

EtherNet/IP Compatible Network Unit

NU-EP1

User's Manual

Read this manual before using the product in order to achieve maximum performance.

Keep this manual in a safe place for future reference.

Compatible with FS-N40 Series, FS-N10 Series, LV-N10 Series, PS-N10 Series, AP-N10 Series, LR-T Series, LR-W Series, FD-Q Series and FD-X Series.








Introduction

This manual describes the basic operations and hardware functions of the NU-EP1. Read the manual carefully to ensure safe performance and function of the NU-EP1. 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.

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

	It indicates cautions and limitations that must be followed during operation.
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	It indicates additional information on proper operation.
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	It indicates tips for better understanding or useful information.
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 It indicates reference pages.



The system names and product names used in this manual are the trademark or registered trademark of the respective companies.
EtherNet/IP is a trademark of ODVA. inc.

Safety Information for NU-EP1

General Precautions

	<p>If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.</p> <ul style="list-style-type: none">• 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 for the purpose of protecting a human body or a part of the human body.• This product is not intended for use as an explosion-proof product. Do not use this product in hazardous locations and/or a potentially explosive atmosphere.• Do not expose equipment, including peripherals, to rapid temperature changes. Equipment failure may result from condensation build up.
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Precautions for Use

	<ul style="list-style-type: none">• To avoid injury or failure, turn off the power immediately in the following cases.<ul style="list-style-type: none">- 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 disassemble or modify this product. Failure to observe may result in injury.
	<p>Do not turn off the power while you are setting any item. Doing this may cause loss of data settings.</p>

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 heat 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 in a location near a noise source, e.g., power source or high-voltage line, it may malfunction or fail because of noise. Take protective measures, such as using a noise filter or running the cables separately.

About the 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.

Precautions on Regulations and Standards

UL Certificate

This product is an UL/C-UL Listed product.

- UL File No. E222809
- Category QUYY, QUYY7

Be sure to consider the following specifications when using this product as an UL/C-UL Listed Product.

- Use this product with one of the following power supplies.
 - UL/CSA certified power supply that provides Class 2 output as defined in the NFPA70 (NEC: National Electrical Code) and CEC (Canadian Electrical Code).
 - UL/CSA certified power supply that has been evaluated as a Limited Energy circuit as defined in UL61010-1 and CAN/CSA-C22.2 No. 61010-1.
- For wiring to the power supply connector, use the AWG 12-24 copper wire with temperature rating 65 °C or more. The marking ⚠ on the power supply connector intends to warn this instruction.
- Use this product under pollution degree 2.
- Use this product at the altitude of 2000 m or less.
- Indoor use only.

CE Marking

Keyence Corporation has confirmed that this product complies with the essential requirements of the applicable EC Directive, based on the following specifications.

Be sure to consider the following specifications when using this product in the member state of European Union.

● EMC Directive

EMI : EN55011, Class A

EMS : EN61000-6-2

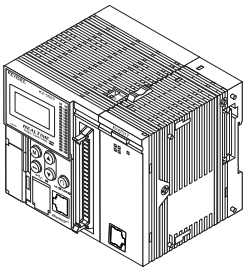
- Use an STP (shielded twisted pair) cable for connection to the network.
- The wire connected to the power supply connector must be 30 m or shorter.

These specifications do not give any guarantee that the end-product with this product incorporated complies with the essential requirements of EMC Directive. The manufacturer of the end-product is solely responsible for the compliance on the end-product itself according to EMC Directive.

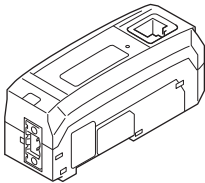
Relevant Manuals

The manuals relevant to this document are as follows:

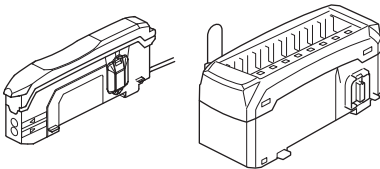
Manuals related to CPU unit
Manuals related to EtherNet/IP unit
This manual
Manuals for each sensor amplifier unit Example) FS-N40 Series User' s Manual



PLC CPU unit
EtherNet/IP unit



NU-EP1 (this unit)



Sensor amplifiers

Manual Organization

1	Before Using	This chapter provides an overview of the NU-EP1 and describes its part names and functions.
2	Connection and Configuration	This chapter explains the procedures for connecting sensor amplifiers to the NU-EP1 and how to communicate.
3	Communication	This chapter explains the configuration of memory linked with the EtherNet/IP unit, and the communication time chart.
4	Specifications	This chapter describes the specifications and dimensions of the NU-EP1.
5	Appendix	This chapter provides the parameter list, as well as troubleshooting instructions.

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Terms Used in This Document

This document uses the following terms:

Term	Description
Sensor	A sensor amplifier
Scanner	The EtherNet/IP scanner device
Adaptor	The EtherNet/IP adaptor device
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 The digital fiber sensor FS-N Series, etc., is supported with this system
PLC	Programmable logic controller, an electronic device which can freely control the devices by changing the programs
Ladder program	A program which controls the PLC

MEMO

Before Using

1

This chapter provides the overview of the NU-EP1 and describes its part names and functions.

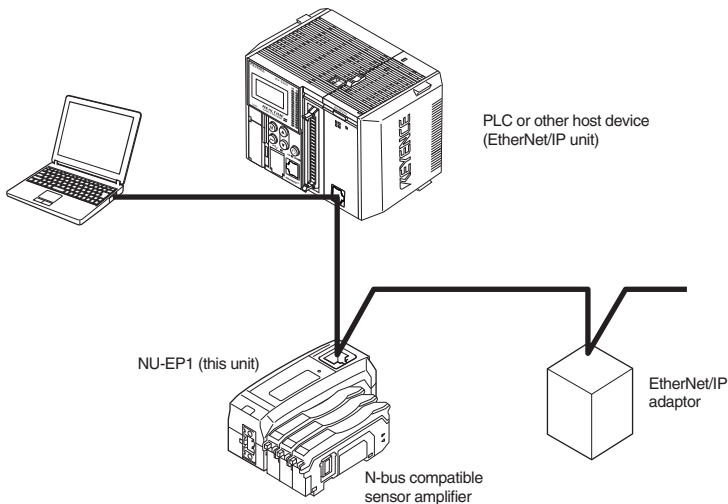
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Overview

The NU-EP1 functions as an EtherNet/IP communication adaptor. Using EtherNet/IP communication, the ON/OFF output signals and current values of the sensors and amplifiers connected to the NU-EP1 can be output to a PLC, etc.

The NU-EP1 supports EtherNet/IP cyclic communication (Implicit messaging) and message communication (Explicit messaging). With cyclic communication, data can be exchanged without ladder programs. With message communication, the sensor amplifier's parameters can be read and written, and operation commands for the sensor amplifier can be executed.

■ Example of system configuration



Types and Number of Connectable Sensor Amplifiers

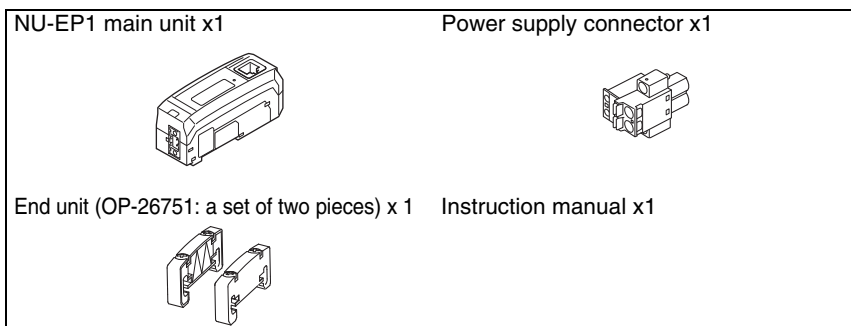
Up to 16 N-bus compatible sensor amplifiers can be connected to the NU-EP1. If the sensor amplifier is N-bus compatible, different models can be connected together.

📖 "Connectable Sensor Amplifiers and Quantities" (page 2-3)

Before using the NU-EP1, verify that the following equipment and accessories are included in the package.

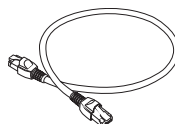
We have thoroughly inspected the package contents before shipment. However, in the event of defective or broken items, contact your nearest KEYENCE office.

Package Contents



■ List of optional part

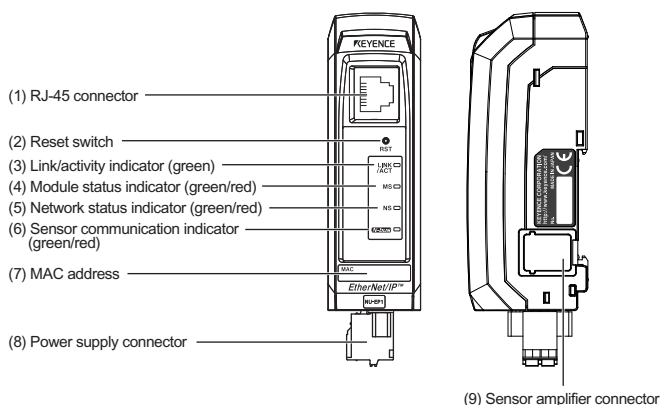
- STP (shielded twisted-pair) cable
(Category 5e, straight)
 - **OP-51504 (0.2 m)**
 - **OP-51505 (0.5 m)**
 - **OP-51506 (1 m)**
 - **OP-51507 (3 m)**
 - **OP-51508 (5 m)**



* The working ambient temperature of the above cable is 0 to 50 °C.

1-3 Part Names

This section describes the part names and functions of the NU-EP1.



Name	Description
(1) RJ-45 connector	Attach the network cable to this connector.
(2) Reset switch	When held down for three seconds or longer, the NU-EP1 settings will be reset to the default settings.
(3) Link/activity indicator (green)	Normal: Green LED lights up or blinks For details, see "Troubleshooting" (page 5-3)
(4) Module status indicator (green/red)	Normal: Green LED lights up
(5) Network status indicator (green/red)	For details, see "Troubleshooting" (page 5-3)
(6) Sensor communication indicator (green/red)	Indicates the communication status between NU-EP1 and the sensor amplifier. Normal: Green LED lights up For details, see "Troubleshooting" (page 5-3)
(7) MAC address	MAC address for the NU-EP1
(8) Power supply connector	Attach the power connection cable to this connector.
(9) Sensor amplifier connector	Attach the sensor amplifier to this connector. A protective cover is attached when shipped from the factory.

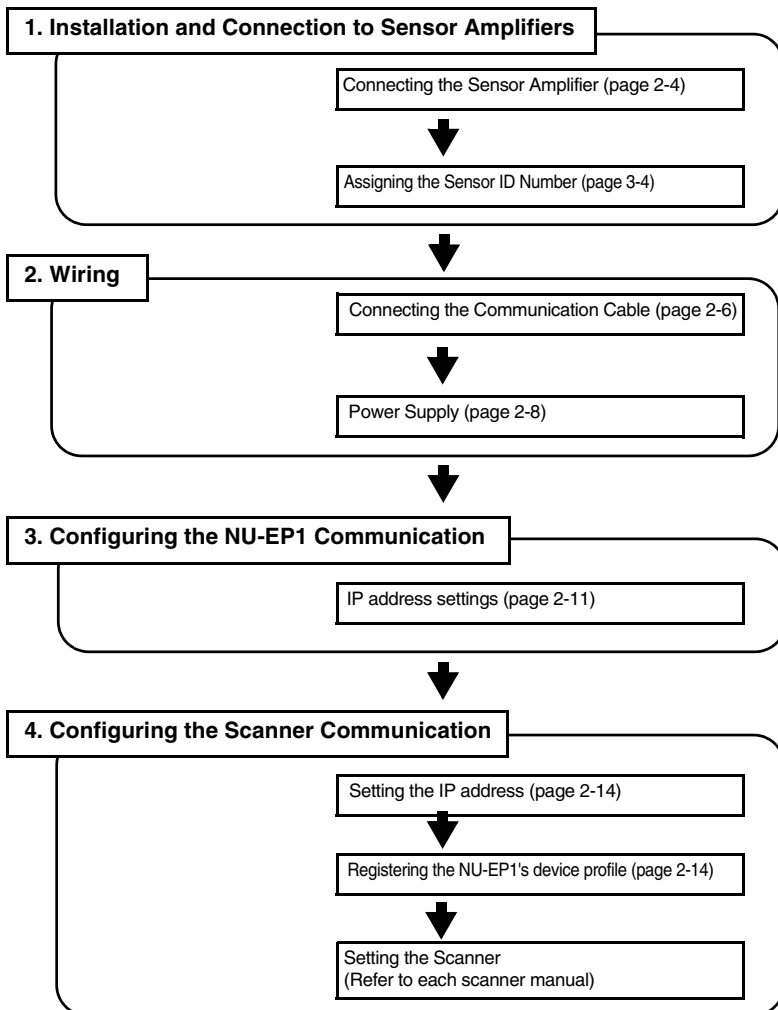
Connection and Configuration

This chapter explains the procedures for connecting sensor amplifiers to the NU-EP1 and how to communicate.

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This section explains the steps for preparing to use the NU-EP1.

Flow from Installation to Communication Configuration



Communication is possible after completing the above settings.

When communicating with an Allen-Bradley PLC (EtherNet/IP scanner), refer to the section "Procedures for Communicating with an Allen-Bradley ControlLogix PLC" (page 5-7) for an overview of the scanner settings.

This chapter provides the procedures for installing the NU-EP1 on a DIN rail and connecting sensor amplifiers.

Connectable Sensor Amplifiers and Quantities

Up to 16 N-bus compatible sensor amplifiers (expansion units) can be connected to the NU-EP1. (N-bus is the name of the KEYENCE's wire-saving system.) Different models can be connected as long as they are N-bus compatible sensor amplifiers.

Connectable sensor amplifiers

Part name	Model	Number of occupied IDs
Digital fiber sensor	FS-N40/N42*	1
Digital fiber sensor (2-output)	FS-N44*	2
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
Network compatible pressure sensor	AP-N10	1
Network compatible pressure sensor (2-output)	AP-N10D	2
Multi-Sensor Controller / All-Purpose Laser Sensor	MU-N12 / LR-T*	3
Multi-Sensor Controller / Full-Spectrum Sensor	MU-N12 / LR-W*	3
Multi-Sensor Controller / Clamp-on Flow Sensor	MU-N12 / FD-Q*	3
Clamp-on Flow Sensor	FD-XA2	2
Clamp-on Flow Sensor	FD-XA2E	2
e-CON 8-point Input Unit (NPN)	NU-EN8N ¹⁾	8

1) Note that it is impossible to connect other sensors after the NU-EN8N.

Number of connectable units

The number of connectable units is determined by the total number of occupied ID numbers. Multiple sensor amplifiers can be connected as long as the number of occupied IDs does not exceed 16. If 17 or more ID numbers are occupied, the green N-bus LED will flash *, and the red MS LED (module status indicator) will flash.

* If the NU-EN8N is installed, the green N-bus LED may not flash, even if the total number of occupied IDs is more than 16.



Point

Even if the number of occupied ID numbers does not exceed 16, the number of connectable units may be restricted by conditions such as the type of connected sensor amplifier or unit. (Example 1: When connecting even one MU-N12 sensor amplifier, the number of connectable sensor amplifiers is limited to four. Example 2: When all the sensor amplifiers to connect are the FD-XA2/XA2E, the number of connectable sensor amplifiers is limited to six.) For details, refer to each sensor amplifier's specifications or check the amount of current which can be supplied from the NU-EP1 to the sensor amplifier. (□ "Specifications" (page 4-2))

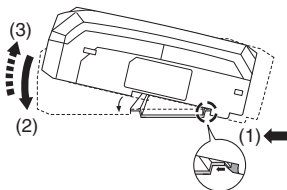
Connecting the Sensor Amplifier

This section explains the methods for connecting the sensor amplifier expansion unit to the NU-EP1.

NOTICE

Turn off the power before connecting the NU-EP1 and sensor amplifiers.

- 1 Align the claw on the bottom of the NU-EP1 with the DIN rail. While pushing the amplifier in the direction of arrow (1), press down in the direction of arrow (2).

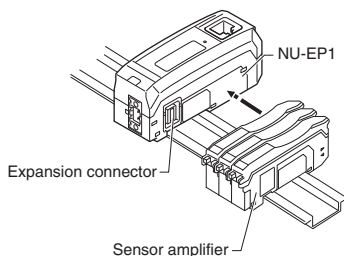


Reference

To remove the NU-EP1, raise the amplifier in the direction of arrow (3) while pushing the NU-EP1 in the direction of arrow (1).

- 2 Repeat step 1 to install additional sensor amplifiers or units on the DIN rail and connect them to the NU-EP1.

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

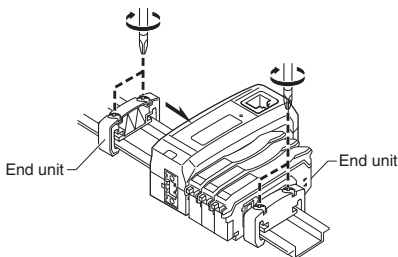


Point

Ensure that the NU-EP1 and sensor amplifiers are connected securely. If they are connected improperly or not inserted completely, 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-EP1) on both sides of the NU-EP1 and the 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-EP1.



Reference

The power for each sensor amplifier is supplied from the NU-EP1.

This section explains how to wire the NU-EP1.

NOTICE

Always turn the power off before starting the wiring work.

Connecting the Communication Cable

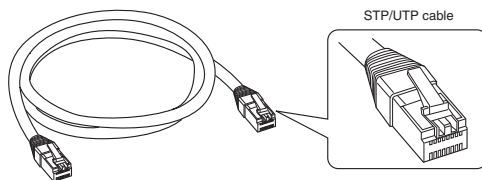
Use the following procedures to connect the NU-EP1 to the communication cable required for EtherNet/IP.

■ Usable cables

The usable cable differs according to whether the system is structured with 10BASE-T or 100BASE-TX.

Structuring a 10BASE-T system

When structuring a 10BASE-T system, use a Category 3 or higher shielded twisted pair (STP) cable or unshielded twisted pair (UTP) cable.



Structuring a 100BASE-TX network

When structuring a 100BASE-TX network, use a Category 5 or higher STP or UTP cable. Do not use a Category 3 or Category 4 cable.

Point

- Use an STP/UTP straight cable to connect the NU-EP1 to an Ethernet switch.
- Use an STP/UTP cross cable when directly connecting the NU-EP1 to a personal computer.
- The STP/UTP cross cable is hard to identify from the STP/UTP straight cable. Take care not to use the incorrect type.
- When connecting with the PoE (Power over Ethernet) function, use an STP cable or a Category 5 or higher UTP cable.
- When structuring Ethernet with a method (10BASE-2, 10BASE-5, etc.) other than 10BASE-T or 100BASE-TX, use a hub equipped with an AUI (MAU) connector or BNC connector, or use a media converter (10BASE5 → 10BASE-T or 10BASE2 → 10BASE-T).

■ NU-EP1 connector port

The NU-EP1 connector port accepts an RJ-45 8-pole modular connector (ISO8877 compliant) used with 10BASE-T and 100BASE-TX, and complies with IEEE802.3 Standards.

Precautions for connecting a STP/UTP cable to the connector port

Make sure that a load is not applied on the connector port when connecting the STP/UTP cable to the NU-EP1.

NOTICE	The cable may be bent when it is installed. If the cable is bent sharply, the wires in the cable may be damaged. Pay attention to the cable's bending radius, R, when installing or routing the cable.
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■ Connecting the NU-EP1 to the EtherNet/IP switch

Use the following procedures to connect to the NU-EP1's RJ-45 connector port.

- 1** Turn the power off.
- 2** Connect the modular jack on one end of the STP/UTP cable to the 10BASE-T/100BASE port on the Ethernet switch being used.

Insert the jack until a "click" is heard. The modular jack and connector port will lock.

Point

- Keep the length of the STP/UTP cable to 100 m or less.
- Carefully check the state of connector (port) on the Ethernet switch before connecting the NU-EP1. Some Ethernet switches have a different shape connector (AUI connector or BNC connector, etc.) from RJ-45, while some have connectors used to connect Ethernet switches together (cascade ports).

- 3** Connect the other modular jack of the STP/UTP cable to the NU-EP1 connector port.

Insert the jack until a "click" is heard. The modular jack and connector port will lock.

Power Supply

This section explains the method for supplying power to the NU-EP1.
In addition to supplying power from the power connector, power can be supplied from the Ethernet port using the PoE (Power over Ethernet) function.

CAUTION

- **Always supply the power with one of the following methods. For example, do not supply from a PoE power sourcing equipment when supplying from a power supply connector. Supplying the power simultaneously from the power supply connector and the PoE power sourcing equipment could result in fire, electrical shock or damage to the NU-EP1 or connected device.**
- **The marking ⚠ on the power supply connector intends to warn this instruction.**

Reference

The power to each sensor amplifier is supplied from the NU-EP1.

■ Supplying power from the power terminal

● Usable cable

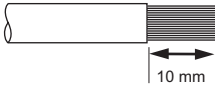
Copper wire, AWG12 to 24 (rated temperature 65 °C or higher)

! Point

The cable length should be 30 m or less.

● Trimming the cable

Strip the end of the cable as shown below.



! Point

- **If you use 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.**

■ Connecting the cable

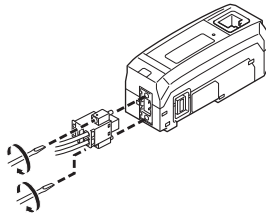
1 Connect the trimmed cable to the power supply connector.

Insert the cable completely.



2 Attach the power supply connector to the NU-EP1.

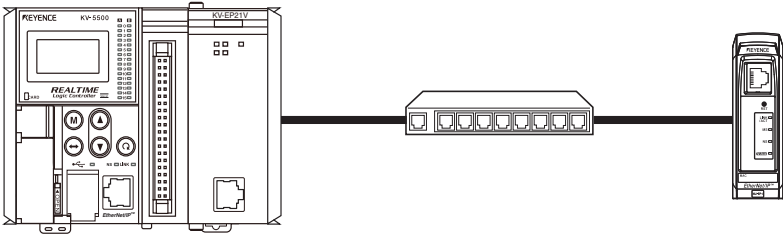
Plug the connector into the NU-EP1 and secure it with the screws on each end. (Tightening torque: 0.2 to 0.3 N•m)



■ Using the PoE (Power over Ethernet) function

Power is supplied from the Ethernet port, so the power connector does not need to be wired.

The PoE function is used to supply power to the NU-EP1 from a PoE compatible Ethernet switch, etc., over an STP cable or a Category 5 or higher UTP cable.



When supplying power from a PoE function, the amount of current which can be supplied to a connected sensor amplifier is limited as shown below.

- Be sure that these limits are not exceeded when operating the system.
Supplied voltage: $24V \pm 10\%$
Supplied current: 50 to 55 °C: 140 mA
45 to 50 °C: 260 mA
-20 to 45 °C: 360 mA
- To ensure terminal protection, do not remove the power supply connector even when supplying the power from a PoE power sourcing equipment.
- The unit must be connected with IEEE802.3af compatible PoE power sourcing equipment. The PoE power sourcing equipment in the following KEYENCE devices do not comply with IEEE802.3af, so never connect these with PoE. There is a risk of damage.
[DT-100A], [DT-500], [NE-V08]
- When connecting an amplifier (with cable) other than a zero-line amplifier to the NU-EP1 and using the PoE power receiving function, contact your nearest KEYENCE office.

NOTICE

Use the following configuration procedures for connecting the NU-EP1 to the EtherNet/IP system.


NU-EP1 Settings

The configuration of the NU-EP1 communication settings are explained below.


■ IP address settings

The IP address is set after wiring the NU-EP1 and supplying the power. By default, the IP address is not set. The NU-EP1 is equipped with a BOOTP client function which allows the IP address to be set over Ethernet.

The IP address can be set by the following two methods.

- Use the IP address setting tool (download from the Keyence web site www.keyence.com/global.jsp).
Refer to the following setting procedures or the  "IP Setting Tool User's Manual".
- Use an IP address setting tool from another source.
Refer to the manual provided by the other source.

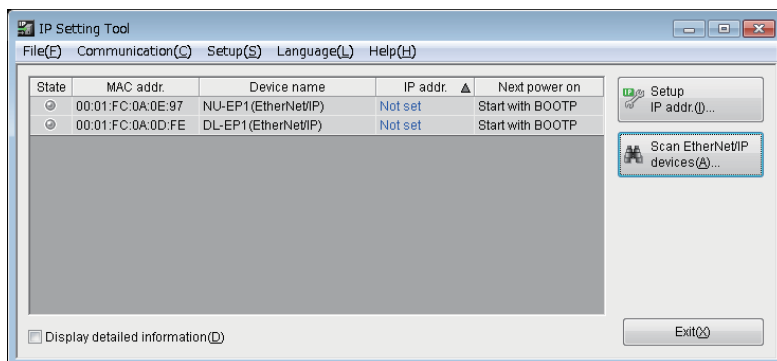
● Using the IP address setting tool

The procedures for using the IP address setting tool are explained briefly in this section. Refer to the  "IP Setting Tool User's Manual" for details on the usage methods. The "IP Setting Tool User's Manual" can be viewed as a pdf file from the [Help (H)] pull-down menu on the "IP Setting Tool" screen.

1 Start the IP Setting Tool.

Devices, such as the NU-EP1, connected to the network and for which the IP address has not been set will appear.

Click the [Scan EtherNet/IP devices (A)] button to display the devices for which the IP address is set.



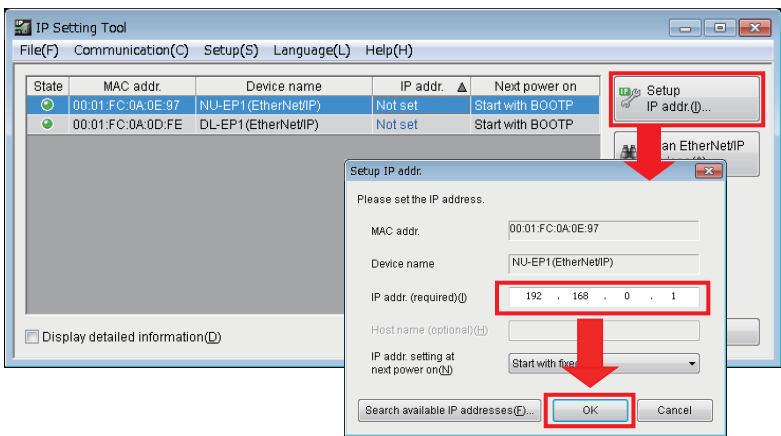


The network status indicator (NS) must be off (IP address not assigned) to display "Not Set" for the IP address. To un-assign an IP address, hold down the NU-EP1's reset switch for three seconds or longer.

2

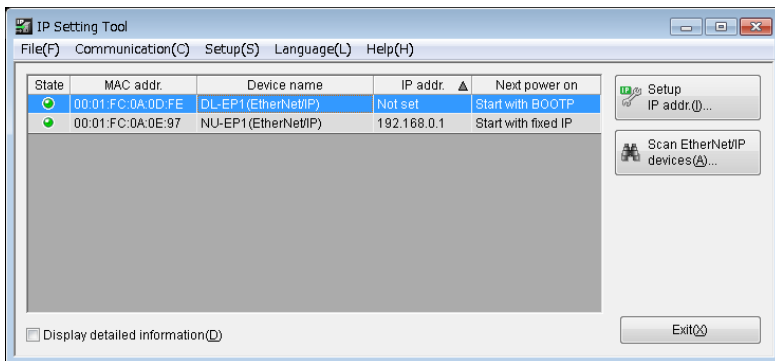
Select the device for which the IP address is to be set, and click on [Setup IP addr.(I)]. [Setup IP addr.] will open.

Set an IP address which is not currently used in "IP addr.(required)(I)", and click on the [OK] button.



Open IP addresses can be searched for by using the [Search available IP addresses (F)] button.

3 This completes the IP address setting.

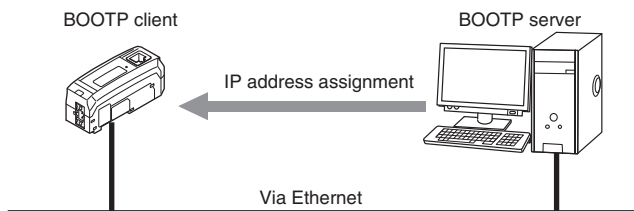


Reference

What is BOOTP?

BOOTP is the abbreviation of BOOT strap Protocol, a protocol used by the client device in the TCP/IP network to retrieve the network settings from the server.

If there is a BOOTP server in the same network as the device running as a BOOTP client, an IP address can be assigned to the device connected as the BOOTP client.



This section explains the scanner configurations for connecting the NU-EP1 to the EtherNet/IP system.

When communicating with an Allen-Bradley PLC (EtherNet/IP scanner), refer to the

📖 "Procedures for Communicating with an Allen-Bradley ControlLogix PLC" (page 5-7) for additional details.

Setting the Scanner

The following settings are required when connecting the NU-EP1 to the EtherNet/IP scanner.

■ Setting the IP address

Set the scanner's IP address.

■ Registering the NU-EP1's device profile

Register the device profile of the connected adaptor (NU-EP1) using the scanner's setting software.

The device profile can be registered manually or by reading in the EDS (Electronic Data Sheet) file. The NU-EP1's EDS file can be downloaded from the Keyence web site (www.keyence.com/global.jsp).

■ Configuring communication with the NU-EP1

The NU-EP1 communicates with the scanner using the EtherNet/IP cyclic communication and message communication.

● Cyclic communication (Implicit messaging)

This function sends and receives data at a set RPI (Requested Packet Interval).

When "connection" communication method is selected, communication can be executed without a ladder program by assigning the devices to be sent and received on the scanner side.

● Message communication (Explicit messaging)

This function is used to send and receive data which does not need to be punctual. Use this method for EtherNet/IP communication when the sensor amplifier settings have been changed, or when using a scanner which does not support cyclic communication (e.g., Allen-Bradley SLC5/05 Series).

This function creates a message at the scanner side and communicates using a ladder program.

For more information on setting each communication method, refer to 📖 "Cyclic Communication" (page 3-6) and 📖 "Message Communication" (page 3-26) as well as the manuals enclosed with each scanner.

Reference

This manual explains only the EtherNet/IP scanner functions and settings required for communication with the NU-EP1. For details on the functions and settings for the EtherNet/IP scanner or CPU unit, refer to the manuals enclosed with the scanner or CPU unit.

Communication

3

This chapter explains the configuration of memory linked with the EtherNet/IP unit, and the communication time chart.

3-1	What Is EtherNet/IP?.....	3-2
3-2	NU-EP1 EtherNet/IP Communication Function.....	3-3
3-3	Cyclic Communication.....	3-6
3-4	Message Communication.....	3-26
3-5	Parameter List.....	3-37

What Is EtherNet/IP?

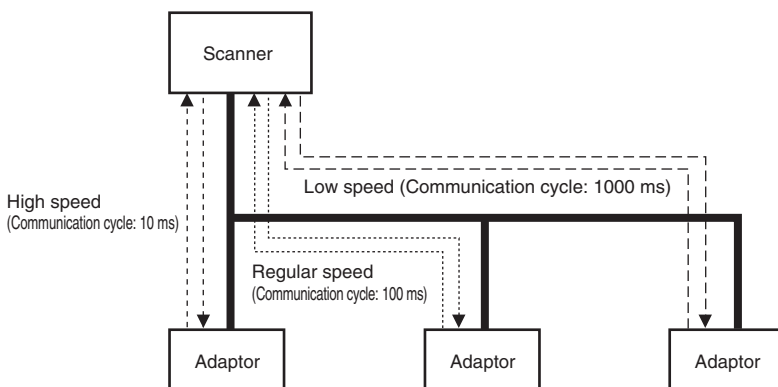
EtherNet/IP is an industrial communication network with open specifications. The specifications are managed by ODVA (Open DeviceNet Vendor Association, Inc.) Industrial protocol has been combined with the Ethernet and standardized as EtherNet/IP (Industrial Protocol).

Communication is realized by combining the protocols known Common Industrial Protocol (CIP), TCP/IP and Ethernet. This allows regular Ethernet to be used together with the network.

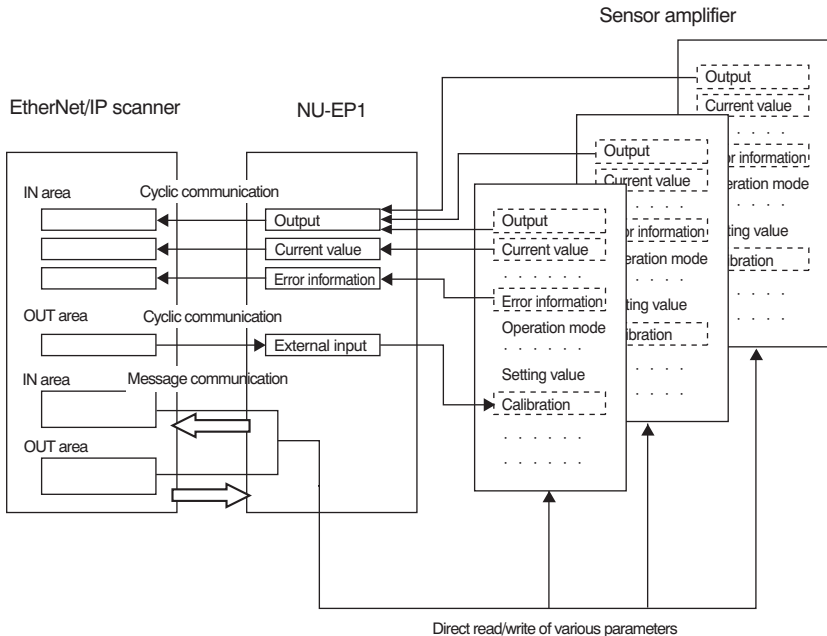
Before starting EtherNet/IP communication, one of the devices must open a communication line called a "connection" with the other device. The side which opens the connection is called the "scanner", and the opened side is called the "adaptor". (The NU-EP1 is an adaptor.)

EtherNet/IP includes cyclic communication (Implicit messaging) which sends and receives data periodically and message communication (Explicit messaging) which sends and receives commands and responses at a random timing. With cyclic communication, RPI (Requested Packet Interval) can be set according to the priority of the exchanged data, allowing the entire communication load to be adjusted when exchanging data.

With message communication, the required commands and responses are exchanged at the required timing. Message communication is used for applications which do not require the punctuality of cyclic communication, such as when reading and writing adaptor settings.



This section explains the EtherNet/IP functions supported by the NU-EP1. The NU-EP1 functions as an EtherNet/IP adaptor, and supports both cyclic and message EtherNet/IP communications.



■ Cyclic communication

This function exchanges data between the scanner and the NU-EP1 at the set RPI (Requested Packet Interval). Data such as the sensor amplifier's output signals and judgment values and error status can be exchanged without ladder programs.

■ Message communication

Message communication can be used for applications which do not require a punctuality like cyclic communication.

Various parameters, including data which can be exchanged with cyclic communication, can be read and written. The sensor amplifier calibration function, etc., can also be executed.

Assigning the Sensor ID Number

Multiple sensor amplifiers can be connected to the NU-EP1. ID numbers are assigned to each sensor amplifier for identification.

The ID number is assigned in the following manner.

- ID numbers "ID: 0" to "ID: 16" can be assigned. (Up to 16 sensor amplifiers can be connected.)
- ID numbers are assigned as ID number 0, ID number 1, ID number 2 and so forth in order from the NU-EP1.
- Some sensor amplifier models occupy several ID numbers with one unit.

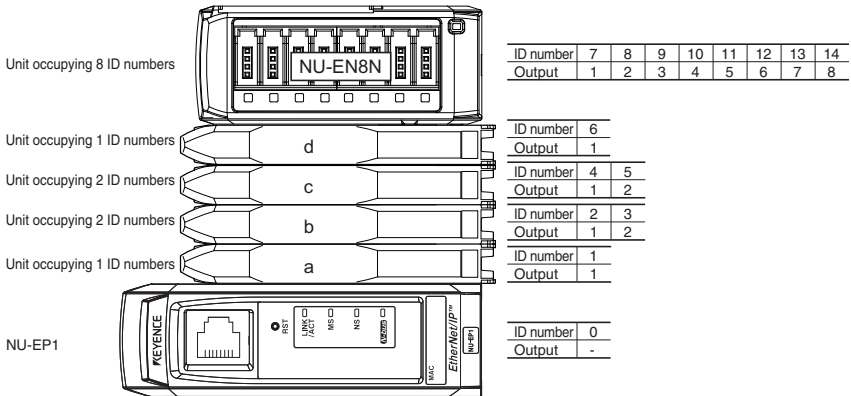


"Connectable Sensor Amplifiers and Quantities" (page 2-3)

An output, setting value, current value and external input are each assigned to one ID number for cyclic communication. The data assignment differs according to the sensor amplifier.

An example of each output ID number assignment when connecting a unit which occupies more than one ID number is shown below.

Example)



Output assigned to each ID number

ID number	Output
0	- (NU-EP1)
1	a - Output 1
2	b - Output 1
3	b - Output 2
4	c - Output 1
5	c - Output 2
6	d - Output 1
7	NU-EN8N output 1
8	NU-EN8N output 2

ID number	Output
9	NU-EN8N output 3
10	NU-EN8N output 4
11	NU-EN8N output 5
12	NU-EN8N output 6
13	NU-EN8N output 7
14	NU-EN8N output 8

NOTIC

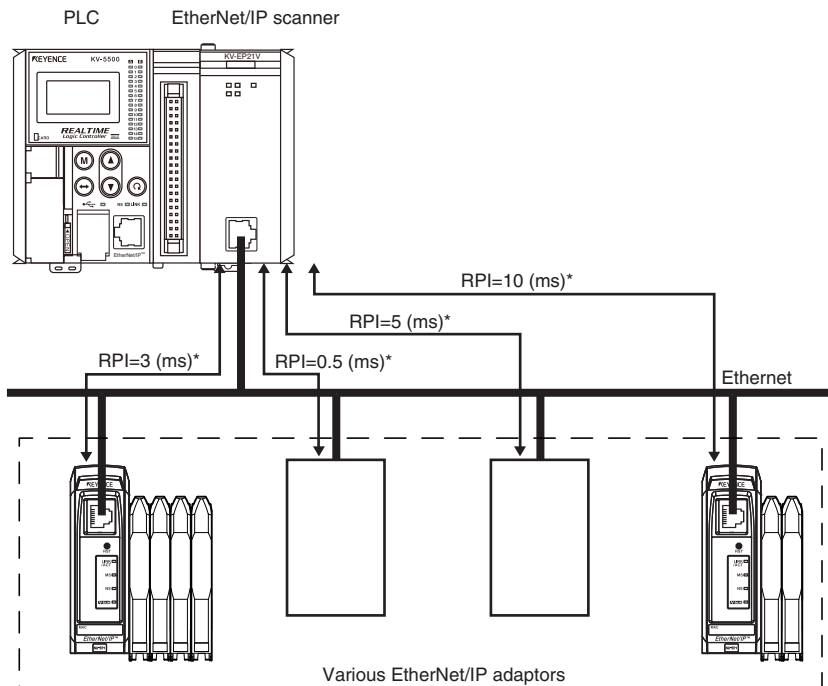
- The ID numbers are automatically assigned, so if the number of connected sensor amplifiers or the order is changed, it may be necessary to change the control program. In addition, some units have restrictions to the connection order (must be connected last, etc.) This must be taken into consideration when creating the control program.
 - An error will occur if more than the maximum number of connectable sensor amplifiers are connected.
- 📖 "Error code list" (page 3-23)

3-3

This section explains the cyclic communication function and its usage methods.

■ What is cyclic communication?

This function exchanges data with the EtherNet/IP device in a cyclic manner (at a set cycle).



* RPI (Requested Packet Interval) can be set individually for each connection.

! Point

The configurations such as RPI and data size for cyclic communication are set according to the scanner size.

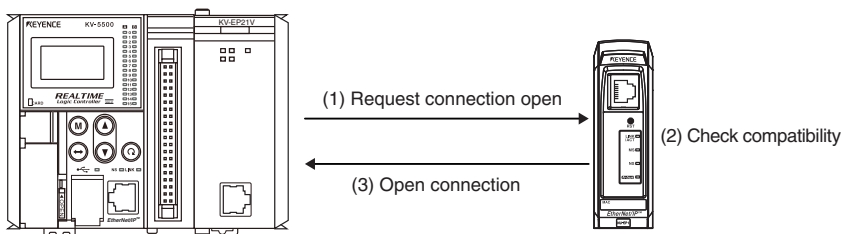
In a network which has many connected devices, including EtherNet/IP devices, a delay or packet loss could occur if a large load is constantly or temporarily applied on the network. Verify the settings carefully before starting use.

With cyclic communication, one device opens a logical communication line called a "connection" with the other device. When successfully opened, data is exchanged. The side which opens the connection is called the "scanner", and the opened side is called the "adaptor". (The NU-EP1 is an adaptor.)

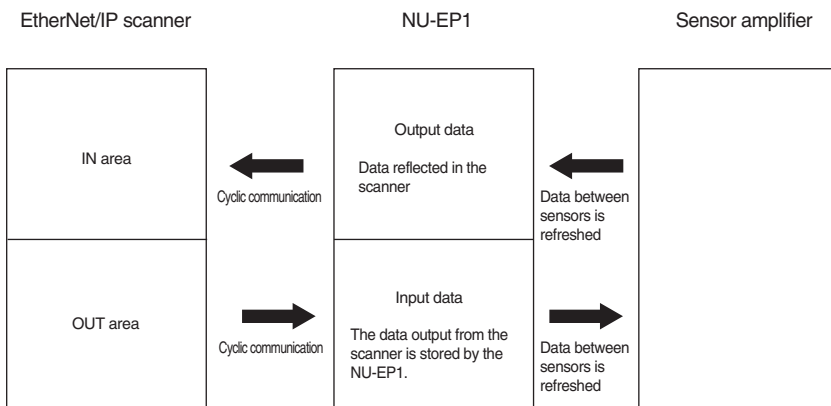
Communication is started with the following procedures.

- (1) The scanner requests the adaptor to open the connection.
 - (2) The compatibility is checked on the adaptor side.
 - (3) If there is no error in the compatibility, the connection is opened.
- (* If an error is found during the compatibility check, the connection is not opened.)

📖 "Checking the Device Compatibility" (page 3-25)



The exchange of data between the EtherNet/IP scanner, NU-EP1 and each sensor amplifier is shown below.



Reference To carry out EtherNet/IP communication between a scanner which does not support cyclic communication (Allen-Bradley SLC5/05 Series, etc.), communicate with the NU-EP1 using message communication.

Configuring Cyclic Communication

The following settings are required to execute cyclic communication with the NU-EP1.

[NU-EP1]

No settings are required for the NU-EP1.

[Scanner]

- (1) Set the connection to be used.
- (2) Set the devices used in cyclic communication.

Refer to the scanner manual for details on the settings.

(* A ladder program is not required when using cyclic communication.)

Usable Connections

The data communicated differs for each connection. Select the necessary connections.

The following connections can be used with the NU-EP1.

No.	Connection Name	Communication data	Input/ Output	Assembly Instance	Size (Byte)	RPI RANGE (in 0.5 ms)	Application type	Reference page
1	Monitor Data And External Input	Output, current value, setting value and operating status	Input NU-EP1 to scanner	64H (100)	128	0.5 ms to 10000 ms	Exclusive Owner	3-11
		External input	Output Scanner to NU-EP1	65H (101)	4			3-17
2	Monitor Data (Input Only)	Output, current value, setting value and operating status	Input NU-EP1 to scanner	64H (100)	128		Input Only	3-11
		-	Output Scanner to NU-EP1	FEH (254)	0			-
3	Sensor Output (Input Only)	Sensor output	Input NU-EP1 to scanner	66H (102)	2		Input Only	3-13
		-	Output Scanner to NU-EP1	FEH (254)	0			-

Reference

- Each connection's trigger timing is executed cyclically. The connection type supports both point-to-point and multicast.
- The details of each application type are explained below.

Exclusive Owner:

This connection allows data sent from the scanner to the NU-EP1 and data sent from the NU-EP1 to the scanner to be set simultaneously. This is set when the scanner not only monitors the adaptor (NU-EP1) data, but also when it issues external inputs and rewrites the settings, etc. Multiple "Exclusive Owner" connections cannot be opened to one adaptor (NU-EP1).

Input Only:

This connection can only allow data sent from the NU-EP1 to the scanner. This is set when the scanner only monitors the adaptor (NU-EP1) data. Multiple scanners can open an "Input Only" connection simultaneously to one adaptor (NU-EP1).

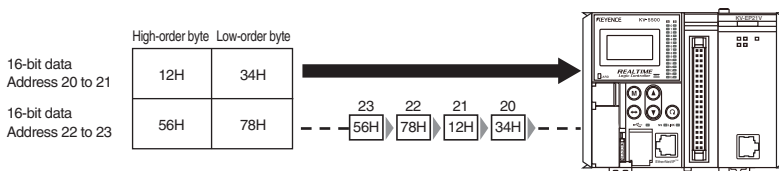
- * When simultaneously opening connections from multiple scanners, set the Connection Type to Multicast.
- Designate "1" for the instance ID of "Assembly Object", and "0" for the size when using the respective PLC which requires the designation of "Configuration".

Assignment to IN Area (NU-EP1 to Scanner)

The data from the NU-EP1 is assigned to the EtherNet/IP scanner's IN area.

Reference If the data extends over multiple byte, such as 16-bit data, the data is stored into an area which starts with an even address in order from the low-order byte.

Example)



■ Monitor Data (64-word/128-byte) Assembly Instance: 64H (100)

📖 "Assigning the Sensor ID Number" (page 3-4)

Name	Address (Byte)	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Status	0	Reserved for system							NU-EP1 Error Status
	1	Error Status	Warning Status	Sensor Ready	Reserved for system	Sensor Setting Error	Sensor External Input Busy	Sensor EEPROM Busy	Updating Sensor Setting
Sensor Error Status	2	Error (ID number 8)	.....						Error (ID number 1)
	3	Error (ID number 16)	.....						Error (ID number 9)
Sensor Warning Status	4	Warning (ID number 8)	.....						Warning (ID number 1)
	5	Warning (ID number 16)	.....						Warning (ID number 9)
L-on/D-on (N.O./N.C.)	6	L-on/D-on (N.O./N.C.) (ID number 8)	.....						L-on/D-on (N.O./N.C.) (ID number 1)
	7	L-on/D-on (N.O./N.C.) (ID number 16)	.....						L-on/D-on (N.O./N.C.) (ID number 9)
Current Value Over Range	8	Current Value Over Range (ID number 8)	.....						Current Value Over Range (ID number 1)
	9	Current Value Over Range (ID number 16)	.....						Current Value Over Range (ID number 9)

Name	Address (Byte)	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Current Value Under Range	10	Current Value Under Range (ID number 8)	• • • • •						Current Value Under Range (ID number 1)
	11	Current Value Under Range (ID number 16)	• • • • •						Current Value Under Range (ID number 9)
Current Value Invalid	12	Current Value Invalid (ID number 8)	• • • • •						Current Value Invalid (ID number 1)
	13	Current Value Invalid (ID number 16)	• • • • •						Current Value Invalid (ID number 9)
Output*1	14	Output (ID number 8)	• • • • •						Output (ID number 1)
	15	Output (ID number 16)	• • • • •						Output (ID number 9)
Reserved for system	16 to 17	Reserved for system							
External Input Response	18	External Input Response (ID number 8)	• • • • •						External Input Response (ID number 1)
	19	External Input Response (ID number 16)	• • • • •						External Input Response (ID number 9)
Error ID Number	20	Current Error ID Number. (16-bit unsigned integer)							
	21								
Error Code	22	Current Error Code (16-bit unsigned integer)							
	23								
Warning ID Number	24	Current Warning ID Number (16-bit unsigned integer)							
	25								
Warning Code	26	Current Warning Code (16-bit unsigned integer)							
	27								
Setting Error ID Number	28	Setting Error ID Number (16-bit unsigned integer)							
	29								
Current Value*1	30	Current Value (ID number 1) (16-bit signed/unsigned integer)							
	31								
	:	:							
	60	Current Value (ID number 16) (16-bit signed/unsigned integer)							
	61								
Setting Value 1*1	62	Setting Value 1 (ID number 1) (16-bit signed/unsigned integer)							
	63								
	:	:							
	92	Setting Value 1 (ID number 16) (16-bit signed/unsigned integer)							
	93								

Name	Address (Byte)	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Setting Value 2 ^{*1}	94	Setting Value 2 (ID number 1) (16-bit signed/unsigned integer)							
	95								
	:	:							
	124	Setting Value 2 (ID number 16) (16-bit signed/unsigned integer)							
	125								
Reserved for system	126 to 127	Reserved for system							

■ Fast Output (1-word/2-byte) Assembly Instance: 66H (102)

📖 "Assigning the Sensor ID Number" (page 3-4)

Name	Address (Byte)	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Fast Output ^{*1}	0	Fast Output (ID number 8)				•••••			Fast Output (ID number 1)
	1	Fast Output (ID number 8)				•••••			Fast Output (ID number 9)

*1 To confirm the data assigned to "Output (Fast output)", "Current Value", "Setting Value 1/2" 📖 "Cyclic communication data assignment" (page 3-18)

What is Fast Output?

Data between the NU-EP1 and the sensor amplifier is exchanged at a set cycle, but when the number of connected amplifiers increases, the exchanged volume also increases and the communication cycle becomes longer. In the following two connections, if the communication cycle becomes longer, a delay is generated when retrieving the sensor amplifier data into the PLC.

- "Monitor Data And External Input"
- "Monitor Data (Input Only)"

As a measure, the NU-EP1 uses a separate dedicated cable to directly retrieve the sensor output signals, and can recognize the data output from the sensor within a delay time of 50 μ s. The output signal, which is directly imported, is called a "high-speed output". This "Fast output" is handled in the "Sensor Output (Input Only)" connection.




By using EtherNet/IP communication for the "Fast output", the sensor's output signals can be imported to the PLC with minimum delay time.


For actual communication times, refer to "4-2 Data Processing Time".

Parameter list

Item	Description
NU-EP1 Error Status	Outputs the NU-EP1's error status. <ul style="list-style-type: none"> ■ ON: Error is occurring. ■ OFF: Error is not occurring.
Updating Sensor Setting	When the settings have been changed with communication or key operations, this is output until the sensor amplifier settings have been changed. <ul style="list-style-type: none"> ■ ON: One sensor amplifier has outdated settings. ■ OFF: All sensor amplifier settings are current.
Sensor EEPROM Busy	When the sensor amplifier settings have been changed, this is output until writing to the EEPROM is completed. <ul style="list-style-type: none"> ■ ON: One sensor amplifier has setting data which has not been written to the EEPROM. ■ OFF: The setting data for all sensor amplifiers has been written to the EEPROM.
Sensor External Input Busy	This is output when an external input signal is sent. If the external input signal is activated, the external input cannot be set via communication. <ul style="list-style-type: none"> ■ ON: The external input signal is activated. ■ OFF: The external input signal is not activated.
Sensor Setting Error	This is output when there is an incorrect combination in the sensor amplifier settings. The ID number which caused the sensor setting error can be confirmed by the "Setting Error ID Number". <ul style="list-style-type: none"> ■ ON: There is an incorrect setting combination in one of the sensor amplifiers. ■ OFF: All sensor amplifiers are running with the correct settings.
Sensor Ready	This is output when the sensor amplifier is running normally. <ul style="list-style-type: none"> ■ ON: The sensor amplifier is running normally. ■ OFF: The sensor amplifier is starting up.
Warning Status	The warning status for the NU-EP1 or connected sensor amplifiers is output. When ON, a value is stored in "Warning ID Number" and "Warning Code", and when OFF, 0 is stored in "Warning ID Number" and "Warning Code". <ul style="list-style-type: none"> ■ ON: A warning is occurring in the NU-EP1 or a sensor amplifier. ■ OFF: A warning is not occurring in the NU-EP1 or any sensor amplifier.
Error Status	The error status for the NU-EP1 or connected sensor amplifiers is output. When ON, a value is stored in "Error ID Number" and "Error Code", and when OFF, 0 is stored in the "Error ID Number" and "Error Code". <ul style="list-style-type: none"> ■ ON: An error is occurring in the NU-EP1 or a sensor amplifier. ■ OFF: An error is not occurring in the NU-EP1 or any sensor amplifier.
Sensor Error Status	The target ID number bit is output when an error is occurring in the sensor amplifier. ^{*1} <ul style="list-style-type: none"> ■ ON: An error is occurring in the target ID number sensor amplifier. ■ OFF: An error is not occurring in the target ID number sensor amplifier.
Sensor Warning Status	The target ID number bit is output when a warning is occurring in the sensor amplifier. ^{*1} <ul style="list-style-type: none"> ■ ON: A warning is occurring in the target ID number sensor amplifier. ■ OFF: A warning is not occurring in the target ID number sensor amplifier.
L-on/D-on (N.O./N.C.)	The L-on/D-on or N.O./N.C. state of the sensor amplifier is output. ^{*1, *2, *3} <ul style="list-style-type: none"> ■ ON: The target ID number sensor amplifier is in the D-on or N.C. state. ■ OFF: The target ID number sensor amplifier is in the L-on or N.O. state.
Current Value Over Range	This is output when the sensor amplifier's current value is larger than the measurement upper limit. ^{*1, *2, *3, *4} <ul style="list-style-type: none"> ■ ON: The target ID number sensor amplifier's current value is larger than the measurement upper limit. ■ OFF: The target ID number sensor amplifier's current value is less than the measurement upper limit.

Item	Description
Current Value Under Range	<p>This is output when the sensor amplifier's current value is less than the measurement lower limit.*1, *2, *3, *4</p> <ul style="list-style-type: none"> ■ ON: The target ID number sensor amplifier's current value is less than the measurement lower limit. ■ OFF: The target ID number sensor amplifier's current value is larger than the measurement lower limit.
Current Value Invalid	<p>This is output when the sensor amplifier's current value is invalid.*1, *2, *3, *4</p> <ul style="list-style-type: none"> ■ ON: The target ID number sensor amplifier's current value is not normal. ■ OFF: The target ID number sensor amplifier's current value is normal.
Output	<p>The sensor amplifier's ON/OFF state is output.*5, *6</p> <ul style="list-style-type: none"> ■ ON: The sensor amplifier output is on. ■ OFF: The sensor amplifier output is off. <p>□ "Cyclic communication data assignment" (page 3-18)</p>
External Input Response	<p>This is output when an external input has been made via communication. The ID number is output even if it does not have an external input.*3</p> <ul style="list-style-type: none"> ■ ON: The external input request turned ON. ■ OFF: The external input request turned OFF. <p>Refer to □ "External Input Request" (page 3-17) for details.</p>
Error ID Number	<p>If the "Error Status" is ON, the ID number of the NU-EP1 or the sensor amplifier connected to the NU-EP1 in which the error is occurring is displayed. (ID number 0 for NU-EP1.) 0 is stored if an error is not occurring. If an error is occurring at multiple IDs, the ID number of the NU-EP1 or sensor amplifier with the highest priority error is stored.</p> <p>Error priority:</p> <ol style="list-style-type: none"> (1) NU-EP1 error (Excluding error code 56) (2) Sensor amplifier error (Smallest error code number has priority)* * If the same error code is occurring in multiple sensor amplifiers, the error with the smallest ID number has the priority. (3) NU-EP1 error (Error code 56)
Error Code	<p>If the "Error Status" is ON, the error code is stored. 0 is stored if an error is not occurring. If an error is occurring at multiple IDs, the error code of the NU-EP1 or sensor amplifier with the highest priority error is stored.</p> <p>Error priority:</p> <ol style="list-style-type: none"> (1) NU-EP1 error (Excluding error code 56) (2) Sensor amplifier error (Smallest error code number has priority)* * If the same error code is occurring in multiple sensor amplifiers, the error with the smallest ID number has the priority. (3) NU-EP1 error (Error code 56) <p>□ "Error code list" (page 3-23)</p>
Warning ID Number	<p>If the "Warning Status" is ON, the ID number of the NU-EP1 or the sensor amplifier connected to the NU-EP1 in which the warning is occurring is displayed. 0 is stored if a warning is not occurring. If a warning is occurring at multiple IDs, the smallest ID number is stored. (Priority: 00 > 01 > to > 16)</p>
Warning Code	<p>If the "Warning Status" is ON, the warning code is stored. 0 is stored if "Warning Status" is OFF. If a warning is occurring at multiple ID numbers, the warning code with the smallest ID number is stored. (Priority: 00 > 01 > to > 16)</p> <p>□ "Warning list" (page 3-24)</p>
Setting Error ID Number	<p>If the "Sensor Setting Error" is ON, the ID number of the sensor amplifier in which the sensor setting error is occurring is stored. 0 is stored if a setting sensor error is not occurring. If an error is occurring at multiple IDs, the smallest ID number is stored. (Priority: 00 > 01 > to > 16)</p> <p>□ "Functions which Cannot be Set in Duplicate" (page 3-25)</p>

Item	Description
Current Value	This is the sensor amplifier's current value. 0 is stored if there is no current value.  "Cyclic communication data assignment" (page 3-18)
Setting Value 1	This is the sensor amplifier setting value 1 data. 0 is stored if setting value 1 does not exist.  "Cyclic communication data assignment" (page 3-18)
Setting Value 2	This is the sensor amplifier setting value 2 data. 0 is stored if setting value 2 does not exist.  "Cyclic communication data assignment" (page 3-18)
Fast Output	The sensor amplifier's ON/OFF status is output. ■ ON: The sensor amplifier output is on. ■ OFF: The sensor amplifier output is off.

- *1 If the sensor occupies more than two ID numbers, the status is output to all occupied ID numbers.
- *2 The status is not output to an ID number for which each item does not exist.
- *3 When using the NU-EN8N sensor amplifier, the status is not output to the occupied ID number.
- *4 For details, refer to "Current Value Property of the Sensor" (page 4-11).
- *5 The output can be switched between "Fast output" and "Current Value Sync. Output".
Change the NU object attribute B3H. (The instance ID is 00H.)
 "What is Fast Output?" (page 3-13)
- *6 With the NU-EN8N, the output is only sent when the output is set to "Fast output".

Assignment to OUT Area (Scanner to NU-EP1)

The data to the sensor amplifier is assigned to the EtherNet/IP scanner's OUT area.

■ External Input (2-word/4-byte) Assembly Instance: 65H (101)

📖 "Assigning the Sensor ID Number" (page 3-4)

Name	Address (Byte)	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
External Input Request	0	External Input Request (ID number 8)	.....						External Input Request (ID number 1)
	1	External Input Request (ID number 16)	.....						External Input Request (ID number 9)
Reserved for system	2 to 3	Reserved for system							

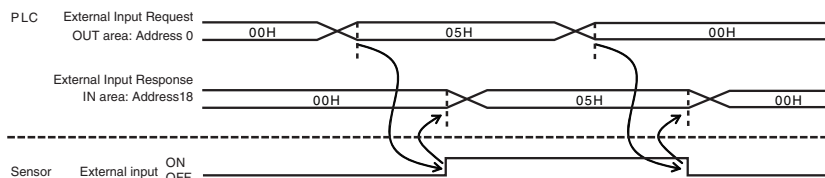
Parameter list

Item	Description
External Input Request	<p>The sensor amplifier's external input is activated via communication. If a signal is input on the external input terminal, the external input request will be ignored.</p> <ul style="list-style-type: none"> ■ ON: External input is activated via communication. "External Input Response" turns ON when input is accepted. ■ OFF: "External Input Response" turns OFF. <p>📖 "Cyclic communication data assignment" (page 3-18)</p>

External Input Request

The procedures and time chart for executing external input with cyclic communication is shown below.

Example) Executing external input to ID numbers 1 and 3 sensors



Reference The external inputs can be executed simultaneously to multiple sensor amplifiers.

Cyclic communication data assignment

For NU-EP1, data such as the sensor "output" and "current value" can be obtained via data communication, but the meaning of "output" and "current value" differs according to the sensor.

For details, refer to the table below.

■ Output (Fast output)

Connected sensor		ID number				
		1st	2nd	3rd	...	8th
FS-N40/N42*		Output	-	-	...	-
FS-N44*		Output 1	Output 2	-	...	-
FS-N10/N12*		Output	-	-	...	-
FS-N14*		Output 1	Output 2	-	...	-
LV-N10/N12C*		Output	-	-	...	-
LV-N12*		Output 1	Output 2	-	...	-
PS-N10/N12*		Output	-	-	...	-
AP-N10		Output 1	-	-	...	-
AP-N10D		Output 1	Output 2	-	...	-
MU-N/LR-T		Output 1	Output 2	Not used	...	-
MU-N/ LR-W	1-Output 16-Bank	Output of the selected bank	Output 2	Not used	...	-
	4-Output 2-Bank	Output 1 of the selected bank	Output 2 of the selected bank	Output 3 of the selected bank	...	-
	Binary	Output 1	Output 2	Output 3	...	-
MU-N/FD-Q		Output 1	Output 2	Not used	...	-
FD-XA2		Output 1	Output 2	-	...	-
FD-XA2E		Output 1	Output 2	-	...	-
NU-EN8N		Output 1	Output 2	Output 3	...	Output 8

■ Current Value

Connected sensor		ID number				
		1st	2nd	3rd	...	8th
FS-N40/N42*		Current value	-	-	...	-
FS-N44*		Current value	Not used	-	...	-
FS-N10/N12*		Current value	-	-	...	-
FS-N14*		Current value	Not used	-	...	-
LV-N10/N12C*		Current value	-	-	...	-
LV-N12*		Current value	Not used	-	...	-
PS-N10/N12*		Current value	-	-	...	-
AP-N10		Current Pressure Value	-	-	...	-
AP-N10D		Current Pressure Value	Raw Pressure Value	-	...	-
MU-N/LR-T		Current Distance	Not used	Not used	...	-
MU-N/ LR-W	1-Output 16-Bank	Current value of the selected bank	Not used	Not used	...	-
	4-Output 2-Bank	Current value of output 1 of the selected bank	Current value of output 2 of the selected bank	Current value of output 3 of the selected bank	...	-
	Binary	Number of the out- put with the high- est matching rate	Current value of the selected out- put number	Not used	...	-
MU-N/FD-Q		Instantaneous flow	Integrated flow	Not used	...	-
FD-XA2		Instantaneous flow	Integrated flow/ Shot amount*	-	...	-
FD-XA2E		Instantaneous flow	Not used	-	...	-
NU-EN8N		Not used	Not used	Not used	...	Not used

* "Integrated flow" when "Shot mode" is not selected, "Shot value" when "Shot mode" is selected

■ External Input

Connected sensor		ID number				
		1st	2nd	3rd	...	8th
FS-N40/N42*		External input	-	-	...	-
FS-N44*		External input	Not used	-	...	-
FS-N10/N12*		External Input	-	-	...	-
FS-N14*		External Input	Not used	-	...	-
LV-N10/N12C*		External Input	-	-	...	-
LV-N12*		External Input	Not used	-	...	-
PS-N10/N12*		External Input	-	-	...	-
AP-N10		External Input	-	-	...	-
AP-N10D		External Input	Not used	-	...	-
MU-N/LR-T		External Input	Not used	Not used	...	-
MU-N/ LR-W	1-Output 16-Bank	External Input	Not used	Not used	...	-
	4-Output 2-Bank	External Input	Not used	Not used	...	-
	Binary	External Input	Not used	Not used	...	-
MU-N/FD-Q		External Input	Not used	Not used	...	-
FD-XA2		External input	External input	-	...	-
FD-XA2E		External input	Not used	-	...	-
NU-EN8N		Not used	Not used	Not used	...	Not used

■ Setting Value 1

Connected sensor		ID number				
		1st	2nd	3rd	...	8th
FS-N40/N42*		Setting value (Output / Area Hi)	-	-	...	-
FS-N44*		Setting value (Output 1 / Area Hi)	Setting value (Output 2)	-	...	-
FS-N10/N12*		Setting Value (Output / Area Hi)	-	-	...	-
FS-N14*		Setting Value (Output 1 / Area Hi)	Setting Value (Output 2)	-	...	-
LV-N10/N12C*		Setting Value (Output / Area Hi)	-	-	...	-
LV-N12*		Setting Value (Output 1 / Area Hi)	Setting Value (Output 2 / Counter Setting Value)	-	...	-
PS-N10/N12*		Setting Value (Output / Area Hi)	-	-	...	-
AP-N10		Setting Value (P1)	-	-	...	-
AP-N10D		Setting Value (P1)	Setting Value (P2)	-	...	-
MU-N/LR-T		Setting Value (Output1 / Output1 Area Near)	Setting Value (Output2 / Output2 Area Near)	Not used	...	-
MU-N/ LR-W	1-Output 16-Bank	Bank 1 setting value	Bank 2 setting value	Bank 3 setting value	...	-
	4-Output 2-Bank	Bank 1, Output 1 Setting value	Bank 1, Output 2 Setting value	Bank 1, Output 3 Setting value	...	-
	Binary	Output 1 Setting value	Output 2 Setting value	Output 3 Setting value	...	-
MU-N/FD-Q		Setting Value (Output1 / Output1 Area Lower)	Setting Value (Output2 / Output2 Area Lower)	Not used	...	-
FD-XA2		Instantaneous Flow Setting Value (Output1 / Output1 Area Lower)	Shot amount Setting Value (Output1 Area Lower)	-	...	-
FD-XA2E		Setting value (Output)	Not used	-	...	-
NU-EN8N		-	-	-	...	-

■ Setting Value 2

Connected sensor		ID number				
		1st	2nd	3rd	...	8th
FS-N40/N42*		Setting value (Area Low)	-	-	...	-
FS-N44*		Setting value (Area Low)	Not used	-	...	-
FS-N10/N12*		Setting Value (Area Low)	-	-	...	-
FS-N14*		Setting Value (Area Low)	Not used	-	...	-
LV-N10/N12C*		Setting Value (Area Low)	-	-	...	-
LV-N12*		Setting Value (Area Low)	Not used	-	...	-
PS-N10/N12*		Setting Value (Area Low)	-	-	...	-
AP-N10		Not used	-	-	...	-
AP-N10D		Setting Value (Area Upper: Hi)	Setting Value (Area Low: Lo)	-	...	-
MU-N/LR-T		Setting Value (Output1 Area Far)	Setting Value (Output2 Area Far)	Not used	...	-
MU-N/ LR-W	1-Output 16-Bank	Bank 4 setting value	Bank 5 setting value	Bank 6 setting value	...	-
	4-Output 2-Bank	Bank 1, Output 4 Setting value	Bank 2, Output 1 Setting value	Bank 2, Output 2 Setting value	...	-
	Binary	Output 4 Setting value	Output 5 Setting value	Output 6 Setting value	...	-
MU-N/FD-Q		Setting Value (Output1 Area Upper)	Setting Value (Output2 Area Upper)	Not used	...	-
FD-XA2		Instantaneous Flow Setting Value (Output1 Area Upper)	Shot amount Setting Value (Output1 Area Upper)	-	...	-
FD-XA2E		Not used	Not used	-	...	-
NU-EN8N		-	-	-	...	-

■ Error code list

The following error codes may occur with the NU-EP1 and sensor amplifier.

Error ID number	Code	Details	Cause	Actions
0	0	No error		
	51	System error	Sensor ID assignment error	Confirm that the NU-EP1 is securely connected to the sensor. Turn the power on again.
	53	Number of sensors down	A sensor was disconnected during use. Only the NU-EP1 was reset. Data is being read from sensor.	
	54	Number of sensors down	A sensor was disconnected during use.	
	56	Number of sensors up	A sensor was connected during operation. Sensors for more than 17 outputs were connected.	Confirm that the NU-EP1 is securely connected to the sensor. Make sure that sensors for 16 outputs or less are connected.
	57	System error	Constant operation communication error	Confirm that the NU-EP1 is securely connected to the sensor. Turn the power on again.
	70	IP address duplicate error	The IP address is the same as another device.	Check the IP address and change it so it is not duplicated. Then, turn the power on again.
	100	System error	An IP setting error occurred.	Contact your nearest Keyence office.
	101	System error	A default gateway setting error occurred.	
	102	System error	An EEPROM error occurred.	
	103	System error	Protocol stack start error	
	104	System error	Flash ROM hardware error	
	150	System error	Number of held IDs error	
	151	System error	Number of sensor units error	
	152	System error	Initial read error	
1-16 (Sensor)	1	An overcurrent was detected through the control output. (<i>ErC</i>)		<ul style="list-style-type: none"> Check whether the load resistance value is too low. Check whether the wire is shortcircuited.
	2	(FS-N40/N10 Series) Does not occur. (Models other than FS-N40/N10 Series) Signals from the sensor head are not conveyed properly. (<i>ErH</i>)		Check the following matters and turn the power OFF and ON. <ul style="list-style-type: none"> 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.
	3	The internal data write/read failed.		Cycle power. If operation is not recovered, initialize the settings.

Error ID number	Code	Details	Cause	Actions
1-16 (Sensor)	5	(FD-Q/FD-X Series) Counter flow happens.		Set the flow direction according to the fluid flow direction. For details, see the instruction manual of the sensor.
		(Other Series) Does not occur.		-
	6	(FS-N40/N10/LV-N10/PS-N10 Series) The DATUM warning output turned ON while using the DATUM function. <ul style="list-style-type: none"> The received light amount is less than the DATUM warning output level. The raw received light amount value is 50 or less 		<ul style="list-style-type: none"> 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.
		(FD-Q/FD-X Series) Sensor cannot receive detection signal.		Check items such as the installation, piping, and fluid status according to the instruction manual of the sensor.
		(Other Series) Does not occur.		-
	7	(FS-N40/N10 Series) The LED light amount drop exceeds the APC compensation limit.		<ul style="list-style-type: none"> Set the APC function to OFF. Replace the sensor if advanced detection (APC function) is required.
		(LV-N10/PS-N10/AP-N10/FD-X Series) No error occurred.		-
		(LR-T/LR-W/FD-Q Series) The settings do not match between the sensor and MU-N.		Refer to the sensor User's manual and complete the initial setting (synchronization of the sensor and MU-N).
	8	A communication error has occurred between this device and the sensor.		Check the connection between this device and the sensor amplifier, and then restart the device.

■ **Warning list**


There are no warnings which occur with the NU-EP1.
The following warnings may occur with the sensor.

● **Type of warning**


Sensor	Warning occurrence condition
FS-N40 Series	Alarm is ON when "Limit Detection" is used.
FS-N14*	Alarm is ON when "Limit setting detection function" is used.
LV-N10 Series	
FD-X Series	Alarm is ON when "Bubble alert" is used.
Other models	No warning occurs.

Refer to each sensor amplifier's manual for details on the Limit Detection function.

- **Procedures to confirm the warning**

Read  "Sensor Warning Status" (page 3-11) which is assigned to the cyclic communication's IN area.

- **Functions which Cannot be Set in Duplicate**

Some functions of the sensor amplifier cannot be set in duplicate. For the details, refer to  "Functions which Cannot be Set in Duplicate" (page 5-35).

Checking the Device Compatibility

The compatibility check is a function executed when the sensor communicates with the NU-EP1. This function checks that the device set with the scanner matches the NU-EP1 to prevent communicating with the wrong device. This function is executed at the moment the connection is opened.

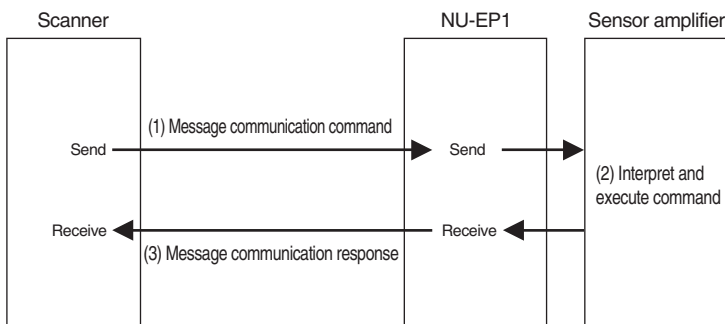
Refer to the respective scanner manual for details on using the scanner.

This section explains the message communication function and usage methods.

■ What is message communication (Explicit messaging)?

Message communication is a function which communicates by issuing commands at a random timing using the objects and services (Service Codes) prepared for each EtherNet/IP device. Message communication is used for applications which do not require the punctuality of cyclic communication, such as when reading and writing adaptor settings.

The objects and service codes which can be used with message communication include those which are specified as a standard and those which are unique to the device. Using the objects and services unique to the NU-EP1, data can be monitored, parameters can be read and written, and operations such as reset can be executed.



Reference

The NU-EP1 message communication function supports CIP defined UCMM (unconnected) and Class 3 (connected) message communication.

Configuring Message Communication

The following settings are required to execute message communication with the NU-EP1.

[NU-EP1]

No settings are required for the NU-EP1.

[Scanner]

Set the applicable service, Class ID, Instance ID, Attribute ID and service data, and send the command used for message communication.

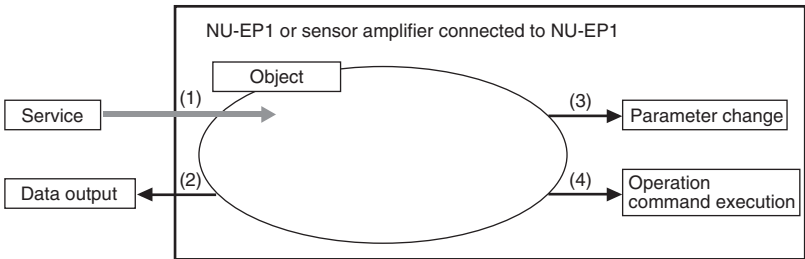
 "Objects and Services" (page 3-28)

Refer to the scanner manual for details on the setting methods and applicable commands.

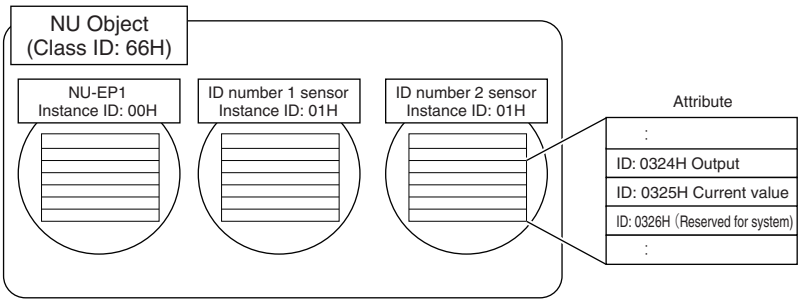
Objects and Services

With message communication, data is exchanged using objects and services.

When (1) a service is executed to an NU-EP1 object, actions such as (2) data output, (3) parameter changes or (4) designated operation execution are performed.

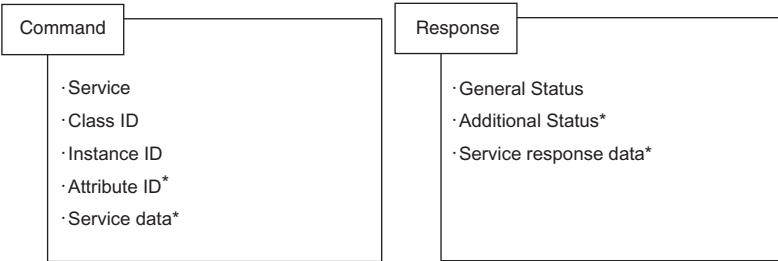


For example with the NU Object, one instance is prepared for each sensor amplifier connected to the NU-EP1. By reading the attributes which correspond to each instance's current incoming light amount value, the current incoming light amount value for each sensor amplifier corresponding to that instance can be read out.



Reference With the EtherNet/IP (CIP), a method called "object modeling" is used to express the device. The device is handled as a group of objects. Objects abstractly express the configuration elements in the device. The class is a group of objects for expressing the same type of configuration elements. An instance actually expresses a specific object contained in a class. Each instance in the class has the same attribute group, but each uses a unique attribute value.

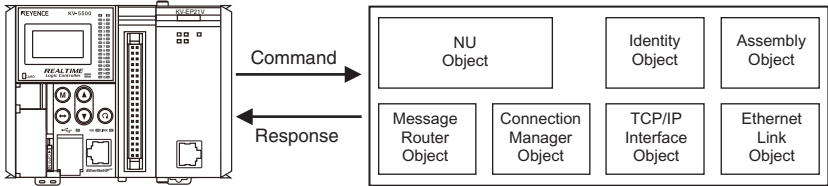
Reference To execute a service to the NU-EP1, send a command from the scanner. The NU-EP1 then returns the service execution results as a response. Commands require a service, class ID, instance ID, attribute ID *, and setting value (service data)* when writing parameters.



* May be unnecessary, depending on the command being used.
"Basic Format for Message Communication and Flow of Process" (page 3-30)

Objects Usable with NU-EP1

A list of objects which can be used with the NU-EP1 is provided in this section.
EtherNet/IP unit



Object name	Class ID	Description	Reference page
NU Object	66H	This object provides the status of the NU-EP1 or sensor amplifier connected to the NU-EP1, and writes/reads the parameters. This object is unique to the NU-EP1.	3-32
Identity Object	01H	This object provides the identification information, general information and reset service.	5-19
Message Router Object	02H	This object provides the connection point for message communication.	5-22
Assembly Object	04H	This object provides access to the devices exchanged with cyclic communication. Data cannot be sent to a device which does not support cyclic communication.	5-23
Connection Manager Object	06H	This object is used for connection type communication.	5-25

Object name	Class ID	Description	Reference page
TCP/IP Interface Object	F5H	This object provides the structure for setting the TCP/IP network interface. The IP address, subnet mask and gateway, etc., can be set.	5-27
Ethernet Link Object	F6H	This object provides the Ethernet status information.	5-31



Basic Format for Message Communication and Flow of Process

The EtherNet/IP scanner and NU-EP1 communicate by exchanging Explicit messages. The following section gives a basic example of the command format of sent Explicit messages and the response format returned from the NU-EP1 to the scanner.

● Commands

● Command format

Item	Description
Service code ^{*1}	Designates the service code to be used.
Class ID	Designates the class ID according to the service ^{*1} being used.
Instance ID	Designates the instance ID according to the service ^{*1} being used.
Attribute ID	Designates the attribute ID according to the service ^{*1} being used.
Service data	Designates the service according to the service ^{*1} being used.

^{*1} Refer to  "How to Use NU Objects" (page 3-32) or  "Objects for Use with the NU-EP1" (page 5-18) for details on the usable services.

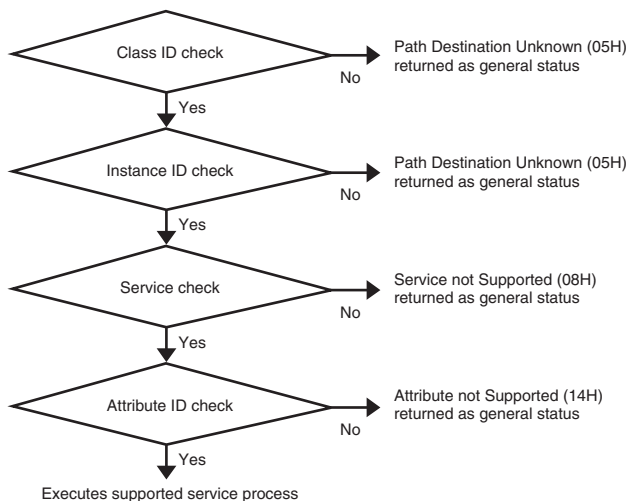
● Responses

● Response format

Item	Description
General status	Returns a general status in respect to the command. 00H is returned when normal.
Additional status	Returns the additional status.
Service response data	Returns the service response data in respect to the command.

■ Command processing order and error response

Check whether each ID is within the supported range with the following process.



● Supplement for object processing

- Get_Attribute_Single and Get_Attributes_All are executed regardless of the send service data.
- If the service (Get_Attributes_All, Reset) does not designate an attribute ID, the Attribute ID is ignored when executing the service.
- If Set_Attribute_Single is designated for an attribute which cannot be written (Set), "0EH" (Attribute not settable) is returned to the general status.
- If Set_Attribute_Single is designated for a writeable attribute and the writing size is less than the attribute size, the general status "13H" (Not enough data) will be returned. If the writing size is larger than the attribute size, the excessive data is ignored when executing the service.


How to Use NU Objects



This section explains how to carry out message communication using NU Objects.

(1) Reading data from sensor amplifier


Each parameter is read from the NU-EP1 or a sensor amplifier connected to the NU-EP1.

● Command format

Refer to  "Parameter List" (page 3-37) and designate the instance ID / attribute ID according to the data to be read.

Item	Value
Service code (HEX)	0EH (Get Attribute Single)
Class ID (HEX)	66H
Instance ID (DEC)	00 : NU 01 to 16 : Sensor ID number  "Assigning the Sensor ID Number" (page 3-4)
Attribute ID (HEX)	 "Parameter List" (page 3-37)
Service data	-


● Response format




Item	Value
General status (HEX)	 "General status" (page 3-36)
Service response data	-

(2) Writing data to sensor amplifier


Parameters are written to the NU-EP1 or a sensor amplifier connected to the NU-EP1.

● **Command format**

Refer to  "Parameter List" (page 3-37) and designate the instance ID / attribute ID / service according to the data to be written.

Item	Value
Service code (HEX)	10H (Set Attribute Single)
Class ID (HEX)	66H
Instance ID (DEC)	00 : NU 01 to 16 : Sensor ID number  "Assigning the Sensor ID Number" (page 3-4)
Attribute ID (HEX)	 "Parameter List" (page 3-37)
Service data	 "Parameter List" (page 3-37)


● **Response format**



Item	Value
General status (HEX)	 "General status" (page 3-36)
Service response data	-

(3) Issuing operation command to sensor amplifier


An operation command, such as sensitivity calibration, is issued to a sensor amplifier connected to the NU-EP1.

● **Command format**

Refer to "Attribute IDs corresponding to operation commands" of  "Parameter List" (page 3-37) and designate the instance ID / attribute ID.

Item	Value
Service code (HEX)	4BH
Class ID (HEX)	66H
Instance ID (DEC)	01 to 16 :Sensor ID number  "Assigning the Sensor ID Number" (page 3-4)
Attribute ID (HEX)	 "Parameter List" (page 3-37)
Service data	-

● **Response format**

Item	Value
General status (HEX)	 "General status" (page 3-36)
Service response data	-

(4) Locking to disable sensor amplifier operations

A batch key lock is applied to the sensor amplifiers connected to the NU-EP1.

● **Command format**

Refer to the following chart and designate the parameter.


Item	Value
Service code (HEX)	4CH
Class ID (HEX)	66H
Instance ID (DEC)	00 : NU
Attribute ID (HEX)	-
Service data	00H : Key lock cancel 01H : Key lock execute 02H : PIN key lock execute 03H : Communication key lock execute

- Reference

PIN key lock: The PIN set in the sensor amplifier is required to cancel this setting from the sensor amplifier.

Communication key lock: This cannot be canceled from the sensor amplifier.

● **Response format**

Item	Value
General status (HEX)	 "General status" (page 3-36)
Service response data	-

● **General status**

The responses made when using each service are shown below.

- (1) Parameter read: Service code 0EH
- (2) Parameter write: Service code 10H
- (3) Operation command: Service code 4BH
- (4) Batch lock setting: Service code 4CH

General status	Command type				Details
	(1)	(2)	(3)	(4)	
00H	○	○	○	○	Normal end
05H	○	○	○	○	Instance ID is out of range.
08H	-	-	○	○	This service is not supported by designated ID, or cannot be executed.
09H	-	○	-	○	Written data is out of range.
0CH	-	-	○	-	Execution of operation command failed. Check that sensor amplifier can execute operation command.
0EH	-	○	-	-	Writing was attempted to unwriteable attribute ID.
10H	○	○	○	-	System is starting up. Try again.
13H	-	○	-	○	Service data size is less than specified.
14H	○	○	○	-	Attribute ID is out of range.
16H	○	○	○	-	Sensor amplifier corresponding to designated instance ID is not connected.
1FH	○	○	○	-	This service is supported with designated instance ID but cannot be used with designated attribute ID. C350H is stored in additional status.
FEH	○	○	○	○	System error. Contact your nearest Keyence office.

3-5 Parameter List

This section explains the attribute IDs and operation commands used for each sensor amplifier's message communication, including error codes and warning codes.

Reading the Table

Reading the attribute ID

Example) Excerpt from NU Object attribute ID

(1)	(2)	(3)	(4)	(5)	(6)
Attribute ID	Name	Description	Data type	Attribute	Value
69H (105)	Output	Indicates the sensor output. Select from fast output or current value continuous output.	WORD	R	bit0 to 15: Output for ID number 1 to 16

Item	Description
(1) Attribute ID	Expresses the attribute ID as a hexadecimal (decimal).
(2) Name	Indicates the attribute name.
(3) Description	Describes the attribute, and indicates the read data, and the range of parameters which can be set.
(4) Data type	Indicates the attribute data type.
(5) Attribute	Indicates the direction of services on the attribute ID. R (Read): The attribute values can be read using Get_Attribute_Single and Get_Attributes_All. W (Write): Can write a value into the attributes using Set_Attribute_Single.
(6) Value	Describes the parameter value which can be set.

Data type

The data type is defined in the following manner by the EtherNet/IP specifications.

Data type	Description	Range	
		Minimum	Maximum
INT	Signed 16-bit integer	-32768	32767
UINT	Unsigned 16-bit integer	0	65535
WORD	Bit string: 16-bit	-	-
STRING	Character string (2-byte length information + 1-byte per 1-character array)	-	-

3-5 Parameter List

NU-EP1





NU-EP1 (Instance ID: 0)

Attribute ID	Name	Description	Data type	Attribute	Value
64H (100)	Status	Indicates the status of this unit and connected sensor amplifiers.	2byte WORD	R	Bit0: NU-EP1 Error Status Bit1 to 7: Reserved Bit8: Updating Sensor Setting Bit9: Sensor EEPROM Busy Bit10: Sensor External Input Busy Bit11: Sensor Setting Error Bit12: Reserved Bit13: Sensor Ready Bit14: Warning Status Bit15: Error Status
65H (101)	Sensor Error Status	Indicates the error status of the connected sensor amplifiers.	2byte WORD	R	Bit0 to 15: ID number 1 to 16 error status
66H (102)	Sensor Warning Status	Indicates the warning status of the connected sensor amplifiers.	2byte WORD	R	Bit0 to 15: ID number 1 to 16 warning status
67H (103)	L-on/D-on (N.O./N.C.)	Indicates the status of L-on/D-on (N.O./N.C.) of each amplifier.	2byte WORD	R	Bit0 to 15: ID number 1 to 16 L-on/D-on status
68H (104)	Current Value Property	Indicates the status of the current value of each amplifier.	2byte WORD	R	Bit0 to 15: ID number 1 to 16 current value status ¹
69H (105)	Output	Indicates the status of output of each amplifier. (attribute ID: B3H)	2byte WORD	R	Bit0 to 15: ID number 1 to 16 output
6AH (106) to 6BH (107)	Reserved for system	-	-	-	-
6CH (108)	Error ID Number	Indicates the ID number of the unit experiencing an error. ¹	2byte UINT	R	0: ID No. of the NU-EP1 1 to 16: ID No. of the sensor amplifier
6DH (109)	Error Code	Indicates the Error code that is occurring.	2byte UINT	R	0: No error 1: Error 1 ... 7: Error 7
6EH (110)	Warning ID Number	Indicates the ID number of the unit issuing a warning.	2byte UINT	R	
6FH (111)	Warning Code	Indicates the Warning code that is occurring.	2byte UINT	R	0: No warning 1: Error 1 ... 7: Error 7
70H (112)	Setting Error ID Number	Indicates the ID number of the unit experiencing a setting problem.	2byte UINT	R	0: No setting error 1 to 16: ID No. of the sensor amplifier
71H (113) to 73H (115)	Reserved for system	-	-	-	-
74H (116)	Fast Output	Indicates the status of the fast output of each amplifier.	2byte WORD	R	Bit0 to 15: ID number 1 to 16 fast output status
75H (117)	Current Value Sync. Output	Indicates the status of current value sync. output of each amplifier.	2byte WORD	R	Bit0 to 15: ID number 1 to 16 current value sync. output status

Attribute ID	Name	Description	Data type	Attribute	Value
76H (118) to 7FH (127)	Reserved for system	-	-	-	-
80H (128)	Updating Sen- sor Setting	Indicates the update status of each amplifier.	2byte WORD	R	Bit0 to 15: ID number 1 to 16 updating sensor setting sta- tus
81H (129)	Sensor EEPROM Busy	Indicates the EEPROM update status of each amplifier.	2byte WORD	R	Bit0 to 15: ID number 1 to 16 sensor EEPROM busy status
82H (130)	Sensor Exter- nal Input Busy	Indicates the external input status of each amplifier.	2byte WORD	R	Bit0 to 15: ID number 1 to 16 sensor external input busy status
83H (131)	Sensor Setting Error	Indicates the status of the setting error bit of each amplifier.	2byte WORD	R	Bit0 to 15: ID number 1 to 16 sensor setting error status
84H (132)	Reserved for system	-	-	-	-
85H (133)	Sensor Ready	Indicates the status of the Sensor Ready bit of each amplifier.	2byte WORD	R	Bit0 to 15: ID number 1 to 16 sensor ready status
86H (134) to 8CH (140)	Reserved for system	-	-	-	-
8DH (141)	Current Value Invalid	Indicates the current value invalid status of each sen- sor amplifier.	2byte WORD	R	Bit0 to 15: ID number 1 to 16 current value invalid status ^{*1}
8EH (142)	Current Value Under Range	Indicates the current value under range status of each sensor amplifier.	2byte WORD	R	Bit0 to 15: ID number 1 to 16 current value under range status ^{*1}
8FH (143)	Current Value Over Range	Indicates the current value over range status of each sensor amplifier.	2byte WORD	R	Bit0 to 15: ID number 1 to 16 current value over range sta- tus ^{*1}
90H (144)	1st Sensor ID Number	Indicates the ID number of the 1st sensor amplifier.	2byte UINT	R	0: Sensor not connected 1 to 16: ID number of con- nected sensor
91H (145) to 9EH (158)		• • •			
9FH (159)	16th Sensor ID Number	Indicates the ID number of the 16th sensor amplifier.	2byte UINT	R	0: Sensor not connected 1 to 16: ID number of con- nected sensor
A0H (160) to AFH (175)	Reserved for system	-	-	-	-
B0H (176)	Sensor Status Mask Setting	Set up the condition to determine if the MS LED blinks in red when the sen- sor error or warning occurs.	2byte UINT	R/W	0: Not mask 1: Mask
B1H (177)	Sensor Con- nected Number	Indicates the number of amplifiers connected.	2byte UINT	R	0: Sensor not connected 1 to 16: Number of connected sensor amplifiers
B2H (178)	Sensor Total ID Number	Indicates the total number of sensor ID.	2byte UINT	R	0 to 16
B3H (179)	Output Select Setting	Select the type of output opened via cyclic communi- cation.	2byte UINT	R/W	0: Fast Output 1: Sync. Output

3-5 Parameter List

NU-EP1

Attribute ID	Name	Description	Data type	Attribute	Value
B4H (180) to 02FFH (767)	Reserved for system	-	-	-	-
0300H (768)	Error Code (ID number 0)	Indicates the error code of ID number 0.	2byte UINT	R	 "Error code list" (page 3-23)
0301H (769)	Error Code (ID number 1)	Indicates the error code of ID number 1.	2byte UINT	R	 "Parameter List" (page 3-37)
0302H (770) to 030FH (783)	• • •				
0310H (784)	Error Code (ID number 16)	Indicates the error code of ID number 16.	2byte UINT	R	 "Parameter List" (page 3-37)
Refer to the attribute IDs of sensor amplifiers connected to each ID number.  "Parameter List" (page 3-37)					

*1 For details, refer to "Current Value Property of the Sensor" (page 5-43).

FS-N40/N42*/N44* (Instance ID : 1 to 16)

Refer to "How to Use NU Objects" (page 3-32) for how to use the parameters.
Designate the ID number of the installed sensor for the instance ID.

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0320H (800)	Group1 Entry count	Indicates the number of entries in Group 1.	2byte UINT	R	18
0321H (801)	Error Information	Indicates error information. When an error occurs, the corresponding bit is turned ON.	2byte 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
0322H (802)	Warning Information	Indicates warning information. When a warning occurs, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Limit Detection
0323H (803)	Warning Function	Indicates the operating status of the warning function. When the warning function is operating, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Limit Detection
0324H (804)	Output	Indicates the output status of the sensor. When the output is ON, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Out 1 Bit1: Out2 ¹
0325H (805)	Current Value	Indicates the current value of received light intensity.	2byte UINT	R	0 to 65535
0326H (806)	Reserved	-	-	-	-
0327H (807)	Reserved	-	-	-	-
0328H (808)	Raw Value	Indicates the received light intensity before correction with the Preset, DATUM, or Zero-shift functions.	2byte UINT	R	0 to 65535
0329H (809)	Peak-Hold Value	Indicates the peak value (or the max bottom value) of received light intensity (depending on the settings of Hold display).	2byte UINT	R	0 to 65535
032AH (810)	Bottom-Hold Value	Indicates the bottom value (or the min peak value) of received light intensity (depending on the settings of Hold display).	2byte UINT	R	0 to 65535
032BH (811)	Reserved	-	-	-	-
032CH (812)	Peak-Hold Minimum Value	Indicates the lowest value among max values of received light intensity during the time period when the setting value of received light intensity is exceeded.	2byte UINT	R	0 to 65535

3-5 Parameter List

FS-N40/N42*/N44*

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
032DH (813)	Preset/Datum Internal Setting Value	Indicates the setting value before scaling with the Pre-set/DATUM function.	2byte UINT	R	0 to 65535
032EH (814)	Display Customize	Indicates the operating status of Readings Correction function.	2byte INT	R	0: No Customize / DATUM 1: Preset 2: Zero-shift 3: Work Preset 4: Work Preset (Reverse)
032FH (815)	Slide Switch Status	Indicates the status of the Slide Switch.	2byte INT	R	0: Selecting [SEL]/[1 ch] 1: Selecting [TERA]/[2ch]
0330H (816)	Saturation Canceling status	Indicates the status of the Saturation Cancel function.	2byte INT	R	0: Off 1: On
0331H (817)	Operation Mode	Indicates the current operation mode of the sensor.	2byte INT	R	0: Normal Operation 1: LED off 2: Sleep 3: Pause
0332H (818)	Operation Mode Setting	Set the operation mode of the sensor.	2byte INT	R/W	0: Normal Operation ● 1: LED off 2: Sleep 3: Pause
0333H (819) to 033FH (831)	Reserved	-	-	-	-
0340H (832)	Group2 Entry count	Indicates the number of entries that can be set in Group 2.	2byte UINT	R	9
0341H (833)	Setting Value (Output 1/ Area Hi)	Indicates the setting value of the output 1. The upper limit of the setting value is displayed when in Area Detection mode.	2byte UINT	R/W	0 to 65535 (Default: 100)
0342H (834)	Setting Value (Output2)	Indicates the setting value of Output 2.	2byte UINT	R/W	0 to 65535 (Default: 100)
0343H (835)	Reserved	-	-	-	-
0344H (836)	Setting Value (Area Low)	Indicates the lower limit of the setting value in Area Detection mode.	2byte UINT	R/W	0 to 65535 (Default: 100)
0345H (837)	Reserved	-	-	-	-
0346H (838)	Reserved	-	-	-	-
0347H (839)	Limit Detection	Indicates if Limit Detection is enabled.	2byte INT	R/W	0: Off ● 1: On
0348H (840)	Limit Detection Point	Indicates the Limit Detection point as a ratio defining the setting value (output 1) as "100".	2byte INT	R/W	0 to 100 (Default: 5)
0349H (841)	Limit Detection Reset Method	Indicates the reset method of the Limit Detection.	2byte INT	R/W	0: User reset ● 1: Auto reset
034AH (842) to 034FH (847)	Reserved	-	-	-	-
0350H (848)	[Custom] Group2 Entry count	Indicates the number of entries that can be set in Group 2 custom save area.	2byte UINT	R	9

3-5 Parameter List

FS-N40/N42*/N44*

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0351H (849)	[Custom]Set- ting Value (Output 1/ Area Hi)	Custom save area for "Set- ting Value (Output1)".	2byte UINT	R/W	0 to 65535 (Default: 100)
0352H (850)	[Custom]Set- ting value (Output 2)	Custom save area for "Set- ting Value (Output2)".	2byte UINT	R/W	0 to 65535 (Default: 100)
0353H (851)	Reserved	-	-	-	-
0354H (852)	[Custom]Set- ting Value (Area Low)	Custom save area for "Set- ting Value (Area Low)".	2byte UINT	R/W	0 to 65535 (Default: 100)
0355H (853)	Reserved	-	-	-	-
0356H (854)	Reserved	-	-	-	-
0357H (855)	[Custom]Limit Detection	Custom save area for "Limit Detection".	2byte INT	R/W	0: Off ● 1: On
0358H (856)	[Custom]Limit Detection Point	Custom save area for "Limit Detection Point".	2byte INT	R/W	0 to 100 (Default: 5)
0359H (857)	[Custom] Reset Method	Custom save area for "Reset Method".	2byte INT	R/W	0: User reset ● 1: Auto reset
035AH (858) to 035FH (863)	Reserved	-	-	-	-
0360H (864)	Group3 Entry count	Indicates the number of entries that can be set in Group 3.	2byte UINT	R	10
0361H (865)	Key Lock Sta- tus	Indicates the status of the Key Lock.	2byte INT	R/W	0: Unlock ● 1: Key Lock 2: PIN Code Lock 3: Communication Lock
0362H (866)	PIN Code	Indicates the password for Key Lock.	2byte INT	R/W	0 to 9999 (Default: 0)
0363H (867)	Slide Switch Lock	Indicates lock status of the Slide Switch. When locked, the Slide Switch is dis- abled, with the value always being "SEL" (When using FS-N44*, "1").	2byte INT	R/W	0: Unlock ● 1: Lock
0364H (868)	L-on/D-on (N.O./N.C.)	Indicates whether the out- put is ON for light (L-on) or ON for dark (D-on). The corresponding bit is turned ON for D-on or N.C..	2byte WORD	R/W	Bit0: Output 1 Bit1: Output 2 *1 (Default: 0)

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3-5 Parameter List

FS-N40/N42*/N44*

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0365H (869)	Power Modes	Indicates the Power mode.	2byte INT	R/W	0: S-HSPD (Response Time 23us) 1: HSPD (Response Time 50us) 2: FINE (Response Time 250us) ● 3: TURBO (Response Time 500us) 4: SUPER (Response Time 1ms) 5: ULTRA (Response Time 4ms) 6: MEGA (Response Time 16ms) 7: TERA (Response Time 64ms)
0366H (870)	Reserved	-	-	-	-
0367H (871)	Percentage Calib. Target Value	Indicates target value of percentage calibration when the Sensitivity Setting is set to Percentage Cali- bration.	2byte INT	R/W	-99 to 99 (Default: -10)
0368H (872)	Area % Set- ting	Indicates the target value for percentage calibration when the Sensitivity setting is set to percentage calibra- tion and the Detection mode is set to Area detec- tion mode.	2byte INT	R/W	1 to 99 (Default: 10)
0369H (873)	Hysteresis	Indicates the hysteresis setting.	2byte INT	R/W	0: Level 1 1: Level 2 2: Level 3 ● 3: Level 4 4: Level 5
036AH (874)	Display Bar	Indicates if the Bar Graph is enabled on the display.	2byte INT	R/W	0: Off ● 1: On
036BH (875)	Key Lock Method	Indicates the method of Key Lock when being set via the buttons on the sensor.	2byte INT	R/W	0: Normal ● 1: PIN Code
036CH (876) to 036FH (879)	Reserved	-	-	-	-
0370H (880)	[Custom] Group3 Entry count	Indicates the number of entries that can be set in Group 3 custom save area.	2byte UINT	R	10
0371H (881)	[Custom]Key Lock Status	Custom save area for "Key Lock Status".	2byte INT	R/W	0: Unlock ● 1: Key Lock 2: PIN Code Lock 3: Communication Lock
0372H (882)	[Custom]PIN Code	Custom save area for "PIN Code".	2byte INT	R/W	0 to 9999 (Default: 0)
0373H (883)	[Custom]Slide Switch Lock	Custom save area for "Slide Switch Lock".	2byte INT	R/W	0: Unlock ● 1: Lock
0374H (884)	[Custom]L-on/ D-on (N.O./ N.C.)	Custom save area for "Lon/ D-on (N.O./N.C.)".	2byte INT	R/W	Bit0: Output 1 Bit1: Output 2 *1 (Default: 0)

3-5 Parameter List

FS-N40/N42*/N44*

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0375H (885)	[Custom] Power Mode	Custom save area for the "Power Mode".	2byte INT	R/W	0: S-HSPD (Response Time 23us) 1: HSPD (Response Time 50us) 2: FINE (Response Time 250us) ● 3: TURBO (Response Time 500us) 4: SUPER (Response Time 1ms) 5: ULTRA (Response Time 4ms) 6: MEGA (Response Time 16ms) 7: TERA (Response Time 64ms)
0376H (886)	Reserved	-	-	-	-
0377H (887)	[Custom]Percentage Carib. Target Value	Custom save area for the "Percentage Calib.Target Value".	2byte INT	R/W	-99 to 99 (Default: -10)
0378H (888)	[Custom]Area % Setting	Custom save area for the "Area Percentage Setting".	2byte INT	R/W	1 to 99 (Default: 10)
0379H (889)	[Custom] Hysteresis	Custom save area for the "Hysteresis".	2byte UINT	R/W	0: Level 1 1: Level 2 2: Level 3 ● 3: Level 4 4: Level 5
037AH (890)	[Custom]Display Bar	Custom save area for the "Display Bar".	2byte INT	R/W	0: Off ● 1: On
037BH (891)	[Custom]Key Lock Method	Custom save area for the "Key Lock Method".	2byte INT	R/W	0: Normal ● 1: PIN Code
037CH (892) to 037FH (895)	Reserved	-	-	-	-
0380H (896)	Group4 Entry count	Indicates the number of entries that can be set in Group 4.	2byte UINT	R	9
0381H (897)	Output Timer (Output 1)	Indicates the settings for the Output 1 timer.	2byte INT	R/W	0: Timer Off ● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer 4: On-delay Off-delay 5: On-delay One-shot
0382H (898)	Timer Duration (Output 1)	Indicates the Timer Duration for the Output 1 timer. Indicates the Timer Duration for the "On-delay" when the "Output timer (Output 1)" is set to "On-delay Off-delay" or "On-delay One shot". (Unit: ms)	2byte INT	R/W	1 to 9999 (Default: 10)
0383H (899)	Timer Duration 2 (Output 1)	Indicates the Timer Duration for the "Off-delay" or the "One-shot" when the "Output timer (Output 1)" is set to "On-delay Off-delay" or "On-delay One shot". (Unit: ms)	2byte INT	R/W	1 to 9999 (Default: 10)

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3-5 Parameter List

FS-N40/N42*/N44*

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0384H (900)	Detection Mode (Output 1)	Indicates the detection mode for Output 1.	2byte INT	R/W	0: Normal Detection Mode ● 1: PREST 2: Percentage Calibration 3: Zero-shift Calibration 4: Area Detection Mode 5: Area % Mode 6: DATUM Mode 7: Rising Edge Detection Mode 8: Falling Edge Detection Mode
0385H (901)	DATUMSpeed	Indicates the DATUM correction speed.	2byte INT	R/W	0: Level1: (Slow) ● 1: Level2: (Normal) 2: Level3: (Fast)
0386H (902)	DATUM Warning Level	Indicates the DATUM alarm output level.	2byte INT	R/W	0 to 100 (Default: 50)
0387H (903)	External Input	Indicates the control input settings.	2byte INT	R/W	0: Not use ● 1: External Calibration 2: Zero-shift 3: Reset 4: Transmission OFF 5: Pause Mode 6: Sleep Mode
0388H (904)	Pause Mode	Sets the output status of the sensor to Pause mode.	2byte INT	R/W	0: Always Off ● 1: Always On 2: Keep Output
0389H (905)	Attenuation	Switch the lighting power.	2byte INT	R/W	1 to 100 (Default: 100)
038AH (906) to 038FH (911)	Reserved	-	-	-	-
0390H (912)	[Custom] Group4 Entry count	Indicates the number of entries that can be set in Group 4 custom save area.	2byte UINT	R	
0391H (913)	[Custom]Out- put Timer (Output 1)	Custom save area for "Output Timer (Output1)".	2byte INT	R/W	0: Timer Off ● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer 4: On-delay Off-delay 5: On-delay One-shot
0392H (914)	[Custom] Timer Dura- tion (Output 1)	Custom save area for "Timer Duration (Output 1)".	2byte INT	R/W	1 to 9999 (Default: 10)
0393H (915)	[Custom] Timer Dura- tion 2 (Output 1)	Custom save area for "Timer Duration 2 (Output 2)".	2byte INT	R/W	1 to 9999 (Default: 10)
0394H (916)	[Custom] Detection Mode	Custom save area for "Detection Mode (Output1)".	2byte INT	R/W	0: Normal Detection Mode ● 1: PREST 2: Percentage Calibration 3: Zero-shift Calibration 4: Area Detection Mode 5: Area % Mode 6: DATUM Mode 7: Rising Edge Detection Mode 8: Falling Edge Detection Mode
0395H (917)	[Custom] DATUMSpeed	Custom save area for "DATUM Speed".	2byte INT	R/W	0: Level1: (Slow) ● 1: Level2: (Normal) 2: Level3: (Fast)

3-5 Parameter List

FS-N40/N42*/N44*

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0396H (918)	[Custom] DATUM Warning Level	Custom save area for "DATUM Warning Level".	2byte INT	R/W	0 or 100 (Default: 50)
0397H (919)	[Custom] External Input	Custom save area for "Control Input".	2byte INT	R/W	0: Not use ● 1: External Calibration 2: Zero-shift 3: Reset 4: Transmission OFF 5: Pause Mode 6: Sleep Mode
0398H (920)	[Custom] Pause Mode	Custom save area for "Pause Mode".	2byte INT	R/W	0: Always Off ● 1: Always On 2: Keep Output
0399H (921)	[Custom] Attenuation	Custom save area for "Attenuation".	2byte INT	R/W	1 to 100 (Default: 100)
039AH (922) to 039FH (927)	Reserved	-	-	-	-
03A0H (928)	Group5 Entry count	Indicates the number of entries that can be set in Group 5.	2byte UINT	R	4
03A1H (929)	Output Timer (Output 2) *1	Indicates the settings of the Output 2 timer.	2byte INT	R/W	0: Timer Off ● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer 4: On-delay Off-delay 5: On-delay One-shot
03A2H (930)	Timer Duration (Output 2) *1	Indicates the Timer Duration for the Output 2 timer. Indicates the Timer Duration for the "On-delay" when the "Output timer (Output 2)" is set to "On-delay Off-delay" or "On-delay One shot". (Unit: ms)	2byte INT	R/W	1 to 9999 (Default: 10)
03A3H (931)	Timer Duration 2 (Output 2) *1	Indicates the Timer Duration for the "Off-delay" or the "One-shot" when the "Output timer (Output 2)" is set to "On-delay Off-delay" or "On-delay One shot". (Unit: ms)	2byte INT	R/W	1 to 9999 (Default: 10)
03A4H (932)	Detection Mode (Output 2) *1	Indicates the detection mode of Output 2.	2byte INT	R/W	0: Normal Detection Mode ● 1: Warning Output
03A5H (933) to 03AFH (943)	Reserved	-	-	-	-
03B0H (944)	[Custom] Group5 Entry count	Indicates the number of entries that can be set in Group 5 custom save area.	2byte UINT	R	4
03B1H (945)	[Custom] Output Timer (Output 2) *1	Custom area for "Output-Timer (Output 2)".	2byte INT	R/W	0: Timer Off ● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer 4: On-delay Off-delay 5: On-delay One-shot

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FS-N40/N42*/N44*

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
03B2H (946)	[Custom] Timer Duration (Output 2) *1	Custom save area for "Timer Duration (Output 2)".	2byte INT	R/W	1 to 9999 (Default: 10)
03B3H (947)	[Custom] Timer Duration 2 (Output 2) *1	Custom save area for "Timer Duration 2 (Output 2)".	2byte INT	R/W	1 to 9999 (Default: 10)
03B4H (948)	[Custom] Detection Mode (Output 2) *1	Custom save area for "Detection Mode (Out- put2)".	2byte INT	R/W	0: Normal Detection Mode ● 1: Warning Output
03B5H (949) to 03BFH (959)	Reserved	-	-	-	-
03C0H (960)	Group6 Entry count	Indicates the number of entries that can be set in Group 6.	2byte UINT	R	14
03C1H (961)	Flip Display	Indicates the display reverse setting.	2byte INT	R/W	0: Normal ● 1: Reverse
03C2H (962)	Sub Display	Indicates the sub display details.	2byte INT	R/W	0: Off ● 1: Excess Gain(%) 2: Display Hold 3: Gain(%) Hold 4: TAG Strings
03C3H (963)	Display Hold	Indicates hold details when the Display Hold is selected under the Sub-display.	2byte 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.
03C4H (964)	Reserved	-	-	-	-
03C5H (965)	Preset Satur- ation Level	Indicates the Presetatura- tion level.	2byte INT	R/W	100 to 200 (Default: 110)
03C6H (966)	Current Dis- play	Indicates the current dis- play.	2byte INT	R/W	0: Normal ● 1: Bar 2: Sub
03C7H (967)	Reserved	-	-	-	-
03C8H (968)	Display Bright- ness	Indicates the display bright- ness for the sensor.	2byte INT	R/W	0: Brightness 1 1: Brightness 2 2: Brightness 3 ●
03C9H (969)	Reserved	-	-	-	-
03CAH (970)	Active- Receiver Set- ting	Indicates the operation set- ting for the Active receiver.	2byte INT	R/W	0: Disable 1: Output Link ● 2: Reversed Operation 3: Always On
03CBH (971) to 03CDH (973)	Reserved	-	-	-	-
03CEH (974)	Language	Indicates the selected lan- guage for the display.	2byte INT	R/W	0: English ● 1: Japanese 2: Chinese 3: Deutsch
03CFH (975)	Reserved	-	-	-	-

Attribute ID	Name	Description	Data type	Attribute	Value
03D0H (976)	[Custom] Group6 Entry count	Indicates the number of entries that can be set in Group 6 custom save area.	2byte UINT	R	14
03D1H (977)	[Custom] Flip Display	Custom save area for the "Flip Display".	2byte INT	R/W	0: Normal ● 1: Reverse
03D2H (978)	[Custom] Sub Display	Custom save area for "Sub Display".	2byte INT	R/W	0: Off ● 1: Excess Gain(%) 2: Display Hold 3: Gain(%) Hold 4: TAG Strings
03D3H (979)	[Custom] Display Hold	Custom save area for "Display Hold".	2byte 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.
03D4H (980)	Reserved	-	-	-	-
03D5H (981)	[Custom] Pre-set Saturation Level	Custom save area for "Pre-set SaturationLevel". Indicates the value from custom save execution.	2byte INT	R/W	100 to 200 (Default: 110)
03D6H (982)	[Custom] Current Display	Custom save area for "Current Display".	2byte INT	R/W	0: Normal ● 1: Bar 2: Sub
03D7H (983)	Reserved	-	-	-	-
03D8H (984)	[Custom] Display Brightness	Custom save area for "Display Brightness".	2byte INT	R/W	0: Brightness 1 1: Brightness 2 2: Brightness 3 ●
03D9H (985)	Reserved	-	-	-	-
03DAH (986)	[Custom] Active-Receiver Setting	Custom save area for "Active-Receiver Setting".	2byte INT	R/W	0: Disable 1: Output Link ● 2: Reversed Operation 3: Always On
03DBH (987) to 03DDH (989)	Reserved	-	-	-	-
03DEH (990)	[Custom] Language	Custom save area for "Language".	2byte INT	R/W	0: English ● 1: Japanese 2: Chinese 3: Deutsch
03DFH (991)	Reserved	-	-	-	-
03E0H (992)	Group7 Entry count	Indicates the number of items (entries) that can be set in Group 7.	2byte UINT	R	10
03E1H (993)	Reserved	-	-	-	-
03E2H (994)	TAG Strings	Indicates the TAG character string.	8byte STRING	R/W	8 characters or less (Default: "") *2
03E3H (995) to 03E5H (997)	Reserved	-	-	-	-
03E6H (998)	ECO	Indicates operating status of the power save function.	2byte INT	R/W	0: Off ● 1: On 2: Full 3: All

3-5 Parameter List

FS-N40/N42*/N44*

● : Default value


Attribute ID	Name	Description	Data type	Attribute	Value
03E7H (999)	Auto Power Control	Indicates operating status of the APC function.	2byte INT	R/W	0: Off 1: On ●
03E8H (1000)	Display Gain	Indicates operating status of the display gain setting.	2byte INT	R/W	0: Standard ● 1: Full
03E9H (1001)	Interference Prevention	Indicates whether the number of interference prevention devices is doubled.	2byte INT	R/W	0: Standard ● 1: Double
03EAH (1002)	Parameter Save by Ext. Input	Indicates whether the Preset/Zero-shift settings are stored in EEPROM when executing Preset/Zero-shift with the external input.	2byte INT	R/W	0: No 1: Yes ●
03EBH (1003) to 03EFH (1007)	Reserved	-	-	-	-
03F0H (1008)	[Custom] Group7 Entry count	Indicates the number of entries that can be set in Group 7 custom save area.	2byte UINT	R	10
03F1H (1009)	Reserved	-	-	-	-
03F2H (1010)	[Custom]TAG Strings	Custom save area for "TAG strings".	2byte STRING	R/W	8 characters or less (Default: "") ²
03F3H (1011) to 03F5H (1013)	Reserved	-	-	-	-
03F6H (1014)	[Custom] Power Save	Custom save area for "Power Save".	2byte INT	R/W	0: Off ● 1: On 2: Full 3: All
03F7H (1015)	[Custom]APC	Custom save area for "APC".	2byte INT	R/W	0: Off 1: On ●
03F8H (1016)	[Custom]Display Gain	Custom save area for "Display Gain".	2byte INT	R/W	0: Standard ● 1: Full
03F9H (1017)	[Custom]Interference Prevention	Custom save area for "Interference Prevention".	2byte INT	R/W	0: Standard ● 1: Double
03FAH (1018)	[Custom] Parameter Save by Ext. Input	Custom save area for "Parameter Save by Ext. Input".	2byte INT	R/W	0: No 1: Yes ●
03FBH (1019) to 03FFH (1023)	Reserved	-	-	-	-
0400H (1024)	Group8 Entry count	Indicates the number of items (entries) that can be set in Group 8.	2byte UINT	R	9
0401H (1025)	ID Number Count	Indicates number of used IDs.	2byte INT	R	FS-N40/N42* : 1 FS-N44* : 2
0402H (1026)	Reserved	-	-	-	-
0403H (1027)	Reserved	-	-	-	-
0404H (1028)	Product Code	Indicates product code.	2byte INT	R	FS-N40/N42* : 2025 FS-N44* : 2026


FS-N40/N42*/N44*

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0405H (1029)	Revision	Indicates revision, with the upper bytes representing the major revision and the lower bytes representing the minor revision.	2byte INT	R	0100H to FFFFH
0406H (1030)	Product Name	Indicates model designation of the sensor.	STRING	R	FS-N40/N42* : "FS-N40/ N42*"** FS-N44* : "FS-N44**"
0407H (1031) to 040DH (1037)	Reserved	-	-	-	-
040EH (1038)	Series Code	Indicates series code.	2byte INT	R	FS-N40/N42* : 2025 FS-N44* : 2026
040FH (1039)	Series Version	Indicates series version.	2byte INT	R	1
0410H (1040)	Device Type	Indicates device type.	2byte INT	R	0
0411H (1041) to 041FH (1055)	Reserved	-	-	-	-

1 FS-N44 2-output type only.

*2 Refer to the  "List of Character String Codes" (page 5-44) for the character strings which can be used with this unit.

-  • [Custom]*** represents parameters that can be saved and recalled the FS-N40 series "custom save" function.
- "Entry count" indicates the number of parameters in the same group.

● Attribute IDs corresponding to operation commands (service 4BH)

The details of the operation command (service code 4BH) are designated with the instance ID (each ID number) and attribute ID.

Details on the selectable operation commands are given below.


Attribute ID	Name	Details
0301H(769)	Initialize	Executes initialization.
0302H(770)	Custom Save	Save the current settings to the "Custom Save" area.
0303H(771)	Maximum Sensitivity Calibration	Executes maximum sensitivity calibration.
0304H(772)	Percentage Calibration	Executes calibration as a percentage of the received light value.
0305H(773)	Two-point Calibration: 1st	Starts calibration the 1st point of 2-point calibration.
0306H(774)	Two-point Calibration: 2nd	Starts calibration the 2nd point of 2-point calibration.
0305H(773)	Positioning Calibration: 1st	Starts calibration the 1st point of positioning calibration.

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Attribute ID	Name	Details
0307H(775)	Positioning Calibration: 2nd	Starts calibration the 2nd point of positioning calibration.
0308H(776)	Full Auto Calibration: Start	Starts fully automatic calibration.
0309H(777)	Full Auto Calibration: Finish	Ends fully automatic calibration.
030AH(778)	Zero-shift Request	Executes zero shift.
030BH(779)	Zero-shift Cancel	Cancels zero shift.
030CH(780)	Preset Request	Executes preset.
030DH(781)	Preset Cancel	Cancels preset.
030EH(782)	Saturation Canceling: Request	Executes saturation canceling.
030FH(783)	Saturation Canceling: Cancel	Cancels saturation canceling.
0310H(784)	Reset Hold Value	Resets the held value.
0311H(785)	Work-Preset Request	Executes workpiece preset.
0312H(786)	Full Auto Preset: Start	Starts fully automatic (or maximum sensitivity) preset.
0313H(787)	Full Auto Preset: Finish	Ends fully automatic (or maximum sensitivity) preset.
0314H(788)	Maximum Sensitivity Preset Req.	Executes maximum sensitivity preset. (Preset can be executed without specifying the start and end.)
0316H(790)	Reset User	Load the settings from the "Custom Save" area.

FS-N10/N12 (Instance ID: 1 to 16)

Refer to  "How to Use NU Objects" (page 3-32) for details on using the parameters.

Designate the ID number of the installed sensor for the instance ID.

● : Default value

Attribute ID	Item	Description	Data type	Attribute	Value
0320H (800)	Group1 Entry count	Indicates the number of entries that can be set in Group 1.	2byte INT	R	22
0321H (801)	Error Information	Indicates error information. When an error occurs, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Over Current Error Bit1: Reserve Bit2: EEPROM Error Bit3 to 4: Reserve Bit5: DATUM Correction Error Bit6: APC Error Bit7: Sensor Communication Error
0322H (802)	Warning Information	Indicates warning information. When a warning occurs, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Limit Detection
0323H (803)	Warning Function	Indicates operating status of the warning function. When the warning function is operating, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Limit Detection
0324H (804)	Output	Indicates output status of the sensor. When the output is ON, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Output
0325H (805)	Current Value	Indicates current value of received light intensity.	2byte INT	R	0 to 9999
0326H (806) to 0327H (807)	Reserved for system	-	-	-	-
0328H (808)	Raw Value	Indicates the received light intensity before correction with Preset, DATUM, or Zero-shift functions.	2byte UINT	R	0 to 65535 ^{*1}
0329H (809)	Peak-Hold Value	Indicates the peak value (or the max bottom value) of received light intensity (depending on the settings of Hold display).	2byte INT	R	0 to 9999
032AH (810)	Bottom-Hold Value	Indicates the bottom value (or the min peak value) of received light intensity (depending on the settings of Hold display).	2byte INT	R	0 to 9999
032BH (811)	Reserved for system	-	-	-	-

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● : Default value

Attribute ID	Item	Description	Data type	Attribute	Value
032CH (812)	Peak-Hold Minimum Value	Indicates the lowest value among max values of received light intensity during the time period when the setting value of received light intensity is exceeded.	2byte INT	R	0 to 9999
032DH (813)	Preset/ DATUM Inter- nal Value	Preset/Indicates the setting value before scaling with the DATUM function.	2byte UINT	R	0 to 65535 ^{*1}
032EH (814)	Display Customize	Indicates the operating status of the Readings Correction function.	2byte INT	R	0: No Customize / DATUM ● 1: Preset 2: Zero-shift 3: Work preset ^{*2} 4: Work preset (Reverse) ^{*2}
032FH (815)	Slide Switch Status	Indicates the status of the amplifier Slide Switch.	2byte INT	R	0: Selecting SEL 1: Selecting MEGA
0330H (816)	Saturation Canceling	Indicates the status of the saturation canceling function.	2byte INT	R	0: Not Active 1: Active
0331H (817)	Operation Mode	Indicates the current operation mode of the sensor.	2byte INT	R	0: RUN 1: LED_OFF 2: SLEEP 3: PAUSE
0332H (818)	Operation Mode Setting	Set the operation mode of the sensor.	2byte INT	R/W	0: RUN ● 1: LED_OFF 2: SLEEP 3: PAUSE
0333H (819)	Recipe Select	Select the Recipe to be used when executing an operating command (Load Recipe Data).	2byte INT	R/W	0: Initialize ● 1: Custom 2: Fall 3: Percentage Calibration 4: Zero-shift 5: MEGA 6: Area Detection ^{*2} 7: 0 DATUM ^{*2}
0334H (820) to 033FH (831)	Reserved for system	-	-	-	-
0340H (832)	Group2 Entry count	Indicates the number of entries that can be set in Group 2.	2byte INT	R	14
0341H (833)	Setting Value (Output / Area High)	Indicates the setting value. The upper limit of the setting value is displayed when in Area Detection mode.	2byte INT	R/W	0 to 9999 (Default: 50)
0342H (834) to 0343H (835)	Reserved for system	-	-	-	-
0344H (836)	Setting Value (Area Low)	Indicates the lower limit of the setting value in Area detection mode.	2byte INT	R/W	0 to 9999 (Default:50)
0345H (837) to 0346H (838)	Reserved for system	-	-	-	-

Attribute ID	Item	Description	Data type	Attribute	Value
0347H (839)	Limit Setting Value	Indicates the setting value of the warning output when the Limit Detection function is used.	2byte INT	R/W	0 to 9999 (Default:0)
034BH (840) to 034FH (847)	Reserved for system	-	-	-	-
0350H (848)	[Custom] Group2 Entry count	Indicates the number of items (entries) that can be custom saved in Group 2.	2byte INT	R	7
0351H (849)	[Custom] Setting Value (Output/Area High)	Custom save area for "Setting Value". Indicates the value from custom save execution.	2byte INT	R/W	
0352H (849) to 0353H (850)	Reserved for system	-	-	-	-
0354H (852)	[Custom] Setting Value (Area Low)	Custom save area for "Setting Value (Area Low)". Indicates the value from custom save execution.	2byte INT	R/W	
0355H (853) to 0356H (854)	Reserved for system	-	-	-	-
0357H (855)	[Custom] Limit Setting Value	Custom save area for "Limit Setting Value". Indicates the value from custom save execution.	2byte INT	R/W	
0358H (856) to 035FH (863)	Reserved for system	-	-	-	-
0360H (864)	Group3 Entry count	Indicates the number of items (entries) that can be set in Group 3.	2byte INT	R	7
0361H (865)	Key Lock Status	Indicates status of Key lock.	2byte INT	R/W	0: Unlock ● 1: Key Lock 2: PIN Code Lock 3: Communication Lock
0362H (866)	PIN Code	Indicates password for Key lock.	2byte INT	R/W	0 to 9999 (Default:0)
0363H (867)	Slide Switch Lock ³	Indicates lock status of Slide Switch. When locked, the Slide Switch is disabled, with the value always being "SEL".	2byte INT	R/W	0: Unlock ● 1: Lock
0364H (868)	L-on/D-on (N.O./N.C.)	Indicates whether the output is ON for light (L-on) or ON (D-on) for dark. The corresponding bit is turned ON for D-on or N.C..	2byte INT	R/W	0: L-on (N.O.) ● 1: D-on (N.C.)

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● : Default value

Attribute ID	Item	Description	Data type	Attribute	Value
0365H (869)	Power Mode	Indicates the Power mode.	2byte INT	R/W	0: HIGH SPEED (Response Time 50μs) 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)
0366H (870)	Sensitivity Setting	Indicates the sensitivity setting method.	2byte INT	R/W	0: Normal Sensitivity Setting 1: Percentage Calibration 2: Zero-shift Calibration
0367H (871)	Percentage Calib. Target Value	Indicates target value of percentage calibration when the Sensitivity Setting is set to Percentage Calibration.	2byte INT	R/W	-99 to 99 (Default: -10)
0368H (872) to 036FH (879)	Reserved for system	-	-	-	-
0370H (880)	[Custom] Group3 Entry count	Indicates the number of items (entries) that can be custom saved in Group 3.	2byte INT	R	7
0371H (881)	[Custom] Key Lock Status	Custom save area for "Key Lock Status". Indicates the value from custom save execution.	2byte INT	R/W	
0372H (882)	[Custom] PIN Code	Custom save area for "PIN Code". Indicates the value from custom save execution.	2byte INT	R/W	
0373H (883)	[Custom] Slide Switch Lock ³	Custom save area for "Slide Switch Lock". Indicates the value from custom save execution.	2byte INT	R/W	
0374H (884)	[Custom] L-on/D-on (N.O./N.C.)	Custom save area for "L-on/D-on (N.O./N.C.)". Indicates the value from custom save execution.	2byte INT	R/W	
0375H (885)	[Custom] Power Mode	Custom save area for "Power Mode". Indicates the value from custom save execution.	2byte INT	R/W	
0376H (886)	[Custom] Sensitivity Setting	Custom save area for "Sensitivity Setting". Indicates the value from custom save execution.	2byte INT	R/W	
0377H (887)	[Custom] Percentage Calib. Target Value	Custom save area for "Percentage Calib. Target Value". Indicates the value from custom save execution.	2byte INT	R/W	

Attribute ID	Item	Description	Data type	Attribute	Value
0378H (888) to 037FH (895)	Reserved for system	-	-	-	-
0380H (896)	Group4 Entry count	Indicates the number of items (entries) that can be set in Group 4.	2byte INT	R	9
0381H (897)	Output Timer	Indicates the settings of the Output timer.	2byte INT	R/W	0: Timer off ● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer
0382H (898)	Timer Value	Indicates the timer value.	2byte INT	R/W	1 to 9999 (Default:10)
0383H (899)	Reserved for system	-	-	-	-
0384H (900)	Detection Mode	Indicates the detection mode.	2byte 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
0385H (901)	DATUM Speed	Indicates the DATUM correction speed.	2byte INT	R/W	0: Level1 (Slow) ● 1: Level2 (Normal) 2: Level3 (Fast)
0386H (902)	DATUM Warning Level	Indicates the DATUM alarm output level.	2byte INT	R/W	0 to 100 (Default: 50)
0387H (903)	Control Input	Indicates the control input settings.	2byte 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
0388H (904)	PAUSE Mode	Sets the output status of the sensor to PAUSE mode.	2byte INT	R/W	0: Always OFF ● 1: Always ON 2: Keep Output
0389H (905)	Light Emission Power	Switch the lighting power.	2byte INT	R/W	1 to 100 (Default: 100)
038AH (906) to 038FH (911)	Reserved for system	-	-	-	-
0390H (912)	[Custom] Group4 Entry count	Indicates the number of items (entries) that can be custom saved in Group 4.	2byte INT	R	9
0391H (913)	[Custom] Output Timer	Custom save area for "Output Timer". Indicates the value from custom save execution.	2byte INT	R/W	
0392H (914)	[Custom] Timer Value	Custom save area for "Timer Value". Indicates the value from custom save execution.	2byte INT	R/W	

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● : Default value

Attribute ID	Item	Description	Data type	Attribute	Value
0393H (915)	Reserved for system	-	-	-	-
0394H (916)	[Custom] Detection Mode	Custom save area for "Detection Mode". Indicates the value from custom save execution.	2byte INT	R/W	
0395H (917)	[Custom] DATUM Speed	Custom save area for "DATUM Speed". Indicates the value from custom save execution.	2byte INT	R/W	
0396H (918)	[Custom] DATUM Warning Level	Custom save area for "DATUM Warning Level". Indicates the value from custom save execution.	2byte INT	R/W	
0397H (919)	[Custom] Control Input	Custom save area for "Control Input". Indicates the value from custom save execution.	2byte INT	R/W	
0398H (920)	[Custom] PAUSE Mode	Custom save area for "PAUSE Mode". Indicates the value from custom save execution.	2byte INT	R/W	
0399H (921)	[Custom] Light Emission Power	Custom save area for "Light Emission Power". Indicates the value from custom save execution.	2byte INT	R/W	
039AH (922) to 039FH (927)	Reserved for system	-	-	-	-
03A0H (928)	Group5 Entry count	Indicates the number of items (entries) that can be set in Group 5.	2byte INT	R	6
03A1H (929) to 03A4H (932)	Reserved for system	-	-	-	-
03A5H (933)	Limit Output Mode	Indicates the reset method of the limit output.	2byte INT	R/W	0: Manual ● 1: Auto
03A6H (934) to 03AFH (943)	Reserved for system	-	-	-	-
03B0H (944)	[Custom] Group5 Entry count	Indicates the number of items (entries) that can be custom saved in Group 5.	2byte INT	R	6
03B1H (945) to 03B4H (948)	Reserved for system	-	-	-	-
03B5H (949)	[Custom] Limit Output Mode	Custom save area for "Limit Output Mode". Indicates the value from custom save execution.	2byte INT	R/W	

Attribute ID	Item	Description	Data type	Attribute	Value
03B6H (950) to 03BFH (959)	Reserved for system	-	-	-	-
03C0H (960)	Group6 Entry count	Indicates the number of items (entries) that can be set in Group 6.	2byte INT	R	7
03C1H (961)	Display Reverse	Indicates the display reverse settings.	2byte INT	R/W	0: Normal ● 1: Reverse
03C2H (962)	Sub Display	Indicates the sub display details.	2byte 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
03C3H (963)	Hold Display	Indicates hold details when the received light intensity hold display is selected under the Sub display.	2byte 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.
03C4H (964)	Preset Satu- ration	Indicates whether the current value of received light intensity is satu- rated when the Preset or DATUM function is used.	2byte INT	R/W	0: Off 1: On ●
03C5H (965)	Preset Satu- ration Level	Indicates the Preset satu- ration level.	2byte INT	R/W	100 to 200 (Default:110)
03C6H (966)	Current Dis- play	Indicates the current dis- play.	2byte INT	R/W	0: Normal ● 1: Sub
03C7H (967) to 03CFH (975)	Reserved for system	-	-	-	-
03D0H (976)	[Custom] Group6 Entry count	Indicates the number of items (entries) that can be custom saved in Group 6.	2byte INT	R	7
03D1H (977)	[Custom] Dis- play Reverse	Custom save area for the "Display Reverse". Indi- cates the value from cus- tom save execution.	2byte INT	R/W	
03D2H (978)	[Custom] Sub Display	Custom save area for "Sub Display". Indicates the value from custom save execution.	2byte INT	R/W	
03D3H (979)	[Custom] Hold Display	Custom save area for "Hold Display". Indicates the value from custom save execution.	2byte INT	R/W	
03D4H (980)	[Custom] Preset Satu- ration	Custom save area for "Preset Saturation". Indi- cates the value from cus- tom save execution.	2byte INT	R/W	

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FS-N10/N12

● : Default value

Attribute ID	Item	Description	Data type	Attribute	Value
03D5H (981)	[Custom] Preset Saturation Level	Custom save area for "Preset Saturation Level". Indicates the value from custom save execution.	2byte INT	R/W	
03D6H (982)	[Custom] Current Display	Custom save area for "Current Display". Indicates the value from custom save execution.	2byte INT	R/W	
03D7H (983) to 03DFH (991)	Reserved for system	-	-	-	-
03E0H (992)	Group7 Entry count	Indicates the number of items (entries) that can be set in Group 7.	2byte INT	R	11
03E1H (993)	Warning Disable	Indicates the settings of the disabled warning function. When the bit is ON, the corresponding warning does not occur.	2byte WORD	R/W	Bit0: Limit Detection
03E2H (994)	TAG Strings	Indicates the TAG character string.	STRING	R/W	8 characters or less (Default: "")
03E3H (995) to 03E5H (997)	Reserved for system	-	-	-	-
03E6H (998)	Power Save	Indicates operating status of the power save function.	2byte INT	R/W	0: OFF ● 1: ON 2: FULL 3: ALL
03E7H (999)	APC	Indicates operating status of the APC function.	2byte INT	R/W	0: OFF ● 1: ON
03E8H (1000)	Display Gain	Indicates operating status of the display gain setting.	2byte INT	R/W	0: Standard ● 1: Full
03E9H (1001)	Interference Prevention	Indicates whether the number of interference prevention devices is doubled.	2byte INT	R/W	0: Normal ● 1: Double
03EAH (1002)	Parameter Save by Ext-Input	Indicates whether the Preset/Zero-shift settings are stored in EEPROM when executing Preset/Zero-shift with the external input.	2byte INT	R/W	0: No 1: Yes ●
03EBH (1003) to 03EFH (1007)	Reserved for system	-	-	-	-
03F0H (1008)	[Custom] Group7 Entry count	Indicates the number of items (entries) that can be custom saved in Group 7.	2byte INT	R	11
03F1H (1009)	[Custom] Warning Disable	Custom save area for "Warning Disable". Indicates the value from custom save execution.	2byte INT	R/W	

Attribute ID	Item	Description	Data type	Attribute	Value
03F2H (1010)	[Custom] TAG Strings	Custom save area for "TAG Strings". Indicates the value from custom save execution.	STRING	R/W	
03F3H (1011) to 03F5H (1013)	Reserved for system	-	-	-	-
03F6H (1014)	[Custom] Power Save	Custom save area for "Power Save". Indicates the value from custom save execution.	2byte INT	R/W	
03F7H (1015)	[Custom] APC	Custom save area for "APC". Indicates the value from custom save execution.	2byte INT	R/W	
03F8H (1016)	[Custom] Dis- play Gain	Custom save area for "Display Gain". Indicates the value from custom save execution.	2byte INT	R/W	
03F9H (1017)	[Custom] Interference Prevention	Custom save area for "Interference Prevention". Indicates the value from custom save execution.	2byte INT	R/W	
03FAH (1018)	[Custom] Parameter Save by Ext- Input	Custom save area for "Parameter Save by Ext-input". Indicates the value from custom save execution.	2byte INT	R/W	
03FBH (1019) to 03FFH (1023)	Reserved for system	-	-	-	-
0400H (1024)	Group8 Entry count	Indicates the number of items (entries) that can be set in Group 8.	2byte INT	R	20
0401H (1025)	ID number Count	Indicates number of used IDs.	2byte INT	R	1
0402H (1026) to 0403H (1027)	Reserved for system	-	-	-	-
0404H (1028)	Product Code	Indicates product code.	2byte INT	R	2000
0405H (1029)	Revision	Indicates revision, with the upper bytes representing the major revision and the lower bytes representing the minor revision.	2byte INT	R	0101H to FFFFH
0406H (1030)	Product Name	Indicates model designation of the sensor.	STRING	R	"FS-N10/N12 **"
0407H (1031) to 040DH (1037)	Reserved for system	-	-	-	-
040EH (1038)	Series Code	Indicates series code.	2byte INT	R	2000

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● : Default value

Attribute ID	Item	Description	Data type	Attribute	Value
040FH (1039)	Series Version	Indicates series version.	2byte INT	R	1
0410H (1040)	Device Type	Indicates device type.	2byte INT	R	0
0411H (1041) to 041FH (1055)	Reserved for system	-	-	-	-

- *1 The FS-N10 Series shipped on March 10, 2011 or before will have the range from 0 to 9999.
- *2 This cannot be set with the FS-N10 Series shipped on March 10, 2011 or before.
- *3 If the slide switch is set to “MEGA” while locked, [SE L LOC] will flash on the sensor amplifier.

● **Attribute IDs corresponding to operation commands (service 4BH)**


The details of the operation command (service 4BH) are designated with the instance ID (each ID number) and attribute ID.

Details on the selectable operation commands are given below.

Attribute ID	Name	Details
0301H(769)	Load Recipe Data	Reads the recipe.
0302H(770)	Custom Save	Executes custom save.
0303H(771)	Maximum Sensitivity Setting	Executes maximum sensitivity calibration.
0304H(772)	Percentage Calibration	Executes percentage calibration of the sensitivity.
0305H(773)	Two-point/Pos. Calibration (1st)	Starts calibration the 1st point of 2-point calibration.
0306H(774)	Two-point Calibration (2nd)	Starts calibration the 2nd point of 2-point calibration.
0305H(773)	Positioning Calibration (1st)	Starts calibration the 1st point of positioning calibration.
0307H(775)	Positioning Calibration (2nd)	Starts calibration the 2nd point of positioning calibration.
0308H(776)	Full Auto Calibration start	Starts fully automatic calibration.
0309H(777)	Full Auto Calibration end	Ends fully automatic calibration.
030AH(778)	Zero-shift start	Executes zero shift.
030BH(779)	Zero-shift end	Cancels zero shift.
030CH(780)	Preset start	Executes preset.
030DH(781)	Preset end	Cancels preset.
030EH(782)	Saturation Canceling start	Executes saturation canceling.
030FH(783)	Saturation Canceling end	Cancels saturation canceling.
0310H(784)	Reset Hold Value	Resets the held value.
0311H (785)	Work-Preset Request ^{*1}	Executes workpiece preset.
0312H(786)	Full Auto Preset: Start ^{*1}	Starts fully automatic (or maximum sensitivity) preset.
0313H(787)	Full Auto Preset: Finish ^{*1}	Ends fully automatic (or maximum sensitivity) preset.
0314H(788)	Maximum Sensitivity Preset: Request ^{*1}	Executes maximum sensitivity preset. (Preset can be executed without specifying the start and end.)

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

FS-N14 (Instance ID: 1 to 16)

Refer to  "How to Use NU Objects" (page 3-32) for how to use the parameters. Designate the ID number of the installed sensor for the instance ID.

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0320H (800)	Group1 Entry count	Indicates the number of entries in Group 1.	2byte INT	R	22
0321H (801)	Error Information	Indicates error information. When an error occurs, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Over Current Error Bit1: Reserved Bit2: EEPROM Error Bit3 to 4: Reserved Bit5: DATUM Correction Error Bit6: APC Error Bit7: Sensor Communication Error
0322H (802)	Warning Information	Indicates warning information. When a warning occurs, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Limit Detection
0323H (803)	Warning Function	Indicates the operating status of the warning function. When the warning function is operating, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Limit Detection
0324H (804)	Output	Indicates the output status of the sensor. When the output is ON, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Output1 Bit1: Output2
0325H (805)	Current Value	Indicates the current value of received light intensity.	2byte INT	R	0 to 9999
0326H (806) to 0327H (807)	Reserved for system	-	-	-	-
0328H (808)	Raw Value	Indicates the received light intensity before correction with the Preset, DATUM, or Zero-shift functions.	2byte UINT	R	0 to 65535 ^{*1}
0329H (809)	Peak-Hold Value	Indicates the peak value (or the max bottom value) of received light intensity (depending on the settings of Hold display).	2byte INT	R	0 to 9999
032AH (810)	Bottom-Hold Value	Indicates the bottom value (or the min peak value) of received light intensity (depending on the settings of Hold display).	2byte INT	R	0 to 9999
032BH (811)	Reserved for system	-	-	-	-

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FS-N14
● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
032CH (812)	Peak-Hold Minimum Value	Indicates the lowest value among max values of received light intensity during the time period when the setting value of received light intensity is exceeded.	2byte INT	R	0 to 9999
032DH (813)	Preset/ DATUM Internal Value	Indicates the setting value before scaling with the Preset/DATUM function.	2byte UINT	R	0 to 65535* ¹
032EH (814)	Display Customize	Indicates the operating status of the Reading Correction function.	2byte INT	R	0: No Customize / DATUM ● 1: Preset 2: Zero-shift 3: Work preset* ² 4: Work preset (Reverse)* ²
032FH (815)	Slide Switch Status	Indicates the status of the Slide Switch.	2byte INT	R	0: Selecting CH1 1: Selecting CH2
0330H (816)	Saturation Canceling	Indicates the status of the saturation canceling function.	2byte INT	R	0: Not Active 1: Active
0331H (817)	Operation Mode	Indicates the current operation mode of the sensor.	2byte INT	R	0: RUN 1: LED_OFF 2: SLEEP 3: PAUSE
0332H (818)	Operation Mode Setting	Set the operation mode of the sensor.	2byte INT	R/W	0: RUN ● 1: LED_OFF 2: SLEEP 3: PAUSE
0333H (819)	Recipe Select	Select the Recipe to be used when executing an operating command (Load Recipe Data).	2byte INT	R/W	0: Initialize ● 1: Custom 2: Fall 3: Percentage Calibration 4: Zero-shift 5: MEGA 6: Area Detection* ² 7: 0 DATUM* ²
0334H (820) to 033FH (831)	Reserved for system	-	-	-	-
0340H (832)	Group2 Entry count	Indicates the number of entries that can be set in Group 2.	2byte INT	R	14
0341H (833)	Setting Value (Output1/ Area High)	Indicates the setting value of Output 1. The upper limit of the setting value is displayed when in Area Detection mode.	2byte INT	R/W	0 to 9999 (Default:50)
0342H (834)	Setting Value (Output2)	Indicates the setting value of Output 2.	2byte INT	R/W	0 to 9999 (Default: 50)
0343H (835)	Reserved for system	-	-	-	-
0344H (836)	Setting Value (Area Low)	Indicates the lower limit of the setting value in Area detection mode.	2byte INT	R/W	0 to 9999 (Default:50)
0345H (837) to 0346H (838)	Reserved for system	-	-	-	-

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Communication

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FS-N14

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0347H (839)	Limit Setting Value	Indicates the setting value of the warning output when the Limit Detection function is used.	2byte INT	R/W	0 to 9999 (Default:0)
0348H (840) to 034FH (847)	Reserved for system	-	-	-	-
0350H (848)	[Custom] Group 2 Entry count	Indicates the number of entries that can be set in Group 2 custom save area.	2byte INT	R	7
0351H (849)	[Custom] Setting Value (Output1/ Area High)	Custom save area for "Setting Value (Output 1)". Indicates the value from custom save execution.	2byte INT	R/W	
0352H (850)	[Custom] Setting Value (Output2)	Custom save area for "Setting Value (Output 2)". Indicates the value from custom save execution.	2byte INT	R/W	
0353H (851)	Reserved for system	-	-	-	-
0354H (852)	[Custom] Setting Value (Area Low)	Custom save area for "Setting Value (Area Low)". Indicates the value from custom save execution.	2byte INT	R/W	
0355H (853) to 0356H (854)	Reserved for system	-	-	-	-
0357H (855)	[Custom] Limit Setting Value	Custom save area for "Limit Setting Value". Indicates the value from custom save execution.	2byte INT	R/W	
0358H (856) to 035FH (863)	Reserved for system	-	-	-	-
0360H (864)	Group3 Entry count	Indicates the number of entries that can be set in Group 3.	2byte INT	R	7
0361H (865)	Key Lock Status	Indicates the status of the Key lock.	2byte INT	R/W	0: Unlock ● 1: Key Lock 2: PIN Code Lock 3: Communication Lock
0362H (866)	PIN Code	Indicates the password for Key lock.	2byte INT	R/W	0 to 9999 (Default:0)
0363H (867)	Slide Switch Lock ³	Indicates lock status of Slide Switch. When locked, the Slide Switch is disabled, with the value always being "1ch".	2byte INT	R/W	0: Unlock ● 1: Lock

Attribute ID	Name	Description	Data type	Attribute	Value
0364H (868)	L-on/D-on (N.O./N.C.)	Indicates whether the output is ON for light (L-on) or ON (D-on) for dark. The corresponding bit is turned ON for D-on or N.C..	2byte INT	R/W	0: Output1:L-on (N.O.)/Output2:L-on (N.O.) ● 1: Output1:D-on (N.C.)/Output2:L-on (N.O.) 2: Output1:L-on (N.O.)/Output2:D-on (N.C.) 3: Output1:D-on (N.C.)/Output2:D-on (N.C.)
0365H (869)	Power Mode	Indicates the Power mode.	2byte 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 1 ms) 4: ULTRA (Response Time 4 ms) 5: MEGA (Response Time 16 ms)
0366H (870)	Sensitivity Setting	Indicates the sensitivity setting method.	2byte INT	R/W	0: Normal Sensitivity Setting ● 1: Percentage Calibration 2: Zero-shift Calibration
0367H (871)	Percentage Calib. Target Value	Indicates target value of percentage calibration when the Sensitivity Setting is set to Percentage Calibration.	2byte INT	R/W	-99 to 99 (Default: -10)
0368H (872) to 036FH (879)	Reserved for system	-	-	-	-
0370H (880)	[Custom] Group 3 Entry count	Indicates the number of entries that can be set in Group 3 custom save area.	2byte INT	R	7
0371H (881)	[Custom] Key Lock Status	Custom save area for "Key Lock Status". Indicates the value from custom save execution.	2byte INT	R/W	
0372H (882)	[Custom] PIN Code	Custom save area for "PIN Code". Indicates the value from custom save execution.	2byte INT	R/W	
0373H (883)	[Custom] Slide Switch Lock ³	Custom save area for "Slide Switch Lock". Indicates the value from custom save execution.	2byte INT	R/W	
0374H (884)	[Custom] L-on/D-on (N.O./N.C.)	Custom save area for "L-on/D-on (N.O./N.C.)". Indicates the value from custom save execution.	2byte INT	R/W	
0375H (885)	[Custom] Power Mode	Custom save area for the "Power Mode". Indicates the value from custom save execution.	2byte INT	R/W	

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● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0376H (886)	[Custom] Sensitivity Setting	Custom save area for the "Sensitivity Setting method". Indicates the value from custom save execution.	2byte INT	R/W	
0377H (887)	[Custom] Percentage Calib. Target Value	Custom save area for the "Percentage Calib. Target Value". Indicates the value from custom save execution.	2byte INT	R/W	
0378H (888) to 037FH (895)	Reserved for system	-	-	-	-
0380H (896)	Group4 Entry count	Indicates the number of entries that can be set in Group 4.	2byte INT	R	9
0381H (897)	Output Timer (Output1)	Indicates the settings for the Output 1 timer.	2byte INT	R/W	0: Timer off ● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer
0382H (898)	Timer Value (Output1)	Indicates the timer value for the Output 1 timer.	2byte INT	R/W	1 to 9999 (Default: 10)
0383H (899)	Reserved for system	-	-	-	-
0384H (900)	Detection Mode (Out- put1)	Indicates the detection mode for Output 1.	2byte 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
0385H (901)	DATUM Speed	Indicates the DATUM correction speed.	2byte INT	R/W	0: Level1 (Slow) ● 1: Level2 (Normal) 2: Level3 (Fast)
0386H (902)	DATUM Warning Level	Indicates the DATUM alarm output level.	2byte INT	R/W	0 to 100 (Default:50)
0387H (903)	Control Input	Indicates the control input settings.	2byte 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
0388H (904)	PAUSE Mode	Sets the output status of the sensor to PAUSE mode.	2byte INT	R/W	0: Always OFF ● 1: Always ON 2: Keep Output
0389H (905)	Light Emis- sion Power	Switch the lighting power.	2byte INT	R/W	1 to 100 (Default:100)
038AH (906) to 038FH (911)	Reserved for system	-	-	-	-

Attribute ID	Name	Description	Data type	Attribute	Value
0390H (912)	[Custom] Group 4 Entry count	Indicates the number of entries that can be set in Group 4 custom save area.	2byte INT	R	9
0391H (913)	[Custom] Output Timer (Output1)	Custom save area for "Output Timer (Output 1)". Indicates the value from custom save execution.	2byte INT	R/W	
0392H (914)	[Custom] Timer Value (Output1)	Custom save area for "Timer Value (Output 1)". Indicates the value from custom save execution.	2byte INT	R/W	
0393H (915)	Reserved for system	-	-	-	-
0394H (916)	[Custom] Detection Mode (Output1)	Custom save area for "Detection Mode (Output 1)". Indicates the value from custom save execution.	2byte INT	R/W	
0395H (917)	[Custom] DATUM Speed	Custom save area for "DATUM Speed". Indicates the value from custom save execution.	2byte INT	R/W	
0396H (918)	[Custom] DATUM Warning Level	Custom save area for "DATUM Warning Level". Indicates the value from custom save execution.	2byte INT	R/W	
0397H (919)	[Custom] Control Input	Custom save area for "Control Input". Indicates the value from custom save execution.	2byte INT	R/W	
0398H (920)	[Custom] PAUSE Mode	Custom save area for "PAUSE Mode". Indicates the value from custom save execution.	2byte INT	R/W	
0399H (921)	[Custom] Light Emission Power	Custom save area for "Light Emission Power". Indicates the value from custom save execution.	2byte INT	R/W	
039AH (922) to 039FH (927)	Reserved for system	-	-	-	-
03A0H (928)	Group5 Entry count	Indicates the number of entries that can be set in Group 5.	2byte INT	R	6
03A1H (929)	Output Timer (Output2)	Indicates the settings of the Output 2 timer.	2byte INT	R/W	0: Timer off ● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer
03A2H (930)	Timer Value (Output2)	Indicates the timer value for the Output 2 timer.	2byte INT	R/W	1 to 9999 (Default:10)
03A3H (931)	Reserved for system	-	-	-	-
03A4H (932)	Detection Mode (Output2)	Indicates the detection mode of Output 2.	2byte INT	R/W	0: Normal Detection Mode ● 1: Limit Setting Output 2: Warning Output

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● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
03A5H (933)	Limit Output Mode	Indicates reset method of limit output.	2byte INT	R/W	0: Manual ● 1: Auto
03A6H (934) to 03AFH (943)	Reserved for system	-	-	-	-
03B0H (944)	[Custom] Group 5 Entry count	Indicates the number of entries that can be set in Group 5 custom save area.	2byte INT	R	6
03B1H (945)	[Custom] Output Timer (Output2)	Custom area for "Output Timer (Output 2)". Indicates the value from custom save execution.	2byte INT	R/W	
03B2H (946)	[Custom] Timer Value (Output2)	Custom save area for "Timer Value (Output 2)". Indicates the value from custom save execution.	2byte INT	R/W	
03B3H (947)	Reserved for system	-	-	-	-
03B4H (948)	[Custom] Detection Mode (Output2)	Custom save area for "Detection Mode (Output 2)". Indicates the value from custom save execution.	2byte INT	R/W	
03B5H (949)	[Custom] Limit Output Mode	Custom save area for "Limit Output Mode". Indicates the value from custom save execution.	2byte INT	R/W	
03B6H (950) to 03BFH (958)	Reserved for system	-	-	-	-
03C0H (960)	Group6 Entry count	Indicates the number of entries that can be set in Group 6.	2byte INT	R	7
03C1H (961)	Display Reverse	Indicates the display reverse settings.	2byte INT	R/W	0: Normal ● 1: Reverse
03C2H (962)	Sub Display	Indicates the sub display details.	2byte 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
03C3H (963)	Hold Display	Indicates hold details when the received light intensity hold display is selected under the Sub display.	2byte 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.
03C4H (964)	Preset Saturation	Indicates whether the current value of received light intensity is saturated when the Preset or DATUM function is used.	2byte INT	R/W	0: Off 1: On ●
03C5H (965)	Preset Saturation Level	Indicates the Preset saturation level.	2byte INT	R/W	100 to 200 (Default:110)

Attribute ID	Name	Description	Data type	Attribute	Value
03C6H (966)	Current Display	Indicates the current display.	2byte INT	R/W	0: Normal ● 1: Sub
03C7H (967) to 03CFH (975)	Reserved for system	-	-	-	-
03D0H (976)	[Custom] Group 6 Entry count	Indicates the number of entries that can be set in Group 6 custom save area.	2byte INT	R	7
03D1H (977)	[Custom] Display Reverse	Custom save area for the "Display Reverse". Indicates the value from custom save execution.	2byte INT	R/W	
03D2H (978)	[Custom] Sub Display	Custom save area for "Sub Display". Indicates the value from custom save execution.	2byte INT	R/W	
03D3H (979)	[Custom] Hold Display	Custom save area for "Hold Display". Indicates the value from custom save execution.	2byte INT	R/W	
03D4H (980)	[Custom] Preset Saturation	Custom save area for "Preset Saturation". Indicates the value from custom save execution.	2byte INT	R/W	
03D5H (981)	[Custom] Preset Saturation Level	Custom save area for "Preset Saturation Level". Indicates the value from custom save execution.	2byte INT	R/W	
03D6H (982)	[Custom] Current Display	Custom save area for "Current Display". Indicates the value from custom save execution.	2byte INT	R/W	
03D7H (983) to 03DFH (991)	Reserved for system	-	-	-	-
03E0H (992)	Group7 Entry count	Indicates the number of items (entries) that can be set in Group 7.	2byte INT	R	11
03E1H (993)	Warning Disable	Indicates the settings of the disabled warning function. When the bit is ON, the corresponding warning does not occur.	2byte WORD	R/W	Bit0: Limit Detection
03E2H (994)	TAG Strings	Indicates the TAG character string.	STRING	R/W	8 characters or less (Default : "")
03E3H (995) to 03E5H (997)	Reserved for system	-	-	-	-
03E6H (998)	Power Save	Indicates operating status of the power save function.	2byte INT	R/W	0: OFF ● 1: ON 2: FULL 3: ALL
03E7H (999)	APC	Indicates operating status of the APC function.	2byte INT	R/W	0: OFF ● 1: ON

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● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
03E8H (1000)	Display Gain	Indicates operating status of the display gain setting.	2byte INT	R/W	0: Standard ● 1: Full
03E9H (1001)	Interference Prevention	Indicates whether the number of interference prevention devices is doubled.	2byte INT	R/W	0: Normal ● 1: Double
03EAH (1002)	Parameter Save by Ext-Input	Indicates whether the Preset/Zero-shift settings are stored in EEPROM when executing Preset/Zero-shift with the external input.	2byte INT	R/W	0: No 1: Yes ●
03EBH (1003) to 03EFH (1007)	Reserved for system	-	-	-	-
03F0H (1008)	[Custom] Group 7 Entry count	Indicates the number of entries that can be set in Group 7 custom save area.	2byte INT	R	11
03F1H (1009)	[Custom] Warning Disable	Custom save area for "Warning Disable". Indicates the value from custom save execution.	2byte INT	R/W	
03F2H (1010)	[Custom] TAG Strings	Custom save area for "TAG Strings". Indicates the value from custom save execution.	STRING	R/W	
03F3H (1011) to 03F5H (1013)	Reserved for system	-	-	-	-
03F6H (1014)	[Custom] Power Save	Custom save area for "Power Save". Indicates the value from custom save execution.	2byte INT	R/W	
03F7H (1015)	[Custom] APC	Custom save area for "APC". Indicates the value from custom save execution.	2byte INT	R/W	
03F8H (1016)	[Custom] Display Gain	Custom save area for "Display Gain". Indicates the value from custom save execution.	2byte INT	R/W	
03F9H (1017)	[Custom] Interference Prevention	Custom save area for "Interference Prevention". Indicates the value from custom save execution.	2byte INT	R/W	
03FAH (1018)	[Custom] Parameter Save by Ext-Input	Custom save area for "Parameter Save by Ext-input". Indicates the value from custom save execution.	2byte INT	R/W	
03FBH (1019) to 03FFH (1023)	Reserved for system	-	-	-	-

Attribute ID	Name	Description	Data type	Attribute	Value
0400H (1024)	Group8 Entry count	Indicates the number of items (entries) that can be set in Group 8.	2byte INT	R	20
0401H (1025)	ID number Count	Indicates number of used IDs.	2byte INT	R	2
0402H (1026) to 0403H (1027)	Reserved for system	-	-	-	-
0404H (1028)	Product Code	Indicates product code.	2byte INT	R	2001
0405H (1029)	Revision	Indicates revision, with the upper bytes representing the major revision and the lower bytes representing the minor revision.	2byte INT	R	0101H to FFFFH
0406H (1030)	Product Name	Indicates model designation of the sensor.	STRING	R	"FS-N14"
0407H (1031) to 040DH (1037)	Reserved for system	-	-	-	-
040EH (1038)	Series Code	Indicates series code.	2byte INT	R	2001
040FH (1039)	Series Version	Indicates series version.	2byte INT	R	1
0410H (1040)	Device Type	Indicates device type.	2byte INT	R	0
0411H (1041) to 041FH (1055)	Reserved for system	-	-	-	-

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

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

*3 If the slide switch is set to "2ch" while locked, [Ich Loc] will flash on the sensor amplifier.

● **Attribute IDs corresponding to operation commands (service 4BH)**


The details of the operation command (service code 4BH) are designated with the instance ID (each ID number) and attribute ID.

Details on the selectable operation commands are given below.

Attribute ID	Name	Details
0301H(769)	Load Recipe Data	Reads the recipe.
0302H(770)	Custom Save	Executes custom save.
0303H(771)	Maximum Sensitivity Setting	Executes calibration at the maximum sensitivity.
0304H(772)	Percentage Calibration	Executes calibration at a percentage of the sensitivity.
0305H(773)	Two-point/Pos. Calibration (1st)	Starts calibration the 1st point of 2-point calibration.
0306H(774)	Two-point Calibration (2nd)	Starts calibration the 2nd point of 2-point calibration.
0305H(773)	Positioning Calibration (1st)	Starts calibration the 1st point of positioning calibration.
0307H(775)	Positioning Calibration (2nd)	Starts calibration the 2nd point of positioning calibration.
0308H(776)	Full Auto Calibration start	Starts fully automatic calibration.
0309H(777)	Full Auto Calibration end	Ends fully automatic calibration.
030AH(778)	Zero-shift start	Executes zero shift.
030BH(779)	Zero-shift end	Cancels zero shift.
030CH(780)	Preset start	Executes preset.
030DH(781)	Preset end	Cancels preset.
030EH(782)	Saturation Canceling start	Executes saturation canceling.
030FH(783)	Saturation Canceling end	Cancels saturation canceling.
0310H(784)	Reset Hold Value	Resets the held value.
0311H (785)	Work-Preset Request*1	Executes workpiece preset.
0312H(786)	Full Auto Preset: Start*1	Starts fully automatic (or maximum sensitivity) preset.
0313H(787)	Full Auto Preset: Finish*1	Ends fully automatic (or maximum sensitivity) preset.
0314H(788)	Maximum Sensitivity Preset: Request*1	Executes maximum sensitivity preset. (Preset can be executed without specifying the start and end.)

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

LV-N10/N12/N12C (Instance ID: 1 to 16)

Refer to  "How to Use NU Objects" (page 3-32) for details on reading the table and using the parameters.

Designate the ID number of the installed sensor for the instance ID.

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0320H (800)	Group1 Entry count	Indicates the number of entries in Group 1.	2byte INT	R	22
0321H (801)	Error Information	Indicates error information. When an error occurs, the corresponding bit is turned ON.	2byte 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
0322H (802)	Warning Information	Indicates warning information. When a warning occurs, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Limit Detection
0323H (803)	Warning Function	Indicates the operating status of the warning function. When the warning function is operating, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Limit Detection
0324H (804)	Output	Indicates the output status of the sensor. When the output is ON, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Output1 Bit1: Output2 ^{*1}
0325H (805)	Current Value	Indicates the current value of received light intensity.	2byte INT	R	0 to 9999
0326H (806) to 0327H (807)	Reserved for system	-	-	-	-
0328H (808)	Raw Value	Indicates the received light intensity before correction with the Preset, DATUM, or Zero-shift functions.	2byte UINT	R	0 to 65535
0329H (809)	Peak-Hold Value	Indicates the peak value (or the max bottom value) of received light intensity (depending on the settings of Hold display).	2byte INT	R	0 to 9999
032AH (810)	Bottom-Hold Value	Indicates the bottom value (or the min peak value) of received light intensity (depending on the settings of Hold display).	2byte INT	R	0 to 9999
032BH (811)	Reserved for system	-	-	-	-

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LV-N10/N12/N12C

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
032CH (812)	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.	2byte INT	R	0 to 9999
032DH (813)	Preset/ DATUM Inter- nal Value	Indicates an internal setting value when executing preset/DATUM.	2byte UINT	R	0 to 65535
032EH (814)	Display Customize	Indicates operating status of the Reading Correction function.	2byte INT	R	0: No Customize / DATUM ● 1: Preset 2: Zero-shift 3: Work preset 4: Work preset (Reverse)
032FH (815)	Slide Switch Status	Indicates status of the Slide Switch.	2byte INT	R	0: Selecting 1ch 1: Selecting 2ch
0330H (816)	Reserved for system	-	-	-	-
0331H (817)	Operation Mode	Indicates current operation mode of the sensor.	2byte INT	R	0: RUN 1: LED_OFF 2: SLEEP 3: PAUSE
0332H (818)	Operation Mode Setting	Set up the operation mode of the sensor.	2byte INT	R/W	0: RUN ● 1: LED_OFF 2: SLEEP 3: PAUSE
0333H (819)	Recipe Select	Select Recipe to be used when executing operating command (Load Recipe Data).	2byte INT	R/W	0: Initialize ● 1: Custom 2: Fall 3: Percentage Calibration 4: Zero-shift 5: MEGA 6: AREA 7: 0 DATUM
0334H (820)	Counter Value*1	Indicates the current counter value.	2byte INT	R	0 to 9999 (Default: 0)
0335H (821) to 033FH (831)	Reserved for system	-	-	-	-
0340H (832)	Group2 Entry count	Indicates the number of entries that can be set in Group 2.	2byte INT	R	14
0341H (833)	Setting Value (Output1)/ (Area High)	Indicates setting value of Output 1. The upper limit of the setting value is displayed when the "Detection Mode" is Area.	2byte INT	R/W	0 to 9999 (Default:50)
0342H (834)	Setting Value (Output 2/ Counter Setting Value)*1	Indicates setting value of Output 2 or counter setting value.	2byte INT	R/W	0 to 9999 (Default: 50)
0343H (835)	Reserved for system	-	-	-	-
0344H (836)	Setting Value (Area Low)	Indicates lower limit of setting value in Area detection mode.	2byte INT	R/W	0 to 9999 (Default:50)

3-5 Parameter List

LV-N10/N12/N12C

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0345H (837) to 0346H (838)	Reserved for system	-	-	-	-
0347H (839)	Limit Setting Value	Indicates setting value of warning output when the Limit Detection function is used.	2byte INT	R/W	0 to 9999 (Default:0)
0348H (840) to 034FH (847)	Reserved for system	-	-	-	-
0350H (848)	[Custom] Group 2 Entry count	Indicates the number of entries that can be set in Group 2 custom save area.	2byte INT	R	14
0351H (849)	[Custom] Setting Value (Output 1/ Area High)	Custom save area for "Setting Value (Output 1/ Area High)". Indicates the value from custom save execution.	2byte INT	R/W	
0352H (850)	[Custom] Setting Value (Output 2/ Counter Set- ting Value)	Custom save area for "Setting Value (Output 2/ Counter Setting Value)" ^{*1} . Indicates the value from custom save execu- tion.	2byte INT	R/W	
0353H (851)	Reserved for system	-	-	-	-
0354H (852)	[Custom] Setting Value (Area Low)	Custom save area for "Setting Value (Area Low)". Indicates the value from custom save execu- tion.	2byte INT	R/W	
0355H (853) to 0356H (854)	Reserved for system	-	-	-	-
0357H (855)	[Custom] Limit Setting Value	Custom save area for "Limit Setting Value". Indicates the value from custom save execution.	2byte INT	R/W	
0358H (856) to 035FH (863)	Reserved for system	-	-	-	-
0360H (864)	Group3 Entry count	Indicates number of entries that can be set in Group 3.	2byte INT	R	7
0361H (865)	Key Lock Status	Indicates status of the Key lock.	2byte INT	R/W	0: Unlock ● 1: Key Lock 2: PIN Code Lock 3: Communication Lock
0362H (866)	PIN Code	Indicates password for Key lock.	2byte INT	R/W	0 to 9999 (Default:0)

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Communication

3-5 Parameter List

LV-N10/N12/N12C

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0363H (867)	Slide Switch Lock	Indicates lock status of Slide Switch. When being locked, the Slide Switch is disabled, with the value always being "1ch".*2	2byte INT	R/W	0: Unlock ● 1: Lock
0364H (868)	L-on/D-on (N.O./N.C.)	Indicates that whether output is ON for light (L-on) or ON (D-on) for dark.	2byte INT	R/W	bit0: Output1 ● bit1: Output2*1 0: Output1:L-on (N.O.)/Output2*1:L-on (N.O.) 1: Output1:D-on (N.C.)/Output2*1:L-on (N.O.) 2: Output1:L-on (N.O.)/Output2*1:D-on (N.C.) 3: Output1:D-on (N.C.)/Output2*1:D-on (N.C.)
0365H (869)	Power Mode	Indicates Power mode.	2byte INT	R/W	0: HIGH SPEED (Response Time 80 μs) 1: FINE (Response Time 250 μs) 2: TURBO (Response Time 500 μs) ● 3: SUPER (Response Time 1 ms) 4: ULTRA (Response Time 4 ms) 5: MEGA (Response Time 16 ms)
0366H (870)	Sensitivity Setting	Indicates setting method of Sensitivity.	2byte INT	R/W	0: Normal Sensitivity Setting ● 1: Percentage Calibration 2: Zero-shift Calibration
0367H (871)	Percentage Calib. Target Value	Indicates target value of percentage calibration when the Sensitivity Setting is set to Percentage Calibration.	2byte INT	R/W	-99 to 99 (Default: -10)
0368H (872) to 036FH (879)	Reserved for system	-	-	-	-
0370H (880)	[Custom] Group 3 Entry count	Indicates the number of entries that can be set in Group 3 custom save area.	2byte INT	R	7
0371H (881)	[Custom] Key Lock Status	Custom save area for "Key Lock Status". Indicates the value from custom save execution.	2byte INT	R/W	
0372H (882)	[Custom] PIN Code	Custom save area for "PIN Code". Indicates the value from custom save execution.	2byte INT	R/W	
0373H (883)	[Custom] Slide Switch Lock	Custom save area for "Slide Switch Lock". Indicates the value from custom save execution.	2byte INT	R/W	

Attribute ID	Name	Description	Data type	Attribute	Value
0374H (884)	[Custom] L-on/D-on (N.O./N.C.)	Custom save area for "L-on/D-on (N.O./N.C.)". Indicates the value from custom save execution.	2byte INT	R/W	
0375H (885)	[Custom] Power Mode	Custom save area for the "Power Mode". Indicates the value from custom save execution.	2byte INT	R/W	
0376H (886)	[Custom] Sensitivity Setting	Custom save area for the "Sensitivity Setting". Indicates the value from custom save execution.	2byte INT	R/W	
0377H (887)	[Custom] Percentage Calib. Target Value	Custom save area for the "Percentage Calib. Target Value". Indicates the value from custom save execution.	2byte INT	R/W	
0378H (888) to 037FH (895)	Reserved for system	-	-	-	-
0380H (896)	Group4 Entry count	Indicates the number of entries that can be set in Group 4.	2byte INT	R	9
0381H (897)	Output Timer (Output1)	Indicates settings of Output 1 timer.	2byte INT	R/W	0: Timer off ● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer
0382H (898)	Timer Value (Output1)	Indicates time of Output 1 timer (unit: ms).	2byte INT	R/W	1 to 9999 (Default: 10)
0383H (899)	Reserved for system	-	-	-	-
0384H (900)	Detection Mode (Output1)	Indicates detection mode of Output 1.	2byte 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
0385H (901)	DATUM Speed	Indicates correction speed of DATUM.	2byte INT	R/W	0: Level1 (Slow) ● 1: Level2 (Normal) 2: Level3 (Fast)
0386H (902)	DATUM Warning Level	Indicates alarm output level of DATUM.	2byte INT	R/W	0 to 100 (Default:50)
0387H (903)	External Input	Indicates settings of external input.	2byte 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
0388H (904)	PAUSE Mode	Set up the output status of the sensor in PAUSE mode.	2byte INT	R/W	0: Always OFF ● 1: Always ON 2: Keep Output

3-5 Parameter List

LV-N10/N12/N12C

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
389H (905) to 038FH (911)	Reserved for system	-	-	-	-
0390H (912)	[Custom] Group 4 Entry count	Indicates the number of entries that can be set in Group 4 custom save area.	2byte INT	R	9
0391H (913)	[Custom] Output Timer (Output1)	Custom save area for "Output Timer (Output 1)". Indicates the value from custom save execu- tion.	2byte INT	R/W	
0392H (914)	[Custom] Timer Value (Output1)	Custom save area for "Timer Value (Output 1)". Indicates the value from custom save execution.	2byte INT	R/W	
0393H (915)	Reserved for system	-	-	-	-
0394H (916)	[Custom] Detection Mode (Out- put1)	Custom save area for "Detection Mode (Output 1)". Indicates the value from custom save execu- tion.	2byte INT	R/W	
0395H (917)	[Custom] DATUM Speed	Custom save area for "DATUM Speed". Indi- cates the value from cus- tom save execution.	2byte INT	R/W	
0396H (918)	[Custom] DATUM Warning Level	Custom save area for "DATUM Warning Level". Indicates the value from custom save execution.	2byte INT	R/W	
0397H (919)	[Custom] External Input	Custom save area for "External Input". Indi- cates the value from cus- tom save execution.	2byte INT	R/W	
0398H (920)	[Custom] PAUSE Mode	Custom save area for "PAUSE Mode". Indicates the value from custom save execution.	2byte INT	R/W	
0399H (921) to 039FH (927)	Reserved for system	-	-	-	-
03A0H (928)	Group5 Entry count	Indicates the number of entries that can be set in Group 5.	2byte INT	R	6
03A1H (929)	Output Timer (Output2)*1	Indicates settings of Out- put 2 timer.	2byte INT	R/W	0: Timer off ● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer
03A2H (930)	Timer Value (Output2)*1	Indicates time of Output 2 timer (unit: ms).	2byte INT	R/W	1 to 9999 (Default:10)
03A3H (931)	Reserved for system	-	-	-	-

3-5 Parameter List

LV-N10/N12/N12C

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
03A4H (932)	Detection Mode (Output2) ^{*1}	Indicates detection mode of Output 2.	2byte INT	R/W	0: Normal Detection Mode ● 1: Limit Setting Output 2: Warning Output 3: Counter Output
03A5H (933)	Limit Output Mode	Indicates reset method of limit output.	2byte INT	R/W	0: Manual ● 1: Auto
03A6H (934)	Counter Type ^{*1}	Indicates settings of counter type.	2byte INT	R/W	0: oVr1 ● 1: oVr2 2: Auto
03A7H (935) to 03AFH (943)	Reserved for system	-	-	-	-
03B0H (944)	[Custom] Group 5 Entry count	Indicates the number of entries that can be set in Group 5 custom save area.	2byte INT	R	6
03B1H (945)	[Custom] Output Timer (Output 2) ^{*1}	Custom area for "Output Timer (Output 2) ^{*1} ". Indicates the value from custom save execution.	2byte INT	R/W	
03B2H (946)	[Custom] Timer Value (Output2) ^{*1}	Custom save area for "Timer Value (Output 2) ^{*1} ". Indicates the value from custom save execution.	2byte INT	R/W	
03B3H (947)	Reserved for system	-	-	-	-
03B4H (948)	[Custom] Detection Mode (Output2) ^{*1}	Custom save area for "Detection Mode (Output 2) ^{*1} ". Indicates the value from custom save execution.	2byte INT	R/W	
03B5H (949)	[Custom] Limit Output Mode	Custom save area for "Limit Output Mode". Indicates the value from custom save execution.	2byte INT	R/W	
03B6H (950)	[Custom] Counter Type ^{*1}	Custom save area for "Counter Type ^{*1} ". Indicates the value from custom save execution.	2byte INT	R/W	
03B7H (951) to 03BFH (959)	Reserved for system	-	-	-	-
03C0H (960)	Group6 Entry count	Indicates the number of entries that can be set in Group 6.	2byte INT	R	7
03C1H (961)	Display Reverse	Indicates settings of display reverse.	2byte INT	R/W	0: Normal ● 1: Reverse
03C2H (962)	Sub Display	Indicates details of the sub display.	2byte 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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3-5 Parameter List

LV-N10/N12/N12C

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
03C3H (963)	Hold Display	Indicates hold details when the received light intensity hold display is selected in the Sub display.	2byte 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.
03C4H (964)	Preset Saturation	Indicates that whether the current value of received light intensity is saturated when Preset or DATUM function is used.	2byte INT	R/W	0: Off 1: On ●
03C5H (965)	Preset Saturation Level	Indicates saturation level of Preset.	2byte INT	R/W	100 to 200 (Default:110)
03C6H (966)	Current Display	Indicates current display.	2byte INT	R/W	0: Normal ● 1: Sub
03C7H (967)	Preset Display	Indicates settings of Preset Display.	2byte INT	R/W	0: Preset ● 1: Area
03C8H (968) to 03CFH (975)	Reserved for system	-	-	-	-
03D0H (976)	[Custom] Group 6 Entry count	Indicates the number of entries that can be set in Group 6 custom save area.	2byte INT	R	7
03D1H (977)	[Custom] Display Reverse	Custom save area for the "Display Reverse". Indicates the value from custom save execution.	2byte INT	R/W	
03D2H (978)	[Custom] Sub Display	Custom save area for "Sub Display". Indicates the value from custom save execution.	2byte INT	R/W	
03D3H (979)	[Custom] Hold Display	Custom save area for "Hold Display". Indicates the value from custom save execution.	2byte INT	R/W	
03D4H (980)	[Custom] Preset Saturation	Custom save area for "Preset Saturation". Indicates the value from custom save execution.	2byte INT	R/W	
03D5H (981)	[Custom] Preset Saturation Level	Custom save area for "Preset Saturation Level". Indicates the value from custom save execution.	2byte INT	R/W	
03D6H (982)	[Custom] Current Display	Custom save area for "Current Display". Indicates the value from custom save execution.	2byte INT	R/W	
03D7H (983)	[Custom] Preset Display	Custom save area for "Preset Display". Indicates the value from custom save execution.	2byte INT	R/W	
03D8H (984) to 03DFH (991)	Reserved for system	-	-	-	-

3-5 Parameter List

LV-N10/N12/N12C

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
03E0H (992)	Group7 Entry count	Indicates the number of items (entries) that can be set in Group 7.	2byte INT	R	11
03E1H (993)	Warning Dis-able	Indicates settings of disabling warning function. When the bit is ON, the corresponding warning not occur.	2byte WORD	R/W	Bit0: Limit Detection
03E2H (994)	TAG Strings	Indicates TAG character string.	STRING	R/W	8 characters or less (Default : "")
03E3H (995) to 03E5H (997)	Reserved for system	-	-	-	-
03E6H (998)	Power Save	Indicates operating status of power save function.	2byte INT	R/W	0: OFF ● 1: ON 2: FULL 3: ALL
03E7H (999)	Reserved for system	-	-	-	-
03E8H (1000)	Display Gain	Indicates display gain setting.	2byte INT	R/W	0: Standard ● 1: Full
03E9H (1001)	Interference Prevention	Indicates that whether number of interference prevention devices is doubled.	2byte INT	R/W	0: Normal ● 1: Double
03EAH (1002)	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.	2byte INT	R/W	0: No 1: Yes ●
03EBH (1003)	Sensitivity	Set up the Sensitivity.	2byte INT	R/W	0: Standard ● 1: High Resolution
03ECH (1004) to 03EFH (1007)	Reserved for system	-	-	-	-
03F0H (1008)	[Custom] Group 7 Entry count	Indicates the number of entries that can be set in Group 7 custom save area.	2byte INT	R	11
03F1H (1009)	[Custom] Warning Dis-able	Custom save area for "Warning Disable". Indicates the value from custom save execution.	2byte INT	R/W	
03F2H (1010)	[Custom] TAG Strings	Custom save area for "TAG Strings". Indicates the value from custom save execution.	STRING	R/W	
03F3H (1011) to 03F5H (1013)	Reserved for system	-	-	-	-
03F6H (1014)	[Custom] Power Save	Custom save area for "Power Save". Indicates the value from custom save execution.	2byte INT	R/W	

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3-5 Parameter List

LV-N10/N12/N12C

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
03F7H (1015)	Reserved for system	-	-	-	-
03F8H (1016)	[Custom] Display Gain	Custom save area for "Display Gain". Indicates the value from custom save execution.	2byte INT	R/W	
03F9H (1017)	[Custom] Interference Prevention	Custom save area for "Interference Prevention". Indicates the value from custom save execution.	2byte INT	R/W	
03FAH (1018)	[Custom] Parameter Save by Ext-Input	Custom save area for "Parameter Save by Ext-input". Indicates the value from custom save execution.	2byte INT	R/W	
03FBH (1019)	[Custom] Sensitivity	Custom save area for "Sensitivity". Indicates the value from custom save execution.	2byte INT	R/W	
03FCH (1020) to 03FFH (1023)	Reserved for system	-	-	-	-
0400H (1024)	Group8 Entry count	Indicates the number of items (entries) that can be set in Group 8.	2byte INT	R	20
0401H (1025)	ID number Count	Indicates number of used IDs.	2byte INT	R	(LV-N10/N12C*) 1 (LV-N12*) 2
0402H (1026)	Head Type	Indicates connected head type.	2byte INT	R	1: LV-S71 2: LV-S61 3: LV-S72 4: LV-S62 5: LV-S41/LV-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
0403H (1027)	Reserved for system	-	-	-	-
0404H (1028)	Product Code	Indicates product code.	2byte INT	R	(LV-N10/N12C*) 2003 (LV-N12) 2004
0405H (1029)	Revision	Indicates revision, with the upper bytes representing the major revision and the lower bytes representing the minor revision.	2byte INT	R	0101H to FFFFH
0406H (1030)	Product Name	Indicates model designation of the sensor.	STRING	R	(LV-N10/N12C*) "LV-N10/ N12C*" (LV-N12*) "LV-N12C"
0407H (1031) to 040DH (1037)	Reserved for system	-	-	-	-
040EH (1038)	Series Code	Indicates series code.	2byte INT	R	(LV-N10/N12C*) 2003 (LV-N12) 2004

Attribute ID	Name	Description	Data type	Attribute	Value
040FH (1039)	Series Ver- sion	Indicates series version.	2byte INT	R	1
0410H (1040)	Device Type	Indicates device type.	2byte INT	R	0
0411H (1041) to 041FH (1055)	Reserved for system	-	-	-	-

*1 Cable type only

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

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.


● **Attribute IDs corresponding to operation commands (service 4BH)**

The details of the operation command (service code 4BH) are designated with the instance ID (each ID number) and attribute ID.

Details on the selectable operation commands are given below.

Attribute ID	Name	Details
0301H(769)	Load Recipe Data	Reads the recipe.
0302H(770)	Custom Save	Executes custom save.
0303H(771)	Maximum Sensitivity Calibration	Executes calibration at the maximum sensitivity.
0304H(772)	Percentage Calibration	Executes calibration at a percentage of the sensitivity.
0305H(773)	Two-point/Pos. Calibration: 1st	Starts calibration the 1st point of 2-point calibration.
0306H(774)	Two-point Calibration: 2nd	Starts calibration the 2nd point of 2-point calibration.
0305H(773)	Positioning Calibration: 1st	Starts calibration the 1st point of positioning calibration.
0307H(775)	Positioning Calibration: 2nd	Starts calibration the 2nd point of positioning calibration.
0308H(776)	Full Auto Calibration: Start	Starts fully automatic calibration.
0309H(777)	Full Auto Calibration: Finish	Ends fully automatic calibration.
030AH(778)	Zero-shift Request	Executes zero shift.
030BH(779)	Zero-shift Cancel	Cancels zero shift.
030CH(780)	Preset Request	Executes preset.
030DH(781)	Preset Cancel	Cancels preset.
0310H(784)	Reset Hold Value	Resets the held value.
0311H (785)	Work-Preset Request	Executes workpiece preset.
0312H(786)	Full Auto Preset: Start	Starts fully automatic (or maximum sensitivity) preset.
0313H(787)	Full Auto Preset: Finish	Ends fully automatic (or maximum sensitivity) preset.
0314H(788)	Maximum Sensitivity Preset: Request	Executes maximum sensitivity preset. (Preset can be executed without specifying the start and end.)
0315H (789)	Reset Counter Value	Resets the counter value. (Cable type only)

PS-N10/N12 (Instance ID: 1 to 16)

Refer to  "How to Use NU Objects" (page 3-32) for how to use the parameters. Designate the ID number of the installed sensor for the instance ID.

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0320H (800)	Group1 Entry count	Indicates the number of entries in Group 1.	2byte INT	R	22
0321H (801)	Error Information	Indicates error information. When an error occurs, the corresponding bit is turned ON.	2byte 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
0322H (802)	Warning Information	Indicates warning information. When a warning occurs, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Limit Detection
0323H (803)	Warning Function	Indicates the operating status of the warning function. When the warning function is operating, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Limit Detection
0324H (804)	Output	Indicates the output status of the sensor. When the output is ON, the corresponding bit is turned ON.	2byte WORD	R	Bit0: Output
0325H (805)	Current Value	Indicates the current value of received light intensity.	2byte INT	R	0 to 9999
0326H (806) to 0327H (807)	Reserved for system	-	-	-	-
0328H (808)	Raw Value	Indicates the received light intensity before correction with the Preset, DATUM, or Zero-shift functions.	2byte UINT	R	0 to 65535
0329H (809)	Peak-Hold Value	Indicates the peak value (or the max bottom value) of received light intensity (depending on the settings of Hold display).	2byte INT	R	0 to 9999
032AH (810)	Bottom-Hold Value	Indicates the bottom value (or the min peak value) of received light intensity (depending on the settings of Hold display).	2byte INT	R	0 to 9999
032BH (811)	Reserved for system	-	-	-	-

3-5 Parameter List

PS-N10/N12

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
032CH (812)	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.	2byte INT	R	0 to 9999
032DH (813)	Preset/ DATUM Internal Value	Indicates an internal setting value when executing preset/DATUM.	2byte UINT	R	0 to 65535
032EH (814)	Display Customize	Indicates operating status of the Reading Correction function.	2byte INT	R	0: No Customize / DATUM ● 1: Preset 2: Zero-shift 3: Work preset 4: Work preset (Reverse)
032FH (815)	Slide Switch Status	Indicates status of the Slide Switch.	2byte INT	R	0: Selecting ch 1: Selecting ch
0330H (816)	Reserved for system	-	-	-	-
0331H (817)	Operation Mode	Indicates current operation mode of the sensor.	2byte INT	R	0: RUN 1: LED_OFF 2: SLEEP 3: PAUSE
0332H (818)	Operation Mode Setting	Set up the operation mode of the sensor.	2byte INT	R/W	0: RUN ● 1: LED_OFF 2: SLEEP 3: PAUSE
0333H (819)	Recipe Select	Select Recipe to be used when executing operating command (Load Recipe Data).	2byte INT	R/W	0: Initialize ● 1: Custom 2: Fall 3: Percentage Calibration 4: Zero-shift 5: MEGA 6: AREA 7: 0 DATUM
0334H (820) to 033FH (831)	Reserved for system	-	-	-	-
0340H (832)	Group2 Entry count	Indicates the number of entries that can be set in Group 2.	2byte INT	R	14
0341H (833)	Setting Value (Output/Area High)	Indicates setting value of Output. The upper limit of the setting value is displayed when the "Detection Mode" is Area.	2byte INT	R/W	0 to 9999 (Default:50)
0342H (834) to 0343H (835)	Reserved for system	-	-	-	-
0344H (836)	Setting Value (Area Low)	Indicates lower limit of setting value in Area detection mode.	2byte INT	R/W	0 to 9999 (Default:50)
0345H (837) to 0346H (838)	Reserved for system	-	-	-	-

Attribute ID	Name	Description	Data type	Attribute	Value
0347H (839)	Limit Setting Value	Indicates setting value of warning output when the Limit Detection function is used.	2byte INT	R/W	0 to 9999 (Default:0)
0348H (840) to 034FH (847)	Reserved for system	-	-	-	-
0350H (848)	[Custom] Group 2 Entry count	Indicates the number of entries that can be set in Group 2 custom save area.	2byte INT	R	14
0351H (849)	[Custom] Setting Value (Output/Area High)	Custom save area for "Setting Value (Output/Area High)". Indicates the value from custom save execution.	2byte INT	R/W	
0352H (850) to 0353H (851)	Reserved for system	-	-	-	-
0354H (852)	[Custom] Setting Value (Area Low)	Custom save area for "Setting Value (Area Low)". Indicates the value from custom save execution.	2byte INT	R/W	
0355H (853) to 0356H (854)	Reserved for system	-	-	-	-
0357H (855)	[Custom] Limit Setting Value	Custom save area for "Limit Setting Value". Indicates the value from custom save execution.	2byte INT	R/W	
0358H (856) to 035FH (863)	Reserved for system	-	-	-	-
0360H (864)	Group3 Entry count	Indicates number of entries that can be set in Group 3.	2byte INT	R	7
0361H (865)	Key Lock Status	Indicates status of the Key lock.	2byte INT	R/W	0: Unlock ● 1: Key Lock 2: PIN Code Lock 3: Communication Lock
0362H (866)	PIN Code	Indicates password for Key lock.	2byte INT	R/W	0 to 9999 (Default:0)
0363H (867)	Slide Switch Lock	Indicates lock status of Slide Switch. When being locked, the Slide Switch is disabled, with the value always being 1.	2byte INT	R/W	0: Unlock ● 1: Lock
0364H (868)	L-on/D-on (N.O./N.C.)	Indicates that whether output is ON for light (L-on) or ON (D-on) for dark.	2byte INT	R/W	0: L-on (N.O.) 1: D-on (N.C.)

3-5 Parameter List

PS-N10/N12

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0365H (869)	Power Mode	Indicates Power mode.	2byte INT	R/W	2: TURBO (Response Time 500 μ s) ● 3: SUPER (Response Time 1 ms) 4: ULTRA (Response Time 4 ms) 5: MEGA (Response Time 16 ms)
0366H (870)	Sensitivity Setting	Indicates setting method of Sensitivity.	2byte INT	R/W	0: Normal Sensitivity Set- ting 1: Percentage Calibration 2: Zero-shift Calibration
0367H (871)	Percentage Calib. Target Value	Indicates target value of percentage calibration when the Sensitivity Set- ting is set to Percentage Calibration.	2byte INT	R/W	-99 to 99 (Default: -10)
0368H (872) to 036FH (879)	Reserved for system	-	-	-	-
0370H (880)	[Custom] Group 3 Entry count	Indicates the number of entries that can be set in Group 3 custom save area.	2byte INT	R	7
0371H (881)	[Custom] Key Lock Status	Custom save area for "Key Lock Status". Indi- cates the value from cus- tom save execution.	2byte INT	R/W	
0372H (882)	[Custom] PIN Code	Custom save area for "PIN Code". Indicates the value from custom save execution.	2byte INT	R/W	
0373H (883)	[Custom] Slide Switch Lock	Custom save area for "Slide Switch Lock". Indi- cates the value from cus- tom save execution.	2byte INT	R/W	
0374H (884)	[Custom] L- on/D-on (N.O./N.C.)	Custom save area for "L- on/D-on (N.O./N.C.)". Indi- cates the value from cus- tom save execution.	2byte INT	R/W	
0375H (885)	[Custom] Power Mode	Custom save area for the "Power Mode". Indicates the value from custom save execution.	2byte INT	R/W	
0376H (886)	[Custom] Sensitivity Setting	Custom save area for the "Sensitivity Setting". Indi- cates the value from cus- tom save execution.	2byte INT	R/W	
0377H (887)	[Custom] Percentage Calib. Target Value	Custom save area for the "Percentage Calib. Target Value". Indicates the value from custom save execution.	2byte INT	R/W	
0378H (888) to 037FH (895)	Reserved for system	-	-	-	-

Attribute ID	Name	Description	Data type	Attribute	Value
0380H (896)	Group4 Entry count	Indicates the number of entries that can be set in Group 4.	2byte INT	R	9
0381H (897)	Output Timer	Indicates settings of Output timer.	2byte INT	R/W	0: Timer off ● 1: Off-delay Timer 2: On-delay Timer 3: One-shot Timer
0382H (898)	Timer Value	Indicates time of Output timer (unit: ms).	2byte INT	R/W	1 to 9999 (Default: 10)
0383H (899)	Reserved for system	-	-	-	-
0384H (900)	Detection Mode	Indicates detection mode of Output.	2byte 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
0385H (901)	DATUM Speed	Indicates correction speed of DATUM.	2byte INT	R/W	0: Level1 (Slow) ● 1: Level2 (Normal) 2: Level3 (Fast)
0386H (902)	DATUM Warning Level	Indicates alarm output level of DATUM.	2byte INT	R/W	0 to 100 (Default:50)
0387H (903)	External Input	Indicates settings of external input.	2byte 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
0388H (904)	PAUSE Mode	Set up the output status of the sensor in PAUSE mode.	2byte INT	R/W	0: Always OFF ● 1: Always ON 2: Keep Output
389H (905) to 038FH (911)	Reserved for system	-	-	-	-
0390H (912)	[Custom] Group 4 Entry count	Indicates the number of entries that can be set in Group 4 custom save area.	2byte INT	R	9
0391H (913)	[Custom] Output Timer	Custom save area for "Output Timer". Indicates the value from custom save execution.	2byte INT	R/W	
0392H (914)	[Custom] Timer Value	Custom save area for "Timer Value". Indicates the value from custom save execution.	2byte INT	R/W	
0393H (915)	Reserved for system	-	-	-	-
0394H (916)	[Custom] Detection Mode	Custom save area for "Detection Mode". Indicates the value from custom save execution.	2byte INT	R/W	

3-5 Parameter List

PS-N10/N12

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0395H (917)	[Custom] DATUM Speed	Custom save area for "DATUM Speed". Indicates the value from custom save execution.	2byte INT	R/W	
0396H (918)	[Custom] DATUM Warning Level	Custom save area for "DATUM Warning Level". Indicates the value from custom save execution.	2byte INT	R/W	
0397H (919)	[Custom] External Input	Custom save area for "External Input". Indicates the value from custom save execution.	2byte INT	R/W	
0398H (920)	[Custom] PAUSE Mode	Custom save area for "PAUSE Mode". Indicates the value from custom save execution.	2byte INT	R/W	
0399H (921) to 039FH (927)	Reserved for system	-	-	-	-
03A0H (928)	Group5 Entry count	Indicates the number of entries that can be set in Group 5.	2byte INT	R	6
03A1H (929) to 03A4H (932)	Reserved for system	-	-	-	-
03A5H (933)	Limit Output Mode	Indicates reset method of limit output.	2byte INT	R/W	0: Manual 1: Auto
03A6H (934) to 03AFH (943)	Reserved for system	-	-	-	-
03B0H (944)	[Custom] Group 5 Entry count	Indicates the number of entries that can be set in Group 5 custom save area.	2byte INT	R	6
03B1H (945) to 03B4H (948)	Reserved for system	-	-	-	-
03B5H (949)	[Custom] Limit Output Mode	Custom save area for "Limit Output Mode". Indicates the value from custom save execution.	2byte INT	R/W	
03B6H (950) to 03BFH (959)	Reserved for system	-	-	-	-
03C0H (960)	Group6 Entry count	Indicates the number of entries that can be set in Group 6.	2byte INT	R	6
03C1H (961)	Display Reverse	Indicates settings of display reverse.	2byte INT	R/W	0: Normal ● 1: Reverse

Attribute ID	Name	Description	Data type	Attribute	Value
03C2H (962)	Sub Display	Indicates details of the sub display.	2byte 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
03C3H (963)	Hold Display	Indicates hold details when the received light intensity hold display is selected in the Sub display.	2byte 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.
03C4H (964)	Preset Saturation	Indicates that whether the current value of received light intensity is saturated when Preset or DATUM function is used.	2byte INT	R/W	0: Off 1: On ●
03C5H (965)	Preset Saturation Level	Indicates saturation level of Preset.	2byte INT	R/W	100 to 200 (Default:110)
03C6H (966)	Current Display	Indicates current display.	2byte INT	R/W	0: Normal ● 1: Sub
03C7H (967) to 03CFH (975)	Reserved for system	-	-	-	-
03D0H (976)	[Custom] Group 6 Entry count	Indicates the number of entries that can be set in Group 6 custom save area.	2byte INT	R	6
03D1H (977)	[Custom] Display Reverse	Custom save area for the "Display Reverse". Indicates the value from custom save execution.	2byte INT	R/W	
03D2H (978)	[Custom] Sub Display	Custom save area for "Sub Display". Indicates the value from custom save execution.	2byte INT	R/W	
03D3H (979)	[Custom] Hold Display	Custom save area for "Hold Display". Indicates the value from custom save execution.	2byte INT	R/W	
03D4H (980)	[Custom] Preset Saturation	Custom save area for "Preset Saturation". Indicates the value from custom save execution.	2byte INT	R/W	
03D5H (981)	[Custom] Preset Saturation Level	Custom save area for "Preset Saturation Level". Indicates the value from custom save execution.	2byte INT	R/W	
03D6H (982)	[Custom] Current Display	Custom save area for "Current Display". Indicates the value from custom save execution.	2byte INT	R/W	
03D7H (983) to 03DFH (991)	Reserved for system	-	-	-	-

3-5 Parameter List

PS-N10/N12

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
03E0H (992)	Group7 Entry count	Indicates the number of items (entries) that can be set in Group 7.	2byte INT	R	13
03E1H (993)	Warning Dis-able	Indicates settings of disabling warning function. When the bit is ON, the corresponding warning not occur.	2byte WORD	R/W	Bit0: Limit Detection
03E2H (994)	TAG Strings	Indicates TAG character string.	STRING	R/W	8 characters or less (Default : "")
03E3H (995) to 03E5H (997)	Reserved for system	-	-	-	-
03E6H (998)	Power Save	Indicates operating status of power save function.	2byte INT	R/W	0: OFF ● 1: ON 2: FULL 3: ALL
03E7H (999)	Reserved for system	-	-	-	-
03E8H (1000)	Display Gain	Indicates display gain setting.	2byte INT	R/W	0: Standard ● 1: Full
03E9H (1001)	Interference Prevention	Indicates that whether number of interference prevention devices is doubled.	2byte INT	R/W	0: Normal ● 1: Double
03EAH (1002)	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.	2byte INT	R/W	0: No 1: Yes ●
03EBH (1003)	Reserved for system	-	-	-	-
03ECH (1004)	Long Dis-tance Mode	The setting status of the long distance mode is stored.	2byte INT	R/W	0: OFF ● 1: ON
03EDH (1005) to 03EFH (1007)	Reserved for system	-	-	-	-
03F0H (1008)	[Custom] Group 7 Entry count	Indicates the number of entries that can be set in Group 7 custom save area.	2byte INT	R	13
03F1H (1009)	[Custom] Warning Dis-able	Custom save area for "Warning Disable". Indicates the value from custom save execution.	2byte INT	R/W	
03F2H (1010)	[Custom] TAG Strings	Custom save area for "TAG Strings". Indicates the value from custom save execution.	STRING	R/W	
03F3H (1011) to 03F5H (1013)	Reserved for system	-	-	-	-

Attribute ID	Name	Description	Data type	Attribute	Value
03F6H (1014)	[Custom] Power Save	Custom save area for "Power Save". Indicates the value from custom save execution.	2byte INT	R/W	
03F7H (1015)	Reserved for system	-	-	-	-
03F8H (1016)	[Custom] Dis- play Gain	Custom save area for "Display Gain". Indicates the value from custom save execution.	2byte INT	R/W	
03F9H (1017)	[Custom] Interference Prevention	Custom save area for "Interference Prevention". Indicates the value from custom save execution.	2byte INT	R/W	
03FAH (1018)	[Custom] Parameter Save by Ext- Input	Custom save area for "Parameter Save by Ext-input". Indicates the value from custom save execution.	2byte INT	R/W	
03FBH (1019)	Reserved for system	-	-	-	-
03FCH (1020)	[Custom] Long Dis- tance Mode	Custom save area for "Long Distance Mode" The value when the custom save is performed is stored.	2byte INT	R/W	
03FDH (1021) to 03FFH (1023)	Reserved for system	-	-	-	-
0400H (1024)	Group8 Entry count	Indicates the number of items (entries) that can be set in Group 8.	2byte INT	R	20
0401H (1025)	ID number Count	Indicates number of used IDs.	2byte INT	R	1
0402H (1026) to 0403H (1027)	Reserved for system	-	-	-	-
0404H (1028)	Product Code	Indicates product code.	2byte INT	R	2005
0405H (1029)	Revision	Indicates revision, with the upper bytes representing the major revision and the lower bytes representing the minor revision.	2byte INT	R	0101H to FFFFH
0406H (1030)	Product Name	Indicates model designation of the sensor.	STRING	R	PS-N10/N12*
0407H (1031) to 040DH (1037)	Reserved for system	-	-	-	-
040EH (1038)	Series Code	Indicates series code.	2byte INT	R	2005
040FH (1039)	Series Ver- sion	Indicates series version.	2byte INT	R	1

3-5 Parameter List

PS-N10/N12

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0410H (1040)	Device Type	Indicates device type.	2byte INT	R	0
0411H (1041) to 041FH (1055)	Reserved for system	-	-	-	-

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

Reference

- [Custom]^{1***} 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.

● **Attribute IDs corresponding to operation commands (service 4BH)**

The details of the operation command (service code 4BH) are designated with the instance ID (each ID number) and attribute ID.


Details on the selectable operation commands are given below.

Attribute ID	Name	Details
0301H(769)	Load Recipe Data	Reads the recipe.
0302H(770)	Custom Save	Executes custom save.
0303H(771)	Maximum Sensitivity Calibration	Executes calibration at the maximum sensitivity.
0304H(772)	Percentage Calibration	Executes calibration at a percentage of the sensitivity.
0305H(773)	Two-point/Pos. Calibration: 1st	Starts calibration the 1st point of 2-point calibration.
0306H(774)	Two-point Calibration: 2nd	Starts calibration the 2nd point of 2-point calibration.
0305H(773)	Positioning Calibration: 1st	Starts calibration the 1st point of positioning calibration.
0307H(775)	Positioning Calibration: 2nd	Starts calibration the 2nd point of positioning calibration.
0308H(776)	Full Auto Calibration: Start	Starts fully automatic calibration.
0309H(777)	Full Auto Calibration: Finish	Ends fully automatic calibration.
030AH(778)	Zero-shift Request	Executes zero shift.
030BH(779)	Zero-shift Cancel	Cancels zero shift.
030CH(780)	Preset Request	Executes preset.
030DH(781)	Preset Cancel	Cancels preset.
0310H(784)	Reset Hold Value	Resets the held value.
0311H (785)	Work-Preset Request	Executes workpiece preset.
0312H(786)	Full Auto Preset: Start	Starts fully automatic (or maximum sensitivity) preset.
0313H(787)	Full Auto Preset: Finish	Ends fully automatic (or maximum sensitivity) preset.
0314H(788)	Maximum Sensitivity Preset: Request	Executes maximum sensitivity preset. (Preset can be executed without specifying the start and end.)

3-5 Parameter List

AP-N10/N10D

AP-N10/N10D (Instance ID: 1 to 16)

Refer to  "How to Use NU Objects" (page 3-32) for how to use the parameters. Designate the ID number of the installed sensor for the instance ID.

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0320H (800)	Group1 Entry count	Indicates the number of entries that can be set in Group1.	2byte UINT	R	12
0321H (801)	Error Information	Indicates error information. When an error occurs, the corresponding bit is turned ON.	2byte WORD	R	bit0 : Reserve bit1 : Sensor-Head Error bit2 : EEPROM Error bit3 : Reserve bit4 : Reserve bit5 : Reserve bit6 : Reserve bit7 : Sensor Communication Error
0322H (802)	Reserved	-	-	-	-
0323H (803)	Reserved	-	-	-	-
0324H (804)	Output	Indicates the output status of the sensor. When the output is ON, the corresponding bit is turned ON.	2byte WORD	R	bit0 : Output 1 bit 1 : Output 2 ^{*1}
0325H (805)	Current Pressure Value	Indicates the current pressure value.	2byte INT	R	-32768~32767
0326H (806)	Reserved	-	-	-	-
0327H (807)	Reserved	-	-	-	-
0328H (808)	Raw Pressure Value	Indicates the pressure value of pressure without zero shift. (unit: 0.1kPa)	2byte INT	R	-32768~32767
0329H (809)	Peak-Hold Value	Indicates the peak value of the current values. (unit: 0.1kPa)	2byte INT	R	-32768~32767
032AH (810)	Bottom-Hold Value	Indicates the bottom value of the current values.(unit: 0.1kPa)	2byte INT	R	-32768~32767
032BH (811)	Bottom-Peak Value ^{*1}	Indicates the max value among the bottom pressure values while the current value falls the setting value (P2). (unit: 0.1kPa)	2byte INT	R	-32768~32767
032CH (812)	Peak-Bottom Value	Indicates the minimum value among the peak pressure values while the current value exceeds the setting value (P1). (unit: 0.1kPa)	2byte INT	R	-32768~32767

Attribute ID	Name	Description	Data type	Attribute	Value
032DH (813) to 033FH (831)	Reserved	-	-	-	-
0340H (832)	Group 2 Entry count	Indicates the number of entries that can be set in Group 2.	2byte UINT	R	15
0341H (833)	Setting Value P1	Indicates the setting value of Output1. (Except for the Window mode) (unit: 0.1kPa)	2byte INT	R/W	■ AP-41M/41 -1200~200 (default value : -500) ■ AP-43 -2000~12000 (default value : 5000) ■ AP-44 -1400~1400 (default value : -500) ■ AP-48 -1400~1400 (default value : 500)
0342H (834)	Setting Value P2 ^{*1}	Indicates the setting value of Output1. (Standard mode) (unit: 0.1kPa)	2byte INT	R/W	■ AP-41M/41 -1200~200 (default value : 50) ■ AP-43 -2000~12000 (default value : -500) ■ AP-44 -1400~1400 (default value : 50) ■ AP-48 -1400~1400 (default value : -50)
0343H (835)	Reserved	-	-	-	-
0344H (836)	Setting Value Area Hi	Indicates the upper limit of the setting value. (Window mode, Leak test mode) (unit: 0.1kPa)	2byte INT	R/W	■ AP-41M/41 -1200~200 (default value : -600) ■ AP-43 -2000~12000 (default value : 6000) ■ AP-44 -1400~1400 (default value : -500) ■ AP-48 -1400~1400 (default value : 500)
0345H (837)	Setting Value Area Lo	Indicates the lower limit of the setting value. (Window mode, Leak test mode) (unit: 0.1kPa)	2byte INT	R/W	■ AP-41M/41 -1200~200 (default value : -200) ■ AP-43 -2000~12000 (default value : 2000) ■ AP-44 -1400~1400 (default value : 500) ■ AP-48 -1400~1400 (default value : -500)
0346H (838)	Reserved	-	-	-	-

3-5 Parameter List

AP-N10/N10D

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0347H (839)	Reserved	-	-	-	-
0348H (840)	Hysteresis	Indicates the hysteresis value. (unit: 0.1kPa)	2byte INT	R/W	<div> <div>AP-41M/41</div> <div>0~1000 (default value : 5)</div> <div>AP-43</div> <div>0~10000</div> <div>(default value : 50)</div> <div>AP-44/48</div> <div>0~1999 (default value : 10)</div> </div>
0349H (841) to 034DH (845)	Reserved	-	-	-	-
034EH (846)	Reference Value	Indicates the zero shift reference value. (unit: 0.1kPa)	2byte INT	R/W	<div> <div>AP-41M/41</div> <div>-1013~30</div> <div>AP-43</div> <div>-300~10000</div> <div>AP-44/48</div> <div>-1013~1013</div> </div>
034FH (847)	Pressure Correction Value	Indicates the atmosphere pressure correction value. (unit: 0.1kPa)	2byte INT	R/W	<div> <div>AP-41M/41</div> <div>-60~60</div> <div>AP-43</div> <div>-600~600</div> <div>AP-44/48</div> <div>-110~110</div> </div>
0350H (848) to 035FH (863)	Reserved	-	-	-	-
0360H (864)	Group 3 Entry count	Indicates the number of entries that can be set in Group 3.	2byte UINT	R	15
0361H (865)	Key Lock Status	Indicates the status of Key lock.	2byte INT	R/W	<div> <div>0 : Unlock ●</div> <div>1 : Key Lock</div> <div>2 : PIN Code Lock</div> <div>3 : Communication Lock</div> </div>
0362H (866)	Password	Indicates the password for Key lock.	2byte INT	R/W	0 to 9999 (default vaule : 0)
0363H (867)	Reserved	-	-	-	-
0364H (868)	N.O./N.C.	Indicates whether the outputs are NO or NC. The corresponding bit turns ON in NC.	2byte WORD	R/W	<div> <div>bit0 : Output 1</div> <div>0 : N.O.</div> <div>1 : N.C.</div> <div>bit1 : Output 2⁺1</div> <div>0 : N.O.</div> <div>1 : N.C.</div> <div>(default value : 0)</div> </div>
0365H (869)	Response Time (Chatter prevention)	Indicates the response time (chatter prevention).	2byte INT	R/W	<div> <div>0 : 1ms</div> <div>1 : 2.5ms ●</div> <div>2 : 5ms</div> <div>3 : 100ms</div> <div>4 : 500ms</div> <div>5 : 1000ms</div> <div>6 : 5000ms</div> </div>

Attribute ID	Name	Description	Data type	Attribute	Value
0366H (870) to 036EH (878)	Reserved	-	-	-	-
036FH (879)	Switching Out1/Out2 ^{*1}	Indicates the selected output. When the calibration is executed, the setting value of the selected output is changed.	2byte INT	R/W	0 : Output1 ● 1 : Output2
0370H (880) to 037FH (895)	Reserved	-	-	-	-
0380H (896)	Group 4 Entry count	Indicates the number of entries that can be set in Group 4.	2byte UINT	R	4
0381H (897) to 0383H (899)	Reserved	-	-	-	-
0384H (900)	Detection Mode	Indicates the detection mode.	2byte INT	R/W	0 : Standard Mode ● 1 : Window Mode 2 : Suction Confirmation Mode ^{*1} 3 : Leak Test Mode ^{*1}
0385H (901) to 039FH (927)	Reserved	-	-	-	-
03A0H (928)	Group 5 Entry count	Indicates the number of entries that can be set in Group 5.	2byte UINT	R	0
03A1H (929) to 03BFH (959)	Reserved	-	-	-	-
03C0H (960)	Group 6 Entry count	Indicates the number of entries that can be set in Group 6.	2byte UINT	R	13
03C1H (961) to 03CCH (972)	Reserved	-	-	-	-
03CDH (973)	Display resolution	Indicates the display resolution setting.	2byte INT	R/W	0 : Standard ● 1 : High Resolution Mode
03CEH (974) to 03DFH (991)	Reserved	-	-	-	-

3-5 Parameter List

AP-N10/N10D

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
03E0H (992)	Group 7 Entry count	Indicates the number of entries that can be set in Group 7.	2byte UINT	R	6
03E1H (993) to 03E5H (997)	Reserved	-	-	-	-
03E6H (998)	Eco Mode	Indicates the Eco mode.	2byte INT	R/W	0 : Off ● 1 : On
03E7H (999) to 03FFH (1023)	Reserved	-	-	-	-
0400H (1024)	Group 8 Entry count	Indicates the number of entries that can be set in Group 8.	2byte UINT	R	16
0401H (1025)	ID Number Count	Indicates the number of used IDs.	2byte INT	R	AP-N10 : 1 AP-N10D : 2
0402H (1026)	Head Type	Indicates the connected head type.	2byte INT	R	1 : AP-48 2 : AP-41/41M 3 : AP-43 4 : AP-44
0403H (1027)	Reserved	-	-	-	-
0404H (1028)	Product Code	Indicates the product code.	2byte INT	R	AP-N10 : 2020 AP-N10D : 2021
0405H (1029)	Revision	Indicates the revision, with the upper bytes representing the major revision and the lower bytes representing the minor revision.	2byte INT	R	0 to FFFFh
0406H (1030)	Product Name 1,0	Indicates the model designation of the sensor.	STRING	R	AP
0407H (1031) to 040DH (1037)	Reserved	-	-	-	-
040EH (1038)	Series Code	Indicates the series code.	2byte INT	R	AP-N10 : 2020 AP-N10D : 2021
040FH (1039)	Series Version	Indicates the series version.	2byte INT	R	1
0410H (1040)	Device Type	Indicates the device type.	2byte INT	R	0
0411H (1041) to 041FH (1055)	Reserved	-	-	-	-

*1 2-output type only


● **Attribute IDs corresponding to operation commands (service 4BH)**

The details of the operation command (service code 4BH) are designated with the instance ID (each ID number) and attribute ID.

Details on the selectable operation commands are given below.

Attribute ID	Name	Details
0301H(769)	Initialization request	Initializes all settings.
0305H(773)	Two-point/Pos. Calibration: 1st	Starts calibration the 1st point of 2-point calibration.
0306H(774)	Two-point Calibration: 2nd	Starts calibration the 2nd point of 2-point calibration.
030EH(782)	Atmosphere Pressure Correction	Executes the atmosphere pressure correction.
030FH(783)	Reset Atmosphere Pressure Correction	Resets the atmosphere pressure correction.
0310H(784)	Reset Hold Value	Resets the hold value.

MU-N/LR-T (Instance ID : 1 to 16)

Refer to  "How to Use NU Objects" (page 3-32) for how to use the parameters. Designate the ID number of the installed sensor for the instance ID.

When the MU-N/LR-T is used for the first time after purchase, initial setting should be completed by either of the following methods:

- (1) By operating the button of the MU-N
- (2) Via communication

Point

When the settings of the MU-N and LR-T are different (such as when only the LR-T is replaced), the settings must be synchronized by button operation of the MU-N. For details, refer to "MU-N Series User's Manual (Using LR-T)".

■ Initial setting via communication

Rewriting one of the sensor settings via message communication completes the initial setting and the sensor enters detection status. Change the "Basic settings" and other settings as necessary. The "Basic settings" can be changed using the following procedure.

1 Set the function to be changed.

Write the data to the following address of the MU-N/LR-T.

Attribute ID	Name	Description	Data type	Attribute	Value
03EFH (1007)	Basic setting changes	Indicates the changes of "Basic settings".	2byte INT	R/W	bit0 : NPN/PNP 0 : NPN 1 : PNP bit1 : I/O Function Output 1+Output 2 Output 1+Input bit2-3 : Distance Unit 0 : mm 1 : inch 2 : feet (Default value : 0)

2 Apply the function to the sensor.

An operation command is issued to the following address.
(Service code: 4BH, Instance ID: 01H to 10H)

Attribute ID	Name	Description
0302H (770)	Basic settings set request	Changes the "Basic settings" in accordance with "Basic settings changes".



To check the input/output function being set, read the data from Attribute ID : 0335H "Basic settings".

This completes the "basic settings". Refer to starting on the next page to perform communication.

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0320H (800)	Group1 Entry count	Indicates the number of entries that can be set in Group1.	2byte UNIT	R	25
0321H (801)	Error Information	Indicates error information. When an error occurs, the corresponding bit is turned ON.	2byte WORD	R	bit0 : Over Current Error bit1 : Head Error bit2 : EEPROM Error bit3 : Reserved bit4 : Reserved bit5 : Reserved bit6 : Sensor/Controller Unsynchronized bit7 : Communication Error
0322H (802) to 0323H (803)	Reserved	-	-	-	-
0324H (804)	Output	Indicates the output status of the sensor. When the output is ON, the corresponding bit is turned ON.	2byte WORD	R	bit0 : Output1 bit1 : Output2
0325H (805)	Current Distance	Indicates the raw value of the current distance value.	2byte INT	R	50 to 9999
0326H (806) to 0327H (807)	Reserved	-	-	-	-
0328H (808)	Light Intensity	Indicates the raw value of the current distance value.	2byte INT	R	0 : Low (instability) 1 : High
0329H (809) to 0334H (820)	Reserved	-	-	-	-
0335H (821)	Basic setting	Indicates the basic settings of the sensor.	2byte INT	R	bit0 : NPN/PNP 0 : NPN 1 : PNP bit1 : I/O Function 0 : Output 1 + Output 2 1 : Output 1 + Input (Default value : 0)
0336H (822) to 0338H (824)	Reserved	-	-	-	-

3-5 Parameter List

MU-N/LR-T

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0339H (825)	Initialization status	Indicates status of Initialization request.	2byte INT	R	0 : IDLE 1 : EXE 2 : FINISH
033AH (826) to 033FH (831)	Reserved	-	-	-	-
0340H (832)	Group2 Entry count	Indicates the number of entries that can be set in Group2.	2byte UINT	R	15
0341H (833)	Setting Value(Output1 / Output1 Area Near)	Indicates the setting value of Output1. The lower limit of the setting value is displayed when the "Detection Mode" is Area.	2byte INT	R/W	0 to 9999 (Default vaule : 500)
0342H (834)	Setting Value(Output2 / Output2 Area Near)	Indicates the setting value of Output2. The lower limit of the setting value is displayed when the "Detection Mode" is Area.	2byte INT	R/W	0 to 9999 (Default vaule : 500)
0343H (835)	Reserved	-	-	-	-
0344H (836)	Setting Value(Output1 Area Far)	Indicates the upper limit of setting value of Output1 when the "Detection Mode" is Area.	2byte INT	R/W	0 to 9999 (Default vaule : 1000)
0345H (837)	Setting Value(Output2 Area Far)	Indicates the upper limit of setting value of Output2 when the "Detection Mode" is Area.	2byte INT	R/W	0 to 9999 (Default vaule : 1000)
0346H (838) to 0347H (839)	Reserved	-	-	-	-
0348H (840)	Hysteresis Value	Indicates the value of hysteresis when Hysteresis Setting is "Custom".	2byte UINT	R/W	0 to 9999 (Default vaule : 10)
0349H (841) to 034EH (846)	Reserved	-	-	-	-
034FH (847)	DATUM Offset	Indicates the offset value in DATUM mode.	2byte INT	R/W	0 to 9999 (Default vaule : 0)
0350H (848) to 035FH (863)	Reserved	-	-	-	-
0360H (864)	Group3 Entry count	Indicates the number of entries that can be set in Group3.	2byte INT	R	15

Attribute ID	Name	Description	Data type	Attribute	Value
0361H (865)	Key Lock Status	Indicates the status of Key lock.	2byte INT	R/W	0 : Unlock ● 1 : Key Lock 2 : PIN Code Lock 3 : Communication Lock
0362H (866)	Password	Indicates the password for Key lock.	2byte INT	R/W	0 to 9999 (Default vaule : 0)
0363H (867)	Reserved	-	-	-	-
0364H (868)	N.O./N.C.	Indicates the output logic(NO/NC). The corresponding bit turns ON in NC.	2byte WORD	R/W	bit0 : Output 1 0 : N.O. 1 : N.C. bit1 : Output 2 0 : N.O. 1 : N.C. (Default value : 0)
0365H (869)	Response Time	Indicates the Response Time.	2byte INT	R/W	■Laser Class2 type 0 : 7ms 1 : 15ms 2 : 30ms ● 3 : 105ms 4 : 1000ms ■Laser Class1 type 0 : 8ms 1 : 25ms 2 : 55ms ● 3 : 205ms 4 : 2000ms
0366H (870) to 0368H (872)	Reserved	-	-	-	-
0369H (873)	Hysteresis Setting	Indicates the setting mode of hysteresis.	2byte INT	R/W	0 : Standard ● 1 : Custom
036AH (874)	Reserved	-	-	-	-
036BH (875)	Detection Mode	Indicates the detection mode.	2byte INT	R/W	0 : Distance mode ● 1 : DATUM mode
036CH (876)	Interference Channel	Indicates the laser emission channel for interference prevention.	2byte INT	R/W	0 : Channel 1 ● 1 : Channel 2 2 : Channel 3 3 : Channel 4
036DH (877)	Received Light Sensitivity	Indicates the received light sensitivity setting.	2byte INT	R/W	0 : Low 1 : Mid 2 : High ●
036EH (878)	Stability Filter	Indicates the number of samples used when determining stability.	2byte INT	R/W	1 to 100 (Default vaule : 5)
036FH (879)	Switching Out1/Out2	Indicates the selected output.	2byte INT	R/W	0 : Output1 ● 1 : Output2
0370H (880) to 037FH (895)	Reserved	-	-	-	-

3-5 Parameter List

MU-N/LR-T

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0380H (896)	Group4 Entry count	Indicates the number of entries that can be set in Group4.	2byte UINT	R	7
0381H (897)	Output Timer (Output1)	Indicates the setting of Output1 timer.	2byte INT	R/W	0 : Off ● 1 : Off delay 2 : On delay 3 : One-shot
0382H (898)	Timer Value (Output1)	Indicates the time of Output1 timer. (unit: ms).	2byte INT	R/W	1 to 9999 (Default value : 10)
0383H (899)	Reserved	-	-	-	-
0384H (900)	Output 1 Mode	Indicates the mode of Output 1.	2byte INT	R/W	0 : Standard ● 1 : Window
0385H (901) to 0386H (902)	Reserved	-	-	-	-
0387H (903)	External Input Function	Indicates the settings of the external input.	2byte INT	R/W	0 : Off ● 1 : Calibration input 2 : LED Off
0388H (904) to 039FH (927)	Reserved	-	-	-	-
03A0H (928)	Group5 Entry count	Indicates the number of entries that can be set in Group5.	2byte UINT	R	15
03A1H (929)	Output Timer (Output2)	Indicates the setting of Output2 timer.	2byte INT	R/W	0 : Off ● 1 : Off delay 2 : On delay 3 : One-shot
03A2H (930)	Timer Value (Output2)	Indicates the time of Output2 timer (unit: ms).	2byte INT	R/W	1 to 9999 (Default value : 10)
03A3H (931)	Reserved	-	-	-	-
03A4H (932)	Output 2 Mode	Indicates the mode of Output 2.	2byte INT	R/W	0 : Standard 1 : Window 2 : Stability ● 3 : Error
03A5H (933) to 03ADH (941)	Reserved	-	-	-	-
03AEH (942)	Output Hold	Indicates the output hold setting.	2byte INT	R/W	0 : Off ● 1 : On
03AFH (943)	Laser On/Off	Indicates the laser emission ON/OFF status.	2byte INT	R/W	0 : Off 1 : On ●
03B0H (944) to 03BFH (959)	Reserved	-	-	-	-

Attribute ID	Name	Description	Data type	Attribute	Value
03C0H (960)	Group6 Entry count	Indicates the number of entries that can be set in Group6.	2byte INT	R	15
03C1H (961) to 03C5H (965)	Reserved	-	-	-	-
03C6H (966)	Display Screen (Sensor)	Indicates the current display screen of the sensor.	2byte INT	R/W	0 : Current value / Setting value ● 1 : Peak value / Bottom value 2 : Current value / Bar 3 : Current value
03C7H (967) to 03CEH (974)	Reserved	-	-	-	-
03CFH (975)	Graphic Mode	Indicates Graphic mode setting.	2byte INT	R/W	0 : On Trigger 1 : Trend Graph ●
03D0H (976) to 03DFH (991)	Reserved	-	-	-	-
03E0H (992)	Group7 Entry count	Indicates the number of entries that can be set in Group7.	2byte INT	R	15
03E1H (993) to 03E5H (997)	Reserved	-	-	-	-
03E6H (998)	Brightness	Indicates screen brightness.	2byte INT	R/W	0 : 100% 1 : OFF 2 : 30% ●
03E7H (999) to 03EAH (1002)	Reserved	-	-	-	-
03EBH (1003)	User Tag0	Indicates User Tag. Available as an area to put optional data.	2byte UINT	R/W	0 to FFFFh
03ECH (1004)	User Tag1				
03EDH (1005)	User Tag2				
03EEH (1006)	Reserved	-	-	-	-

3-5 Parameter List

MU-N/LR-W

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
03EFH (1007)	Basic setting changes	Indicates the changes of "Basic setting".	2byte INT	R/W	bit0 : NPN/PNP 0 : NPN 1 : PNP bit1 : I/O Function Output 1+Output 2 Output 1+Input bit2-3 : Distance Unit 0 : mm 1 : inch 2 : feet (Default value : 0)
03F0H (1008) to 03FFH (1023)	Reserved	-	-	-	-
0400H (1024)	Group8 Entry count	Indicates the number of entries that can be set in Group8.	2byte UINT	R	16
0401H (1025)	ID Number Count	Indicates the number of used IDs.	2byte INT	R	3
0402H (1026)	Reserved	-	-	-	-
0403H (1027)	Multi Controller Revision	Indicates Multi Controller revisions, with the upper bytes representing the major revisions and the lower bytes representing the minor revisions.	2byte INT	R	0 to FFFFh
0404H (1028)	Product Code	Indicates the product code.	2byte INT	R	2012
0405H (1029)	Sensor Revision	Indicates Sensor revisions, with the upper bytes representing the major revisions and the lower bytes representing the minor revisions.	2byte INT	R	0 to FFFFh
0406H (1030)	Product Name	Indicates the model designation of the sensor.	STRING	R	"LR-T**"
0407H (1031) to 040DH (1037)	Reserved	-	-	-	-
040EH (1038)	Series Code	Indicates the series code.	2byte INT	R	2012
040FH (1039)	Series Version	Indicates the series version.	2byte INT	R	1
0410H (1040)	Device Type	Indicates the device type.	2byte INT	R	0

Attribute ID	Name	Description	Data type	Attribute	Value
0411H (1041) to 041FH (1055)	Reserved	-	-	-	-


● Attribute IDs corresponding to operation commands (service 4BH)

The details of the operation command (service code 4BH) are designated with the instance ID (each ID number) and attribute ID.

Details on the selectable operation commands are given below.

Attribute ID	Name	Description
0301H (769)	Initialization request	Initializes all settings, except for "Basic setting".
0302H (770)	Basic setting set request	Changes the "Basic setting" in accordance with "Basic setting changes"
0303H (771)	1-Point Calibration	Executes 1-point calibration.
0305H (773)	2-Point Calibration (1st)	Starts calibration: the 1st point of 2-point calibration.
0306H (774)	2-Point Calibration (2nd)	Starts calibration: the 2nd point of 2-point calibration.
0308H (776)	Full Auto Calibration start	Starts Full auto calibration.
0309H (777)	Full Auto Calibration end	Ends Full auto calibration.
031EH (798)	DATUM Preset	Executes reference surface update.
031FH (799)	DATUM Calibration	Executes DATUM Calibration

MU-N/LR-W (Instance ID: 1 to 16)

Refer to  "How to Use NU Objects" (page 3-32) for how to use the parameters. Designate the ID number of the installed sensor for the instance ID.

When the MU-N/LR-W is used for the first time after the purchase, the initial setting should be completed in either of the following methods:

- (1) By operating the button of the MU-N
- (2) Via communication



When the settings of the MU-N and LR-W are different (such as when only the LR-W is replaced), the settings must be synchronized with the button operation of the MU-N. For details, refer to "MU-N Series User's Manual (LR-W500 Edition)".

■ Initial setting via communication

Rewriting one of the sensor settings via the message communication completes the initial setting and the sensor enters detection status. Change the "Basic settings" and other settings as necessary. The "Basic settings" can be changed in the following procedure.

1 Set the function to be changed.


Write the data to Attribute ID "03EFH(1007)" of the MU-N/LR-W.

Attribute ID (HEX)	Name	Description	Data type	Attribute	Value
03EFH (1007)	Basic setting changes	Indicates the changes of "Basic settings".	2byte INT	R/W	bit0 : NPN/PNP 0 : NPN 1 : PNP bit1-2 : Output Mode 0 : 1-Output, 16-Bank 1 : 4-Output, 2-Bank 2 : Binary bit3-4 : Line 2 Function 0 : Off 1 : Input 2 : Output (Default value : 0)

2 Apply the function to the sensor.

Excute the operation commands for the following address of MU-N/LR-W. (Service code: 4BH, instance ID: 01H to 10H (sensor ID number))

Attribute ID	Name	Description
0302H (770)	Basic settings set request	Changes the "Basic settings" in accordance with "Basic settings changes".

 To check the input/output function being set, read the data from Attribute ID: 0335h "Basic settings".

This completes the "basic settings". Refer to the following indices to perform communication.

● : Default value

Attribute ID (HEX)	Name	Description	Data type	Attribute	Value
0320H (800)	Group 1 Entry count	Indicates the number of entries that can be set in Group 1.	2byte UNIT	R	31
0321H (801)	Error Information	Indicates error information. When an error occurs, the corresponding bit is turned ON.	2byte WORD	R	bit0 : Over Current Error bit1 : Head Error bit2 : EEPROM Error bit3 : Reserved bit4 : Reserved bit5 : Reserved bit6 : Sensor/Controller Unsynchronized bit7 : Communication Error
0322H (802)	Reserved	-	-	-	-
0323H (803)	Reserved	-	-	-	-
0324H (804)	Output	Indicates the output status of the sensor. When the output is ON, the corresponding bit is turned ON.	2byte WORD	R	bit0 : Output 1 : bit14: Output 15
0325H (805)	Current Value	Indicates the current value. Current value is Matching rate when detection mode is Auto or C or C+I mode, received light intensity when detection mode is I mode.	2byte INT	R	0 to 999
0326H (806)	Light intensity ratio Red	Indicates the rate of red received light.	2byte INT	R	0 to 9999
0327H (807)	Light intensity ratio Green	Indicates the rate of green received light.	2byte INT	R	0 to 9999
0328H (808)	Light intensity ratio Blue	Indicates the rate of blue received light.	2byte INT	R	0 to 9999
0329H (809)	Peak-Hold Value	Indicates the peak value of the current values.	2byte INT	R	0 to 999

3-5 Parameter List

MU-N/LR-W

● : Default value

Attribute ID (HEX)	Name	Description	Data type	Attribute	Value
032AH (810)	Bottom-Hold Value	Indicates the bottom value of the current values.	2byte INT	R	0 to 999
032BH (811)-0334H (820)	Reserved	-	-	-	-
0335H (821)	Basic setting	Indicates the basic settings of the sensor.	2byte INT	R	bit0 : NPN/PNP 0 : NPN 1 : PNP bit1-2 : Output Mode 0 : 1-Output, 16-Bank 1 : 4-Output, 2-Bank 2 : Binary bit3-4 : Wire 2 Function 0 : Off 1 : Input 2 : Output (Default value : 0)
0336H (822)-0338H (824)	Reserved	-	-	-	-
0339H (825)	Initialization status	Indicates status of Initialization request.	2byte INT	R	0 : IDLE 1 : EXE 2 : FINISH
033AH (826)	Master Addition Calibration status	Indicates status of Master Addition Calibration request.	2byte INT	R	0 : IDLE 1 : EXE 2 : SUCCESS 3 : FAILURE
033BH (827)	Master Calibration status	Indicate status of Master Calibration request.	2byte INT	R	0 : IDLE 1 : EXE 2 : SUCCESS 3 : FAILURE
033CH (828)-033EH (830)	Reserved	-	-	-	-
033FH (831)	Light intensity stability	Indicates the Light intensity stability.	2byte INT	R/W	0 to 4
0340H (832)	Group 2 Entry count	Indicates the number of entries that can be set in Group 2.	2byte UINT	R	18

Attribute ID (HEX)	Name	Description	Data type	Attribute	Value
0341H (833)	Setting Value 1	Indicates the setting value of each outputs. ■1-Output 16-bank Setting Value 1 : Bank 1 setting value : Setting value 16 : Bank 16 Setting value ■4-Output 2-bank Setting value 1 : Bank 1, Output 1 Setting value Setting value 2 : Bank 1, Output 2 Setting value : Setting value 7 : Bank 2, Output 3 Setting value Setting value 8 : Bank 2, Output 4 Setting value ■Binary Output Setting value 1 : Output 1 Setting value : Setting value 15 : Output 15 Setting value	2byte INT	R/W	0 to 999 (Default value : 999)
0342H (834)	Setting Value 2				
0343H (835)	Setting Value 3				
0344H (836)	Setting Value 4				
0345H (837)	Setting Value 5				
0346H (838)	Setting Value 6				
0347H (839)	Setting Value 7				
0348H (840)	Setting Value 8				
0349H (841)	Setting Value 9				
034AH (842)	Setting Value 10				
034BH (843)	Setting Value 11				
034CH (844)	Setting Value 12				
034DH (845)	Setting Value 13				
034EH (846)	Setting Value 14				
034FH (847)	Setting Value 15				
0350H (848)	Setting Value 16				
0351H (849)	Master Calibration setting value	Indicates the fixed setting value for Master calibration.	2byte INT	R/W	0 to 999 (Default value : 950)
0352H (850)	Difference Monitoring setting value (Only LR-W70)	Indicates the setting value when SPOT/MODE selection is "Difference Monitoring".	2byte INT	R/W	0 to 999 (Default value : 100)
0353H (851)- 035FH (863)	Reserved	-	-	-	-
0360H (864)	Group 3 Entry count	Indicates the number of entries that can be set in Group 3.	2byte UINT	R	31
0361H (865)	Key Lock Status	Indicates the status of Key lock.	2byte INT	R/W	0 : Unlock ● 1 : Key Lock 2 : PIN Code Lock 3 : Communication Lock
0362H (866)	Password	Indicates the password for Key lock.	2byte INT	R/W	0 to 9999 (Default vaule : 0)

3-5 Parameter List

MU-N/LR-W

● : Default value

Attribute ID (HEX)	Name	Description	Data type	Attribute	Value
0363H (867)	NO/NC	Indicates the output logic(NO/NC). The corresponding bit turns ON in NC.	2byte WORD	R/W	bit0 : Output1 bit1 : Output2 : bit14 : Output15 bit15 : Output16 (Default value : 0)
0364H (868)	Reserved	-	-	-	-
0365H (869)	Response Time	Indicates the Response Time.	2byte INT	R/W	*1
0366H (870)	NO/NC(Error output, Stability output)	Indicates the output logic(NO/NC) of Error output and Stability output.	2byte INT	R/W	0 : NO ● 1 : NC
0367H (871)	Reserved	-	-	-	-
0368H (872)	Bank selection*2	Indicates the selected bank number.	2byte INT	R/W	0 : Bank1 ● 1 : Bank2 : 15 : Bank16
0369H (873)- 036BH (875)	Reserved	-	-	-	-
036CH (876)	Spot/Mode Selection (Only LR-W70)	Indicates the Spot/Mode selection.	2byte INT	R/W	0 : 1-Spot Mode ● 1 : Difference Monitoring 2 : 2-Point Matching
036DH (877)	Interference Reduction Function	Indicate the selected frequency mode, in mutual interference reduction function.	2byte INT	R/W	0 : Mode A ● 1 : Mode B
036EH (878)	Cannel Selection	Indicates the selected output channel.	2byte INT	R/W	0 to 14 (Default vaule : 0)
036FH (879)	Detection Mode (ALL)	Indicates the detection mode of all the outputs.	2byte INT	R/W	0 : Auto ● 1 : C+I 2 : C 3 : I 4 : Setting individually

Attribute ID (HEX)	Name	Description	Data type	Attribute	Value
0370H (880)	Detection Mode 1	<p>Indicates the detection mode of each outputs when the "Detection Mode (ALL)" is Setting individually.</p> <p>■1-Output 16-bank Detection Mode 1 : Bank 1 mode : Detection Mode 16 : Bank 16 mode</p> <p>■4-Output 2-bank Detection Mode 1 : Bank 1, Output 1 mode Detection Mode 2 : Bank 1, Output 2 mode : Detection Mode 7 : Bank 2, Output 3 mode Detection Mode 8 : Bank 2, Output 4 mode</p> <p>■Binary Output Detection Mode 1 : Output 1 mode : Detection Mode 15 : Output 15 mode</p>	2byte INT	R/W	0 : Auto ● 1 : C+I 2 : C 3 : I
0371H (881)	Detection Mode 2				
0372H (882)	Detection Mode 3				
0373H (883)	Detection Mode 4				
0374H (884)	Detection Mode 5				
0375H (885)	Detection Mode 6				
0376H (886)	Detection Mode 7				
0377H (887)	Detection Mode 8				
0378H (888)	Detection Mode 9				
0379H (889)	Detection Mode 10				
037AH (890)	Detection Mode 11				
037BH (891)	Detection Mode 12				
037CH (892)	Detection Mode 13				
037DH (893)	Detection Mode 14				
037EH (894)	Detection Mode 15				
037FH (895)	Detection Mode 16				
0380H (896)	Group 4 Entry count	Indicates the number of entries that can be set in Group 4.	2byte UINT	R	31
0381H (897)-0386H (902)	Reserved	-	-	-	-
0387H (903)	External Input Function	Indicates the settings of the external input.	2byte INT	R/W	0 : Off ● 1 : Calibration input 2 : LED Off
0388H (904)-038EH (910)	Reserved	-	-	-	-
038FH (911)	Output2 Function	Indicates the function of Output2.	2byte INT	R/W	0 : Off ● 1 : Error output 2 : Stability output

3-5 Parameter List

MU-N/LR-W

● : Default value

Attribute ID (HEX)	Name	Description	Data type	Attribute	Value
0390H (912)	Timer Mode 1	Indicates the timer mode of each outputs. ■1-Output 16-bank Timer Mode 1 : Bank 1 mode : Timer Mode 16 : Bank 16 mode ■4-Output 2-bank Timer Mode 1 : Bank 1 mode Timer Mode 2 : Bank 2 mode ■Binary Output Timer Mode 1 : Output 1 to 15 mode	2byte INT	R/W	0 : Off ● 1 : On delay 2 : Off delay 3 : One-shot
0391H (913)	Timer Mode 2				
0392H (914)	Timer Mode 3				
0393H (915)	Timer Mode 4				
0394H (916)	Timer Mode 5				
0395H (917)	Timer Mode 6				
0396H (918)	Timer Mode 7				
0397H (919)	Timer Mode 8				
0398H (920)	Timer Mode 9				
0399H (921)	Timer Mode 10				
039AH (922)	Timer Mode 11				
039BH (923)	Timer Mode 12				
039CH (924)	Timer Mode 13				
039DH (925)	Timer Mode 14				
039EH (926)	Timer Mode 15				
039FH (927)	Timer Mode 16				
03A0H (928)	Group 5 Entry count	Indicates the number of entries that can be set in Group 5.	2byte UINT	R	31
03A1H (929)- 03ADH (941)	Reserved	-	-	-	-
03AEH (942)	Sensor Indicator Blinking Function	Indicates the operation of the sensor indicator.	2byte INT	R/W	0 : Off ● 1 : Flush
03AFH (943)	LED On/Off	Indicates the setting of LED On/Off.	2byte INT	R/W	0 : Off 1 : On ●

Attribute ID (HEX)	Name	Description	Data type	Attribute	Value
03B0H (944)	Timer Setting 1	Indicates the time of output timer. (Unit : ms) ■1-Output 16-bank Timer Setting 1 : Bank 1 mode : Timer Setting 16 : Bank 16 mode ■4-Output 2-bank Timer Setting 1 : Bank 1 mode Timer Setting 2 : Bank 2 mode ■Binary Output Timer Setting 1 : Output 1 to 15 mode	2byte INT	R/W	1 to 999 (Default value : 10)
03B1H (945)	Timer Setting 2				
03B2H (946)	Timer Setting 3				
03B3H (947)	Timer Setting 4				
03B4H (948)	Timer Setting 5				
03B5H (949)	Timer Setting 6				
03B6H (950)	Timer Setting 7				
03B7H (951)	Timer Setting 8				
03B8H (952)	Timer Setting 9				
03B9H (953)	Timer Setting 10				
03BAH (954)	Timer Setting 11				
03BBH (955)	Timer Setting 12				
03BCH (956)	Timer Setting 13				
03BDH (957)	Timer Setting 14				
03BEH (958)	Timer Setting 15				
03BFH (959)	Timer Setting 16				
03C0H (960)	Group 6 Entry count	Indicates the number of entries that can be set in Group 6.	2byte UINT	R	31
03C1H (961)- 03CEH (974)	Reserved	-	-	-	-
03CFH (975)	Graphic Mode	Indicates Graphic mode setting.	2byte INT	R/W	0 : On Trigger 1 : On Peak ●

3-5 Parameter List

MU-N/LR-W

● : Default value

Attribute ID (HEX)	Name	Description	Data type	Attribute	Value
03D0H (976)	Detection Light Source 1	Indicates the light source for the detection when using "Super I Mode". ■1-Output 16-bank Light selection 1 : Bank 1 light : Light selection 16 : Bank 16 light ■4-Output 2-bank Light selection 1 : Bank 1, Output 1 light Light selection 2 : Bank 1, Output 2 light : Light selection 7 : Bank 2, Output 3 light Light selection 8 : Bank 2, Output 4 light	2byte INT	R/W	0 : Auto ● 1 : RGB 2 : R 3 : G 4 : B
03D1H (977)	Detection Light Source 2				
03D2H (978)	Detection Light Source 3				
03D3H (979)	Detection Light Source 4				
03D4H (980)	Detection Light Source 5				
03D5H (981)	Detection Light Source 6				
03D6H (982)	Detection Light Source 7				
03D7H (983)	Detection Light Source 8				
03D8H (984)	Detection Light Source 9				
03D9H (985)	Detection Light Source 10				
03DAH (986)	Detection Light Source 11				
03DBH (987)	Detection Light Source 12				
03DCH (988)	Detection Light Source 13				
03DDH (989)	Detection Light Source 14				
03DEH (990)	Detection Light Source 15				
03DFH (991)	Detection Light Source 16				
03E0H (992)	Group 7 Entry count	Indicates the number of entries that can be set in Group 7.	2byte UINT	R	15
03E1H (993)- 03E5H (997)	Reserved	-	-	-	-
03E6H (998)	Brightness	Indicates screen brightness.	2byte INT	R/W	0 : 100% 1 : OFF 2 : 30% ●
03E7H (999)- 03EAH (1002)	Reserved	-	-	-	-
03EBH (1003)	User Tag0	Indicates User Tag. Available as an area to put optional data.	2byte UINT	R/W	0 to FFFFh
03ECH (1004)	User Tag1				
03EDH (1005)	User Tag2				
03EEH (1006)	Reserved	-	-	-	-

Attribute ID (HEX)	Name	Description	Data type	Attribute	Value
03EFH (1007)	Basic setting changes	Indicates the changes of "Basic setting".	2byte UINT	R/W	bit0 : NPN/PNP 0 : NPN 1 : PNP bit1-2 : Output Mode 0 : 1-Output, 16-Bank 1 : 4-Output, 2-Bank 2 : Binary bit3-4 : Line 2 Function 0 : Off 1 : Input 2 : Output (Default value : 0)
03F0H (1008)- 03FFH (1023)	Reserved	-	-	-	-
0400H (1024)	Group8 Entry count	Indicates the number of entries that can be set in Group8	2byte UINT	R	16
0401H (1025)	ID Number Count	Indicates number of used IDs.	2byte INT	R	3
0402H (1026)	Reserved	-	-	-	-
0403H (1027)	Multi Controller Revision	Indicates Multi Controller revision, with the upper bytes representing the major revision and the lower bytes representing the minor revision.	2byte INT	R	0 to FFFFh
0404H (1028)	Product Code	Indicates product code.	2byte INT	R	2010
0405H (1029)	Sensor Revision	Indicates Sensor revision, with the upper bytes representing the major revision and the lower bytes representing the minor revision.	2byte INT	R	0 to FFFFh
0406H (1030)	Product Name 1,0	Indicates model designation of the sensor.	STRING	R	"LR-W***"
0407H (1031)- 040DH (1037)	Reserved	-	-	-	-
040EH (1038)	Series Code	Indicates series code.	2byte INT	R	2010
040FH (1039)	Series Version	Indicates series version.	2byte INT	R	1
0410H (1040)	Device Type	Indicates device type.	2byte INT	R	0
0411H (1041)- 041FH (1055)	Reserved	-	-	-	-

3-5 Parameter List

MU-N/LR-W

***1 Response time**
LR-W500

Value	1-Output 16-bank	4-Output 2-bank Binary Output
0	300 μ s	2 ms
1	1.1 ms	3 ms
2	11 ms	11 ms
3	100 ms	100 ms
4	500 ms	500 ms

LR-W70

Value	1-Output 16-bank			4-Output 2-bank Binary Output	
	1-Spot Mode	Difference Monitoring	2-Point Matching	1-Spot Mode	Difference Monitoring 2-Point Matching
0	300 μ s	600 μ s	500 μ s	2 ms	2 ms
1	1.1 ms	2.6 ms	2.1 ms	3 ms	4 ms
2	11 ms	21 ms	21 ms	11 ms	21 ms
3	100 ms	200 ms	200 ms	100 ms	200 ms
4	500 ms	1 s	1 s	500 ms	1 s

LR-WF10

Value	1-Output 16-bank	4-Output 2-bank Binary Output
0	350 μ s	3 ms
1	1.2 ms	4 ms
2	13 ms	14 ms
3	120 ms	120 ms
4	600 ms	600 ms

- *2** During key lock, switching between banks via data communication is not possible. To switch between banks via data communication, cancel the key lock (attribute ID: 865) beforehand.


● **Attribute IDs corresponding to operation commands (service 4BH)**

The details of the operation command (service code 4BH) are designated with the instance ID (each ID number) and attribute ID.

Details on the selectable operation commands are given below.


Attribute ID	Name	Details
0301H (769)	Initialization request	Initializes all settings, except for "Basic setting".
0302H (770)	Basic setting set request	Changes the "Basic setting" in accordance with "Basic setting changes"
0303H (771)	1-point Calibration start	Starts 1-point calibration.
0304H (772)	1-point Calibration end	Ends 1-point calibration.
0305H (773)	2-point Calibration (1st)	Starts calibration: the 1st point of 2-point calibration.
0306H (774)	2-point Calibration (2nd)	Starts calibration: the 2nd point of 2-point calibration.
0308H (776)	Full Auto Calibration Start	Starts Full auto calibration.
0309H (777)	Full Auto Calibration End	Ends Full auto calibration.
030EH (782)	Adjust Light Intensity	Executes Adjust light Intensity.
0316H (790)	Maximum Sensitivity Calibration Start	Starts Maximum sensitivity calibration.
0317H (791)	Maximum Sensitivity Calibration End	Ends Maximum sensitivity calibration.
0319H(793)	Fiber Status Initialization (only LR-WF10)	Initialize the fiber unit status.
031BH (795)	2-Point Matching Calibration (Only LR-W70)	Executes 2-Point Matching Calibration.
031CH (796)	Master Addition Calibration Start	Starts Master addition calibration.
031DH (797)	Master Addition Calibration End	Ends Master addition calibration.
031EH (798)	Master Calibration Start	Starts Master calibration.
031FH (799)	Master Calibration End	Ends Master calibration.

MU-N/FD-Q Series Index (Instance ID: 1 to 16)

Refer to  "How to Use NU Objects" (page 3-32) for how to use the parameters. Designate the ID number of the installed sensor for the instance ID.

When the MU-N/FD-Q is used for the first time after the purchase, the initial setting should be completed in either of the following methods:

- (1) By operating the button of the MU-N
- (2) Via communication

 **Point** When the settings of the MU-N and FD-Q are different (such as when only the FD-Q is replaced), the settings must be synchronized with the button operation of the MU-N. For details, refer to "MU-N Series User's Manual (Using FD-Q)".

■ Initial setting via communication

Rewriting one of the sensor settings via the mail box communication completes the initial setting and the sensor enters detection status. Change the "Basic settings" and other settings as necessary. The "Basic settings" can be changed in the following procedure.

1 Set the function to be changed.

Write the data to the following address of the MU-N/FD-Q.

Attribute ID	Name	Description	Data type	Attribute	Value
03EFH (1007)	Basic setting changes	Indicates the changes of "Basic settings".	2byte INT	R/W	bit0 : NPN/PNP 0 : NPN 1 : PNP bit1-2 : I/O functions 0 : 1 Output 1 : 2 Output 2 : Output + Input bit3 : Flow unit 0 : Liter 1 : Gallon (Default value : 0)

2 Apply the function to the sensor.

Write "1" to the following address of the MU-N/FD-Q.

Attribute ID	Name	Description
0302H (770)	Basic settings set request	Changes the "Basic settings" in accordance with "Basic settings changes".



To check the input/output function being set, read the data from Index 53 "Basic settings".

This completes the "basic settings". Refer to starting on the next page to perform communication.

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0320H (800)	Group1 Entry count	Indicates the number of entries that can be set in Group1.	2byte UNIT	R	31
0321H (801)	Error Information	Indicates error information. When an error occurs, the corresponding bit is turned ON.	2byte WORD	R	bit0 : Over Current Error bit1 : Head Error bit2 : EEPROM Error bit3 : Reserved bit4 : Counter Flow Error bit5 : Cannot receive detection signal bit6 : Sensor/Controller Unsynchronized bit7 : Communication Error
0322H (802) to 0323H (803)	Reserved	-	-	-	-
0324H (804)	Output	Indicates the output status of the sensor. When the output is ON, the corresponding bit is turned ON.	2byte WORD	R	bit0 : Output 1 bit1 : Output 2
0325H (805)	Instantaneous flow	Indicates the instantaneous flow value.	2byte INT	R	0 to 9999
0326H (806) to 0327H (807)	Reserved	-	-	-	-
0328H (808)	Integrated flow	Indicates the integrated flow value.	2byte INT	R	0 to 9999
0329H (809)	Peak-Hold Value	Indicates the peak value of the current values.	2byte INT	R	0 to 9999
032AH (810)	Bottom-Hold Value	Indicates the bottom value of the current values.	2byte INT	R	0 to 9999
032BH (811) to 032DH (813)	Reserved	-	-	-	-
032EH (814)	Customize Status	When using "Origin Adjustment" or "Condition Monitoring", the corresponding bit is turned ON.	2byte WORD	R	bit0 : Origin Adjustment bit1 : Condition Monitoring

3-5 Parameter List

MU-N/FD-Q

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
032FH (815) to 0334H (820)	Reserved	-	-	-	-
0335H (821)	Basic setting	Indicates the basic settings of the sensor.	2byte INT	R	bit0 : NPN/PNP 0 : NPN 1 : PNP bit1-2 : I/O functions 0 : 1 Output 1 : 2 Output 2 : Output + Input bit3 : Flow unit 0 : Liter 1 : Gallon (Default value : 0)
0336H (822) to 0338H (824)	Reserved	-	-	-	-
0339H (825)	Initialization status	Indicates status of Initialization request.	2byte INT	R	0 : IDLE 1 : EXE 2 : FINISH
033AH (826)	Origin adjustment status	Indicates the status of "Origin Adjustment" request.	2byte INT	R	0 : IDLE 1 : EXE 2 : SUCCESS 3 : FAILURE
033BH (827)	Condition monitoring status	Indicates the status of "Condition Monitoring function" request.	2byte INT	R	0 : IDLE 1 : EXE 2 : SUCCESS 3 : FAILURE
033CH (828)	Flow display resolution	Indicates the flow display resolution.	2byte INT	R	0 : 0.01 1 : 0.1
033DH (829)	Reference flow rate	Indicates the reference flow in Condition Monitoring mode.	2byte INT	R	0 to 9999
033EH (830)	Simulation Mode	Indicates the simulation mode setting.	2byte INT	R	0 : Off 1 : On
033FH (831)	Stability level	Indicates the signal stability level.	2byte INT	R	0 : Direction not possible 1 : Low 2 : Medium-Low 3 : Medium-High 4 : High
0340H (832)	Group2 Entry count	Indicates the number of entries that can be set in Group2.	2byte UINT	R/W	15
0341H (833)	Setting Value (Output1 / Output1 Area Lower)	Indicates the setting value of Output1. The lower limit of the setting value is displayed when the "Detection Mode" is Area.	2byte INT	R/W	0 to 9999

Attribute ID	Name	Description	Data type	Attribute	Value
0342H (834)	Setting Value (Output2 / Output2 Area Lower)	Indicates the setting value of Output2. The lower limit of the setting value is displayed when the "Detection Mode" is Area.	2byte INT	R/W	0 to 9999
0343H (835)	Reserved	-	-	-	-
0344H (836)	Setting Value (Output1 Area Upper)	Indicates the upper limit of the setting value of Output1 when the "Detection Mode" is Area.	2byte INT	R/W	0 to 9999
0345H (837)	Setting Value (Output2 Area Upper)	Indicates the upper limit of the setting value of Output2 when the "Detection Mode" is Area.	2byte INT	R/W	0 to 9999
0346H (838) to 0347H (839)	Reserved	-	-	-	-
0348H (840)	Hysteresis Value	Indicates the setting value of hysteresis when the "Hysteresis Setting" is Custom.	2byte UINT	R/W	0 to 9999
0349H (841) to 034DH (845)	Reserved	-	-	-	-
034EH (846)	Integrated flow set value	Indicates the setting value in Integrated flow mode.	2byte INT	R/W	0 to 9999 (Default vaule : 150)
034FH (847)	Zero cut flow rate	Indicates the Zero cut flow rate.	2byte INT	R/W	0 to 9999
0350H (848) to 035FH (863)	Reserved	-	-	-	-
0360H (864)	Group3 Entry count	Indicates the number of entries that can be set in Group3.	2byte UINT	R	15
0361H (865)	Key Lock Status	Indicates the status of Key lock.	2byte INT	R/W	0 : Unlock ● 1 : Key Lock 2 : PIN Code Lock 3 : Communication Lock
0362H (866)	Password	Indicates the password for Key lock.	2byte INT	R/W	0 to 9999 (Default vaule : 0)
0363H (867)	Reserved	-	-	-	-

3-5 Parameter List

MU-N/FD-Q

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0364H (868)	N.O./N.C.	Indicates the output logic(NO/NC). The corresponding bit turns ON in NC.	2byte WORD	R/W	bit0 : Output 1 0 : N.O. 1 : N.C. bit1 : Output 2 0 : N.O. 1 : N.C. (Default value : 0)
0365H (869)	Response Time	Indicates the Response Time.	2byte INT	R/W	0 : 0.5s 1 : 1s 2 : 2.5s 3 : 5s ● 4 : 10s 5 : 30s 6 : 60s
0366H (870) to 0369H (873)	Reserved	-	-	-	-
036AH (874)	Integrated flow unit	Indicates the value of the integrated flow unit.	2byte INT	R/W	0 : 0.1 (Only Q10C,Q20C) 1 : 1 ● 2 : 10 3 : 100 4 : 1000 5 : 10000 (Only Q32C,Q50C)
036BH (875)	Flow direction	Indicates the selected flow direction.	2byte INT	R/W	0 : From left to right ● 1 : From right to left
036CH (876)	Selecting bore diameter of pipe	Indicates the selected bore diameter of the pipe.	2byte INT	R/W	■FD-Q10C 0 : 1/4 1 : 3/8 ● ■FD-Q20C 0 : 1/2 1 : 3/4 ● ■FD-Q32C 0 : 1 1 : 1 1/4 ● ■FD-Q50C 0 : 1 1/2 1 : 2 ● (Default value : 0)
036DH (877)	Correcting flow rate value	Indicates the corrected flow rate value.	2byte INT	R/W	0 : No correction ● 1 : Selecting pipe schedule 2 : Flow rate magnification
036EH (878)	Selecting pipe schedule	Indicates the selected pipe schedule.	2byte INT	R/W	0 : SGP ● 1 : Sch20 2 : Sch40 3 : Sch80
036FH (879)	Adjusting flow rate span	Indicates the setting value of Setting flow rate magnification (Span). (Unit : x1/100)	2byte INT	R/W	10 to 250 (Default vaule : 100)
0370H (880) to 037FH (895)	Reserved	-	-	-	-

Attribute ID	Name	Description	Data type	Attribute	Value
0380H (896)	Group4 Entry count	Indicates the number of entries that can be set in Group4.	2byte UINT	R	7
0381H (897) to 0383H (899)	Reserved	-	-	-	-
0384H (900)	Detection Mode (Output1)	Indicates the detection mode of Output1.	2byte INT	R/W	0 : Instantaneous flow rate mode ● 1 : Area mode 2 : Pulse output mode 3 : Integrated flow mode
0385H (901) to 0386H (902)	Reserved	-	-	-	-
0387H (903)	External Input Function	Indicates the settings of the external input.	2byte INT	R/W	0 : Integrated flow reset input ● 1 : Flow rate zero input 2 : Origin adjustment input
0388H (904) to 039FH (927)	Reserved	-	-	-	-
03A0H (928)	Group5 Entry count	Indicates the number of entries that can be set in Group5.	2byte UINT	R	15
03A1H (929) to 03A3H (931)	Reserved	-	-	-	-
03A4H (932)	Detection Mode (Output2)	Indicates the detection mode of Output2.	2byte INT	R/W	0 : Instantaneous flow rate mode ● 1 : Area mode 2 : Error output mode
03A5H (933) to 03ADH (941)	Reserved	-	-	-	-
03AEH (942)	Sensor Indicator Flash	Indicates the operation of the sensor indicator.	2byte INT	R/W	0 : Off ● 1 : Flush
03AFH (943)	Flow rate zero input	Indicates the setting of flow rate zero input.	2byte INT	R/W	0 : Off ● 1 : On
03B0H (944) to 03BFH (959)	Reserved	-	-	-	-
03C0H (960)	Group6 Entry count	Indicates the number of entries that can be set in Group6.	2byte UINT	R	15

3-5 Parameter List

MU-N/FD-Q

● : Default value


Attribute ID	Name	Description	Data type	Attribute	Value
03C1H (961) to 03CCCH (972)	Reserved	-	-	-	-
03CDH (973)	Display resolution	Indicates the display resolution setting.	2byte INT	R/W	0 : 0.01 (Only Q10C) 1 : 0.1 ● 2 : 1
03CEH (974)	Display averaging	Indicates the display averaging setting.	2byte INT	R/W	0 to 10 (Default value : 1)
03CFH (975)	Indicator illumination mode	Indicates the display indicator illumination mode.	2byte INT	R/W	0 : Green - Off ● 1 : Off - Red 2 : Green - Red 3 : PMI
03D0H (976) to 03DFH (991)	Reserved	-	-	-	-
03E0H (992)	Group7 Entry count	Indicates the number of entries that can be set in Group7.	2byte UNIT	R	15
03E1H (993) to 03E5H (997)	Reserved	-	-	-	-
03E6H (998)	Brightness	Indicates screen brightness.	2byte INT	R/W	0 : 100% 1 : Off 2 : 30% ●
03E7H (999) to 03EAH (1002)	Reserved	-	-	-	-
03EBH (1003)	User Tag0	Indicates User Tag.Available as an area to put optional data.	2byte INT	R/W	0 to FFFFh
03ECH (1004)	User Tag1				
03EDH (1005)	User Tag2				
03EEH (1006)	Reserved	-	-	-	-
03EFH (1007)	Basic setting changes	Indicates the changes of "Basic setting".	2byte INT	R/W	bit0 : NPN/PNP 0 : NPN 1 : PNP bit1-2 : I/O functions 0 : 1 Output 1 : 2 Output 2 : Output + Input bit3 : Flow unit 0 : Liter 1 : Gallon (Default value : 0)

Attribute ID	Name	Description	Data type	Attribute	Value
03F0H (1008) to 03FFH (1023)	Reserved	-	-	-	-
0400H (1024)	Group8 Entry count	Indicates the number of entries that can be set in Group8.	2byte UINT	R	16
0401H (1025)	ID Number Count	Indicates the number of used IDs.	2byte INT	R	3
0402H (1026)	Reserved	-	-	-	-
0403H (1027)	Multi Controller Revision	Indicates Multi Controller revisions, with the upper bytes representing the major revisions and the lower bytes representing the minor revisions.	2byte INT	R	0 to FFFFh
0404H (1028)	Product Code	Indicates the product code.	2byte INT	R	2011
0405H (1029)	Sensor Revision	Indicates Sensor revisions, with the upper bytes representing the major revisions and the lower bytes representing the minor revisions.	2byte INT	R	0 to FFFFh
0406H (1030)	Product Name	Indicates the model designation of the sensor.	STRING	R	"FD-Q*C"
0407H (1031) to 040DH (1037)	Reserved	-	-	-	-
040EH (1038)	Series Code	Indicates the series code.	2byte INT	R	2011
040FH (1039)	Series Version	Indicates the series version.	2byte INT	R	1
0410H (1040)	Device Type	Indicates the device type.	2byte INT	R	0
0411H (1041) to 041FH (1055)	Reserved	-	-	-	-

- **Attribute IDs corresponding to operation commands (service 4BH)**
The details of the operation command (service code 4BH) are designated with the instance ID (each ID number) and attribute ID.
Details on the selectable operation commands are given below.

Attribute ID	Name	Description
0301H (769)	Initialization request	Initializes all settings, except for "Basic setting".
0302H (770)	Basic setting set request	Changes the "Basic setting" in accordance with "Basic setting changes"
030AH (778)	Performing origin adjustment	Performs origin adjustment.
030BH (779)	Canceling origin adjustment	Cancels origin adjustment.
0310H (784)	Reset Hold Value	Resets the hold value.
031DH (797)	Performing condition monitoring	Performs condition monitoring.
031EH (798)	Canceling condition monitoring	Cancels condition monitoring.
031FH (799)	Reset integrated flow	Reset the integrated flow value.

FD-XA2 (Instance ID : 1 to 16)

Refer to  "How to Use NU Objects" (page 3-32) for how to use the parameters.
Designate the ID number of the installed sensor for the instance ID.

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0320H (800)	Group 1 Entry count	Indicates the number of entries in Group 1.	2byte UINT	R	31
0321H (801)	Error information	Indicates error information. When an error occurs, the corresponding bit is turned ON.	2byte WORD	R	bit0: Over current error bit1: Head error bit2: EEPROM error bit3: Reserve bit4: Counter flow error bit5: Cannot receive detection signal bit6: Reserve bit7: Sensor communication error
0322H (802)	Warning information	Indicates warning information. When a warning occurs, the corresponding bit is turned ON.	2byte WORD	R	bit0: Bubble alert
0323H (803)	Warning function	Indicates the operating status of the warning function. When the warning function is operating, the corresponding bit is turned ON.	2byte WORD	R	bit0: Bubble alert
0324H (804)	Output	Indicates the output status of the sensor. When the output is ON, the corresponding bit is turned ON.	2byte WORD	R	bit0: Output1 bit1: Output2
0325H (805)	Instantaneous flow rate	Indicates the instantaneous flow value. The unit is as follows. • FD-XS1/XS8, XS20 [high resolution]: 1mL/min or 0.1G/h (fixed) • FD-XS20 [standard]: 0.01L/min or 0.1G/h (fixed) If you want to read values with even higher resolution, use attribute ID 032DH (813).	2byte UINT	R	0 to 65535

3-5 Parameter List

FD-XA2

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0326H (806)	Shot amount	Indicates the shot amount. The unit is as follows. • FD-XS1/XS8, XS20 [high resolution]: 0.01mL (fixed) • FD-XS20 [standard]: 0.001L (fixed) If you want to read values with even higher resolution, use attribute ID 032EH (814).	2byte UINT	R	0 to 65535
0327H (807)	Reserved	-	-	-	-
0328H (808)	Integrated flow value	Indicates the integrated flow value.	2byte UINT	R	0 to 65535
0329H (809)	Peak-hold flow value	Indicates the peak value of the instantaneous flow values.	2byte UINT	R	0 to 65535
032AH (810)	Bottom-hold flow value	Indicates the bottom value of the instantaneous flow values.	2byte UINT	R	0 to 65535
032BH (811)	Peak-hold shot amount	Indicates the peak value of the shot amounts.	2byte UINT	R	0 to 65535
032CH (812)	Bottom-hold shot amount	Indicates the bottom value of the shot amounts.	2byte UINT	R	0 to 65535
032DH (813)	Instantaneous flow rate (high resolution) ^{*1}	Indicates the instantaneous flow value with the highest resolution. The unit is as follows. • FD-XS1/XS8, XS20 [high resolution]: 0.1mL/min or 0.01G/h (fixed) • FD-XS20 [standard]: 0.01L/min or 0.1G/h (fixed)	2byte UINT	R	0 to 65535
032EH (814)	Shot amount (high resolution) ^{*1}	Indicates the shot amount with the highest resolution. The unit is as follows. • FD-XS1/XS8, XS20 [high resolution]: 0.001mL (fixed) • FD-XS20 [standard]: 0.001L (fixed)	2byte UINT	R	0 to 65535
032FH (815) to 0330H (816)	Reserved	-	-	-	-

Attribute ID	Name	Description	Data type	Attribute	Value
0331H (817)	Custom status	When using "Origin Adjustment" or "Condition Monitoring", the corresponding bit is turned ON.	2byte WORD	R	bit0: Origin adjustment bit1: Condition monitoring
0332H (818) to 0337H (823)	Reserved	-	-	-	-
0338H (824)	Init settings finished	Indicates if the initials settings are finished.	2byte INT	R	0: Unfinished 1: Finished
0339H (825)	Initialization status	Indicates status of Initialization request.	2byte INT	R	0: Idle 1: Exe 2: Finish
033AH (826)	Origin adjustment status	Indicates the status of "Origin Adjustment" request.	2byte INT	R	0: Idle 1: Exe 2: Finish 3: Failure
033BH (827)	Condition monitoring status	Indicates the status of "Condition Monitoring function" request.	2byte INT	R	0: Idle 1: Exe 2: Finish 3: Failure
033CH (828)	Resolution (instantaneous flow) when message communication is used	Indicates the resolution of the parameters related to the instantaneous flow value when they are read/written with message communication. The unit is as follows. • FD-XS1/XS8, XS20 [high resolution]: 2: 1mL/min or 1: 0.1G/h (fixed) • FD-XS20 [standard]: 0: 0.01L/min or 1: 0.1G/h (fixed)	2byte INT	R	0: 0.01 1: 0.1 2: 1
033DH (829)	Reference flow rate	Indicates the reference flow in Condition Monitoring mode.	2byte UINT	R	0 to 65535
033EH (830)	Resolution (shot amount) when message communication is used	Indicates the resolution of the parameters related to the shot amount when they are read/written with message communication. The unit is as follows. • FD-XS1/XS8, XS20 [high resolution]: 1: 0.01mL (fixed) • FD-XS20 [standard]: 0: 0.001L (fixed)	2byte INT	R	0: 0.001 1: 0.01

3-5 Parameter List

FD-XA2

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
033FH (831)	Stability level	Indicates the signal stability level.	2byte INT	R	0: Detection not possible 1: Low 2: Medium-low 3: Medium-high 4: High 5: Searching Signal
0340H (832)	Group 2 Entry count	Indicates the number of entries in Group 2.	2byte UINT	R	15
0341H (833)	Flow threshold (Output 1/Area Lo)	Indicates the setting value of Output1. The lower limit of the setting value is displayed when the "Detection Mode" is set to Area. Default value is 100 (XS1)/ 800 (XS8, XS20 [high resolution])/200 (XS20 [standard]).	2byte UINT	R/W	0 to 65535
0342H (834)	Shot threshold (Output 1/Area Lo)	Indicates the lower limit of the setting value of Output1 when the "Detection Mode" is set to Shot. Default value is 100 (XS1)/ 300 (XS8, XS20 [high resolution])/15 (XS20 [standard]).	2byte UINT	R/W	0 to 65535
0343H (835)	Reserved	-	-	-	-
0344H (836)	Flow threshold (Output 1/Area Hi)	Indicates the upper limit of the setting value of Output1 when the "Detection Mode" is set to Area. Default value is 400 (XS1)/ 3200 (XS8, XS20 [high resolution])/800 (XS20 [standard]).	2byte UINT	R/W	0 to 65535
0345H (837)	Shot threshold (Output 1/Area Hi)	Indicates the upper limit of the setting value of Output1 when the "Detection Mode" is set to Shot. Default value is 600 (XS1)/ 1800 (XS8, XS20 [high resolution])/90 (XS20 [standard]).	2byte UINT	R/W	0 to 65535
0346H (838)	Reserved	-	-	-	-
0347H (839)	Reserved	-	-	-	-

Attribute ID	Name	Description	Data type	Attribute	Value
0348H (840)	Hysteresis	Indicates the setting value of hysteresis. Default value is 10 (XS1)/20 (XS8, XS20 [high resolution])/5 (XS20 [standard]).	2byte UINT	R/W	0 to 65535
0349H (841)	Flow threshold (Output 2/Area Lo)	Indicates the setting value of Output2 of instantaneous flow values. The lower limit of the setting value is displayed when the "Detection Mode" is set to Area. Default value is 200 (XS1)/1600 (XS8, XS20 [high resolution])/400 (XS20 [standard]).	2byte UINT	R/W	0 to 65535
034AH (842)	Flow threshold (Output 2 Area Hi)	Indicates the upper limit of the setting value of Output2 when the "Detection Mode" is set to Area. Default value is 300 (XS1)/2400 (XS8, XS20 [high resolution])/600 (XS20 [standard]).	2byte UINT	R/W	0 to 65535
034BH (843)	Shot threshold (Output 2 /Area Lo)	Indicates the lower limit of the setting value of Output2 when the "Detection Mode" is set to Shot. Default value is 200 (XS1)/600 (XS8, XS20 [high resolution])/30 (XS20 [standard]).	2byte UINT	R/W	0 to 65535
034CH (844)	Shot threshold (Output 2 Area Hi)	Indicates the upper limit of the setting value of Output2 when the "Detection Mode" is set to Shot. Default value is 400 (XS1)/1200 (XS8, XS20 [high resolution])/60 (XS20 [standard]).	2byte UINT	R/W	0 to 65535
034DH (845)	Reserved	-	-	-	-
034EH (846)	Integrated flow threshold value	Indicates the setting value in Integrated flow mode. Default value is 200 (XS1)/600 (XS8, XS20 [high resolution])/300 (XS20 [standard]).	2byte UINT	R/W	0 to 9999

3-5 Parameter List

FD-XA2

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
034FH (847)	Zero-cut flow rate	Indicates the Zero cut flow rate. Default value is 20 (XS1)/ 40 (XS8, XS20 [high resolution])/10 (XS20 [standard]).	2byte UINT	R/W	0 to 65535
0350H (848) to 035FH (863)	Reserved	-	-	-	-
0360H (864)	Group 3 Entry count	Indicates the number of entries in Group 3.	2byte UINT	R	15
0361H (865)	Key Lock Status	Indicates the status of the Key lock.	2byte INT	R/W	0: Unlock 1: Key lock 2: Password lock 3: Communication lock
0362H (866)	Password	Indicates the password for Key lock.	2byte UINT	R/W	0 to 9999 (Default value :0)
0363H (867)	Reserved	-	-	-	-
0364H (868)	N.O./N.C.	Indicates the output logic (NO/NC). The corresponding bit turns ON in NC.	2byte WORD	R/W	bit0: Output 1 bit1: Output 2 (Default value :0)
0365H (869)	Response time	Indicates the Response Time.	2byte INT	R/W	0: 50ms 1: 100ms 2: 500ms ● 3: 1s 4: 2.5s 5: 5s 6: 10s 7: 30s 8: 60s
0366H (870)	Reserved	-	-	-	-
0367H (871)	Tuning percentage	Indicates the Tuning percentage.	2byte UINT	R/W	1 to 99 (Default value: 25)
0368H (872)	Out1/Out2 Switch	Indicates the output during tuning.	2byte INT	R/W	0: Output1 ● 1: Output2
0369H (873)	Reserved	-	-	-	-
036AH (874)	Integrated flow unit	Indicates the value of the integrated flow unit. Default value is 2 (XS1)/ 2 (XS8, XS20 [high resolution])/0 (XS20 [standard]).	2byte INT	R/W	0: 0.01 1: 0.1 2: 1 3: 10 4: 100 5: 1000 6: 10000
036BH (875)	Flow direction selection	Indicates the selected flow direction.	2byte INT	R/W	0: From Cable to LED ● 1: From LED to Cable

Attribute ID	Name	Description	Data type	Attribute	Value
036CH (876)	Pipe bore diameter selection	Indicates the selected bore diameter of the pipe.	2byte INT	R/W	0: [XS1/8/20]4mm, 6mm, 10mm ● 1: [XS1/8/20]1/8inch, 8mm, 12mm 2: [XS1/8/20]3mm, 1/4inch, 3/8inch 3: [XS20]1/2inch 4: [XS20]6A 5: [XS20]8A
036DH (877)	Flow rate tuning	Indicates the corrected flow rate value.	2byte INT	R/W	0: No correction ● 1: Pro settings 2: Span adjustment
036EH (878)	Reserved	-	-	-	-
036FH (879)	Flow rate span adjustment*2	Indicates the setting value of Setting flow rate magnification (Span). (Unit : *1/1000)	2byte UINT	R/W	100 to 10000 (Default value: 1000)
0370H (880) to 037FH (895)	Reserved	-	-	-	-
0380H (896)	Group 4 Entry count	Indicates the number of entries in Group 4.	2byte UINT	R	15
0381H (897) to 0383H (899)	Reserved	-	-	-	-
0384H (900)	Output 1 detection mode	Indicates the detection mode of Output 1.	2byte INT	R/W	0: Instantaneous flow rate mode ● 1: Area mode 2: Pulse output (+) mode 3: Integrated flow mode 4: Shot mode
0385H (901)	Reserved	-	-	-	-
0386H (902)	Reserved	-	-	-	-
0387H (903)	Input 1 function selection	Indicates the settings of the external input 1.	2byte INT	R/W	0: Off ● 1: Flow rate zero input 2: Shot sampling trigger
0388H (904)	Input 2 function selection	Indicates the settings of the external input 2.	2byte INT	R/W	0: Off ● 1: Integrated flow reset input 2: Zero shift input
0389H (905)	Reserved	-	-	-	-
038AH (906)	Reserved	-	-	-	-

3-5 Parameter List

FD-XA2

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
038BH (907)	Pipe outer diameter input*3	Set the pipe outer diameter to an appropriate value. Default value is 400(XS1)/600(XS8)/1000(XS20). (Unit: x 1/100 mm)	2byte UINT	R/W	270 to 1430
038CH (908)	Pipe thickness input*3	Selecting the pipe thickness correctly will improve flow rate readings. (Unit: x 1/100 mm)	2byte UINT	R/W	10 to 400 (Default value: 100)
038DH (909)	Liquid type selection*3	If the fluid is not water, and if the fluid's sound speed and kinetic viscosity is known, accuracy will increase by inputting the proper value.	2byte INT	R/W	0: Water ● 1: Value input
038EH (910)	Ultrasonic speed input*3	Inputs the sound speed of the fluid. (Unit: m/s)	2byte UINT	R/W	300 to 1900 (Default value: 1497)
038FH (911)	Kinematic viscosity input*3	Inputs the kinetic viscosity of the fluid. (Unit: x 1/100 cSt)	2byte UINT	R/W	1 to 65535 (Default value: 100)
0390H (912) to 039FH (927)	Reserved	-	-	-	-
03A0H (928)	Group 5 Entry count	Indicates the number of entries in Group 5.	2byte UINT	R	18
03A1H (929) to 03A3H (931)	Reserved	-	-	-	-
03A4H (932)	Output 2 detection mode	Indicates the detection mode of Output 2.	2byte INT	R/W	0: Instantaneous flow rate mode ● 1: Area mode 2: Pulse output(-) mode 3: Shot mode 4: Error output mode 5: Bubble alert mode 6: Error and alert mode
03A5H (933)	Reserved	-	-	-	-
03A6H (934)	Bubble cancel custom	Indicates Bubble cancel setting.	2byte INT	R/W	0: Default ● 1: Custom 2: Off
03A7H (935)	Bubble cancel level	Indicates Bubble cancel level.	2byte INT	R/W	0: Low 1: Mid ● 2: High
03A8H (936)	Hold time	Indicates Hold time of the bubble cancel setting. (Unit: Second)	2byte UINT	R/W	1 to 60 (Default value: 5)

Attribute ID	Name	Description	Data type	Attribute	Value
03A9H (937)	Bubble alert custom	Indicates Bubble alert setting.	2byte INT	R/W	0: Default ● 1: Custom
03AAH (938)	Bubble alert level	Indicates Bubble alert level.	2byte INT	R/W	0: Low 1: Mid ● 2: High
03ABH (939)	Alert one shot timer	Indicates Alert one shot timer. (Unit: x 1/10 s)	2byte UINT	R/W	1 to 100 (Default value: 10)
03ACH (940)	Total decrement	Indicates if the Integrated flow value decreases when the flow reverses.	2byte INT	R/W	0: Off ● 1: On
03ADH (941)	Shot decrement	Indicates if the shot amount decreases when the flow reverses.	2byte INT	R/W	0: Off ● 1: On
03AEH (942)	Blink head LED	Indicates the operation of the head indicator when setting the controller.	2byte INT	R/W	0: Off ● 1: On
03AFH (943)	Flow rate zero input	Indicates the setting of flow rate zero input.	2byte INT	R/W	0: Off ● 1: On
03B0H (944)	Simulation mode	Indicates the simulation mode setting.	2byte INT	R/W	0: Off ● 1: On
03B1H (945)	Simulation flow rate	Indicates the instantaneous flow value in simulation mode.	2byte UINT	R/W	0 to 65535
03B2H (946)	Simulation shot amount	Indicates the shot amount of simulation mode.	2byte UINT	R/W	0 to 65535
03B3H (947) to 03BFH (959)	Reserved	-	-	-	-
03C0H (960)	Group 6 Entry count	Indicates the number of entries in Group 6.	2byte UINT	R	15
03C1H (961) to 03C5H (965)	Reserved	-	-	-	-
03C6H (966)	Current Display	Indicates current display.	2byte INT	R/W	0: Normal ● 1: Sub
03C7H (967) to 03CBH (971)	Reserved	-	-	-	-
03CCH (972)	Main unit display resolution (shot amount)	Indicates the display resolution (shot amount) of the FD-X main unit. Default value is 1 (XS1)/ 1 (XS8, XS20 [high resolution])/0 (XS20 [standard]).	2byte INT	R/W	0: 0.001 1: 0.01 2: 0.1 3: 1

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FD-XA2

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
03CDH (973)	Main unit display resolution (instantaneous flow)	Indicates the display resolution (instantaneous flow) of the FD-X main unit. Default value is 3 (XS1)/ 3 (XS8, XS20 [high resolution])/1 (XS20 [standard]).	2byte INT	R/W	0: 0.001 1: 0.01 2: 0.1 3: 1 4: 10
03CEH (974)	Display averaging	Indicates the display averaging setting.	2byte UINT	R/W	0 to 100 (Default value: 10)
03CFH (975)	Head indicator illumination mode	Indicates the display indicator illumination mode.	2byte INT	R/W	0: Green - Off ● 1: Off - Red 2: Green - Red 3: PMI (Predictive Maint Info) 4: Off
03D0H (976) to 03DFH (991)	Reserved	-	-	-	-
03E0H (992)	Group 7 Entry count	Indicates the number of entries in Group 7.	2byte UINT	R	15
03E1H (993)	Warning Disable	Indicates the settings of the disabled warning function. When the bit is ON, the corresponding warning does not occur. By default, bit 0 is ON. To enable the Bubble alert warning, turn OFF bit 0.	2byte WORD	R/W	bit0: Bubble alert
03E2H (994)	TAG Strings	Indicates the TAG character string.	STRING	R/W	8 characters or less (Default : "")
03E3H (995) to 03E5H (997)	Reserved	-	-	-	-
03E6H (998)	Screen brightness	Indicates screen brightness.	2byte INT	R/W	0: 100% 1: Off 2: 30% ●

Attribute ID	Name	Description	Data type	Attribute	Value
03E7H (999)	Resolution for Cyclic Com (Flow)	Indicates the resolution for the instantaneous flow values while using cyclic communication. If the parameter changes from 0 to 1, resolution for the instantaneous flow value while cyclic communication changes as follows. • FD-XS1/XS8, XS20 [high resolution]: 1mL/min to 0.1mL/min or 0.1G/h to 0.01G/h ^{*4} • FD-XS20 [standard]: 0.01L/min to 0.001L/min or 0.1G/h to 0.01G/h	2byte INT	R/W	0: Standard ● 1: High Resolution
03E8H (1000)	Resolution for Cyclic Com (Shot)	Indicates the resolution for the shot amount values while using cyclic communication. If the parameter changes from 0 to 1, resolution for the shot amount while cyclic communication changes as follows. • FD-XS1/XS8, XS20 [high resolution]: 0.01mL to 0.001mL • FD-XS20 [standard]: 0.001L to 0.001L (No change)	2byte INT	R/W	0: Standard ● 1: High Resolution
03E9H (1001) to 03EBH (1003)	Reserved	-	-	-	-
03ECH (1004)	Flow unit	Indicates the flow unit.	-	-	0: Liter ● 1: Gallon
03EDH (1005)	Reserved	-	-	-	-
03EEH (1006)	Pipe material selection	Indicates the pipe material selected.	2byte INT	R/W	0: Metal ● 1: Plastic
03EFH (1007)	NPN/PNP selection	Indicates the output type (NPN/PNP) selected.	2byte INT	R/W	0: NPN ● 1: PNP
03F0H (1008) to 03FFH (1023)	Reserved	-	-	-	-
0400H (1024)	Group 8 Entry count	Indicates the number of entries in Group 8.	2byte UINT	R	31
0401H (1025)	ID Number Count	Indicates number of used IDs.	2byte INT	R	2

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FD-XA2

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0402H (1026)	Head Type	Indicates connected head type.	2byte INT	R	0: No head 1: FD-XS1 2: FD-XS8 3: FD-XS20
0403H (1027)	Reserved	-	-	-	-
0404H (1028)	Product Code	Indicates product code.	2byte INT	R	2030
0405H (1029)	Revision	Indicates revision, with the upper bytes representing the major revision and the lower bytes representing the minor revision.	2byte INT	R	259
0406H (1030)	Product Name	Indicates model designation of the sensor.	STRING	R	"FD-XA2"
0407H (1031) to 040DH (1037)	Reserved	-	-	-	-
040EH (1038)	Series Code	Indicates series code.	2byte INT	R	2030
040FH (1039)	Series Version	Indicates series version.	2byte INT	R	1
0410H (1040)	Device Type	Indicates device type.	2byte INT	R	0
0411H (1041) to 041FH (1055)	Reserved	-	-	-	-

*1 This is only supported by FD-XA2 units whose serial numbers start with the letter "G."

*2 To enable correction based on parameters, you need to select [2: Span adjustment] at Attribute ID 036DH (877).

*3 To enable correction based on parameters, you need to select [1: Pro settings] at Attribute ID 036DH (877).

*4 When the FD-XS8 is used in combination with the FD-XC8R3 (resin clamp set), the rated flow range is 0 to 8000 mL/min. If, however, high resolution is selected, the range of the instantaneous flow value will be "0.0 to 6553.5 mL/min."

● **Attribute IDs corresponding to operation commands (service 4BH)**

The details of the operation command (service code 4BH) are designated with the instance ID (each ID number) and attribute ID.

Details on the selectable operation commands are given below.


Attribute ID	Name	Details
0301H(769)	Initialization request	Executes initialization.
0302H(770)	Initialization request (dedicated for FD-XS20 high-resolution mode)* ²	With the FD-XS20 sensor head connected, the resolution is set to high resolution (High (mL)) and all other parameters are initialized.* ³
0308H(776)	Full auto calibration : Start* ²	Starts fully automatic calibration.
0309H(777)	Full auto calibration : Finish* ²	Ends fully automatic calibration.
030AH(778)	Perform origin adjustment	Executes origin adjustment.
030BH(779)	Cancel origin adjustment	Cancels origin adjustment.
0310H(784)	Reset hold values	Resets the hold value.
031BH(795)	Multi shot calibration : Start* ²	Starts multi shot calibration.
031CH(796)	Multi shot calibration : Finish* ²	Ends multi shot calibration.
031DH(797)	Perform conditional monitoring	Executes conditional monitoring.
031EH(798)	Cancel conditional monitoring	Cancels conditional monitoring.
031FH(799)	Reset integrated flow value	Resets integrated flow value.

*1 Before starting tuning, select the output used for the tuning at Attribute ID 0368H (872).

*2 This is only supported by FD-XA2 units whose serial numbers start with the letter "G."

*3 This operates the same as the normal initialization request for the FD-XS1/XS8 sensor head.

FD-XA2E (Instance ID : 1 to 16)

Refer to  "How to Use NU Objects" (page 3-32) for how to use the parameters. Designate the ID number of the installed sensor for the instance ID.

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0320H (800)	Group 1 Entry count	Indicates the number of entries in Group 1.	2byte UINT	R	31
0321H (801)	Error information	Indicates error information. When an error occurs, the corresponding bit is turned ON.	2byte WORD	R	bit0: Over current error bit1: Head error bit2: EEPROM error bit3: Reserve bit4: Counter flow error bit5: Cannot receive detection signal bit6: Reserve bit7: Sensor communication error
0322H (802)	Reserved	-	-	-	-
0323H (803)	Reserved	-	-	-	-
0324H (804)	Output	Indicates the output status of the sensor. When the output is ON, the corresponding bit is turned ON.	2byte WORD	R	bit0: Output1 bit1: Output2
0325H (805)	Instantaneous flow rate	Indicates the instantaneous flow value. The unit is as follows. • FD-XS1/XS8: 1mL/min or 0.1G/h (fixed) • FD-XS20: 0.01L/min or 0.1G/h (fixed)	2byte UINT	R	0 to 65535
0326H (806) to 0330H (816)	Reserved	-	-	-	-
0331H (817)	Custom status	When using "Origin Adjustment" or "Condition Monitoring", the corresponding bit is turned ON.	2byte WORD	R	bit0: Origin adjustment bit1: Condition monitoring
0332H (818) to 0337H (823)	Reserved	-	-	-	-
0338H (824)	Init settings finished	Indicates if the initials settings are finished.	2byte INT	R	0: Unfinished 1: Finished

3-5 Parameter List

FD-XA2E
● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
0339H (825)	Initialization status	Indicates status of Initialization request.	2byte INT	R	0: Idle 1: Exe 2: Finish
033AH (826)	Origin adjustment status	Indicates the status of "Origin Adjustment" request.	2byte INT	R	0: Idle 1: Exe 2: Finish 3: Failure
033BH (827)	Condition monitoring status	Indicates the status of "Condition Monitoring function" request.	2byte INT	R	0: Idle 1: Exe 2: Finish 3: Failure
033CH (828)	Resolution (instantaneous flow) when message communication is used	Indicates the resolution for the instantaneous flow value when it is read with message communication. The unit is as follows. • FD-XS1/XS8: 2: 1mL/min or 1: 0.1G/h (fixed) • FD-XS20: 0: 0.01L/min or 1: 0.1G/h (fixed)	2byte INT	R	0: 0.01 1: 0.1 2: 1
033DH (829)	Reference flow rate	Indicates the reference flow in Condition Monitoring mode.	2byte UINT	R	0 to 65535
033EH (830)	Reserved	-	-	-	-
033FH (831)	Stability level	Indicates the signal stability level.	2byte INT	R	0: Detection not possible 1: Low 2: Medium-low 3: Medium-high 4: High 5: Searching Signal
0340H (832)	Group 2 Entry count	Indicates the number of entries in Group 2.	2byte UINT	R	15
0341H (833)	Flow threshold (Output 1)	Indicates the setting value of Output1. Default value is 100 (XS1E) /800 (XS8E) /200 (XS20E).	2byte UINT	R/W	0 to 65535
0342H (834) to 0347H (839)	Reserved	-	-	-	-
0348H (840)	Hysteresis	Indicates the setting value of hysteresis. Default value is 25 (XS1E) / 25 (XS8E) /10 (XS20E).	2byte UINT	R/W	0 to 65535
0349H (841) to 034EH (846)	Reserved	-	-	-	-

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Communication

3-5 Parameter List

FD-XA2E

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
034FH (847)	Zero-cut flow rate	Indicates the Zero cut flow rate. Default value is 50 (XS1E) / 50 (XS8E) /15 (XS20E).	2byte UINT	R/W	0 to 65535
0350H (848) to 035FH (863)	Reserved	-	-	-	-
0360H (864)	Group 3 Entry count	Indicates the number of entries in Group 3.	2byte UINT	R	15
0361H (865)	Key Lock Status	Indicates the status of the Key lock.	2byte INT	R/W	0: Unlock 1: Key lock 2: Password lock 3: Communication lock
0362H (866)	Password	Indicates the password for Key lock.	2byte UINT	R/W	0 to 9999 (Default value :0)
0363H (867)	Reserved	-	-	-	-
0364H (868)	N.O./N.C.	Indicates the output logic (NO/NC). The corresponding bit turns ON in NC.	2byte WORD	R/W	bit0: Output 1 bit1: Output 2 (Default value :0)
0365H (869)	Response time	Indicates the Response Time.	2byte INT	R/W	0: 50ms 1: 100ms 2: 500ms ●
0366H (870) to 036AH (874)	Reserved	-	-	-	-
036BH (875)	Flow direction selection	Indicates the selected flow direction.	2byte INT	R/W	0: From Cable to LED ● 1: From LED to Cable
036CH (876)	Pipe bore diameter selection	Indicates the selected bore diameter of the pipe.	2byte INT	R/W	0: [XS1/8/20]4mm, 6mm, 10mm ● 1: [XS1/8/20]1/8inch, 8mm, 12mm 2: [XS1/8/20]3mm, 1/4inch, 3/8inch 3: [XS20]1/2inch 4: [XS20]6A 5: [XS20]8A
036DH (877)	Reserved	-	-	-	-
036EH (878)	Reserved	-	-	-	-
036FH (879)	Flow rate span adjustment	Indicates the setting value of Setting flow rate magnification (Span). (Unit : *1/1000)	2byte UINT	R/W	100 to 10000 (Default value: 1000)

Attribute ID	Name	Description	Data type	Attribute	Value
0370H (880) to 037FH (895)	Reserved	-	-	-	-
0380H (896)	Group 4 Entry count	Indicates the number of entries in Group 4.	2byte UINT	R	15
0381H (897) to 0386H (902)	Reserved	-	-	-	-
0387H (903)	Input function selection	Indicates the settings of the external input.	2byte INT	R/W	0: Off ● 1: Flow rate zero input 2: Zero shift input
0388H (904) to 039FH (927)	Reserved	-	-	-	-
03A0H (928)	Group 5 Entry count	Indicates the number of entries in Group 5.	2byte UINT	R	18
03A1H (929) to 03A5H (933)	Reserved	-	-	-	-
03A6H (934)	Bubble cancel custom	Indicates Bubble cancel setting.	2byte INT	R/W	0: Default ● 1: Custom 2: Off
03A7H (935)	Bubble cancel level	Indicates Bubble cancel level.	2byte INT	R/W	0: Low 1: Mid ● 2: High
03A8H (936)	Hold time	Indicates Hold time of the bubble cancel setting. (Unit: Second)	2byte UINT	R/W	1 to 60 (Default value: 5)
03A9H (937) to 03ADH (941)	Reserved	-	-	-	-
03AEH (942)	Blink head LED	Indicates the operation of the head indicator when setting the controller.	2byte INT	R/W	0: Off ● 1: On
03AFH (943)	Flow rate zero input	Indicates the setting of flow rate zero input.	2byte INT	R/W	0: Off ● 1: On
03B0H (944)	Simulation mode	Indicates the instantaneous flow value in simulation mode.	2byte INT	R/W	0: Off ● 1: On
03B1H (945)	Simulation flow rate	Indicates the instantaneous flow values of simulation mode.	2byte UINT	R/W	0 to 65535

3-5 Parameter List

FD-XA2E

● : Default value

Attribute ID	Name	Description	Data type	Attribute	Value
03B2H (946) to 03BFH (959)	Reserved	-	-	-	-
03C0H (960)	Group 6 Entry count	Indicates the number of entries in Group 6.	2byte UINT	R	15
03C1H (961) to 03C5H (965)	Reserved	-	-	-	-
03C6H (966)	Current Display	Indicates current display.	2byte INT	R/W	0: Normal ● 1: Sub
03C7H (967) to 03CCH (972)	Reserved	-	-	-	-
03CDH (973)	Main unit display resolution (instantaneous flow)	Indicates the display resolution (instantaneous flow) of the FD-X main unit. Default value is 3 (XS1E) / 3 (XS8E) / 1 (XS20E).	2byte INT	R/W	1: 0.01 2: 0.1 3: 1 4: 10
03CEH (974)	Display averaging	Indicates the display averaging setting.	2byte UINT	R/W	0 to 100 (Default value: 10)
03CFH (975)	Head indicator illumination mode	Indicates the display indicator illumination mode.	2byte INT	R/W	0: Green - Off ● 1: Off - Red 2: Green - Red 3: Reserved 4: Off
03D0H (976) to 03DFH (991)	Reserved	-	-	-	-
03E0H (992)	Group 7 Entry count	Indicates the number of entries in Group 7.	2byte UINT	R	15
03E1H (993)	Reserved	-	-	-	-
03E2H (994)	TAG Strings	Indicates the TAG character string.	STRING	R/W	8 characters or less (Default : "")
03E3H (995) to 03E5H (997)	Reserved	-	-	-	-
03E6H (998)	Screen brightness	Indicates screen brightness.	2byte INT	R/W	0: 100% 1: Off 2: 30% ●

Attribute ID	Name	Description	Data type	Attribute	Value
03E7H (999) to 03EBH (1003)	Reserved	-	-	-	-
03ECH (1004)	Flow unit	Indicates the flow unit.	-	-	0: Liter ● 1: Gallon
03EDH (1005)	ch2. function selection	Indicates the ch.2 function selection.	2byte INT	R/W	0: Off ● 1: Control output 2: External input
03EEH (1006)	Pipe material selection	Indicates the pipe material selected.	2byte INT	R/W	0: Metal ● 1: Plastic
03EFH (1007)	NPN/PNP selection	Indicates the output type (NPN/PNP) selected.	2byte INT	R/W	0: NPN ● 1: PNP
03F0H (1008) to 03FFH (1023)	Reserved	-	-	-	-
0400H (1024)	Group 8 Entry count	Indicates the number of entries in Group 8.	2byte UINT	R	31
0401H (1025)	ID Number Count	Indicates number of used IDs.	2byte INT	R	2
0402H (1026)	Head Type	Indicates connected head type.	2byte INT	R	0: No head 1: FD-XS1E 2: FD-XS8E 3: FD-XS20E
0403H (1027)	Reserved	-	-	-	-
0404H (1028)	Product Code	Indicates product code.	2byte INT	R	2031
0405H (1029)	Revision	Indicates revision, with the upper bytes representing the major revision and the lower bytes representing the minor revision.	2byte INT	R	257
0406H (1030)	Product Name	Indicates model designation of the sensor.	STRING	R	"FD-XA2E"
0407H (1031) to 040DH (1037)	Reserved	-	-	-	-
040EH (1038)	Series Code	Indicates series code.	2byte INT	R	2031
040FH (1039)	Series Version	Indicates series version.	2byte INT	R	1
0410H (1040)	Device Type	Indicates device type.	2byte INT	R	0

Attribute ID	Name	Description	Data type	Attribute	Value
0411H (1041) to 041FH (1055)	Reserved	-	-	-	-

● **Attribute IDs corresponding to operation commands (service 4BH)**

The details of the operation command (service code 4BH) are designated with the instance ID (each ID number) and attribute ID.

Details on the selectable operation commands are given below.

Attribute ID	Name	Details
0301H(769)	Initialization request	Executes initialization.
0308H(776)	Full auto calibration : Start	Starts fully automatic calibration.
0309H(777)	Full auto calibration : Finish	Ends fully automatic calibration.
030AH(778)	Perform origin adjustment	Executes origin adjustment.
030BH(779)	Cancel origin adjustment	Cancels origin adjustment.
031DH(797)	Perform conditional monitoring	Executes conditional monitoring.
031EH(798)	Cancel conditional monitoring	Cancels conditional monitoring.

Specifications

4

4-1	Specifications	4-2
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The specifications of the NU-EP1 are explained in this section.

Product name		EtherNet/IP Compatible Network Unit
Model		NU-EP1
Ethernet specifications	Compliant standards	IEEE802.3 (10BASE-T)
		IEEE802.3u (100BASE-TX)
		IEEE802.3af (Power over Ethernet, Class 3)
	Transmission rate	10 Mbps (10BASE-T)
		100 Mbps (100BASE-TX)
	Transmission medium	STP cable or Category 3 or higher UTP cable (10BASE-T) ^{*1} STP cable or Category 5 or higher UTP cable (100BASE-TX)
EtherNet/IP	Maximum cable length	100 m (Distance between NU-EP1 and Ethernet switch)
	Maximum number of connectable hubs ^{*2}	4 (10BASE-T) 2 (100BASE-TX)
	Compatible functions	Cyclic communication Compatible with UCMM and Class 3 messaging (Explicit messaging)
	Number of connections	64
	RPI (Transmission cycle)	0.5 to 10000 ms (in 0.5 ms)
	Tolerable communication bandwidth for cyclic communication	6000 pps
Sensor connection specifications	Message communication	Compatible with UCMM and Class 3
	Conformance test	Compatible with Version A7
	Connectable sensors	Sensor amplifiers with N-bus support ^{*3}
	Number of connectable sensor units	Up to 16 units ^{*4}
	Power supply	Power is supplied from NU-EP1 via wiring-saving connector.
	Allowable passing current ^{*5}	Overall 1200 mA or less
Indicator lamps	Power during PoE power receiving ^{*6}	Supply voltage: 24 V ± 10 %, supply current: 360 mA or less ^{*7}
	Indicator lamps	Link/activity indicator (LINK/ACT): Green LED
		Module status indicator (MS): 2-color (green/red) LED
		Network status indicator (NS): 2-color (green/red) LED
		Sensor communication indicator (D-bus): 2-color (green/red) LED
	Power voltage	24 VDC ± 10%, ripple (p-p) 10% or less, (with power supply connector) 48 VDC (Max. 57 VDC) (During PoE power receiving)
Power consumption		1500 mW or less (at 24 V 60 mA max) ^{*8}
Environmental resistance	Operating surrounding air temperature	-20 to 55 °C (no freezing)
	Operating surrounding air 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: Polycarbonate Power supply connector: Polyamide (plug), PBT (socket)
Weight (including connectors)		Approx. 80 g
Accessories		Instruction manual x 1, power connector x 1, end unit x 2

^{*1} When using the power PoE power receiving function, use the STP cable or Category 5 or higher UTP cable.

^{*2} The number of connectable units is not limited when using a switch.

^{*3} "N-bus" is the name of KEYENCE's wiring-saving system for sensor amplifiers.

^{*4} Varies with the sensor amplifiers connected.

^{*5} Current value which, when supplying power from the power supply connector, can be supplied to the NU-EP1 or to a sensor amplifier unit connected to the NU-EP1.

^{*6} Power which can be supplied to the sensor amplifier when using the PoE power receiving function.

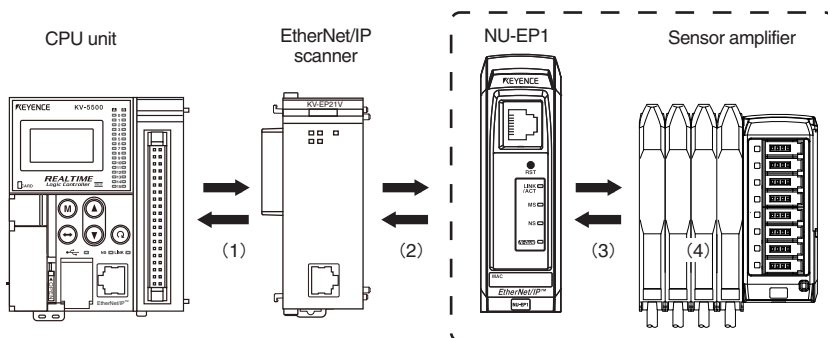
^{*7} Varies according to the working ambient temperature.

(-20 to 45 °C: 360 mA or less, 45 to 50 °C: 260 mA or less, 50 to 55 °C: 140 mA or less)

^{*8} Does not include power supplied to connected sensor amplifier.

4-2 Data Processing Time

This section shows an example of data processing times for cyclic communication.



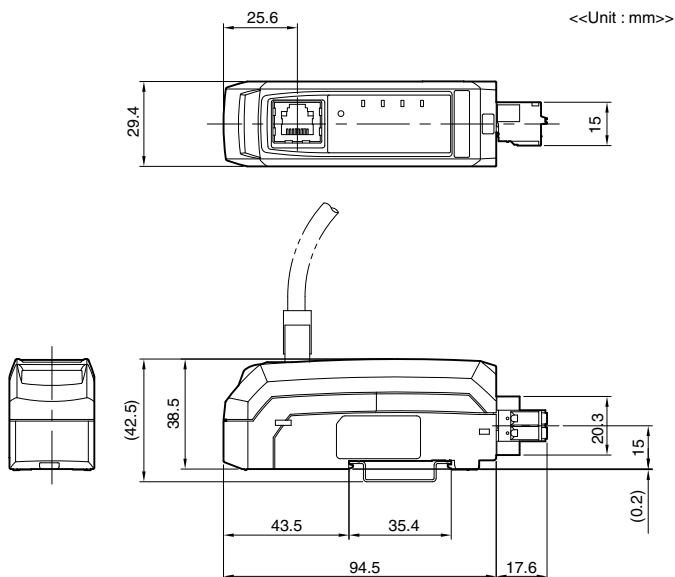
Maximum data processing time = (1) + (2) + (3) + (4)

- (1) PLC scan time
- (2) RPI (Requested Packet Interval).
- (3) NU-EP1 data communication time
- (4) Sensor amplifier communication time

- (2) RPI is set with the EtherNet/IP scanner in 0.5 ms increments between 0.5 ms and 10000 ms.
- (3) The NU-EP1 data communication time is shown below.

Number of connected sensor amplifiers	Connection	
	Fast output	Others
1 to 3 units	0.05 ms	4.5 ms
4 to 6 units		6.0 ms
7 to 9 units		8.0 ms
10 to 16 units		10.0 ms

Refer to each unit's manual for details on the (1) and (4) times.



Appendix

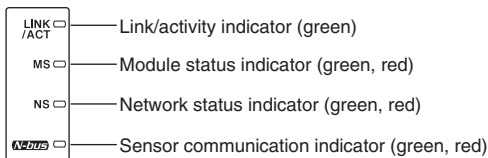
5

5-1	Device Profile	5-2
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5-3	Default Settings	5-6
5-4	Procedures for Communicating with an Allen-Bradley ControlLogix PLC	5-7
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5-9	Index.....	5-46

Class	Item	Details
General data	Vendor name	Keyence Corporation
	Vendor ID	367
	Device type	0 (Generic Device)
	Revision	1.1
	Product code	2501
	Product name	NU-EP1

5-2 Troubleshooting

The indicator lamps on the NU-EP1 are used to determine the cause of the error and the necessary corrective actions.



■ Link/activity indicator (LINK/ACT)

This lamp indicates whether the NU-EP1 is communicating correctly.

LED status		Condition	Corrective action
Green	Solid	Link correctly established.	-
	Flashing	Link correctly established, and exchanging data.	-
Not lit		<ul style="list-style-type: none"> Power is not supplied to the NU-EP1. Link is not established. 	<ul style="list-style-type: none"> Check that the power is correctly connected to the power terminal. Check that the power for the connected device or Ethernet switch is correctly connected. Check that the cables are correctly connected. Check that the IP address is correct.

NOTICE	<p>When using the PoE function, always connect to an IEEE802.3af-compliant PoE power device. The following Keyence devices do not support IEEE802.3af or the PoE function. Never connect a PoE device as there is a risk of damage.</p> <p>[DT-100A], [DT-500], [NE-V08]</p>
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■ **Module status indicator (MS)**


This lamp indicates whether the NU-EP1 is operating correctly.

LED status		Condition	Corrective action
Green	Solid	The NU-EP1 is operating correctly.	-
	Flashing	A system error may be occurring in the NU-EP1.	Contact your nearest Keyence office.
Red	Solid	One or more error or warning is occurring in a connected sensor.	Correct the error or warning that is occurring in the connected sensor(s).
	Flashing	The IP address may be duplicated.	Check whether the IP address is duplicated.
Not lit		Power is not supplied to the NU-EP1.	<ul style="list-style-type: none">• Check that the power is correctly connected to the power terminal.• When using the PoE function, check that the power for the connected device or Ethernet switch is correctly connected.• When using the PoE function, check that the Ethernet switch is connected to a PoE compatible port. Even if the Ethernet switch is PoE compatible, some devices do not supply power to some ports.

* Red LED flashing can be set to "off" for message communication.

■ **Network status indicator (NS)**

This lamp indicates whether the NU-EP1 is conducting EtherNet/IP communication correctly.

LED status		Condition	Corrective action
Green	Solid	One or more connection is established.	When using multiple connections, communication may not be possible, even when the lamp is green.
	Flashing	Connection is not established.	Check that the NU-EP1 is registered in the scanner.
Red	Solid	Duplicate IP address was detected.	Check whether the IP address setting is the same as the scanner or other adaptor.
	Flashing	One or more connection has timed out.	Locate the connection which has timed out, and check the power and wiring of the communication device.
Not lit		Power is not supplied to the NU-EP1.	<ul style="list-style-type: none">• Check that the power is correctly connected to the power terminal.• When using the PoE function, check that the power for the connected device or Ethernet switch is correctly connected.• When using the PoE function, check that the Ethernet switch is connected to a PoE compatible port. Even if the Ethernet switch is PoE compatible, some devices do not supply power to some ports.
		IP address is not assigned.	Set the IP address.  "IP address settings" (page 2-11)

■ Sensor communication indicator (N-bus)

This lamp indicates whether the NU-EP1 is communicating correctly with the sensor amplifier.

If an error occurs, the cause can be identified by reading the error code with cyclic communication or message communication.

📖 "Error code list" (page 3-23)

LED status	Condition	Corrective action
Solid green	Communicating correctly.	-
Flashing green	The NU-EP1 is starting up after power ON.	After starting, the NU-EP1 will automatically shift to the normal state.
	The number of connected sensor amplifiers increased after power on. (Error ID number/code: 00H/56)	Confirm that the NU-EP1 and sensor amplifiers are correctly connected.
	The number of ID numbers occupied by the connected sensor amplifiers exceeds 16. (Error ID number/code: 00H/56)	Make sure that 16 or less ID numbers are occupied.
Solid red	Communication with the sensor amplifier failed when starting. (Error ID number/code: 00H/53)	<ul style="list-style-type: none"> • Confirm that the NU-EP1 and sensor amplifiers are correctly connected, and then turn the NU-EP1 power off and on. • Check whether a connected sensor amplifier is incompatible with the NU-EP1, and then turn the NU-EP1 power off and on. • If the error is not resolved after checking the above matters, contact your nearest Keyence office.
	The number of connected sensor amplifiers increased after power on. (Error ID number/code: 00H/54)	
	The NU-EP1 and sensor amplifier combination is not within the specified range.	
	A system error may be occurring in the NU-EP1.	
Flashing red	Communication with the sensor amplifier was temporarily cut off. (Error ID number/code: 00H/57)	Confirm that there are no sources of noise around the NU-EP1. (The error is automatically reset when the cause is removed.)
Not lit	Power is not supplied to the NU-EP1.	<ul style="list-style-type: none"> • Check that the power is correctly connected to the power terminal. • When using the PoE function, check that the power for the connected device or Ethernet switch is correctly connected.

When the reset switch is held down for three seconds or longer, the NU-EP1 can be reset and initialized to the default settings. This can also be done by using message communication.

The default settings are shown below.

Setting item	Value after initialization
Communication speed	10/100Mbps automatic
IP address setting method	BOOTP
IP address	0.0.0.0*
Net mask	255.255.255.0
Default gateway	0.0.0.0
Sensor status mask setting	MS LED flashes in red at sensor error/warning.
Sensor output setting	Fast output
Multicast TTL	1
Multicast assignment method	0 (Automatic)
Number of multicast addresses	32
Multicast address	239.255.0.0

- * Only the BOOTP client function can be used when the IP address is 0.0.0.0. The IP address must be set to use any other function.

This section explains the procedures for communicating with the NU-EP1 using an Allen-Bradley ControlLogix PLC (EtherNet/IP scanner).

Procedures for Communicating with an Allen-Bradley ControlLogix PLC

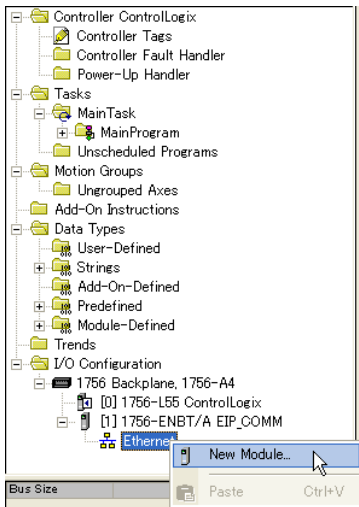
The NU-EP1 is capable of the following communication when connected to an Allen-Bradley ControlLogix PLC.

- Cyclic communication function maximum data size: 496 bytes
- Message communication function: Class3/UCMM

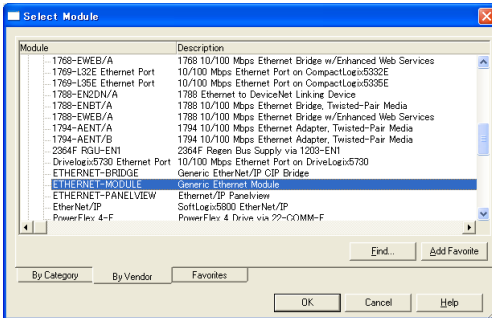
■ Changing the cyclic communication settings

Refer to the PLC instruction manual for details on the PLC unit configuration and settings such as RsLinx, required for communicating with the PC.

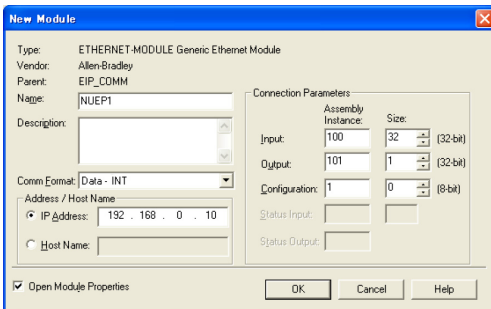
- 1 Select the EIP communication module (1756-ENBT) connected with the NU-EP1 from RsLogix500 I/O Configuration, and then select "New Module" with a right click.**



2 Add "ETHERNET-MODULE (Generic Ethernet Module)".



3 Change the settings as required.



Name

Set a random name. The following tags are generated based on the name set here, and are used as the data exchanged with cyclic communication.

- (Name): I Data received from NU-EP1
- (Name): O Data sent to NU-EP1
- (Name): C Not used.

Comm Format

Designate [Data INT].

IP Address

Designate the NU-EP1's IP address.

Input (NU-EP1 send data size)

- Instance number: 100 (decimal)
- Data size: Random value up to 32

Output (NU-EP1 receive data size)

- Instance number 101 (decimal)
- Data size: Random value up to 1

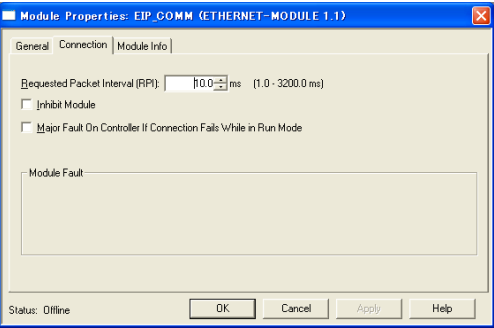
Configuration

- Instance number: 1 (decimal)
- Data size: 0

- Reference**
- For the details of InputOnly connection, refer to "Sending data to multiple PLCs (InputOnly)" (page 5-9).
 - Refer to "Usable Connections" (page 3-9) for details on the connection.

RPI

Designate the cyclic communication interval.



Designate a value between 0.5 and 3200 ms.

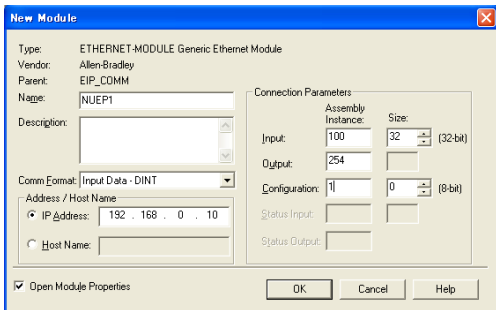
4 Download the settings to the PLC.

EtherNet/IP communication is enabled after the settings are downloaded and the status is switched to online.

● **Sending data to multiple PLCs (InputOnly)**

By connecting to multiple PLCs with the InputOnly connection format, multiple PLCs can receive the data sent from the NU-EP1. Each PLC must be set as shown below to use the InputOnly connection.

Setting item	Bidirectional communication PLC (maximum 1 unit)	PLC connected with InputOnly
RPI value	Random value	Same value as left
InputAssembly Instance number	No. 100 (decimal)	Same value as left
InputAssembly data size	Random value	Same value as left
OutputAssembly Instance number	No. 101 (decimal)	No. 254 (decimal)
OutputAssembly data size	Random value	0 bite
Comm Format	Data-INT	Input Data INT



Point

To carry out cyclic communication with multiple PLCs using the InputOnly connection, the NU-EP1 input data must be sent as a Multicast packet. With ControlLogix, the NU-EP1 transmission is fixed to Multicast packet, so the data can be sent without any problems. However, caution is required when using devices, such as KV or SYSMAC, for which the connection method can be selected from Multicast or Point to Point.

■ **Changing the message communication settings**

After completing "Changing the cyclic communication settings" (page 5-7), issue the MSG instruction from the ladder program to execute message communication.)

Reference

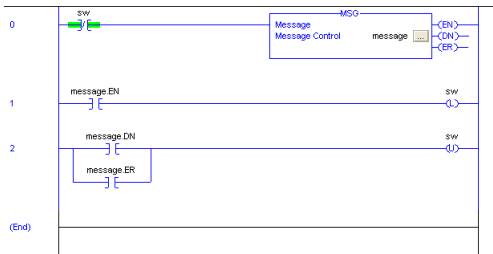
- Refer to "Logix500 Controllers General Instructions" (1756-RM003) for details on the MSG instructions.
- Select Inhibit Module when not using cyclic communication.

1 Define the following tags under the RsLogix5000 "Controller Tags" field.

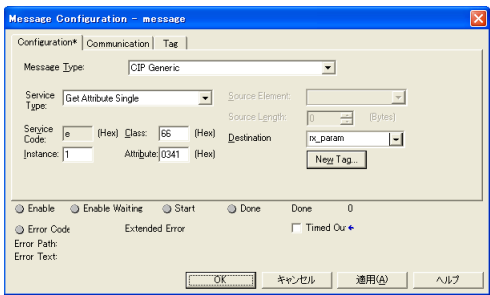
Scope: NUEP1		Show...		Show All	
Name	Value	Force Mask	Style	Data Type	Description
NUEP1:I	{...}	{...}		AB.ETHERNET_MODULE_DINT_128bytes:I.0	
NUEP1:O	{...}	{...}		AB.ETHERNET_MODULE_DINT_4bytes:O.0	
NUEP1:C	{...}	{...}		AB.ETHERNET_MODULE:C.0	
message	{...}	{...}		MESSAGE	
tx_param	0			DINT	
rx_param	0			DINT	
sw	0			BOOL	

- Tag for storing control information for MSG instruction (message- Message type)
- Tag for storing data exchanged with MSG instruction (tx_param, rx_param - INT type)

2 Add the MSG instruction to the RsLogix5000 ladder.



3 Open the "Configuration" tab in the Message instruction setting dialog, and change the MSG instruction setting.



Message Type

Select "CIP Generic".

ServiceType, Class, Instance, Attribute

Designate a value which matches the message to be sent.

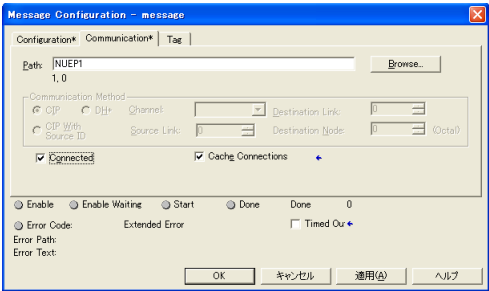
- Example 1: Writing data to NU Object "Setting value (area upper limit)" when writing data to attributes

Item	Setting value
ServiceType	SetAttributeSingle
ServiceCode	- (Cannot be designated)
Class	66H
Instance	01H
Attribute	0341H
SourceElement	Name of tag storing send data
SourceLength	2 byte (attribute size is 2)
Destination	- (Cannot be designated)

- Example 2: Retrieving NU Object "Sensor Ready" data when reading attributes

Item	Setting value
ServiceType	GetAttributeSingle
ServiceCode	- (cannot be designated)
Class	66H
Instance	0AH
Attribute	85H
SourceElement	- (cannot be designated)
SourceLength	- (cannot be designated)
Destination	Name of tag storing received data.

4 Open the "Communication" tab, and change the MSG communication settings.



Path

Designate the device name set in "Configuration for cyclic communication". (An example for the NU-EP1 device is shown above.)

Connected, Cache Connections

- For UCMM connection: Invalidate bidirectional (default setting)
- For Class3 connection: Validate bidirectional

5 Describe the process for setting the send data and retrieving the receive data with the ladder program, and download it to the PLC.

Procedures for Communication with an Allen-Bradley SLC5/05 PLC

The NU-EP1 is capable of the following communication when connected to an Allen-Bradley SLC5/05 PLC.

- Message communication function: Class3



Point

**The size of attribute ID used for SLC5/05 Series is 1 byte or smaller.
The SLC5/05 Series does not support the parameter which contains 2
byte attribute ID.**



Reference

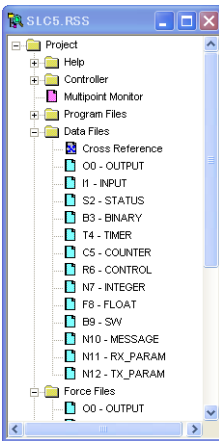
- The SLC5/05 Series does not support the cyclic communication function, but by accessing the NU-EP1's Assembly Object with messages, control can be executed with the same data type and procedures as cyclic communication.
- Up to 248 bytes can be exchanged with the SLC5/05 series message communication.
 - Do not exceed this size when exchanging data with message communication.
 - The Assembly Object data size is the same as the cyclic communication data size set in the NU-EP1 properties. When using the SLC5/05, confirm that this value is 248 bytes.

■ **Changing the message communication configuration**

Message communication is carried out with a ladder program using EEM instructions.

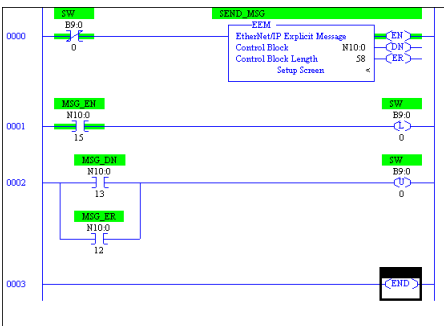
Reference Refer to the "SLC 500 Instruction Set Reference Manual" (1747-RM001), etc., for details on the EEM instructions.

1 Define the following file in the RsLogix500 "Data Files" field.

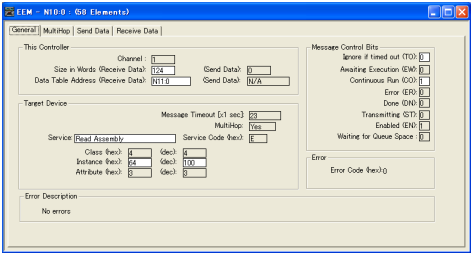


- File storing EEM instruction control information (message-Integer type)
- File storing data exchanged with EEM instruction (tx_param, rx_param - Integer type)

2 Add EMM instruction to RsLogix500 ladder.



3 Designate the File used in the EEM instruction defined in Step 1 for the EEM instruction Control Block, and open the SetupScreen.



Service, Class, Instance, Attribute

Designate a value which matches the message to be sent.

- Example 1: Retrieving NU Object "Sensor ready" data when reading attribute

Item	Setting value
ServiceType	Generic Set Attribute Single
ServiceCode	- (Cannot be designated)
Class	66H
Instance	0H
Attribute	85H
Data Table Address (Send data)	- (Cannot be designated)
Size In Words (Send data)	- (Cannot be designated)
Data Table Address (Received data)	Name of file storing send data
Size In Words (Received data)	1 word (attribute size is 1)

- Example 2: To control with same format and procedure as set cycle data, Access the Assembly Object attribute3: data.

- 1) Retrieving the NU-EP1 input data

Item	Setting value
Service	ReadAssembly
ServiceCode	0EHex (Cannot be designated)
Class	04Hex (Cannot be designated)
Instance	64Hex (Monitor Data)
Attribute	03Hex (Cannot be designated)
Data Table Address (Send data)	(Cannot be designated)
Size In Words (Send data)	(Cannot be designated)
Data Table Address (Received data)	Name of file storing send data
Size In Words (Received data)	64 words
Value of file storing send data	Data following the format assigned to the NU-EP1 set cycle data communication allocation can be retrieved.

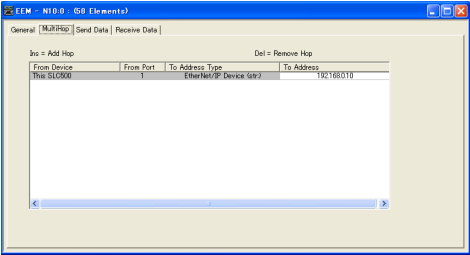
- * The message exchanged with SLC5/05 can have up to 124 words (248 bytes). Confirm that the cyclic communication data size is set to 248 in the NU-EP1 properties.

- 2) Setting the NU-EP1 output data

Item	Setting value
Service	WriteAssembly
ServiceCode	10Hex (Cannot be designated)
Class	04Hex (Cannot be designated)
Instance	65Hex (External Input)
Attribute	03Hex (Cannot be designated)
Data Table Address (Send data)	Name of file storing send data
Size In Words (Send data)	2 words
Data Table Address (Received data)	(Cannot be designated)
Size In Words (Received data)	(Cannot be designated)
Value of file storing send data	Designate with data having a format following the NU-EP1 set cycle data communication allocation.

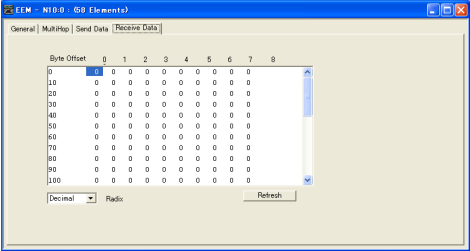
- * The message exchanged with SLC5/05 can have up to 124 words (248 bytes). Confirm that the cyclic communication data size is set to 248 in the NU-EP1 properties.

4 Open the "MultiHop" tab, and set the NU-EP1 IP address.



The above screen is an example of when the NU-EP1 IP address is 192.168.0.10.

5 Open the "Send Data" tab and "Receive Data" tab, and check the contents of the file containing the send and receive data.




6 Describe the process of setting the send data and retrieving the receive data in a ladder program, and download it to the PLC.

This section explains the objects for use with the NU-EP1.

List of Usable Objects

The following objects can be used with the NU-EP1.

Object name	Class ID	Instance ID
Identity Object	1(01H)	1(01H)
Message Router Object	2(02H)	1(01H)
Assembly Object	4(04H)	100(64H) to 102(66H)
Connection Manager Object	6(06H)	1(01H)
NU Object	102(66H)	0(00H) to 16(10H)
TCP/IP Interface Object	245(F5H)	1(01H)
Ethernet Link Object	246(F6H)	1(01H)

Refer to  "How to Use NU Objects" (page 3-32) for details on the NU Objects.

Reading Each Object Table

Reading the class attributes and instance attributes

Example) Excerpt from NU Object class attributes

(1)	(2)	(3)	(4)	(5)	(6)
Attribute ID	Name	Description	Attribute	Data type	Parameter range
01H	Vendor ID	Indicates the vendor ID.	R	UINT	367

Item	Details
(1) Attribute ID	Expresses the attribute ID as a hexadecimal.
(2) Name	Indicates the attribute name.
(3) Description	Describes the attribute.
(4) Attribute	Indicates the direction of services on the attribute ID. R (Read): The attribute values can be read using Get_Attribute_Single and Get_Attributes_All. W (Write): A value can be written into the attributes using Set_Attribute_Single.
(5) Data type	Indicates the attribute data type.
(6) Parameter range	Indicates the range of the data read from the attributes or the parameters which can be set.

Data type

The data type is defined in the following manner by the EtherNet/IP specifications.

Data type	Description	Range	
		Minimum	Maximum
INT	Signed 16-bit integer	-32768	32767
UINT	Unsigned 16-bit integer	0	65535
USINT	Signed 8-bit integer	0	255
UDINT	Unsigned 32-bit integer	0	$2^{32}-1$
WORD	Bit string: 16-bit	-	-
DWORD	Bit string: 32-bit	-	-
BYTE	Bit string: 8-bit	-	-
SHORT_STRING	Character string (1-byte length information + 1-byte per 1-character array)	-	-
STRING	Character string (2-byte length information + 1-byte per 1-character array)	-	-

Identify Object (Class ID: 01H)

This object provides the NU-EP1 identification information, general information and resetting service, etc.

■ Class

● Class service

Get_Attribute_Single (0EH) and Get_Attributes_All (01H) are supported.

● Class attribute (instance ID: 00H)

Attribute ID	Name	Description	Attribute	Data type	Parameter range
01H	Revision	Object revision	R	UINT	0001H
02H	Max Instance	Maximum instance number	R	UINT	0001H
03H	Number of Instances	Number of instances in generated object	R	UINT	0001H
06H	Maximum ID number Class Attributes	Maximum attribute ID of class attribute	R	UINT	0007H
07H	Maximum ID number Instance Attributes	Maximum ID number of instance attribute	R	UINT	0007H

■ Instance

● Instance service

Get_Attribute_Single (0EH), Get_Attributes_All (01H) and Reset service (05H) are supported.

📖 "Reset service" (page 5-21)

Identity Object

● Instance attribute (instance ID: 01H)

Attribute ID	Name	Description	Attribute	Data type	Parameter range
01H	Vendor ID	Vendor ID	R	UINT	016FH
02H	Device Type	General device type	R	UINT	0000
03H	Product Code	Product ID	R	UINT	09C5H
04H	Revision	IdentityObject revision	R	Structure	-
	Major Revision	Major revision		USINT	01H
	Minor Revision	Minor revision		USINT	01H
05H	Status	NU-EP1 status	R	WORD	Reference 1
06H	Serial Number	Serial number	R	UDINT	Serial number
07H	Product Name	Product name	R	SHORT-STRING	"NU-EP1"

Reference 1) Details of status (16-bit)

Bit	Name	Description
0	Owned	ON: On when one or more Class 1 or Class 3 connections are opened.
1	Reserved	Always OFF.
2	Reserved	Always ON.
3	Reserved	Always OFF.
4 to 7	Extended Device Status	Bit 4 to 7 change in the following matter according to the NU-EP1 status. 0101(1): Unrecoverable fault status (1) 0010(2): Not (1). One or more connection has timed out. 0011(3): Not (1) or (2), and connection is not established. 0110(4): Not (1), (2) or (3), and there is one or more RUN status connection. 0111: Status excluding (1) to (4)
8	Minor Recoverable Fault	Always OFF.
9	Minor Unrecoverable Fault	Always OFF.
10	Major Recoverable Fault	ON: Turns ON when a recoverable unit error occurs. Red MS LED flashes.
11	Major Unrecoverable Fault	ON: Turns ON when an unrecoverable unit error (EEPROM read error, etc.) occurs. Red MS LED turns on.
12 to 15	Reserved	Always OFF.


Reset service

The Reset service is a CIP standard function used to emulate the same operations which can only be executed when the power is reset. When this function is received, the NU-EP1 stops each function, cuts off the communication and reads in the settings again. The Reset service is used as a restart request to apply changed parameters (e.g., IP address, Ethernet communication speed, etc.).

Execute the Reset service by designating 01H for the Identify object Instance ID.

Point

- **Commands received during the reset process may be discarded.**
- **The response in respect to the Reset service is returned before the NU-EP1 starts the reset process.**

Service code	Service name	Service data (1-byte)
05H	Reset	00H: Emulates power reset. 01H: Returns to default settings, and emulates power reset. Refer to  "Default Settings" (page 5-6) <ul style="list-style-type: none"> • If any other value is designated, 03H (Invalid parameter value) will be returned to the general status.

■ List of general statuses returned to each service

Name	General status	Extended status	Details
Get_Attributes_All	00H	-	The process ended normally.
	05H	-	The designated instance ID does not exist.
Reset	00H	-	The process ended normally.
	03H	-	The designated reset method is incorrect.
	05H	-	The designated instance ID does not exist.
Get_Attribute_Single	00H	-	The process ended normally.
	05H	-	The designated instance ID does not exist.
	14H	-	The designated attribute ID does not exist.
Others	08H	-	The designated service is not supported.

Message Router Object (Class ID: 02H)

This object provides the communication point for message communication.

■ Class

● Class service

Get_Attribute_Single (0EH) is supported.

● Class attribute (instance ID: 00H)

Attribute ID	Name	Description	Attribute	Data type	Parameter range
01H	Revision	Object revisions	R	UINT	0001H
02H	Max Instance	Maximum instance number	R	UINT	0001H
03H	Number of Instances	Number of instances in generated object	R	UINT	0001H
06H	Maximum ID number Class Attributes	Maximum attribute ID of class attribute	R	UINT	0007H
07H	Maximum ID number Instance Attributes	Maximum ID number of instance attribute	R	UINT	0002H

■ Instance

● Instance service

Get_Attribute_Single (0EH) is supported.

● Instance attribute (instance ID: 01H)

Attribute ID	Name	Description	Attribute	Data type	Parameter range
01H	Object_list	List of supported objects	R	Structure	-
	Number	Number of supported classes in class array		UINT	0007H
	Classes	List of class IDs		Array of UINTs	0001H 0002H 0004H 0006H 00F5H 00F6H 0066H
02H	Number Available	Maximum number of connections	R	UINT	0040H

■ List of general statuses returned to each service

Name	General status	Extended status	Details
Get_Attribute_Single	00H	-	The process ended normally.
	05H	-	The designated instance ID does not exist.
	14H	-	The designated attribute ID does not exist.
Others	08H	-	The designated service is not supported.

Assembly Object (Class ID: 04H)

This object is used to directly access and control the same data as that exchanged with cyclic communication using message communication. This can be used to send data to a device which does not support cyclic communication.

■ Class

- **Class service**
Get_Attribute_Single (0EH) is supported.
- **Class attribute (instance ID: 00H)**

Attribute ID	Name	Description	Attribute	Data type	Parameter range
01H	Revision	Object revisions	R	UINT	0002H




■ Instance

- **Instance service**
Get_Attribute_Single (0EH) and Set_Attribute_Single (10H) are supported.
- **Instance attribute (instance ID: 64H to 66H)**
Instance ID is assigned when using instances to set tags.

Instance ID: 64H to 66H

Attribute ID	Name	Description	Attribute	Data type	Parameter range
03H	Data	Data assigned to Instance ID	R/W ¹	Array of BYTEs	Set data assigned to instance ID ^{2*3}
04H	Size	Number of bytes assigned to instance ID	R	UINT	Set size assigned to instance ID(byte unit)

Assembly Object

- *1 When the target instance ID is 64H or 66H, the attribute is R.
- *2 The synchronism is ensured by instance IDs if read with Get_Attribute_Single.
- *3 Refer to the following sections for details on data assigned to each instance ID.
 - Instance ID: 64H  "Monitor data" (page 3-11)
 - Instance ID: 65H  "External input" (page 3-17)
 - Instance ID: 66H  "Fast output" (page 3-13)

■ List of general statuses returned to each service

Name	General status	Extended status	Details
Get_Attribute_Single	00H	-	The process ended normally.
	05H	-	The designated instance ID does not exist.
	14H	-	The designated attribute ID does not exist.
Set_Attribute_Single	00H	-	The process ended normally.
	05H	-	The designated instance ID does not exist.
	08H	-	Instance ID for which attribute is read (R) was designated.
	0CH	-	Service was executed on instance in cyclic communication.
	0EH	-	Cannot write to designated attribute ID.
	14H	-	The designated attribute ID does not exist.
	15H	-	Data exceeding the defined size was written.
Others	08H	-	The designated service is not supported.

Connection Manager Object (Class ID: 06H)

This object is used for connection type communication. Use this to establish a connection with the NU-EP1.

■ Class

● Class service/class attribute

There are no class services or class attributes.

■ Instance

● Instance service

Forward_Close (4EH) and Forward_Open (54H) are supported. Refer to the CIP specifications for details on the services.

● Instance attribute

There are no instance attributes.

■ List of general statuses returned to each service

Name	General status	Extended status	Details
Forward_Close	00H	-	The process ended normally.
	04H	-	Attribute ID was not designated.
	05H	-	The designated instance ID does not exist.
	13H	-	Length of send data is too short.
Forward_Open	00H	-	The process ended normally.
	01H	0100H	The designated connection is already in use.
		0103H	The designated trigger cannot be used.
		0106H	<ul style="list-style-type: none"> The target → originator direction connection point designated with the ForwardOpen connection path in cyclic communication is already in use, and is Point to Point. The type of connection trying to be opened is Point to Point. The size currently in use differs from the size being opened.
		0108H	<ul style="list-style-type: none"> The send direction connection is not Point to Point. The receive direction connection parameter is not Point to Point or Multicast.
		0109H	The size trying to be opened is larger than the NU-EP1 connection size.*1
		0111H	<ul style="list-style-type: none"> The time out multiplier is larger than 7. An RPI less than 500 μs or larger than 10s was designated.*2
		0114H	The Vendor ID does not match. The Product Code does not match.
		0115H	The DeviceType does not match.
		0116H	The revision does not match.

5-5 Objects for Use with the NU-EP1

Connection Manager Object

Name	General status	Extended status	Details
Forward_Open	01H	0315H	<ul style="list-style-type: none">• The ForwardOpen network connection parameter Connection Size is 0.• The ForwardOpen Connection Point does not contain a ConnectionPoint.• For the ForwardOpen Connection Path class ID, a value other than 04H was set for cyclic, or a value other than 02H for Class 3.• A value other than 1 was set with Class 3 for the instance ID of the ForwardOpen Connection Path.• There is a setting unique for the product data segment.• An illegal Connection Point was designated with cyclic communication for the send direction of the ForwardOpen Connection Path.• A value other than 2 was set with cyclic communication for the ForwardOpen send direction network connection parameter Connection Size.• An illegal Connection Point was designated with cyclic communication for the receive direction of the ForwardOpen Connection Path.
		0322H	<ul style="list-style-type: none">• An error occurred during communication between sensors.• The IP assignment failed when starting.• A sensor was disconnected during operation.
		0323H	A sensor amplifier which is not compatible with the NU-EP1 was connected.
		0327H	<ul style="list-style-type: none">• A sensor was disconnected during operation.• Only the NU-EP1 is reset. Reading of data from the sensor continues.
		0328H	A sensor was disconnected during operation.
		04C2H	The NU-EP1 unique setting is incorrect.
		0640H-067FH	The corresponding device is not connected, an error occurred during communication between sensors, or the sensor amplifier information is being collected again.
		0680H-06BFH	The 2nd or following output of a sensor amplifier having several outputs was designated.
		06C0H-06FFH	The number of occupied slots is different.
		0700H-073FH	When "Check Model Match" is selected for compatibility check, the ProductCode does not match.
		0740H-077FH	When "Check Model Match" is selected for compatibility check, the major revisions or minor revisions does not match.
		0780H-07BFH	When "Check Series" is selected for compatibility check, the series code does not match.
		07C0H-07FFH	When "Check Series" is selected for compatibility check, the actual series version is smaller than the setting.
	02H	-	The maximum number of connections has already been used.
	04H	-	The attribute ID has been designated.
	05H	-	The designated instance ID does not exist.
	13H	-	The length of send data is too short.
	15H	-	The length of send data is too long.
Others	08H	-	The designated service is not supported.

*1 Successful if smaller than the NU-EP1 connection size. If this error occurs, the expansion status is added and the data size defined in the second expansion status is returned.

*2 RPI is set in increments of 500 μ s. If a value which cannot be divided by 500 μ s is set, an RPI rounded to the nearest 500 μ s is set.

TCP/IP Interface Object (Class ID: F5H)

This object provides a system to set the TCP/IP network interface. The IP address, subnet mask and gateway, etc., can be set.

■ Class

● Class service

Get_Attribute_Single (0EH) and Get_Attributes_All (01H) are supported.

● Class attribute (instance ID: 00H)

Attribute ID	Name	Description	Attribute	Data type	Parameter range
01H	Revision	Object revisions	R	UINT	0001H
02H	Max Instance	Maximum instance number	R	UINT	0001H
03H	Number of Instances	Number of instances in generated object	R	UINT	0001H

■ Instance

● Instance service

- Get_Attribute_Single (0EH), Set_Attribute_Single (10H) and Get_Attributes_All (01H) are supported.
- If the internal process of the previous Set_Attribute_Single is not completed, the general status "0CH" (Object State Conflict) will be returned in response to the Set_Attribute_Single executed to the writable AttributeID.
- Changes to the writable AttributeID are applied when executing the reset service after power is turned on again.

TCP/IP Interface Object

● Instance attribute (instance ID: 01H)

Attribute ID	Name	Description	Attribute	Data type	Parameter range
01H	Status	Interface status	R	DWORD	(Reference 1)
02H	Configuration Capability	Method of acquiring initial IP address	R	DWORD	(Reference 2)
03H	Configuration Control	Method device acquires default settings at start-up	R/W	DWORD	(Reference 3)
04H	PhysicalLink Object	Path to physical link object	R	Structure	-
	Path size	Path size (byte)		UINT	0004H
	Path	Segment for designating physical link object		Padded EPATH	20F62401H
05H	Interface Configuration	TCP/IP network interface setting	R/W	Structure	-
	IP Address	Device IP address (IP address)		UDINT	Setting value ^{*1}
	Network Mask	Device network mask (subnet mask)		UDINT	Setting value ^{*1}
	Gateway Address	Default gateway address (Gateway address)		UDINT	Setting value ^{*1}
	Name Server	Primary name server (DNS server)		UDINT	Setting value ^{*1}
	Name Server 2	Secondary name server (reserved)		UDINT	Setting value ^{*1}
	Domain Name	Default domain name (reserved)		STRING	""(Character string can be set)
06H	Host Name	Host name	R/W	STRING	""(Character string can be set)
08H	TTL Value	TTL value for multicast	R/W	USINT	1 (1 to 255) setting value ^{*1}

Attribute ID	Name	Description	Attribute	Data type	Parameter range
09H	Mcast Config	Multicast address setting	R/W	Structure	-
	Alloc Control	Multicast address setting function (multicast allocation method)		USINT	0: Automatic allocation 1: User-designated allocation
	Reserved	Reserved		USINT	00H
	Num Mcast	Number of multicast addresses(Number of multicast addresses)		UINT	For automatic allocation: 0020H For user-designated allocation: 1 to 256 ^{*1}
	Mcast Start Addr	Start multicast address(Allocation start multicast address)		UDINT	For automatic allocation: ^{*2} For user-designated allocation: Setting value ^{*1}

*1 If an invalid value is written in, the general status 09H (Invalid Attribute Value) is returned.

*2 When automatically assigning, the start multicast address is calculated with 239.192.1.0+ ((IP address host section -1) * 03FF) x 32).

(Example)

When IP address is 192.168.0.10, the multicast address is as follows.

Start address
 $= 239.192.1.0 + (((192.168.0.10 - 1) \& 0x3FF) \ll 5)$
 $= 239.192.1.0 + ((192.168.0.9 \& 0x3FF) \ll 5)$
 $= 239.192.1.0 + (0.0.0.9 \ll 5)$
 $= 239.192.1.0 + 0.0.1.32$
 $= 239.192.2.32$

Reference 1) Status list

Bit	Name	Details
0 to 3	Interface ConfigurationStatus	0: IP address is not set (BOOTP start state). 1: IP address is set.B 2 or higher: Not returned with the NU-EP1.
4	Mcast Pending	Changes to 1 if "TTL Value" or "Mcast Config" is set. Cleared to 0 when power is turned off an on, or at Prog->Run after the setting is changed.
5 to 31	Reserved	All OFF (fixed).

Reference 2) List of configuration capabilities

Bit	Name	Details
0	BOOTP Client	ON (fixed)
1	DNS Client	OFF (fixed)
2	DHCP Client	OFF (fixed)
3	DHCP-DNS Update	OFF (fixed)
4	Configuration Settable	ON (fixed)
5 to 31	Reserved	OFF (fixed)

Reference 3) List of configuration control

Bit	Name	Details
0 to 3	Startup Configuration	Displays and sets the IP address setting tool "IP address setting method". 0: Fixed IP address 1: BOOTP 2 to 15: Cannot be set. If set, the general status 09H (Bad attribute data value) is returned.
4	DNS Enable	This bit's operations are ignored when set to OFF (fixed).
5 to 31	Reserved	All OFF (fixed).

■ List of general statuses returned to each service

Name	General status	Extended status	Details
Get_Attributes_All	00H	-	The process ended normally.
	05H	-	The designated instance ID does not exist.
Get_Attribute_Single	00H	-	The process ended normally.
	05H	-	The designated instance ID does not exist.
	14H	-	The designated attribute ID does not exist.
Set_Attribute_Single	00H	-	The process ended normally.
	05H	-	The designated instance ID does not exist.
	09H	-	Written value is illegal.
	0EH	-	Can't write to designated attribute ID.
	13H	-	Length of send data is too short.
	14H	-	The designated attribute ID does not exist.
Others	08H	-	The designated service is not supported.

Ethernet Link Object (Class ID: F6H)

This object provides information on the Ethernet status.

■ Class

● Class service

Get_Attribute_Single (0EH) and Get_Attributes_All (01H) are supported.

● Class attribute (instance ID: 00H)

Attribute ID	Name	Description	Attribute	Data type	Parameter range
01H	Revision	Object revisions	R	UINT	0002H
02H	Max Instance	Maximum instance number	R	UINT	0001H
03H	Number of Instances	Number of instances in generated object	R	UINT	0001H

■ Instance

● Instance service

Get_Attribute_Single (0EH), Set_Attribute_Single (10H) and Get_Attributes_All (01H) are supported.

● Instance attribute (instance ID: 01H)

Attribute ID	Name	Description	Attribute	Data type	Parameter range
01H	Interface Speed	Interface communication speed.	R	UDINT	10, 100
02H	Interface Flags	Interface status flag.	R	DWORD	(Reference 1)
03H	Physical Address	MAC layer address	R	ARRAY of 6 USINTs	Current value
04H	Interface Counters	Interface counter	R	Current value	-
	In Octets	Number of octets received on the interface. Includes the unnecessary multicast packets and discarded packets counted with In Discards.		UDINT	Current value
	In Ucast Packets	Number of octets received on the interface. Does not include the discarded packets counted with In Discards.		UDINT	Current value

5-5 Objects for Use with the NU-EP1

Ethernet Link Object

Attribute ID	Name	Description	Attribute	Data type	Parameter range
04H	In NUcast Packets	Number of nonunicast packets received on the interface. Includes unnecessary multicast packets, but not discarded packets counted with In Discards.	R	UDINT	Current value
	In Discards	Number of inbound packets containing errors, not including discards.		UDINT	Current value
	In Errors	Number of received packets containing errors. Is not included in In Discards.		UDINT	Current value
	In Unknown Protos	Number of inbound packets with unknown protocols.		UDINT	0 (fixed)
	Out Octets	Number of octets sent on the interface.		UDINT	Current value
	Out Ucast Packets	Number of unicast packets sent on the interface.		UDINT	Current value
	Out NUcast Packets	Number of nonunicast packets sent on the interface.		UDINT	Current value
	Out Discards	Number of outbound packets which were discarded.		UDINT	Current value
	Out Errors	Number of outbound packets containing errors.		UDINT	Current value
05H	Media Counters	Counter unique to media.	R	Structure	-
	Alignment Errors	Number of received frames that did not have octet integer length.		UDINT	Current value
	FCS Errors	Number of received frames that did not pass FCS check.		UDINT	Current value
	Single Collisions	Number of frames sent successfully with only one collision.		UDINT	0 (fixed)
	Multiple Collisions	Number of frames sent successfully with two or more collisions.		UDINT	0 (fixed)
	SQE Test Errors	Number of times SQE test error messenger was generated.		UDINT	0 (fixed)
	Deferred Transmissions	Number of frames whose first transmission was deferred because media was busy.		UDINT	0 (fixed)
	Late Collisions	Number of collisions detected in packet transmission more than 512 bytes later.		UDINT	0 (fixed)
	Excessive Collisions	Number of frames for which transmission failed because of excessive collisions.		UDINT	0 (fixed)

Attribute ID	Name	Description	Attribute	Data type	Parameter range
05H	MAC Transmit Errors	Number of frames for which transmission failed because of internal MAC sublayer transmit error.	R	UDINT	0 (fixed)
	Carrier Sense Errors	Number of times carrier sense condition was lost or never asserted when transmitting frames.		UDINT	Current value
	Frame Too Long	Number of received frames that exceeded the maximum tolerable frame size.		UDINT	Current value
	MAC Receive Errors	Number of frames lost during transmission on the interface due to an internal sublayer receive error.		UDINT	0 (fixed)
06H	Interface Control	Settings for following physical interface.	W	Following structure	-
	Control Bits	Interface control bit (Designate AutoNego, full duplex)		WORD	(Reference 2)
	Forced Interface Speed	Operation speed forced by interface. (Fixed to 10 Mbps, etc.)		UINT	Setting value ^{*1}

- ^{*1} The following interface speed can be set for Forced Interface Speed.
 When auto-negotiation is disabled (half-duplex): 10 Mbps fixed (setting value: 10)
 When auto-negotiation is enabled (half-duplex/full duplex): 100/10 Mbps auto-matic (setting value: 0 or 100)

Reference 1) List of interface flags

Bit	Name	Details
0	Link Status	OFF: Non-active link ON: Active link
1	Half/FullDuplex	OFF: Half-duplex ON: Full duplex (OFF when Link Status=0)
2 to 4	NegotiationStatus	0: Executing auto-negotiation. 1: Auto-negotiation and speed detection failed. 2: Auto-negotiation failed and speed detection succeeded. 3: Speed and duplex mode negotiation succeeded. 4: Couldn't execute auto-negotiation (when communication speed is 10 Mbps fixed).
5	Manual SettingRequires Speed	OFF: Changes can be automatically applied. ON: Reset service is required to apply changes (fixed).
6	Local Hardware Fault	OFF (fixed)
7 to 31	Reserved	OFF (fixed)

Ethernet Link Object

Reference 2) List of control bits

Bit	Name	Details
0	Auto-negotiate	OFF: Auto-negotiation invalid (Communication setting fixed to 100 Mbps) ON: Auto-negotiation valid (Communication setting fixed to 100/10 Mbps auto)
1	ForcedDuplex Mode	OFF (fixed)
2 to 15	Reserved	OFF (fixed)

■ List of general statuses returned to each service

Name	General status	Extended status	Details
Get_Attributes_All	00H	-	The process ended normally.
	05H	-	The designated instance ID does not exist.
Get_Attribute_Single	00H	-	The process ended normally.
	05H	-	The designated instance ID does not exist.
	14H	-	The designated attribute ID does not exist.
Set_Attribute_Single	00H	-	The process ended normally.
	05H	-	The designated instance ID does not exist.
	09H	-	Written value is illegal.
	0CH	-	Object cannot execute requested service in current state.
	0EH	-	Can't write to designated attribute ID.
	13H	-	Length of send data is too short.
	14H	-	The designated attribute ID does not exist.
	08H	-	The designated service is not supported.

When functions that cannot be set or used at the same time are set via communication, the function with the lower priority will be invalidated or canceled.

Also, setting errors can be checked with the status (bit11: Sensor Setting Error) of the cyclic communication data of the NU-EP1.

FS-N40 Series

Function 1 (Priority: High)		Function 2 (Priority: Low)		Function 2 operation	Sensor setting error
Power Modes	HSPD	Interference Prevention	Double	Invalid state	
	S-HSPD	Display Gain	Full	Invalid state	
Detection Mode (Output 1)	Rising Edge Detection Mode Falling Edge Detection Mode	Preset Start		Cancel	
		Zero-shift Start		Cancel	
		External Input function	Zero-shift	External input invalid state	ON
		Limit Detection Setting	Valid	Invalid state	ON
		Display Bar Setting	Valid	"---- ----" appears on amplifier' s digital display.	ON
		Sub Display	Display Hold Gain % Hold	"---- ----" appears on amplifier' s digital display.	ON
Detection Mode (Output 1)	DATUM Mode	Preset Start		Execution not possible (cancel)	
		Zero-shift Start		Execution not possible (cancel)	
		External Input function	Zero-shift	External input invalid state	ON
		Preset Saturation Level	Other than 101	Functions as 101.	
		Sub Display	Gain % Hold	"---- ----" appears on amplifier' s digital display.	ON
Detection Mode (Output 1)	Area Detection Mode Area % Mode	Limit Detection Setting	Valid	Invalid state	ON
		Sub Display	Display Hold Gain % Hold	"---- ----" appears on amplifier' s digital display.	ON
Detection Mode (Output 1)	Zero-shift Calibration	Preset Start		Execution not possible	
External Input function	Zero-shift	Preset Start		Execution not possible	ON
Power Modes	S-HSPD	Detection Mode (Output 1)	Area Detection Mode Area % Mode DATUM Mode Rising Edge Detection Mode Falling Edge Detection Mode	Normal Detection Mode	OFF
		External Input function	Reset	Cancel	ON
		Limit Detection Setting	Valid	Invalid state	ON
		Sub Display	Display Hold Gain % Hold	"---- ----" appears on amplifier' s digital display.	ON
		Power Save	FULL	Invalid state	

5-6 Functions which Cannot be Set in Duplicate

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 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 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	

LV-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 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.

PS-N10 Series

Function 1 (Priority: High)		Function 2 (Priority: Low)		Function 2 operation	Sensor setting error
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	

MU-N/LR-T Series

Function 1 (Priority: High)		Function 2 (Priority: Low)		Function 2 operation	Sensor setting error
I/O Function	Output 1+Input	Switching Out 1/ Out 2	Output 2	Output 1	ON
Output 1 Mode	Window	Detection Mode	DATUM mode	Standard	ON
Output 2 Mode	Window	Detection Mode	DATUM mode	Standard	ON
Output 2 Mode	Stability Error	Switching Out 1/ Out 2	Output 2	Output 1	ON
Response Time	4 ms (Class2)/ 5 ms (Class1) 13 ms (Class2)/ 23 ms (Class1)	Received Light Sensitivity	Low Mid	High	ON
Output 1 timer	Off delay On delay One-shot	Graphic Mode	On Trigger	Stops the graph drawing update	

MU-N/LR-W Series

Function 1 (Priority: High)		Function 2 (Priority: Low)		Function 2 operation	Sensor setting error
Output Mode	Binary	Detection Mode (ALL, 1 to 16)	I	Auto	ON
Output Mode	Binary	Response Time	0	1	ON
Output Mode	Binary	External Input Function	Tuning	Invalid state	ON
Output Mode	Binary	Timer Mode 1	One-shot	Invalid state	ON
Output Mode	Binary	Spot/Mode Selection	A-1 (Difference Monitoring) A-2 (2-Point Matching)	1spot	ON
Output Mode	4-Output, 2-Bank	Bank selection	2 or more	0	ON
Output Mode	4-Output, 2-Bank	Cannel Selection	4 or more	0	ON
Output Mode	4-Output, 2-Bank	Spot/Mode Selection	A-1 (Tuning Free)	1spot	ON
Timer function of the selected bank	On delay Off delay One-shot	Graphic Mode	On Peak	Stops the graph drawing update	
Timer function of the selected bank	On delay Off delay One-shot	Graphic Mode	On Trigger	Stops the graph drawing update	

FD-XA2

Connected sensor head	Function 1 (Priority: High)		Function 2 (Priority: Low)		Function 2 operation	Sensor setting error
Common	-	-	Setting value Hysteresis Zero-cut flow rate Simulation flow rate Simulation shot amount	Larger than 9999 (Minimum resolution standard)	9999 (Minimum resolution standard)	ON
	Detection mode(ch.1)	Shot mode	Head indicator illumination mode	0: Green - Off 1: Off - Red 3: PMI (Predictive Maint Info)	2: Green - Red	
	Detection mode(ch.1/2) Input 1 function selection	Shot mode Off/Flow rate zero input	Zero-cut flow rate	Lower than minimum value	Minimum value	ON
	Flow unit	Gallon	Flow display resolution	0: 0.001	1: 0.01	ON
4: 10				3: 1	ON	
FD-XS1	Flow unit	Liter	Flow display resolution	0: 0.001, 1: 0.01	2: 0.1	ON
			Integrated flow unit	0: 0.01	1: 0.1	ON
		Gallon	Integrated flow unit	0: 0.01	1: 0.1	ON
	-	-	Pipe bore diameter selection	3 to 5	2: ø3	ON
	-	-	Pipe outer diameter input	Larger than maximum value (550)	Maximum value (550)	ON
	-	-	Pipe thickness input	Larger than maximum value (200)	Maximum value (200)	ON
FD-XS8	Flow unit	Liter	Flow display resolution	0: 0.001, 1: 0.01	2: 0.1	ON
			Integrated flow unit	0: 0.01	1: 0.1	ON
		Gallon	Integrated flow unit	0: 0.01	1: 0.1	ON
	-	-	Pipe bore diameter selection	3 to 5	2: 1/4"	ON
	-	-	Pipe outer diameter input	Lower than minimum value (550)	Minimum value (550)	ON
	-	-		Larger than maximum value (850)	Maximum value (850)	ON
FD-XS20 [standard]	Flow unit	Liter	Flow display resolution	3: 1, 4: 10	2: 0.1	ON
			Integrated flow unit	5: 1000, 6: 10000	4: 100	ON
		Gallon	Integrated flow unit	5: 1000, 6: 10000	4: 100	ON
			Shot display resolution	3: 1	2: 0.1	ON
	-	-	Pipe outer diameter input	Lower than minimum value (830)	Minimum value (830)	ON

Connected sensor head	Function 1 (Priority: High)		Function 2 (Priority: Low)		Function 2 operation	Sensor setting error
FD-XS20 [high resolution]	Flow unit	Liter	Flow display resolution	0: 0.001, 1: 0.01	2: 0.1	ON
			Integrated flow unit	0: 0.01	1: 0.1	ON
		Gallon	Integrated flow unit	0: 0.01	1: 0.1	ON
			Shot display resolution			ON
	-	-	Pipe outer diameter input	Lower than minimum value (830)	Minimum value (830)	ON

FD-XA2E

Connected sensor head	Function 1 (Priority: High)		Function 2 (Priority: Low)		Function 2 operation	Sensor setting error
Common	-	-	Setting value Hysteresis Zero-cut flow rate Simulation flow rate	Larger than 9999 (Minimum resolution standard)	9999 (Minimum resolution standard)	ON
	Flow unit	Gallon	Flow display resolution	1: 0.01	2: 0.1	ON
				4: 10	3: 1	ON
FD-XS1E	Flow unit	Liter	Flow display resolution	1: 0.01, 2: 0.1	3: 1	ON
	-	-	Pipe bore diameter selection	3 to 5	2: ø3	ON
FD-XS8E	Flow unit	Liter	Flow display resolution	1: 0.01, 2: 0.1	3: 1	ON
	-	-	Pipe bore diameter selection	3 to 5	2: 1/4"	ON
FD-XS20E	Flow unit	Liter	Flow display resolution	3: 1, 4: 10	2: 0.1	ON

Using the the "Current value property", you can check if the sensor connected to the NU-EP1 is operating as intended.

There are three types of the current value property - "Disabled", "Upper limit over" and "Lower limit over".

The current value property is assigned as the following communication data.

Communication method	Assigned area
Cyclic communication	IN Area: Address 8 to 13
Message communication	Instance ID: 00H, Attribute ID: 68H, 8DH, 8EH, 8FH

When the sensor is in the following status, the bit corresponding to "Current Value Property", "Current Value Over Range", "Current Value Under Range", or "Current Value Invalid" turns ON.

Sensor	Current value property	Sensor display for the current value property
LV-N10 Series +LV-S31	Disable	---
	Upper limit over	FR-
	Lower limit over	nERr
AP-N10 Series	Disable	N/A
	Upper limit over	When connecting AP-41/41M/44 : -FFFF When connecting AP-43/48 : FFFF
	Lower limit over	When connecting AP-41/41M/44 : FFFF When connecting AP-43/48 : -FFFF
MU-N12 / LR-T*	Disable	----
	Upper limit over	N/A
	Lower limit over	NEAR
MU-N12 / LR-W*	Disable	---
	Upper limit over	uuuu
	Lower limit over	nnnn
MU-N12 / FD-Q	Disable	----
	Upper limit over	FFFF
	Lower limit over	rEu
FD-X	Disable	----
	Upper limit over	N/A
	Lower limit over	rEu
Other than the above	Disable	
	Upper limit over	N/A
	Lower limit over	

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.

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	M	6d	m	M
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	S	73	s	S
34	4	4	54	T	T	74	t	T
35	5	5	55	U	U	75	u	u
36	6	6	56	V	V	76	v	v
37	7	7	57	W	W	77	w	W
38	8	8	58	X	X	78	x	X
39	9	9	59	Y	Y	79	y	Y
3a	:		5a	Z	Z	7a	z	Z
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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Revision History

Print date	Edition	Description
August, 2010	1st edition	
December, 2010	1st revised edition	
March, 2011	Second revision, first edition	The PS-N10 Series is added, etc.
July, 2012	2nd edition	
January, 2016	3rd revision 1st edition	The LR-W Series is added.
March, 2016	3rd revision 2nd edition	The LR-T Series and FD-Q Series is added.
September, 2016	3rd revision 3rd edition	The AP-N10 Series is added.
October, 2017	4th revision 1st edition	The FS-N40 Series is added.
November, 2017	4th revision 2nd edition	
May, 2018	5th revision 1st edition	The FD-X Series is added.
November, 2018	5th revision 2nd edition	
July, 2019	5th revision 3rd edition	
February, 2020	6th revision 1st edition	

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