KEYENCE

CC-Link Compatible Network Unit

NU-CL1

User's Manual

Read this manual before use.

Keep this manual in a safe place for future reference.

Compatible with FS-N10, LV-N10 and PS-N10 Series

Introduction

This manual describes the basic operations and hardware functions of the NU-CL1. Read the manual carefully to ensure safe performance and function of the NU-CL1.
Keep this manual in a safe place for future reference.
Ensure that the end user of this product receives this manual.

■ Symbols
The following symbols alert you to matters concerning the prevention of injury and product damage.

⚠ DANGER	**It indicates a hazardous situation which, if not avoided, will result in death or serious injury.**
⚠ WARNING	**It indicates a hazardous situation which, if not avoided, could result in death or serious injury.**
⚠ CAUTION	**It indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.**
NOTICE	**It indicates a situation which, if not avoided, could result in product damage as well as property damage.**

▶ Important	**It indicates cautions and limitations that must be followed during operation.**

✎ Point	**It indicates additional information on proper operation.**

Reference	It indicates tips for better understanding or useful information.

Safety Precautions

General Precautions

- Before and while operating this product, confirm that it provides its functions and performance correctly.

- Implement sufficient safety measures to prevent human and physical damages in case this product fails.

- Be aware that the product functions and performance are not warranted if the product is used outside the range of stated specifications or is modified by the customer.

- Combining this product with other equipment requires sufficient consideration because the proper functions and performance may not be provided depending on the environment.

- Do not use this product in applications for human protection.

- Do not expose equipment, including peripherals, to rapid temperature changes. Equipment failure may result from condensation build up.

Precautions for Use

⚠ CAUTION	• **To avoid injury or failure, turn off the power immediately in the following cases.** - **Water or foreign matter entered the main unit.** - **The case is broken, for example if it is dropped.** - **Smoke or unusual smell is emitted from the product.** • **Use the correct power voltage. Failure to observe may result in injury, or failure.** • **Do not disassembly or modify this product. Failure to observe may result in injury.**

NOTICE	**Do not turn off the power while you are setting any item. Doing this may cause loss of data settings.**

Equipment Environment

For safe, trouble-free operation of this product, the product must not be installed in the following locations:

- Humid, dusty, or poorly ventilated.
- Exposed to direct sunlight or heating source.
- Exposed to corrosive or flammable gases.
- Exposed directly to vibration or shock.

- Exposed to water, oil, or chemical splashes.
- Exposed to static electricity.

Noise Protection

If this product is installed on a location near a noise source, e.g., power source or high-voltage line, it may malfunction or fail. Use protective measures, such as using a noise filter or running the cables separately.

About Power Supply

- Noise superimposed on the power supply may result in malfunction. Use a stabilized DC power supply configured with an isolation transformer.
- When using a commercially available switching regulator, be sure to ground the frame ground terminal.

Power-On Reset Time

The NU-CL1 starts updating data a certain time (depending on the type and number of sensor amplifiers connected, and the data to be read) after the power is turned on. The start time can be changed using the fourth bit of the operation mode setting switch.
Here are examples of start times for each mode of the FS-N10 digital fiber unit.

Operation mode	Data communicated	Data communication start time	
		When no sensor amplifier is connected	When one or more sensor amplifiers are connected
Standard start mode (factory default setting)	Output and current value (cyclic communication)	40 ms	120 ms + 30 ms x (number of connected sensor amplifiers)
	Change setting value, read/write parameter, and execute motion command	2 s x (number of connected sensor amplifiers)	

Operation mode	Data communicated	Data communication start time	
		When no sensor amplifier is connected	When one or more sensor amplifiers are connected
Command-priority start mode:	Output and current value (cyclic communication)	35 ms	240 ms + 110 ms x (number of connected sensor amplifiers)
	Change setting value, read/write parameter, and execute motion command		

Notes on Regulations and Standards

UL Certificate

The NU-CL1 is an UL/C-UL Listed product:

- UL File No. E207185
- Categories: NRAQ, NRAQ7

Be sure to follow the specification below.

- Use a power supply that provides Class 2 output defined in NFPA70 (NEC: National Electric Code).
- Use copper wire having a gage of AWG#12 to #24 and temperature rating of 60°C or higher when wiring to the CC-Link connector and power supply connector.
- Pollution degree 2

CE Marking

The NU-CL1 complies with the essential requirements of EMC Directive. The following harmonized standards are applied.
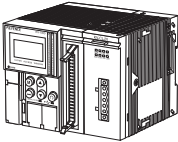EMI: EN55011, Class A
EMS: EN61000-6-2

- Be sure to install the NU-CL1 in a conductive enclosure such as a control panel.
- The length of the cable for wiring to the power supply connector must be 30 meters or less.

Relevant Manuals

The manuals to relevant to this document are as follows:

Manuals relevant to CPU unit Example: KV-5500 user's manual	PLC CPU unit CC-Link master unit
Manuals relevant to CC-Link master unit Example: KV-CL20 user's manual	NU-CL1 (This unit)
This manual	
Manuals of sensor amplifier main unit Example: FS-N10 series user's manual	Sensor amplifier
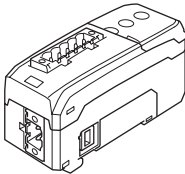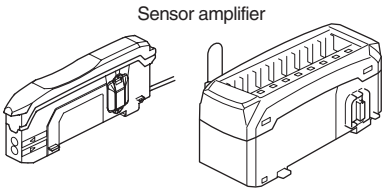
Manual Organization

1	Before Using	This chapter provides an overview of the NU-CL1 and describes its part names and functions.
2	Connection and Configuration	This chapter explains the procedures for connecting sensor amplifiers to the NU-CL1 and how to configure the data link
3	Executing Communication	This chapter describes the configuration of the memory linked to the CC-Link master station and provides communication methods.
4	Specifications	This chapter describes the specifications and dimensions of the NU-CL1.
5	Appendix	This chapter provides troubleshooting instructions.

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Chapter 1   Before Using

Chapter 2   Connection and Configuration

Chapter 3   Executing Communication

Chapter 4　Specifications

Chapter 5　Appendix

Terms Used in This Document

This document uses the following terms:

Term	Description
Sensor	A sensor amplifier.
Main unit	A sensor amplifier that has a power line and can operate alone.
Expansion unit	A sensor amplifier that does not have a power line and must be connected to a main unit.
N-bus	The name of KEYENCE's wiring-saving system for sensor amplifiers. For example, the digital fiber sensors of the FS-N series support this system.

Before Using

1

This chapter provides an overview of the NU-CL1 and describes its part names and functions.

1-1 NU-CL1 Overview

Overview

This unit operates as a remote device station (Ver. 1.1 and 2 switchable) of a CC-Link system. Using CC-Link communications, the sensor amplifiers and other units connected to the NU-CL1 can transmit their ON/OFF control signals and measured values as communication data to a PLC or other equipment.
The NU-CL1 supports cyclic transfer and extended cyclic transfer, enabling data communication without the need of a ladder program. In addition, remote input/output signals can be used as handshake signals to read/write settings of sensor amplifiers and to issue commands to the sensor amplifiers.

■ **System configuration example**

PLC or other host device
(CC-Link master unit)

CC-Link V2

NU-CL1 (This unit)

CC-Link slave

N-bus compatible sensor amplifier
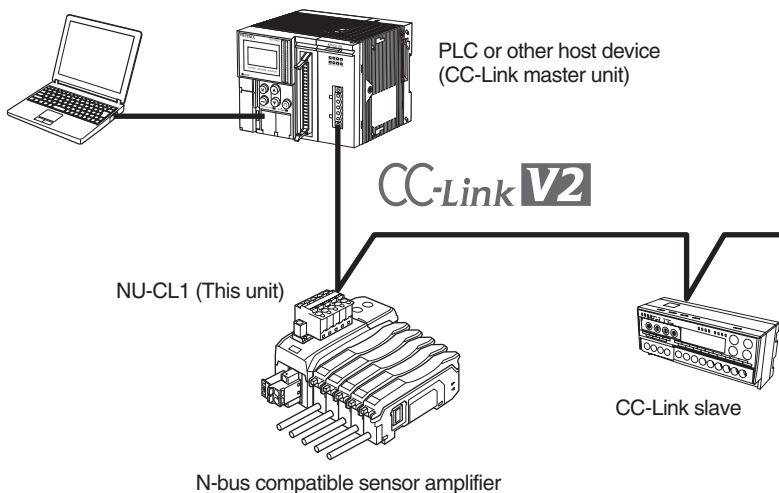
The NU-CL1 can connect sensor amplifiers (expansion units) which support N-bus. ("N-bus" is the name of KEYENCE's wiring-saving system for sensor amplifiers.)
Different types of sensor amplifiers with N-bus support can be connected up to 16 units to the single NU-CL1 unit. (The number of connectable units depends on sensor amplifiers.)

1-2 Checking the Package Contents

Before using the NU-CL1, make sure that the following equipment and accessories are included in the package.
We have thoroughly inspected the package contents before shipment. However, in the event of defective or broken items, contact your nearest KEYENCE office.

Package Content

NU-CL1 main unit x 1
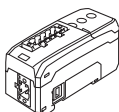
Termination resistor x 1
110Ω 1/2W

(brown/brown/brown/gold)

CC-Link connector x 1
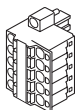
End unit (OP-26751; 2-unit set) x 1
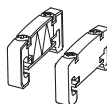
Power supply connector x 1

Instruction manual x 1

List of Optional Parts

■ **OP-79426 (CC-Link Ver. 1.10 compatible cable, 20 m)**
■ **OP-79427 (CC-Link Ver. 1.10 compatible cable, 100 m)**

Cable x 1

Names and Functions of Each Part

1

Before Using

This section describes the part names and functions of the NU-CL1.

(1) Transmission rate setting switch

(2) Station number setting switch

(3) Operation mode setting switch

(4) Power indicator (green)
(5) Communication indicator (green)
(6) Communication error indicator (red)
(7) Sensor communication indicator (red/green)

(8) CC-Link connector

(9) Power supply connector

(10) Sensor amplifier connector

Name	Description
(1) Transmission rate setting switch	Sets the transmission rate of CC-Link.

No.	0	1	2	3	4	5 to 9
Transmission rate (bps)	156k	625k	2.5M	5M	10M	Cannot be set.

Default value: 0

Name	Description
(2) Station number setting switch	Sets the station number of the NU-CL1 in the CC-Link. x10 : Ten's digit x1 : One's digit Setting range: 01 to 64 Default value: 01

1

Name	Description
(3) Operation mode setting switch ON 1234	Sets the operation mode of the NU-CL1 in the CC-Link. The specific data that can be communicated using cyclic transfer varies with each operation mode. In addition, the start time can be changed with this switch.[*] 📖 "Operation with CC-Link and Memory Configuration" (page 3-2)

Switch setting	Operation mode	Station configuration	Number of link points	
			RX/RY	RWw/RWr
ON 1234	Small-memory mode	Ver.1.1 1-station, 1x	32 each	4 each
ON 1234	Monitor mode 1	Ver.1.1 2-station, 1x	64 each	8 each
ON 1234	Monitor mode 2	Ver.1.1 3-station, 1x	96 each	12 each
ON 1234	Full mode 1	Ver.1.1 4-station, 1x	128 each	16 each
ON 1234	Full mode 2	Ver.2 3-station, 2x	160 each	24 each
Others	Cannot be set.	-	-	

Default value: Small-memory mode

Name	Description
(4) Power indicator	When normal: Lit in green
(5) Communication indicator	For details, see 📖 "Troubleshooting" (page 5-2).
(6) Communication error indicator	When normal: Not lit For details, see 📖 "Troubleshooting" (page 5-2).
(7) Sensor communication indicator	When normal: Lit in green For details, see 📖 "Troubleshooting" (page 5-2).
(8) CC-Link connector	Attach the CC-Link cable to this connector.
DA/DB/DG	Communication signal
SLD	Shielded wire of the CC-Link cable.
FG	Ground this functional ground terminal according to a Class D (Class 3) grounding.
(9) Power supply connector	Attach the power cable to this connector.
(10) Sensor amplifier connector	Attach the sensor amplifier to this connector. When shipped from the factory, a protection cover is installed.

1

* The NU-CL1 starts updating data a certain time (depending on the type and number of sensor amplifiers connected, and the data to be communicated) after the power is turned on. The start time can be changed using the fourth bit of the operation mode setting switch.
Here are examples of start times for each mode of the FS-N10 digital fiber unit.

Switch setting	Operation mode	Data communicated	Data communication start time	
			When no sensor amplifier is connected	When one or more sensor amplifiers are connected
ON 1234 ↑ □□□□■	Standard start mode (factory default setting)	Output and current value (cyclic communication)	40 ms	120 ms + 30 ms x (number of connected sensor amplifiers)
		Change setting value, read/write parameter, and execute motion command	2 s x (number of connected sensor amplifiers)	
ON 1234 ↑ □□□□■	Command-priority start mode:	Output and current value (cyclic communication)	35 ms	240 ms + 110 ms x (number of connected sensor amplifiers)
		Change setting value, read/write parameter, and execute motion command		

Connection and Configuration

2

This chapter explains the procedures for connecting sensor amplifiers to the NU-CL1 and how to configure the data link.

2-1   **Installation and Connection to Sensor Amplifiers**

This section provides the procedures for installing the NU-CL1 on the DIN rail and connecting to sensor amplifiers.

Types and Number of Connectable Sensor Amplifiers

The NU-CL1 can be connected with the sensor amplifiers (expansion units) which support N-bus. ("N-bus" is the name of KEYENCE's wiring-saving system for sensor amplifiers.)

- Different types of sensor amplifiers with N-bus support can be connected to the NU-CL1.
- The NU-CL1 assigns an ID number between 1 and 16 to the connected sensor amplifier.
- Some models of sensor amplifiers occupy multiple ID numbers.
- Multiple sensor amplifiers can be connected as long as the number of occupied IDs does not exceed 16.

The sensor amplifiers which can be connected to the NU-CL1, and the number of occupied ID numbers are shown below.

Part name	Model	Number of occupied ID numbers
Digital fiber sensor	FS-N10 / N12*	1
Digital fiber sensor (2-output)	FS-N14*	2
Digital laser sensor (0-line / connector type)	LV-N10 / N12C*	1
Digital laser sensor (cable type)	LV-N12*	2
Digital photoelectric sensor	PS-N10/N12*	1
e-CON input unit	NU-EN8N	8

Connection and Configuration

2

ID Number Assignments to Sensor Amplifiers

ID numbers are assigned sequentially, starting from the adjacent sensor amplifier or unit connected to the NU-CL1.
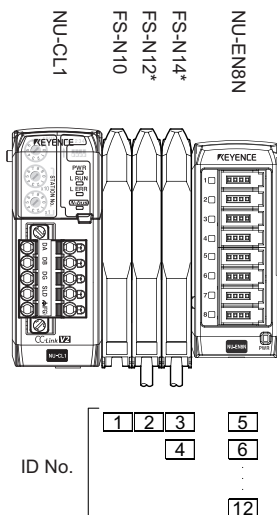
✎ **Point**
- Since ID numbers are assigned automatically, changing the number of sensor amplifiers or their connection sequence may require modification of the control program. In addition, sensor amplifiers cannot be connected next to the the NU-EN8N (NU-EN8N must be the last connection). These considerations should be taken when configuring the sensor amplifiers and control programs.
- An error will occur if the number of occupied ID stations exceeds 16.
  📖 "Error Information" (page 5-6)

Reference When the NU-EN8N is connected, an error will not occur even if the NU-EN8N ID number exceeds 16, and outputs up to the ID number 16 can be used.
Example) When ten FS-N10 units and one NU-EN8N unit are connected to the NU-CL1, the NU-EN8N outputs 1 to 6 can be used.

Installing and Connecting Sensor Amplifiers

This section provides the procedures for installing the NU-CL1 on the DIN rail and connecting to sensor amplifiers.

✎ **Point**   **Turn off the power before connecting the NU-CL1 and sensor amplifiers.**

1   **Align the claw on the bottom of the NU-CL1 with the DIN rail. While pushing the amplifier in the direction of arrow (1), press down in the direction of arrow (2).**
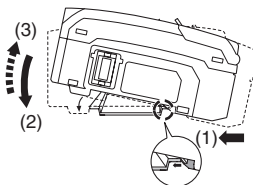
Reference   To remove the NU-CL1, raise the amplifier in the direction of arrow (3) while pushing the amplifier in the direction of arrow (1).

2 **Repeat step 1 to install additional sensor amplifiers or units to the DIN rail and connect them to the NU-CL1.**

If the sensor amplifier connector has an expansion protective cover, remove the cover before connecting the amplifier.

NU-CL1

Expansion connector
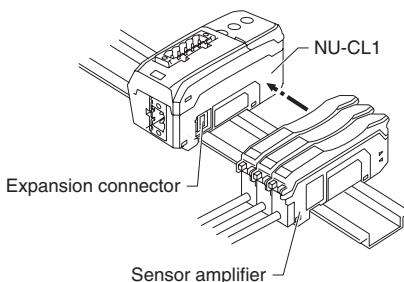
Sensor amplifier

✎ Point **Ensure that the NU-CL1 and sensor amplifiers are connected securely. If they are connected improperly or not inserted fully, they may be damaged when the power is turned on.**

3 **Mount the end units (OP-26751: a two-unit set shipped with the NU-CL1) on both sides of the NU-CL1 and sensor amplifier. Then, fix the end units with the screws on the top of each end unit (Tightening torque: 0.6 N•m or less).**

Mount the end units in the same way as the NU-CL1.

End unit

End unit
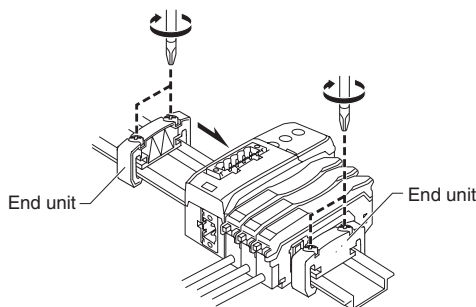
Reference Power to each sensor amplifier is provided from the NU-CL1.

2

Connection and Configuration

Use the following procedures to wire the NU-CL1.

✎ Point
- **Turn off the power before wiring.**
- **For more information on the CC-Link system, including the cable length and wiring methods, refer to the CC-Link Installation Manual issued by the CC-Link Organization or the CC-Link master unit's manual.**

Connecting to the CC-Link System

Use the following procedures to connect the NU-CL1 to the CC-Link system.

■ Recommended cables

For connection between the NU-CL1 and the CC-Link system, use CC-Link cables (Ver. 1.10 or later) accredited by the CC-Link Partner Association.

CC-Link cables (for Ver. 1.10) are available as optional items.
OP-79426 (20 m) OP-79427 (100 m)

✎ Point **To ensure normal communication, only use the CC-Link cables.**

■ Trimming the cable

1 Strip the cable sheath.

Strip approximately 50 mm of the sheath from the end of the CC-Link cable, with care to avoid damaging the shield braid of the cable.

Sheath   Approx. 50 mm
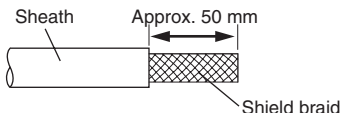
Shield braid

2 **Trim the shield.**

Unbraid the shield braid carefully. Find the bare drain wire (twisted or flying) inside the shield braid. Twist together the unbraided shield braid and the drain wire securely, and then put on the insulating tube.

Aluminum polyester laminated tape

Insulating tube   Shield braid twisted together
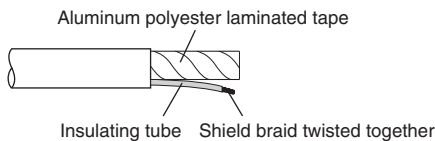
3 **Strip the sheathed conductors.**

Strip approximately 10 mm of sheath from each signal wire, by removing the aluminum polyester laminated tape. Take care not to damage the signal wires. Twist together the exposed conductors securely.
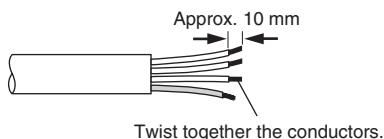
Approx. 10 mm

Twist together the conductors.

✎ Point
- **If you are using solderless terminals, perform cable wiring/ trimming appropriately to suit the specifications of the particular terminals.**
  Recommended solderless terminals: Phoenix Contact's A/AI Series
- **Do not perform soldering (pre-soldering) on the trimmed end of the cable.**

2

Connection and Configuration

■ **Connecting the cable**

Use the following procedures to connect to the CC-Link connector supplied with the NU-CL1.

1 **Connect the trimmed cable to the CC-Link connector.**

Insert the cable completely.
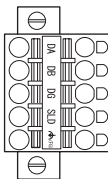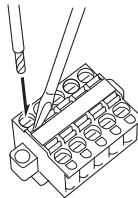
Terminal name	Function
DA/DB/DG	Communication signal
SLD	Connect the shielded wire of the CC-Link cable.
FG	Ground this functional ground terminal according to Class D (Class 3) grounding.

2 **Attach the CC-Link connector to the NU-CL1.**

Plug the connector into the NU-CL1 and secure it down with the screws on each end.
(Tightening torque: 0.2 to 0.3 N•m)
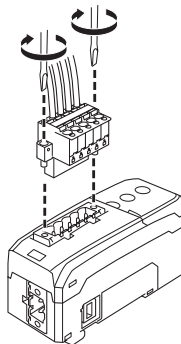
■ **Connecting the termination resistor**
If the NU-CL1 is at the end of the CC-Link system, connect the supplied termination resistor to DA/DB of the CC-Link connector.

Type of cable	Termination resistor
CC-Link Ver. 1.10 compatible cable	110 Ω , 1/2 W (brown/brown/brown/gold)
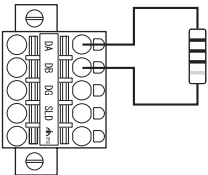
Connecting the Power Supply

Use the following procedure to connect the power supply to the NU-CL1.

✎ **Point** **The cable length should be 30 meters or less.**

Reference Power to each sensor amplifier is supplied from the NU-CL1.

■ **Usable cable**
Copper wire of AWG12 to 24 (rated temperature 60°C or higher).

■ **Trimming the cable**
Strip the end of the cable as shown below.
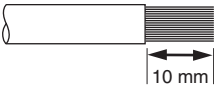
10 mm

✎ **Point** • **If you are using solderless terminals, perform cable wiring/trimming appropriately to suit the specifications of the particular terminals. Recommended solderless terminals: Phoenix Contact's A/AI Series**
• **Do not perform soldering (pre-soldering) on the trimmed end of the cable.**

2

Connection and Configuration

■ Connecting the cable

1 **Connect the trimmed cable to the power supply connector.**

Insert the cable completely.
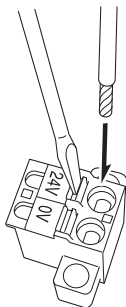
2 **Attach the power supply connector to the NU-CL1.**

Plug the connector into the NU-CL1 and secure it down with the screws on each end.
(Tightening torque: 0.2 to 0.3 N•m)

2-3 Configuring for Communication
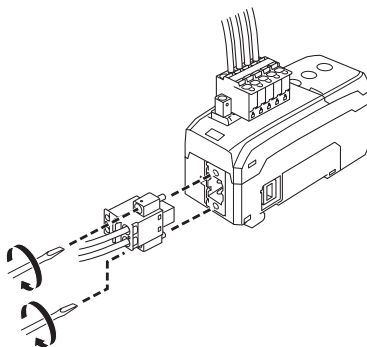
Use the following configuration procedures for connecting the NU-CL1 to the CC-Link system.

✎ **Point**   **This manual covers only the functions and settings of a CC-Link master station which are required for communication with the NU-CL1. For the functions and settings related to the communication between the CC-Link master unit and CPU unit, refer to the manuals shipped with your master unit or CPU unit.**

Configuring the Master Station

To connect the NU-CL1 to the CC-Link master unit, it is necessary to configure the slave attribute and memory allocation settings.

■ Slave attribute settings
Register the NU-CL1 to the CC-Link master unit as a remote device station.
You can also configure the settings by importing a CSP file into the software for the master unit (ladder programming software or CC-Link configuration software).

> **Reference** The CSP file can be downloaded from the KEYENCE web site:
> http://www.keyence.co.jp

■ Memory allocation settings
In order to exchange data between the NU-CL1 and CC-Link master station, configure the memory allocation settings using the software for the master station (ladder programming software or CC-Link configuration software).

> **Reference** Where multiple slave units are connected, the memory allocation for each slave unit is done automatically based on the specified starting address. The allocation information for each slave unit can be checked using the CC-Link configuration software.

2

Configuring the NU-CL1

The communication configurations for the NU-CL1 are described in this section.

Transmission rate setting switch

Station number setting switch

Operation mode setting switch
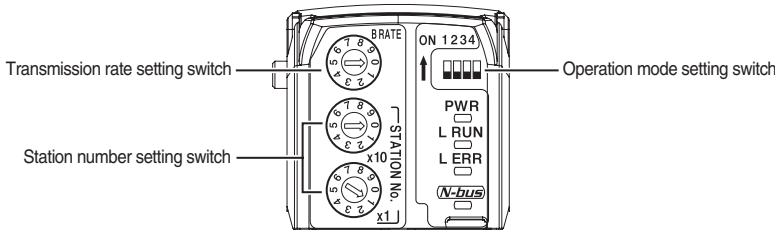
■ Setting the transmission rate

Set the transmission rate of the NU-CL1 to the same value as set in the CC-Link master station.
Do this using the transmission rate setting switch on the NU-CL1.

• Default value: 0

No.	0	1	2	3	4	5 to 9
Transmission rate (bps)	156k	625k	2.5M	5M	10M	Cannot be set.

■ Setting the station number

Using the station address setting switch, set the station number (slave ID) assigned to the NU-CL1.

• Default value: 01
• Setting range: 01 to 64

■ **Setting the operation mode**

Using the operation mode setting switch, set the combination of the number of stations occupied by the NU-CL1 and the extended cyclic setting. The specific data that can be communicated using cyclic transfer varies with each operation mode.

For the data that can be communicated, and memory configuration, see 📖 "Operation with CC-Link and Memory Configuration" (page 3-2).

• Default value: Small-memory mode

Switch setting	Operation mode	Station configuration	Number of link points	
			RX/RY	RWw/RWr
ON 1 2 3 4	Small-memory mode	Ver.1.1 1-station, 1x	32 each	4 each
ON 1 2 3 4	Monitor mode 1	Ver.1.1 2-station, 1x	64 each	8 each
ON 1 2 3 4	Monitor mode 2	Ver.1.1 3-station, 1x	96 each	12 each
ON 1 2 3 4	Full mode 1	Ver.1.1 4-station, 1x	128 each	16 each
ON 1 2 3 4	Full mode 2	Ver.2 3-station, 2x	160 each	24 each
Others	Cannot be set.	-	-	

✎ Point **Each switch should be set before turning on the power. If any setting is changed while the NU-CL1 is operating, the new setting will not be applied until the power is turned on again. (The communication error indicator flashes intermittently.)**

2

Connection and Configuration

■ **Changing the start time**

The NU-CL1 starts updating data a certain time (depending on the type and number of sensor amplifiers connected, and the data to be communicated) after the power is turned on. The start time can be changed using the fourth bit of the operation mode setting switch.

- Default value: Standard start mode

Switch setting	Start mode
ON 1234	Standard start mode
ON 1234	Command-priority start mode

Here are examples of start times for each mode of the FS-N10 digital fiber unit.

Operation mode	Data communicated	Data communication start time	
		When no sensor amplifier is connected	When one or more sensor amplifiers are connected
Standard start mode (factory default setting)	Output and current value (cyclic communication)	40 ms	120 ms + 30 ms x (number of connected sensor amplifiers)
	Change setting value, read/write parameter, and execute motion command	2 s x (number of connected sensor amplifiers)	
Command-priority start mode:	Output and current value (cyclic communication)	35 ms	240 ms + 110 ms x (number of connected sensor amplifiers)
	Change setting value, read/write parameter, and execute motion command		

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This chapter describes the configuration of the memory linked to the CC-Link master station and provides communication time charts.

3-1 Operation with CC-Link and Memory Configuration

The NU-CL1 operates as a remote device station of a CC-Link system.
This section describes the data that the NU-CL1 can exchange through the CC-Link, and specific memory configuration.

Overview

The NU-CL1 can retrieve the sensor amplifier's ON/OFF signals, error status and current value and execute external inputs with cyclic transfer.

Detailed data transfer is possible by using the remote input RX/remote output RY area as a handshake communication signal.
With handshake communication, motion commands such as calibration can be issued to the sensor amplifier, the sensor amplifier can be set, and the status can be read and written.

The data which can be exchanged with cyclic transfer and the memory assignments differ according to the NU-CL1's operation mode.

- Actual communication procedures
  - → 📖 "Communication Methods" (page 3-5)
- List of data which can be exchanged with cyclic transfer
  - → 📖 "Cyclic Transfer" (page 3-17)
- List of data which can be communicated with handshake communication
  - → 📖 "Parameter List" (page 3-27)
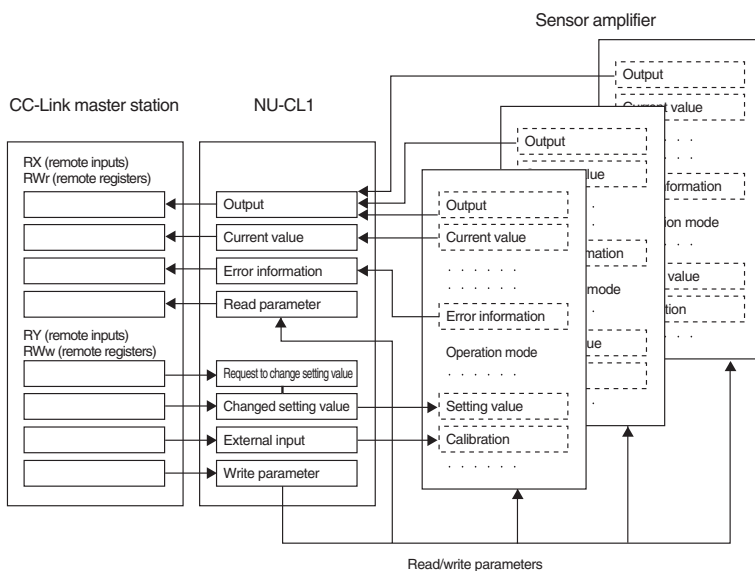
Station Organization and Memory Occupied

Switch setting	Operation mode	Station configuration	Number of link points	
			RX/RY	RWw/RWr
ON 1234	Small-memory mode	Ver.1.1 1-station, 1x	32 each	4 each
ON 1234	Monitor mode 1	Ver.1.1 2-station, 1x	64 each	8 each
ON 1234	Monitor mode 2	Ver.1.1 3-station, 1x	96 each	12 each
ON 1234	Full mode 1	Ver.1.1 4-station, 1x	128 each	16 each
ON 1234	Full mode 2	Ver.2 3-station, 2x	160 each	24 each
Others	Cannot be set.			

Assigning Data to ID Numbers

The number of occupied ID numbers and the ID numbers used for communication differ according to the connected sensor amplifier. Refer to the following table for details.

■ **Output**

ID No.	FS-N10 FS-N12*	FS-N14*	LV-N10 LV-N12C*	LV-N12*	PS-N10 PS-N12*	NU-EN8N
1st	Output	Output 1	Output	Output 1	Output	No.1 output
2nd		Output 2		Output 2		No. 2 output
.						.
.						.
.						.
8th						No. 8 output

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■ **Current value**

ID No.	FS-N10 FS-N12*	FS-N14*	LV-N10 LV-N12C*	LV-N12*	PS-N10 PS-N12*	NU-EN8N
1st	Current value or received light intensity	Current value or received light intensity	Current value or received light intensity	Current value or received light intensity	Current value or received light intensity	Not used
2nd		Not used		Not used		Not used
. . .						. . .
8th						Not used

■ **External input**

ID No.	FS-N10 FS-N12*	FS-N14*	LV-N10 LV-N12C*	LV-N12*	PS-N10 PS-N12*	NU-EN8N
1st	External input	External input	External input	External input	External input	Not used
2nd		Not used		Not used		Not used
. . .						. . .
8th						Not used

For details of the ID number assignments

→ 📖 "ID Number Assignments to Sensor Amplifiers" (page 2-3)

Meaning of Each Item

The meaning of each item used in the list on the following pages are as follows:

Item	Value	Meaning	Range
Data type	INT	16-bit signed integer	-32768 to 32767
	UINT	16-bit unsigned integer	0 to 65535
	WORD	16-bit data	-
Attribute	R	Read enabled	-
	R/W	Read/write enabled	
	W	Write enabled	
	C	Motion command	

This section describes the detailed communication methods.

Overview

The NU-CL1 can exchange data with the following two methods.

(1) Cyclic transfer
The data which can be exchanged and the memory assignments differ according to the NU-CL1's operation mode.
Operation mode → ☐ "Setting the operation mode" (page 2-13)

(2) Handshake communication
Regardless of the NU-CL1's operation mode, all sensor amplifier's settings and statuses can be read and written. <u>Note that handshake communication is not possible in the Small-memory mode.</u>

Types of communication	(1) Cyclic transfer					(2) Handshake communication	Reference
	Small-memory mode	Monitor mode 1	Monitor mode 2	Full mode 1	Full mode 2		
Reading the Sensor ON/OFF Output	○	○	○	○	○	○	page 3-6
Reading the Sensor Current Value*	–	4	8	12	16	○	page 3-7
Changing the Sensor Setting Value	–	–	–	○	○	○	page 3-8
Executing an External Input to a Sensor	○	–	○	○	○	○	page 3-10
Reading the Sensor Error Information	○	○	○	○	○	○	page 3-12
Disabling the Sensor Key Operations	–	○	○	○	○	○	page 3-13
Displaying Random Characters on the Sensor	–	○	○	○	○	○	page 3-14
Reducing the Sensor Power Consumption	–	○	○	○	○	○	page 3-16

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* The listed numbers indicate the number of sensor amplifiers for which the current value is read out (total number of occupied ID numbers).

📖 "Installation and Connection to Sensor Amplifiers" (page 2-2)

The functions shown above are an example of what can be used with communication. Refer to the following sections for information on other functions.
* Finding data which can be transferred with cyclic transfer
    → 📖 "Cyclic Transfer" (page 3-17)
* Checking all data which can be communicated
    → 📖 "Handshake Communication" (page 3-23)

Reading the Sensor ON/OFF Output

Example: Read the ID number 01 sensor amplifier's ON/OFF output state using cyclic transfer.

The sensor amplifier's data is automatically reflected on the CC-Link master unit's remote input RX area at each cyclic transfer cycle.
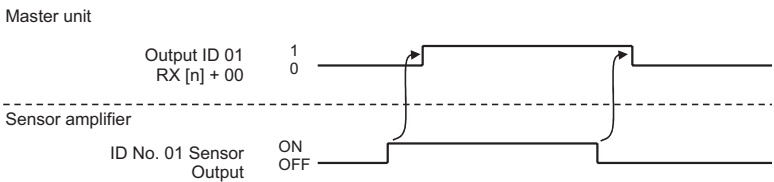
Master unit

Output ID 01
RX [n] + 00   1
              0

Sensor amplifier

ID No. 01 Sensor   ON
Output   OFF

n: The first device number assigned to the NU-CL1

Operation mode	Device No. (HEX)	Name	Description	Value
Can be used in all modes	RX [n] + 00	Output ID 01	Indicates each ID number sensor's ON/OFF output.	0: Output OFF 1: Output ON
	:	:		
	RX [n] + 0F	Output ID 16		

📖 "Cyclic Transfer" (page 3-17)

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Reading the Sensor Current Value

Example: Read the current value of ID number 01 sensor amplifier using cyclic transfer.

The sensor amplifier's data is automatically reflected on the CC-Link master unit's remote register RWr area at each cyclic transfer cycle.
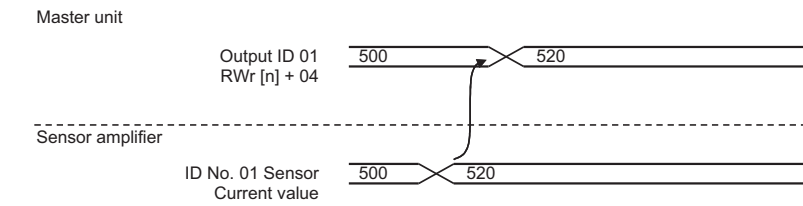
Master unit

Output ID 01
RWr [n] + 04

| 500 | 520 |

Sensor amplifier

ID No. 01 Sensor
Current value

| 500 | 520 |

n: The first device number assigned to the NU-CL1

Operation mode					Device No. (HEX)	Name	Description	Value
Small-memory	Monitor 1	Monitor 2	Full 1	Full 2				
Non-assigned	Non-assigned	Non-assigned	Non-assigned		RWr [n] + 04	Current Value ID 01	Expresses each ID number sensor's current value.	0 to 9999
					:	:		
					RWr [n] + 07	Current Value ID 04		
					RWr [n] + 08	Current Value ID 05		
					:	:		
					RWr [n] + 0B	Current Value ID 08		
					RWr [n] + 0C	Current Value ID 09		
					:	:		
					RWr [n] + 0F	Current Value ID 12		
					RWr [n] + 10	Current Value ID 13		
					:	:		
					RWr [n] + 13	Current Value ID 16		

📖 "Setting the operation mode" (page 2-13)
📖 "Cyclic Transfer" (page 3-17)

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Changing the Sensor Setting Value

Example: Change the ID number 01 and 02 sensor amplifier setting values with cyclic transfer.

The sensor amplifier setting value is changed by storing the setting value to be written in a specific register and turning the setting value write request bit ON.

CC-Link master unit

Setting value ID 01 RWw [n] + 04 — 100

Setting value ID 02 RWw [n] + 05 — 300

Setting write request ID 01 RY [n] + 50

Setting write request ID 02 RY [n] + 51

Setting write complete ID 01* RX [n] + 50*

Setting write complete ID 02* RX [n] + 51*

Sensor amplifier

Setting value of sensor amplifier ID No. 01 — 100

Setting value of sensor amplifier ID No. 02 — 300
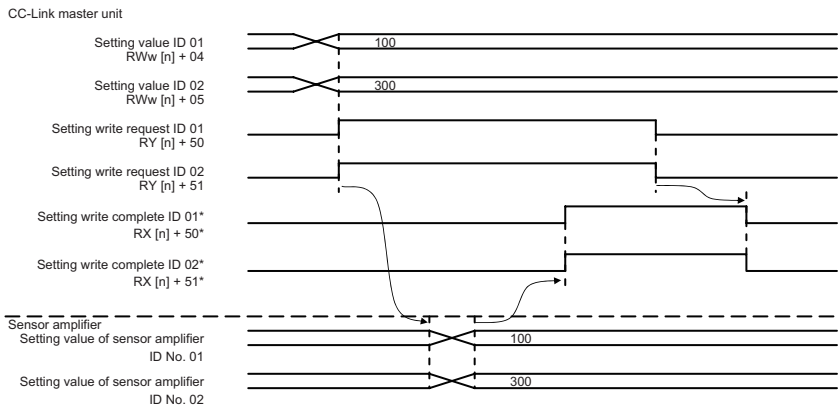
*The "sensor setting value change error" (RX[n]+60 / RX[n]+61) bit turns ON when an error occurs.

n: The first device number assigned to the NU-CL1

Operation mode					Device No. (HEX)	Name	Description	Value
Small-memory	Monitor 1	Monitor 2	Full 1	Full 2				
Non-assigned	Non-assigned	Non-assigned			RX [n] + 50	Setting Write Finish ID 01	Indicates that each ID number sensor process end normally in response to the remote output RY "setting value write request".	0: Write incomplete 1: Write complete
					:	:		
					RX [n] + 5F	Setting Write Finish ID 16		
					RX [n] + 60	Setting Write Error ID 01	Indicates that an error occurred in each ID number sensor in response to the remote output RY "setting value write request".	0: No Error 1: Error
					:	:		
					RX [n] + 6F	Setting Write Error ID 16		
					RY [n] + 50	Setting Write Request ID 01	Indicates a setting value write request to each ID number sensor.	0 → 1: Setting write request
					:	:		
					RY [n] + 5F	Setting Write Request ID 16		
					RWw [n] + 04	Setting Value ID 01	Indicates the setting value written to each ID number sensor in response to the remote output RX "setting value write request".	0 to 9999
					:	:		
					RWw [n] + 0F	Setting Value ID 12		
			Non-assigned		RWw [n] + 10	Setting Value ID 13		
					:	:		
					RWw [n] + 13	Setting Value ID 16		

📖 "Setting the operation mode" (page 2-13)
📖 "Cyclic Transfer" (page 3-17)

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Executing Communication

Executing an External Input to a Sensor

With cyclic transfer, external input is executed after setting the sensor amplifier's external input function by pressing the sensor amplifier's buttons or with handshake communication.
When using handshake communication, directly specify the function to be executed with external input.
Handshake communication is convenient when simultaneously using multiple functions assigned to external input.

In the following example, external inputs are executed to the ID number 01 and 02 sensor amplifiers with cyclic transfer.

Executing handshake communication

→ 📖 "(3) Executing the Sensor Amplifier Function (Motion Command)" (page 3-25)

■ **Monitor mode 2 / Full mode 1 / Full mode 2**

n: The first device number assigned to the NU-CL1

Operation mode					Device No. (HEX)	Name	Description	Value
Small-memory	Monitor 1	Monitor 2	Full 1	Full 2				
		Non-assigned	Non-assigned	Non-assigned	RWr [n] + 02	External Input Response	Indicates that the sensor's external input is ON in response to the remote register RWw "external input request".	Bit0: ID No. 01 sensor external input response : Bit15: ID No. 16 sensor external input response
	Non-assigned				RWw [n] + 02	External Input Request	Indicates the external input request to each ID number sensor.	Bit0: ID No. 01 sensor external input request : Bit15: ID No. 16 sensor external input request
Non-assigned					RX [n] + 40	External Input Response ID 01	Indicates that the external input for each ID number sensor is ON in response to the remote output RY "external input request".	0: External input OFF 1: External input ON
					:	:		
					RX [n] + 4F	External Input Response ID 16		
					RY [n] + 40	External Input Request ID 01	Indicates the external input request to each ID number sensor.	0→1: External input request
					:	:		
					RY [n] + 4F	External Input Request ID 16		

📖 "Setting the operation mode" (page 2-13)
📖 "Cyclic Transfer" (page 3-17)

Reading the Sensor Error Information

Example: Read the error information with cyclic transfer when FS-N10 is connected as the ID number 01 sensor amplifier.

The error information is automatically applied on the CC-Link master unit's remote input RX and remote register RWr areas at each cyclic transfer cycle.

■ **Monitor modes 1 and 2 / Full mode 1 and 2**

n: The first device number assigned to the NU-CL1

Operation mode					Device No. (HEX)	Name	Description	Value
Small-memory	Monitor 1	Monitor 2	Full 1	Full 2				
Non-assigned					RX [n] + 18	Error Status	Indicates the error status of the NU-CL1 or sensor amplifier. 📖 "Error Information" (page 5-6)	0: No error 1: Error
					RWr [n] + 00	Error Code	Indicates the error information when an error occurred on the NU-CL1 or sensor amplifier.	📖 "Error Information" (page 5-6)
	Non-assigned	Non-assigned	Non-assigned	Non-assigned	RWr [n] + 01	Status	Indicates the sensor status. Refer to the remote input [RX18 to 1F] when the operation mode is set to monitor/full mode for the meaning of each status. 📖 "Remote Input RX (NU-CL1 → Master Station)" (page 3-17)	Bit0: Error status Bit1: Warning status Bit2: Sensor ready Bit3: Command ready Bit4: Sensor setting error Bit5: Sensor external input busy Bit6: Sensor EEPROM busy Bit7: Updating sensor setting Bit8 to 15: 0 fixed

📖 "Setting the operation mode" (page 2-13)
📖 "Cyclic Transfer" (page 3-17)

Disabling the Sensor Key Operations

The keys of all connected sensor amplifiers can be locked via communication. In addition to key lock which can be executed and canceled with the sensor amplifier's key operations, key lock which can be disabled only via communication.

The following parameters are set with handshake communication.

Checking the methods of handshake communication

→ 📖 "Handshake Communication" (page 3-23)

Index (HEX)	Sub-Index (HEX)	Name	Description	Data type	Attribute	Value
01	0000	All Unit Key Lock	Executes or cancels the designated key lock set for all amplifiers.	UINT	WO	0: Unlock 1: Key Lock 2: PIN Code Lock 3: Communication Lock

Reference : Key lock and PIN code lock can be executed and canceled with the sensor amplifier's key operations. For the operation procedure, refer to the User's Manual of each sensor amplifier. Communication key lock can only be executed and canceled via communication.

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Executing Communication

Displaying Random Characters on the Sensor

A random character string can be displayed on the sensor amplifier's 7-segment display.

| Reference | This function can be used in the following manner.
- Use instead of identification tags.
- Monitor the incoming light amount, and display an original error message if the light amount drops below a specified level.

Example: When FS-N10 is connected as the ID number 01 sensor amplifier.

The following parameters are set with handshake communication.

Checking the methods of handshake communication
→ 📖 "List of Character String Codes" (page 5-12)

1 Write the character string to be displayed.

(FS-N10 Series parameters)   nn: Sensor amplifier ID number (01 to 10h)

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nnE2	TAG Strings 1, 2	Indicates 1st and 2nd characters.	WORD	R/W	(2-byte character string) (Default value: "")
	nnE3	TAG Strings 3, 4	Indicates 3rd and 4th characters.			
	nnE4	TAG Strings 5, 6	Indicates 5th and 6th characters.			
	nnE5	TAG Strings 7, 8	Indicates 7th and 8th characters.			

Usable character strings → 📖 "List of Character String Codes" (page 5-12)

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2 Switch the sensor amplifier's sub-screen display to the TAG character string display.

(FS-N10 Series parameters) nn: Sensor amplifier ID number (01 to 10h)

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nnC2	Sub Display	Indicates details of the sub display.	INT	R/W	0: None● 1: Extension 2: Bar 3: Excess Gain (%) 4: Light Intensity HOLD 5: Excess Gain HOLD (%) 6: L-on/D-on 7: TAG Strings

3 Switch the sensor amplifier's display to the sub-display.

(FS-N10 Series parameters) nn: Sensor amplifier ID number (01 to 10h)

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nnC6	Current Display	Indicates current display.	INT	R/W	0: Normal● 1: Sub

📖 "FS-N10 Series Parameters" (page 3-30)
📖 "LV-N10 Series Parameters" (page 3-40)
📖 "PS-N10 Series Parameters" (page 3-50)

> **Reference** The method for storing the data to display the following string on the sensor amplifier is shown below.

41 42 43 44 45 46 47 48 h
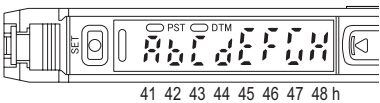
TAG character string 1, 2: 4241h
TAG character string 3, 4: 4443h
TAG character string 5, 6: 4645h
TAG character string 7, 8: 4847h

> ✎ **Point** **When displaying a tag character string using 2-output type amplifiers, set the slide style DIP switch to 1ch. The display will not switch to the tag character string if the slide style DIP switch is set to 2ch.**

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Reducing the Sensor Power Consumption

The sensor amplifier can be switched to the standby state via communication to reduce the consumed power.
The method when FS-N10 is connected as the sensor amplifier is explained as an example.

The following parameters are set with handshake communication.

Checking the methods of handshake communication
→ 📖 "Handshake Communication" (page 3-23)

(FS-N10 Series parameters)   nn: Sensor amplifier ID number (01 to 10h)

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn32	Operation Mode Setting	Set up the operation mode of the sensor.	INT	R/W	0: RUN● 1: LED_OFF 2: SLEEP 3: PAUSE

📖 "FS-N10 Series Parameters" (page 3-30)
📖 "LV-N10 Series Parameters" (page 3-40)
📖 "PS-N10 Series Parameters" (page 3-50)

✎ Point   **The sensor amplifier operates in the following method while the "operation mode setting" is set to sleep.**
- **The light emission stops.**
- **The ON/OFF output remains fixed at OFF regardless of the L-on/D-on setting.**
- **"-" sequentially appears on the display screen.**
- **If keys are activated, the display screen returns to the normal state for approx. four seconds.**

3-3 **Cyclic Transfer**

This section explains the data which can be exchanged with cyclic transfer.

Remote Input RX (NU-CL1 → Master Station)

In the descriptions below, "n" denotes the first device number assigned to the NU-CL1.

Operation mode					Device No. (HEX)	Name	Description	Value
Small-memory	Monitor mode 1	Monitor mode 2	Full mode 1	Full mode 2	RX [n] + 00	Output ID 01	Indicates each ID number sensor's ON/OFF output. 📖 "Reading the Sensor ON/OFF Output" (page 3-6)	0: Output OFF 1: Output ON
					:	:		
					RX [n] + 0F	Output ID 16		
					RX [n] + 10	Command Finish	Indicates that the process for the remote output RY "command request" is finished. 📖 "Handshake Communication" (page 3-23)	0: Process not finished 1: Process finished
					RX [n] + 11	Current Value Update Locked	Indicates that the current value update is locked in response to the remote output RY "current value update lock request".	0: Updating current value 1: Current value update locked
					RX [n] + 12 to 17	System reserved	-	-
					RX [n] + 18	Error Status	Indicates the error status of the NU-CL1 or sensor amplifier. 📖 "Error Information" (page 5-6)	0: No error 1: Error
					RX [n] + 19	Warning Status	Indicates the warning status of the sensor amplifier. 📖 "Warning Information" (page 5-8)	0: No warning 1: Warning
					RX [n] + 1A	Sensor Ready	Indicates the sensor ready status.	0: Sensor amplifier ready 1: Sensor amplifier in normal operation
					RX [n] + 1B	Command Ready	Indicates that a command can be requested to execute handshake communication. 📖 "Handshake Communication" (page 3-23)	0: Command request disabled 1: Command request enabled
					RX [n] + 1C	Sensor Setting Error	Indicates the sensor setting error status. 📖 "Functions which Cannot be Set in Duplicate" (page 5-9)	0: Normal 1: Error
					RX [n] + 1D	Sensor External Input Busy	Indicates the status of the external input process using sensor wiring. *External inputs set via communication are not possible during external inputs set via wiring.	0: External input off 1: External input busy
					RX [n] + 1E	Sensor EEPROM Busy	Indicates the status of the EEPROM process after changing the sensor settings.	0: Not writing to EEPROM 1: Writing to EEPROM
					RX [n] + 1F	Updating Sensor Setting	Indicates the status of the setting application process after changing the sensor settings.	0: Settings updated 1: Updating settings
					RX [n] + 20 to 2F	System reserved	-	-

Operation mode				Device No. (HEX)	Name	Description	Value
Monitor mode 2	Full mode 1	Full mode 2		RX[n] + 30 to 3F	System reserved	-	-
				RX [n] + 40	External Input Response ID 01	Indicates that each ID number sensor's external input is ON in response to the remote output RY "external input request". 📖"Executing an External Input to a Sensor" (page 3-10)	0: External input OFF 1: External input ON
				:	:		
				RX [n] + 4F	External Input Response ID 16		
				RX [n] + 50	Setting Write Finish ID 01	Indicates that each ID number sensor's process has finished normally in response to the remote output RY "setting write request". 📖"Changing the Sensor Setting Value" (page 3-8)	0: Setting write incomplete 1: Setting write finish
				:	:		
				RX [n] + 5F	Setting Write Finish ID 16		
				RX [n] + 60	Setting Write Error ID 01	Indicates that an error occurred in each ID number sensor in response to the remote output RY "setting write request". 📖"Changing the Sensor Setting Value" (page 3-8)	0: No error 1: Error
				:	:		
				RX [n] + 6F	Setting Write Error ID 16		
				RX [n] + 1B	Remote READY	Indicates the status of communication with the CC-Link system. *The assigned device number differs according to the NU-CL1 operation mode.	0: Error (Data from sensor amplifier is not updated.) 1: Normal
				RX [n] + 3B			
				RX [n] + 5B			
				RX [n] + 7B			
				RX [n] + 9B			

*1 "Output ID01" to "output ID16" are updated at a faster speed than other data, so there are cases when it is inconsistent with other data retrieved with communication.

✎ Point	**Do not have your program operate on the system reserved area or any areas other than reserved by the NU-CL1.**

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Remote Output RX (Master Station → NU-CL1)

In the descriptions below, "n" denotes the first device number assigned to the NU-CL1.

Operation mode					Device No. (HEX)	Name	Description	Value
Small-memory	Monitor mode 1	Monitor mode 2	Full mode 1	Full mode 2	RY [n] + 00 to 0F	System reserved	-	-
					RY [n] + 10	Command Request	Used as a trigger to read/write data with handshake communication. 📖 "Handshake Communication" (page 3-23)	0 → 1: Command request
					RY [n] + 11	Current Value Update Lock Request	Indicates the sensor current value update stop request state.	0: No current value update lock request 1: Current value update lock requested
					RY [n] + 12 to 2F	System reserved	-	-
					RY [n] + 30 to 3F	System reserved		
					RY [n] + 40	External Input Request ID 01	Indicates the external input request to each ID number sensor. 📖 "Executing an External Input to a Sensor" (page 3-10)	0 → 1: External input request
					:	:		
					RY [n] + 4F	External Input Request ID 16		
					RY [n] + 50	Setting Write Request ID 01	Indicates the setting write request to each ID number sensor. 📖 "Changing the Sensor Setting Value" (page 3-8)	0 → 1: Setting write request
					:	:		
					RY [n] + 5F	Setting Write Request ID 16		

✎ **Point** | **Do not have your program operate on the system reserved area or any areas other than reserved by the NU-CL1.**

Remote Register RWr (NU-CL1 → Master Station)

In the descriptions below, "n" denotes the first device number assigned to the NU-CL1.

■ Small-memory mode

Operation mode					Device No. (Hex)	Name	Description	Value
Small-memory mode	Monitor mode 1	Monitor mode 2	Full mode 1	Full mode 2	RWr [n] + 00	Error Code	Indicates the error information when an error occurred on the NU-CL1 or sensor amplifier.	📖 "Error Information" (page 5-6)
					RWr [n] + 01	Status	Indicates the sensor status. *Refer to the remote input [RX18 to 1F] when the operation mode is set to monitor/full mode for the meaning of each status. 📖 "Remote Input RX (NU-CL1 → Master Station)" (page 3-17)	Bit0: Error status Bit1: Warning status Bit2: Sensor ready Bit3: Command ready Bit4: Sensor setting error Bit5: Sensor external input busy Bit6: Sensor EEPROM busy Bit7: Updating sensor setting Bit8 to 15: 0 fixed
					RWr [n] + 02	External Input Response	Indicates that the sensor's external input is ON in response to the remote register RWw "external input request". 📖 "Executing an External Input to a Sensor" (page 3-10)	Bit0: ID No. 01 sensor external input response : Bit15: ID No. 16 sensor external input response

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■ **Monitor mode / Full mode**

Operation mode			Device No. (Hex)	Name	Description	Value
Small-memory mode	Monitor mode 1	Full mode 1	RWr [n] + 00	Error Code	Indicates the error information when an error occurred on the NU-CL1 or sensor amplifier.	📖 "Error Information" (page 5-6)
	Monitor mode 2		RWr [n] + 01	Command Response	Indicates the command process results in response to the remote output RY "command request". 📖 "Handshake Communication" (page 3-23)	📖 "Command Response List" (page 3-26)
		Full mode 2	RWr [n] + 02	Read Data	Indicates the read data when reading data with handshake communication. 📖 "Handshake Communication" (page 3-23)	0000 to FFFFh
			RWr [n] + 03	System reserved	-	-
			RWr [n] + 04	Current Value ID 01	Expresses each ID number sensor's current value.	0 to 9999
			:	:		
			RWr [n] + 07	Current Value ID 04		
			RWr [n] + 08	Current Value ID 05		
			:	:		
			RWr [n] + 0B	Current Value ID 08		
			RWr [n] + 0C	Current Value ID 09		
			:	:		
			RWr [n] + 0F	Current Value ID 12		
			RWr [n] + 10	Current Value ID 13		
			:	:		
			RWr [n] + 13	Current Value ID 16		
			RWr [n] + 14	Current Value Property	Turns the corresponding bit ON if the current value of the connected sensor exceeds the upper/lower limits or if it is invalid.[1]	Bit0: ID No. 01 sensor current value property : Bit15: ID No. 16 sensor current value property

[1] Turns the corresponding bit ON when the sensor head LV-S31 is connected to the LV-N10 Series sensor amplifier and the display shows "----", "nEAr" or "FAr".

✎ **Point** **Do not have your program operate on the system reserved area or any areas other than reserved by the NU-CL1.**

Remote Register RWr (Master Station → NU-CL1)

In the descriptions below, "n" denotes the first device number assigned to the NU-CL1.

■ **Small-memory mode**

Operation mode					Device No. (Hex)	Name	Description	Value
Small-memory mode	Monitor mode 1	Monitor mode 2	Full mode 1	Full mode 2	RWw [n] + 00	System reserved	-	-
					RWw [n] + 01	System reserved	-	-
					RWw [n] + 02	External Input Request	Indicates the external input request to each ID number sensor. 📖 "Executing an External Input to a Sensor" (page 3-10)	Bit0: ID No. 01 sensor external input request : Bit15: ID No. 16 sensor external input request

■ **Monitor mode / Full mode**

Operation mode					Device No. (Hex)	Name	Description	Value
Small-memory mode	Monitor mode 1	Monitor mode 2	Full mode 1	Full mode 2	RWw [n] + 00	Data category/ Command number	Specifies the read/write data when reading/writing data with handshake communication. 📖 "Handshake Communication" (page 3-23) *Methods of storing data in RWw[n]+00	■Upper 1 byte: 00 to FFh ■Lower 1 byte: 00: Read 01: Write 02: Motion command
					RWw [n] + 01	Data number	┌┬┬┬┐h Command number Data category	0000 to FFFFh
					RWw [n] + 02	Data to be written	Indicates the write data when writing data with handshake communication. 📖 "Handshake Communication" (page 3-23)	0000 to FFFFh
					RWw [n] + 03	System reserved		
					RWw [n] + 04	Setting value ID 01	Indicates the setting value written to each ID number sensor in response to the remote output RX "setting value write request". 📖 "Changing the Sensor Setting Value" (page 3-8)	0000 to 9999
					:	:		
					RWw [n] + 0F	Setting value ID 12		
					RWw [n] + 10	Setting value ID 13		
					:	:		
					RWw [n] + 13	Setting value ID 16		

✎ **Point**   **Do not have your program operate on the system reserved area or any areas other than reserved by the NU-CL1.**

3-4 **Handshake Communication**

The NU-CL1 realizes handshake communication by using the remote input RX and remote output RY areas as handshake communication signals. This enables more detailed data to be exchanged. With handshake communication, the sensor amplifier settings and status can be read and written, and functions, such as calibration, can be executed to the amplifier (motion commands can be executed).

* List of data which can be communicated with handshake communication
  → 📖 "Parameter List" (page 3-27)
* List of devices usable for communication timing control
  → 📖 "Remote Input RX (NU-CL1 → Master Station)" (page 3-17)

(1) Reading the Sensor Amplifier Data
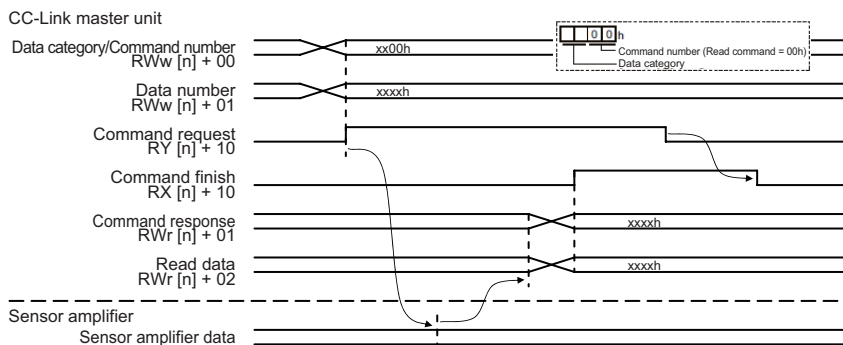
[n]: The first device number assigned to the NU-CL1

(1) The parameter of the data to be read is stored in "Data category/command No." and "data No.", and the "command request" bit turns ON.
* List of data categories and data numbers
  → 📖 "Parameter List" (page 3-27)
(2) After communicating with the sensor amplifier, the "command finish" bit turns ON, and communication results are stored in "command response". The read data is stored in "read data".
* List of command responses
  → 📖 "Command Response List" (page 3-26)
(3) When the "command request" bit turns OFF, the "command finish" bit turns OFF.

(2) Writing Data to the Sensor Amplifier

CC-Link master unit

Data category/Command number
RWw [n] + 00   xx01h   01 h
     Command number (Write command = 01h)
     Data category

Data number
RWw [n] + 01   xxxxh

Write data
RWw [n] + 02   xxxxh

Command request
RY [n] + 10

Command finish
RX [n] + 10

Command response
RWr [n] + 01   xxxxh

Read data
RWr [n] + 02   0000h

Sensor amplifier
Sensor amplifier data
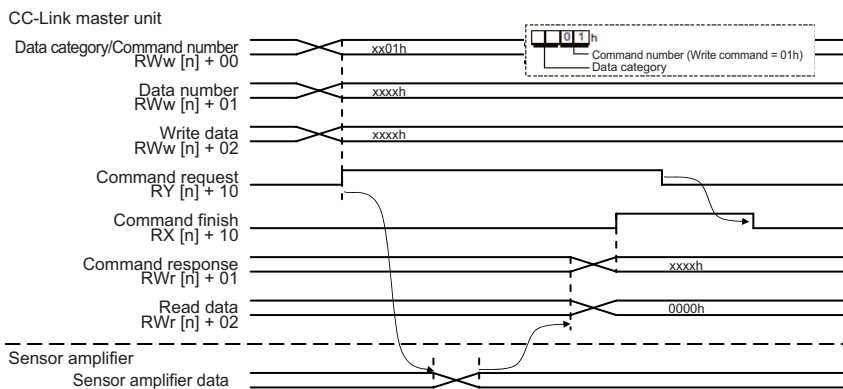
[n]: The first device number assigned to the NU-CL1

(1) The parameter of the data to be written is stored in "data category/command No.", "data No.", and "write data", and the "command request" bit turns ON.
• List of data categories and data numbers
→ ⬜ "Parameter List" (page 3-27)
(2) After communicating with the sensor amplifier, the "command finish" bit turns ON, and the communication results are stored in "command response". The "read data" is reset to 0.
• List of command responses
→ ⬜ "Command Response List" (page 3-26)
(3) When the "command request" bit turns OFF, the "command finish" bit turns OFF.

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(3) Executing the Sensor Amplifier Function (Motion Command)

CC-Link master unit

Data category/Command number RWw [n] + 00

Data number RWw [n] + 01

Command request RY [n] + 10

Command finish RX [n] + 10

Command response RWr [n] + 01

Read data RWr [n] + 02

Sensor amplifier
Sensor amplifier data

xx02h

Command number (Motion command = 02h)
Data category

xxxxh

xxxxh

0000h
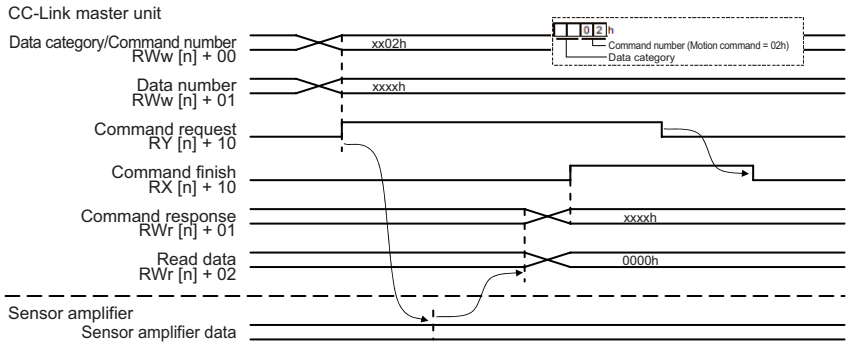
[n]: The first device number assigned to the NU-CL1

(1) The parameter of the function of which the motion command is to be issued is stored in "data category/command No." and "data No.", and the "command request" bit turns ON.

• List of data category and data numbers

 → 📖 "Parameter List" (page 3-27)

(2) After communicating with the sensor amplifier, the "command finish" bit turns ON, and the communication results are stored in "command response". The "read data" is reset to 0.

• List of command responses

 → 📖 "Command Response List" (page 3-26)

(3) When the "command request" bit turns OFF, the "command finish" bit turns OFF.

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Executing Communication

Command Response List

Response (Hex)	Name	Description
0000	Successfully completed	The command has been processed successfully.
0001	Command number error	The command number is out of range.
0002	Data category error	The data category value is out of range.
0003	ID number out of range	A nonexisting ID number is specified.
0004	Data number out of range	The data number is out of range.
0005	Write inhibit	An attempt was made to write in a read-only data number.
0006	Write data out of range	The value of write data is out of range.
0007	Sensor-to-sensor communication error	An error occurred in the communication between sensors. Example: Noise, improper contact, etc.
0008	Motion command area access error	An attempt was made to read/write to a motion command area.
0009	Motion command address error	The address is out of range. (The address is not used with this sensor.)
000A	Motion command execution error	Failed to execute a motion command.
000B	Read inhibit	An attempt was made to read data of a write-only data number.

The parameters used with handshake communication are listed below.

NU-CL1 Parameters

📖 "Meaning of Each Item" (page 3-4)   nn: Sensor amplifier ID No. (00 to 10h)

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn00 : nnFF	Depends on the sensor amplifiers connected.				
01	0000	All Unit Key Lock	Executes or cancels the designated key lock set for all amplifiers.	UINT	W	0: Cancel 1: Key lock 2: PIN key lock 3: Communication key lock
02	0000	Output	When the ON/OFF output of each ID number sensor is ON, the corresponding bit turns ON.	WORD	R	Bit0: ID No. 01 sensor : Bit15: ID No. 16 sensor
03	0001	Current Value Over Range[*1]	When the current value of each ID number sensor exceeds the upper limit, the corresponding bit turns ON.	WORD	R	Bit0: ID No. 01 sensor : Bit15: ID No. 16 sensor
	0002	Current Value Under Range[*2]	When the current value of each ID number sensor exceeds the lower limit, the corresponding bit turns ON.	WORD	R	Bit0: ID No. 01 sensor : Bit15: ID No. 16 sensor
	0003	Current Value Invalid[*3]	When the current value of each ID number sensor is invalid, the corresponding bit turns ON.	WORD	R	Bit0: ID No. 01 sensor : Bit15: ID No. 16 sensor
	0004	Current Value Property[*4]	When the current value of each ID number sensor exceeds the upper/lower limit or is invalid, the corresponding bit turns ON.	WORD	R	Bit0: ID No. 01 sensor : Bit15: ID No. 16 sensor
	0040	Error Information	Indicates the error information when an error occurred on the NU-CL1 or sensor amplifier.	WORD	R	📖 "Error Information" (page 5-6)
	0041	Status	Indicates the status of all connected sensors as OR. *Refer to the remote input [RX18 to 1F] when the operation mode is set to monitor/full mode for the meaning of each status. 📖 "Remote Input RX (NU-CL1 → Master Station)" (page 3-17)	WORD	R	Bit0: Error status Bit1: Warning status Bit2: Sensor ready Bit3: 0 fixed Bit4: Sensor setting error Bit5: Sensor external input busy Bit6: Sensor EEPROM busy Bit7: Updating sensor setting Bit8 to 15: 0 fixed

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Executing Communication

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Executing Communication

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
03	0101	Current Value ID 01	Expresses each ID number sensor's current value.	INT	R	0 to 9999
	:	:				
	0110	Current Value ID 16				
	0201	Status/Output ID 01	Indicates the status and output of each ID number sensor. *Refer to the remote input [RX18 to 1F] when the operation mode is set to monitor/full mode for the meaning of each status. 📖 "Remote Input RX (NU-CL1 → Master Station)" (page 3-17)	WORD	R	Bit15: Error status Bit14: Warning status Bit13: Sensor ready Bit12: Motion command error Bit11: Sensor setting error Bit10: Sensor external input busy Bit9: Sensor EEPROM busy Bit8: Updating sensor setting Bit7: Current value over range Bit6: Current value under range Bit5: Current value invalid Bit4: 0 fixed Bit3: 0 fixed Bit2: Output 3 Bit1: Output 2 Bit0: Output 1
	:	:				
	0210	Status/Output ID 16				
04	0000	External Input Request	Indicates the external input request to each ID number sensor. 📖 "Executing an External Input to a Sensor" (page 3-10)	WORD	R/W	Bit0: ID No. 01 sensor : Bit15: ID No. 16 sensor
	0001	External Input Response	Indicates that the sensor's external input is ON in response to the remote register RWw "external input request". 📖 "Executing an External Input to a Sensor" (page 3-10)	WORD	R	Bit0: ID No. 01 sensor : Bit15: ID No. 16 sensor
	0101	Setting Value ID 01	Indicates the setting value written to each ID number sensor in response to the remote output RX "setting value write request". 📖 "Changing the Sensor Setting Value" (page 3-8)	INT	R/W	-32768 to 32767 *Depends on sensor amplifiers.
	:	:				
	0110	Setting Value ID 16				
	0120	Setting Write Request	Indicates a setting value write request to each ID number sensor. 📖 "Changing the Sensor Setting Value" (page 3-8)	WORD	R/W	Bit0: ID No. 01 sensor : Bit15: ID No. 16 sensor
	0121	Setting Write Finish	Indicates that each ID number sensor process end normally in response to the remote output RY "setting value write request". 📖 "Changing the Sensor Setting Value" (page 3-8)	WORD	R/W	Bit0: ID No. 01 sensor : Bit15: ID No. 16 sensor

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
04	0122	Setting Write Error	Indicates that an error occurred in each ID number sensor in response to the remote output RY "setting value write request". 📖 "Changing the Sensor Setting Value" (page 3-8)	WORD	R/W	Bit0: ID No. 01 sensor : Bit15: ID No. 16 sensor
05	0000	Sensor Count	Indicates the number of sensor amplifiers connected to the NU-CL1.	UINT	R	0 to 16
	0101	1st Sensor ID Number	Indicates the 1st sensor's ID number.	UINT	R	0: Sensor unconnected 1 to 16: Sensor ID No.
	:	:	:			
	0110	16th Sensor ID Number	Indicates the 16th sensor's ID number.			
	0200	Warning ID Number	Indicates the ID number of the sensor at which an error is occurring.	UINT	R	0: No warning 1 to 16: Sensor ID number
	0401	Product Code ID01	Indicates the product code of ID No. 01 sensor.	WORD	R	FS-N10/N12*: 2000 FS-N14*: 2001 LV-N10/N12C*: 2003 LV-N12*: 2004 PS-N10/N12*: 2005
	:	:	:			
	0410	Product Code ID16	Indicates the product code of ID No. 16 sensor.			
	0501	Head Code ID01	Indicates the type of the sensor head connected to ID No. 01 sensor.	INT	R	■ FS-N10 Series Not available ■ LV-N10 Series 1: LV-S71 2: LV-S61 3: LV-S72 4: LV-S62 5: LV-S41/S41L 6: LV-S31 8: LV-S63 9: LV-NH37/NH42 10: LV-NH32/NH35 11: LV-NH100/NH110 12: LV-NH300 13: LV-NH62 The value is non-specific when a sensor head is not connected. ■ PS-N10 Series Not available
	:	:	:			
	0510	Head Code ID16	Indicates the type of the sensor head connected to ID No. 16 sensor.			

*1 Turns the corresponding bit ON when the sensor head LV-S31 is connected to the LV-N10 Series sensor amplifier and the display shows "FAr".

*2 Turns the corresponding bit ON when the sensor head LV-S31 is connected to the LV-N10 Series sensor amplifier and the display shows "nEAr".

*3 Turns the corresponding bit ON when the sensor head LV-S31 is connected to the LV-N10 Series sensor amplifier and the display shows "----".

*4 Turns the corresponding bit ON when the sensor head LV-S31 is connected to the LV-N10 Series sensor amplifier and the display shows "----", "nEAr" or "FAr".

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Executing Communication

FS-N10 Series Parameters

📖 "Meaning of Each Item" (page 3-4)   nn: Sensor amplifier ID No. (00 to 10h)

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn00	Group0 Entry count	Indicates the number of entries in Group 0.	UINT	R	16
	nn01	Load Recipe Data	Reads the mode selected with "Recipe Select".		C	
	nn02	Custom Save	Writes the current settings into the custom save area.		C	
	nn03	Maximum Sensitivity Setting	Executes maximum sensitivity calibration.		C	
	nn04	Percentage Calibration	Executes percentage calibration.		C	
	nn05	Two-point/Pos. Calibration (1st)	Designates the 1st point for 2-point calibration and positioning calibration.		C	
	nn06	Two-point Calibration (2nd)	Designates the 2nd point for 2-point calibration.		C	
	nn07	Positioning Calibration (2nd)	Designates the 2nd point for positioning calibration.		C	
	nn08	Full Auto Calibration start	Starts full-auto calibration.		C	
	nn09	Full Auto Calibration end	Ends full-auto calibration.		C	
	nn0A	Zero-shift start	Executes zero shift.		C	
	nn0B	Zero-shift end	Cancels zero shift.		C	
	nn0C	Preset start	Executes preset.		C	
	nn0D	Preset end	Cancels preset.		C	
	nn0E	Saturation Canceling start	Executes the saturation circuit.		C	
	nn0F	Saturation Canceling end	Cancels the saturation circuit.		C	
	nn10	Reset Hold Value	Resets the hold value such as the peak value and bottom value.		C	
	nn11	Work-Preset Request[*1]	Executes work preset.		C	
	nn12	Full Auto Preset: Start[*1]	Starts fully automatic (or maximum sensitivity) preset.		C	
	nn13	Full Auto Preset: Finish[*1]	Ends fully automatic (or maximum sensitivity) preset.		C	
	nn14	Maximum Sensitivity Preset: Request[*1]	Executes maximum sensitivity preset. (Preset can be executed without specifying the start and end.)		C	
	nn15 to nn1F	System reserved				

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn20	Group1 Entry count	Indicates the number of entries in Group 1.	UINT	R	19
	nn21	Error Information	Indicates the error information. If an error has occurred, the corresponding bit turns ON.	WORD	R	Bit0: Over Current Error Bit1: Reserve Bit2: EEPROM Error Bit3: Reserve Bit4: Reserve Bit5: DATUM Correction Error Bit6: APC Error Bit7: Sensor Communication Error
	nn22	Warning Information	Indicates the warning information. If a warning has occurred, the corresponding bit turns ON.	WORD	R	Bit0: Limit Detection
	nn23	Warning Function	Indicates the warning function working status. The corresponding bit turns ON if the warning function is active.	WORD	R	Bit0: Limit Detection (Default value: 0)
	nn24	Output	Indicates the sensor output status. If the output is ON, the corresponding bit turns ON.	WORD	R	Bit0: Output1 Bit1: Output2
	nn25	Current Value	Indicates the current received light amount.	INT	R	0 to 9999
	nn26	System reserved	-	-	-	-
	nn27	System reserved	-	-	-	-
	nn28	Raw Value	Indicates the received light amount before it is adjusted with the preset function, DATUM function or zero shift function.	INT	R	0 to 65535 [*2]
	nn29	Peak-Hold Value	Indicates the peak value of the received light (or maximum value of the bottom value). (Differs according to the hold display setting.)	INT	R	0 to 9999
	nn2A	Bottom-Hold Value	Indicates the bottom value of the received light (or minimum value of the peak value). (Varies according to the hold display setting)	INT	R	0 to 9999
	nn2B	System reserved	-	-	-	-
	nn2C	Peak-Hold Minimum Value	Indicates the smallest maximum received light amount while it exceeds the setting value.	INT	R	0 to 9999
	nn2D	DATUM Internal Value	Indicates the setting value prior to scaling with the DATUM function.	INT	R	0 to 65535 [*2]
	nn2E	Display Customize	Indicates the operation status of the function compensating the display value.	INT	R	0: No Customize / DATUM ● 1: Preset 2: Zero-shift
	nn2F	Slide Switch Status	Indicates the status of the slide switch.	INT	R	0: Selecting SEL 1: Selecting MEGA

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn30	Saturation Canceling	Indicates the execution status of the saturation circuit function.	INT	R	0: Not Active 1: Active
	nn31	Operation Mode	Indicates the sensor's current operation mode.	INT	R	0: RUN● 1: LED_OFF 2: SLEEP 3: PAUSE
	nn32	Operation Mode Setting	Sets the sensor's operation mode.	INT	R/W	0: RUN● 1: LED_OFF 2: SLEEP 3: PAUSE
	nn33	Recipe Select	Selects the application setting to be read with the motion command "Load Recipe Data".	INT	R/W	0: Initialize● 1: Custom 2: Fall 3: Percentage Calibration 4: Zero-shift 5: MEGA 6: AREA[*1] 7: 0 DATUM[*1]
	nn34 to nn3F	System reserved	-	-	-	-
	nn40	Group2 Entry count	Indicates the number of entries in Group 2.	UINT	R	7
	nn41	Setting Value (Output1 / Area Hi)	Indicates the output 1 setting value. If the "Detection mode" is set to area detection mode, the upper limit of the setting value is indicated.	INT	R/W	0 to 9999 (Default value: 50)
	nn42	Setting Value (Output2)[*3]	Indicates the output 2 setting value.	INT	R/W	0 to 9999 (Default value: 50)
	nn43	System reserved	-	-	-	-
	nn44	Setting Value (Area Low)	Indicates the lower limit of the setting value in the area detection mode.	INT	R/W	0 to 9999 (Default value: 50)
	nn45	System reserved	-	-	-	-
	nn46	System reserved	-	-	-	-
	nn47	Limit Setting Value	Indicates the setting value for outputting a warning while using the limit detection function.	INT	R/W	0 to 9999 (Default value: 0)
	nn48 to nn4F	System reserved	-	-	-	-
	nn50	[Custom] Group2 Entry count	Number of entries in the Group 2 custom save area	UINT	R	7
	nn51	[Custom] Setting Value (Output1 / Area Hi)	Custom save area for "Setting Value (Output1)"	INT	R/W	0 to 9999 (Default value: 50)
	nn52	[Custom] Setting Value (Output2)[*3]	Custom save area for "Setting Value (Output2)[*1]"	INT	R/W	0 to 9999 (Default value: 50)
	nn53	System reserved	-	-	-	-
	nn54	[Custom] Setting Value (Area Low)	Custom save area for "Setting Value (Area Low)"	INT	R/W	0 to 9999 (Default value: 50)
	nn55	System reserved	-	-	-	-
	nn56	System reserved	-	-	-	-
	nn57	[Custom] Limit Setting Value	Custom save area for "Limit Setting Value"	INT	R/W	0 to 9999 (Default value: 0)

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
	nn58 to nn5F	System reserved	-	-	-	-
00	nn60	Group3 Entry count	Indicates the number of entries in Group 3.	UINT	R	7
	nn61	Key Lock Status	Indicates the key lock status.	INT	R/W	0: Unlock● 1: Key Lock 2: PIN Code Lock 3: Communication Lock
	nn62	PIN Code	Indicates the PIN for using the PIN key lock.	INT	R/W	0 to 9999 (Default value: 0)
	nn63	Slide Switch Lock	Indicates the lock status of the slide switch. If locked, the slide switch is disabled, and is fixed at SEL (1 for FS-N14). *4	INT	R/W	0: Unlock● 1: Lock
	nn64	L-on/D-on (N.O./N.C.)	Indicates whether the output is received light ON (L-on) or interrupted ON (D-on). Indicates the output logic (NO/NC) when using the area detection mode. The corresponding bit turns ON in D-on or NC.	WORD	R/W	Bit0: Output1 Bit1: Output2*3 (Default value: 0)
	nn65	Power Mode	Indicates the power mode.	INT	R/W	0: HIGH SPEED (Response Time 50 μs) 1: FINE (Response Time 250 μs)● 2: TURBO (Response Time 500us) 3: SUPER (Response Time 1ms) 4: ULTRA (Response Time 4ms) 5: MEGA (Response Time 16ms)
	nn66	Sensitivity Setting	Indicates the sensitivity setting method.	INT	R/W	0: Normal Sensitivity Setting● 1: Percentage Calibration 2: Zero-shift Calibration
	nn67	Percentage Calib. Target Value	Indicates the percent calibration target value when the "Sensitivity Setting" is set to Percent Calibration.	INT	R/W	-99 to 99 (Default value: -10)
	nn68 to nn6F	System reserved	-	-	-	-
	nn70	[Custom] Group3 Entry count	Number of entries in the Group 3 custom save area	UINT	R	7
	nn71	[Custom] Key Lock Status	Custom save area for "Key Lock Status"	INT	R/W	0: Unlock● 1: Key Lock 2: PIN Code Lock 3: Communication Lock
	nn72	[Custom] PIN Code	Custom save area for "PIN Code"	INT	R/W	0 to 9999 (Default value: 0)

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn73	[Custom] Slide Switch Lock	Custom save area for "Slide Switch Lock"	INT	R/W	0: Unlock● 1: Lock
	nn74	[Custom] L-on/D-on (N.O./N.C.)	Custom save area for "L-on/D-on (N.O./N.C.)"	WORD	R/W	Bit0: Output1 Bit1: Output2[*3] (Default value: 0)
	nn75	[Custom] Power Mode	Custom save area for "Power Mode"	INT	R/W	0: HIGH SPEED (Response Time 50 μs) 1: FINE (Response Time 250 μs)● 2: TURBO (Response Time 500 μs) 3: SUPER (Response Time 1ms) 4: ULTRA (Response Time 4ms) 5: MEGA (Response Time 16ms)
	nn76	[Custom] Sensitivity Setting	Custom save area for "Sensitivity Setting"	INT	R/W	0: Normal Sensitivity Setting● 1: Percentage Calibration 2: Zero-shift Calibration
	nn77	[Custom] Percentage Calib. Target Value	Custom save area for "Percentage Calib. Target Value"	INT	R/W	-99 to 99 (Default value: -10)
	nn78 to nn7F	System reserved	-	-	-	-
	nn80	Group4 Entry count	Indicates the number of entries in Group 4.	UINT	R	9
	nn81	Output Timer (Output1)	Indicates the settings for the output 1 timer function.	INT	R/W	0: Timer Off● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer
	nn82	Timer Value (Output1)	Indicates the output 1 timer time.	INT	R/W	1 to 9999 (Default value: 10)
	nn83	System reserved	-	-	-	-
	nn84	Detection Mode (Output1)	Indicates the output 1 detection mode.	INT	R/W	0: Normal Detection Mode● 1: DATUM1 Mode 2: DATUM2 Mode 3: Area Detection Mode 4: Rising Edge Detection Mode 5: Falling Edge Detection Mode
	nn85	DATUM Speed	Indicates the compensation speed when using the DATUM function.	INT	R/W	0: Level1 (Slow)● 1: Level2 (Normal) 2: Level3 (Fast)
	nn86	DATUM Warning Level	Indicates the warning output level when using the DATUM function.	INT	R/W	0 to 100 (Default value: 50)

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn87	Control Input	Indicates the settings for the external input function.	INT	R/W	0: Not use● 1: External Calibration 2: Preset 3: Zero-shift 4: Reset 5: Transmission OFF 6: PAUSE Mode Transition 7: SLEEP Mode Transition
	nn88	PAUSE Mode	Set the output state for when the sensor's "Operation Mode" is set to pause mode.	INT	R/W	0: Always OFF● 1: Always ON 2: Keep Output
	nn89	Light Emission Power	Switches the emission power.	INT	R/W	1 to 100 (Default value: 100)
	nn8A to 8F	System reserved	-	-	-	-
	nn90	[Custom] Group4 Entry count	Number of entries in the Group 4 custom save area	UINT	R	9
	nn91	[Custom] Output Timer (Output1)	Custom save area for "Timer function (Output 1)"	INT	R/W	0: Timer Off● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer
	nn92	[Custom] Timer Value (Output1)	Custom save area for "Timer time (Output 1)"	INT	R/W	1 to 9999 (Default value: 10)
	nn93	System reserved	-	-	-	-
	nn94	[Custom] Detection Mode (Output1)	Custom save area for "Detection mode (Output 1)"	INT	R/W	0: Normal Detection Mode● 1: DATUM1 Mode 2: DATUM2 Mode 3: Area Detection Mode 4: Rising Edge Detection Mode 5: Falling Edge Detection Mode
	nn95	[Custom] DATUM Speed	Custom save area for "DATUM Speed"	INT	R/W	0: Level1 (Slow)● 1: Level2 (Normal) 2: Level3 (Fast)
	nn96	[Custom] DATUM Warning Level	Custom save area for "DATUM Warning Level"	INT	R/W	0 to 100 (Default value: 50)
	nn97	[Custom] Control Input	Custom save area for "Control Input"	INT	R/W	0: Not use● 1: External Calibration 2: Preset 3: Zero-shift 4: Reset 5: Transmission OFF 6: PAUSE Mode Transition 7: SLEEP Mode Transition
	nn98	[Custom] PAUSE Mode	Custom save area for "PAUSE Mode"	INT	R/W	0: Always OFF● 1: Always ON 2: Keep Output
	nn99	[Custom] Light Emission Power	Custom save area for "Light Emission Power"	INT	R/W	1 to 100 (Default value: 100)
	nn9A to nn9F	System reserved	-	-	-	-

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●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nnA0	Group5 Entry count	Indicates the number of entries in Group 5.	UINT	R	5
	nnA1	Output Timer (Output2)*3	Indicates the settings for the output 2 timer function.	INT	R/W	0: Timer Off● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer
	nnA2	Timer Value (Output2)*3	Indicates the output 2 timer function.	INT	R/W	1 to 9999 (Default value: 10)
	nnA3	System reserved	-	-	-	-
	nnA4	Detection Mode (Output2)	Indicates the output 2 detection mode.	INT	R/W	0: Normal Detection Mode● 1: Limit Setting Output 2: Warning Output
	nnA5	Limit Output Mode	Indicates the limit output resetting method.	INT	R/W	0: Manual● 1: Auto
	nnA6 to nnAF	System reserved	-	-	-	-
	nnB0	[Custom] Group5 Entry count	Number of entries in Group 5 custom save area	UINT	R	5
	nnB1	[Custom] Output Timer (Output2)*3	Custom area for "Output Timer (Output2)"	INT	R/W	0: Timer Off● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer
	nnB2	[Custom] Timer Value (Output2)*3	Custom area for "Timer Value (Output2)"	INT	R/W	1 to 9999 (Default value: 10)
	nnB3	System reserved	-	-	-	-
	nnB4	[Custom] Detection Mode (Output2)	Custom save area for "Detection Mode (Output2)"	INT	R/W	0: Normal Detection Mode● 1: Limit Setting Output 2: Warning Output
	nnB5	[Custom] Limit Output Mode	Custom save area for "Limit Output Mode"	INT	R/W	0: Manual● 1: Auto
	nnB6 to BF	System reserved	-	-	-	-
	nnC0	Group6 Entry count	Indicates the number of entries in Group 6.	UINT	R	6
	nnC1	Display Reverse	Displays the display reverse settings.	INT	R/W	0: Normal● 1: Reverse
	nnC2	Sub Display	Indicates the subscreen display.	INT	R/W	0: None● 1: Extension 2: Bar 3: Excess Gain (%) 4: Light Intensity HOLD 5: Excess Gain HOLD (%) 6: L-on/D-on 7: TAG Strings

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nnC3	Hold Display	Indicates the contents being held when Light Intensity HOLD is selected for "Sub Display".	INT	R/W	0: Normal● 1: Peak Max. / Peak Min. 2: Bottom Max. / Bottom Min. 3: Peak Min. / Bottom Max. 4: Peak Max. / Bottom Min.
	nnC4	Preset Saturation	Indicates whether to saturate the current received light amount value when using the preset or DATUM functions.	INT	R/W	0: Off 1: On●
	nnC5	Preset Saturation Level	Indicates the saturation level for preset.	INT	R/W	100 to 200 (Default value: 110)
	nnC6	Current Display	Indicates the current display screen.	INT	R/W	0: Normal● 1: Sub
	nnC7 to nnCF	System reserved	-	-	-	-
	nnD0	[Custom] Group6 Entry count	Indicates the number of entries in the Group 6 custom save area.	UINT	R	6
	nnD1	[Custom] Display Reverse	Custom save area for the "Display Reverse"	INT	R/W	0: Normal● 1: Reverse
	nnD2	[Custom] Sub Display	Custom save area for "Sub Display"	INT	R/W	0: None● 1: Extension 2: Bar 3: Excess Gain (%) 4: Light Intensity HOLD 5: Excess Gain HOLD (%) 6: L-on/D-on 7: TAG Strings
	nnD3	[Custom] Hold Display	Custom save area for "Hold Display"	INT	R/W	0: Normal● 1: Peak Max. / Peak Min. 2: Bottom Max. / Bottom Min. 3: Peak Min. / Bottom Max. 4: Peak Max. / Bottom Min.
	nnD4	[Custom] Preset Saturation	Custom save area for "Preset Saturation"	INT	R/W	0: Off 1: On●
	nnD5	[Custom] Preset Saturation Level	Custom save area for "Preset Saturation Level"	INT	R/W	100 to 200 (Default value: 110)
	nnD6	[Custom] Current Display	Custom save area for "Current Display"	INT	R/W	0: Normal● 1: Sub
	nnD7 to nnDF	System reserved	-	-	-	-

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nnE0	Group7 Entry count	Indicates the number of Group 7 entries.	UINT	R	10
	nnE1	Warning Disable	Indicates the warning function prohibit settings. If the bit is ON, the corresponding warning will not occur.	WORD	R/W	Bit0: Limit Detection (Default value: 0)
	nnE2	TAG Strings 1,0	Indicates 1st and 2nd characters.	WORD	R/W	(2-byte character string)*5 (Default value: "")
	nnE3	TAG Strings 3,2	Indicates 3rd and 4th characters.			
	nnE4	TAG Strings 5,4	Indicates 5th and 6th characters.			
	nnE5	TAG Strings 7,6	Indicates 7th and 8th characters.			
	nnE6	Power Save	Indicates the energy saving function's status.	INT	R/W	0: OFF● 1: ON 2: FULL 3: ALL
	nnE7	APC	Indicates the APC function's status.	INT	R/W	0: OFF● 1: ON
	nnE8	Display Gain	Indicates the working state of the light amount increase setting.	INT	R/W	0: Standard● 1: Full
	nnE9	Interference Prevention	Indicates whether to double the number of interference prevention units.	INT	R/W	0: Normal● 1: Double
	nnEA	Parameter Save by Ext-Input	Indicates whether to save the preset (zero shift) settings in the EEPROM when executing a preset (zero shift) with the external input.	INT	R/W	0: No 1: Yes●
	nnEB to nnEF	System reserved	-	-	-	-
	nnF0	[Custom] Group7 Entry count	Indicates the number of entries in the Group 7 custom save area.	UINT	R	10
	nnF1	[Custom] Warning Disable	Custom save area for "Warning Disable"	WORD	R/W	Bit0: Limit Detection (Default value: 0)
	nnF2	[Custom] TAG Strings 1,0	Custom save area for "TAG Strings 1,0"	WORD	R/W	(2-byte character string)*5 (Default value: "")
	nnF3	[Custom] TAG Strings 3,2	Custom save area for "TAG Strings 3,2"			
	nnF4	[Custom] TAG Strings 5,4	Custom save area for "TAG Strings 5,4"			
	nnF5	[Custom] TAG Strings 7,6	Custom save area for "TAG Strings 7,6"			
	nnF6	[Custom] Power Save	Custom save area for "Power Save"	INT	R/W	0: OFF● 1: ON 2: FULL 3: ALL
	nnF7	[Custom] APC	Custom save area for "APC"	INT	R/W	0: OFF● 1: ON
	nnF8	[Custom] Display Gain	Custom save area for "Display Gain"	INT	R/W	0: Standard● 1: Full
	nnF9	[Custom] Interference Prevention	Custom save area for "Interference Prevention"	INT	R/W	0: Normal● 1: Double

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●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nnFA	[Custom] Parameter Save by Ext-Input	Custom save area for "Parameter Save by Ext-Input"	INT	R/W	0: No 1: Yes●
	nnFB to nnFF	System reserved	-	-	-	-

*1 This cannot be set with the FS-N10 Series shipped on March 10, 2011 or before.

*2 The FS-N10 Series shipped on March 10, 2011 or before will have the range from 0 to 9999.

*3 2-output type only

*4 If the slide style DIP switch is set to MEGA/2 while locked, [5EL (Ich) Loc] will flash on the sensor amplifier.

*5 Refer to the ▢ "List of Character String Codes" (page 5-12) for the character strings which can be used with the NU-CL1.

> Reference
> - [Custom]*** is a parameter can save and read settings using the FS-N10 series "custom save" and "user reset function".
> - "Entry count" indicates the number of parameters in the same group.

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LV-N10 Series Parameters

📖 "Meaning of Each Item" (page 3-4)　　　nn: Sensor amplifier ID No. (00 to 10h)

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn00	Group0 Entry count	Indicates the number of entries in Group 0.	UINT	R	21
	nn01	Load Recipe Data	Reads the mode selected with "Load Recipe Data".		C	
	nn02	Custom Save	Writes the current settings into the custom save area.		C	
	nn03	Maximum Sensitivity Calibration	Executes maximum sensitivity calibration.		C	
	nn04	Percentage Calibration	Executes percentage calibration.		C	
	nn05	Two-point/Pos. Calibration: 1st	Designates the 1st point for 2-point calibration and positioning calibration.		C	
	nn06	Two-point Calibration: 2nd	Designates the 2nd point for 2-point calibration.		C	
	nn07	Positioning Calibration: 2nd	Designates the 2nd point for positioning calibration.		C	
	nn08	Full Auto Calibration: Start	Starts full-auto calibration.		C	
	nn09	Full Auto Calibration: Finish	Ends full-auto calibration.		C	
	nn0A	Zero-shift Request	Executes zero shift.		C	
	nn0B	Zero-shift Cancel	Cancels zero shift.		C	
	nn0C	Preset Request	Executes preset.		C	
	nn0D	Preset Cancel	Cancels preset.		C	
	nn0E	System reserved	-		-	
	nn0F	System reserved	-		-	
	nn10	Reset Hold Value	Resets the hold value such as the peak value and bottom value.		C	
	nn11	Work-Preset Request	Executes work preset.		C	
	nn12	Full Auto Preset: Start	Starts fully automatic (or maximum sensitivity) preset.		C	
	nn13	Full Auto Preset: Finish	Ends fully automatic (or maximum sensitivity) preset.		C	
	nn14	Maximum Sensitivity Preset: Request	Executes maximum sensitivity preset. (Preset can be executed without specifying the start and end.)		C	
	nn15	Reset Counter Value[1]	Resets the counter value.		C	
	nn16 to nn1F	System reserved	-	-	-	

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
	nn20	Group1 Entry count	Indicates the number of entries in Group 1.	UINT	R	22
	nn21	Error Information	Indicates an error information. When an error occurs, the corresponding bit is turned ON.	WORD	R	Bit0: Over Current Error Bit1: Sensor-Head Error Bit2: EEPROM Error Bit3: Reserve Bit4: Reserve Bit5: DATUM Correction Error Bit6: Reserve Bit7: Sensor Communication Error
	nn22	Warning Information	Indicates a warning information. When a warning occurs, the corresponding bit is turned ON.	WORD	R	Bit0: Limit Detection
	nn23	Warning Function	Indicates operating status of warning function. When the warning function is operating, the corresponding bit is turned ON.	WORD	R	Bit0: Limit Detection (Default value: 0)
	nn24	Output	Indicates output status of the sensor. When the output is ON, the corresponding bit is turned ON.	WORD	R	Bit0: Output1 Bit1: Output2[*1]
	nn25	Current Value	Indicates current value of received light intensity.	INT	R	0 to 9999
	nn26	System reserved	-	-	-	-
	nn27	System reserved	-	-	-	-
00	nn28	Raw Value	Indicates received light intensity before correction with Preset, DATUM, Zero-shift functions.	INT	R	0 to 65535
	nn29	Peak-Hold Value	Indicates peak value (or the max bottom value) of received light intensity (depending on the settings of Hold display).	INT	R	0 to 9999
	nn2A	Bottom-Hold Value	Indicates bottom value (or the min peak value) of received light intensity (depending on the settings of Hold display).	INT	R	0 to 9999
	nn2B	System reserved	-	-	-	-
	nn2C	Peak-Hold Minimum Value	Indicates min value among max values of received light intensity during the time period when the setting value of received light intensity is violated.	INT	R	0 to 9999
	nn2D	Preset/Datum Internal Setting Value	Indicates an internal setting value when executing preset/DATUM.	INT	R	0 to 65535
	nn2E	Display Customize	Indicates operating status of Readings Correction function.	INT	R	0: No Customize / DATUM● 1: Preset 2: Zero-shift 3: Work Preset 4: Work Preset (Reverse)
	nn2F	Slide Switch Status	Indicates status of the Slide Switch.	INT	R	0: Selecting 1ch 1: Selecting 2ch
	nn30	System reserved	-	-	-	-

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn31	Operation Mode	Indicates current operation mode of the sensor.	INT	R	0: RUN● 1: LED_OFF 2: SLEEP 3: PAUSE
	nn32	Operation Mode Setting	Set up the operation mode of the sensor.	INT	R/W	0: RUN● 1: LED_OFF 2: SLEEP 3: PAUSE
	nn33	Recipe Select	Select the Recipe to be read when executing operating command (recipe reading).	INT	R/W	0: Initialize● 1: Custom 2: Fall 3: Percentage Calibration 4: Zero-shift 5: MEGA 6: AREA 7: 0 DATUM
	nn34	Counter Value[*1]	Indicates the current counter value.	INT	R	0 to 9999 (Default value: 0)
	nn35 to nn3F	System reserved	-	-	-	-
	nn40	Group2 Entry count	Indicates the number of entries in Group 2.	UINT	R	14
	nn41	Setting Value (Output1 / Area Hi)	Indicates setting value of Output 1. The upper limit of setting value is displayed when the "Detection Mode" is Area.	INT	R/W	0 to 9999 (Default value: 50)
	nn42	Setting Value (Output2 / Counter Setting Value)[*1]	Indicates setting value of Output 2 or counter setting value.	INT	R/W	0 to 9999 (Default value: 50)
	nn43	System reserved	-	-	-	-
	nn44	Setting Value (Area Low)	Indicates lower limit of setting value in Area detection mode.	INT	R/W	0 to 9999 (Default value: 50)
	nn45	System reserved	-	-	-	-
	nn46	System reserved	-	-	-	-
	nn47	Limit Setting Value	Indicates setting value of warning output when the Limit Detection function is used.	INT	R/W	0 to 9999 (Default value: 0)
	nn48 to nn4F	System reserved	-	-	-	-
	nn50	[Custom] Group2 Entry count	Number of entries in the Group 2 custom save area.	UINT	R	14
	nn51	[Custom] Setting Value (Output1 / Area Hi)	Custom save area for "Setting Value (Output1 / Area Hi)"	INT	R/W	0 to 9999 (Default value: 50)
	nn52	[Custom] Setting Value (Output2 / Counter Setting Value)[*1]	Custom save area for "Setting Value (Output2 / Counter Setting Value)"	INT	R/W	0 to 9999 (Default value: 50)
	nn53	System reserved	-	-	-	-
	nn54	[Custom] Setting Value (Area Low)	Custom save area for "Setting Value (Area Low)"	INT	R/W	0 to 9999 (Default value: 50)
	nn55	System reserved	-	-	-	-
	nn56	System reserved	-	-	-	-

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn57	[Custom] Limit Setting Value	Custom save area for "Limit Setting Value"	INT	R/W	0 to 9999 (Default value: 0)
	nn58 to nn5F	System reserved	-	-	-	-
	nn60	Group3 Entry count	Indicates the number of entries in Group 3.	UINT	R	7
	nn61	Key Lock Status	Indicates status of Key lock.	INT	R/W	0: Unlock● 1: Key Lock 2: PIN Code Lock 3: Communication Lock
	nn62	PIN Code	Indicates password of Key lock.	INT	R/W	0 to 9999 (Default value: 0)
	nn63	Slide Switch Lock	Indicates lock status of Slide Switch. When being locked, the Slide Switch is disabled, with the value always being "1ch".*[2]	INT	R/W	0: Unlock● 1: Lock
	nn64	L-on/D-on (N.O./N.C.)	Indicates whether the output is received light ON (L-on) or interrupted ON (D-on). Indicates the output logic (NO/NC) when using the area detection mode. The corresponding bit turns ON in D-on or NC.	WORD	R/W	Bit0: Output1 Bit1: Output2*[1] (Default value: 0)
	nn65	Power Mode	Indicates Power mode.	INT	R/W	0: HIGH SPEED (Response Time 80μs) 1: FINE (Response Time 250μs) 2: TURBO (Response Time 500μs)● 3: SUPER (Response Time 1ms) 4: ULTRA (Response Time 4ms) 5: MEGA (Response Time 16ms)
	nn66	Sensitivity Setting	Indicates setting method of Sensitivity.	INT	R/W	0: Normal Sensitivity Setting● 1: Percentage Calibration 2: Zero-shift Calibration
	nn67	Percentage Calib. Target Value	Indicates target value of percentage calibration when the Sensitivity Setting is set to Percentage Calibration.	INT	R/W	-99 to 99 (Default value: -10)
	nn68 to nn6F	System reserved	-	-	-	-
	nn70	[Custom] Group3 Entry count	Number of entries in Group 3 custom save area	UINT	R	7
	nn71	[Custom] Key Lock Status	Custom save area for "Key Lock Status"	INT	R/W	0: Unlock● 1: Key Lock 2: PIN Code Lock 3: Communication Lock
	nn72	[Custom] PIN Code	Custom save area for "PIN Code"	INT	R/W	0 to 9999 (Default value: 0)

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn73	[Custom] Slide Switch Lock	Custom save area for "Slide Switch Lock"	INT	R/W	0: Unlock● 1: Lock
	nn74	[Custom] L-on/D-on (N.O./N.C.)	Custom save area for "L-on/D-on (N.O./N.C.)"	WORD	R/W	Bit0: Output1 Bit1: Output2[*1] (Default value: 0)
	nn75	[Custom] Power Mode	Custom save area for "Power Mode"	INT	R/W	0: HIGH SPEED (Response Time 80μs) 1: FINE (Response Time 250μs) 2: TURBO (Response Time 500μs)● 3: SUPER (Response Time 1ms) 4: ULTRA (Response Time 4ms) 5: MEGA (Response Time 16ms)
	nn76	[Custom] Sensitivity Setting	Custom save area for "Sensitivity Setting"	INT	R/W	0: Normal Sensitivity Setting● 1: Percentage Calibration 2: Zero-shift Calibration
	nn77	[Custom] Percentage Calib. Target Value	Custom save area for "Percentage Calib. Target Value"	INT	R/W	-99 to 99 (Default value: -10)
	nn78 to nn7F	System reserved	-	-	-	-
	nn80	Group4 Entry count	Indicates the number of entries in Group 4.	UINT	R	9
	nn81	Output Timer (Output1)	Indicates settings of Output 1 timer.	INT	R/W	0: Timer Off● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer
	nn82	Timer Value (Output1)	Indicates time of Output 1 timer (unit: ms).	INT	R/W	1 to 9999 (Default value: 10)
	nn83	System reserved	-	-	-	-
	nn84	Detection Mode (Output1)	Indicates detection mode of Output 1.	INT	R/W	0: Normal Detection Mode● 1: DATUM1 Mode 2: DATUM2 Mode 3: Area Detection Mode 4: Rising Edge Detection Mode 5: Falling Edge Detection Mode
	nn85	DATUM Speed	Indicates correction speed of DATUM.	INT	R/W	0: Level1 (Slow)● 1: Level2 (Normal) 2: Level3 (Fast)
	nn86	DATUM Warning Level	Indicates alarm output level of DATUM.	INT	R/W	0 to 100 (Default value: 50)

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn87	External Input	Indicates settings of external input.	INT	R/W	0: Not use● 1: External Calibration 2: Preset 3: Zero-shift 4: Reset 5: Transmission OFF 6: PAUSE Mode Transition 7: SLEEP Mode Transition
	nn88	PAUSE Mode	Set up the output status of the sensor in PAUSE mode.	INT	R/W	0: Always OFF● 1: Always ON 2: Keep Output
	nn89 to nn8F	System reserved	-	-	-	-
	nn90	[Custom] Group4 Entry count	Number of entries in the Group 4 custom save area	UINT	R	9
	nn91	[Custom] Output Timer (Output1)	Custom save area for "Output Timer (Output1)"	INT	R/W	0: Timer Off● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer
	nn92	[Custom] Timer Value (Output1)	Custom save area for "Timer Value (Output1)"	INT	R/W	1 to 9999 (Default value: 10)
	nn93	System reserved	-	-	-	-
	nn94	[Custom] Detection Mode (Output1)	Custom save area for "Detection Mode (Output1)"	INT	R/W	0: Normal Detection Mode● 1: DATUM1 Mode 2: DATUM2 Mode 3: Area Detection Mode 4: Rising Edge Detection Mode 5: Falling Edge Detection Mode
	nn95	[Custom] DATUM Speed	Custom save area for "DATUM Speed"	INT	R/W	0: Level1 (Slow)● 1: Level2 (Normal) 2: Level3 (Fast)
	nn96	[Custom] DATUM Warning Level	Custom save area for "DATUM Warning Level"	INT	R/W	0 to 100 (Default value: 50)
	nn97	[Custom] Control Input	Custom save area for "Control Input"	INT	R/W	0: Not use● 1: External Calibration 2: Preset 3: Zero-shift 4: Reset 5: Transmission OFF 6: PAUSE Mode Transition 7: SLEEP Mode Transition
	nn98	[Custom] PAUSE Mode	Custom save area for "PAUSE Mode"	INT	R/W	0: Always OFF● 1: Always ON 2: Keep Output
	nn99 to nn9F	System reserved	-	-	-	-
	nnA0	Group5 Entry count	Indicates the number of entries in Group 5.	UINT	R	6
	nnA1	Output Timer (Output2)[*1]	Indicates settings of Output 2 timer.	INT	R/W	0: Timer Off● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer

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●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nnA2	Timer Value (Output2)[*1]	Indicates time of Output 2 timer (unit: ms).	INT	R/W	1 to 9999 (Default value: 10)
	nnA3	System reserved	-	-	-	-
	nnA4	Detection Mode (Output2)[*1]	Indicates detection mode of Output 2.	INT	R/W	0: Normal Detection Mode● 1: Limit Setting Output 2: Warning Output 3: Counter Output
	nnA5	Limit Output Mode	Indicates reset method of limit output.	INT	R/W	0: Manual● 1: Auto
	nnA6	Counter Type[*1]	Indicates settings of counter type.	INT	R/W	0: oVr1● 1: oVr2 2: Auto
	nnA7 to nnAF	System reserved	-	-	-	-
	nnB0	[Custom] Group5 Entry count	Number of entries in Group 5 custom save area	UINT	R	6
	nnB1	[Custom] Output Timer (Output2)[*1]	Custom area for "Output Timer (Output2)"	INT	R/W	0: Timer Off● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer
	nnB2	[Custom] Timer Value (Output2)[*1]	Custom area for "Timer Value (Output2)"	INT	R/W	1 to 9999 (Default value: 10)
	nnB3	System reserved	-	-	-	-
	nnB4	[Custom] Detection Mode (Output2)[*1]	Custom save area for "Detection Mode (Output2)"	INT	R/W	0: Normal Detection Mode● 1: Limit Setting Output 2: Warning Output 3: Counter Output
	nnB5	[Custom] Limit Output Mode	Custom save area for "Limit Output Mode"	INT	R/W	0: Manual● 1: Auto
	nnB6	[Custom] Counter Type[*1]	Custom area for "Counter Type"	INT	R/W	0: oVr1● 1: oVr2 2: Auto
	nnB7 to nnBF	System reserved	-	-	-	-
	nnC0	Group6 Entry count	Indicates the number of entries in Group 6.	UINT	R	7
	nnC1	Display Reverse	Indicates settings of display reverse.	INT	R/W	0: Normal● 1: Reverse
	nnC2	Sub Display	Indicates details of the sub display.	INT	R/W	0: None● 1: Extension 2: Bar 3: Excess Gain (%) 4: Light Intensity HOLD 5: Excess Gain HOLD (%) 6: L-on/D-on 7: TAG Strings

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nnC3	Hold Display	Indicates hold details when received light intensity hold display is selected in the Sub display.	INT	R/W	0: Normal● 1: Peak Max. / Peak Min. 2: Bottom Max. / Bottom Min. 3: Peak Min. / Bottom Max. 4: Peak Max. / Bottom Min.
	nnC4	Preset Saturation	Indicates that whether the current value of received light intensity is saturated when Preset or DATUM function is used.	INT	R/W	0: Off 1: On●
	nnC5	Preset Saturation Level	Indicates saturation level of Preset.	INT	R/W	100 to 200 (Default value: 110)
	nnC6	Current Display	Indicates current display.	INT	R/W	0: Normal● 1: Sub
	nnC7	Preset Display	Indicates settings of Preset Display.	INT	R/W	0: Preset● 1: Area
	nnC8 to nnCF	System reserved	-	INT	R/W	-
	nnD0	[Custom] Group6 Entry count	Number of entries in the Group 6 custom save area	UINT	R	7
	nnD1	[Custom] Display Reverse	Custom save area for the "Display Reverse"	INT	R/W	0: Normal● 1: Reverse
	nnD2	[Custom] Sub Display	Custom save area for "Sub Display"	INT	R/W	0: None● 1: Extension 2: Bar 3: Excess Gain (%) 4: Light Intensity HOLD 5: Excess Gain HOLD (%) 6: L-on/D-on 7: TAG Strings
	nnD3	[Custom] Hold Display	Custom save area for "Hold Display"	INT	R/W	0: Normal● 1: Peak Max. / Peak Min. 2: Bottom Max. / Bottom Min. 3: Peak Min. / Bottom Max. 4: Peak Max. / Bottom Min.
	nnD4	[Custom] Preset Saturation	Custom save area for "Preset Saturation"	INT	R/W	0: Off 1: On
	nnD5	[Custom] Preset Saturation Level	Custom save area for "Preset Saturation Level"	INT	R/W	100 to 200 (Default value: 110)
	nnD6	[Custom] Current Display	Custom save area for "Current Display"	INT	R/W	0: Normal● 1: Sub
	nnD7	[Custom] Preset Display	Custom save area for "Preset Display"	INT	R/W	0: Preset● 1: Area
	nnD8 to nnDF	System reserved	-	-	-	-

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nnE0	Group7 Entry count	Indicates the number of Group 7 entries.	UINT	R	11
	nnE1	Warning Disable	Indicates settings of disabling warning function. When the bit is ON, the corresponding warning not occur.	WORD	R/W	Bit0: Limit Detection (Default value: 0)
	nnE2	TAG Strings 1,0	Indicates TAG character string.	WORD	R/W	(2-byte character string)[*3] (Default value: "")
	nnE3	TAG Strings 3,2				
	nnE4	TAG Strings 5,4				
	nnE5	TAG Strings 7,6				
	nnE6	Power Save	Indicates operating status of power save function.	INT	R/W	0: OFF● 1: ON 2: FULL 3: ALL
	nnE7	System reserved	-	-	-	-
	nnE8	Display Gain	Indicates display gain setting.	INT	R/W	0: Standard● 1: Full
	nnE9	Interference Prevention	Indicates that whether number of interference prevention devices is doubled.	INT	R/W	0: Normal● 1: Double
	nnEA	Parameter Save by Ext-Input	Indicates that whether the Preset/Zero-shift settings are stored in EEPROM when executing Preset/Zero-shift with external input.	INT	R/W	0: No 1: Yes●
	nnEB	Sensitivity	Set up the Sensitivity.	INT	R/W	0: Standard● 1: Hi Resolution
	nnEC to nnEF	System reserved	-	-	-	-
	nnF0	[Custom] Group7 Entry count	Number of entries in the Group 7 custom save area	UINT	R	11
	nnF1	[Custom] Warning Disable	Custom save area for "Warning Disable"	WORD	R/W	Bit0: Limit Detection (Default value: 0)
	nnF2	[Custom] TAG Strings 1,0	Custom save area for "TAG Strings 1,0"	WORD	R/W	(2-byte character string)[*3] (Default value: "")
	nnF3	[Custom] TAG Strings 3,2	Custom save area for "TAG Strings 3,2"			
	nnF4	[Custom] TAG Strings 5,4	Custom save area for "TAG Strings 5,4"			
	nnF5	[Custom] TAG Strings 7,6	Custom save area for "TAG Strings 7,6"			
	nnF6	[Custom] Power Save	Custom save area for "Power Save"	INT	R/W	0: OFF● 1: ON 2: FULL 3: ALL
	nnF7	System reserved	-	-	-	-
	nnF8	[Custom] Display Gain	Custom save area for "Display Gain"	INT	R/W	0: Standard● 1: Full

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nnF9	[Custom] Interference Prevention	Custom save area for "Interference Prevention"	INT	R/W	0: Normal● 1: Double
	nnFA	[Custom] Parameter Save by Ext-Input	Custom save area for "Parameter Save by Ext-Input"	INT	R/W	0: No 1: Yes●
	nnFB	[Custom] Sensitivity	Custom save area for "Sensitivity"	INT	R/W	0: Standard● 1: Hi Resolution
	nnFC to nnFF	System reserved	-	-	-	-

*1 2-output type only

*2 If the slide style DIP switch is set to MEGA/2 while locked, [𝖲𝖤𝖫 (𝖨𝖼𝗁) 𝖫𝗈𝖼] will flash on the sensor amplifier.

*3 Refer to the 📖 "List of Character String Codes" (page 5-12) for the character strings which can be used with the NU-CL1.

Reference
- [Custom]*** is a parameter can save and read settings using the LV-N10 series "custom save" and "user reset function".
- "Entry count" indicates the number of parameters in the same group.

3

Executing Communication

PS-N10 Series Parameters

📖 "Meaning of Each Item" (page 3-4)   nn: Sensor amplifier ID No. (00 to 10h)

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
	nn00	Group0 Entry count	Indicates the number of entries in Group 0.	UINT	R	21
	nn01	Load Recipe Data	Reads the mode selected with "Load Recipe Data".		C	
	nn02	Custom Save	Writes the current settings into the custom save area.		C	
	nn03	Maximum Sensitivity Calibration	Executes maximum sensitivity calibration.		C	
	nn04	Percentage Calibration	Executes percentage calibration.		C	
	nn05	Two-point/Pos. Calibration: 1st	Designates the 1st point for 2-point calibration and positioning calibration.		C	
	nn06	Two-point Calibration: 2nd	Designates the 2nd point for 2-point calibration.		C	
	nn07	Positioning Calibration: 2nd	Designates the 2nd point for positioning calibration.		C	
	nn08	Full Auto Calibration: Start	Starts full-auto calibration.		C	
	nn09	Full Auto Calibration: Finish	Ends full-auto calibration.		C	
00	nn0A	Zero-shift Request	Executes zero shift.		C	
	nn0B	Zero-shift Cancel	Cancels zero shift.		C	
	nn0C	Preset Request	Executes preset.		C	
	nn0D	Preset Cancel	Cancels preset.		C	
	nn0E	System reserved	-		-	
	nn0F	System reserved	-		-	
	nn10	Reset Hold Value	Resets the hold value such as the peak value and bottom value.		C	
	nn11	Work-Preset Request	Executes work preset.		C	
	nn12	Full Auto Preset: Start	Starts fully automatic (or maximum sensitivity) preset.		C	
	nn13	Full Auto Preset: Finish	Ends fully automatic (or maximum sensitivity) preset.		C	
	nn14	Maximum Sensitivity Preset: Request	Executes maximum sensitivity preset. (Preset can be executed without specifying the start and end.)		C	
	nn15 to nn1F	System reserved	-	-	-	

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn20	Group1 Entry count	Indicates the number of entries in Group 1.	UINT	R	22
	nn21	Error Information	Indicates an error information. When an error occurs, the corresponding bit is turned ON.	WORD	R	Bit0: Over Current Error Bit1: Sensor-Head Error Bit2: EEPROM Error Bit3: Reserve Bit4: Reserve Bit5: DATUM Correction Error Bit6: Reserve Bit7: Sensor Communication Error
	nn22	Warning Information	Indicates a warning information. When a warning occurs, the corresponding bit is turned ON.	WORD	R	Bit0: Limit Detection
	nn23	Warning Function	Indicates operating status of warning function. When the warning function is operating, the corresponding bit is turned ON.	WORD	R	Bit0: Limit Detection (Default value: 0)
	nn24	Output	Indicates output status of the sensor. When the output is ON, the corresponding bit is turned ON.	WORD	R	Bit0: Output
	nn25	Current Value	Indicates current value of received light intensity.	INT	R	0 to 9999
	nn26	System reserved	-	-	-	-
	nn27	System reserved	-	-	-	-
	nn28	Raw Value	Indicates received light intensity before correction with Preset, DATUM, Zero-shift functions.	INT	R	0 to 65535
	nn29	Peak-Hold Value	Indicates peak value (or the max bottom value) of received light intensity (depending on the settings of Hold display).	INT	R	0 to 9999
	nn2A	Bottom-Hold Value	Indicates bottom value (or the min peak value) of received light intensity (depending on the settings of Hold display).	INT	R	0 to 9999
	nn2B	System reserved	-	-	-	-
	nn2C	Peak-Hold Minimum Value	Indicates min value among max values of received light intensity during the time period when the setting value of received light intensity is violated.	INT	R	0 to 9999
	nn2D	Preset/Datum Internal Setting Value	Indicates an internal setting value when executing preset/DATUM.	INT	R	0 to 65535
	nn2E	Display Customize	Indicates operating status of Readings Correction function.	INT	R	0: No Customize / DATUM● 1: Preset 2: Zero-shift 3: Work Preset 4: Work Preset (Reverse)
	nn2F	Slide Switch Status	Indicates status of the Slide Switch.	INT	R	0: Selecting ch 1: Selecting ch
	nn30	System reserved	-	-	-	-

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn31	Operation Mode	Indicates current operation mode of the sensor.	INT	R	0: RUN● 1: LED_OFF 2: SLEEP 3: PAUSE
	nn32	Operation Mode Setting	Set up the operation mode of the sensor.	INT	R/W	0: RUN● 1: LED_OFF 2: SLEEP 3: PAUSE
	nn33	Recipe Select	Select the Recipe to be read when executing operating command (recipe reading).	INT	R/W	0: Initialize● 1: Custom 2: Fall 3: Percentage Calibration 4: Zero-shift 5: MEGA 6: AREA 7: 0 DATUM
	nn34 to nn3F	System reserved	-	-	-	-
	nn40	Group2 Entry count	Indicates the number of entries in Group 2.	UINT	R	14
	nn41	Setting Value (Output / Area Hi)	Indicates setting value of Output. The upper limit of setting value is displayed when the "Detection Mode" is Area.	INT	R/W	0 to 9999 (Default value: 50)
	nn42	System reserved	-	-	-	-
	nn43	System reserved	-	-	-	-
	nn44	Setting Value (Area Low)	Indicates lower limit of setting value in Area detection mode.	INT	R/W	0 to 9999 (Default value: 50)
	nn45	System reserved	-	-	-	-
	nn46	System reserved	-	-	-	-
	nn47	Limit Setting Value	Indicates setting value of warning output when the Limit Detection function is used.	INT	R/W	0 to 9999 (Default value: 0)
	nn48 to nn4F	System reserved	-	-	-	-
	nn50	[Custom] Group2 Entry count	Number of entries in the Group 2 custom save area.	UINT	R	14
	nn51	[Custom] Setting Value (Output / Area Hi)	Custom save area for "Setting Value (Output / Area Hi)"	INT	R/W	0 to 9999 (Default value: 50)
	nn52	System reserved	-	-	-	-
	nn53	System reserved	-	-	-	-
	nn54	[Custom] Setting Value (Area Low)	Custom save area for "Setting Value (Area Low)"	INT	R/W	0 to 9999 (Default value: 50)
	nn55	System reserved	-	-	-	-
	nn56	System reserved	-	-	-	-

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn57	[Custom] Limit Setting Value	Custom save area for "Limit Setting Value"	INT	R/W	0 to 9999 (Default value: 0)
	nn58 to nn5F	System reserved	-	-	-	-
	nn60	Group3 Entry count	Indicates the number of entries in Group 3.	UINT	R	7
	nn61	Key Lock Status	Indicates status of Key lock.	INT	R/W	0: Unlock● 1: Key Lock 2: PIN Code Lock 3: Communication Lock
	nn62	PIN Code	Indicates password of Key lock.	INT	R/W	0 to 9999 (Default value: 0)
	nn63	Slide Switch Lock	Indicates lock status of Slide Switch. When being locked, the Slide Switch is disabled, with the value always being "1ch".*[1]	INT	R/W	0: Unlock● 1: Lock
	nn64	L-on/D-on (N.O./N.C.)	Indicates whether the output is received light ON (L-on) or interrupted ON (D-on). Indicates the output logic (NO/NC) when using the area detection mode. The corresponding bit turns ON in D-on or NC.	WORD	R/W	Bit0: Output (Default value: 0)
	nn65	Power Mode	Indicates Power mode.	INT	R/W	2: TURBO (Response Time 500μs)● 3: SUPER (Response Time 1ms) 4: ULTRA (Response Time 4ms) 5: MEGA (Response Time 16ms)
	nn66	Sensitivity Setting	Indicates setting method of Sensitivity.	INT	R/W	0: Normal Sensitivity Setting● 1: Percentage Calibration 2: Zero-shift Calibration
	nn67	Percentage Calib. Target Value	Indicates target value of percentage calibration when the Sensitivity Setting is set to Percentage Calibration.	INT	R/W	-99 to 99 (Default value: -10)
	nn68 to nn6F	System reserved	-	-	-	-
	nn70	[Custom] Group3 Entry count	Number of entries in the Group 3 custom save area	UINT	R	7
	nn71	[Custom] Key Lock Status	Custom save area for "Key Lock Status"	INT	R/W	0: Unlock● 1: Key Lock 2: PIN Code Lock 3: Communication Lock
	nn72	[Custom] PIN Code	Custom save area for "PIN Code"	INT	R/W	0 to 9999 (Default value: 0)

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn73	[Custom] Slide Switch Lock	Custom save area for "Slide Switch Lock"	INT	R/W	0: Unlock● 1: Lock
	nn74	[Custom] L-on/D-on (N.O./N.C.)	Custom save area for "L-on/D-on (N.O./N.C.)"	WORD	R/W	Bit0: Output (Default value: 0)
	nn75	[Custom] Power Mode	Custom save area for "Power Mode"	INT	R/W	2: TURBO (Response Time 500μs)● 3: SUPER (Response Time 1ms) 4: ULTRA (Response Time 4ms) 5: MEGA (Response Time 16ms)
	nn76	[Custom] Sensitivity Setting	Custom save area for "Sensitivity Setting"	INT	R/W	0: Normal Sensitivity Setting● 1: Percentage Calibration 2: Zero-shift Calibration
	nn77	[Custom] Percentage Calib. Target Value	Custom save area for "Percentage Calib. Target Value"	INT	R/W	-99 to 99 (Default value: -10)
	nn78 to nn7F	System reserved	-	-	-	-
	nn80	Group4 Entry count	Indicates the number of entries in Group 4.	UINT	R	9
	nn81	Output Timer	Indicates settings of Output timer.	INT	R/W	0: Timer Off● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer
	nn82	Timer Value	Indicates time of Output timer (unit: ms).	INT	R/W	1 to 9999 (Default value: 10)
	nn83	System reserved	-	-	-	-
	nn84	Detection Mode	Indicates detection mode of Output.	INT	R/W	0: Normal Detection Mode● 1: DATUM1 Mode 2: DATUM2 Mode 3: Area Detection Mode 4: Rising Edge Detection Mode 5: Falling Edge Detection Mode
	nn85	DATUM Speed	Indicates correction speed of DATUM.	INT	R/W	0: Level1 (Slow)● 1: Level2 (Normal) 2: Level3 (Fast)
	nn86	DATUM Warning Level	Indicates alarm output level of DATUM.	INT	R/W	0 to 100 (Default value: 50)
	nn87	External Input	Indicates settings of external input.	INT	R/W	0: Not use● 1: External Calibration 2: Preset 3: Zero-shift 4: Reset 5: Transmission OFF 6: PAUSE Mode Transition 7: SLEEP Mode Transition
	nn88	PAUSE Mode	Set up the output status of the sensor in PAUSE mode.	INT	R/W	0: Always OFF● 1: Always ON 2: Keep Output
	nn89 to nn8F	System reserved	-	-	-	-

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nn90	[Custom] Group4 Entry count	Number of entries in the Group 4 custom save area	UINT	R	9
	nn91	[Custom] Output Timer	Custom save area for "Output Timer"	INT	R/W	0: Timer Off● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer
	nn92	[Custom] Timer Value	Custom save area for "Timer Value"	INT	R/W	1 to 9999 (Default value: 10)
	nn93	System reserved	-	-	-	-
	nn94	[Custom] Detection Mode	Custom save area for "Detection Mode"	INT	R/W	0: Normal Detection Mode● 1: DATUM1 Mode 2: DATUM2 Mode 3: Area Detection Mode 4: Rising Edge Detection Mode 5: Falling Edge Detection Mode
	nn95	[Custom] DATUM Speed	Custom save area for "DATUM Speed"	INT	R/W	0: Level1 (Slow)● 1: Level2 (Normal) 2: Level3 (Fast)
	nn96	[Custom] DATUM Warning Level	Custom save area for "DATUM Warning Level"	INT	R/W	0 to 100 (Default value: 50)
	nn97	[Custom] Control Input	Custom save area for "Control Input"	INT	R/W	0: Not use● 1: External Calibration 2: Preset 3: Zero-shift 4: Reset 5: Transmission OFF 6: PAUSE Mode Transition 7: SLEEP Mode Transition
	nn98	[Custom] PAUSE Mode	Custom save area for "PAUSE Mode"	INT	R/W	0: Always OFF● 1: Always ON 2: Keep Output
	nn99 to nn9F	System reserved	-	-	-	-
	nnA0	Group5 Entry count	Indicates the number of entries in Group 5.	UINT	R	6
	nnA1 to nnA4	System reserved	-	-	-	-
	nnA5	Limit Output Mode	Indicates reset method of limit output.	INT	R/W	0: Manual● 1: Auto
	nnA6 to nnAF	System reserved	-	-	-	-
	nnB0	[Custom] Group5 Entry count	Number of entries in Group 5 custom save area	UINT	R	6
	nnB1 to nnB4	System reserved	-	-	-	-

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
	nnB5	[Custom] Limit Output Mode	Custom save area for "Limit Output Mode"	INT	R/W	0: Manual● 1: Auto
	nnB6 to nnBF	System reserved	-	-	-	-
	nnC0	Group6 Entry count	Indicates the number of entries in Group 6.	UINT	R	6
	nnC1	Display Reverse	Indicates settings of display reverse.	INT	R/W	0: Normal● 1: Reverse
	nnC2	Sub Display	Indicates details of the sub display.	INT	R/W	0: None● 1: Extension 2: Bar 3: Excess Gain (%) 4: Light Intensity HOLD 5: Excess Gain HOLD (%) 6: L-on/D-on 7: TAG Strings
	nnC3	Hold Display	Indicates hold details when received light intensity hold display is selected in the Sub display.	INT	R/W	0: Normal● 1: Peak Max. / Peak Min. 2: Bottom Max. / Bottom Min. 3: Peak Min. / Bottom Max. 4: Peak Max. / Bottom Min.
	nnC4	Preset Saturation	Indicates that whether the current value of received light intensity is saturated when Preset or DATUM function is used.	INT	R/W	0: Off 1: On●
	nnC5	Preset Saturation Level	Indicates saturation level of Preset.	INT	R/W	100 to 200 (Default value: 110)
	nnC6	Current Display	Indicates current display.	INT	R/W	0: Normal● 1: Sub
	nnC7 to nnCF	System reserved	-	INT	R/W	-
	nnD0	[Custom] Group6 Entry count	Number of entries in the Group 6 custom save area	UINT	R	6
	nnD1	[Custom] Display Reverse	Custom save area for the "Display Reverse"	INT	R/W	0: Normal● 1: Reverse
	nnD2	[Custom] Sub Display	Custom save area for "Sub Display"	INT	R/W	0: None● 1: Extension 2: Bar 3: Excess Gain (%) 4: Light Intensity HOLD 5: Excess Gain HOLD (%) 6: L-on/D-on 7: TAG Strings

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nnD3	[Custom] Hold Display	Custom save area for "Hold Display"	INT	R/W	0: Normal● 1: Peak Max. / Peak Min. 2: Bottom Max. / Bottom Min. 3: Peak Min. / Bottom Max. 4: Peak Max. / Bottom Min.
	nnD4	[Custom] Preset Saturation	Custom save area for "Preset Saturation"	INT	R/W	0: Off 1: On
	nnD5	[Custom] Preset Saturation Level	Custom save area for "Preset Saturation Level"	INT	R/W	100 to 200 (Default value: 110)
	nnD6	[Custom] Current Display	Custom save area for "Current Display"	INT	R/W	0: Normal● 1: Sub
	nnD7 to nnDF	System reserved	-	-	-	-
	nnE0	Group7 Entry count	Indicates the number of Group 7 entries.	UINT	R	13
	nnE1	Warning Disable	Indicates settings of disabling warning function. When the bit is ON, the corresponding warning not occur.	WORD	R/W	Bit0: Limit Detection (Default value: 0)
	nnE2	TAG Strings 1,0	Indicates TAG character string.	WORD	R/W	(2-byte character string)[*2] (Default value: "")
	nnE3	TAG Strings 3,2				
	nnE4	TAG Strings 5,4				
	nnE5	TAG Strings 7,6				
	nnE6	Power Save	Indicates operating status of power save function.	INT	R/W	0: OFF● 1: ON 2: FULL 3: ALL
	nnE7	System reserved	-	-	-	-
	nnE8	Display Gain	Indicates display gain setting.	INT	R/W	0: Standard● 1: Full
	nnE9	Interference Prevention	Indicates that whether number of interference prevention devices is doubled.	INT	R/W	0: Normal● 1: Double
	nnEA	Parameter Save by Ext-Input	Indicates that whether the Preset/Zero-shift settings are stored in EEPROM when executing Preset/Zero-shift with external input.	INT	R/W	0: No 1: Yes●
	nnEB	System reserved	-	-	-	-
	nnEC	Long Distance Mode	Set up the Long Distance Mode.	INT	R/W	0: OFF● 1: ON
	nnED to nnEF	System reserved	-	-	-	-
	nnF0	[Custom] Group7 Entry count	Number of entries in the Group 7 custom save area	UINT	R	13

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Executing Communication

●: Default value

Data category (HEX)	Data No. (HEX)	Name	Description	Data type	Attribute	Value
00	nnF1	[Custom] Warning Disable	Custom save area for "Warning Disable"	WORD	R/W	Bit0: Limit Detection (Default value: 0)
	nnF2	[Custom] TAG Strings 1,0	Custom save area for "TAG Strings 1,0"	WORD	R/W	(2-byte character string)[*2] (Default value: "")
	nnF3	[Custom] TAG Strings 3,2	Custom save area for "TAG Strings 3,2"			
	nnF4	[Custom] TAG Strings 5,4	Custom save area for "TAG Strings 5,4"			
	nnF5	[Custom] TAG Strings 7,6	Custom save area for "TAG Strings 7,6"			
	nnF6	[Custom] Power Save	Custom save area for "Power Save"	INT	R/W	0: OFF● 1: ON 2: FULL 3: ALL
	nnF7	System reserved	-	-	-	-
	nnF8	[Custom] Display Gain	Custom save area for "Display Gain"	INT	R/W	0: Standard● 1: Full
	nnF9	[Custom] Interference Prevention	Custom save area for "Interference Prevention"	INT	R/W	0: Normal● 1: Double
	nnFA	[Custom] Parameter Save by Ext-Input	Custom save area for "Parameter Save by Ext-Input"	INT	R/W	0: No 1: Yes●
	nnFB	System reserved	-	-	-	-
	nnFC	[Custom] Long Distance Mode	Custom save area for "Long Distance Mode"	INT	R/W	0: OFF● 1: ON
	nnFD to nnFF	System reserved	-	-	-	-

*1 If the style DIP switch is set to MEGA while locked, [*SEL Loc*] will flash on the sensor amplifier.

*2 Refer to the 📖 "List of Character String Codes" (page 5-12) for the character strings which can be used with the NU-CL1.

| Reference | • [Custom]*** is a parameter can save and read settings using the PS-N10 series "custom save" and "user reset function".
• "Entry count" indicates the number of parameters in the same group.

Specifications

4

This chapter describes the specifications and dimensions of the NU-CL1.

4-1 **Specifications**

Product name		CC-Link compatible network unit
Model		NU-CL1
Communication method		CC-Link compliant
CC-Link specifications	Compatible versions	Ver.2.00/Ver.1.10 (selectable)
	Number of occupied stations	Ver.2.00: 3 stations; Ver.1.10: 1/2/3/4 stations (selectable)
	Type of station	Remote device station
	Transmission rate	156 kbps/625 kbps/2.5 Mbps/5 Mbps/10 Mbps
	Setting of station numbers	1 to 64
Sensor connection specifications	Connectable sensors	Sensor amplifiers with N-bus support[1]
	Number of connectable sensor units	16 units max.[2]
	Power supply	Power is supplied from the NU-CL1 via wiring-saved connector.
	Allowable passing current	Overall 1200 mA or less[3]
Indicator lamps		Power indicator: Green LED Communication indicator (L_RUN): Green LED Communication error indicator (L_ERR): Red LED Sensor communication indicator: 2-color (green/red) LED
Power voltage		24 VDC ± 10%; ripple (p-p) 10% or less
Power consumption		1400 mW or less (55 mA max. at 24 V)[4]
Environmental resistance	Operating ambient temperature	0 to +55°C (no freezing)
	Operating ambient humidity	35 to 85% RH (no condensation)
	Vibration resistance	10 to 55 Hz, compound amplitude 1.5 mm, 2 hours each in X, Y, Z directions
	Pollution degree	2
Materials		Main unit case and dust cover: Polycarbonate CC-Link connector and power supply connector: Polyamide (plug), PBT (socket)
Weight (including connectors)		Approx. 80g

*1 "N-bus" is the name of KEYENCE's wiring-saving system for sensor amplifiers.

*2 Depends on the sensor amplifiers connected.

*3 Indicates the current that can be supplied to the NU-CL1 or to the sensor amplifier units linked to the NU-CL1.

*4 Exclusive of the current supplied to the sensor amplifiers connected.

4

Specifications

4-2 Data Processing Times

This section describes the length of time taken from detection by a sensor(s) to data processing by PLC.
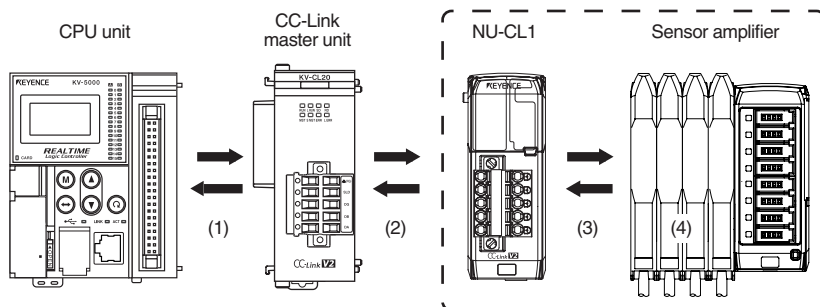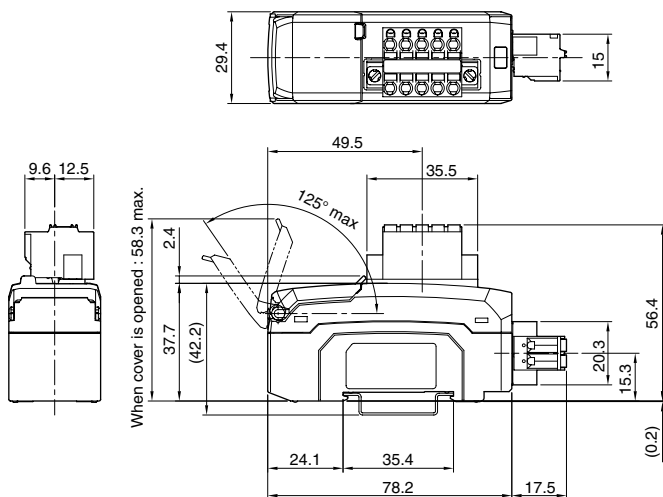

Maximum data processing time = (1) + (2) + (3) + (4)
(1) Scan time of PLC
(2) Scan time of network
(3) Data communication time of NU-CL1
(4) Response time of sensor

(3) Data communication time of NU-CL1

Number of sensor amplifier units connected	Output	Current Value
1		4.5 ms
4	1 ms	6 ms
8		8 ms
16		10 ms

For information on (1), (2), and (4), refer to the manual of each unit.

4

Specifications

Dimensions

(Unit: mm)

When cover is opened : 58.3 max.

125° max

Appendix

5

5-1 **Troubleshooting**

If proper communication is not possible with the NU-CL1, refer to this section and troubleshoot the cause.

LED Indicator Specifications

The cause and remedies of the error can be confirmed by checking the NU-CL1 indicators.

LED display during normal operation


```
PWR ──── Power indicator (green)
L RUN ──── Communication indicator (green)
L ERR ──── Communication error indicator (not lit)
(N-bus) ──── Sensor communication indicator (green)
```
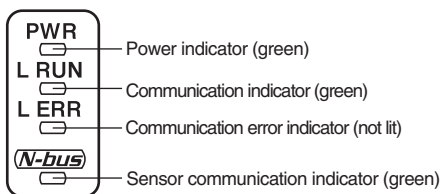
■ **Power indicator (PWR)**
This lamp indicates whether power is supplied to the NU-CL1.

LED status	Condition	Corrective action
Lighting in green	Power is supplied to the NU-CL1.	-
Not lit	Power is not supplied to the NU-CL1.	Check that the power cable is correctly attached to the power supply connector. ▢ "Connecting the Power Supply" (page 2-9)

■ **Communication indicator (L RUN)**
This lamp indicates whether the NU-CL1 is connected to the CC-Link system.

LED status	Condition	Corrective action
Lighting in green	Communicating correctly.	-
Not lit	Disconnected from the CC-Link system.	・ Check that the CC-Link cable is correctly connected. (The error is automatically recovered after the cause is removed.) 📖 "Connecting to the CC-Link System" (page 2-6) ・ Check that the data link is correctly configured, and then turn off the power to the NU-CL1 and back on. 📖 "Configuring for Communication" (page 2-11)

■ **Communication error indicator (L ERR)**
This lamp lights when the NU-CL1 is not communicating properly with the CC-Link maser station.

LED status	Condition	Corrective action
Not lit	Communicating correctly.	-
Lighting in red	・ The data link is not configured properly. ・ The NU-CL1 is configured for CC-Link Ver. 2 (full mode 2) while the master station is configured for Ver. 1.	Check that the data link is properly configured, and then turn off the power to the NU-CL1 and back on. 📖 "Configuring for Communication" (page 2-11)
Flashing in red (At regular intervals)	The setting of the transmission rate setting switch, operation mode setting switch, or station number setting was changed while in operation.	If you changed the setting intentionally, turn off the power and back on. The new setting is applied. If you changed the setting unintentionally, restore the previous setting. Normal condition is automatically recovered.

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LED status	Condition	Corrective action
Flashing in red (At irregular intervals)	The termination resistor is not correctly connected.	Connect the termination resistor correctly. (Normal condition is automatically restored after the cause is removed.) ▭ "Connecting the termination resistor" (page 2-9)
	Affected by noise.	Implement noise protection on the NU-CL1 and CC-Link cable. (Normal condition is automatically restored after the cause is removed.)

■ **Sensor communication indicator**

This lamp indicates whether the NU-CL1 is correctly connected and communicating with sensor amplifiers.

The cause of each error can be identified by reading the error information.

▭ "Error Information" (page 5-6)

LED status		Condition	Corrective action
Green	Lighting	Communicating correctly.	-
	Flashing	In process of power-on reset.	After elapse the power-on reset time, the NU-CL1 goes back to normal condition. ▭ "Power-On Reset Time" (page 1-2)
		The number of connected sensor amplifiers increased while in operation. (Error information: 0006h)	Check that the NU-CL1 is correctly connected with the power amplifiers. (Normal condition is automatically restored after the cause is removed.)
		More than 16 sensor amplifier are connected	Decrease the numbers of connected sensor amplifiers to 16 or less. (Normal condition is automatically restored after the cause is removed.)

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LED status		Condition	Corrective action
Red	Lighting	• Failed to communicate with sensor amplifiers in the startup process. (Error information: 0001h/0003h) • The number of connected sensor amplifiers decreased after power-on. (Error information: 0004h) • At least one sensor amplifier is connected that is incompatible with the NU-CL1. (Error information: 0002h)	• Check that the NU-CL1 is correctly connected with the sensor amplifiers, and then turn off the power to the NU-CL1 and back on. • Check that the connected sensor amplifiers are all compatible with the NU-CL1, and then turn off the power to the NU-CL1 and back on.
	Flashing	Temporarily unable to communicate with sensor amplifiers. (Error information: 0007h)	Check for any noise source around the NU-CL1. (Normal condition is automatically restored after the cause is removed.)
Not lit		Power is not supplied to the NU-CL1.	Check that the power cable is correctly attached to the power supply connector. 📖 "Connecting the Power Supply" (page 2-9)

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Appendix

Error Information

If an error occurs with the NU-CL1 or sensor amplifier, information on the error will be input to the remote input RX and remote device RWr as shown below. The error status can be monitored by assigning these devices to the PLC.

■ Small-memory mode

Device No. (HEX)	Name	Description	Value
RWr [n] + 00	Error Code	Indicates error information when an error occurred in the NU-CL1 or sensor amplifier.	(See below)
RWr [n] + 01	Status	Indicates the sensor status. *Refer to the remote input [RX18 to 1F] when the operation mode is set to monitor/full mode for the meaning of each status. 📖 "Remote Input RX (NU-CL1 → Master Station)" (page 3-17)	Bit0: Error status Bit1: Warning status Bit2: Sensor ready Bit3: Command ready Bit4: Sensor setting error Bit5: Sensor external input busy Bit6: Sensor EEPROM busy Bit7: Updating sensor setting Bit8 to 15: 0 fixed

■ Monitor mode / Full mode

Device No. (HEX)	Name	Description	Value
RX [n] + 18	Error Status	Indicates the error status of the NU-CL1 or sensor amplifier. 📖 "Error Information" (page 5-6)	0: No error 1: Error
RWr [n] + 00	Error Code	Indicates error information when an error occurred in the NU-CL1 or sensor amplifier.	(See below)

■ **Error code list**

	Error Information (Hex)	Cause	Corrective action
NU-CL1 error	0001/0002 0003/0007	An error occurred in the internal system.	Check the connection with the sensor amplifier and cycle the power.
	0004	The number of sensors decreased during operation.	Check the connection with the sensor amplifier and cycle the power.
	0006	The number of sensors increased during operation.	Check the connection with the sensor amplifier.
		The number of ID numbers occupied by the sensor exceeds 17.	Make sure that the number of ID numbers occupied by the sensor is 16 or less.
Sensor amplifier error	nn01	An overcurrent was detected through the control output.	• Check whether the load resistance value is too low. • Check whether the wire is short-circuited.
	nn02	(FS-N10 Series) Does not occur.	Check the following matters and turn the power OFF and ON. • Check that the sensor head is connected. • Check that the sensor head cable is not broken. • Securely crimp the head cable connector with a pair of pliers, etc.
		(LV-N10 Series/PS-N10 Series) Signals from the sensor head are not conveyed properly.	
	nn03	The internal data write/read failed.	Cycle power. If operation is not recovered, initialize the settings.
	nn06	The DATUM warning output turned ON while using the DATUM function. • The received light amount is less than the DATUM warning output level. • The raw received light amount value is 50 or less.	• Check whether the received light amount has dropped. • Adjust the DATUM warning output level. • Adjust the raw received light amount to be 50 or more.
	nn07	(FS-N10 Series) The LED light amount drop exceeds the APC compensation limit.	• Set the APC function to OFF. • Replace the sensor if advanced detection (APC function) is required.
		(LV-N10 Series/PS-N10 Series) Does not occur.	-
	0000	No error occurred.	-

nn: Sensor amplifier ID No. (01 to 10h)

| Reference | If several errors occur simultaneously, the error codes will appear with the following order of priority.
1. Error code 0 > error code 1 > ... > error code 7
2. NU-CL1 error (00) > ID number 00 sensor amplifier error (01) > ... > ID number 15 sensor amplifier error (0Fh)

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Appendix

Warning Information

If a warning occurs with the connected sensor amplifier, the warning is sent as cyclic data as shown below. The details of the warning can be read out with handshake communication.

■ Small-memory mode

Device No. (HEX)	Name	Description	Value
RWr [n] + 01	Status	Indicates the sensor status. *Refer to the remote input [RX18 to 1F] when the operation mode is set to monitor/full mode for the meaning of each status. 📖 "Remote Input RX (NU-CL1 → Master Station)" (page 3-17)	Bit0: Error status Bit1: Warning status Bit2: Sensor ready Bit3: Command ready Bit4: Sensor setting error Bit5: Sensor external input busy Bit6: Sensor EEPROM busy Bit7: Updating sensor setting Bit8 to 15 : 0 fixed

■ Monitor mode / Full mode

Device No. (HEX)	Name	Description	Value
RX [n] + 19	Error Status	Indicates the warning status of the sensor amplifier. 📖 "Warning Information" (page 5-8)	0: No warning 1: Warning

■ FS-N10 / LV-N10 / PS-N10 series warning

Device No. (HEX)	Name	Description	Value	Device No. (HEX)
nn22	Warning Information	Indicates the warning information. The corresponding bit turns ON if the warning occurred.	RO	Bit0: Limit detection

nn: Sensor amplifier ID No. (01 to 10h)

5-2 Functions which Cannot be Set in Duplicate

If functions which cannot be set (or used) in duplicate are set via communication, the function with the lower priority will be invalidated or canceled.

The remote input RX (the remote register RWr in the small memory mode) "sensor setting error" turns ON if the setting is incorrect.

FS-N10 Series

Function 1 (Priority: High)		Function 2 (Priority: Low)		Function 2 operation	Sensor setting error
Power Mode	HIGH SPEED	Interference Prevention	Double	Invalid state	
		Display Gain	Full	Invalid state	
Detection Mode (Output 1)	Rising Edge Detection Mode Falling Edge Detection Mode	Preset Start		Cancel	
		Zero-shift Start		Cancel	
		Control Input	Preset Zero-shift	External input invalid state	ON
		Detection Mode (Output 2)	Limit Setting Output	Operates as Normal Detection Mode.	ON
		Sub Display	Bar Excess Gain (%) Excess Gain HOLD (%)	"---- ----" appears on amplifier's digital display.	ON
Detection Mode (Output 1)	DATUM 1 Mode DATUM 2 Mode	Preset Start		Execution not possible (cancel)	
		Zero-shift Start		Execution not possible (cancel)	
		Control Input	Preset Zero-shift	External input invalid state	ON
		Preset Satuation Level	Other than 101	Functions as 101.	
		Sub Display	Excess Gain HOLD (%)	"---- ----" appears on amplifier's digital display.	ON
Detection Mode (Output 1)	Area Detection Mode	Detection Mode (Output 2)	Limit Setting Output	Operates as Normal Detection Mode.	ON
		Sub Display	Bar Excess Gain (%) Excess Gain HOLD (%)	"---- ----" appears on amplifier's digital display.	ON
Detection Mode (Output 1)	DATUM 1 Mode DATUM 2 Mode Area Detection Mode Rising Edge Detection Mode Falling Edge Detection Mode	Sensitivity Setting	Zero-shift Calibration	Invalid state	
Sensitivity Setting	Zero-shift Calibration	Preset Start		Execution not possible (cancel)	
		Control Input	Preset	External input invalid state	ON
Control Input	Preset	Zero-shift Start		Execution not possible (cancel)	
Control Input	Zero-shift	Preset Start		Execution not possible (cancel)	
Power Save	All	Interference Prevention	Double	Invalid state	

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Appendix

LV-N10 Series

Function 1 (Priority: High)		Function 2 (Priority: Low)		Function 2 operation	Sensor setting
Power Mode	HIGH SPEED	Interference Prevention	Double	Invalid state	
		Display Gain	Full	Invalid state	
Detection Mode (Output 1)	Rising Edge Detection Mode Falling Edge Detection Mode	Preset Request / Work-Preset Request / Maximum Sensitivity Preset: Request		Execution not possible (cancel)	
		Full Auto Preset: Start		Execution not possible (cancel)	
		Zero-shift Request		Cancel	
		External Input	Preset Zero-shift	External input invalid state	ON
		Detection Mode (Output 2)	Limit Setting Output	Operates as Normal Detection Mode.	ON
		Sub Display	Bar Excess Gain (%) Excess Gain HOLD (%)	"---- ----" appears on amplifier's digital display.	ON
Detection Mode (Output 1)	DATUM 1 Mode DATUM 2 Mode	Preset Request		Execution not possible (cancel)	
		Zero-shift Request		Execution not possible (cancel)	
		External Input	Preset Zero-shift	External input invalid state	ON
		Preset Saturation Level	Other than 101	Functions as 101.	
		Sub Display	Excess Gain HOLD (%)	"---- ----" appears on amplifier's digital display.	ON
Detection Mode (Output 1)	Area Detection Mode	Detection Mode (Output 2)	Limit Setting Output	Operates as Normal Detection Mode.	ON
		Sub Display	Bar Excess Gain (%) Excess Gain HOLD (%)	"---- ----" appears on amplifier's digital display.	ON
Detection Mode (Output 1)	DATUM 1 Mode DATUM 2 Mode Area Detection Mode Rising Edge Detection Mode Falling Edge Detection Mode	Sensitivity Setting	Zero-shift Calibration	Invalid state	
Sensitivity Setting	Zero-shift Calibration	Preset Request / Work-Preset Request / Maximum Sensitivity Preset: Request		Execution not possible (cancel)	
		Full Auto Preset: Start		Execution not possible (cancel)	
		External Input	Preset	External input invalid state	ON
External Input	Preset	Zero-shift Request		Execution not possible (cancel)	
External Input	Zero-shift	Preset Request / Work-Preset Request / Maximum Sensitivity Preset: Request		Execution not possible (cancel)	
		Full Auto Preset: Start		Execution not possible (cancel)	
Power Save	All	Interference Prevention	Double	Invalid state	

For items other than listed above, some functions cannot be set depending on the connected sensor head. Therefore, make sure to execute the initial reset (initialization) of the sensor amplifier after changing the sensor head.

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Appendix

PS-N10 Series

Function 1 (Priority: High)		Function 2 (Priority: Low)		Function 2 operation	Sensor setting
Detection Mode	Rising Edge Detection Mode Falling Edge Detection Mode	Preset Request / Work-Preset Request / Maximum Sensitivity Preset: Request		Execution not possible (cancel)	
		Full Auto Preset: Start		Execution not possible (cancel)	
		Zero-shift Request		Cancel	
		External Input	Preset Zero-shift	External input invalid state	ON
		Sub Display	Bar Excess Gain (%) Excess Gain HOLD (%)	"---- ----" appears on amplifier' s digital display.	ON
Detection Mode	DATUM 1 Mode DATUM 2 Mode	Preset Request		Execution not possible (cancel)	
		Zero-shift Request		Execution not possible (cancel)	
		External Input	Preset Zero-shift	External input invalid state	ON
		Preset Saturation Level	Other than 101	Functions as 101.	
		Sub Display	Excess Gain HOLD (%)	"---- ----" appears on amplifier' s digital display.	ON
Detection Mode	Area Detection Mode	Sub Display	Bar Excess Gain (%) Excess Gain HOLD (%)	"---- ----" appears on amplifier' s digital display.	ON
Detection Mode	DATUM 1 Mode DATUM 2 Mode Area Detection Mode Rising Edge Detection Mode Falling Edge Detection Mode	Sensitivity Setting	Zero-shift Calibration	Invalid state	
Sensitivity Setting	Zero-shift Calibration	Preset Request / Work-Preset Request / Maximum Sensitivity Preset: Request		Execution not possible (cancel)	
		Full Auto Preset: Start		Execution not possible (cancel)	
		External Input	Preset	External input invalid state	ON
External Input	Preset	Zero-shift Request		Execution not possible (cancel)	
External Input	Zero-shift	Preset Request / Work-Preset Request / Maximum Sensitivity Preset: Request		Execution not possible (cancel)	
		Full Auto Preset: Start		Execution not possible (cancel)	
Power Save	All	Interference Prevention	Double	Invalid state	

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Appendix

5-3 List of Character String Codes

If the "sub display" is set to "TAG display" when a character string is stored in the "TAG character string", the character string can be displayed on the amplifier. The following character strings can be used with the FS-N10/LV-N10/PS-N10 Series.

Code (HEX)	Character string	7-segment display	Code (HEX)	Character string	7-segment display	Code (HEX)	Character string	7-segment display
20	SP		40	@		60	`	
21	!		41	A	A	61	a	A
22	"		42	B	b	62	b	b
23	#		43	C	C	63	c	c
24	$		44	D	d	64	d	d
25	%		45	E	E	65	e	E
26	&		46	F	F	66	f	F
27	'		47	G	G	67	g	g
28	(		48	H	H	68	h	h
29	)		49	I	I	69	i	i
2a	*		4a	J	J	6a	j	J
2b	+		4b	K	K	6b	k	K
2c	,		4c	L	L	6c	l	l
2d	-	-	4d	M	m̄	6d	m	m̄
2e	.		4e	N	n	6e	n	n
2f	/		4f	O	O	6f	o	o
30	0	0	50	P	P	70	p	P
31	1	1	51	Q	q	71	q	q
32	2	2	52	R	r	72	r	r
33	3	3	53	S	5	73	s	5
34	4	4	54	T	t	74	t	t
35	5	5	55	U	U	75	u	u
36	6	6	56	V	u	76	v	u
37	7	7	57	W	y	77	w	y
38	8	8	58	X	"	78	x	"
39	9	9	59	Y	y	79	y	y
3a	:		5a	Z	2	7a	z	2
3b	;		5b	[		7b	{	
3c	<		5c	¥		7c			
3d	=	=	5d	]		7d	}	
3e	>		5e	^		7e	~	-
3f	?		5f	_	-	7f	DEL	

*   If a code which is not assigned to the 7-segment display is set, the character string will remain blank on the display.

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MEMO

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5-4 Index

This index provides a list of terms used in this document in alphabetical order.

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Revision History

Print date	Edition	Description
January, 2009	First edition	
January, 2010	Second edition	
December, 2010	First revised edition	
March, 2011	Second revision, first edition	The PS-N10 Series is added, etc.
April, 2011	Second revision, second edition	Correction of misdescription

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