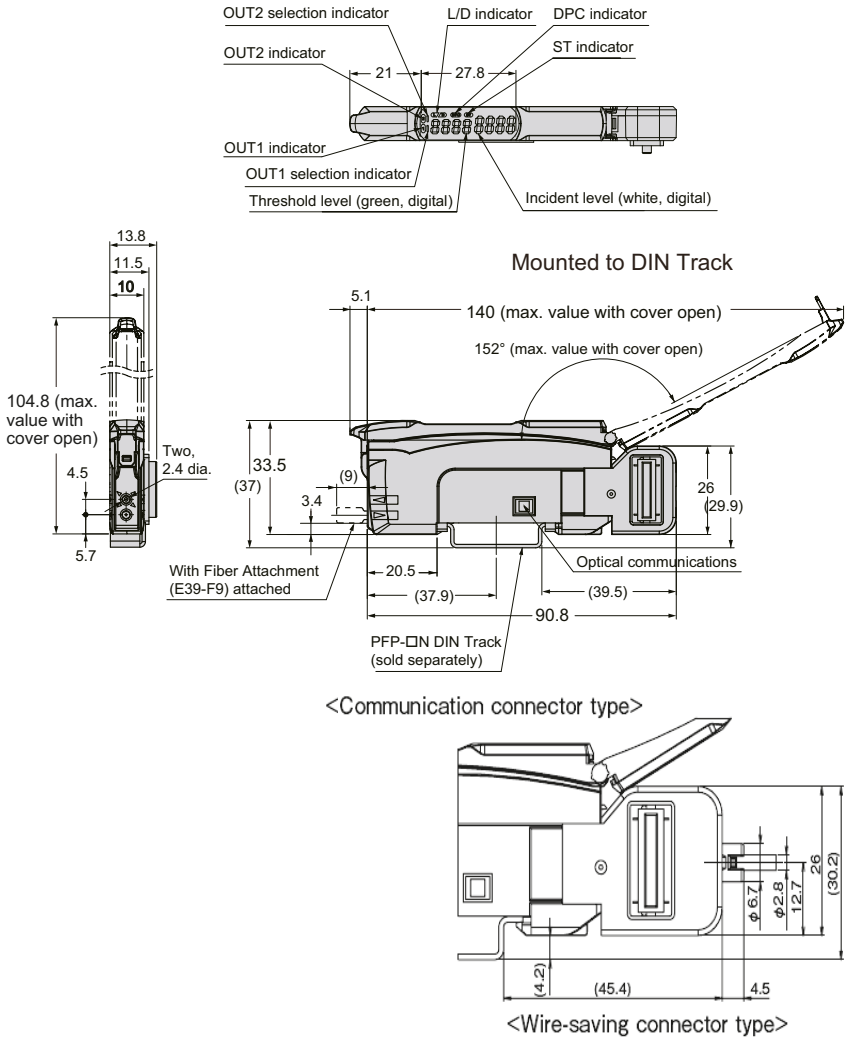
E3NW-CCL



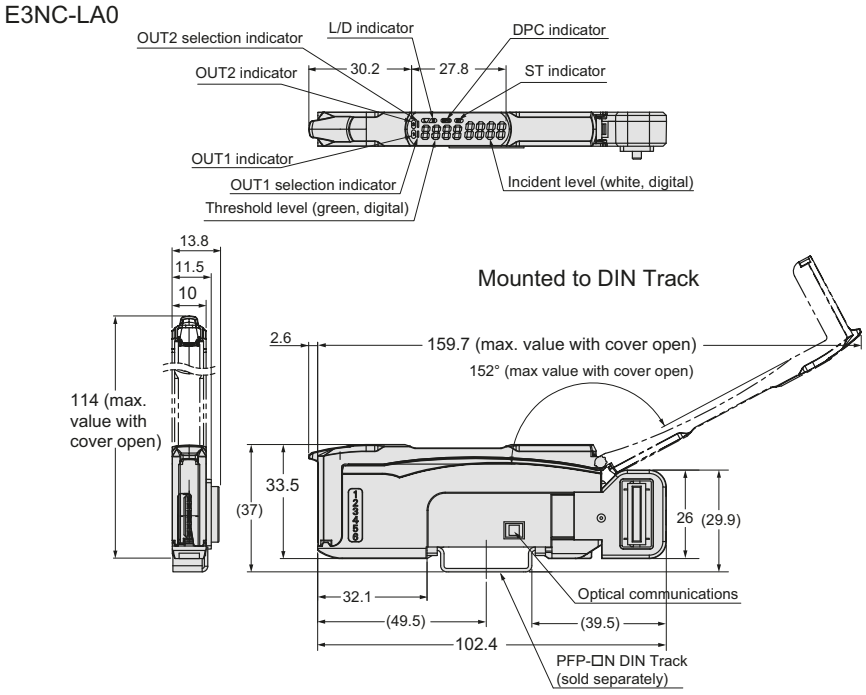
E3NW-DS



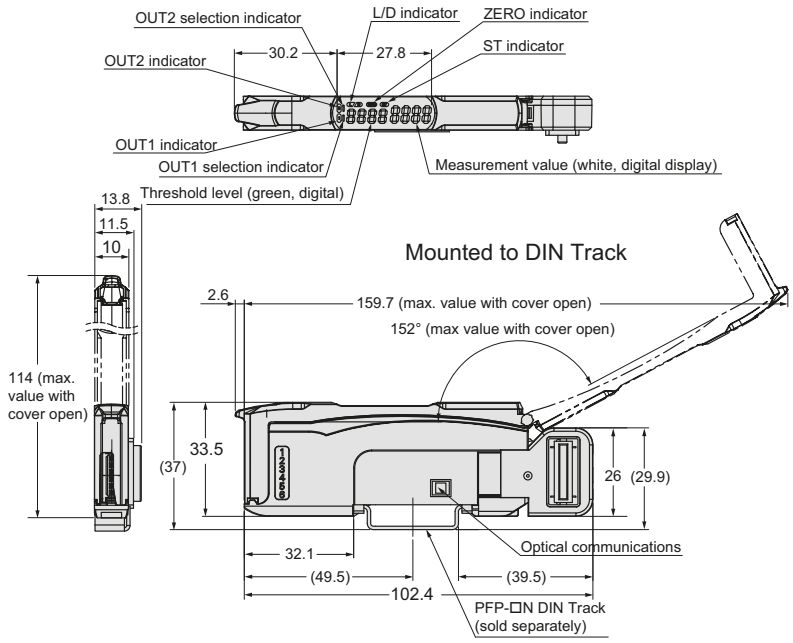
E3NX-FA□0



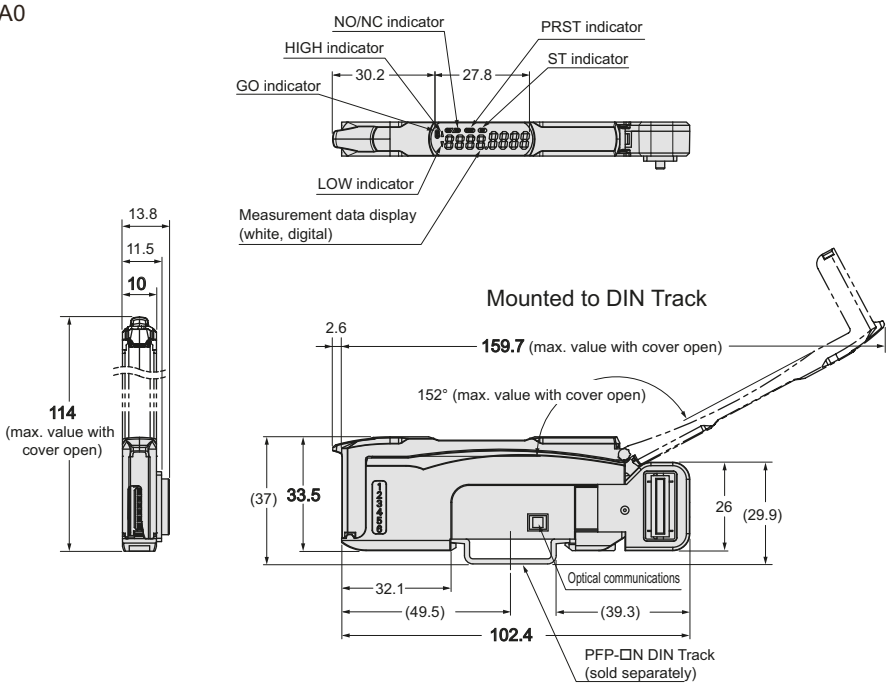
E3NC-LA0



E3NC-SA0

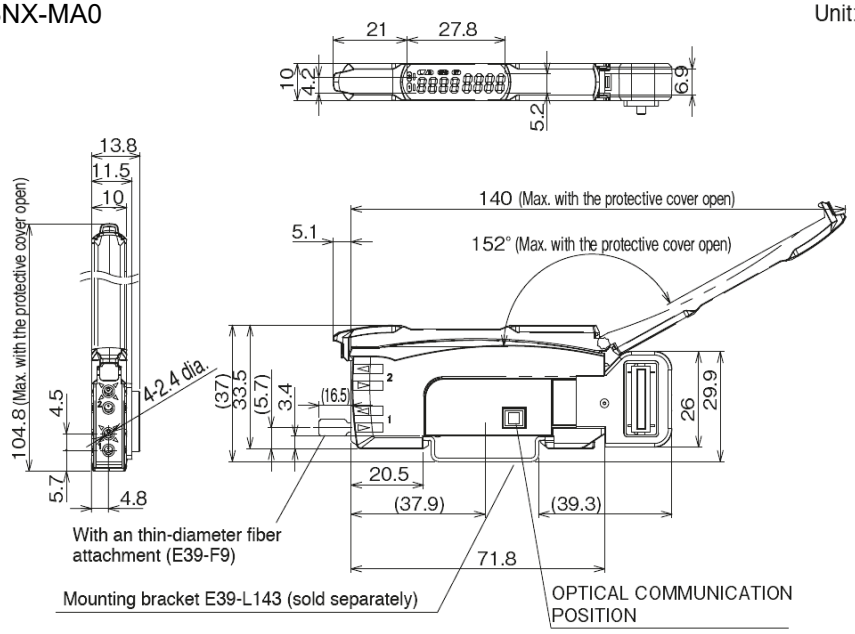


E9NC-TA0



E3NX-MA0

Unit: mm

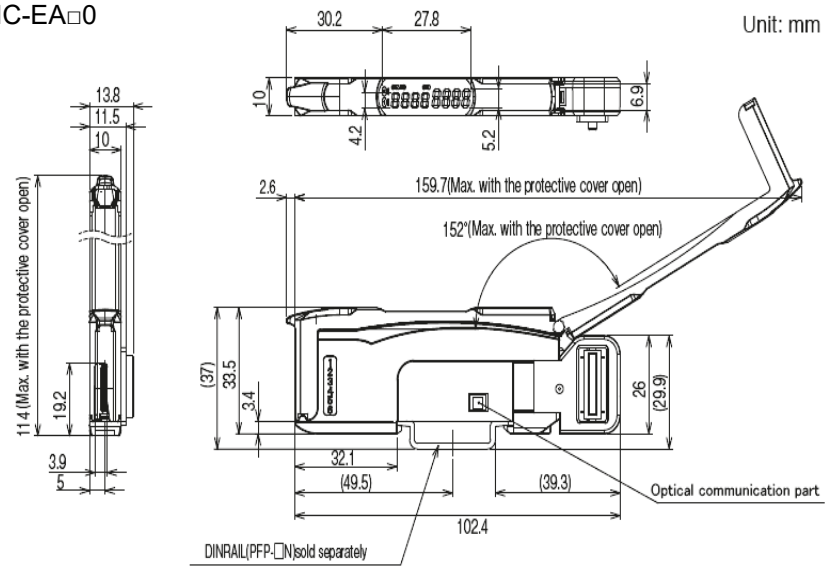


E3NX-FAH0

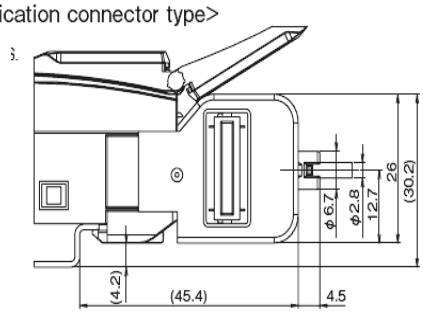
* It is the same as E3NX-FA0 <Communication connector type>.

E2NC-EA□0

Unit: mm

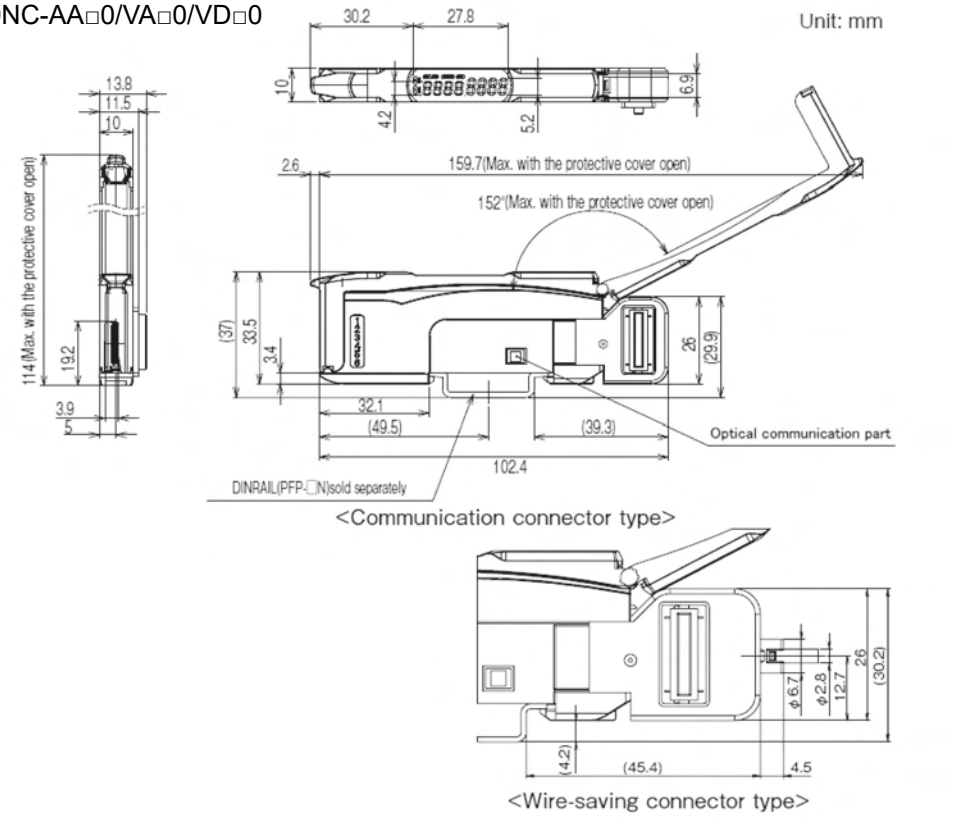


<Communication connector type>



<Wire-saving connector type>

E9NC-AA□0/VA□0/VD□0



7

Troubleshooting and Maintenance

This section describes troubleshooting and maintenance.

7-1 Troubleshooting

7-1-1 Troubleshooting Errors with the Status Indicators

You can check for errors by looking at the status indicators on the E3NW-CCL. For detailed status definitions, refer to *5-3-1 Status Indicators*.

● Errors Related to the E3NW-CCL

RUN Indicator	ERR Indicator	SS Indicator *1	Description	Cause	Solution
Not lit.	Lit (red)	Lit (green or red)	Communications Error	CC-Link communications were interrupted during communications.	Check the following items for all CC-Link communications cables. • Are the signal wires connected properly? • Are there any disconnections? • Are you using only CC-Link-authorized products? • Is there any noise?
			Switch Setting Error (Station number setting is out of range.)	There is an error in a station number setting.	Set the station number to within the valid range.
	Flashing (red)		Switch Setting Error	A switch setting was changed during operation.	The settings of the setting switches are read only once when the power is turned ON. Changing this setting after the power is turned ON will have no effect until after the next time the power is turned ON. To change switch settings, cycle the power supply.
	Not lit.		Communications Error	The CC-Link cable is not connected.	Check the following items for all CC-Link communications cables. • Are the signal wires connected properly? • Are there any disconnections? • Are you using only CC-Link-authorized products? • Is there any noise?
				The parameters do not match those set in the CC-Link master station.	• Set the baud rate/operating mode setting switch to match the parameter set in the CPU of the master station. • Set the station number setting switch to match the parameter set in the CPU of the master station. • Set the operating mode to match the CC-Link version in the parameter set in the CPU of the master station.
		Not lit.	Power Supply Error	The power supply is not connected properly to the E3NW-CCL.	Eliminate the following causes of power interruption and then restart the E3NW-CCL according to the specifications of the CC-Link master that the E3NW-CCL is connected to. • Are the power supply cables wired properly? • Are the power supply cables disconnected? • Is the power supply voltage within the specifications? • Is the power supply capacity sufficient? • Is the power supply malfunctioning?

RUN Indicator	ERR Indicator	SS Indicator *1	Description	Cause	Solution
Not lit.	Not lit.	Not lit.	The Unit is malfunctioning.	Unit hardware malfunction	Check the following items for CC-Link communications cables. If none of these resolves the problem, the Unit has malfunctioned. Replace the E3NW-CCL Unit. • Are the signal wires connected properly? • Are there any disconnections? • Are you using only CC-Link-authorized products? • Is there any noise? • Is the Amplifier Unit connected?

*1 You can determine if it is a power supply error/Unit malfunction or communications error/switch settings error by checking the indicators on the Communications Unit when an Amplifier Unit is connected to the Communications Unit.
The SS indicator is either green, red, or OFF based on the connection status of the Amplifier Unit, regardless of any communications problems.
For details on this indicator and how it relates to the Amplifier Unit connection status, refer to the section on the SS indicator in *5-3-1 Status Indicators*.

7-1-2 Troubleshooting Errors Specific to the E3NW-CCL

Troubleshooting Parameter Setting Mistakes

<table>
<tr><th>Parameter</th><th>Method for checking on the master station</th><th>Solution</th></tr>
<tr><td>CC-Link mode setting</td><td>• Error station detection in the CC-Link diagnostics
• CC-Link error code: B823 (Remote Control Mode Error)
• Determining the station where the error occurred: SW0144 to SW0147 (CC-Link Version Mounting/Parameter Matching Status)</td><td>Set the CC-Link mode based on the operating mode of the Communications Unit as follows:
<table>
<tr><th>Reduced I/O Mode</th><th>Monitor Mode</th></tr>
<tr><td>Select one of the following:
(1) Remote network version 1 mode
(2) Remote network version 2 mode
(3) Remote network addition mode</td><td>Select one of the following:
(1) Remote network version 2 mode
(2) Remote network addition mode</td></tr>
</table>
</td></tr>
<tr><td>Station type
Allocated station number
Expanded cyclic setting</td><td>• Error station detection in the CC-Link diagnostics
• CC-Link error code: B30A
• Determining the station where the error occurred: SW009C to SW009F (Mounting/Parameter Matching Status)</td><td>Set the CC-Link mode based on the operating mode of the Communications Unit as follows:
<table>
<tr><th>Operating mode</th><th>Reduced I/O Mode</th><th>Monitor Mode</th></tr>
<tr><td>Station type</td><td>Remote device station or version 1 remote device station</td><td>Version 2 remote device station</td></tr>
<tr><td>Allocated station number</td><td>2</td><td>3</td></tr>
<tr><td>Expanded cyclic setting</td><td>---</td><td>Quadruple</td></tr>
</table>
</td></tr>
</table>

Refer to the manual for your CC-Link master for details on parameter setting errors other than those listed above.

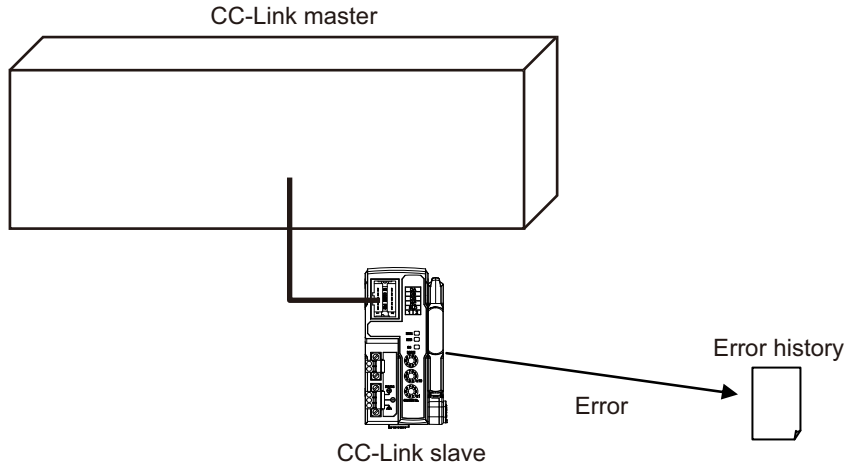
Troubleshooting CC-Link Switch Setting Mistakes

Switch	Cause	Checking method		Solution
		Communications Unit	Master station	
Setting the station number	Station number setting is out of range.	ERR indicator lit.	CC-Link diagnostics • CC-Link error code: B308 • Determining the location of the error: SW0080 to SW0083	Change the station number setting to be within the setting range.
	Duplicate station number	---	CC-Link diagnostics • CC-Link error code: B309 • Determining the location of the error: SW0098 to SW009B	Change the station number to a unique one.
	Station number changed during communications.	ERR indicator flashing.	CC-Link diagnostics • Determining the location of the change: SW008C to SW008F	Return to the previous setting.
Baud rate/operating mode setting	The set baud rate does not match the baud rate of the master station.	ERR indicator lit.	CC-Link diagnostics • CC-Link error code: B308 • Determining the location of the error: SW0080 to SW0083	Match the baud rate setting of the master station.
	Station number changed during communications.	ERR indicator flashing.	CC-Link diagnostics • Determining the location of the change: SW008C to SW008F	Return to the previous setting.
	Operating mode setting	---	CC-Link diagnostics • Check the CC-Link version: SW0144 to SW0147	Match with the operating mode you want to use.

Refer to the manual for your CC-Link master for the CC-Link diagnostics and CC-Link special registers (SW) used to troubleshoot problems on the master.

7-1-3 Error Notification Methods

This section describes the notification methods for errors that occur on the E3NW-CCL.



External cause	Location of problem		Detection method	Notification method	Solution
Noise	Communications	CC-Link	CRC error	• ERR indicator lit. • Error station detection in the CC-Link diagnostics on the master station	Stop and restart CC-Link communications.
		Serial connection with Sensor Amplifier Unit	PV Error (Checksum Error)	SS indicator lit red. RX(n+2)3 turns ON.	Cycle the power supply.
		Serial connection with Distributed Sensor Unit			
	Power supply		---	SS indicator not lit.	Cycle the power supply.
Dis-connection	Communications	CC-Link	MFP3N communications error detection	• ERR indicator lit. • Error station detection in the CC-Link diagnostics on the master station	Check the cable connections at the location where the error occurred.
		Serial connection with Sensor Amplifier Unit	PV Error (Checksum Error)	SS indicator lit red. RX(n+2)3 turns ON.	Check the connections for communications interfaces and communications cables.
		Serial connection with Distributed Sensor Unit			
	Power supply		---	SS indicator not lit.	Check the power supply cable.

Reference

Refer to the CC-Link master station for error codes that can be checked on the CC-Link master unit.

7-1-4 Emergency Error Codes

The following tables gives the meanings of the emergency error codes used by the E3NW-CCL Sensor Communications Unit.

E3NW-CCL Error Codes

Error code	Error name in error history	Error details	Notification to CC-Link master	Solution
0×01	Communications Error	Checksum error, timeout error, etc.	The error code is stored in the Error Information Storage Area remote register (RWrm+5) and the Error Status Flag remote input relay (RX(n+3)A in Reduced I/O Mode and RX(n+13)A in Monitor Mode) turns ON.	• Retry. • Check communications with the Sensor Unit.
0×02	Set Value Error	The command data value is invalid. (For example, it is out of range.) • Tuning failed. • Hysteresis width data is out of range. • Timer data is out of range.		Set the correct data.
0×04	Status Error	The Sensor Amplifier is currently not in a state that can accept the command. • Command was received in Setting Mode. • A command for the second point for two-point tuning was received, but not for the first point. • A command for the second point for positioning tuning was received, but not for the first point.		Send the commands at the correct time.
0×08	Command Error	An unsupported command was sent to the Sensor Amplifier Unit. • A command that could not be executed was sent. • A channel that does not exist was specified. • Multiple Sensor Units were specified in a read command.		Set the correct command.
0×10	TRG Error	TRG was turned OFF before processing was finished.		Keep TRG ON until processing is finished.

7-2 Device Maintenance

This section describes cleaning methods, inspection methods, and the E3NW-CCL replacement procedure for regular device maintenance.

7-2-1 Cleaning Methods

Clean the Communications Unit regularly to keep it in optimum operating condition.

- For daily cleaning, use a soft, dry cloth.
- If dry wiping does not remove all of the dirt, use a diluted mild detergent (2%) and wring out the cloth thoroughly before wiping.
- Leaving rubber items, plastic items, or tape on the Unit for an extended period of time may leave stains. Remove any such items from the Unit when cleaning.

Precautions for Correct Use

Never use benzine, paint thinner, or any other volatile cleaning solutions or chemical wash cloths for cleaning. These products can damage the coating on the Unit.

7-2-2 Inspection Methods

Perform regular inspections to keep the Communications Units in optimal working condition.
Inspections are best performed once every 6 months to 1 year.
However, in extremely humid environments, high-temperature environments, dusty environments, or other extreme environments, more frequent inspections are recommended.

Materials Required for Inspection

Prepare the following materials before performing an inspection.

● Daily Required Items

- Phillips screwdriver and flat-blade screwdriver
- Screwdrivers for communications connectors
- Voltage tester (or digital voltmeter)
- Industrial alcohol and 100% cotton cloth

● Possibly Required Items

- Synchroscope
- Pen-writing oscillograph
- Thermometer and hygrometer

Inspection Items

Check that the following items are within the criteria.
If they do not meet the criteria, improve the surrounding environment so that the affected items are within the acceptable standard range or adjust the Communications Unit as required.

Inspection Items	Inspection details	Criteria	Inspection method
Environmental status	Are the ambient and internal panel temperatures normal?	0 to 55°C	Thermometer
	Are the ambient and internal panel humidity normal?	25% to 85% (with no condensation or icing)	Hygrometer
	Is there any build-up of dust?	There must be no dust.	Visual inspection
Installation status	Is the E3NW-CCL securely mounted into place?	The Communications Unit must not be loose.	Phillips screwdriver
	Are the communications cable connectors completely inserted?	The communications cable connectors must not be loose.	Visual inspection
	Are there any loose screws on external wiring?	The screws on external wiring must not be loose.	Phillips screwdriver
	Are any connection cables loose or about to be disconnected?	There must be no visual anomalies.	Visual inspection

7-2-3 Handling Communications Units for Replacement

Every Unit (the CC-Link master and E3NW-CCL Units) is part of the network.
If a Unit malfunctions, this can affect the entire network and therefore must be repaired as soon as possible.
We recommend keeping replacement Units available in order to minimize the time needed to restore network functionality if required.

Precautions when Replacing Units

Be aware of the following points when replacing a malfunctioning Communications Unit.

- After replacement, check to confirm that there are no problems with the new Unit.
- If you are returning a defective Unit for repair, be sure to write down any details of the problem and send the information along with the defective Unit to your nearest OMRON representative.
- For poor contacts, wipe down the contacts with a clean 100% cotton cloth soaked in industrial alcohol.

Settings after Replacing Units

After replacing a Unit, be sure to set all switches and other settings to be the same those in the previous Unit.

A

Appendices

A-1 Using Commands for Communications

The Communications Unit can use read and write registers to perform communications with commands to perform more detailed data exchange. Using commands for communications allows you to read and write the status of a Sensor Amplifier Unit or change its settings.

1 Reading the Sensor Amplifier Unit Data

(1) Store the parameters for the data you want to read into the Data Category/Command Number Word and Data Number Word, and then turn ON the Command Request Bit.

(2) After communicating with the Sensor Amplifier Unit, the Command Completed Bit turns ON and the results of the communications are stored in Command Response Word. Read data is stored in the Read Data Words.

(3) When the Command Request Bit is turned OFF, the Command Completed Bit also turns OFF.

2 Writing Data to the Sensor Amplifier Unit

(1) Store the parameters for the data you want to write into the Data Category/Command Number Word, Data Number Word, and Write Data Words, and then turn ON the Command Request Bit.

(2) After communicating with the Sensor Amplifier Unit, the Command Completed Bit turns ON and the results of the communications are stored in the Command Response Word. The Read Data Words will be reset to 0.

(3) When the Command Request Bit is turned OFF, the Command Completed Bit also turns OFF.

● Commands

The following table lists the commands.

List of Read Commands

Command type RWwn+2	Name	Read values RWrm+2: Received Data 1 Area RWrm+3: Received Data 2 Area	Applicable Sensor Amplifier Units
0×00	Read Status	0: Normal (waiting for command) 1 = Busy 2 = Error	To communication unit
0×02	Read Number of Mounted Sensors	Number of connected nodes	To communication unit
0×03	Read Error History	Received Data 1: Type of error Received Data 2: Number of stored history items	To communication unit
0×05	Read Dummy Sensor Setting	0: Not set as dummy. 1 = Set as dummy.	To communication unit
0×06	Read Dummy Sensor Response Setting	0: Abort response 1: Normal response	To communication unit
0×08	Sensor Warning Status	The bits for the Sensor Amplifier Units where an error occurred will be 1.	To communication unit

Command type RWwn+2	Name	Read values RWrm+2: Received Data 1 Area RWrm+3: Received Data 2 Area	Applicable Sensor Amplifier Units				
0×0B	Check Communications Unit Software Version	The value is read as a binary number.	To communication unit				
0x0C	Communication Unit ID Confirmation	The value is read as a hexadecimal number.	To communication unit				
0×20	Read Detection Level	−1999 to 9999 (FA□0, LA0, SA0, MA0, FAH0, or EA□0) −19999999 to 99999999 (TA0, AA□0, or VA□0)	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×22	Read Peak Detection Level	−1999 to 9999 (FA□0, LA0, SA0, MA0, FAH0, or EA□0) −19999999 to 99999999 (AA□0 or VA□0) * "Minimum input peak value and maximum interrupted light bottom value [P-b]" or "PEAK" (detection level at peak) must be selected with the Display Switch (B0 hex).	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 -
0×24	Read Bottom Detection Level	−1999 to 9999 (FA□0, LA0, SA0, MA0, FAH0, or EA□0) −19999999 to 99999999 (AA□0 or VA□0) * You must select the input peak minimum value and maximum interrupted light bottom value [P-b] for the Display Switch Setting (B0 hex).	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 -
0×27	Read Zero Reset Level	−9999 to 0 (FA□0, LA0, SA0, MA0, FAH0, or EA□0) −99999999 to 0 (AA□0 or VA□0)	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 -
0×28	Read Sensor Status (tuning status, mutual interference status, etc.)	The bits listed below will turn ON when the conditions for an alarm are met. Bit 00: Normal operation (This bit is normally set to 1, and changes to 0 if any bit 08 or higher changes to 1.) Bit 01: CH1 DPC status (This bit is set to "1" when the DPC is ON.) Bit 02: CH1 Smart Tuning Status (This bit is set to "1" when ST is ON.) Bit 03: CH2 DPC status (This bit is set to "1" when the DPC is ON.) *MA0 only Bit 04: CH2 Smart Tuning Status (This bit is set to "1" when ST is ON.) *MA0 only Bit 05 to 07: Not used. Bit 08: DPC Error (FA□0, LA0, MA0, or FAH0 only) Bit 09: EEPROM Error (response or checksum) Bit 0A: Load Short Error Bit 0B: Head Error (SA0 or TA0 only)	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0

Command type RWwn+2	Name	Read values RWrm+2: Received Data 1 Area RWrm+3: Received Data 2 Area	Applicable Sensor Amplifier Units				
0×29	Sensor Model	FA□0/FAH0: 0160 FA10/40: 01D0 LA0: 0260 SA0: 0360 TA0: 0460 MA0: 0560 AA0: 0860 AA10/40: 08D0 VA0: 0960 VA10/40: 09D0 EA0: 0A60 EA10/40: 0AD0 VD0: 0b61 VD20/50: 0bD5	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0x2A	Sensor ID	The value is read as a hexadecimal number.	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×40	Threshold Setting 1	–1999 to 9999 (FA□0, LA0, SA0, MA0, FAH0, or EA□0) –19999999 to 99999999 (TA0, AA□0, or VA□0) -9999 to 9999 (VD□0) * This is the threshold value in Normal Detection Mode or the low threshold value in Area Detection Mode.	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×41	Threshold Setting 2	–1999 to 9999 (FA□0, LA0, SA0, MA0, FAH0, or EA□0) –19999999 to 99999999 (TA0, AA□0, or VA□0) -9999 to 9999 (VD□0) * This is the high threshold value in Area Detection Mode.	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0

Command type RWwn+2	Name	Read values RWrm+2: Received Data 1 Area RWrm+3: Received Data 2 Area	Applicable Sensor Amplifier Units				
0×42	Output Mode Setting	Received data (1) Output 1 0: Normal detection mode 1: Area detection mode 2: Differential detection mode (FA□0 or EA□0) Peak detection mode (VD□0) 3: Hold mode (SA0 only) Peak bottom detection mode AND (VD□0) 4: Peak bottom detection mode OR (VD□0) 5: Difference detection mode (VD□0) Received data (2) Output 2 0: Normal detection mode 1: Alarm output mode (FA□0, LA0, or FAH0) 2: Error output mode 3: Differential detection mode (FA□0 only) AND detection mode (MA0 only) Disconnection detection output mode (EA□0 only) 4: OR detection mode (MA0 only) 5: XOR detection mode (MA0 only) 6: GAP detection mode (MA0 only) 7: Rise synchronization detection mode (MA0 only) 8: Fall synchronization detection mode (MA0 only) 9: Area detection mode (MA0 only)	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×44	Operating Mode	0: Light ON/NO 1: Dark ON/NC	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0

Command type RWwn+2	Name	Read values RWrm+2: Received Data 1 Area RWrm+3: Received Data 2 Area	Applicable Sensor Amplifier Units				
0×45	Detection	Other than AA, VA 0: SHS 1: HS 2: STND 3: GIGA AA, VA 1 ms 10 ms 100 ms 500 ms 1 s 10 s 30 s 60 s VD 300 µs 500 µs 1 ms 5 ms	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×46	Differential Mode Threshold	FA□0 or EA□0 -1999 to 9999	FA□0 -	- EA□0	- -	- -	- -
0×47	Timer Setting	Timer Setting 0: OFF 1: OFFD (OFF delay) 2: ON-D (ON delay) 3: SHOT (one-shot timer) 4: ONOF (ON delay and OFF delay) * AA□0/VA□0/VD□0 cannot use 4: ONOFF.	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 VD□0
0×48	Timer Value 1	1 to 9999 * Timer Value 1 is assigned to the ON delay or one-shot timer.	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 VD□0
0×49	Timer Value 2	1 to 9999 * Timer Value 2 is assigned to the OFF delay timer.	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 VD□0
0×4A	DPC Setting/ Display No. of Digits	FA□0, LA0, FAH0, or MA0 0: DPC function OFF 1: DPC function ON TA0, AA□0 or VA□0 0: Four decimal digits displayed. 1: Three decimal digits displayed. 2: Two decimal digits displayed. 3: One decimal digit displayed. 4: Zero decimal digit displayed.	FA□0 MA0	LA0 -	- AA□0	TA0 VA□0	FAH0 -
0×4B	Differential Mode Response Time	FA□0, EA□0 1: Response Time 250 µS 2: Response Time 500 µS 3: Response Time 1 mS 4: Response Time 10 mS 5: Response Time 100 mS	FA□0 -	- EA□0	- -	- -	- -

Command type RWwn+2	Name	Read values RWrm+2: Received Data 1 Area RWrm+3: Received Data 2 Area	Applicable Sensor Amplifier Units				
0x50	Display Switch	0: Std (threshold value or detection level) 1: PEr (detection level margin for the threshold value (FA□0, LA0, SA0, MA0, or FAH0)) 2: P-b (minimum incident light peak value and maximum interrupted light bottom value) 3: bAr (bar display (FA□0, LA0, SA0, MA0, or FAH0)) 4: PEAK (detection level at peak (FA□0, LA0, SA0, MA0, or FAH0)) 5: ch (channel number and detection level) 7: CFdr (change finder (FA□0, LA0, MA0, or FAH0)) 8: dGdG (Ch1 detection level or Ch2 detection level display (MA0 only) * Specify the Solution Viewer setting with the lowest bit of the upper byte (FA□0, LA0, MA0, FAH0, or EA□0) Solution Viewer ON: 0x0001 XXXX Solution Viewer OFF: 0x0000	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 VD□0
0x51	Reversed Display	0: Reversed display OFF 1: Reversed display ON	FA□0 MA0	LA0 EA□0	SA0 AA□0	- -	FAH0 -
0×53	Eco Mode	0: Eco Mode OFF 1: Eco Mode ON 2: Eco Mode LO	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×54	Key Lock Setting	0: Lock OFF 1: Lock ON	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×60	Hysteresis Width Setting	0: Standard 1: User setting	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×61	Hysteresis Width 1	0 to 9999 (FA□0, LA0, SA0, MA0, FAH0, EA□0, or VD□0) 0 to 9999.9999 (AA□0 or VA□0) * FA□0, LA0, SA0, or FAH0 is the hysteresis width of output 2 in normal detection mode. * MA0, EA□0, AA□0, or VA□0 is the hysteresis width in normal detection mode and the low/high hysteresis width of area detection mode.	FA□0 MA0	LA0 EA□0	- AA□0	TA0 VA□0	FAH0 VD□0
0×62	Hysteresis Width 2	0 to 9999 (FA□0, LA0, SA0, MA0, FAH0, EA□0, or VD□0) 0 to 9999.9999 (TA0, AA□0, or VA□0) * FA□0, LA0, SA0, TA0, or FAH0 is the hysteresis width of output 1 in normal detection mode, and the hysteresis width in area detection mode. * MA0, EA□0, AA□0, or VA□0 do not use this object.	FA□0 MA0	LA0 -	SA0 -	TA0 -	FAH0 VD□0

Command type RWwn+2	Name	Read values RWrm+2: Received Data 1 Area RWrm+3: Received Data 2 Area	Applicable Sensor Amplifier Units				
0×63	Keep Setting or Mutual Interference Prevention No. of Units Setting External input setting Sensor OFF setting	SA 0: KEEP OFF 1: KEEP ON EA□0 0: Mutual interference prevention OFF 1: Mutual interference prevention 2 units 2: Mutual interference prevention 3 units 3: Mutual interference prevention 4 units 4: Mutual interference prevention 5 units VD□0 0: Input OFF 1: Tuning 4: Zero reset 6: Synchronized detection END output setting 9: Synchronized detection: Immediate output setting FA□0, MA0 0: OFF 1: ON * During sensor OFF operation, commands other than a command that cancels sensor OFF cannot be received.	FA□0 MA0	- EA□0	SA0 -	- -	- VD□0
0×64	Hold Mode Setting Zero reset automatic following	SA 0: Peak 1: Bottom (Valid when the mode for output 1 is set to Hold Mode.) VD 0: OFF 1: ON	- -	- -	SA0 -	- -	- VD□0
0×65	Warning Output Level	0 to 100 (Only valid when Output 2 mode = Alarm Output Mode)	FA□0 -	LA0 EA□0	- -	- -	FAH0 -
0×67	Read Zero Reset Status	0: Zero reset OFF 1: Zero reset ON	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 VD□0
0×6E	Percentage Tuning Setting or Origin Point Use Setting	FA□0, LA0, MA0, FAH0, EA□0, AA□0, VA□0 0: Percentage tuning OFF 1: Percentage tuning ON TA0 0: Origin point use setting ON 1: Origin point use setting OFF	FA□0 MA0	LA0 EA□0	- AA□0	TA0 VA□0	FAH0 -
0×6F	Percentage Tuning Level or Preset Value	FA□0, LA0, MA0, FAH0, EA□0, AA□0, VA□0 –99 to 99 TA0 –19999999 to 99999999	FA□0 MA0	LA0 EA□0	- AA□0	TA0 VA□0	FAH0 -

Command type RWwn+2	Name	Read values RWrm+2: Received Data 1 Area RWrm+3: Received Data 2 Area	Applicable Sensor Amplifier Units				
0×71	Power Tuning Setting, Tolerance Setting High, or Scaling Lower Limit Setting	FA□0, LA0, MA0, or FAH0 0: Power tuning setting ON 1: Power tuning setting OFF 2: Power Tuning ON When Power Turned On (FA□0 only) TA0 −1999999 to 9999999 AA□0 or VA□0 −1999.9999 to 9999.9999	FA□0 MA0	LA0 -	- AA□0	TA0 VA□0	FAH0 -
0×72	Power Tuning Level, Tolerance Setting Low, or Scaling Higher Limit Setting	FA□0, LA0, MA0, or FAH0 100 to 9999 TA0 −1999999 to 9999999 AA□0 or VA□0 −1999.9999 to 9999.9999	FA□0 MA0	LA0 -	- AA□0	TA0 VA□0	FAH0 -
0×7B	Background Suppression	0: Background suppression OFF 1: Background suppression ON	- -	- -	SA0 -	- -	- -
0x80	External input detection time	You can change the time external input is enabled. 5 to 9999 ms	- -	- -	- -	- -	- VD□0
0x86	Response Data Change	AA□0 or VA□0 0: Read input measurement value that is input. (Before scaling and zero reset) 1: Read displayed measurement value. (After scaling and zero reset)	- -	- -	- AA□0	- VA□0	- -
0×91	Direction Selection	0: Normal 1: Reversed	- -	- -	- -	TA0 -	- -
0×92	Output Selection Gain switching	TA 0: Normal 1: Hybrid VD 0: Gain x4000 1: Gain x2000 2: Gain x800 3: Gain x200 4: Gain x80 5: Gain x20 6: Gain x4 7: Gain x1	- -	- -	- -	TA0 -	- VD□0
0×95	Preset	0: Cleared 1: Executed	- -	- -	- -	TA0 -	-

* Commands to the E9NC-TA0 are supported from Ver. 1100, and E3NX-MA0, E2NC-EA□0, and E9NC-AA□0 /VA□0/VD□0 are supported from Version 1160.
You can check the version with read command "B". (Refer to page A-2)

List of Write Commands

Command type RWwn+2	Name	Write values RWwm + 4: Command data 1 RWwm + 5: Command data 2	Applicable Sensor Amplifier Units				
0×13	Clear Error History	1: Execute	To communication unit				
0×15	Dummy Sensor Setting	0: Clear Dummy Sensor setting n: Set Dummy Sensor (For n, enter the number of the Unit you want to set as a Dummy Sensor.)	To communication unit				
0×16	Dummy Sensor Response Setting	0: Abort response 0: Normal response	To communication unit				
0×A0	Threshold Setting 1	−1999 to 9999 (FA□0, LA0, SA0, MA0, FAH0, or EA□0) −19999999 to 99999999 (TA0, AA□0, or VA□0) -9999 to 9999 (VD□0) * This is the threshold value in Normal Detection Mode or the low threshold value in Area Detection Mode.	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×A1	Threshold Setting 2	−1999 to 9999 (FA□0, LA0, SA0, MA0, FAH0, or EA□0) −19999999 to 99999999 (TA0, AA□0, or VA□0) -9999 to 9999 (VD□0) * This is the high threshold value in Area Detection Mode.	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×A2	Output Mode Setting	Received Data 1 Output 1 0: Normal Detection Mode 1: Area Detection Mode 2: Differential detection mode (FA□0 or EA□0) Peak detection mode (VD□0) 3: Hold Mode (SA0 only) Peak bottom detection mode AND (VD□0) Received Data 2 Output 2 0: Normal Detection Mode 1: Alarm Output Mode (FA□0, LA0, or FAH0) 2: Error Output Mode 3: Differential detection mode (FA□0 only) AND detection mode (MA0 only) Disconnection detection output mode (EA□0 only) 4: OR detection mode (MA0 only) Peak bottom detection mode OR (VD□0) 5: XOR detection mode (MA0 only) Differential detection mode (VD□0) 6: GAP detection mode (MA0 only) 7: Rise synchronization detection mode (MA0 only) 8: Fall synchronization detection mode (MA0 only) 9: Area detection mode (MA0 only)	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0

Command type RWwn+2	Name	Write values RWwm + 4: Command data 1 RWwm + 5: Command data 2	Applicable Sensor Amplifier Units				
0×A4	Operating Mode	0: Light ON/NO 1: Dark ON/NC	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×A5	Detection	Other than AA, VA 0: SHS 1: HS 2: STND 3: GIGA AA, VA 1 ms 10 ms 100 ms 500 ms 1 s 10 s 30 s 60 s VD 300 µs 500 µs 1 ms 5 ms	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×A6	Differential Mode Threshold	FA□0 or EA□0 –1999 to 9999	FA□0 -	- EA□0	- -	- -	- -
0×A7	Timer Setting	Timer Setting 0: OFF 1: OFFD (OFF delay) 2: ON-D (ON delay) 3: SHOT (one-shot timer) 4: ONOF (ON delay and OFF delay) * AA□0/VA□0/VD□0 cannot use 4: ONOFF.	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 VD□0
0×A8	Timer Value 1	1 to 9999 * Timer Value 1 is assigned to the ON delay or one-shot timer.	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 VD□0
0×A9	Timer Value 2	1 to 9999 * Timer Value 2 is assigned to the OFF delay timer.	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 VD□0
0×AA	DPC Setting or Display No. of Digits	FA□0, LA0, FAH0, or MA0 0: DPC function OFF 1: DPC function ON TA0, AA□0, or VA□0 0: Four decimal digits displayed. 1: Three decimal digits displayed. 2: Two decimal digits displayed. 3: One decimal digit displayed. 4: Zero decimal digit displayed.	FA□0 MA0	LA0 -	- AA□0	TA0 VA□0	FAH0 -
0×AB	Differential Mode Response Time	FA□0 or EA□0 1: Response Time 250 µS 2: Response Time 500 µS 3: Response Time 1 mS 4: Response Time 10 mS 5: Response Time 100 mS	FA□0 -	- EA□0	- -	- -	- -

Command type RWwn+2	Name	Write values RWwm + 4: Command data 1 RWwm + 5: Command data 2	Applicable Sensor Amplifier Units				
0×B0	Display Switch	0: Std (threshold value or detection level) 1: PEr (detection level margin for the threshold value (FA0, LA0, SA0, MA0, or FAH0)) 2: [P-b] Incident light peak minimum value and interrupted light bottom maximum value 3: bAr (bar display (FA□0, LA0, SA0, MA0, or FAH0)) 4: PEAK (detection level at peak (FA□0, LA0, SA0, MA0, or FAH0)) 5: ch (channel number and detection level) 7: CFdr (change finder (FA□0, LA0, MA0, or FAH0)) 8: dGdG (Ch1 detection level or Ch2 detection level display (MA0 only)) Specify the Solution Viewer Setting in the least significant bit of the upper byte. (FA□0, LA0, MA0, FAH0, or EA□0) Solution Viewer OFF: 0x0001 XXXX Solution Viewer OFF: 0x0000 XXXX	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 VD□0
0×B1	Reversed Display	0: Reversed display OFF 1: Reversed display ON	FA□0 MA0	LA0 EA□0	SA0 -	- -	FAH0 -
0×B2	Channel Display	0: Clear the setting 1: Execute	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 VD□0
0×B3	Eco Mode	0: Eco Mode OFF 1: Eco Mode ON 2: Eco Mode LO	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×B4	Key Lock Setting	0: Lock OFF 1: Lock ON	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×B5	Flash Display Setting	0: Clear the setting 1: Execute	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×C0	Hysteresis Width Setting	0: Standard 1: User setting	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×C1	Hysteresis Width 1	0 to 9999 (FA□0, LA0, SA0, MA0, FAH0, EA□0, or VD□0) 0 to 9999.9999 (AA□0 or VA□0) * FA□0, LA0, SA0, or FAH0 is the hysteresis width of output 2 in normal detection mode. * MA0, EA□0, AA□0, or VA□0 is the hysteresis width in normal detection mode and the low/high hysteresis width of area detection mode.	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 VD□0

Command type RWwn+2	Name	Write values RWwm + 4: Command data 1 RWwm + 5: Command data 2	Applicable Sensor Amplifier Units				
0×C2	Hysteresis Width 2	0 to 9999 (FA□0, LA0, SA0, MA0, FAH0, EA□0, or VD□0) 0 to 9999.9999 (TA0, AA□0 or VA□0) * FA□0, LA0, SA0, TA0, or FAH0 is the hysteresis width of output 1 in normal detection mode, and the hysteresis width in area detection mode. * MA0, EA□0, AA□0, or VA□0 do not use this object.	FA□0 MA0	LA0 -	SA0 -	TA0 -	FAH0 VD□0
0×C3	Keep Setting or Mutual Interference Prevention No. of Units Setting External time setting Sensor OFF setting	SA 0: KEEP OFF 1: KEEP ON EA□0 0: Mutual Interference OFF 1: Mutual Interference 2 Units 2: Mutual Interference 3 Units 3: Mutual Interference 4 Units 4: Mutual Interference 5 Units VD□0 0: Input OFF 1: Tuning 4: Zero reset 6: Synchronized detection END output setting 9: Synchronized detection: Immediate output setting FA□0, MA0 0: OFF 1: ON * During sensor OFF operation, commands other than a command that cancels sensor OFF cannot be received.	FA□0 MA0	- EA□0	SA0 -	- -	- VD□0
0×C4	Hold Mode Setting Zero reset automatic following	SA 0: Peak 1: Bottom (Valid when the mode for output 1 is set to Hold Mode.) VD 0: OFF 1: ON	- -	- -	SA0 -	- -	- VD□0
0×C5	Warning Output Level	0 to 100 (Valid when the mode for output 2 is set to Alarm Output Mode.)	FA□0 -	LA0 EA□0	- -	- -	FAH0 -
0×C6	Maximum Sensitivity Tuning	1: Execute * The Full Auto Tuning Setup command must be executed before this command is sent.	FA□0 MA0	LA0 -	- -	- -	FAH0 -
0×C7	Execute Zero Reset	0: Zero reset OFF 1: Zero reset ON	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 VD□0

Command type RWwn+2	Name	Write values RWwm + 4: Command data 1 RWwm + 5: Command data 2	Applicable Sensor Amplifier Units				
0×C8	Light OFF	0: Clear the setting 1: Execute * During light OFF operation, commands other than a command that cancels light OFF cannot be received.	FA□0 MA0	LA0 -	SA0 -	- -	FAH0 -
0×C9	Two-point Tuning First Point	0: Clear the setting 1: Execute	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 -
0×CA	Two-point Tuning Second Point	1: Execute * The Two-point Tuning First Point command must be executed before this command is sent.	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 -
0×CB	Position Tuning	1: Execute * The Two-point Tuning First Point command must be executed before this command is sent.	FA□0 MA0	LA0 EA□0	- -	- -	FAH0 -
0×CC	Full Auto Tuning Setup	0: Clear the setting 1: Execute	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×CD	Execute Full Auto Tuning	1: Execute * The Full Auto Tuning Setup command must be executed before this command is sent.	FA□0 MA0	LA0 EA□0	SA0 AA□0	- VA□0	FAH0 VD□0
0×CE	Percentage Tuning Setting or Origin Point Use Setting	FA□0, LA0, MA0, FAH0, EA□0, AA□0, VA□0 0: Percentage tuning OFF 1: Percentage tuning ON TA0 0: Origin point use setting ON 1: Origin point use setting OFF	FA□0 MA0	LA0 EA□0	- AA□0	TA0 VA□0	FAH0 -
0×CF	Percentage Tuning Level or Preset Value	FA□0, LA0, MA0, FAH0, EA□0, AA□0, VA□0 –99 to 99 TA0 –19999999 to 99999999	FA□0 MA0	LA0 EA□0	- AA□0	TA0 VA□0	FAH0 -
0×D0	Execute Percentage Tuning	1: Execute	FA□0 MA0	LA0 EA□0	- AA□0	- VA□0	FAH0 -
0×D1	Power Tuning Setting, Tolerance Setting High, or Scaling Higher Limit Setting	FA□0, LA0, MA0, or FAH0 0: Power tuning setting ON 1: Power tuning setting OFF 2: Power Tuning ON When Power Turned On (FA□0 only) TA0 –1999999 to 9999999 AA□0, VA□0 –1999.9999 to 9999.9999	FA□0 MA0	LA0 -	- AA□0	TA0 VA□0	FAH0 -
0×D2	Power Tuning Level, Tolerance Setting Low, or Scaling Lower Limit Setting	FA□0, LA0, MA0, or FAH0 100 to 9999 TA0 –1999999 to 9999999 AA□0, VA□0 –1999.9999 to 9999.9999	FA□0 MA0	LA0 -	- AA□0	TA0 VA□0	FAH0 -
0×D3	Execute Power Tuning or Execute Fine Positioning	1: Execute * CH2 of FA □ 0, FAH0, LA0, EA0 are not executed.	FA□0 MA0	LA0 EA□0	- -	- -	FAH0 -

Command type RWwn+2	Name	Write values RWwm + 4: Command data 1 RWwm + 5: Command data 2	Applicable Sensor Amplifier Units				
0×D4	1-point Tuning (SAO) or Tolerance Tuning (TAO)	1: Execute * The Full Auto Tuning Setup command must be executed before this command is sent.	- -	- -	SA0 -	TA0 -	- -
0×D7	Flashing	0: Clear the setting 1: Execute * During flashing operation, commands other than a command that cancels flashing cannot be received.	FA□0 MA0	LA0 EA□0	SA0 -	- -	FAH0 -
0×D8	Initialize	1: Execute	FA□0 MA0	LA0 EA□0	SA0 AA□0	TA0 VA□0	FAH0 VD□0
0×D9	Self-trigger Level, Scaling function setting or Writing to EEPROM setting	SA0 −1999 to 9999 AA□0, VA□0 0: Scaling ON 1: Scaling OFF FA□0, MA0, TA0 0: OFF 1: ON	FA□0 MA0	- -	SA0 AA□0	TA0 VA□0	- -
0×DA	Tuning without a Workpiece	1: Execute * The Two-point Tuning First Point command must be executed before this command is sent.	- -	- -	SA0 -	- -	- -
0×DB	Background Suppression	0: Background suppression OFF 1: Background suppression ON	- -	- -	SA0 -	- -	- -
0×E0	External input detection time	You can change the time external input is enabled. 5 to 9999 ms	- -	- -	- -	- -	- VD□0
0xE6	Response Data Change	AA□0, VA□0 0: Read input measurement value that is input. (Before scaling and zero reset) 1: Read displayed measurement value. (After scaling and zero reset)	- -	- -	- AA□0	- VA□0	- -
0×F1	Direction Selection	0: Normal 1: Reversed	- -	- -	- -	TA0 -	- -
0×F2	Output Selection Gain switching	TA 0: Normal 1: Hybrid VD 0: Gain x4000 1: Gain x2000 2: Gain x800 3: Gain x200 4: Gain x80 5: Gain x20 6: Gain x4 7: Gain x1	- -	- -	- -	TA0 -	- VD□0
0×F5	Preset	0: Cleared 1: Executed	- -	- -	- -	TA0 -	- -

Command type RWwn+2	Name	Write values RWwm + 4: Command data 1 RWwm + 5: Command data 2	Applicable Sensor Amplifier Units

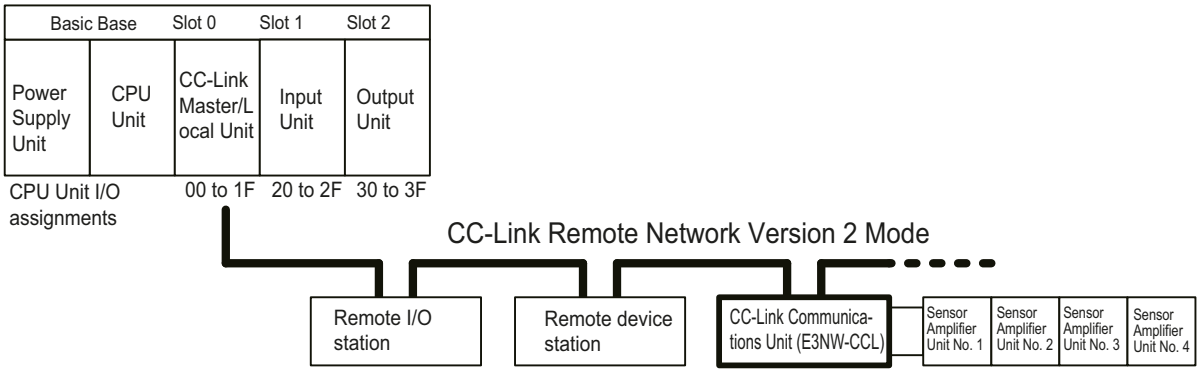
* Commands to the E9NC-TA0 are supported from E3NW-CCL Ver. 1100, and the E3NX-MA0, E2NC-EA□0, and E9NC-AA□0/VA□0/VD□0 are supported from E3NW-CCL Ver. 1160.
You can check the version with read command "B". (Refer to page A-2)

Precautions for Correct Use

- The Sensor Amplifier Unit bank cannot be changed when using the E3NW-CCL. Leave the Sensor Amplifier Unit in bank 1 (default).
- On the E3NX-FA10/40, E2NC-EA10/40, E9NC-AA10/40, E9NC-VA10/40, and E9NC-VD20/50, the output 2 setting in the read command / write command list cannot be used.
- After executing a setting initialization command after executing one of the tuning commands, a command cannot be received until writing to the EEPROM is completed.
- On the FA□0 and MA0, a command cannot be executed during setting initialization and tuning. If a command is sent, an error response will be sent to the master.
  Guidelines for setting initialization and tuning processing times are as follows:
  - Setting initialization: 2 sec
  - Tuning: 2 sec (varies depending on the light reception state and tuning type.)
- Because time is required to process setting changes, reading a value immediately after changing a setting may result in the value prior to the change being read. After changing settings, wait briefly before performing reading.
- Time is required to save settings. If you execute consecutive setting changes by command, add wait time between write commands.

A-2 Sequence Programming Examples

This section provides example programs for when a Mitsubishi Electronics MELSEC-Q-series or MELSEC-L-series general-purpose sequencer is used as the master station.
These programming examples assume the following system configuration. Perform thorough testing in your own environment before use.



CC-Link auto refresh settings		
CPU device	⇔	CC-Link device
X1000 on	⇦	RX00 on
Y1000 on	⇨	RY00 on
W0000 on	⇦	RWr00 on
W1000 on	⇨	RWw00 on

Allocated station number		One-station allocation	Three-station allocation	Three-station allocation
Expanded cyclic setting		-	-	Quadruple setting
Link register assignments	RX	00 to 1F Hex	20 to 7F Hex	80 to 1BF Hex
	RY	00 to 1F Hex	20 to 7F Hex	80 to 1BF Hex
	RWr	00 to 03 Hex	04 to 0F Hex	10 to 3F Hex
	RWw	00 to 03 Hex	04 to 0F Hex	10 to 3F Hex

The sequencer devices used in the programming example are as follows:

■ Input Switches

X0020: Requests sending a command to a Sensor Amplifier Unit.
X0021: Sets the read status for the threshold value or detection level.
X0022: Error reset switch
X0023: Warning reset switch

■ Output Indicators

Y0030: Send command normal completion indicator
Y0031: Send command error completion indicator

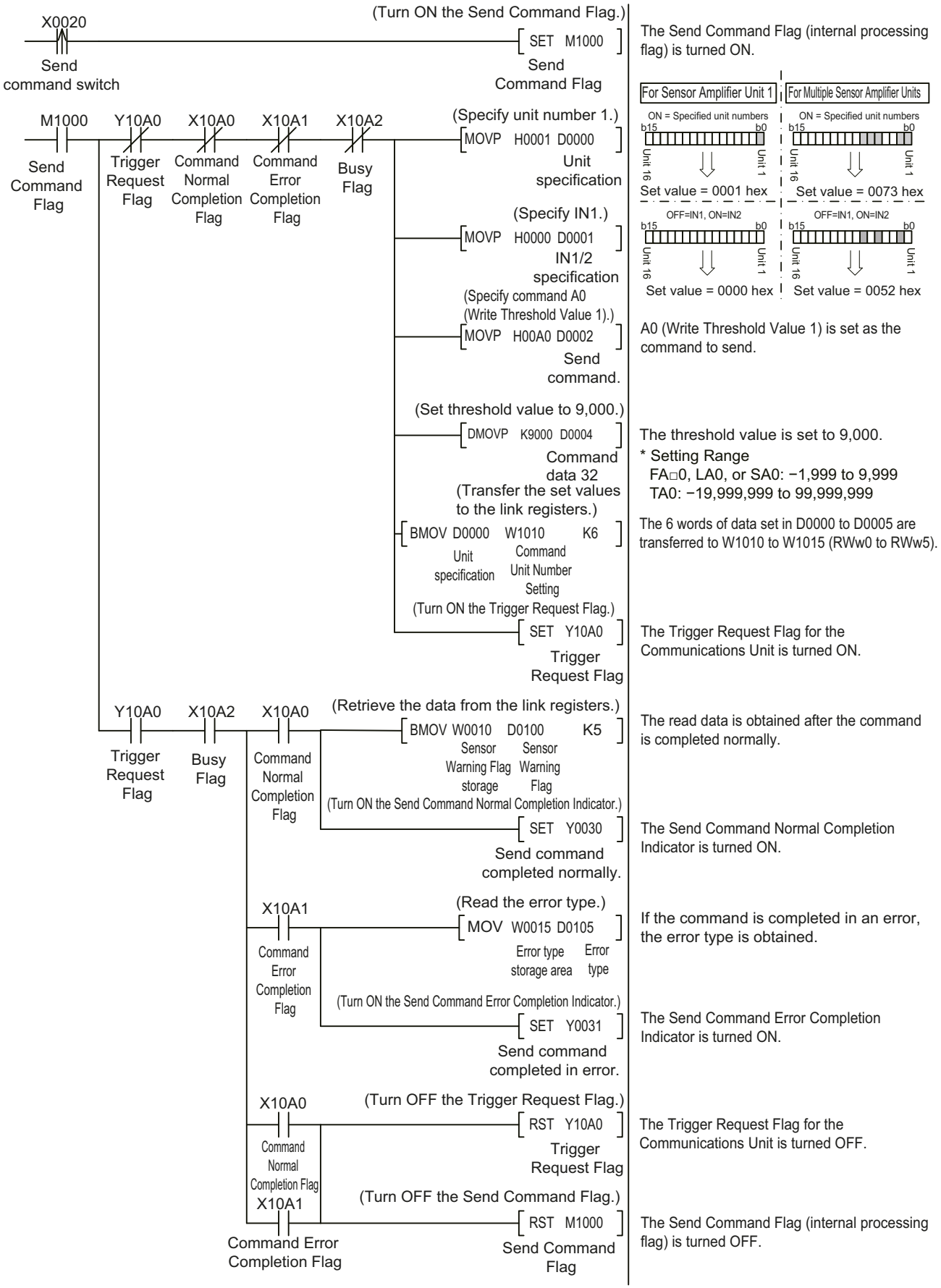
■ Data Setting Devices

D0000: CPU internal device that specifies the unit number
D0001: CPU internal device that sets IN1/IN2.
D0002: CPU internal device that sets the command.
D0004: CPU internal device that sets command data 1.
D0005: CPU internal device that sets command data 2.
D0006: CPU internal device that sets the threshold value or detection level read data.
D0007: CPU internal device that sets the threshold value or detection level IN1/IN2.
D0008: CPU internal device that sets the detection level, peak value, or bottom value.

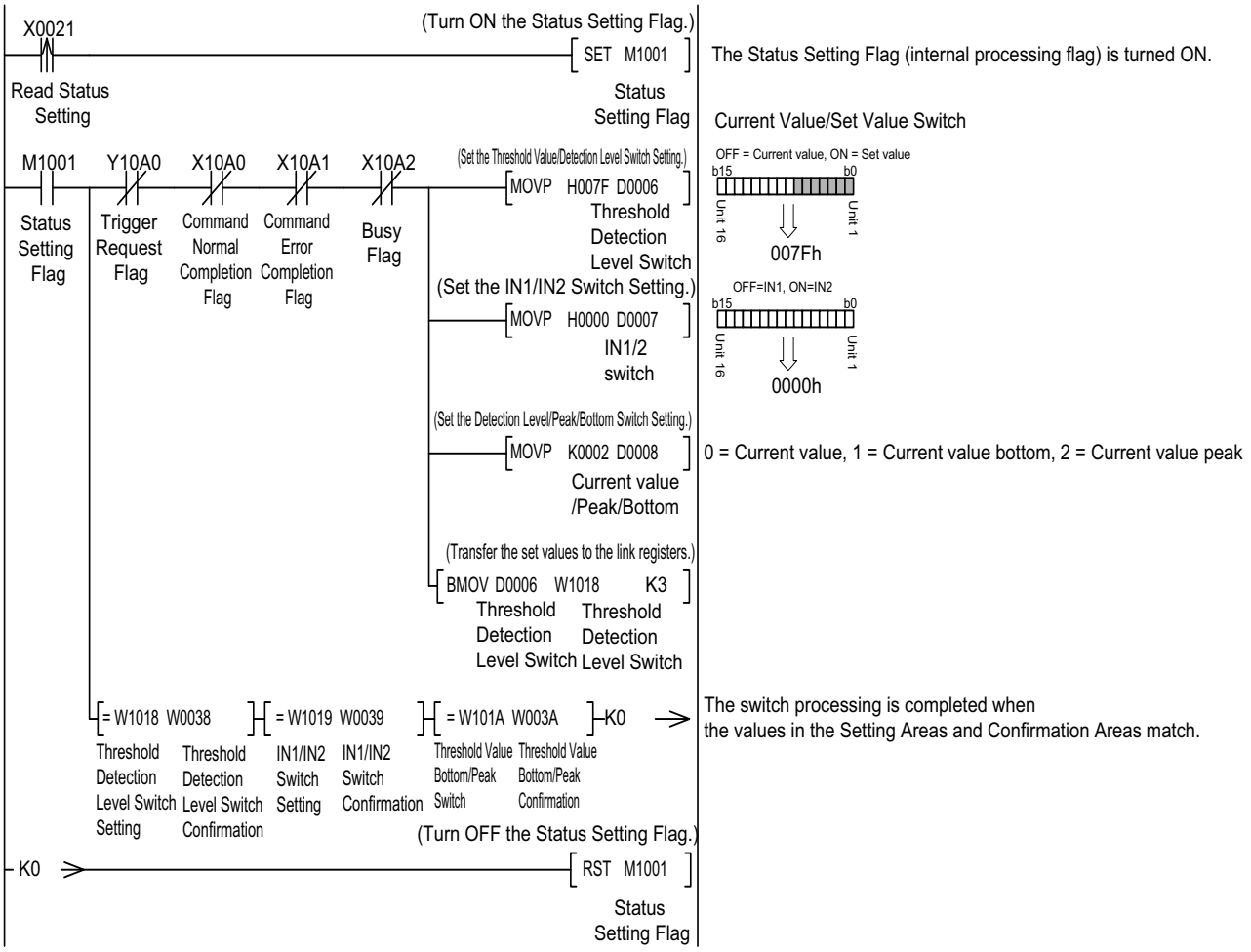
■ Data Storage Devices

D0100: Sensor Warning Flag
D0102: Received Data 1
D0103: Received Data 2
D0104: Number of Mounted Sensors
D0105: Error Type

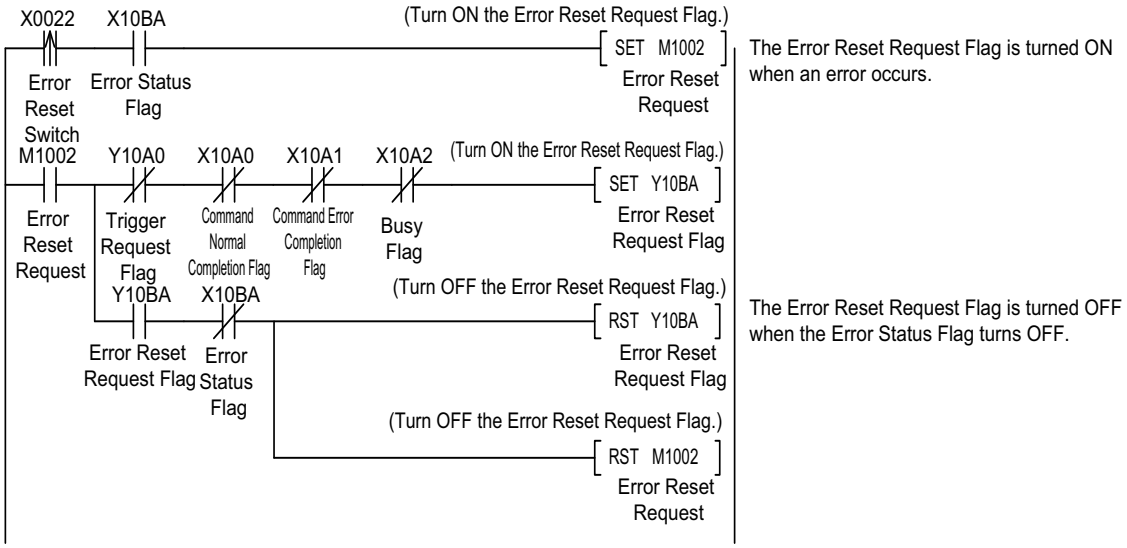
● Sending Commands to the Sensor Amplifier Unit



● Switching the Threshold Value or Detection Level Read Status

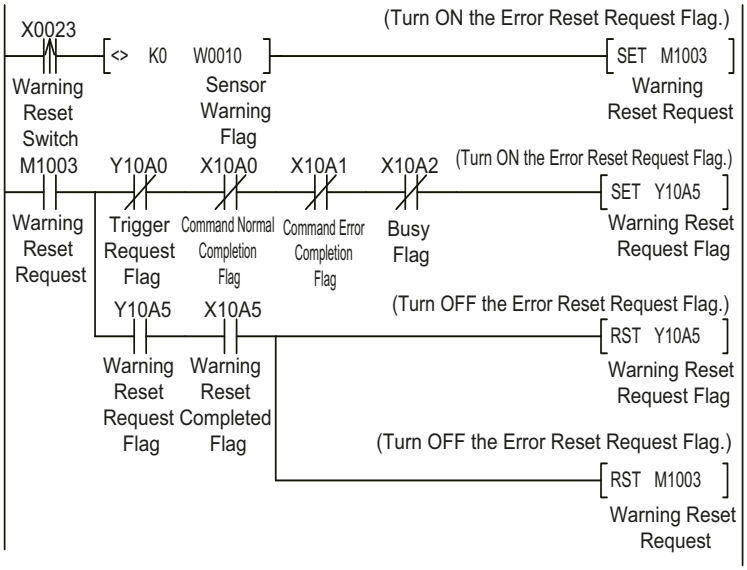


● Resetting Errors



*In Monitor Mode, replace the Error Status Flag and Error Reset Request Flag as follows:
Error Status Flag: Change X10BA to X11BA. Error Reset Request Flag: Change Y10BA to Y11BA.

● Resetting Warning Flags



The Warning Reset Request Flag is turned ON when a warning occurs (i.e., when the Warning Flag is not 0).

The Warning Reset Request Flag is turned OFF the Warning Reset Complete Flag turns ON.

A-3 Command Response Time (Reference Values)

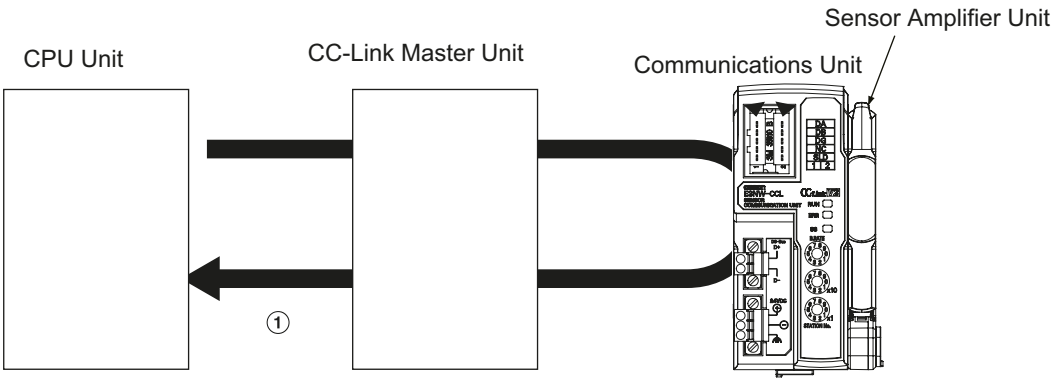
The time required from when a command is sent to obtain the detection level of input 1 of Sensor Amplifier Unit 1 connected to an E3NW-CCL Communications Unit until a response is received is approximately 12 ms in Reduced I/O Mode, and approximately 18 ms in Monitor Mode.

* The command response time is a reference value only. Perform thorough testing in your own environment before use. In Monitor Mode, you can read the detection levels in approx. 6 ms each if you use read/write registers.

Command response time = (1)

Test Conditions

Baud rate:	10 Mbps
CPU Unit cycle time:	1 ms
Number of CC-Link Slave Units:	1
CC-Link version:	Version 1 for Reduced I/O Mode Version 2 for Monitor Mode



● Communications Configuration

Item	Model number	Manufacturer
CPU Unit	Q02UCPU	Mitsubishi Electric Corporation
CC-Link Master Unit	QJ61BT11N	Mitsubishi Electric Corporation
Sensor Communications Unit	E3NW-CCL	OMRON Corporation
Sensor Amplifier Unit	E3NX-FA□0	OMRON Corporation

● Executed Command: Read Detection Level

Command number	20
Unit No.	01

A-4 Using the Distributed Sensor Unit

A-4-1 Models of Sensor Amplifier Units Connectable to a Distributed Sensor Unit

This section describes the models and features of the Sensor Amplifier Units that can be connected to an E3NW-DS Distributed Sensor Unit.

Type	Model number	Features
Smart Fiber Amplifier Unit	E3NX-FA□0	A standard, easy to operate and easy to configure Fiber Amplifier Unit.
Smart Laser Amplifier Unit	E3NC-LA0	A Laser Sensor that can reliably detect workpieces even with a small spot diameter
Smart Laser Amplifier Unit (CMOS)	E3NC-SA0	A CMOS-type Laser Sensor that can reliably detect steps.
Contact-type Smart Sensor	E9NC-TA0	A durable contact-type sensor.
Smart Fiber Amplifier Unit	E3NX-MA0	Fiber Amplifier with Light Emission/Reception
Smart Fiber Amplifier Unit	E3NX-FAH0	Fiber Amplifier with Near Infrared Light Emission/Reception
Smart Amplifier Separation Proximity Unit	E2NC-EA□0	Proximity Sensor Amplifier
Smart Analog Input Unit	E9NC-AA□0	Current (4 to 20 mA) Input Amplifier
Smart Analog Input Unit	E9NC-VA□0	Voltage (1 to 5 V) Input Amplifier
Smart Analog Input Unit	E9NC-VD□0	Voltage Differential (–2 to 2 V) Input Amplifier

* The E9NC-TA0 is supported from E3NW-CCL Version 1100, and the E3NX-MA0, E2NC-EA□0, and E9NC-AA□0/VA□0/VD□0 are supported from E3NW-CCL Version 1160.
You can check the version with read command "B". (Refer to page A-2)

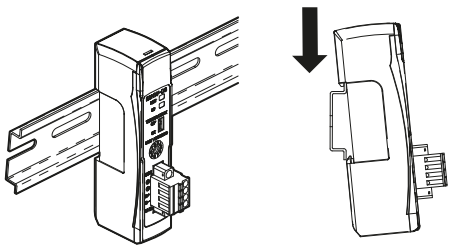
A-4-2 Mounting and Removing Distributed Sensor Units

This section describes how to mount an E3NW-DS Distributed Sensor Unit and Sensor Amplifier Units to a DIN Track and how to remove them.
For dimensions of each Unit, refer to *6-3 Dimensional Diagrams* on page 6-13.

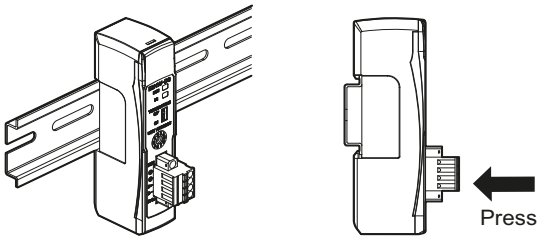
Mounting Procedure

Use the following procedure to install the Units.

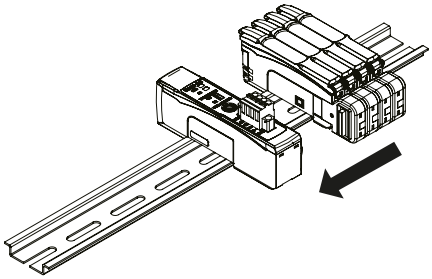
1 **Place the top part of the Unit onto the DIN Track.**



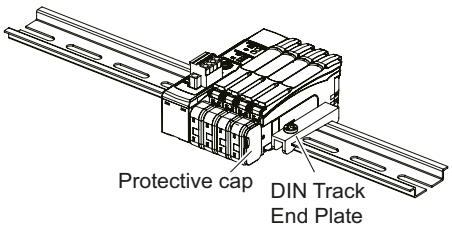
2 **Press the bottom part of the Unit onto the DIN Track.**



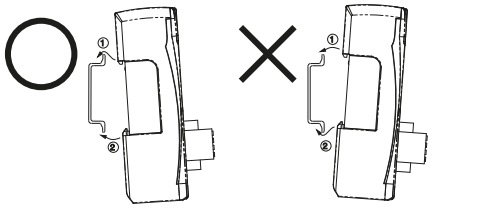
3 **Remove the protective cap from the right side of the Distributed Sensor Unit. Then, slide the Sensor Amplifier Unit, align the hooks on the connector with the Distributed Sensor Unit, and press the Units together until you hear them lock into place.**



4 **Secure the enclosed DIN Track End Plates (PFP-M) onto the ends so that there is no space between them and the Units. Finally, attach the protective cap you removed in step 3 to the Sensor Amplifier Unit on the far right end.**



CHECK! Do not reverse the order of steps 1 and 2, above. Doing so may reduce the mounting strength on the DIN Track.

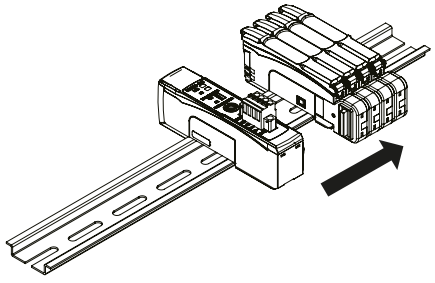


After you have completed the above procedure, check to make sure that the E3NW-DS is mounted securely into place.

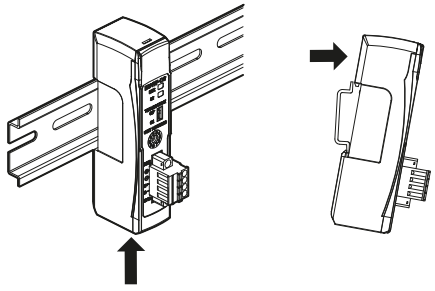
Removal Procedure

Use the following procedure to remove the Unit.

1 **Slide the Sensor Amplifier Units to separate them from the Distributed Sensor Unit.**



2 **Press in on the Distributed Sensor Unit toward the DIN Track and lift up to remove it.**



A-4-3 Installing a DS-Bus Network

This section describes how to install a DS-Bus network.

Precautions for Installing a DS-Bus Network

This section provides basic precautions for installing a DS-Bus network.

● Precautions for Installing a Network

- When installing a DS-Bus network, observe proper safety measures and follow all applicable standards. (Refer to JIS X5252 or *Electric Installation Technical Standards*.)
  We recommend that you request installation from a specialist who is qualified in safety measures and standards.
- Do not place any DS-Bus network devices near any devices that generate noise.
  If no other suitable location is available, place the device or devices in a metal case or take other measures to reduce ambient noise.

● Precautions for Installing Communications Cables

- Check the following conditions for the communications cables in the network.
  - Are there any disconnections?
  - Are there any short circuits?
  - Are there any problems with connector connections?
- When connecting to the communications connector on each device, be sure to insert the wires until they lock into place in the communications cable connector.
- Separate communications cables from high-voltage power lines and install them in ducts.
- Do not wire communications cables near devices that generate noise.
- Do not wire communications cables in high-temperature, high-humidity environments.
- Use in locations free of dirt, oil mist, and other foreign matter.
- There is a limit to the bending radius of communications cables. Refer to the specifications for your communications cables for information on allowable bending radii.
- You can connect up to eight Distributed Sensor Units to one Sensor Communications Unit.
- Keep the total length of DS-Bus communications cables (L1 + L2 + ... + Ln) to within 30 m.
- Turn ON the DS-Bus termination setting switch for the last Distributed Sensor Unit on the DS-Bus network. Turn this switch OFF for all other Distributed Sensor Units.

Preparing to Install the Network

Prepare the following equipment.

Item	Remarks
DS-Bus communications cable	Use the recommended product that is given below.
Sensor Communications Unit	Enclosed with the E3NW Series Sensor Communications Unit.
Distributed Sensor Unit	Enclosed with the E3NW-DS Distributed Sensor Unit.
Ferrite cores	Two are required. Enclosed with the E3NW-DS Distributed Sensor Unit.

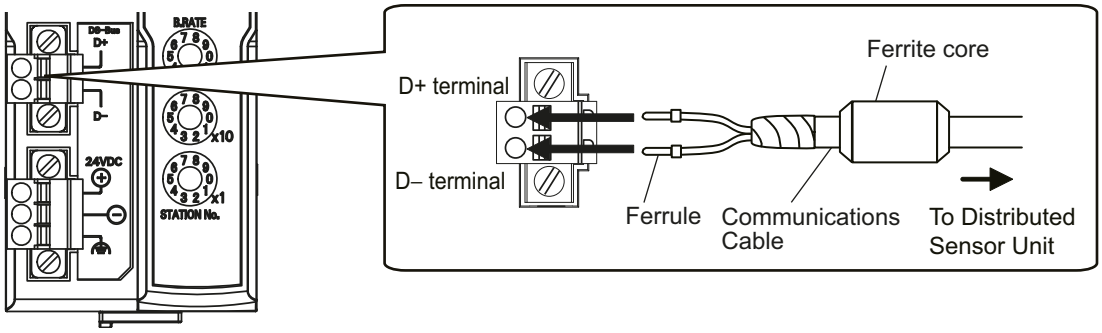
● Recommended Parts

Part	Manufacturer	Model
Communications Cable	Bando Densen Co., Ltd.	ESVC 0.5X2C black

Connecting the Communications Cables and Connectors

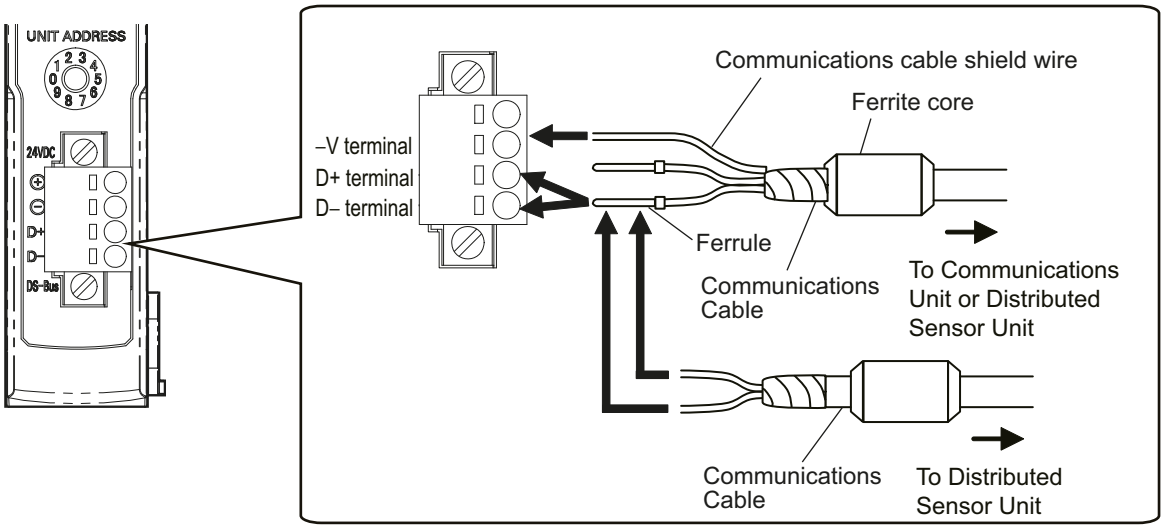
● E3NW-series Sensor Communications Unit

Connect the communications cable to the DS-Bus communications connector on the Communications Unit. Clamp a ferrite core (enclosed with the Distributed Sensor Unit) on the communications cable.



● E3NW-DS Distributed Sensor Unit

Connect the D+ and D– signal lines and shield wire of the communications cable to the power supply/communications connector on the Sensor Communications Unit. Clamp a ferrite core (enclosed with the Distributed Sensor Unit) on the communications cable.
Connect the shield wire on the communications cable between Distributed Sensor Units to the -V terminal on only one of the Distributed Sensor Units. Do not connect the shield wire to both Units.



To prevent the communication cable from becoming disconnected, install a rod terminal.

● Recommended terminal

The rod terminal below is recommended for the communication terminal.

Part number	Compatible wire size	Crimp tool	Manufacturer
AI-TWIN 2X 0,5-10WH	0.5mm^2/AWG20	CRIMPFOX UD6 (product No. 1204436) or CRIMPFOX ZA3 Series	Phoenix Contact

The screwdriver below is recommended for removal of the rod terminal.

Part number	Manufacturer
XW4Z-00C	OMRON Corporation

A-4-4 Distributed Sensor Unit Power Supply Specifications and Connections

Precautions on Supplying Unit Power

Consider the following points on the allowable current and voltage drop on cables and connectors and the placement of the power supply used to supply power to the Units.

● Precaution on Cable Voltage Drop

Make sure that the power supply voltage to the Distributed Sensor Unit farthest from the power supply is within the allowable fluctuation range.

● Supplying Power to Units from Multiple Power Supplies

Using multiple power supplies to supply power can allow you to reduce the line current, reduce voltage drop, and decrease cable size. It also helps to maintain system stability in the event of a power supply problems.

● Power Supply Problems

You must decide how to place your power supplies and how to group them depending on whether you want to stop the entire system when a power supply problem occurs or if you want to avoid stopping the entire system when possible.
If you want to avoid stopping the entire system, install power supplies in multiple locations and divide the Distributed Sensor Units into groups.
This will also help to reduce voltage drop and enable you to use smaller cables.

Unit Power Supply Specifications

Use a standard power supply that meets the following specifications.

Item	Specification
Output voltage	24 VDC ±10%
Output ripple	600 mVp-p
Output current	Must be able to supply current that is higher than the total sum of the current consumed by all Slave Units.
Isolation	Between output and AC power supply and between output and frame ground

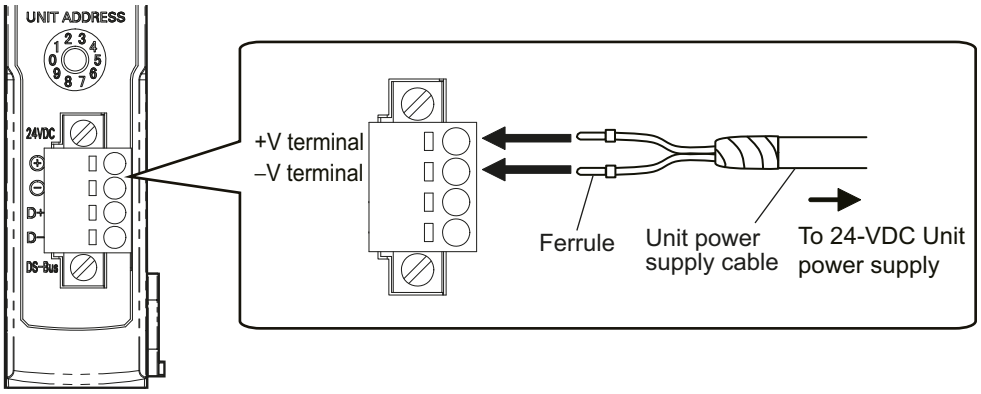
We recommend using an OMRON S8JX-series power supply for the Unit power supply.

Precautions for Correct Use

- When calculating the output current for the Unit power supply, always include the current consumption of the E3NW-DS and the current consumption of all Sensor Amplifier Units in the Unit power supply consumption current.
- Make sure that the power supply has sufficient capacity to handle the inrush current when the system is started.

Connecting the Unit Power Supply

Connect a cable from the Unit power supply (24 VDC) to the power supply connectors on each Distributed Sensor Unit.



Securely attach ferrules to the Unit power supply cable wires.

● Recommended Parts

We recommend using the following ferrules for the Unit power supply cable.

Model number	Applicable wire size	Crimp tool	Manufacturer
AI0,5-10WH	0.5mm^2/AWG20	CRIMPFOX UD6 (product No. 1204436) or CRIMPFOX ZA3 Series	Phoenix Contact Co., Ltd.
H0.5/16 orange	0.5mm^2/AWG20	Crimper PZ1.5 (product No. 900599)	Weidmueller Japan Co., Ltd.

We recommend the following screwdriver for the removal of ferrules.

Model number	Manufacturer
XW4Z-00C	OMRON Corporation

A-4-5 General Specifications of the Distributed Sensor Unit

The following table gives the general specifications of the E3NW-DS Distributed Sensor Unit.

Item	Specifications and Performances
Unit power supply voltage	24 VDC (20.4 to 26.4 V)
Maximum connectable Sensors	10
Power and current consumption	2 W max. (Not including the power supplied to Sensors.), 80 mA max. (Not including the current supplied to Sensors.)
Noise immunity	Conforms to IEC 61000-4-4, 1 kV (power supply line).
Vibration resistance	10 to 60 Hz with a 0.7-mm double amplitude, 50 m/s^2 at 60 to 150 Hz, for 1.5 hours each in X, Y, and Z directions
Shock resistance	150 m/s^2 for 3 times each in X, Y, and Z directions
Dielectric strength	500 VAC at 50/60 Hz for 1 min

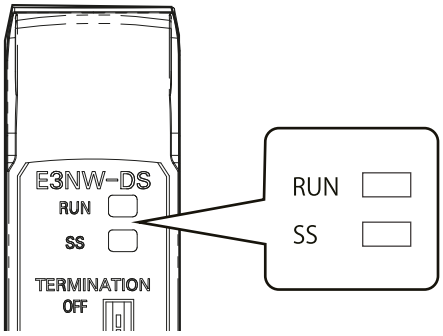
Item	Specifications and Performances
Insulation resistance	20 MΩ min. (at 500 VDC)
Ambient operating temperature	0 to 55°C *1
Operating ambient humidity	25% to 85% (with no condensation or icing)
Operating ambient environment	No corrosive gases.
Storage temperature	–30 to 70°C (with no condensation or icing)
Storage humidity	25% to 85% (with no condensation or icing)
Installation Procedure	35-mm DIN Track-mounting

*1 Temperature Limitations Based on Number of Connected Amplifier Units:
Groups of 1 or 2 Amplifier Units: 0 to 55°C, Groups of 3 to 10 Amplifier Units: 0 to 50°C

A-4-6 Hardware Specifications of the Distributed Sensor Unit

Status Indicators

These indicators show the current status of the E3NW-DS.



● RUN Indicator

This indicator shows the operating status.

Color	State	Description
Green	Not lit.	Power OFF, or one of the following errors has occurred: Rotary switch setting error, watchdog timer timeout error, hardware error, RAM check error
	Flashing	No access from the Sensor Communications Unit (for 3 seconds or longer).
	Lit	Normal status, or Sensor not connected error

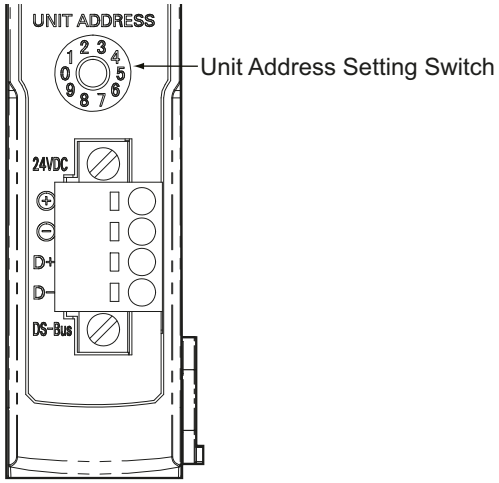
● SS Indicator

This indicator shows the Sensor connection status and various error information.

Color	State	Description
	Not lit.	Initial checks are in progress or a hardware error or sensor disconnected error occurred after turning the power supply OFF and ON.
Green	Lit	The number of connected Sensors does not match the number of connected Sensors setting.
Red	Lit	One of the following errors occurred: Number of connected Sensors verification error, too many Sensors connected error, RAM check error, or rotary switch setting error

Unit Address Setting Switch

This switch sets the Unit address (as a decimal number) of the E3NW-DS on the DS-Bus network. The setting range is 1 to 8. (Factory setting: 1)
If multiple Distributed Sensor Units are connected to the Sensor Communications Unit, set the addresses of the Distributed Sensor Units in order starting from 1.

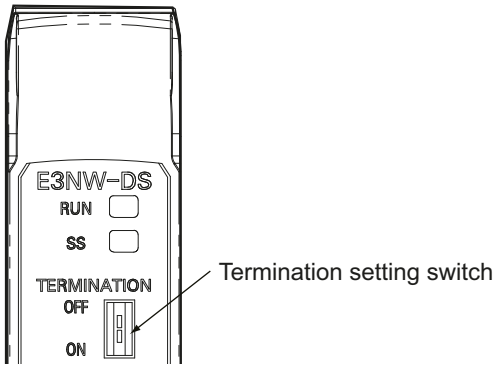


Precautions for Correct Use

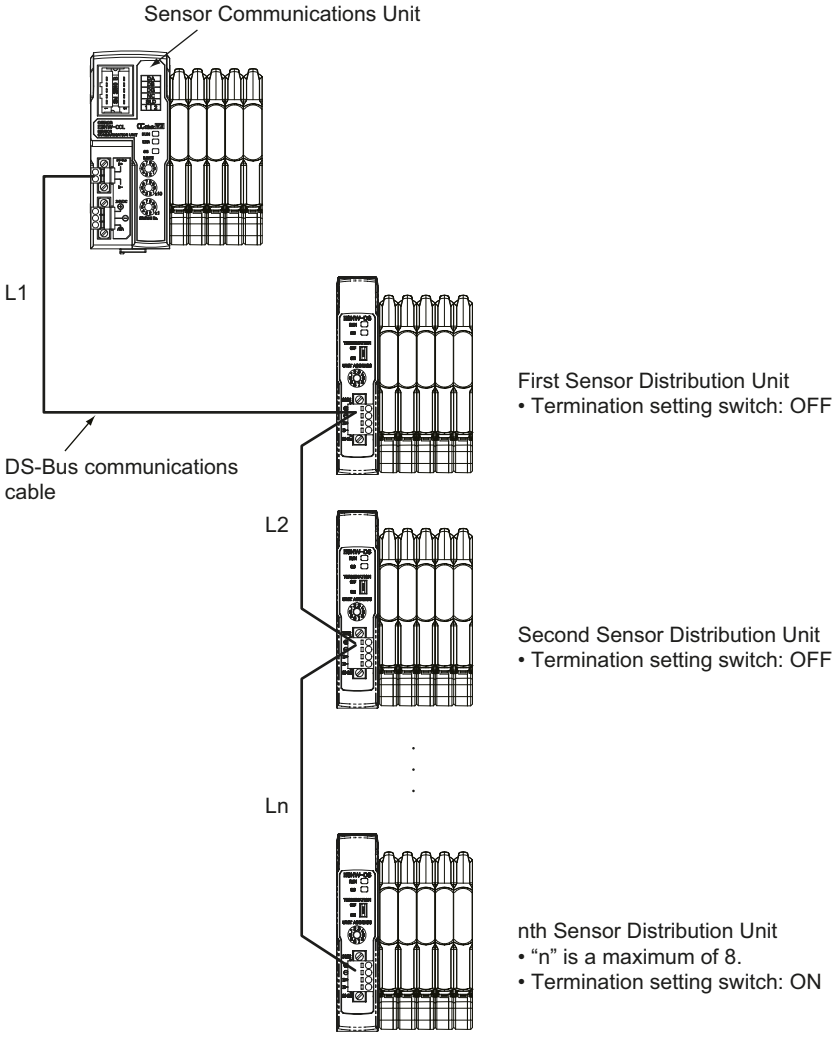
- The setting of the unit address switch is read only once when the power is turned ON. Changing this setting after the power is turned ON will have no effect until after the next time the power is turned ON.
- An error will occur and operation will not continue normally if the same Unit address is assigned to more than one Unit.

DS-Bus Network Termination Setting Switch

This switch turns the communications terminating resistance ON or OFF on the DS-Bus network.

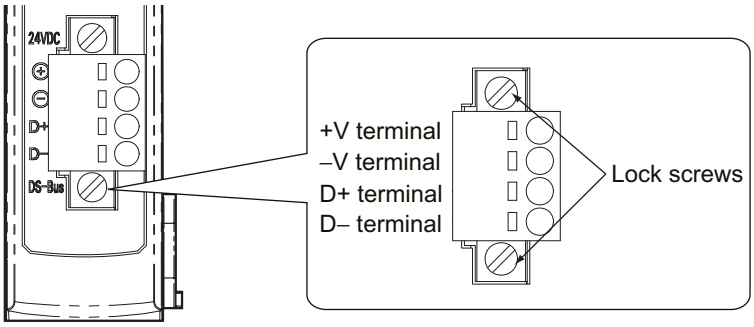


Turn ON the DS-Bus termination setting switch for the last Distributed Sensor Unit on the DS-Bus network. Turn this switch OFF for all other Distributed Sensor Units. This is shown in the following figure.



Communications and Power Supply Connector

Connect the power supply cable from the Unit power supply and the DS-Bus communications cable to this connector.



Name	Specifications
+V	24 VDC
–V	0 VDC
D+	Communications data signal +
D–	Communications data signal –

- Connector type: Four-pin spring cage connector with lock screws
- Applicable ferrule diameter: 0.25 to 0.5 mm^2 (AWG24 to AWG20) (Using ferrules with insulating sleeves)

Refer to *Connecting the Unit Power Supply* on page A-30 for the recommended ferrules.

B-1 Glossary

This appendix contains a glossary of terms related to the CC-Link Digital Sensor Communications Unit.

Term	Abbreviation	Description
CC-Link Partner Association	CLPA	The organization that opened the CC-Link technology and promotes its use.
remote I/O	-	A slave unit that handles DIO.
remote device	-	A slave unit that handles DIO and data.
intelligent device	-	A slave unit that handles DIO and data and supports transient transmissions.
master station	-	The unit that controls the CC-Link.
standby master station	-	The unit that takes over control of the CC-Link if a problem occurs with the master station.
local station	-	A unit that is connected to a PLC and communicates with master and slave stations.
Remote network version 1 mode	-	A network that consists of only slave stations compatible with CC-Link version 1 specifications.
Remote network version 2 mode	-	A network that consists of slave stations compatible with both CC-Link version 1 and version 2 specifications.
Remote Network Addition Mode	-	A network to which a slave station that is compatible with CC-Link version 2 specifications is added to an existing network consisting of slave stations compatible with CC-Link version 1 specifications.
Remote I/O Mode	-	A network that consists of only slave units that support remote I/O.
expanded cyclic	-	An expansion function added to CC-Link Version 2 Mode that separates data to more efficiently use limited network resources.
link relays (RX/RY)	-	The name for signals that handle ON/OFF information for the CC-Link.
link registers (RWw/RWr)	-	The name for devices that handle data for the CC-Link.
special link relays (SB)	-	The name for signals that monitor and control the operation status of the CC-Link.
special link registers (SW)	-	The name for devices that monitor and set the operation status of the CC-Link.

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