



Good Thinking, Good Future

*FASTUS is a product brand of OPTEX FA.

Multifunction LED Lighting Controller OPPX Series

User's Manual

Before using this product, read this manual carefully.

Keep this manual at hand so that it can be used whenever necessary.

Store the manual in a secure location.



OPTEX FA CO., LTD.

Introduction



Thank you for the purchase of the Multifunction LED Lighting Controller “OPPX series.”

Before using this product, read this manual carefully to ensure proper use.

Read this manual thoroughly, and then keep this manual at hand so that it can be used whenever necessary.

This product is a dedicated LED controller for industrial LED lighting as a machine vision light source



Safety Precautions

Safety precautions for ensuring safe operation of this product are displayed as follows with the following symbols.










Precautions listed here describe important information about safety. Make sure to follow them accordingly.

■ Safety Symbols



The safety precaution symbols used and their meanings are listed below.

 Warning	Indicates that any improper operation or handling may result in moderate or minor injury, and in rare cases, serious injury or death. Also indicates a risk of serious property damage.
 Caution	Indicates that any improper operation or handling may result in minor injury or property damage.












■ Precautions

 Warning	
	Do not disassemble, repair, modify, deform under pressure, or incinerate this product. Doing so may cause injury or fire.
	Do not use this product in water or in a location where it may be exposed to water. Do not use this product if wet. Doing so may cause a fire or damage the product.
 	This product is not explosion-proof and should not be used around flammable or explosive gases or liquids. Doing so may cause ignition resulting in an explosion or fire.
 	Do not use air dusters or any spray that uses flammable gas around the product or on the inside of the product. Doing so may cause ignition resulting in an explosion or fire.
	Do not install this product in any of the following locations. Doing so may cause a fire, damage, or a malfunction. <ol style="list-style-type: none"> 1. Locations where dust, salt, iron powders, or vapor (steam) is present. 2. Locations subjected to corrosive gases or flammable gases. 3. Locations where oil or chemical splashes may occur. 4. Locations where heavy vibrations or impacts may occur. 5. Locations where the ambient temperature exceeds the rated range. 6. Locations subject to rapid temperature changes (or where condensation occurs). 7. Locations with strong electric or magnetic fields. 8. Outdoor locations or locations subject to direct sunlight.
	Do not use this product in a non-industrial setting. Doing so may cause induction or radiation interference.

⚠ Warning

	<p>In the event of a malfunction such as smoke comes out from the product If you detect any malfunction including emission of smoke, abnormal smells or sounds, or the housing becoming very hot, immediately stop operating the product and turn off the power to the controller.</p> <p>Doing so may cause a fire. Repairing the product is dangerous and should in no way be performed by the customer. Contact the OPTEX FA sales office.</p>
	<p>In case water enters the product If water or any other liquid enters the product, immediately stop operating the product and turn off the power to the controller.</p> <p>Using the product in this condition may cause a fire.</p>

⚠ Caution

	Do not touch the product with wet hands. Doing so may damage the product.
	Do not drop the product or subject the product to strong impacts. Doing so may damage the product.
	During operation, this product becomes very hot. Do not keep touching it. Doing so may cause a low-temperature burn.
	Follow the instructions in this manual or the specified instruction manual when wiring the product for the correct wiring method. Incorrect wiring can damage the product or cause a malfunction. Output cannot be connected with other LED controller in series nor in parallel.
	Use the dedicated cable to connect to this product, and use an input power supply cable with a sufficiently large wire diameter. Use of anything other than the dedicated cable may cause a malfunction or damage the product.
	Do not excessively twist or apply stress to the cable. Doing so may damage the cable or the connector.
	Always hold the connector when connecting or disconnecting cables. Do not apply excessive force to cables.
	When disconnecting the connector, be careful not to touch the terminals inside the connector, and do not allow foreign objects to enter the connector.
	Route wiring separately from high-voltage circuits and power circuits. If the wires are routed together, induction may occur, which can cause a malfunction or damage the product. If this is unavoidable, use a conductive object such as a properly grounded conduit as a shield.
	Install this product as far away from high-voltage equipment, power equipment, equipment that generates large switching surges, welders, inverter motors, or any equipment that can be a source of noise.
	Use the product within the rated ranges

Caution



Install this product and the dedicated controller securely. Failure to ensure secure installation can result in the products falling and becoming damaged.



Make sure to turn the power off before connecting or disconnecting the cable. Connecting or disconnecting while energized may damage the product.

■ NOTICE

- After carefully considering the intended use, required specifications, and usage conditions, install and use the product within the specified ranges.
- All specifications may be changed without notice.
- When using this product, it is the responsibility of the customer to ensure necessary safety designs in hardware, software, and systems in order to prevent any threat to life, physical health, and property due to product malfunction or failure.
- This product is not intended for use with nuclear power, railways, aviation, vehicles, medical equipment, food-handling equipment, or any application where particular safety measures are required. Absolutely do not use this product for any of these fields.
- This product cannot be used in applications that directly or indirectly detect human bodies for the purpose of ensuring safety. Do not use this product as a detection device for protecting the human body.
- Do not use this product for the development of weapons of mass destruction, for military use, or for any other military application. Moreover, if this product is to be exported, comply with all applicable export laws and regulations, including the "Foreign Exchange and Foreign Trade Act" and the "Export Administration Regulations," and carry out the necessary procedures pursuant to the provisions therein.
- Before using this product, fully examine the applicable environmental laws and regulations, and operate the product in conformity to such laws and regulations. OPTEX FA does not assume any responsibility for damages or losses occurring as a result of noncompliance with applicable laws and regulations.

Expressions Used in This Manual



This section explains the expressions used in this manual.

CAUTION

Indicates an item that requires special attention during use.

MEMO

Indicates information that is useful to know during use.

Manual Composition

This manual is composed of the following contents.

1. Product Overview	This section explains the features of this product, the basic system configuration, and the names of its parts.
2. Installation and connections	This section explains the installation of the product, connections with the power supply and light sources, and how to connect multiple products.
3. Screen Configuration and Basic Operations	This section explains the screen configuration and basic operations of this product.
4. Basic Settings	This section explains the basic setting process and a list of the setting items.
5. Lighting Output Settings	This section explains the selection and adjustment of the lighting method for outputting the light.
6. Light Source Communication	This section explains the light source communication which performs communication between this product and the light sources.
7. External Synchronization Control Input	This section explains how to set the illumination control, light intensity value, and other settings for the light source device using an input signal from an external device.
8. Status Output	This section explains the function which outputs the status (error occurred, light source illuminated, etc.) of this product and the light source device to an external device.
9. Communication with an External Device	This section explains the communication specifications and setting method for controlling this product from an external device.
10. Other Functions	This section explains how to set sequence control and recipes.
11. Errors and Warnings	This section explains the error and warning contents and responses.
12. Appendix	The appendix contains the specifications and dimension drawings of the product.

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1

Product Overview

This section explains the features of this product, the basic system configuration, and the names of its parts.

1-1 Features



The OPPX series multifunction LED lighting controller includes the following features.

- It supports three output modes: PWM illumination, overdrive illumination, and variable voltage illumination.
- With “FALUX sensing” and “FALUX sensing +,” it is capable of performing monitoring and feedback of lighting brightness and temperature.
- External light intensity adjustment supports RS-232, parallel, and Ethernet communication.
- The installation of a recipe registration function allows model change with just a small number of input points.
- The synchronization control input uses 5 - 24 V input specifications.
- Sequence control allows individual settings for light intensity value and lighting time, and a maximum of 16 sequences can be registered.
- Infrared communication with the product (between devices) allows a maximum of four devices to be interconnected and controlled.
- The external synchronization input can be selected from models with 5 to 24 V input or TTL level input.

1-2 Basic System Configuration

The basic configuration of the OPPX multifunction LED lighting controller is as shown below.

• Configuration elements

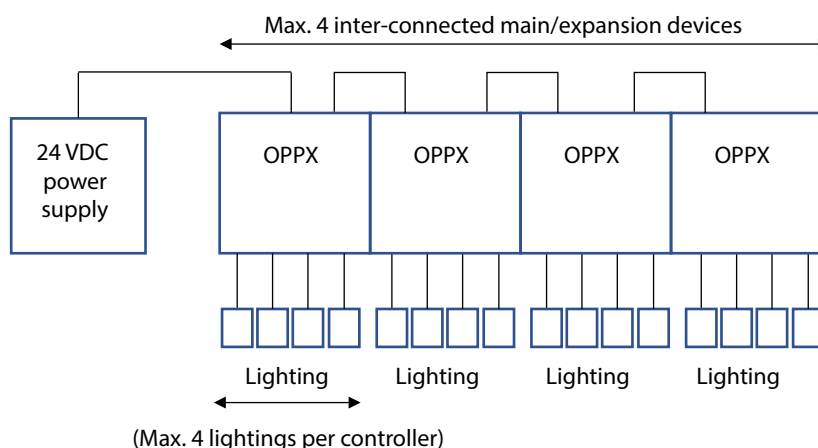
OPPX series : Adjacent installation allows a maximum of four devices to be inter-connected and controlled using infrared communication.

24 VDC power supply : Prepared by the customer according to the number of connected OPPX devices and the lighting capacity.

For the total power consumption of the connected LED lighting, refer to "24 VDC Power Supply Capacity"(12-12page).

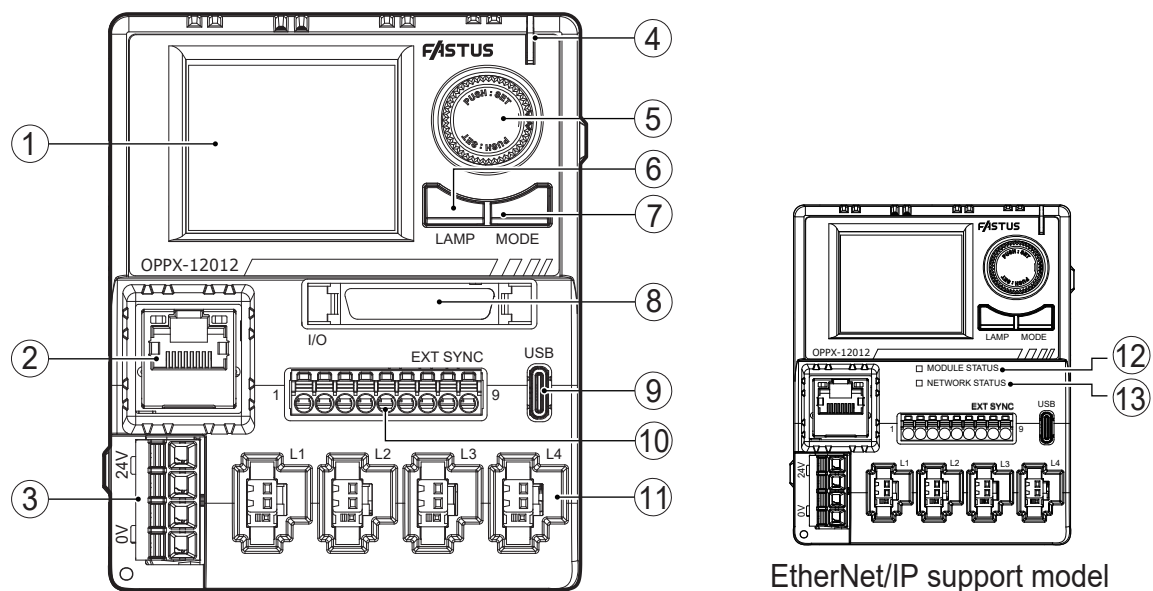
Lighting : Connect a lighting with input voltage that corresponds to the output voltage of that OPPX series. The function for information communication (FALUX sensing or FALUX sensing +) between the lighting and the OPPX series differs depending on the connected lighting.

Lighting extension cable: Connect an appropriate cable according to the OPPX series and lighting which is used.



1-3 Part name and Function

1-3-1 Part name and Function



No.	Name	Description
①	View display	Displays the light intensity value, illumination monitor display, and the settings menu.
②	Ethernet connector	Connect when controlling a controller externally over an Ethernet network. Compatible cables: STP (Shielded Twisted Pair), Category 5, 5e or higher. (This connector is not equipped on Ethernet non-support models.)
③	Power connector	Connect 24 V and GND.
④	Status LED	Indicates the product status. Green (lit): Running Red (blinking): Error active Green (blinking): Warning active Red (lit): Defective startup
⑤	Dial key	Use to switch between screens and edit/confirm setting values.
⑥	LAMP key	Use to switch the lamp you want to configure.
⑦	MODE key	Use to switch between modes (monitoring / light intensity adjustment / setting) and cancel operations
⑧	External parallel connector	Connect externally via parallel communication or RS232 serial communication. You can also input external synchronization and output the controller status with this connector. (This connector is not equipped on EtherNet/IP support models.)
⑨	USB (USB Type-C)	Connect the USB cable to control the controller externally via serial communication. You can also update the firmware. The communication format is USB 1.1.
⑩	External synchronization control connector	Use this connector to control illumination externally or output the controller status.
⑪	Illumination output connector	Connect to LED lighting. OPPX-6012 and OPPX-10024 have only L1 and L2. In OPPX-1601224, L1 and L2 are 12 V output type and L3 and L4 are 24 V output type.

No.	Name	Description
⑫	MODULE STATUS	Displays EtherNet/IP network status.
⑬	NETWORK STATUS	<ul style="list-style-type: none">• Failure to initialize communication settings ⑫: Green (Blinking), ⑬: OFF• No network connection ⑫: Green (ON), ⑬: OFF• Cyclic communication not established ⑫: Green (ON), ⑬: Green (Blinking)• Cyclic communication failure ⑫: Green (ON), ⑬: Red (Blinking)• Communication setting error ⑫: Red (Blinking), ⑬: Red (ON)• Cyclic communication in progress ⑫: Green (ON), ⑬: Green (ON)



2

Installation and Connections

This section explains the installation of the product, connections with the power supply and lightings, and how to connect multiple products.

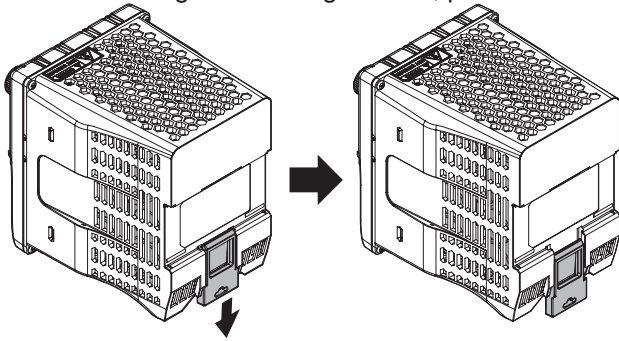
2-1 Installation

■ Installation method

Fit the controller to the DIN rail or use the screw holes on the bottom surface to securely fix it.

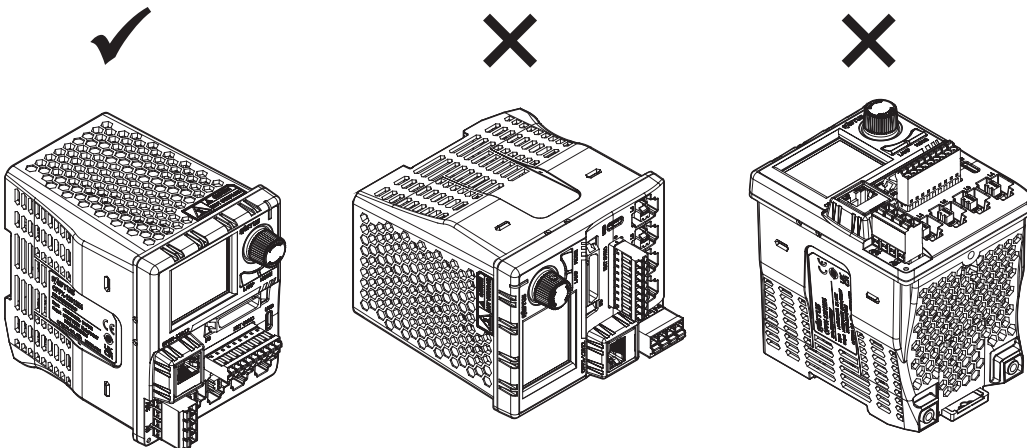
● When installing on DIN rail

When attaching or removing the unit, pull the hook at the bottom in the direction of the ▼.



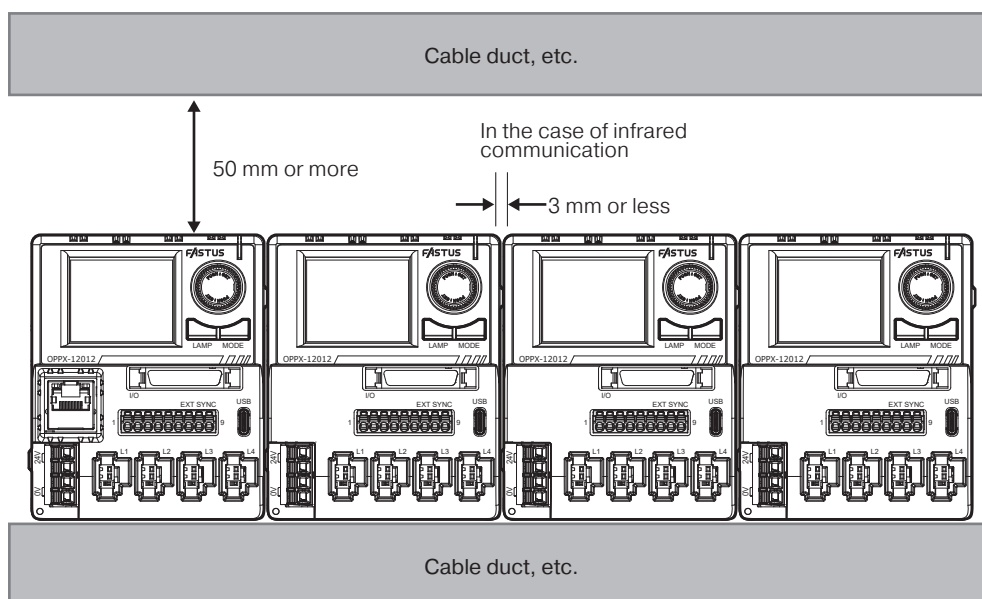
■ Installation position

Install the controller in a position shown ✓ in the figure below. Avoid any other positions for the installation.



■ Installation distance limit

- Leave at least 50 mm clearance at the top of controllers.
- If you are using infrared communication to control inter-connection, make sure that the clearance between the controllers is within 3 mm.



- The ambient temperature range of the OPPX series is 0 to 40°C.
- Take the following into consideration.
Avoid installing the unit directly over devices that generate a large amount of heat (heater, transformer, power supply unit etc.).
Where the ambient temperature may exceed 40°C, install a forced cooling fan or air conditioner. When installing the controller in an enclosure, locate it at the bottom wherever possible.

2-2 Basic Connections

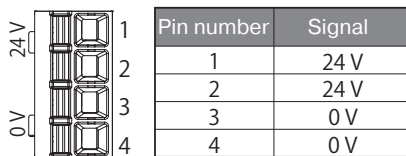
2-2-1 Power Connector

■ Specification.

Connector: (included accessory)

Applicable wire: 0.5 to 2 mm², AWG 20 to 14

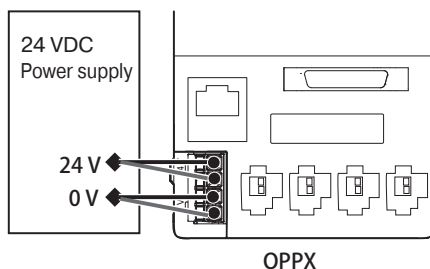
Length of stripping part: 11 to 12 mm



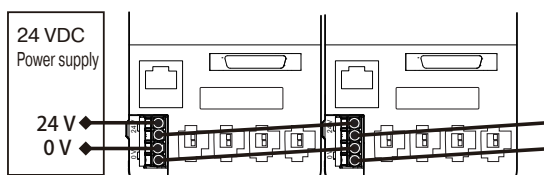
■ Wiring

If the current consumption in the controller exceeds the connector rating of 12 A, wire up the free + and - terminals as shown in the figure below.

Also make sure that the wire diameter is large enough.



When controllers are used adjacent to each other, the spare terminal can be used to transfer the power supply between the controllers as shown in the figure below.



CAUTION

When wiring one power supply to one unit and passing power from one unit to another, use the empty terminals.

However, do not exceed the connector rating. (Max: 12 A)

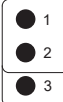
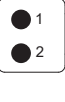
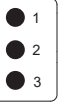
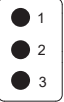
Also, take into account the total current value of all units when selecting the power supply to use.

2-2-2 Illumination Output Connector

This connector connects to the LED lighting.

The connector shape and color are different for the OPPX series 12 V output type and 24 V output type.

The opposite connector which is compatible with each is also different. Check before connecting.

	12 V output type		24 V output type	
	FALUX sensing + lighting	Other 12 V input lighting	FALUX sensing + lighting	24 V input lighting
Connector housing	Dedicated 3-pin plug connector	JST's SMR-02V-B/N	JST's SMR-03V-B	
Pin layout diagram	 <ul style="list-style-type: none"> 1: Lighting device output positive side 2: Lighting device output negative side 3: For inter-unit communication 	 <ul style="list-style-type: none"> 1: Lighting device output positive side 2: Lighting device output negative side 	 <ul style="list-style-type: none"> 1: Lighting device output positive side 2: For inter-unit communication 3: Lighting device output negative side 	 <ul style="list-style-type: none"> 1: Lighting device output positive side 2: NC 3: Lighting device output negative side
Housing color	Red	Black	Black	Black
Dedicated extension cable model	OP-XCB1-□	OP-CB1-□	OP-FXCB1-□	OP-FCB1-□

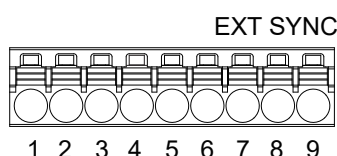
2-2-3 External parallel control connector

■ External synchronization control connector (included accessory)

Applicable wire: 0.2 to 1.3 mm², AWG 24 to 16

Length of stripping part: 9 to 10 mm Terminal specifications: Push-in

Dedicated cable model: OP-ECBX9-3



● Pin assignment

Standard

Pin number	Name	Input/output	Signal name	Explanation of signal name
1	SYNC1	Input	Synchronization input 1	Can be used to control lighting illumination. Selecting the synchronization control input can change the corresponding lighting.
2	SYNC2	Input	Synchronization input 2	
3	SYNC3	Input	Synchronization input 3	
4	SYNC4	Input	Synchronization input 4	
5	SEQRST	Input	Sequence reset input	Resets the sequence control number.
6	COMINB	—	Input COM	This is the input common terminal. Each input can be turned ON by applying 5 - 24 V between the input and this common terminal. (No polarity)

Pin number	Name	Input/output	Signal name	Explanation of signal name
7	USER1	Output	General-purpose output 1	This is a general-purpose output pin. It is possible to set the output contents. It is the same as USER1 on the external parallel connector.
8	USER2	Output	General-purpose output 2	This is a general-purpose output pin. It is possible to set the output contents. It is the same as USER2 on the external parallel connector.
9	COMOUTB	—	Output COM	This is the output common terminal. When output is ON, current flows from the output to this common terminal.

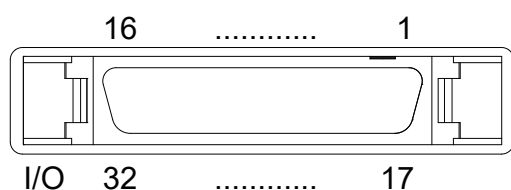
TTL level model

Pin number	Name	Input/output	Signal name	Explanation of signal name
1	SYNC1	Input	Synchronization input 1	Can be used to control lighting illumination. Selecting the synchronization control input can change the corresponding lighting.
2	SYNC2	Input	Synchronization input 2	
3	SYNC3	Input	Synchronization input 3	
4	SYNC4	Input	Synchronization input 4	
5	SEQRST	Input	Sequence reset input	Resets the sequence control number.
6	COMIN	—	Input COM	This is the input common terminal. Each input can be turned ON by applying 2 - 8 V between the input and this common terminal. (No polarity)
7	USER1	Output	General-purpose output 1	This is a general-purpose output pin. It is possible to set the output contents. NPN output is provided. It is the same as USER1 on the external parallel connector.
8	USER2	Output	General-purpose output 2	This is a general-purpose output pin. It is possible to set the output contents. NPN output is provided. It is the same as USER2 on the external parallel connector.
9	GND	—	GND for general-purpose output 1, 2	This is the output common terminal (USR1 to USER6). When output is ON, current flows from the output terminal to this common terminal.

■ External parallel connector (Not equipped on EtherNet/IP support models)

Applicable connector: HIROSE FX2-32PA insulation-displacement connector with lock

Dedicated cable model: OP-ECBX32-3



● Pin assignment

Standard

Pin number	Name	Input/output	Signal name	Explanation of signal name
1	D0	Input	Light intensity bit 0	Inputs the Light intensity value or the lighting width. Writing is performed using the BRTWR or PLSWR signal in combination with the specified station number. The recipe number can also be switched by changing the input mode.
2	D1	Input	Light intensity bit 2	
3	D2	Input	Light intensity bit 2	
4	D3	Input	Light intensity bit 3	
5	D4	Input	Light intensity bit 4	
6	D5	Input	Light intensity bit 5	
7	D6	Input	Light intensity bit 6	
8	D7	Input	Light intensity bit 7	
9	D8	Input	Light intensity bit 8	
10	D9	Input	Light intensity bit 9	
11	L0	Input	LAMP switching 0	Specifies the lamp station number for performing light intensity adjustment. The value is specified in binary.
12	L1	Input	LAMP switching 1	
13	L2	Input	LAMP switching 2	
14	L3	Input	LAMP switching 3	
15	BRTWR	Input	Brightness control value writing	Writes the light intensity adjustment bit as the Light intensity value (or recipe number).
16	COMINA	—	Input COM	This is the input common terminal. Each input can be turned ON by applying 5 - 24 V between the input and this common terminal. (No polarity)
17	RXD	Input	RS-232C Receive data	This is the RS-232C receiving input.
18	TXD	Output	RS-232C Transmit data	This is the RS-232C transmission output.
19	SG	—	RS-232C Signal ground	This is the RS-232C common terminal.
20	PLSWR	Input	Illumination time write	Writes the light intensity adjustment bit as the lighting width.
21	MASK	Input	Write mask	When ON, controls the write signal (BRTWR, PLSWR) input.
22	USER1	Output	General-purpose output 1	This is a general-purpose output pin. It is possible to set the output contents. It is the same as external synchronization control connector USER1.
23	USER2	Output	General-purpose output 2	This is a general-purpose output pin. It is possible to set the output contents. It is the same as external synchronization control connector USER2.

Pin number	Name	Input/output	Signal name	Explanation of signal name
24	USER3	Output	General-purpose output 3	This is a general-purpose output pin. It is possible to set the output contents.
25	USER4	Output	General-purpose output 4	
26	USER5	Output	General-purpose output 5	
27	USER6	Output	General-purpose output 6	
28	COMOUTA	—	Output COM	This is the output common terminal (USER1 to USER6). When output is ON, current flows from the output terminal to this common terminal.
29	SYNC1	Input	Synchronization input 1	Can be used to control lighting illumination. Selecting the synchronization input can change the corresponding lighting.
30	SYNC2	Input	Synchronization input 2	
31	SYNC3	Input	Synchronization input 3	
32	SYNC4	Input	Synchronization input 4	

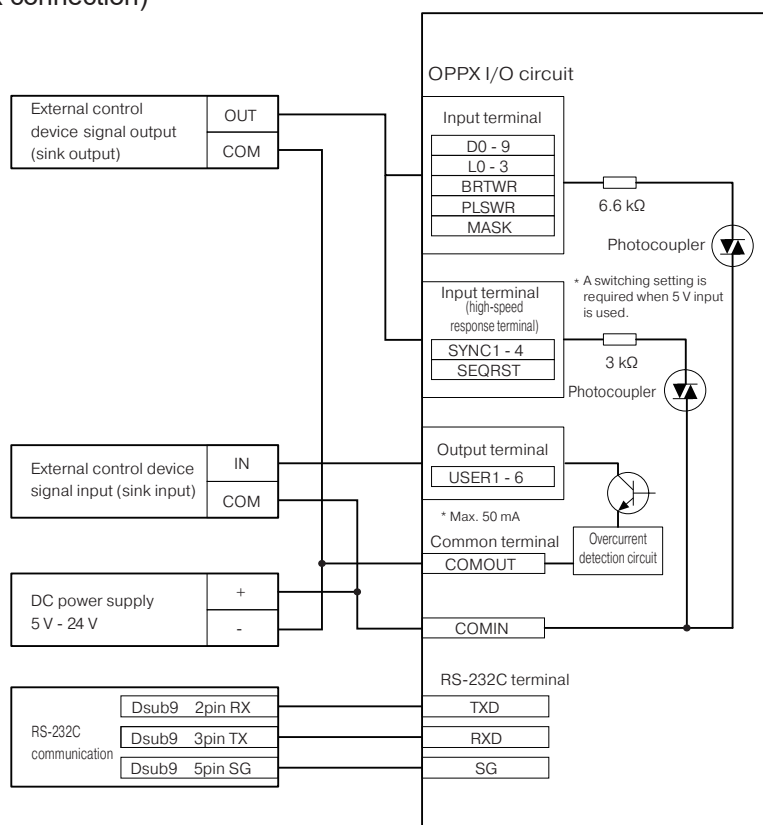
TTL level model

Pin number	Name	Input/output	Signal name	Explanation of signal name
1	D0	Input	Light intensity bit 0	Inputs the Light intensity value or the lighting width. Writing is performed using the BRTWR or PLSWR signal in combination with the specified station number. The recipe number can also be switched by changing the input mode.
2	D1	Input	Light intensity bit 2	
3	D2	Input	Light intensity bit 2	
4	D3	Input	Light intensity bit 3	
5	D4	Input	Light intensity bit 4	
6	D5	Input	Light intensity bit 5	
7	D6	Input	Light intensity bit 6	
8	D7	Input	Light intensity bit 7	
9	D8	Input	Light intensity bit 8	
10	D9	Input	Light intensity bit 9	
11	L0	Input	LAMP switching 0	Specifies the lamp station number for performing light intensity adjustment. The value is specified in binary.
12	L1	Input	LAMP switching 1	
13	L2	Input	LAMP switching 2	
14	L3	Input	LAMP switching 3	
15	BRTWR	Input	Brightness control value writing	Writes the light intensity adjustment bit as the Light intensity value (or recipe number).
16	COMINA	—	Input COM	This is the input common terminal. Each input can be turned ON by applying 2 -8 V between the input and this common terminal. (No polarity)
17	RXD	Input	RS-232C Receive data	This is the RS-232C receiving input.
18	TXD	Output	RS-232C Transmit data	This is the RS-232C transmission output.
19	SG	—	RS-232C Signal ground	This is the RS-232C common terminal.

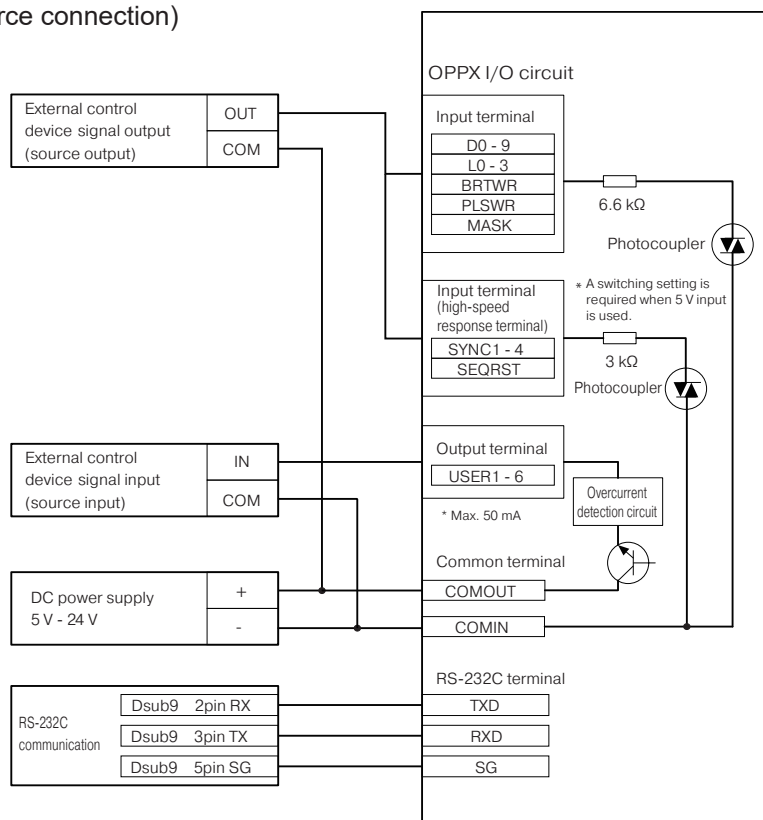
Pin number	Name	Input/output	Signal name	Explanation of signal name
20	PLSWR	Input	Illumination time write	Writes the light intensity adjustment bit as the lighting width.
21	MASK	Input	Write mask	When ON, controls the write signal (BRTWR, PLSWR) input.
22	USER1	Output	General-purpose output 1	This is a general-purpose output pin. It is possible to set the output contents. It is the same as external synchronization control connector USER1.
23	USER2	Output	General-purpose output 2	
24	USER3	Output	General-purpose output 3	
25	USER4	Output	General-purpose output 4	
26	USER5	Output	General-purpose output 5	
27	USER6	Output	General-purpose output 6	This is a general-purpose output pin. It is possible to set the output contents.
28	GND	—	GND for general-purpose output	
29	SYNC1	Input	Synchronization input 1	
30	SYNC2	Input	Synchronization input 2	
31	SYNC3	Input	Synchronization input 3	
32	SYNC4	Input	Synchronization input 4	Can be used to control lighting illumination. Selecting the synchronization input can change the corresponding lighting.

2-2-4 Parallel Input/Output Connection Diagram

NPN connection (sink connection)

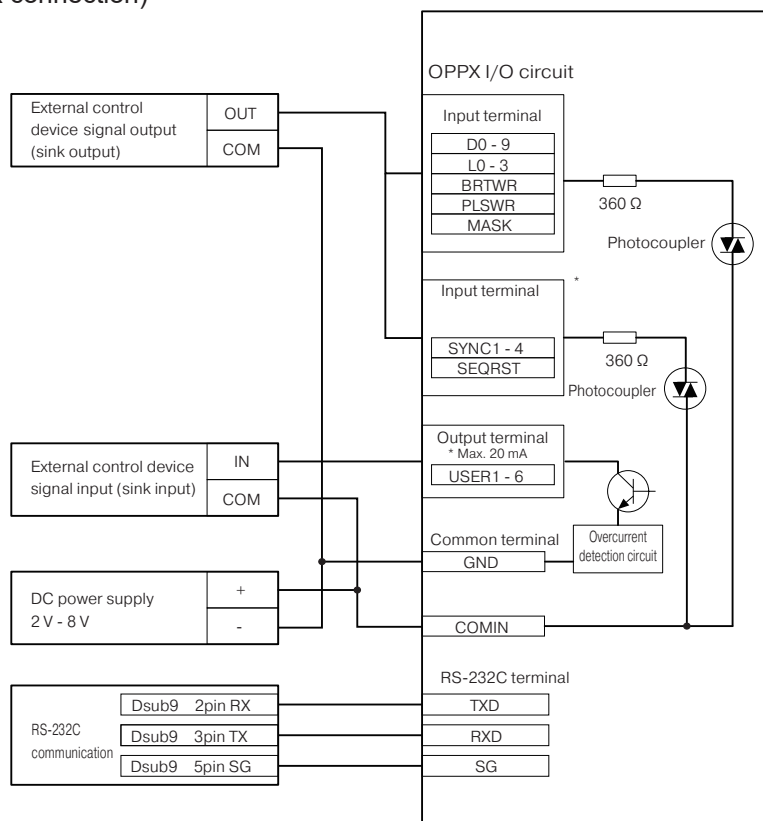


PNP connection (source connection)

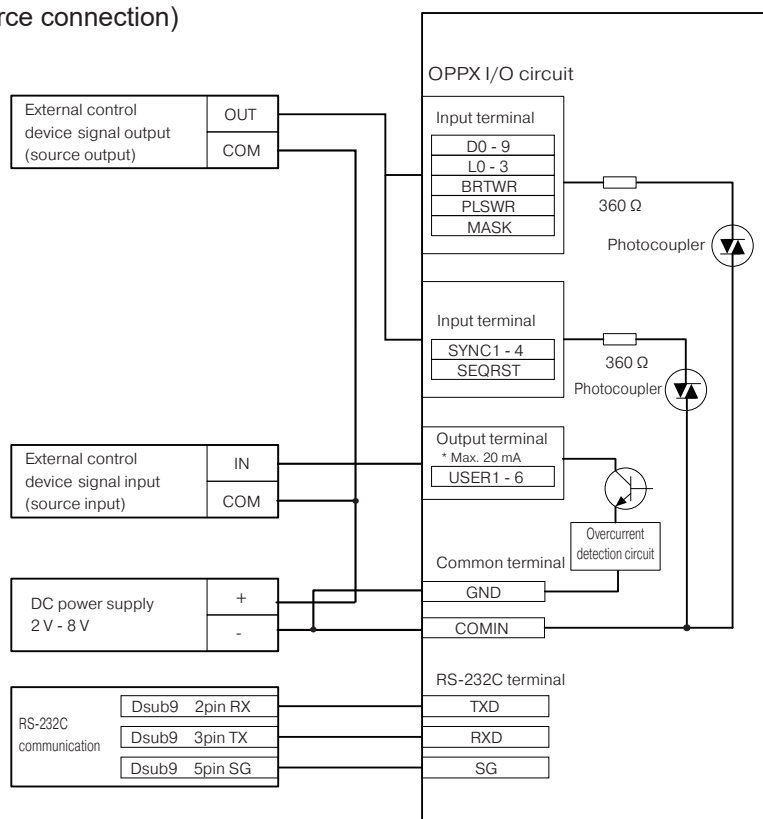


● TTL level model

NPN connection (sink connection)

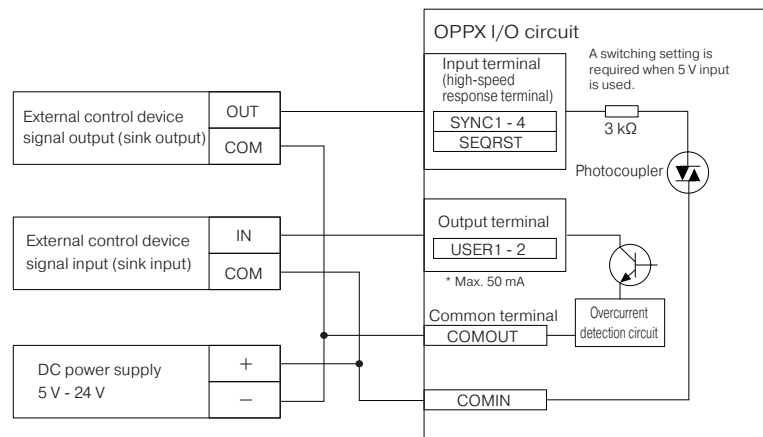


PNP connection (source connection)

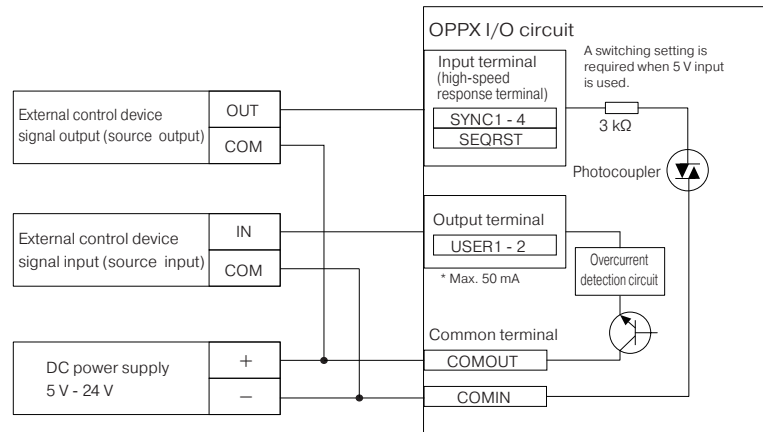


● EtherNet/IP model

NPN connection (sink connection)



PNP connection (source connection)



2-3 Inter-connection Infrared Communication

This section explains the infrared communication between the controllers.

2-3-1 Overview of Infrared Communication

With this product, infrared communication is possible by arranging multiple devices on the right side. This infrared communication allows multiple OPPX to be controlled simultaneously using a single external communication.

CAUTION

Contents which can be controlled by infrared communication: All data except for the synchronization signal using I/O
Contents which must be provided to each controller: I/O synchronization signal, 24 VDC power

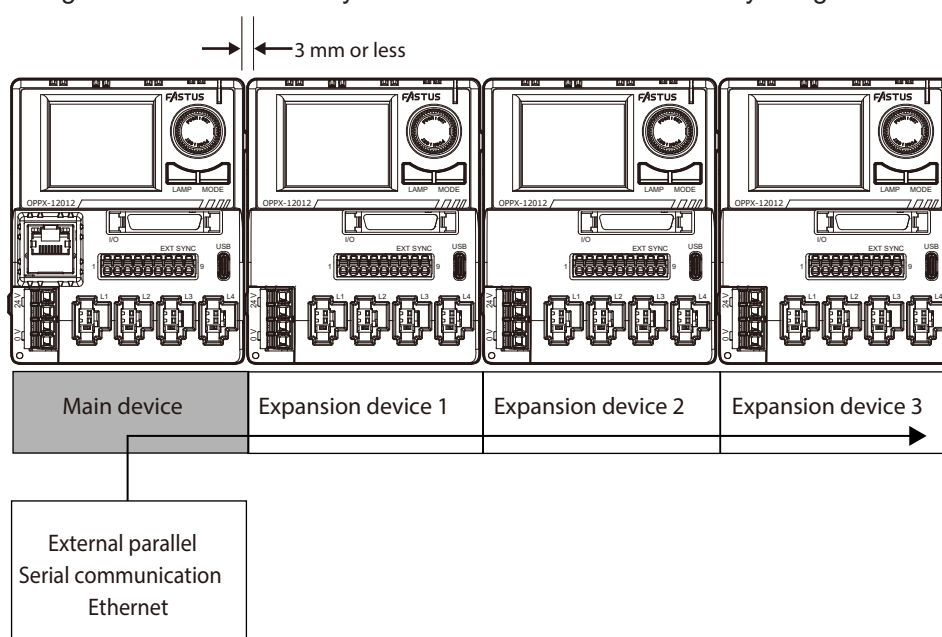
2-3-2 How to Connect Inter-connection Infrared Communication

This section explains how to connect the inter-connection infrared communication.

■ Installation and main/expansion device assignment

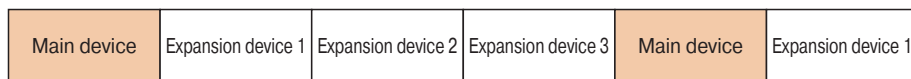
Infrared communication is established automatically when the devices are installed next to each other at a distance of 3 mm or less as shown in the figure below.

At this time, the device farthest on the left is automatically assigned as the main device, and the devices to the right that are controlled by the main device are automatically assigned as expansion devices.



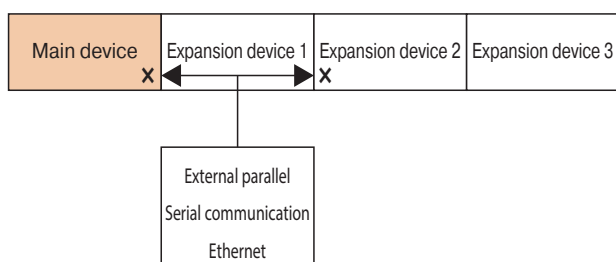
■ Number of inter-connectable devices

The maximum number of devices that can be inter-connected is four. When a fifth and later devices are connected, a maximum of four devices can be connected using the fifth device as the main device.



■ Control communication to the expansion devices

When control is provided to an expansion device, control of the lighting at that device is accepted, however it is not possible for it to control other devices. The only device capable of controlling connected devices is the main device.



■ Display

For the display when devices are connected, refer to  “3-1-3 Display” (page 3-4).

2-3-3 Inter-connection Infrared Communication Settings and Specifications

This section explains the settings and specifications related to infrared communication.

■ List of related items

Item name	Setting value	Description
MODULE POSITION [display only]	Main device Expansion devices 1 - 3	Displays the corresponding status of infrared communication at that device.
E1 CONFIG [display only]	Output voltage/number of channels NONE	Displays the output voltage and number of channels of the expansion device connected to that device. When no such expansion device exists, “NONE” is displayed.
E2 CONFIG [display only]		
E3 CONFIG [display only]		

■ Recognition of device configuration

The main device manages the number of inter-connected devices and the number of lighting outputs possessed by each device.

0 is returned for parameter reading of a lighting that does not exist in the configuration. “Station number error” is returned for serial communication and the “Write not possible” response status is returned for Ethernet.

■ Expansion device errors and warnings

When “Main device error output” or “Main device warning output” is assigned to the main device general output, the main device output also turns ON when an expansion device error or warning is output.

However because the details of the error are unknown, check the expansion device display for the details of the expansion device error or warning.

■ Restrictions

- When an OPPX-1601224P4 or OPPX-1601224E4 is used as an expansion device, the main device version must be xxxx75xx or higher. If the version is xxxx74xx or lower, the infrared communication will be recognized however access to LAMP3 and LAMP4 will not be possible.
There is no effect when an OPPX-1601224P4 or OPPX-1601224E4 is used as the main device.
- When a standard model is used as the main device and a EtherNet/IP support model (the OPPX-xxxxEPx) is used as an expansion device, it is not possible to obtain commands characteristic to the model that supports EtherNet/IP from inter-connection infrared communication.



3

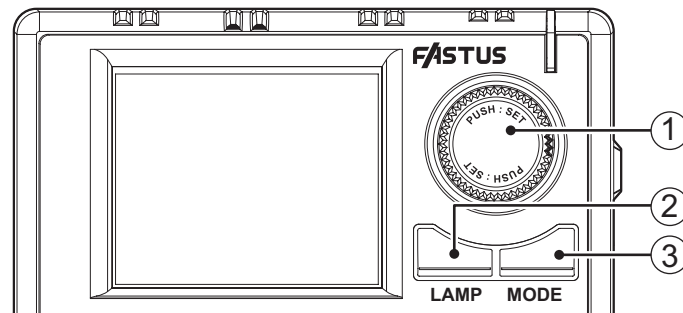
Screen Configuration and Basic Operations

This section explains the screen configuration and basic operations of this product.

3-1 Operation Keys and Screen Configuration

3-1-1 Explanation of Operation Keys

The items displayed on the LCD display of this product are operated using three keys: the dial key, LAMP key, and MODE key.



No.	Name	Description
①	Dial key	Rotate the dial to switch the screen or change the setting value, and press the key to confirm.
②	LAMP key	This key switches the lamp (lighting) to be set.
③	MODE key	This key cancels the screen change or operation.

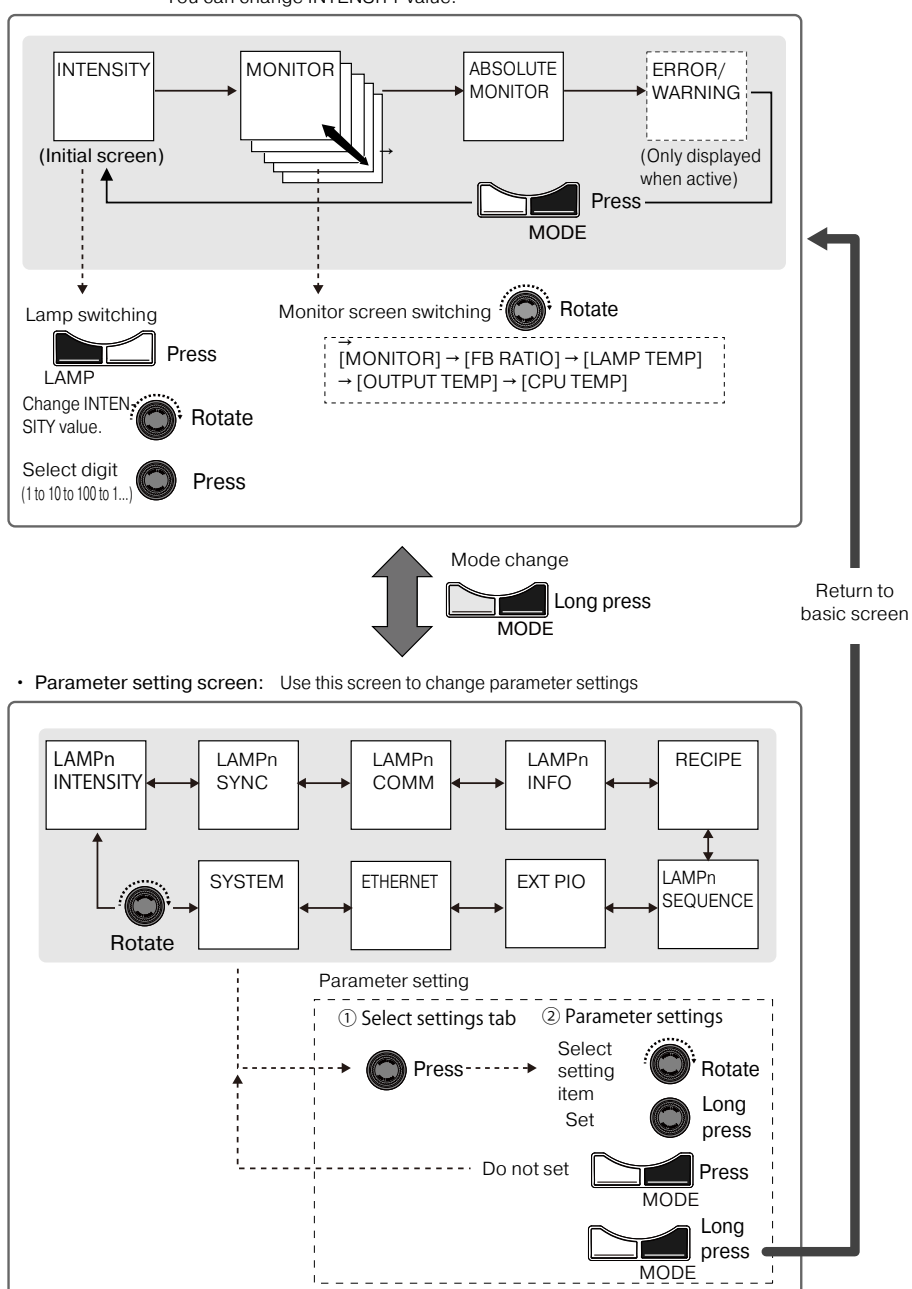
3-1-2 Screen Configuration

The LCD display is divided into two parts: the [Basic screen] and the [Parameter setting screen].

Screen	How to display	Description
Basic screen	Displayed when this product starts.	This screen can be used to check and change the light intensity value (brightness setting value) of a currently connected lighting, and to display lighting status and error information.
Parameter setting screen	Displayed when the MODE key is pressed and held.	This screen is used to check and change the various parameters of the OPPX device.

■ Image of screen configuration and key operations

- Basic screen: INTENSITY, MONITOR, ERROR/WARNING of the connected lighting are displayed. You can change INTENSITY value.



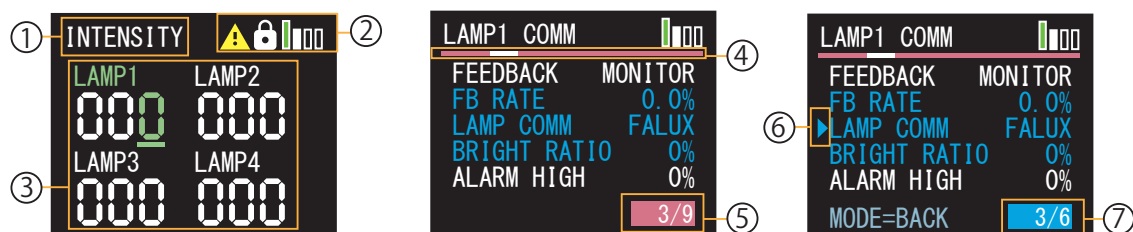
3-1-3 Display

This section explains the contents which are displayed on all screens.

■ Displayed screen

[Basic screen]

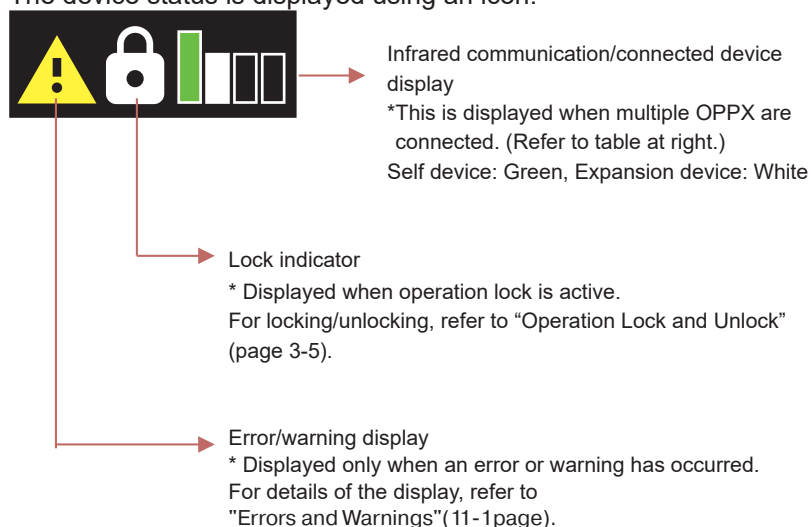
[Parameter setting screen]



No.	Display item	Description
①	Display content	This shows the type of screen that is currently displayed.
②	Device status	This shows information such as whether or not an error has occurred, the operation lock status, and connected device information. (See below.)
③	Main screen	Displays information according to that particular screen.
④	Tab bar	This is displayed when it is possible to change the tab. The white line indicates the current tab.
⑤	Tab number	Current tab number/Total number of tabs
⑥	Cursor	This is displayed when it is possible to select an item.
⑦	Item number	Number of the selected item/Total number of items

■ ② Device status

The device status is displayed using an icon.



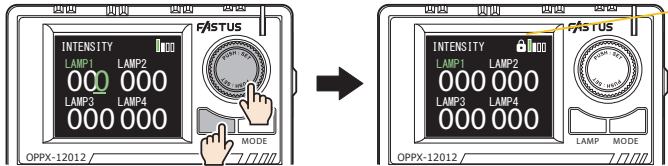
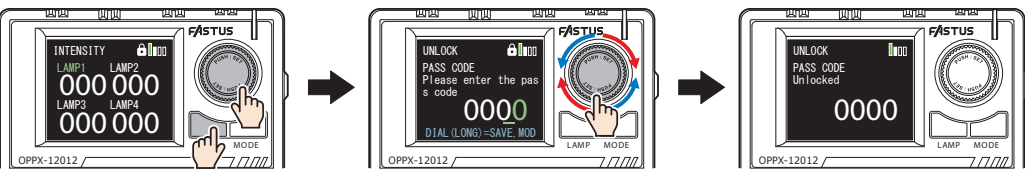
Example of display	Infrared communication/device information
	No infrared communication This device only
	Infrared communication established This device is the main device. 1 expansion device is connected.
	Infrared communication established This device is the main device. 3 expansion devices are connected.
	Infrared communication established This device is expansion device 1.

3-1-4 Operation Lock and Unlock

Some device operations can be locked in order to disable setting value changes by dial rotation and key operation, preventing unintended setting changes.

Because only the device operations are locked, the setting values can still be changed by external communication control. Even when operation is locked, the setting values can be checked by operating the keys.

● Operation method

Operation lock	<p>From the “INTENSITY” on the [Basic screen], press and hold the dial key and LAMP key at the same time.</p> <p>Operation lock is not possible from any screen other than INTENSITY display.</p>  <p>When operation lock is enabled: Icon display</p> <p>Dial key + Lamp key long press</p>
Operation unlock	<p>From the “INTENSITY” on the [Basic screen], press and hold the dial key and LAMP key at the same time.</p> <p>The pass code input screen is displayed. Enter the four-digit pass code (default value: 0000)*¹, then press and hold the dial key to unlock.</p> <p>Operation unlock is not possible from any screen other than the light intensity value display.</p>  <p>Dial key + Lamp key long press</p> <p>After entering the passcode, long press the dial key</p>

*1: Changing the pass code: Change from [Parameter setting screen] > “System” page (9/9) > Pass code (9/32).

It can also be changed from the OPPX Utility software for Windows.

Resetting the pass code: Press and hold the dial key and LAMP key while starting the product.

● Functions which are locked and functions which are not locked

Screen	Display mode	Functions which are locked	Functions which are not locked
Basic screen	INTENSITY	Light intensity value change	Lamp selection, mode selection
	MONITOR	None	All operations are possible.
	ABSOLUTE MONITOR	Light intensity value change	Lamp selection, mode selection
Parameter setting screen*	All	Setting value change	Setting value check, page change

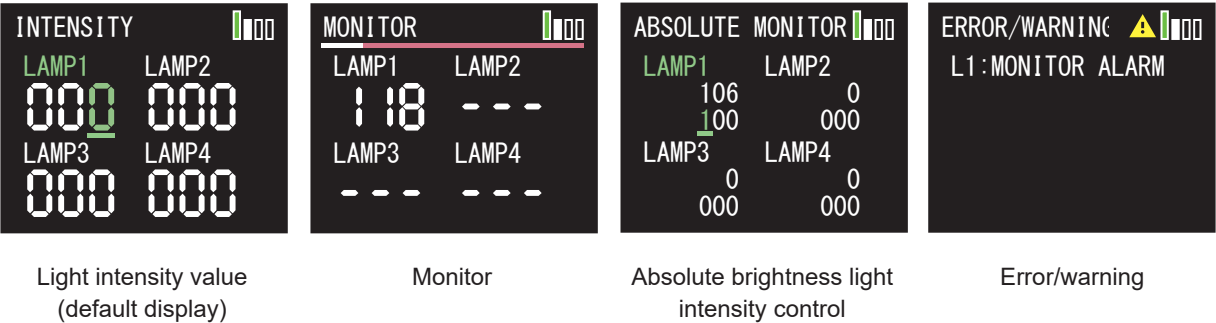
* When operation lock is engaged, the items which cannot be changed on the parameter setting screen are grayed out.

3-2 Basic Screen

This screen can be used to change the light intensity value, perform various monitoring of lightings, and check error/warning information and other information. It is displayed when the device is started.

3-2-1 Basic Screen: Modes

The following four modes are available on the basic screen, and can be selected using the MODE key.



Display mode	Description
INTENSITY (default display)	Used to display the light intensity value of the lighting and to change the setting. This is the screen that is first displayed when the device is started.
MONITOR	Used to display various monitor values for the connected lightings. The display contents are changed by rotating the dial key.
ABSOLUTE MONITOR	This mode is used to check the absolute brightness monitor value, and to simultaneously change the light intensity value.
ERROR/WARNING	Displays the error or warning which has occurred. (Displayed only when an error or warning has occurred.)

3-2-2 INTENSITY Mode

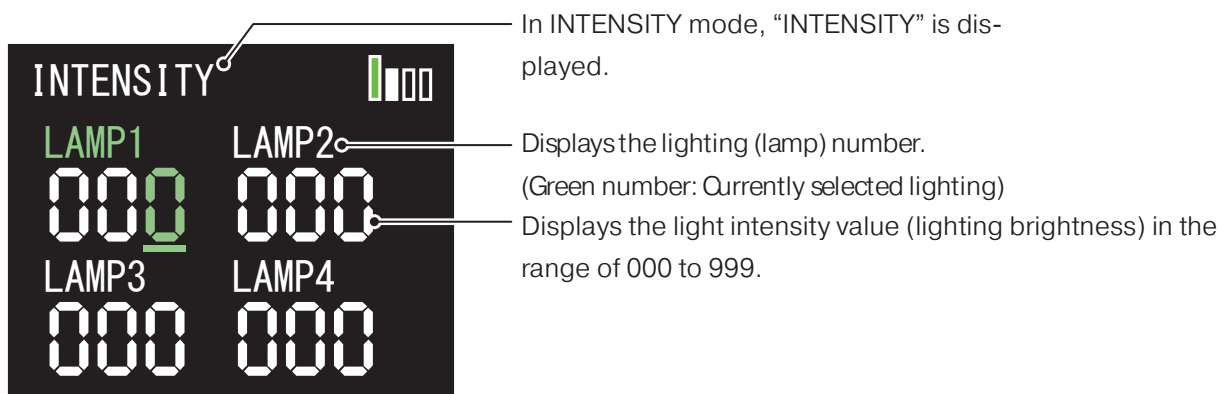
■ General description

“INTENSITY” can be used to check and change the “light intensity value” which indicates the brightness of the lighting.

Setting range: 0 (off) - 999 (maximum light amount)

The light intensity value can also be changed in the same way from [Parameter setting screen] > “LAMP INTENSITY” page (1/9) > INTENSITY (2/4).

■ Display explanation

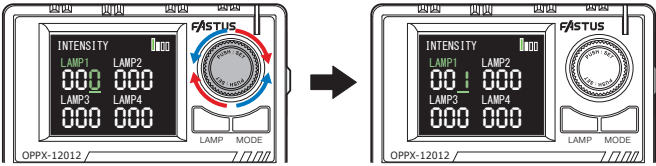
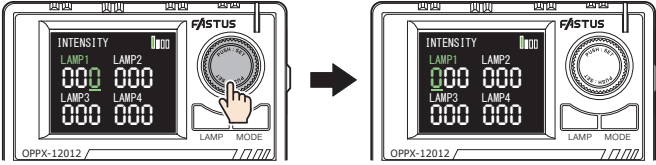
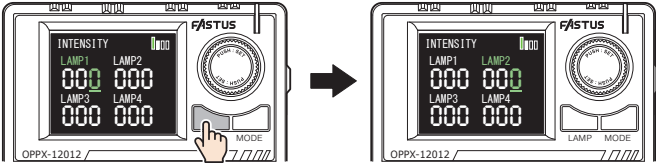
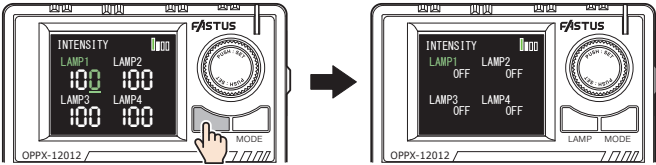


CAUTION

Changing the light intensity value of lighting with FEEDBACK set to ON may cause an overcurrent or voltage drop in the main power supply.

If this results in a condition such as the unit repeatedly rebooting, remove the lighting with FEEDBACK set to ON.

■ Operation method

Operation	Location to operate	Explanation of operation
Changing the light intensity (Changing the lighting brightness)	Dial key	<p>Rotate the dial key to change the light intensity value.</p>  <p>Value increase/decrease ⇒ Rotate dial right (increase) or left (decrease). The value displayed in green changes.</p>  <p>Digit change ⇒ Press the dial key. The digit to be changed (green value) is selected using the dial key.</p>
Changing the lighting (lamp)	LAMP key	<p>Change the lighting where the light intensity value will be changed. The lighting with the lighting number that is displayed green is the currently selected lighting.</p>  <p>Lighting change ⇒ Press the LAMP key. The lighting changes each time the LAMP key is pressed.</p>
Forcibly turning off all lightings	LAMP key (Press and hold)	<p>All lighting output can be stopped in order to forcibly turn off the illumination. At this time, the screen display for INTENSITY field changes from a value to "OFF." To turn the illumination back on, press and hold the LAMP key again.</p>  <p>Forced off/on switching ⇒ Press and hold the LAMP key.</p>

3-2-3 MONITOR Mode

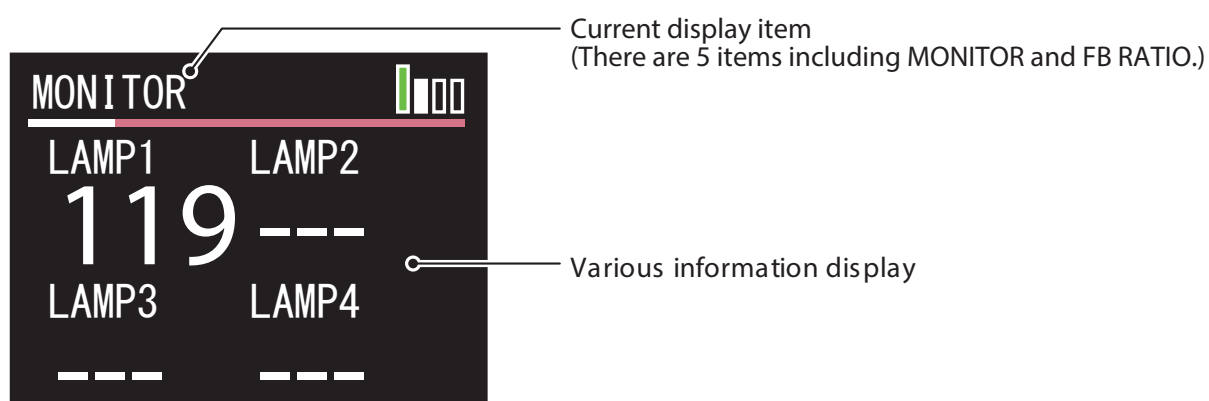
■ General description

This mode is used to display the monitor values and temperatures of the connected lightings, as well as information such as the temperature of the substrate inside the product.

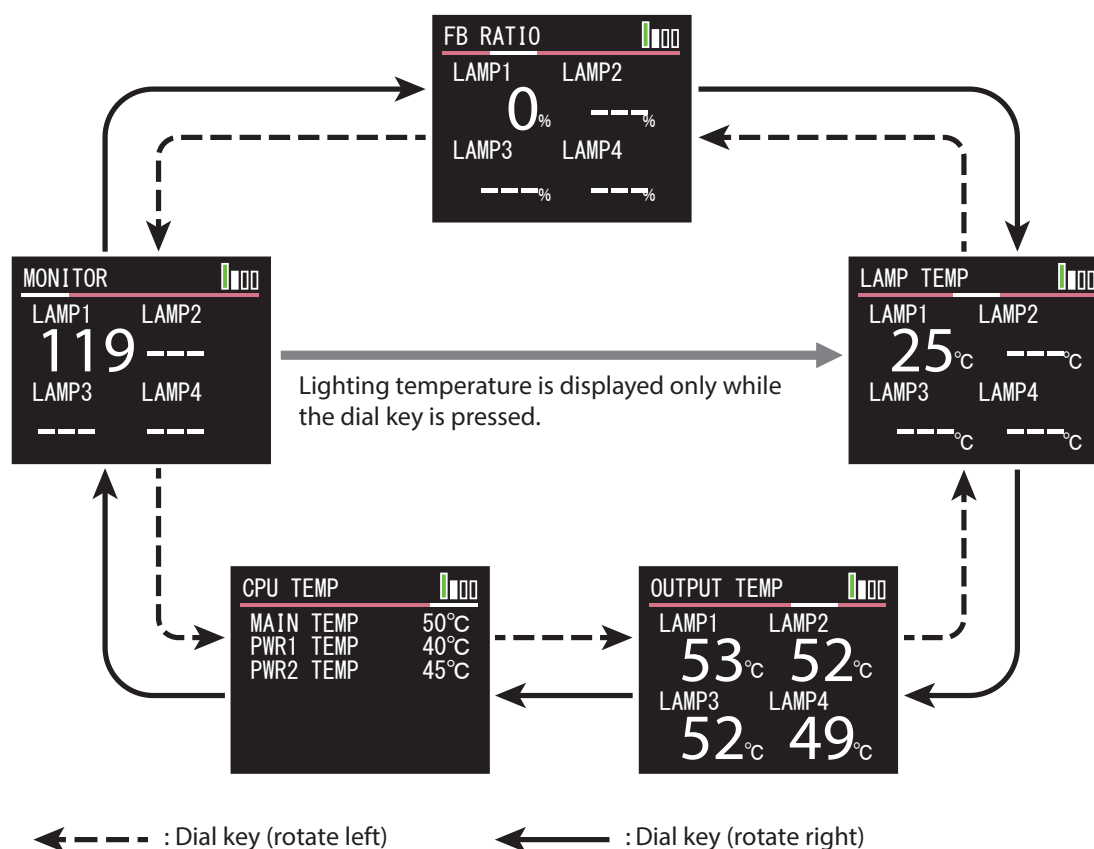
Information related to the controller is displayed regardless of the connected lighting. Information related to the lighting is displayed when a lighting that supports FALUX sensing or FALUX sensing + is connected. When a lighting that does not support FALUX sensing or FALUX sensing + is connected, "---" or "-b-" is displayed.

When MODE in LAMP n INTENSITY is "DC" and the intensity is less than "DC MON LIMIT", or when MODE is "L-INT" or "L-INT STB" and the intensity is less than "LINT MON LIMIT", the number is displayed in gray.

■ Display explanation

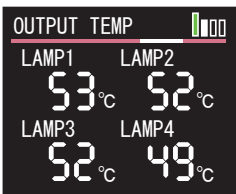
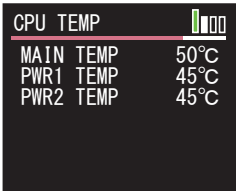


■ Changing the display item



■ Details of each display



Display item	Display	Description
MONITOR (default display)		Displays the lighting monitor values (= brightness). Values are displayed only when a lighting that supports FALUX sensing or FALUX sensing + is connected.
FB RATIO		Displays the feedback ratio (= correction rate for output voltage). Values are displayed only when a lighting that supports FALUX sensing or FALUX sensing + is connected and the feedback function is enabled. * "6-4 FEEDBACK" (page 6-7)
LAMP TEMP		Displays the internal temperature of the lighting device. Values are displayed only when a lighting that supports FALUX sensing or FALUX sensing + is connected.

OUTPUT TEMP		Displays the temperature at the lighting output section of the device. This is displayed regardless of whether or not a lighting is connected.
CPU TEMP		Displays the internal substrate temperature of the device. This is displayed regardless of whether or not a lighting is connected.

About non-numerical displays

Information related to the lighting is displayed only when a lighting that supports FALUX sensing or FALUX sensing + is connected.

When a lighting that does not support FALUX sensing or FALUX sensing + is connected or when monitoring is not possible due to the settings, the display is as shown below.

Display	Description
	<ul style="list-style-type: none"> • A lighting is not connected. • A lighting that does not support FALUX sensing or FALUX sensing + is connected. • Set FEEDBACK to "OFF" regardless of the connected lighting. • A lighting that supports FALUX sensing is connected, and the Light intensity mode is DC, L-INT or L-INT STB. • A lighting that supports FALUX sensing is connected, and the PWM frequency setting is 100 kHz DC or 130 kHz DC.
	<ul style="list-style-type: none"> • A lighting that does not support FALUX sensing or FALUX sensing + is connected and the automatic communication disconnect function activated. <p>* Only when PWM frequency setting is 100 kHz or 50 kHz</p> <p>* The automatic communication disconnect function is reset when the power turns OFF.</p>

3-2-4 ABSOLUTE MONITOR Mode

■ General description

This mode is used to check ABSOLUTE MONITOR of the connected lighting, and to simultaneously change INTENSITY.

When multiple lightings of the same model are used, it is possible to adjust the brightness of the lightings so they match by changing INTENSITY while viewing ABSOLUTE MONITOR.

■ Display explanation

The diagram shows a digital display screen for the ABSOLUTE MONITOR mode. The screen is divided into four quadrants, each representing a different lighting unit (LAMP1, LAMP2, LAMP3, LAMP4). Each quadrant displays a lamp number, a top number (absolute brightness monitor value), and a bottom number (light intensity value). The top number is displayed in green, and the bottom number is displayed in white. The lamp numbers are also displayed in green. The top of the screen shows the title 'ABSOLUTE MONITOR' and a bar graph. Callouts explain the following elements:


- In ABSOLUTE MONITOR mode, "ABSOLUTE MONITOR" is displayed.
- Displays the lighting (lamp) number.
(Green number: Currently selected lighting
⇒ Press the LAMP key to change.)
- Top number: Displays the absolute brightness monitor value.
Bottom number: Displays the light intensity value
(lighting brightness) in the range of 000 to 999.
(Green number: Currently selected digit ⇒ Press the dial key to change.)
- * INTENSITY can be changed using the same operation as on [Basic screen] > INTENSITY display.

LAMP1	LAMP2	LAMP3	LAMP4
106	0	0	0
100	000	000	000

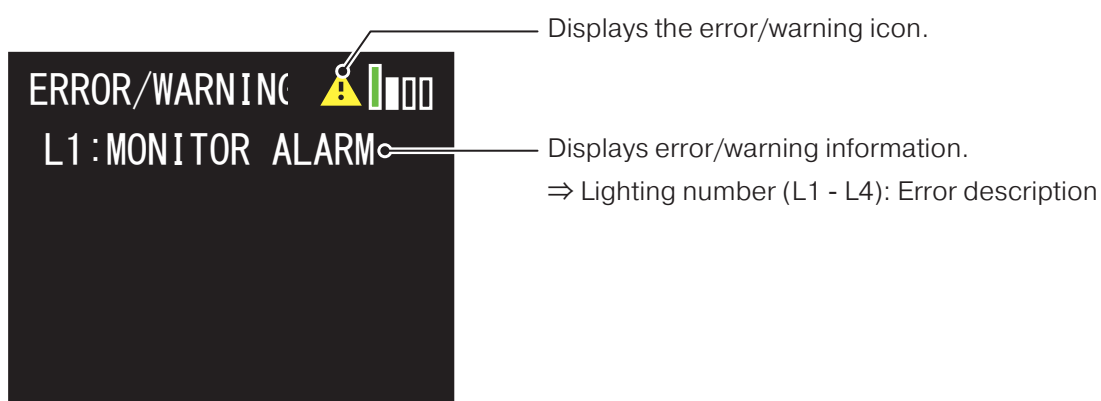
3-2-5 ERROR/WARNING Mode

■ General description

This mode is displayed when an error or warning has occurred. It is not displayed when the status is normal. The error contents are not automatically erased during operation. Be sure to perform the following delete operation and manually delete them.

* For the content of error/warning messages and whether or not they can be canceled, refer to  “Errors and Warnings” (page 11-1).

■ Display explanation



■ Operations

Operation	Location to operate	Explanation of operation
Erasing error information	LAMP key	Press and hold the LAMP key to erase the error information.

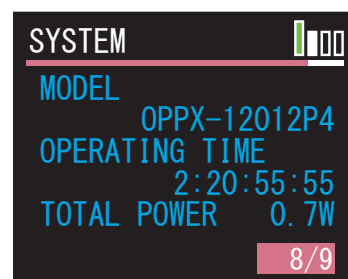
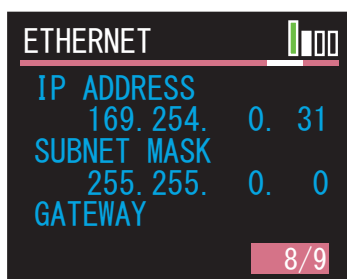
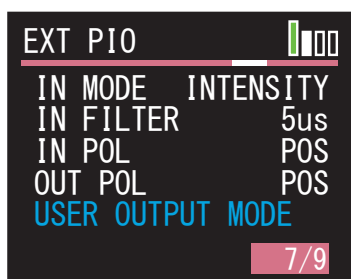
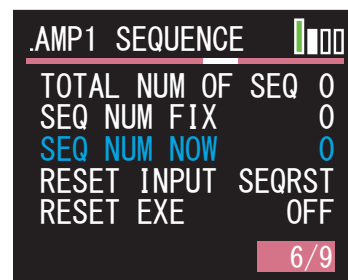
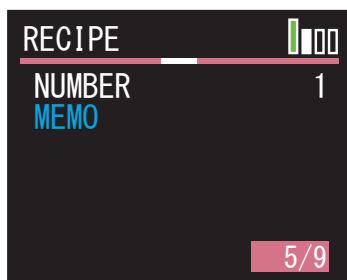
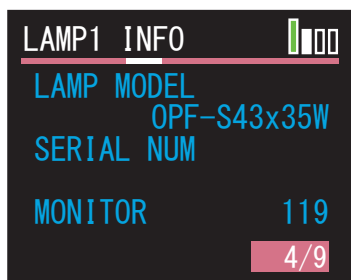
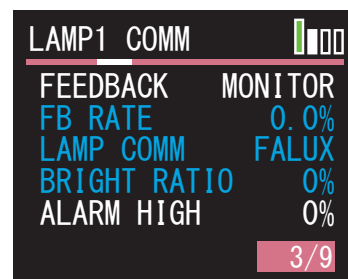
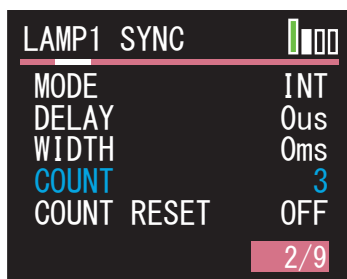
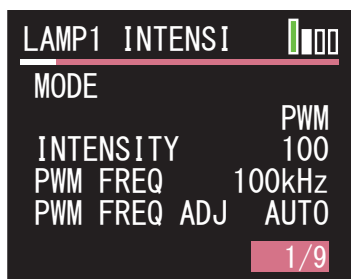
3-3 Parameter Setting Screen

This screen is used to set and check the various parameters in the OPPX device.

The parameters are classified by type onto nine tabs.

3-3-1 Parameter Setting Screen: Setting Tabs

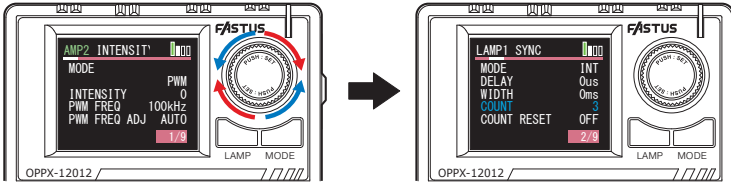
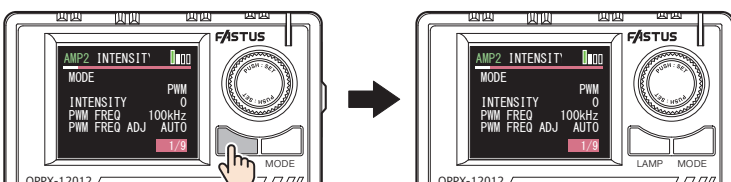
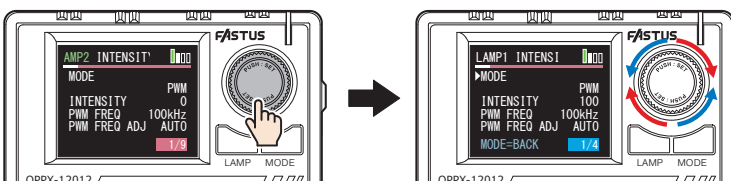
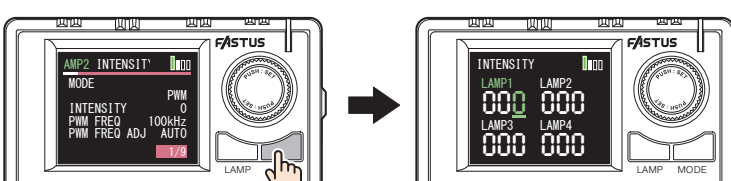
This section provides a general description of each tab.



No.	Tab display	Description	Reference
1	LAMP n INTENSITY	These setting items are related to light intensity adjustment and include the light intensity value and Light intensity mode (such as switching between PWM and DC) for each lighting output. n = LAMP number (1 - 4) Change using the LAMP key.	Page 5-2
2	LAMP n SYNC	These setting items are used when turning the lighting on/off by means of external synchronization control. They include POLARITY, DELAY and WIDTH in LAMP n SYNC. n = LAMP number (1 - 4) Change using the LAMP key.	Page 7-5
3	LAMP n COMM	These setting items are related to communication between the lighting and this product. They include turning ON/OFF FEEDBACK that can be used when a lighting that supports FALUX sensing or FALUX sensing + is connected, and the upper/lower limit values for alarm output. n = LAMP number (1 - 4) Change using the LAMP key.	Page 6-4

No.	Tab display	Description	Reference
4	LAMP n INFO	Displays information related to the connected lighting, such as LAMP MODEL, SERIAL NUM, and LED TOTAL TIME. * The items which can be displayed vary depending on the lighting. n = LAMP number (1 - 4) Change using the LAMP key.	Page 6-5
5	RECIPE	It is possible to call the recipe function, which can save and apply various settings together. The setting values for four lamps (LAMP1 - 4) can be saved in one recipe, and up to 16 recipes can be saved.	Page 10-5
6	LAMP n SEQUENCE	These setting items are for the illumination control sequence function. n = LAMP number (1 - 4) Change using the LAMP key.	Page 10-2
7	EXT PIO	These setting items are for parallel communication.	Page 9-9
8	ETHERNET	These setting items are for Ethernet communication.	Page 9-12
9	SYSTEM	These are displays and settings for information related to the OPPX device. They include LANGUAGE, setting value copy function, and checking FW VERSION (firmware).	Page 9-3, Page 9-13, Page 10-8, Page 10-9, Page 10-10, Page 11-5

■ Operation method

Operation	Location to operate	Explanation of operation
Changing the tab	Dial key	<p>Rotate the dial key to change the displayed tab.</p> 
Changing the lighting	LAMP key	<p>For items where the tab display is "LAMP n," the parameters can be set for each individual lighting. Press the LAMP key to change the LAMP.</p> 
Checking/changing the parameters on a tab	Dial key (MODE key)	<p>On the tab containing the parameter that you want to check, press the dial key. When a cursor will be displayed in the parameter items, rotate the dial to change the item.</p> <p>Align the cursor with the parameter that you want to change and press the dial key to change the setting value.</p> <p>Press the MODE key to check/change the parameters on a different tab. The display returns to tab selection.</p>  <p>* Items which can only be viewed are displayed in blue.</p>
Returning to the [Basic screen]	MODE key	<p>Press and hold the MODE key to return to [Basic screen] > INTENSITY mode.</p> 



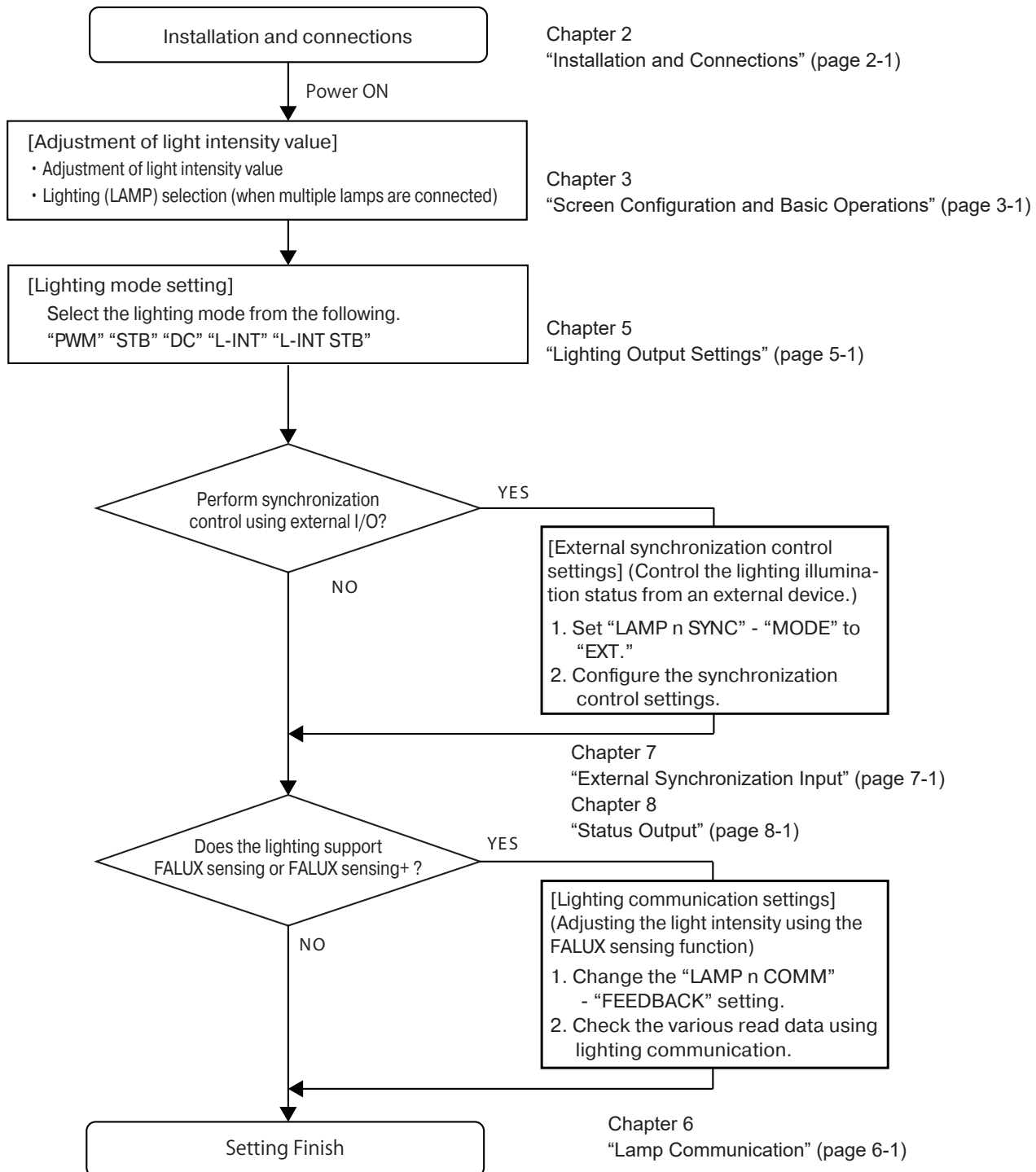
4

Basic Settings

This section explains the basic setting process and a list of the setting items.

4-1 Basic Settings Process

This shows the basic setting process prior to illumination of the lighting.



4-2 List of Settings

A list of the settings that can be configured with this product is shown below.

■ Standard/TTL Level Model

Tab	Sub menu	Setting value / description	Default value	Reference
LAMP n INTENSITY	MODE	PWM, STB, DC, L-INT, L-INT STB	PWM	Page 5-3
	INTENSITY	0 to 999	0	Page 3-7
	PWM FREQ	12 VDC output type: 50 kHz, 100 kHz, 100 kHz DC, 130 kHz DC 24 VDC output type: 100 kHz DC, 130 kHz DC (Can be set only when MODE in LAMP n INTENSITY is PWM or STB)	100 kHz (12 V output type), 100 kHz DC (24 V output type)	Page 5-5
	PWM FREQ ADJ	AUTO, -1, -2, -3, OFF (Can be set only when MODE in LAMP n INTENSITY is PWM or STB)	AUTO	Page 5-5
	DC RANGE*1	LOW, HIGH	HIGH	Page 5-6
LAMP n SYNC	MODE	EXT, INT, OFF	INT	Page 7-8
	DELAY	Numerical value: 0 to 999, Unit: μs/ms	0 μs	Page 7-8
	WIDTH	Numerical value: 0 to 999, Unit: μs(*2)/ms	0 ms	Page 7-7
	COUNT	Displays the number of lights per lamp. (When the upper limit is reached, it returns to 0.)	*3	Page 7-11
	COUNT RESET	OFF, ON	OFF	Page 7-11
	ENABLE	-	-	Page 7-9
	SYNC 1	OFF, ON	*4	
	.	.		
	.	.		
	SYNC 4	OFF, ON		
	POLARITY	-	-	Page 7-10
	SYNC1	NEG, POS	POS	
	.	.		
	.	.		
	SYNC4	NEG, POS		
	FILTER	1 to 1000 μs	1 μs	Page 7-10
	INT STB PERIOD	Numerical value: 0 to 2000, Unit: 0.1 ms/1 ms	250 ms	Page 7-12
	Lx-ON OFF DELAY	0 to 999 μs	0 μs	Page 8-6
	5V SYNC *4	OFF, ON	OFF	Page 7-10

Tab	Sub menu	Setting value / description	Default value	Reference
LAMP n COMM	FEEDBACK	MONITOR, ON, OFF, ABSOLUTE AUTO ADJUST	MONITOR	Page 6-4
	FB RATE	Displays the feedback correction rate.	*3	Page 6-4
	LAMP COMM	Displays the connection status (FALUX+/FALUX/NONE).	*3	Page 6-4
	BRIGHT RATIO	Displays percentage of monitor value versus light intensity value.	*3	Page 6-4
	ALARM HIGH	0 to 255 %	0 %	Page 6-6
	ALARM LOW	0 to 200 %	0 %	Page 6-6
LAMP n INFO	LAMP MODEL	Displays the lighting model.	*3	Page 6-5
	SERIAL NUM	Displays the lighting manufacturing code.	*3	
	MONITOR	Displays the received light brightness (monitor value).	*3	
	ABSOLUTE MONITOR	Displays the absolute brightness monitor.	*3	
	TEMP	Displays the lighting temperature.	*3	
	TEMP LIMIT	Displays the maximum permitted temperature of the lighting.	*3	
	DC MON LIMIT	The lower limit of INTENSITY that stops FEEDBACK to the lighting. (When MODE in LAMP n INTENSITY is DC)	*3	
	L-INT MON LIMIT	The lower limit of INTENSITY that stops FEEDBACK to the lighting. (When MODE in INTENSITY is L-INT or L-INT STB)	*3	
	APPLIED VOLTAGE	Displays the lighting input voltage.	*3	Page 6-5
	SW VERSION	Displays the lighting software version.	*3	
	RATED POWER	Displays the lighting power consumption.	*3	
	CCT/ WAVELENGTH	Displays the lighting wavelength.	*3	
	LED TOTAL TIME	Displays the lighting cumulative illumination time.	*3	
	LED USER TIME	0 to 4,294,967,295 s	0 s	
RECIPE	NUMBER	1 to 16	1	Page 10-5
	MEMO	Recipe note (Arbitrary character string can be set by communication)	*3	Page 10-6
LAMP n SEQUENCE	TOTAL NUM OF SEQ	0 to 15	0	Page 10-2
	SEQ NUM FIX	0 to 16	0	
	SEQ NUM NOW	Displays the current sequence number.	*3	
	RESET INPUT	SEQRST, SYNC1, SYNC2, SYNC3, SYNC4	SEQRST	
	RESET EXE	OFF, ON	OFF	
	INTENSITY 1	0 to 999	0	
	WIDTH 1	Numerical value: 0 to 999 , Unit: $\mu\text{s}(*2)/\text{ms}$	0 ms	
	.	.		
	.	.		
	.	.		
	INTENSITY 16	0 to 999	0	
	WIDTH 16	Numerical value: 0 to 999 , Unit: $\mu\text{s}(*2)/\text{ms}$	0 ms	

Tab	Sub menu	Setting value / description	Default value	Reference
EXT PIO	IN MODE	OFF, INTENSITY, RECIPE	INTENSITY	Page 9-9
	IN FILTER	5, 25, 50, 100, 300, 500, 1000 μ s	5 μ s	Page 9-10
	IN POL	NEG, POS	POS	Page 9-10
	OUT POL	NEG, POS	POS	Page 8-6
	USER OUTPUT MODE	-	-	Page 8-6
	USER1	OFF, RUN, L1 ON to L4 ON, L1 SYNC to L4 SYNC, L1 SEQ1 to L4 SEQ1, Lx ON, ERROR, WARNING, MST ERR, MST WRN	Lx ON	
	USER2		L1 ON	
	USER3		L2 ON	
	USER4		L3 ON	
	USER5		L4 ON	
	USER6		OFF	
ETHERNET	IP ADDRESS	(Can be set when DHCP is turned off)	169.254.0.31	Page 9-28
	SUBNET MASK	(Can be set when DHCP is turned off)	255.255.0.0	
	GATEWAY	(Can be set when DHCP is turned off)	0.0.0.0	
	PORT	61440	*3	
	DHCP	OFF, ON	ON	
	MAC ADDRESS	Displays the MAC address.	*3	-
	iQSS COM IP *5	Communication counterpart IP address	255.255.255.255	
	iQSS COM PORT *5	Communication counterpart port number	65535	
	iQSS UPDATE *5	OFF, ON	OFF	
	iQSS TX PERIDO *5	iQSS periodic transmission	5.0 s	
	iQSS DEVICE NUM *5	iQSS device number	100	
	HOST NAME	Host name (can be changed by Ethernet communication)	*3	

Tab	Sub menu	Setting value / description	Default value	Reference
SYSTEM	MODEL	Displays the main unit model.	*3	Page 10-10
	OPERATING TIME	Displays the operating time. (Days: Hours: Minutes: Seconds)	*3	Page 10-10
	TOTAL POWER	Displays the power consumed by the power supply.	*3	-
	MANUAL ENTRY MODE	OFF, ON	OFF	Page 9-13
	LCD ACTIVE TIME	0000 to 3600 s	300 s	-
	RS-232C BAUDRATE	OFF, 4800, 9600, 19200, 38400, 57600, 115200 bps	9600 bps	Page 9-13
	LANGUAGE	ENGLISH, 日本語	*6	-
	PASS CODE	0000 to 9999	0000	Page 10-10
	COPY FROM	LAMP1 to LAMP16	LAMP1	Page 10-8
	COPY TO BEGIN	LAMP1 to LAMP16	LAMP1	Page 10-8
	COPY TO END	LAMP1 to LAMP16	LAMP1	Page 10-8
	COPY EXE	OFF, ON	OFF	Page 10-8
	MODULE POSITION	MAIN, EXPANSION1, EXPANSION2, EXPANSION3	*3	Page 10-10
	MY CONFIG	Output voltage/channel No.	*3	Page 10-10
	E1 CONFIG	Display examples:	*3	
	E2 CONFIG	OPPX-6012x2: 12 V/2 ch	*3	
	E3 CONFIG	OPPX-20024x4: 24 V/4 ch When the expansion device is not connected: NONE	*3	
	FW VERSION	Displays the firmware version.	*3	Page 10-10
	UNIQUE ID	Displays the unique ID using 17 alphanumeric characters.	*3	Page 10-10
	POWER DROP	Displays the number of times the 24 VDC power supply voltage has dropped.	*3	Page 10-10
	24V MIN PEAK	Displays the minimum voltage value of 24 V (mV) detected since the start of operation.	*3	Page 10-10
	LAMP1 CAP STATUS	Displays the degradation of each LAMP capacitor from its initial state.	*3	Page 10-9
	DECREASE TIME	The deterioration time shows the predicted time to 1 % deterioration.		
	.	.		
	LAMP4 CAP STATUS			
	DECREASE TIME			
	ERROR RESET	OFF, ON	OFF	Page 11-5
	STOP SAVING	OFF, ON	OFF	Page 9-3
	INIT	BACK, CURRENT RECIPE, AL RECIPE, COMMON SETTING, LANGUAGE	BACK	Page 10-9

*1 Only displayed for the 24 V output type.

*2 Depends on the PWM FREQ setting.

*3 These items are display only.

*4 Only ON for the same SYNC number as the LAMP number. Other SYNC numbers are OFF.

*5 Not displayed for models with TTL specification.

*6 Select this item at the initial startup or startup after a reset.

EtherNet/IP Support Model

Tab	Sub menu	Setting value / description	Default value	Reference
LAMP n INTENSITY	MODE	PWM, STB, DC, L-INT, L-INT STB	PWM	Page 5-3
	INTENSITY	0 to 999	0	Page 3-7
	PWM FREQ	12 VDC output type: 50 kHz, 100 kHz, 100 kHz DC, 130 kHz DC 24 VDC output type: 100 kHz DC, 130 kHz DC (Can be set only when MODE in LAMP n INTENSITY is PWM or STB)	100 kHz (12 V output type), 100 kHz DC (24 V output type)	Page 5-5
	PWM FREQ ADJ	AUTO, -1, -2, -3, OFF (Can be set only when MODE in LAMP n INTENSITY is PWM or STB)	AUTO	Page 5-5
	DC RANGE*1	LOW, HIGH	HIGH	Page 5-6
	LAMP n SYNC	MODE	EXT, INT, OFF	INT
DELAY		Numerical value: 0 to 999, Unit: μs/ms	0 μs	Page 7-8
WIDTH		Numerical value: 0 to 999, Unit: μs(*2)/ms	0 ms	Page 7-7
COUNT		Displays the number of lights per lamp. (When the upper limit is reached, it returns to 0.)	*3	Page 7-13
COUNT RESET		OFF, ON	OFF	Page 7-13
ENABLE		-	-	Page 7-9
SYNC 1		OFF, ON	*4	
.		.		
.		.		
.		.		
SYNC 4		OFF, ON		
POLARITY		-	-	Page 7-10
SYNC1		NEG, POS	POS	
.		.		
.		.		
.		.		
SYNC4		NEG, POS		
FILTER		1 to 1000 μs	1 μs	Page 7-10
INT STB PERIOD		Numerical value: 0 to 2000, Unit: 0.1 ms/1 ms	250 ms	Page 7-12
Lx-ON OFF DELAY		0 to 999 μs	0 μs	Page 8-6
5V SYNC *4	OFF, ON	OFF	Page 7-10	
LAMP n COMM	FEEDBACK	MONITOR, ON, OFF, ABSOLUTE AUTO ADJUST	MONITOR	Page 6-4
	FB RATE	Displays the feedback correction rate.	*3	Page 6-7
	LAMP COMM	Displays the connection status (FALUX+/FALUX/NONE).	*3	Page 6-4
	BRIGHT RATIO	Displays percentage of monitor value versus light intensity value.	*3	Page 6-4
	ALARM HIGH	0 to 255 %	0 %	Page 6-6
	ALARM LOW	0 to 200 %	0 %	Page 6-6

Tab	Sub menu	Setting value / description	Default value	Reference
LAMP n INFO	LAMP MODEL	Displays the lighting model.	*3	Page 6-5
	SERIAL NUM	Displays the lighting manufacturing code.	*3	
	MONITOR	Displays the received light brightness (monitor value).	*3	
	ABSOLUTE MONITOR	Displays the absolute brightness monitor.	*3	
	TEMP	Displays the lighting temperature.	*3	
	TEMP LIMIT	Displays the maximum permitted temperature of the lighting.	*3	
	DC MON LIMIT	The lower limit of INTENSTY that stops FEEDBACK to the lighting. (When MODE in LAMP n INTENSITY is DC)	*3	
	L-INT MON LIMIT	The lower limit of INTENSITY that stops FEEDBACK to the lighting. (When MODE in INTENSITY is L-INT or L-INT STB)	*3	
	APPLIED VOLTAGE	Displays the lighting input voltage.	*3	
	SW VERSION	Displays the lighting software version.	*3	
	RATED POWER	Displays the lighting power consumption.	*3	
	CCT/ WAVELENGTH	Displays the lighting wavelength.	*3	
	LED TOTAL TIME	Displays the lighting cumulative illumination time.	*3	Page 6-6
	LED USER TIME	0 to 4,294,967,295 s	0 s	Page 6-5
RECIPE	NUMBER	1 to 16	1	Page 10-5
	MEMO	Recipe note (Arbitrary character string can be set by communication)	*3	Page 10-5
LAMP n SEQUENCE	TOTAL NUM OF SEQ	0 to 15	0	Page 10-2
	SEQ NUM FIX	0 to 16	0	
	SEQ NUM NOW	Displays the current sequence number.	*3	
	RESET INPUT	SEQRST, SYNC1, SYNC2, SYNC3, SYNC4	SEQRST	
	RESET EXE	OFF, ON	OFF	
	INTENSITY 1	0 to 999	0	
	WIDTH 1	Numerical value: 0 to 999 , Unit: $\mu\text{s}(*2)/\text{ms}$	0 ms	
	.	.		
	.	.		
	.	.		
	INTENSITY 16	0 to 999	0	
	WIDTH 16	Numerical value: 0 to 999 , Unit: $\mu\text{s}(*2)/\text{ms}$	0 ms	
EXT PIO	IN POL	NEG, POS	POS	Page 9-10
	OUT POL	NEG, POS	POS	Page 8-6
	USER OUTPUT MODE	-	-	Page 8-6
	USER1	OFF, RUN, L1 ON to L4 ON, L1 SYNC to L4 SYNC, L1 SEQ1 to L4 SEQ1, Lx ON, ERROR, WARNING, MST ERR, MST WRN	Lx ON	
	USER2		L1 ON	

Tab	Sub menu	Setting value / description	Default value	Reference
ETHERNET	IP ADDRESS	(Can be set when DHCP is turned off)	169.254.0.31	Page 9-64
	SUBNET MASK	(Can be set when DHCP is turned off)	255.255.0.0	Page 9-64
	GATEWAY	(Can be set when DHCP is turned off)	0.0.0.0	Page 9-64
	CYCLIC FORMAT	FIX, USER	USER	Page 9-65
	BYTE ORDER	LITTLE, BIG	LITTLE	Page 9-66
	DHCP	OFF, ON	ON	Page 9-64
	BOOTP	OFF, ON	OFF	Page 9-64
	MAC ADDRESS	Displays the MAC address.	*3	-
	HOST NAME	Host name (can be changed by Ethernet communication)	*3	
CYCLIC O2T	CONNECTIONS	0 to 8	*3	-
	RPI	0 to 32767	*3	-
	CONNECT SIZE	0 to 226	*3	Page 9-63
	FORMAT SIZE	0 to 226	*3	Page 9-63
	SUSPEND	OFF, ON	OFF	Page 9-68
	USER FORMAT	LAMP1:0x0000 to 0xFFFF ... LAMP16:0x0000 to 0xFFFF	*3	Page 9-75
CYCLIC T2O	CONNECTIONS	0 to 8	*3	-
	RPI	0 to 32767	*3	-
	CONNECT SIZE	0 to 500	*3	Page 9-63
	FORMAT SIZE	0 to 500	*3	Page 9-63
	USER FORMAT	LAMP1:0x00000000 to 0xFFFFFFFF ... LAMP16:0x00000000 to 0xFFFFFFFF	*3	Page 9-86
SYSTEM	MODEL	Displays the main unit model.	*3	Page 10-10
	OPERATING TIME	Displays the operating time. (Days: Hours: Minutes: Seconds)	*3	Page 10-10
	TOTAL POWER	Displays the power consumed by the power supply.	*3	-
	MANUAL ENTRY MODE	OFF, ON	OFF	Page 9-13
	LCD ACTIVE TIME	0000 to 3600 s	300 s	-
	LANGUAGE	ENGLISH, 日本語	*5	-
	PASS CODE	0000 to 9999	0000	Page 10-10
	COPY FROM	LAMP1 to LAMP16	LAMP1	Page 10-8
	COPY TO BEGIN	LAMP1 to LAMP16	LAMP1	Page 10-8
	COPY TO END	LAMP1 to LAMP16	LAMP1	Page 10-8
	COPY EXE	OFF, ON	OFF	Page 10-8
	MODULE POSITION	MAIN, EXPANSION1, EXPANSION2, EXPANSION3	*3	Page 10-10
	MY CONFIG	Output voltage/channel No.	*3	Page 10-10
	E1 CONFIG	Display examples: OPPX-6012x2: 12 V/2 ch	*3	
	E2 CONFIG	OPPX-20024x4: 24 V/4 ch	*3	
	E3 CONFIG	OPPX-1601224□4 : DUAL/4CH When the expansion device is not connected: NONE	*3	

Tab	Sub menu	Setting value / description	Default value	Reference
SYSTEM	FW VERSION	Displays the firmware version. The EtherNet/IP firmware version is also displayed.	*3	Page 10-10
	UNIQUE ID	Displays the unique ID using 17 alphanumeric characters.	*3	Page 10-10
	POWER DROP	Displays the number of times the 24 VDC power supply voltage has dropped.	*3	Page 10-10
	24V MIN PEAK	Displays the minimum voltage value of 24 V (mV) detected since the start of operation.	*3	Page 10-10
	LAMP1 CAP STATUS	Displays the degradation of each LAMP capacitor from its initial state. The deterioration time shows the predicted time to 1 % deterioration.	*3	Page 10-9
	DECREASE TIME			
	.			
	.			
	LAMP4 CAP STATUS			
	DECREASE TIME			
	ERROR RESET	OFF, ON	OFF	Page 11-5
	STOP SAVING	OFF, ON	OFF	Page 9-3
	INIT	BACK, CURRENT RECIPE, AL RECIPE, COMMON SETTING, LANGUAGE	BACK	Page 10-9

*1 Only displayed for the 24 V output type.

*2 Depends on the PWM FREQ setting.

*3 These items are display only.

*4 Only ON for the same SYNC number as the LAMP number. Other SYNC numbers are OFF.

*5 Select this item at the initial startup or startup after a reset.



5

Lighting Output Settings

This section explains the selection and adjustment of the lighting mode for outputting the light.

5-1 Output Setting Items

This section explains the individual setting items related to lighting output.

A list of the items is shown below.

Tab name	Item	Setting value	Default value	Description	Reference
LAMP n INTENSITY	MODE	PWM/STB/DC /L-INT/L-INT STB	PWM	Changes the mode.	Page 5-4
	PWM FREQ	12 V output type: 50 kHz/100 kHz 100 kHz DC/130 kHz DC 24 V output type: 100 kHz DC/130 kHz DC	12 V output type: 100 kHz 24 V output type: 100 kHz DC	Changes the PWM frequency. *This can be set only when the mode is PWM or STB.	Page 5-5
	PWM FREQ ADJ	AUTO/-1/-2/-3/OFF	AUTO	Makes manual adjustments to the PWM frequency. *This can be set only when the mode is PWM or STB.	Page 5-5
	DC RANGE	LOW / HIGH	HIGH	Sets the voltage variation range. *This can be set only when the type is a 24 V output type and the mode is DC.	Page 5-6

5-1-1 MODE (in LAMP n INTENSITY)

Change the light intensity mode or output voltage setting for when the lighting is lit.

List of settings and characteristics table

The following modes are available. Select according to the circumstances of use.

For details of each setting value, refer to the explanation on the following pages.

Light intensity mode Setting value	WIDTH setting	Output voltage		Output waveform	Example of use	Reference
		12 V output type	24 V output type			
PWM	-	12 V	24 V	PWM pulse	This is the basic setting. Select this when you want the relationship between the actual light amount and light intensity value to be relatively linear.	Page 5-4
STB	$t \leq 1000 \mu\text{s}$	18 V (Overdrive)	48 V ^{*2} (Overdrive)	PWM pulse	Select this when the lighting illumination time is short and more brightness than ordinary lighting is required.	Page 5-4
	$t > 1000 \mu\text{s}$	12 V	24 V	PWM pulse	Select this when you want the lighting to illuminate for only the set time, synchronized with the synchronization input.	Page 5-4
	$t = 1 \text{ to } 999 \text{ ms}^{*1}$					
DC	-	8 - 12 V	LOW: 12 - 24 V HIGH: 18 - 24 V	DC output	Select this when the camera exposure time is set to a high speed of several 100 μs or less, as typified by a line camera.	Page 5-6
L-INT	-	12 V	24 V	DC output	Select this when a FALUX sensing + lighting is selected and voltage drop is a concern due to light intensity adjustment linearity or a long cable.	Page 5-7
L-INT STB	$t \leq 1000 \mu\text{s}$	18 V (Overdrive)	36 V (Overdrive)	DC output	Select this when a FALUX sensing + lighting is selected and greater brightness is required.	Page 5-7
	$t > 1000 \mu\text{s}$	12 V	24 V	DC output	Select this when a FALUX sensing + lighting is selected, voltage drop is a concern due to light intensity adjustment linearity or a long cable, and you want the lighting to illuminate for only the set time synchronized with the synchronization input.	Page 5-7
	$t = 1 - 999 \text{ ms}^{*1}$					

*1: In STB or L-INT STB mode, even if WIDTH unit is set to “ms” and WIDTH is set to 1ms, overdrive will not occur.

To use overdrive, set the units to “ μs ” and set WIDTH to $t \leq 1000 \mu\text{s}$.

*2: Depending on the lighting connected, 48V overdrive may result in an overcurrent that cannot be used.

PWM mode, STB mode

PWM (Pulse Width Modulation) and STB mode involve pulse lighting which repeatedly turns ON/OFF at high speed. Light intensity is adjusted based on the lighting ON time ratio.

A feature of these modes is that they are highly universal and allow linear light intensity adjustment with all kinds of lightings.

However when using a high-speed shutter such as a line camera, differences in the brightness of each image may occur due to deviation in the synchronization of shutter ON/OFF and lighting ON/OFF.

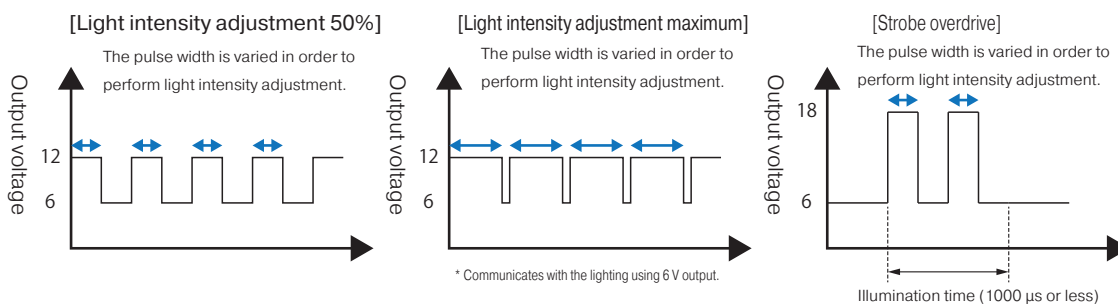
Use “PWM mode” when you want continuous illumination. Use “STB mode” when you want illumination for only the set time synchronized with the synchronization input.

In STB mode, when WIDTH (illumination time) is 1,000 μ s or less, overdrive is available to increase the output voltage and obtain a large light amount.

For the differences in output voltage according to the mode and set time, refer to “List of settings and characteristics table” on page 5-3.

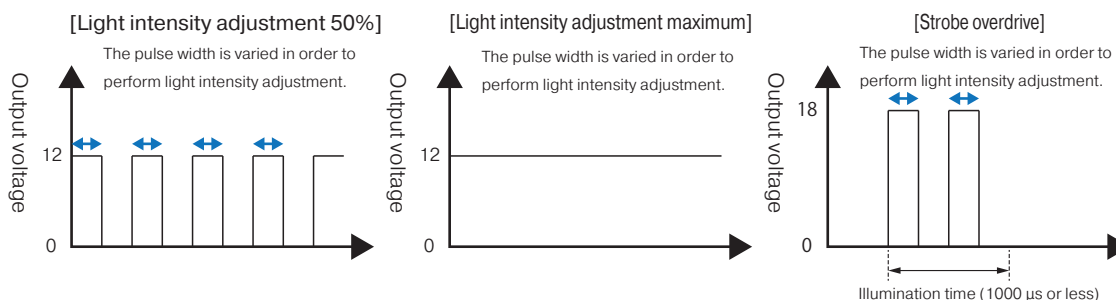
Image of output waveform

PWM FREQ: 50 kHz or 100 kHz

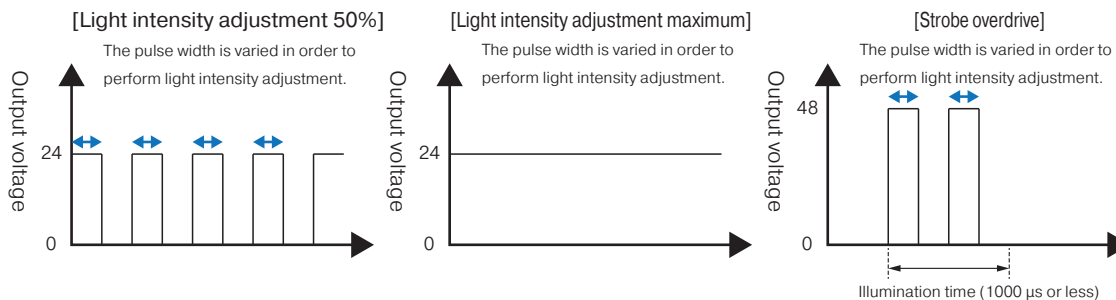


PWM FREQ: 100 kHz DC or 130 kHz DC

(12 V output type)



(24 V output type)



● PWM FREQ

The PWM frequency can be changed in PWM mode and STB mode.

The waveform varies with each PWM FREQ setting.

Setting item	Description
50 kHz/100 kHz (12 V output type only)	This setting is for performing communication with a lighting that supports FALUX sensing. DC output does not occur even at max. intensity value in order to ensure communication time. Communication using FALUX sensing + is also possible.
100 kHz DC/130 kHz DC (Same for 12 V and 24 V output types)	This causes DC output at max. intensity value. FALUX sensing communication is not possible. Communication using FALUX sensing + is possible.

● PWM FREQ ADJ

Make fine changes to the PWM frequency.

This setting item is used primarily when performing inter-connection infrared communication.

When multiple OPPX devices are used together, if the PWM frequencies are the same, then operation trouble may occur as a result of mutual interference. As a countermeasure to this, setting the frequencies of the main and expansion devices to different frequencies can prevent operation trouble.

Setting item	Description
AUTO (default value)	When inter-connection communication is established, the main device automatically sets a frequency that is reduced by 1 kHz at a time from the frequency set for the PWM frequency at each expansion device in sequence.
-1, -2, -3	The frequency is reduced by the set value (kHz) from the frequency decided by the PWM frequency.
OFF	The value set for the PWM frequency is not changed.

• List of frequency adjustment settings and setting results

Device	Setting value	PWM frequency	Notes
Main device	AUTO	50/100/130 kHz	Instruction for adjustment is sent to the expansion devices.
	OFF	50/100/130 kHz	
	-1	49/99/129 kHz	
	-2	48/98/128 kHz	
	-3	47/97/127 kHz	
Expansion device	AUTO	Expansion device 1: 49/99/129 kHz Expansion device 2: 48/98/128 kHz Expansion device 3: 47/97/127 kHz	Adjustment is performed automatically when the main device is set to AUTO.
	OFF	50/100/130 kHz	
	-1	49/99/129 kHz	
	-2	48/98/128 kHz	
	-3	47/97/127 kHz	

■ DC mode

The voltage is varied in order to perform light intensity adjustment.

This makes differences in brightness less likely to occur even with a high-speed shutter.

There is frequently a difference between the set light intensity value and the actual output light amount.

Depending on the characteristics of the lighting, for example one model may illuminate at 8 V or more while another model may illuminate at 8.5 V or more, producing differences in the light intensity value at the start of illumination.

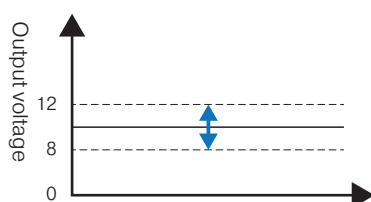
● Output voltage specifications

12 V output type: 8 to 12 V

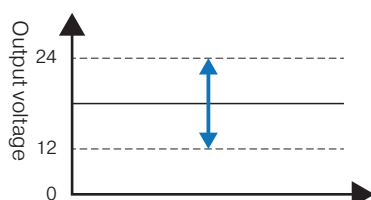
24 V output type: 12 to 24 V (LOW), 18 to 24 V (HIGH)

● Image of output waveform

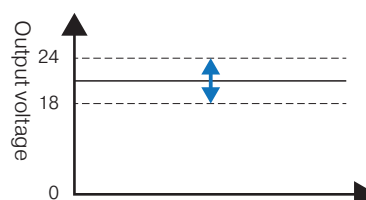
(12 V output type: 8 to 12 V)



(24 V output type: LOW: 12 to 24 V)



(24 V output type: HIGH: 18 - 24 V)



● DC RANGE

When the set lighting mode is variable voltage with a 24 V output type, this decides the supplied voltage output range.

This cannot be set with a 12 V output type because the output range is fixed.

Setting item	Description
LOW	Sets DC RANGE for output voltage to 12 to 24 V.
HIGH (default value)	Sets DC RANGE for output voltage to 18 to 24 V.

■ L-INT mode, L-INT STB mode

These light intensity control modes can be used when a lighting that supports FALUX sensing + is connected.

The output voltage is fixed, and the brightness is adjusted inside the lighting using the FALUX sensing + special line communication.

In particular, because this can reduce the effects of the voltage drop that occurs when an extension cable is used, it is effective when using extension cables of different lengths or when using a long extension cable.

The output waveform is fixed in the same way as with DC mode.

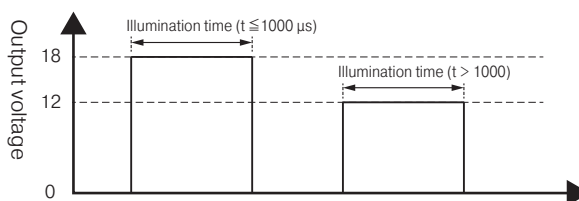
* If the lighting does not support FALUX sensing +, the lighting will not illuminate when L-INT or L-INT STB is selected.

● Output waveform

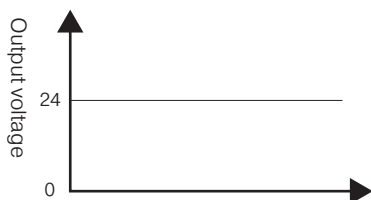
(L-INT : 12 V output specifications)



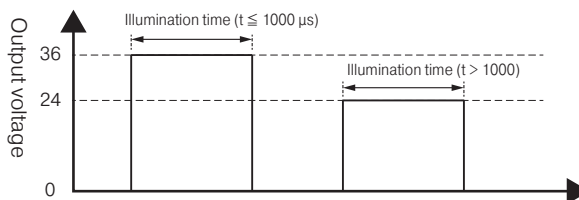
(L-INT STB: 12 V output specifications)*



(L-INT : 24 V output specifications)



(L-INT STB: 24 V output specifications)*



* In L-INT STB mode, the output voltage varies depending on the set illumination time.

Illumination time (t)		Output voltage	
Setting value	Units	12 V output type	24 V output type
$t \leq 1000$	μs	18 V	36 V
$t > 1000$		12 V	24 V
$t = 1 - 999$	ms		

5-1-2 Temporary Output Stop

Output stops after the following settings changes.

12 V output type: Stops for approx. 700 ms.

24 V output type: Stops for approx. 2000 ms.

- The lighting mode was changed.
 - The PWM FREQ was changed.
 - FEEDBACK control was changed from “OFF” or was changed to “OFF”.
 - TOTAL NUM OF SEQ was changed.
 - STB output voltage was changed.
- (Switching between overdrive and normal voltage occurred due to WIDTH (units) setting.)



6

Lamp Communication

This section explains the lamp communication which performs communication between this product and the lighting.

6-1 Features of Lamp Communication

This product supports two types of lamp communication: FALUX sensing and FALUX sensing +.

A lighting which supports lamp communication (a sensing lighting) is recognized automatically when it is connected, and the appropriate communication is established.

■ Main functions

There are two main functions shared by FALUX sensing and FALUX sensing +: monitoring and feedback.

1. Monitoring: The photodiode (light receiver element) inside the lighting receives the light from the lighting itself, and displays the brightness as the monitor value. The displayed value is an independent value obtained via this lamp communication. It is not a value that conforms to ordinary standards such as brightness or luminance.
In addition to lighting brightness, monitoring of total illumination time and monitoring of lighting internal temperature by a thermistor are also possible.
2. Feedback: Based on the lighting brightness obtained from the monitoring operation, the output voltage from the controller is adjusted so that the monitor value and light intensity value match. This allows constant brightness to be maintained regardless of LED deterioration.

■ Differences between the FALUX sensing and FALUX sensing + functions

For the differences in functions depending on the lamp communication, refer to the table below and the corresponding items.

	Monitoring contents			Functions			Others		
	Brightness	Temperature	Lighting illumination time, Device serial number	FEEDBACK	ABSOLUTE MONITOR	ALARM HIGH, ALARM LOW	MODE in LAMP n INTENSITY	Communication line *1	Cable
FALUX sensing +	✓	✓	✓	✓	✓	✓	PWM, DC	Special communication line	Special 3-pin cable
FALUX sensing	✓	✓		✓	✓	✓	PWM only	Power line communication	General-purpose 2-pin cable

*1: FALUX sensing + is composed of a power line and special communications line. FALUX sensing is composed only of a power line, and communication is performed using the power line.

■ Restrictions when using lamp communication

When performing lamp communication, there are some restrictions on the device configuration and settings.

Setting item	Lighting model	OPPX model	Extension cable	Lighting mode	PWM FREQ
FALUX sensing +	Lighting supporting FALUX sensing + only	OPPX 12 V output type	OP-XCB1-x	Can be used with all settings.	Can be used with all settings.
		OPPX 24 V output type	OP-FXCB1-x		
FALUX sensing	Lighting supporting FALUX sensing	OPPX series 12 V output type	OP-CB1-x	PWM, STB only	50 kHz, 100 kHz only

6-2 Lamp Communication Setting Items

List of lamp communication setting items

Tab name	Item	Setting value	Default value	Description	Reference
LAMP n COMM	FEEDBACK	MONITOR ON OFF ABSOLUTE AU- TO ADJUST	MONITOR	Changes whether or not feedback control is used.	Page 6-4
	FB RATE [Display only]	0.0 - 144.5%	-	Displays the feedback rate.	Page 6-7
	LAMP COMM [Display only]	NONE FALUX FALUX+	-	Displays the connection status of communication with the Lighting.	-
	BRIGHT RATIO [Display only]	0% or higher	-	Displays the ratio of the light intensity value to the monitor value.	-
	ALARM HIGH	0 - 255%	0	Sets the upper limit for the monitor brightness alarm.	Page 6-6
	ALARM LOW	0 - 200%	0	Sets the lower limit for the monitor brightness alarm.	Page 6-6

“FEEDBACK” setting item

With lamp communication, the functions that can be used with the “FEEDBACK” setting item vary.

The setting values and descriptions are shown in the table below.

Setting value	Description
MONITOR (default value)	Only monitoring operation is performed, and feedback control for adjusting the brightness is not performed.
ON	Feedback control and monitoring are performed, and the output voltage is corrected.
OFF	Lamp communication is not performed, and monitoring operation stops. Stops application of 6 V voltage for FALUX sensing communication. The FALUX sensing + communication pin is fixed at 24 V.
ABSOLUTE AUTO ADJUST	Together with monitoring, feedback control and automatic adjustment of the absolute brightness value are performed at the same time. This levels out differences between devices within the same model, and prevents a decline in brightness caused by deterioration.

6-3 Monitoring

Brightness, temperature, and various other data can be read.

Alarms can also be output based on the read data.

The setting values for the “FEEDBACK” setting item which allow monitoring are the following.

Setting values: MONITOR, ON, ABSOLUTE AUTO ADJUST

List of monitoring information

Tab name	Item	Description	FALUX-sensing +	FALUX-sensing
LAMP n INFO	LAMP MODEL	Displays the lighting model.	✓	✓
	SERIAL NUM*2	Displays the serial number which is the number that identifies the lighting device.	✓	
	MONITOR	Displays the lighting brightness.	✓	✓
	ABSOLUTE MONITOR	Displays the absolute brightness monitor value.	✓	✓
	TEMP	Displays the internal temperature (°C) of the lighting.	✓	✓
	TEMP LIMIT	Displays the temperature (°C) at which lighting operation protection activates. When the lighting temperature exceeds this temperature, temperature protection activates.	✓	✓ Displayed as 110°C for all lightings.
	DC MON LIMIT	This is the lower limit value for the light intensity value at which feedback control to the lighting stops.	✓	
	L-INT MON LIMIT	This is the lower limit value for the light intensity value at which feedback control to the lighting stops. (Light intensity value mode: L-INT or L-INT strobe)	✓	
	APPLIED VOLTAGE	Displays the actual voltage (V) that is applied inside the lighting.	✓	
	SW VERSION	Displays the lighting software version.	✓	✓
	RATED POWER	Displays the rated power consumption (W) of the lighting.	✓	✓
	CCT TEMPERATURE/ WAVELENGTH	Displays color temperature (K) or wavelength (nm) of the lighting.	✓	
	LED TOTAL TIME	Displays the total illumination time of the lighting.	✓	
	LED USER TIME	Displays the illumination time at which 0 reset can be performed manually.	✓	

6-3-1 ALARM HIGH, ALARM LOW

It is possible to monitor the monitor value and output a warning when the monitor value exceeds the threshold value that was set for the alarm upper/lower limit.

This makes it possible to immediately identify changes in brightness occurring due to lighting aging or other cause.

For details of the output, refer to  “Status Output” (page 8-1).

Setting item	Description
ALARM HIGH	Sets the upper limit threshold value for outputting an alarm. Set in the range of 0 (default value) to 255 (%), with the light intensity value being 100%. When 0 is set, an alarm is not output.
ALARM LOWER	Sets the lower limit threshold value for outputting an alarm. Set in the range of 0 (default value) to 200 (%), with the light intensity value being 100%. When 0 is set, an alarm is not output.

6-3-2 LED TOTAL TIME

This is used to check the total illumination time of the lighting in order to check the lifetime. This function is available only with FALUX sensing + lightings.

The illumination time that is managed here is saved in the lighting. Therefore it is possible to easily manage the total illumination time since the time when the lighting was produced.

LED TOTAL TIME is calculated only when FALUX sensing + communication is established. Be aware that LED TOTAL TIME is not counted when the lighting does not support FALUX sensing + or when it is illuminated by a different power supply. It is also not counted when an extension cable is used that does not support FALUX sensing + and communication is not established.

6-3-3 Temperature protection

If the lighting temperature that was acquired by communication exceeds the TEMP LIMIT that was prescribed for each lighting, output from the controller is automatically stopped and the lighting turns off.

At the same time, a “Lighting high temperature detection error” (Lx OVERHEAT) is output. When the lighting temperature has dropped by 10°C after the lighting turned off, it illuminates again.

The methods of checking each of these are the following.

- Lighting temperature: 1. In MONITOR Mode (Page 3-9)
2. “TEMP” on LAMP n INFO tab
- Limit temperature: “TEMP LIMIT” on LAMP n INFO tab

With a FALUX sensing + lighting, the temperature limit is prescribed for each lighting model.

For a FALUX sensing lighting, this is fixed at 110°C.

6-4 FEEDBACK

This function corrects the voltage that is applied to the lighting so that the monitor value matches the light intensity value.

If the intended brightness is not reached even after voltage correction, warning output turns ON.

For details of the output, refer to  "Status Output" (page 8-1).

The setting values for the "FEEDBACK" setting item which allow feedback control are the following.

Setting values: ON, ABSOLUTE AUTO ADJUST

CAUTION

Changing the light intensity value of lighting with FEEDBACK set to ON may cause an overcurrent or voltage drop in the main power supply.

If this results in a condition such as the unit repeatedly rebooting, remove the lighting with FEEDBACK set to ON.

■ FB RATE

Displays the voltage correction rate that was corrected by FEEDBACK.

The voltage correction rate is the value calculated as follows: Corrected voltage ÷ Voltage without correction × 100.

Example: No correction: 12 V, After correction: 15 V

$$\text{FB RATE} = 15 \div 12 \times 100 = 125.0\%$$

6-5 Absolute Brightness Control

This function displays the value using the brightness data of each individual device known as the absolute brightness value.

The setting values of the “FEEDBACK” setting item that allow absolute brightness control are the following.

Setting values: MONITOR, ON, ABSOLUTE AUTO ADJUST

6-5-1 How to Use

There are two ways to use the function: automatic adjustment and manual adjustment.

■ Automatic adjustment

Set “FEEDBACK” to “ABSOLUTE AUTO ADJUST.”

■ Manual adjustment

Perform in ABSOLUTE MONITOR mode.

For details, refer to  “3-2-4 ABSOLUTE MONITOR Mode” (page 3-12).

6-6 Precautions

● Operation cycle

The update cycle for the received light amount obtained by communication between the lighting and controller is 21 ms. For temperature, the cycle is 105 ms.

● Operating conditions

Monitoring may not function correctly in the following cases.

- When there is contamination on the lighting lens or diffusion plate

Because brightness is monitored close to the LED element inside the lighting, changes in brightness caused by factors such as contamination on the outside cannot be monitored.

- When communication is unstable due to noise

Enact noise countermeasures such as placing a shield cover (shield gasket or other) onto the lighting cable.

The monitoring function will automatically turn OFF in the following cases.

- When lighting mode is “PWM” or “STB” and light intensity value is less than 50 (12 V specification)
- When lighting mode is “PWM” or “STB” and light intensity value is less than 100 (24 V specification)

In the following cases, the monitor value will not be updated even if FEEDBACK is set to MONITOR.

The monitor value will be the value of the light intensity value that has been set and will be displayed in gray text.

- When the light intensity mode is “DC” and the set light intensity value is lower than the “DC MON LIMIT” in “LAMP n INFO”.
- When the light intensity mode is “L-INT” or “L-INT STB” and the set light intensity value is lower than “LINT MON LIMIT” in “LAMP n INFO”.

The start operating conditions related to the monitor are the following.

- A minimum of 8 light flash operations are required for brightness monitoring. During continuous illumination, an illumination time of 100 ms or longer is required.
- Operation of the monitor brightness alarm requires a minimum of 24 light flash operations or 300 ms or more of illumination time.

When a minimum of 160 light flash operations have been performed or illumination time of 2000 ms or more has elapsed, the output after feedback correction is saved in memory when the power supply is turned OFF, allowing illumination under the same conditions as before powering OFF the next time the power is turned ON.

Operation	Operating conditions
Monitoring start	INTENSITY 50 or higher
	Illumination count 8 or more, or continuous illumination of 100 ms or more
ALARM start	Illumination count 24 or more, or continuous illumination of 300 ms or more
Correction by FEEDBACK Saving of output data * The lighting illuminates immediately at the corrected brightness even after the power was once turned OFF.	Illumination count 160 or more, or continuous illumination of 2000 ms or more



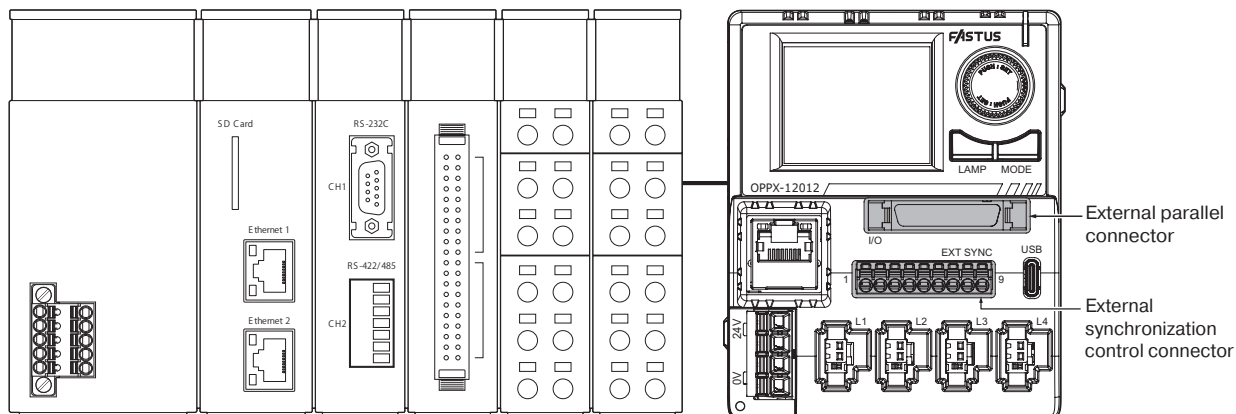
7

External Synchronization Input

This section explains how to set the lamp synchronization, lamp intensity, and other settings for the lighting using an input signal from an external device.

7-1 Connecting the synchronization Control Connector

Either an external synchronization control connector or an external parallel connector can be used for control.

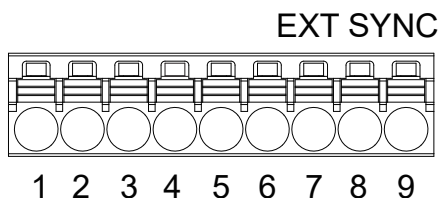


■ External synchronization control connector (included accessory)

Applicable wire: 0.2 to 1.3 mm², AWG 24 to 16

Length of stripping part: 9 to 10 mm Terminal specifications: Push-in

Dedicated cable model: OP-ECBX9-3



● List of pin assignment

Standard

Pin number	Name	Input/output	Signal name	Explanation of signal name
1	SYNC 1	Input	Synchronization input 1	The lamp illuminates while this input is ON. When the illumination time is specified, the lamp illuminates for the specified time following brightness rise. The subject lamp can be selected by means of the setting.
2	SYNC 2	Input	Synchronization input 2	
3	SYNC 3	Input	Synchronization input 3	
4	SYNC 4	Input	Synchronization input 4	
5	—	—	—	Not used for external synchronization control..
6	COMINB	—	Input COM	This is the input common terminal. Each input can be turned ON by applying 5 - 24 V between the input and this common terminal. (No polarity)
7 to 9	—	—	—	Not used for external synchronization control.

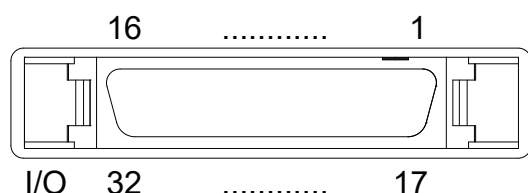
TTL level model

Pin number	Name	Input/output	Signal name	Explanation of signal name
1	SYNC 1	Input	Synchronization input 1	The lamp illuminates while this input is ON. When the illumination time is specified, the lamp illuminates for the specified time following brightness rise. The subject lamp can be selected by means of the setting.
2	SYNC 2	Input	Synchronization input 2	
3	SYNC 3	Input	Synchronization input 3	
4	SYNC 4	Input	Synchronization input 4	
5	—	—	—	Not used for external synchronization control..
6	COMIN	—	Input COM	This is the input common terminal. Each input can be turned ON by applying 2 - 8 V between the input and this common terminal. (No polarity)
7 to 9	—	—	—	Not used for external synchronization control.

■ External parallel connector (Not equipped on EtherNet/IP support models)

Applicable connector: HIROSE FX2-32PA insulation-displacement connector with lock

Dedicated cable model: OP-ECBX32-3 (sold separately) (open-end, 3 m)



● List of pin assignment

Standard

Pin number	Name	Input/output	Signal name	Description
1 to 15	—	—	—	Not used for external synchronization control.
16	COMINA	—	Input COM	This is the input common terminal. Each input can be turned ON by applying 5 to 24 V between the input and this common terminal. (No polarity)
17 to 28	—	—	—	Not used for external synchronization control.
29	SYNC 1	Input	Synchronization input 1	The lamp illuminates while this input is ON. When the illumination time is specified, the lamp illuminates for the specified time following brightness rise. The subject lamp can be selected by means of the setting.
30	SYNC 2	Input	Synchronization input 2	
31	SYNC 3	Input	Synchronization input 3	
32	SYNC 4	Input	Synchronization input 4	

TTL level model

Pin number	Name	Input/output	Signal name	Description
1 to 15	—	—	—	Not used for external synchronization control.
16	COMINA	—	Input COM	This is the input common terminal. Each input can be turned ON by applying 2 to 8 V between the input and this common terminal. (No polarity)
17 to 28	—	—	—	Not used for external synchronization control.
29	SYNC 1	Input	Synchronization input 1	The lamp illuminates while this input is ON. When the illumination time is specified, the lamp illuminates for the specified time following brightness rise. The subject lamp can be selected by means of the setting.
30	SYNC 2	Input	Synchronization input 2	
31	SYNC 3	Input	Synchronization input 3	
32	SYNC 4	Input	Synchronization input 4	

■ Connection diagram

Refer to  "2-2-4 Parallel Input/Output Connection Diagram" (page 2-10).

7-2 Synchronization Control Settings


List of setting items

For details of this list, refer to  “7-3 Detailed Explanation of Settings” (page 7-7).

Tab name	Item	Setting value	Default value	Description
LAMP n SYNC	MODE	EXT, INT, OFF	INT	Synchronization input switching
	DELAY	Numerical value: 0 to 999, Unit: μs / ms	0 μs	Changes both the synchronization delay time and the units of the synchronization delay time.
	WIDTH	Numerical value: 0 to 999, Unit: $\mu\text{s}(*2)/\text{ms}$	0 ms	Changes both the lighting width and the units of the lighting width.
	COUNT	Displays the number of lights per lamp. (When the upper limit is reached, it returns to 0.)	-	Number of lighting counts. Cleared when power is turned OFF and back ON.
	COUNT RESET	OFF, ON	OFF	Reset of the number of lighting counts. Count is reset when ON is selected.
	ENABLE	-	The SYNC number that is the same as the set lamp number has default value: ON.	Synchronization input selection is performed for each lamp number.
	SYNC 1	OFF, ON		
	SYNC 2			
	SYNC 3			
	SYNC 4			
	POLARITY	-	POS	Changes the synchronization input polarity for each SYNC number. This is a common setting for all lamps.
	SYNC 1	NEG, POS		
	SYNC 2			
	SYNC 3			
	SYNC 4			
	FILTER	1 to 1000 μs	1 μs	Sets the synchronization input filter.
	INT STB PERIOD	Numerical value: 0 to 2000, Unit: 1 ms/0.1 ms	250 ms	Displays both the automatic strobe flashing period and units.
	5V SYNC *1	OFF, ON	OFF	OFF: Turns ON when external input voltage is 12 V or higher. ON: Turns ON when external input voltage is 5 V or higher.

*1 Not displayed for models with TTL specification.

Basic process for Synchronization control settings

Setting procedure	
1	Setting item: lighting mode * For details, refer to  “Lighting Output Settings” (page 5-1). Set STB or L-INT STB when performing high-brightness lighting using overdrive.
2	[Required] Setting item: MODE in LAMP n SYNC MODE is set to EXT.

Setting procedure	
3	Setting item: ENABLE Set the combination of the lamp you want to illuminate and the input signal number.
4	Setting item: POLARITY Sets the polarity of lighting synchronous operation relative to the signal.
5	Setting items: WIDTH, DELAY Sets the lighting width and lighting delay time in order to adjust the lighting timing.

■ Setting examples

● Conditions to be set

Lighting synchronization control is performed under the following conditions.

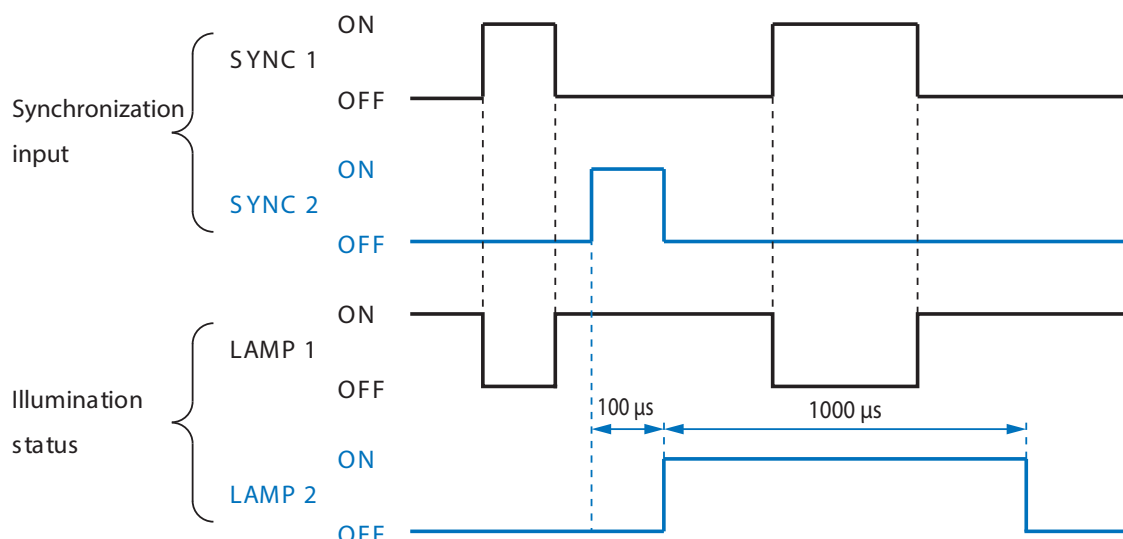
LAMP1: Turns off synchronized with the input signal to SYNC1. Lamp is off while the signal is input.

LAMP2: Illuminates synchronized with the input signal to SYNC2. The lighting width is 1000 μ s, and the lighting delay is 100 μ s. Overdrive is used.

● List of setting values for the above conditions

		LAMP1	LAMP2
LAMP n SYNC		PWM	STB
MODE in LAMP n SYNC		EXT	EXT
ENABLE	SYNC 1	ON	OFF
	SYNC 2	OFF	ON
	SYNC 3	OFF	OFF
	SYNC 4	OFF	OFF
POLARITY	SYNC 1	NEG	
	SYNC 2	POS	
	SYNC 3	POS	
	SYNC 4	POS	
WIDTH		0	1000 μ s
DELAY		0	100 μ s

Timing chart



7-3 Detailed Explanation of Settings

■ WIDTH

Sets the width the lamp illuminates when the signal is input. The widths which can be set are in the range of 10 μ s (7.7 μ s) to 999 ms.

WIDTH is the value calculated as follows: Setting value \times Setting units.

Setting range: 0 to 999

Setting units: μ s (= 7.7 μ s, 10 μ s, 20 μ s^{*1}), ms (= 1 ms)

*1: There are two types of setting units in the display: " μ s" and "ms." For " μ s," the unit time is converted automatically according to the modes and the PWM FREQ. (Refer to the table below.)

For details of each setting, refer to "Lighting Output Settings" (page 5-1).

Unit times when μ s is displayed

PWM FREQ	MODE in LAMP n INTENSITY				
	PWM	STB	DC	L-INT	L-INT STB
50 kHz	20 μ s	20 μ s	-	-	-
100 kHz	10 μ s	10 μ s	-	-	-
100 kHz DC	10 μ s	10 μ s	-	-	-
130 kHz DC	7.7 μ s	7.7 μ s	-	-	-
No setting	-	-	10 μ s	10 μ s	10 μ s

Example: When setting value is 50 and units are μ s, the lighting times for each setting are calculated as shown below.

MODE in LAMP n INTENSITY	PWM FREQ	Setting value	Setting units	(Unit time)	(Calculation)	WIDTH
PWM, STB	50 kHz	50	μ s	20 μ s	50 \times 20 μ s	1000 μ s ^{*1}
	100 kHz	50	μ s	10 μ s	50 \times 10 μ s	500 μ s
	100 kHz DC	50	μ s	10 μ s	50 \times 10 μ s	500 μ s
	130 kHz DC	50	μ s	7.7 μ s	50 \times 7.7 μ s	385 μ s ^{*1, *2}
DC, L-INT, L-INT STB	-	50	μ s	10 μ s	50 \times 10 μ s	500 μ s

*1: The device display shows WIDTH that was calculated below the setting value.

*2: With 130 kHz DC, this is actually displayed to the first place after the decimal point.

●●● MEMO ●●●

When the setting value is 0, the illumination operation changes depending on the MODE in LAMP n INTENSITY.

- PWM, DC, L-INT: Illuminates for the same time as the input illumination signal.
- STB, L-INT STB: Displayed as 0 but handled internally as a setting value of 1.

■ DELAY

It is possible to delay illumination of the lighting after signal input. Adjust when synchronizing the trigger with a camera.

The times which can be set are in the range of 10 μ s to 999 ms.

The illumination delay time is the value calculated as follows: Setting value \times Setting units.

Setting range: 0 to 999

Setting units: 10 μ s, 1 ms

●●● MEMO ●●●


Delay is a setting that applies to each input signal (SYNC), not to each LAMP.

For example, if LAMP1 and 2 are set to illuminate for SYNC1, LAMP1 and 2 will have a common illumination delay time.

■ MODE in LAMP n SYNC

Sets whether to perform lighting illumination operation based on a signal from an external source.

This setting is required when using an external signal to perform illumination operation.

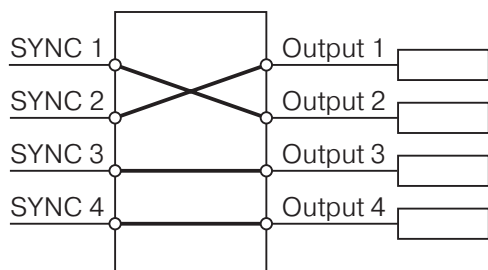
Setting value	Description
EXT	Uses external synchronization input. Illuminates and turns off synchronized with the external signal.
INT (default value)	External synchronization input is ignored, and illumination occurs based only on the internal signal. The operation varies depending on the MODE in LAMP n INTENSITY. PWM, DC, L-INT: Lit at all times STB, L-INT STB: Flashing occurs at the cycle set for the automatic strobe flashing cycle and for the time set for WIDTH. For information about automatic strobe flashing, refer to  "7-4 Strobe Illumination (Strobe Overdrive)" (page 7-11).
OFF	Turns off the lighting. External synchronization input is ignored.

■ ENABLE

Selects the synchronization input to use for illumination. This can be set for each lighting output. This function can illuminate multiple lamps using a single signal.

[Setting example 1]

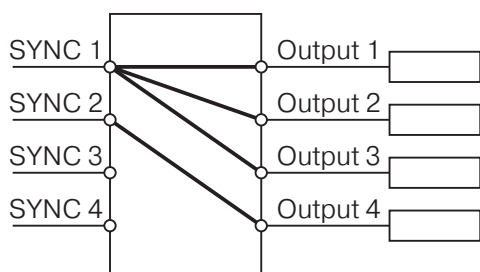
Lighting LAMP 2 illuminates based on the input to SYNC 1, and lighting LAMP 1 illuminates based on the input to SYNC 2.



Set lamp	SYNC 1	SYNC 2	SYNC 3	SYNC 4
LAMP 1	OFF	ON	OFF	OFF
LAMP 2	ON	OFF	OFF	OFF
LAMP 3	OFF	OFF	ON	OFF
LAMP 4	OFF	OFF	OFF	ON

[Setting example 2]

Lightings LAMP1 to 3 illuminate simultaneously based on the input to SYNC 1, and lighting LAMP 4 illuminates based on the input to SYNC 2.



Set lamp	SYNC 1	SYNC 2	SYNC 3	SYNC 4
LAMP 1	ON	OFF	OFF	OFF
LAMP 2	ON	OFF	OFF	OFF
LAMP 3	ON	OFF	OFF	OFF
LAMP 4	OFF	ON	OFF	OFF

■ POLARITY

Sets the polarity for synchronization input. This can be set separately for each control input (SYNC).

POS: Illuminates when external input is ON.

NEG: Illuminates when external input is OFF.

Illumination status		External input	
		OFF	ON
POLARITY	POS (default value)	Off	Lit
	NEG	Lit	Off

■ FILTER

Sets the filter time to prevent malfunction caused by noise.

Signals which are shorter than the set filter time are ignored by the controller.

■ 5 V SYNC

Set to ON when the input voltage is low, such as when synchronization input uses the PC internal voltage.

Changing this setting changes the input voltage and response time.

* Not displayed for models with TTL specification.

Setting value	Description
OFF	Input signal ON voltage : 12 - 24 VDC Input signal OFF voltage: 1 V or less NPN input response time: OFF to ON; 2 μ s or less, ON to OFF; 10 μ s or less, PNP input response time: OFF to ON; 2 μ s or less, ON to OFF; 12 μ s or less
ON	Input signal ON voltage : 5 - 24 VDC Input signal OFF voltage: 1 V or less NPN input response time: OFF to ON; 24 μ s or less, ON to OFF; 78 μ s or less, PNP input response time: OFF to ON; 32 μ s or less, ON to OFF; 76 μ s or less

7-4 Strobe Illumination (Strobe Overdrive)

This illumination method can be used when the MODE in LAMP n INTENSITY is STB or L-INT STB. An illumination time and illumination cycle that are at or below a certain value make it possible to overdrive the voltage and cause a rapid rise in lighting brightness.

Power supply type	Overdrive voltage	Operating conditions
12 V output	18 V	Illumination time 1 ms or less ^{*1} Duty 10% (Illumination cycle that is 10 times the illumination time)
24 V output	48 V: STB ^{*2} 36 V: L-INT STB	Illumination time 1 ms or less ^{*1} Duty 7% (Illumination cycle that is 14.3 times the illumination time)

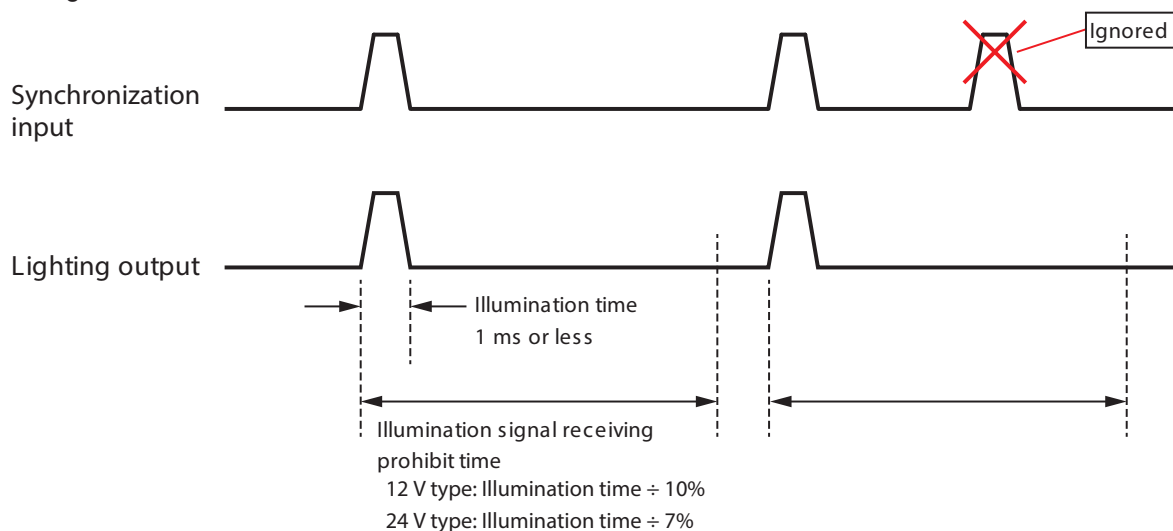
*1: Operates when the illumination time units are set to μ s and the time is 1,000 μ s or less. When the illumination time units are set to ms, strobe overdrive does not operate and operation uses the normal voltage (12 V or 24 V).

*2: Depending on the lighting connected, 48V overdrive may result in an overcurrent that cannot be used.

■ Illumination prohibit time

When the illumination time in strobe mode is 1 ms or less, an illumination prohibit time is set until the duty in the operating conditions has elapsed in order to protect the lighting. Trigger input is not accepted until this time has elapsed.

Timing chart



■ INT STB PERIOD

When MODE in LAMP n INTENSITY is set to STB, and INT is selected as the MODE in LAMP n SYNC, the lighting flashes on a cycle regardless of external control.

The cycle time can be set based on the units and setting value. DELAY is not inserted.

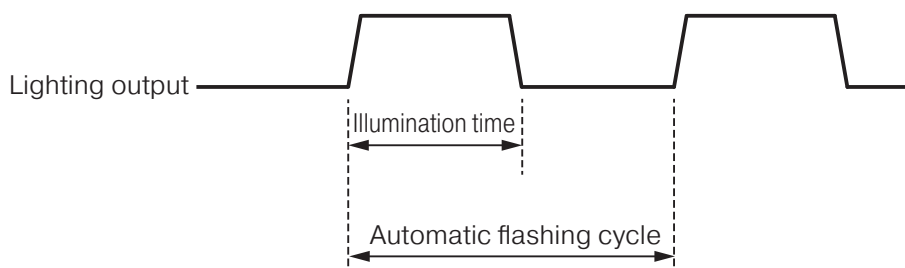
Because this setting is common for all lamps, the cycle cannot be changed for an individual lamp.

The following cycles can be set in combination with the units setting.

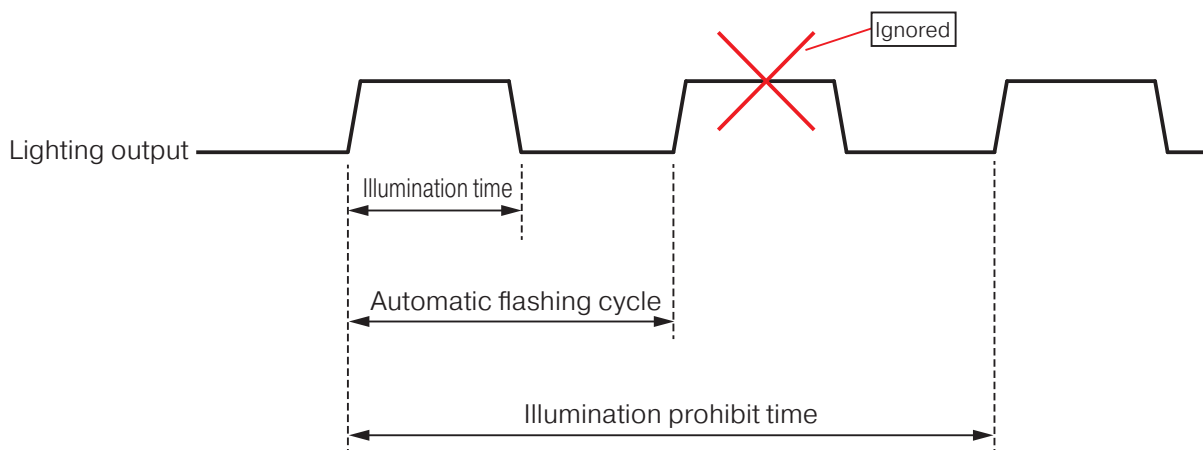
0.1 ms units : 0.1 ms to 200.0 ms

1 ms units : 1 ms to 2000 ms

Operation image timing chart



The flashing cycle is canceled while the overdrive illumination prohibit time is continuing, and illumination occurs based on the following cycle.



7-5 Illumination Counter

This counts and displays the number of times that a lighting illuminated.

It can be cleared at any time by device operation or communication. The value is also cleared automatically when the power is turned OFF.

It is not saved in the lighting.

The illumination count is displayed as an item that cannot be edited.

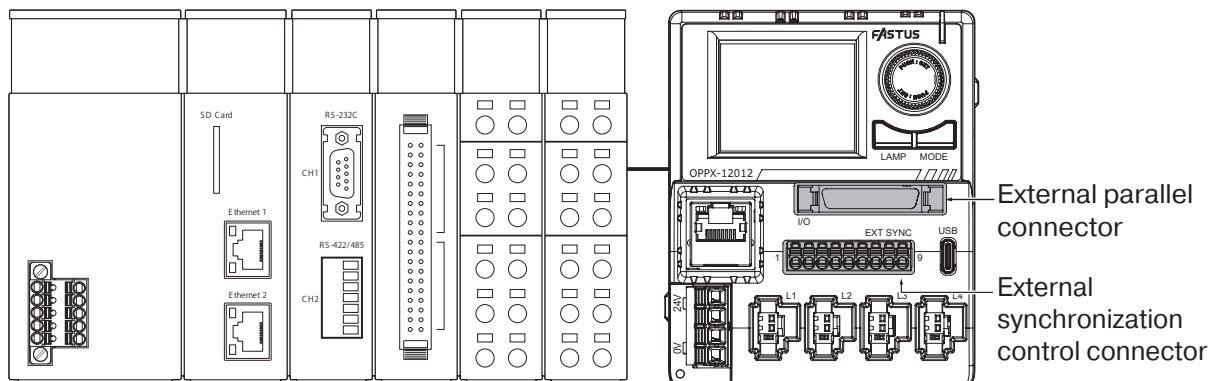
Item name	Setting value	Description
COUNT	0 to 999,999,999	Illumination counter for each lamp
COUNT RESET	ON, OFF	Resets the illumination count to 0. The illumination count changes to 0 when this turns ON.

Status Output

This section explains the function which outputs the status (error occurred, lighting illuminated, etc.) of this product and the lighting device to an external device.

8-1 Connecting to an External Control Device

Either an external illumination control connector or an external parallel connector can be used for control.

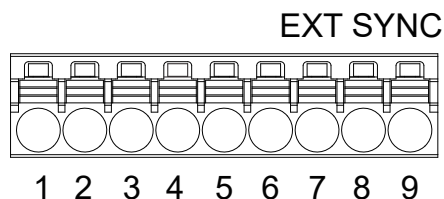


■ External illumination control connector (included accessory)

Applicable wire: 0.2 to 1.3 mm², AWG 24 to 16

Length of stripping part: 9 to 10 mm Terminal specifications: Push-in

Dedicated cable model: OP-ECBX9-3



● List of pin assignment

Standard

Pin number	Name	Input/output	Signal name	Explanation of signal name
1 to 6				Not used for output operation.
7	USER1	Output	General-purpose outout 1	This is a general-purpose output pin. It is possible to set the output contents. It is the same as USER1 on the external parallel connector.
8	USER2	Output	General-purpose outout 2	This is a general-purpose output pin. It is possible to set the output contents. It is the same as USER2 on the external parallel connector.
9	COMOUTB	—	Output COM	This is the output common terminal. When output is ON, current flows from the output to this common terminal.

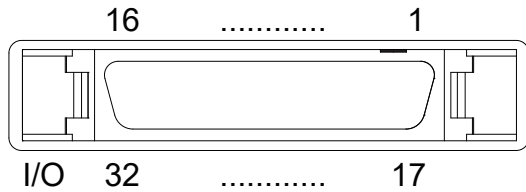
TTL level model

Pin number	Name	Input/output	Signal name	Explanation of signal name
1 to 6				Not used for output operation.
7	USER1	Output	General-purpose output 1	This is a general-purpose output pin. It is possible to set the output contents. Output is NPN.
8	USER2	Output	General-purpose output 2	This is a general-purpose output pin. It is possible to set the output contents. Output is NPN.
9	GND	—	GND for general-purpose output	This is the output (USER1 to USER6) common terminal. When output is ON, current flows from the output to this common terminal.

■ External parallel connector (Not equipped on EtherNet/IP support models)

Applicable connector: HIROSE FX2-32PA insulation-displacement connector with lock

Dedicated cable model: OP-ECBX32-3 (sold separately) (open-end, 3 m)



● List of pin assignment

Standard

Pin number	Name	Input/output	Signal name	Description
1 to 21	—	—	—	Not used for output operation.
22	USER 1	Output	General-purpose output 1	This is a general-purpose output pin. It is possible to set the output contents. It is the same as external illumination control connector USER 1.
23	USER 2	Output	General-purpose output 2	This is a general-purpose output pin. It is possible to set the output contents. It is the same as external illumination control connector USER 2.
24	USER 3	Output	General-purpose output 3	This is a general-purpose output pin. It is possible to set the output contents.
25	USER 4	Output	General-purpose output 4	
26	USER 5	Output	General-purpose output 5	
27	USER 6	Output	General-purpose output 6	
28	COMOUTA	—	Output COM	This is the output common terminal (USER1 to USER6). When output is ON, current flows from the output terminal to this common terminal.
29 to 32	—	—	—	Not used for output operation.

TTL level model

Pin number	Name	Input/output	Signal name	Description
1 to 21	—	—	—	Not used for output operation.
22	USER 1	Output	General-purpose output 1	This is a general-purpose output pin. It is possible to set the output contents. It is the same as external illumination control connector USER 1.
23	USER 2	Output	General-purpose output 2	This is a general-purpose output pin. It is possible to set the output contents. It is the same as external illumination control connector USER 2.
24	USER 3	Output	General-purpose output 3	This is a general-purpose output pin. It is possible to set the output contents.
25	USER 4	Output	General-purpose output 4	
26	USER 5	Output	General-purpose output 5	
27	USER 6	Output	General-purpose output 6	
28	GND	—	GND for general-purpose output	This is the output (USER1 to USER6) common terminal. When output is ON, current flows from the output to this common terminal.
29 to 32	—	—	—	Not used for output operation.

■ Connection diagram

Refer to  “2-2-4 Parallel Input/Output Connection Diagram” (page 2-10).

8-2 Status Output Settings

A list of status output settings is shown below.

For details on the setting items, refer to  “8-3 Details of Output Signals” (page 8-6).

Tab name	Item	Setting value	Default value	Description
EXT PIO	OUT POL	POS/NEG	POS	Changes the external parallel output polarity.
	USER OUTPUT MODE	-	-	-
	USER1	OFF	Lx ON	Sets the output trigger operation for general-purpose output.
	USER2	RUN	L1 ON	
	USER3*1	L1 ON to L4 ON	L2 ON	
	USER4*1	L1 SYNC to L4 SYNC	L3 ON	
	USER5*1	L1 SEQ1 to L4 SEQ1	L4 ON	
	USER6*1	Lx ON	OFF	
		ERROR		
		WARNING		
		MST ERR		
		MST WRN		
LAMP n SYNC	Lx-ON OFF DELAY	0 to 999 μ s	0 μ s	Sets the off delay time for the “Lx ON” signal.

*1:Not displayed on EtherNet/IP support models.

8-3 Details of Output Signals

■ OUTPUT POL

Sets the polarity of external parallel output. The actual operation is as shown in the table below.

Output status		Internal operation trigger status	
		ON	OFF
OUTPUT POL	POS	ON	OFF
	NEG	OFF	ON

■ Details of output settings

- RUN

Turns ON based on the operating status after the power supply starts. Turns OFF when an error occurs.

Operation	Output
Power ON	ON
Power OFF or when error occurs	OFF

- L1 ON/L2 ON/L3 ON/L4 ON/Lx ON

“L1 ON/L2 ON/L3 ON/L4 ON” each turn ON when that lighting is illuminated. “Lx ON” turns ON when any lighting among L1 - L4 is illuminated.

By using this output and inputting the signal to a camera, it is possible to ensure that the lighting is illuminated during the camera exposure.

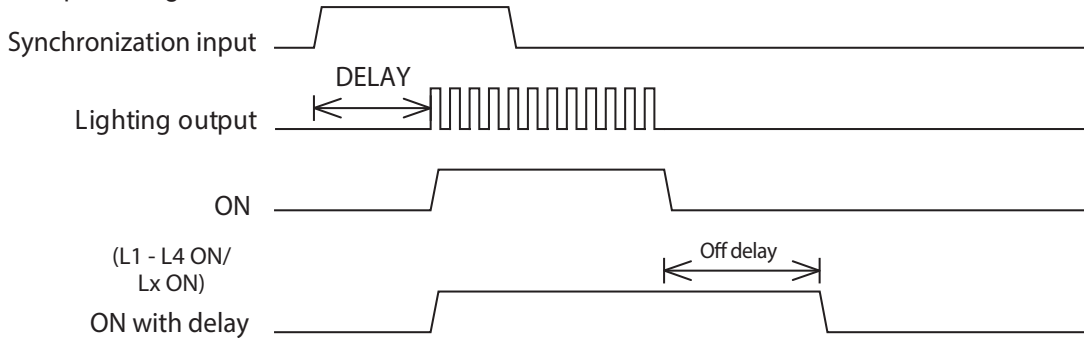
- This signal turns OFF when INTENSITY is 0.
- When INTENSITY is set from external parallel signal and the lighting turns ON, there is a delay of approximately 3 ms at the time when this signal turns ON. No delay occurs with Ethernet communication or serial communication control.

With this output, the off delay time can be set in the range of 0 - 999 μ s.

The off delay setting can be set with “Lx-ON OFF DELAY” in the tab for LAMP n SYNC.

Operation	Output
Lighting illuminated	ON
Lighting not illuminated	OFF

- Output timing chart



- L1 SYNC/L2 SYNC/L3 SYNC/L4 SYNC

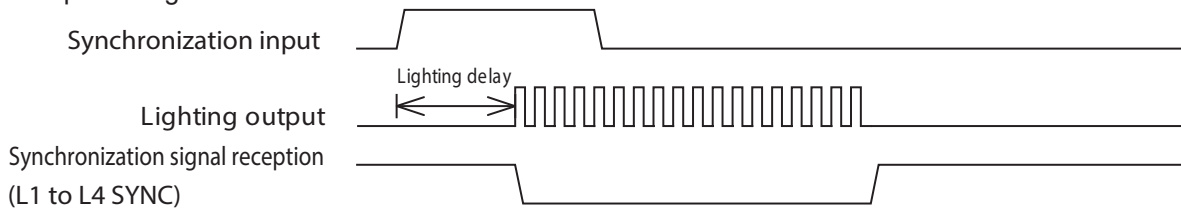
Turns ON when status allows the synchronization input for each lamp to be accepted.

Turns OFF during light output or during the STB mode illumination prohibit time.

* For the STB mode illumination prohibit time, refer to “Illumination prohibit time” (page 7-11).

Operation	Output
Synchronization input can be accepted.	ON
Lighting illuminated or synchronization control input cannot be accepted (preparing for illumination)	OFF

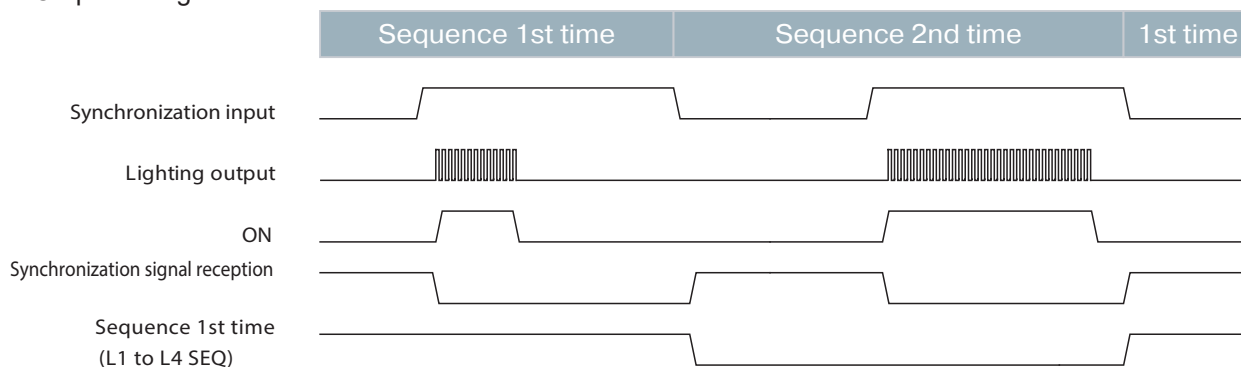
- Output timing chart



- L1 SEQ1/L2 SEQ1/L3 SEQ1/L4 SEQ1 (sequence 1st time ON)
Output turns ON during sequence control 1st time for each lamp.

Operation	Output
From start of receiving sequence 1st time to sequence 1st time lamp off	ON
Other than the above	OFF

- Output timing chart



- Error (main device error)

Error output turns ON when the cause of an error has occurred.

For the causes of errors, refer to "11-1 List of Errors"(11-2page).

Operation	Output
Error occurred (“MST ERR” signal includes the occurrence of an error at an inter-connected expansion device.)	ON
Other than the above	OFF

- Warning (main device warning)

Warning output turns ON when the cause of a warning has occurred.

For the causes of warnings, refer to "11-2 List of Warnings"(11-4page).

Operation	Output
Warning occurred (“MST WRN” signal includes the occurrence of a warning at an inter-connected expansion device.)	ON
Other than the above	OFF

8-4 Other Output Specifications

■ Output terminal overcurrent

When overcurrent is detected at an output terminal, all output stops.

Recovery occurs automatically after 100 ms. If overcurrent is then detected again within 100 ms after recovery, output remains stopped and automatic recovery does not occur. Recovery requires the controller to be restarted.

Communication with an External Device

This section explains the communication specifications and setting method for controlling this product from an external device.

9-1 General description

This section describes the method of changing setting values from an external device, and the output from this product.

With this product, three types of control can be used: parallel communication, serial communication, and Ethernet communication.

Select a communication method based on the characteristics of each method and the equipment conditions.

Communication method	Connectors to be used	Advantages	Disadvantages	Reference
Parallel communication *1	External parallel connector	High-speed communication	Multi-wiring Limits to status where control is possible	9-4 page
Serial communication RS-232C	External parallel connector USB (USB Type-C)	<ul style="list-style-type: none">Control is possible in all status.Wiring saving	Low-speed communication (several ms)	9-12 page
Ethernet communication UDP, TCP *2	Ethernet connector	<ul style="list-style-type: none">Control is possible in all status.Wiring savingConnection of multiple devices using a network hub	Low-speed communication (several ms)	9-27 page
EtherNet/IP communication *3	Ethernet connector	<ul style="list-style-type: none">Control is possible in all status.Wiring savingConnection of multiple devices using a network hubPeriodic (cyclic) and non-periodic (message) communication are possible.Can be used together with general-purpose Ethernet	-	9-52 page

*1 Not available on EtherNet/IP support models.

*2 Only available Ethernet and EtherNet/IP support models.

*3 Only available on EtherNet/IP support models.

CAUTION

When communication between inter-connected main and expansion devices is performed, only the main device can specify the expansion device station numbers.

The expansion device can specify its self station number (0 - 3) and perform light intensity adjustment of the lighting at that device.

Specification of four or more station numbers for expansion devices is disabled. For details, refer to Page 9-65 "2 Select the periodic communication format."

9-2 Memory Save Restriction for Setting Values

With this product, when settings are changed, they are regularly saved in memory regardless of the method used to change them.

As a measure for environments where setting changes occur frequently, there is a setting for preventing memory capacity from being exceeded.

Tab name	Item	Setting value	Default value	Description
System	STOP SAVING	OFF, ON	OFF	OFF:Saving in memory is performed. When the controller is restarted, the setting values from immediately before restart are restored. ON:Saving in memory is not performed. When the power supply is restarted, the most recent setting values saved in memory are restored. However settings written to recipes other than the selected recipe number are saved.

9-3 Parallel Communication

This section explains the method for changing the lighting output setting value using parallel communication.

9-3-1 General description

Parallel communication is one communication method. It uses multiple signal wires and communication lines to send data simultaneously in parallel.

The advantage of this method is the higher transmission speed. Disadvantages are that more wires are required, and that complex internal settings are not possible.

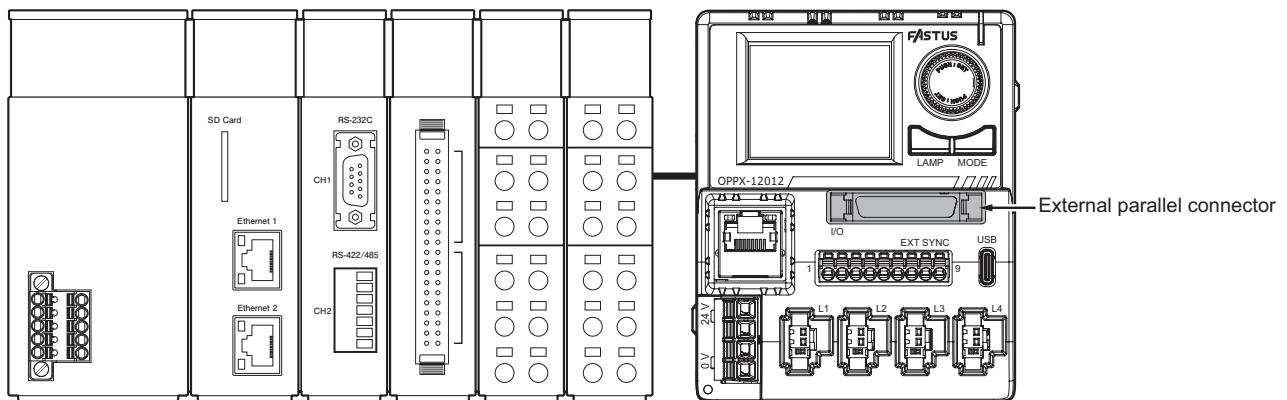
MEMO

Not equipped on EtherNet/IP support models.

Items where settings can be changed
Light intensity value
Lighting width value (Units cannot be set.)
Recipe number selection

9-3-2 Connecting

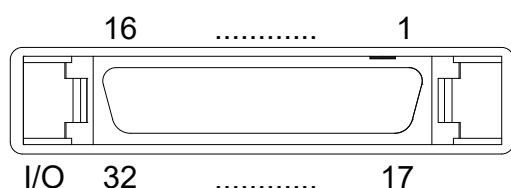
Connect the external parallel connector.



■ External parallel connector

Applicable connector: HIROSE FX2-32PA insulation-displacement connector with lock

Dedicated cable model: OP-ECBX32-3



● Related pin numbers

Standard

Pin number	Name	Input/output	Signal name	Explanation of signal name
1	D 0	Input	Light intensity bit 0	Inputs the light intensity value or the lighting width. Writing is performed using the BRTWR or PLSWR signal in combination with the specified station number. This is also used to select the recipe number.
2	D 1	Input	Light intensity bit 1	
3	D 2	Input	Light intensity bit 2	
4	D 3	Input	Light intensity bit 3	
5	D 4	Input	Light intensity bit 4	Inputs the light intensity value or the lighting width. Writing is performed using the BRTWR or PLSWR signal in combination with the specified station number.
6	D 5	Input	Light intensity bit 5	
7	D 6	Input	Light intensity bit 6	
8	D 7	Input	Light intensity bit 7	
9	D 8	Input	Light intensity bit 8	
10	D 9	Input	Light intensity bit 9	
11	L 0	Input	LAMP switching 0	Specifies the lamp station number for performing light intensity adjustment. The value is specified in binary.
12	L 1	Input	LAMP switching 1	
13	L 2	Input	LAMP switching 2	
14	L 3	Input	LAMP switching 3	
15	BRTWR	Input	Brightness control value writing	Writes the light intensity adjustment bit as the light intensity value (or recipe number).
16	COMINA	—	Input COM	This is the input common terminal. Each input can be turned ON by applying 5 - 24 V between the input and this common terminal. (No polarity)
17 to 19	—	—	—	Not used for parallel writing operation.
20	PLSWR	Input	Lighting width write	Writes the light intensity adjustment bit as the lighting width.
21	MASK	Input	Write mask	When input is ON, input to the write signal (BRTWR, PLSWR) is ignored.
22 to 32	—	—	—	Not used for parallel writing operation.

TTL level model

Pin number	Name	Input/output	Signal name	Explanation of signal name
1	D 0	Input	Light intensity bit 0	Inputs the light intensity value or the lighting width. Writing is performed using the BRTWR or PLSWR signal in combination with the specified station number. This is also used to select the recipe number.
2	D 1	Input	Light intensity bit 1	
3	D 2	Input	Light intensity bit 2	
4	D 3	Input	Light intensity bit 3	
5	D 4	Input	Light intensity bit 4	Inputs the light intensity value or the lighting width. Writing is performed using the BRTWR or PLSWR signal in combination with the specified station number.
6	D 5	Input	Light intensity bit 5	
7	D 6	Input	Light intensity bit 6	
8	D 7	Input	Light intensity bit 7	
9	D 8	Input	Light intensity bit 8	
10	D 9	Input	Light intensity bit 9	
11	L 0	Input	LAMP switching 0	Specifies the lamp station number for performing light intensity adjustment. The value is specified in binary.
12	L 1	Input	LAMP switching 1	
13	L 2	Input	LAMP switching 2	
14	L 3	Input	LAMP switching 3	
15	BRTWR	Input	Brightness control value writing	Writes the light intensity adjustment bit as the light intensity value (or recipe number).
16	COMINA	—	Input COM	This is the input common terminal. Each input can be turned ON by applying 2 - 8 V between the input and this common terminal. (No polarity)
17 to 19	—	—	—	Not used for parallel writing operation.
20	PLSWR	Input	Lighting width write	Writes the light intensity adjustment bit as the lighting width.
21	MASK	Input	Write mask	When input is ON, input to the write signal (BRTWR, PLSWR) is ignored.
22 to 23	—	—	—	Not used for parallel writing operation.
24 to 27	Not available	—	—	—
28 to 32	—	—	—	Not used for parallel writing operation.

■ Connection diagram

Refer to  "2-2-4 Parallel Input/Output Connection Diagram" (page 2-10).

9-3-3 Parallel Communication Settings

This section explains the settings required for parallel communication.

■ Basic process for synchronization control settings

Basic process	
①	[Required] Setting item: IN MODE Set the input mode in the external parallel settings to “INTENSITY” or “RECIPE.”
②	Setting item: IN POL Set the input polarity and select the polarity of the internal operation relative to the input signal.

9-3-4 List of Parallel Communication Station Numbers/Assignments

A station number is allocated to each lighting output in sequence beginning from the device on the left side. The station numbers are the same even when there are devices with 2ch specifications present. Even when the main device is 2ch, LAMP1 of expansion device #1 still has the station number 4.

● List of station numbers

Lighting setting	Station number	L0	L1	L2	L3
Main device LAMP1	0	OFF	OFF	OFF	OFF
Main device LAMP2	1	ON	OFF	OFF	OFF
Main device LAMP3	2	OFF	ON	OFF	OFF
Main device LAMP4	3	ON	ON	OFF	OFF
Expansion device #1 LAMP1	4	OFF	OFF	ON	OFF
Expansion device #1 LAMP2	5	ON	OFF	ON	OFF
Expansion device #1 LAMP3	6	OFF	ON	ON	OFF
Expansion device #1 LAMP4	7	ON	ON	ON	OFF
Expansion device #2 LAMP1	8	OFF	OFF	OFF	ON
Expansion device #2 LAMP2	9	ON	OFF	OFF	ON
Expansion device #2 LAMP3	10	OFF	ON	OFF	ON
Expansion device #2 LAMP4	11	ON	ON	OFF	ON
Expansion device #3 LAMP1	12	OFF	OFF	ON	ON
Expansion device #3 LAMP2	13	ON	OFF	ON	ON
Expansion device #3 LAMP3	14	OFF	ON	ON	ON
Expansion device #3 LAMP4	15	ON	ON	ON	ON

9-3-5 Parallel Communication Setting Items

List of items

Setting tab	Setting item	Setting value	Default value	Description
External parallel (EXT PIO)	IN MODE	OFF/INTENSITY/RECIPE	OFF	Changes the control contents for external parallel communication.
	IN FILTER	5/25/50/100/300/500/1000 μ s	5 μ s	Selects the filter time for the external parallel input signal.
	IN POL	POS/NEG	POS	Selects the input polarity of the external parallel signal.

IN MODE: External parallel input mode

Changes the control contents for parallel signal input. There are three settings: OFF/INTENSITY/RECIPE. When using external parallel communication, change this setting to "INTENSITY" or "RECIPE."

Setting value	Description
OFF	Does not react to external parallel input. Even when OFF is set, the output pin, RS-232C input/output, and synchronization control input can still be used.
INTENSITY	External parallel input can be used to change the light intensity value and lighting width. <ul style="list-style-type: none"> ■ Writing of light intensity value: Input the BRTWR signal. Can be set in the range of 0 to 999. If 1000 or higher is written, it is set to 999. ■ Writing of lighting width: Input the PLSWR signal. When writing the WIDTH, the behavior varies as shown below according to the light intensity mode. <ul style="list-style-type: none"> • PWM/DC/L-INT mode: 0 to 999 (ms/μs) can be set. If 1000 or higher is written, it is set to 999. • STB/L-INT STB mode: 1 to 999 (ms/μs) can be set. If 0 is written, it is set to 1. If 1000 or higher is written, it is set to 999. <p>The time units (ms/μs) cannot be changed by external parallel communication. Set in advance using the device operation or other communication.</p>
RECIPE	External parallel input can be used to change the current recipe number. Writing is possible in the same way using either the BRTWR signal or PLSWR signal. The total 16 recipe selections are written as 0 - 15 (pin numbers 1 - 4). If 16 or higher is written, the recipe does not change.

■ IN FILTER

Sets the filter value for external parallel input to prevent malfunction caused by noise.

The setting is selected from a total of seven values. 5/25/50/100/300/500/1000 μ s

Signals which are shorter than the set filter time are ignored by the controller.

A delay of the set filter time is applied to the input. By using a longer filter time, it is possible to input the write signal after the light intensity adjustment bit has fully stabilized.

● Signals subject to IN FILTER change

Signal description
Light intensity value write BRTWR
Lighting width write PLSWR
Input mask MASK

■ IN POL: Sets the polarity of external parallel input.

There are two setting values: POS/NEG.

The relationship between the setting value and operation is as shown in the table below.

Input judgment status		External signal status	
		ON	OFF
IN POL	POS	ON	OFF
	NEG	OFF	ON

● Signals subject to IN POL change

Signal description
Light intensity adjustment bit: D0 - D9
Lamp selection: L0 - L3
Light intensity value write: BRTWR
Lighting width write: PLSWR
Input mask: MASK

9-3-6 Input Mask Function

When the pin number 21 MASK input signal is ON, input to the write signal (BRTWR, PLSWR) can be ignored.

This is used as a countermeasure to prevent unexpected writing caused by noise.

The output signal, synchronization input, and RS-232C signal are not masked.

9-3-7 Response time

The response times from when receiving of parallel input is completed until the light intensity value changes are as shown in the table below.

The response time varies depending on the device main/expansion status, input polarity, and input filter time.

● List of light intensity value change response times

The conditions vary depending on the lighting mode.

- Lighting mode: PWM, STB

Subject device	IN POL	IN FILTER time (μs)						
		5	25	50	100	300	500	1000
Main device	POS	10 - 20 μs	25 - 35 μs	50 - 60 μs	86 - 106 μs	245 - 305 μs	405 - 505 μs	800 - 1000 μs
	NEG	65 - 75 μs	78 - 88 μs	98 - 108 μs	138 - 158 μs	298 - 358 μs	460 - 560 μs	860 - 1060 μs
Expansion device	POS/NEG	4 - 15 ms						

- Lighting mode: DC

Subject	Response time
12 V output type	350 ms
24 V output type	600 ms

* Both are response times when changing the light intensity value from the minimum to the maximum. These times may not be correct when the amount of the light intensity value change is smaller.

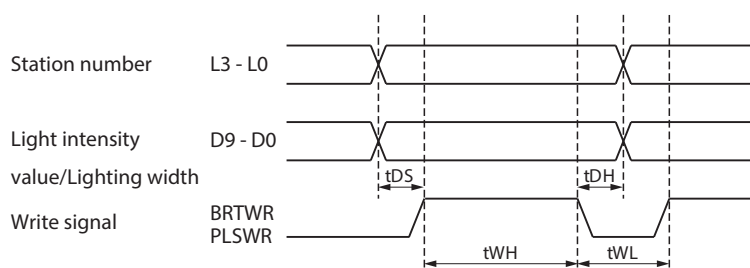
- Lighting mode: L-INT, L-INT STB

Subject	Response time
Main device	30 - 175 ms
Expansion device	35 - 180 ms

● Recipe change response time

Common setting: 6 - 50 ms

9-3-8 Input timing chart



Item		Time
Data setup time (tDS)		500 μs or more
Data hold time (tDH)		0 ms
Mask signal setup time (tMS)		Set filter time or more
Mask signal hold time (tMH)		0 ms
Write signal high hold time (tWH)	Main device lighting	Set filter time x2 or more
	Expansion device lighting	Set filter time x2 + 4 to 16 ms or more
Write signal low hold (tWL)		2 ms or more

9-4 Serial communication

This section explains serial communication.

9-4-1 General description

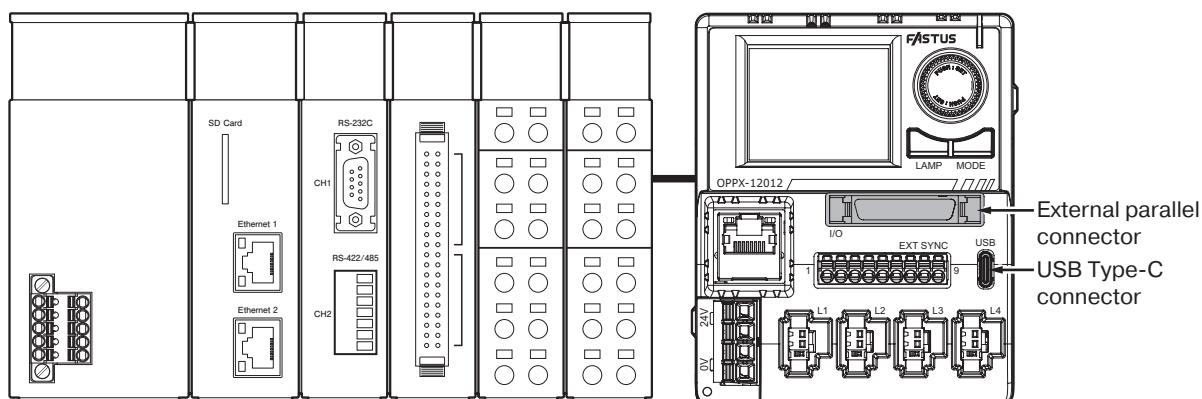
Serial communication is possible from the external parallel RS-232C or USB connector.

Serial communication is one communication method. It uses multiple communication lines and sends and receives data on the same line.

It is capable of internal complex setting changes and data extraction, and allows the number of wires to be reduced.

9-4-2 Connecting

Control is possible from the external parallel connector or USB Type-C connector.



■ External parallel connector (Not equipped on EtherNet/IP support models)

Applicable connector: HIROSE FX2-32PA insulation-displacement connector with lock

Dedicated cable model: OP-ECBX32-3 (sold separately) (open-end, 3 m)



Pin number	Name	Input/output	Signal name	Description
1 - 16				
17	RXD	Input	Receive data	This is the RS-232C receiving input.
18	TXD	Output	Transmit data	This is the RS-232C transmission output.
19	SG	-	Signal ground	This is the RS-232C common terminal.
20 - 32				

■ External communication USB connector

Connector: USB Type-C connector

Communication standard: USB1.1

9-4-3 Communication Settings and Specifications

The receiving timeout time on the device side is 3 ms.

When manual input mode is enabled, the receiving timeout time is extended to 3000 ms.

● List of specifications

Item	Description
Baud rate	Default value 9600 OFF, 4800, 9600, 19200, 38400, 57600, 115200 * Setting is not required for serial communication using USB.
Data length	8 bits
Stop bit	1 bit
Parity	None
Flow control	None

● List of setting items

Setting tab name	Setting item	Setting value	Description
System	MANUAL ENTRY MODE	ON/OFF	Set when manually inputting communication commands. The receiving timeout time is extended.
	RS-232C BAUDRATE	OFF/4800/9600/19200/38400/57600/115200 bps	RS-232C transmission speed Setting is not required for USB serial communication.

9-4-4 Command Formats

This section explains the command formats.

CAUTION

Information for users of the OPPF series of OPTEx FA LED lighting controller



Although this product conforms to the OPPF series RS-232C communication format, some data contents and data specification methods may be different.

Due to the larger amount of data that can be sent at one time, the maximum length of the variable length data has been expanded from the OPPF series.

■ Request commands (sent to this product from an external device)

The command format for request commands is different between when reading and writing setting values in the recipe that is currently set and when reading and writing setting values in a specified recipe number.

● Request commands (changing the recipe that is currently set)



#	Contents	Description
0	Header	'@' (0x40)
1	Lamp station number	'0' - '9', 'A' - 'F' (Refer to the station number assignment table  "Station number" (page 9-15).)
2 - 4	Command	ASCII character string (Refer to  "9-4-6 List of Communication Commands" (page 9-18).)
5 and above	Data	Write: Data value (ASCII) variable length Read: Specify 'R'.
N-3	Checksum	'00' - 'FF' or '***' (2AH, 2AH)
N-2		
N-1	Delimiter	CR (0x0D)
N		LF (0x0A)

N maximum value: 72

● Request commands (communication with a specified recipe number)

By inserting \$0 - \$F between the lamp station number and command, it is possible to read or write the settings of the specified recipe number.

If a recipe number where a recipe is not set is selected, it is ignored.

#	Contents	Description
0	Header	'@' (0x40)
1	Lamp station number	'0' - '9', 'A' - 'F' (Refer to the station number assignment table  "Station number" (page 9-15).)
2 - 3	Recipe number	'\$0' - '\$F' '\$' is the recipe number selection identifier. The next characters 0 - F specify the recipe number. 0 = Recipe 1, F = Recipe 16
4 - 6	Command	ASCII character string (Refer to  "9-4-6 List of Communication Commands" (page 9-18).)
7 and above	Data	Write: Data value (ASCII) variable length Read: Specify 'R'.
N-3	Checksum	'00' - 'FF' or '***' (2AH, 2AH)
N-2		
N-1	Delimiter	CR (0x0D)
N		LF (0x0A)

N maximum value: 72

■ Response commands (sent from this product to an external device)

#	Contents	Description
0	Header	'@' (0x40)
1	Station number	Received station number
2 - 4	Command	When normal: Received command Error: "ERR"
5 and above	Data	Normal write: 'W' Normal read: Variable length data Error: Error code + Received command The SDL command can be used to change to 4-digit fixed length. * 9999 is returned when the data exceeds 4 digits.
N-3	Checksum	'00' - 'FF'
N-2		Last 1 byte of total value up to data
N-1	Delimiter	CR (0x0D)
N		LF (0x0A)

N maximum value: 72

When the received station number or command is not ASCII code, '?' or '???' is returned.

0 is returned when read is specified for a command that does not support reading.

■ Station number

Because infrared communication is performed between the devices, all station numbers can be accessed from the main device.

The specified station numbers are as shown below.

The assigned station numbers are the same even when there are devices with 2ch specifications present.

Even when the main device is 2ch, LAMP1 of expansion device 1 still has the station number 4.

Device	LAMP1	LAMP2	LAMP3	LAMP4
Main device	0	1	2	3
Expansion device 1	4	5	6	7
Expansion device 2	8	9	A	B
Expansion device 3	C	D	E	F

When the main device is connected, it is possible to connect directly to and communicate with the expansion device without going through the main device.

In this case, it is possible to access the station numbers only of the connected expansion device, and it is not possible to access the station numbers of other inter-connected devices. The station numbers that are used use the station numbers of the main device (0 - 3).

■ Checksum

The checksum adds the transmission data (header + station number + command + data) in binary, and stores the value with the last 8 bits inverted (complement of 1) as a hexadecimal number.

If the checksum calculation is omitted when sending a request command, "***" (2AH, 2AH) is sent in place of the checksum.

■ Command examples

Writing the light intensity value for 4 channels to the current recipe (station number 0: 100, station number 1: 200, station number 2: 300, station number 3: 400)

● Request command:

```
@0EVO100**<CR+LF>@1EVO200**<CR+LF>@2EVO300**<CR+LF>@3EVO400**<CR+LF>
```

● Response command:

```
@0EVOW4E<CR+LF>@1EVOW4D<CR+LF>@2EVOW4C<CR+LF>@3EVOW4B<CR+LF>
```

■ Other command specifications

● Amount of data sent at one time with a request command

There is a limit to the amount of data sent at one time with a request command sent from external devices to this product.

When the contents from the header (@) to the delimiter (<CR+LF>) are a single request command, this product can receive a maximum of 8 request commands at one time from external devices.

When multiple commands are received at once, the response commands from this product are returned in sequence following the designated response time for each station number.

* Multiple commands of reading and writing recipe notes cannot be received at once. Wait for the response command after each data transmission.

With USB serial communication, in addition to the above limit, it is necessary to open a certain amount of time when sending data that is larger than 208 bytes.

“Receiving overflow” is returned as an error response when the data size exceeds the limit.

● Error response

When a request command is invalid, an error code is returned in the response command.

The error codes are shown in the table below.

When multiple errors are detected at the same time, a response command is returned only for the error code with the highest priority in the table.

Error code	Description	Priority
M	Insufficient received quantity error • The number of received characters is less than the minimum number.	1
C	Character code error • The station number, command, data, or checksum contains a character code that cannot be used.	2
L	Station number error • A character that cannot be used was used to specify the station number. • A lamp which does not exist in the system was specified. • When performing lighting writing such as specifying LAMP3 in 2ch specifications, a lighting that is not connected was specified.	3

Error code	Description	Priority
S	Checksum error • The calculated values do not match.	4
U	Command error • Undefined command	5
D	Data error • A value outside the write range was specified. * 0 is always returned for setting values that do not support reading.	6
T	Receiving timeout error • The delimiter was not received within a certain time after receiving the header. • Writing failed during lighting writing.	7
V	Receiving overflow • Data larger than the receiving buffer was received by USB serial communication. * The receiving buffer size for USB serial communication is 208 bytes.	8

● Receiving the data section using a fixed length

The “SDL” serial communication command allows receiving of the serial data section using a fixed length.

The default value is variable length, and this command is used to change to fixed length mode.

The mode returns to the default of variable length when the power is turned OFF. Both variable length and fixed length can be received for request command write data.

For response command read data, numerical data is 4 digits aligned on the right side, and “0” is added when the number of digits is insufficient. The “W” for writing completion is inserted in the left as “W_ _ _.”

Character string data is output with the maximum length that is specified for the setting value. Any insufficient part is filled with Null.

Command examples: Checksum is entered as **.

Command	Variable length	Fixed length
Request LAMP1 WIDTH write	@0STB777**<CR+LF>	@0STB0777**<CR+LF>
→ Response	@0STBW**<CR+LF>	@0STBW_ _ _ **<CR+LF>
Request LAMP1 INTENSITY read	@0EVOR**<CR+LF>n	@0EVOR_ _ _ **<CR+LF>
→ Response	@0EVO555**<CR+LF>	@0EVO0555**<CR+LF>

● Manual input mode

When it is necessary to input a serial command manually, set “MANUAL ENTRY MODE in SYSTEM” to ON.

When MANUAL ENTRY MODE is ON, the receiving timeout time is extended to 3 seconds. By performing input of each character within 3 seconds, the data is received as connected serial communication.

When not inputting commands manually, set MANUAL ENTRY MODE to OFF.

When it is OFF, the receiving timeout time is 3 ms.

9-4-5 Response time


The setting is changed at the following time after command receiving is completed.

This time applies when a single control command was sent. It may not apply when multiple commands were sent at the same time.

Inter-connection	Lighting mode	Response time
Main device	PWM, STB	0.9 to 2.8 ms
	DC	1.0 to 300 ms*
	L-INT, L-INT STB	32 to 66 ms
Expansion device	PWM, STB	4 to 13 ms
	DC	4 to 313 ms*
	L-INT, L-INT STB	35 to 110 ms

* Includes the voltage change time. When voltage changes 8 V → 12 V, the time is approx. 300 ms.

9-4-6 List of Communication Commands

This is a list of the communication setting values. For an explanation of the setting values, refer to  “4-2 List of Settings” (page 4-3). With a lamp common command, specify any of the lamp station numbers that belong to the subject controller.

When the command name is less than three characters, add a space (20H) at the end. (Example: 'FB_')
Command names that are the same as OPPF are indicated in **bold**.

[Legend]

Read/write: R: Read capable, W: Write capable, R/W: Read/write capable

Lamp: “Individual” indicates that setting for each individual lamp is possible. “Common” indicates a setting value that is common to all lamps or applies to the controller.

MEMO

To turn on/off the lighting, use the command “LCT” below.

Note that this is the same command as “LCT lighting control mode”.

Command	Name	Data	Read/write	Lamp
LCT	Lighting control	0: Lights off 1: Lights on	R/W	Individual

Command	Name	Data	Read/write	Lamp
MOD	MODE (in LAMP n INTENSITY)	0: PWM 1: STB 2: DC 3: L-INT 4: L-INT STB	R/W	Individual
PFR	PWM FREQ	0: 50 kHz 1: 100 kHz 2: 100 kHz DC 3: 130 kHz DC	R/W	Individual
PAJ	PWM FREQ ADJ	0: AUTO 1: -1 2: -2 3: -3 4: OFF	R/W	Common
EVO	INTENSITY (in LAMP n INTENSITY)	0 - 999	R/W	Individual
STB	WIDTH	0 - 999	R/W	Individual
STU	Units of WIDTH (in LAMP n SYNC)	0: μ s 1: ms	R/W	Individual
DL _L	DELAY	0 - 999	R/W	Individual
DLU	DELAY units	0: 1 μ s 1: 1 ms	R/W	Individual
DCR	DC RANGE	0: LOW 1: HIGH Valid only for 24 V output specifications	R/W	Individual
LCT	MODE (in LAMP n SYNC) * Use this command when performing communication to turn a lighting ON/OFF. 0: OFF, 1: ON	0: External 1: Internal 2: OFF	R/W	Individual
TSL	ENABLE	0 - 15 (bit flag) Bit0: SYNC1 Bit1: SYNC2 Bit2: SYNC3 Bit4: SYNC4 0: OFF, 1: ON * For details of the setting procedure, refer to the separate table (*1).	R/W	Individual
TPL	POLARITY	0 - 15 (bit flag) Bit0: SYNC1 Bit1: SYNC2 Bit2: SYNC3 Bit4: SYNC4 0: NEG, 1: POS * For details of the setting procedure, refer to the separate table (*1).	R/W	Common
TFL	FILTER	1 - 1000	R/W	Common

Command	Name	Data	Read/write	Lamp
T5V	5 V SYNC	0: OFF 1: ON	R/W	Common
SQM	TOTAL NUM OF SEQ	0 - 15 0: Sequence control OFF 1: 2nd time, 15: 16th time	R/W	Common
SNQ	SEQ NUM NOW	0 - 16 0: Sequence control OFF 1: 1st time, 16: 16th time	R	Individual
SQF	SEQ NUM FIX	0 - 16 0: Not fixed 1: Fixed at 1st time, 16: Fixed at 16th time	R/W	Common
SQT	RESET INPUT	0: SQRST 1: SYNC1 2: SYNC2 3: SYNC3 4: SYNC4	R/W	Common
SQR	RESET EXE	1: Execute	W	Common
En ^{*2}	INTENSITY (in LAMP n SEQUENCE)	0 - 999	R/W	Individual
Wn ^{*2}	WIDTH (in LAMP n SEQUENCE)	0 - 999	R/W	Individual
Un ^{*2}	WIDTH units (in LAMP n SEQUENCE)	0: μ s 1: ms	R/W	Individual
FB _┐	FEEDBACK	0: Monitor 1: ON 2: OFF 3: ABSOLUTE AUTO ADJUST	R/W	Individual
EPS	OUT POL	0: NEG 1: POS	R/W	Common
EPN	IN POL	0: NEG 1: POS	R/W	Common
BIN	IN MODE	0: OFF 1: Light intensity value 2: Recipe	R/W	Common
PFL	IN FILTER	0: 5 μ s 1: 25 μ s 2: 50 μ s 3: 100 μ s 4: 300 μ s 5: 500 μ s 6: 1000 μ s	R/W	Common

Command	Name	Data	Read/write	Lamp
US1	USER1	0: OFF	R/W	Common
US2	USER2	1: RUN		
US3	USER3	2: LAMP1 ON		
US4	USER4	3: LAMP1 synchronization control ready		
US5	USER5	4: LAMP1 sequence control 1st time		
US6	USER6	5: LAMP2 ON		
		6: LAMP2 synchronization control ready		
		7: LAMP2 sequence control 1st time		
		8: LAMP3 ON		
		9: LAMP3 synchronization control ready		
		10: LAMP3 sequence control 1st time		
		11: LAMP4 ON		
		12: LAMP4 synchronization control ready		
		13: LAMP4 sequence control 1st time		
		14: Any of LAMP1 - 4 ON		
		15: Error		
		16: Warning		
		17: MST ERR		
		18: MST WRN		
BNO	NUMBER	1 - 16	R/W	Common
SMW	Write recipe MEMO	Character string, maximum length 64 characters	W	Common
SMR	Read recipe MEMO	Character string, maximum length 64 characters	R	Common
OSC	IST STB PERIOD	1 - 2000	R/W	Common
OSU	INT STB PERIOD units	0: 0.1 ms 1: 1 ms	R/W	Common
BAL	ALARM LOW	0 - 200	R/W	Individual
BAH	ALARM HIGH	0 - 255	R/W	Individual
TM1	Control substrate microcomputer (MAIN) temperature	-100 - 155	R	Common
TM2	Power substrate 1 microcomputer (PWR1) temperature	-100 - 155	R	Common
TM3	Power substrate 2 microcomputer (PWR2) temperature	-100 - 155	R	Common
TM4	Lighting output section temperature	-100 - 130	R	Individual
VER	FW version	Character string, fixed length 8 characters	R	Common
VLD	POWER DROP	0 - 9999	R	Common

Command	Name	Data	Read/write	Lamp
UCF	Device connection information	0001 - 6666 The configuration of devices connected by infrared communication is returned for each digit. In sequence from the lowest position: main device, expansion device 1. 0: Not connected 1: 12 V/2ch 2: 12 V/4ch 3: 24 V/2ch 4: 24 V/4ch 6: Dual/4ch	R	Common
SDL	Specify response command type	0: Variable length 1: Fixed length	R/W	Common
LNG	LANGUAGE	0: English 1: Japanese	R/W	Common
CPY ^{*3}	Copy setting value	Character string, fixed length 3 characters [Copy source station number/copy destination station number 1/copy destination station number 2]	W	Common
INI	INIT	1: Current recipe 2: All recipes 3: Common setting values (except for communication setting values) 4: Language	W	Common
RST	ERROR RESET / ERROR CLEAR	1: Clear currently detected error and warning and reset overcurrent stop status and low voltage detection count. Lighting output turns off momentarily.	W	Common
OFD	Lx-ON OFF DELAY	0 - 999	R/W	Individual
EDH	DHCP	0: OFF 1: ON	R/W	Common
EBP	BOOTP	0: OFF 1: ON DHCP=1 is preferred.	R/W	Common
EIP	IP ADDRESS	Character string Four 0 - 255 strings delimited by periods xxx.xxx.xxx.xxx	R/W	Common
ESM	SUBNET MASK	Character string Four 0 - 255 strings delimited by periods xxx.xxx.xxx.xxx	R/W	Common
EGW	GATEWAY	Character string Four 0 - 255 strings delimited by periods xxx.xxx.xxx.xxx	R/W	Common

Command	Name	Data	Read/write	Lamp
STA	Device status	b0: Memory error b1: FPGA error b2: FW update failed b3: Power substrate 1 communication error b4: Power substrate 2 communication error b5: Low power supply voltage b6: Power supply high temperature detection warning b7: Power too high b8: IP error b9: DHCP error b10: Network error b11: Output terminal overcurrent b15 - 12: Infrared communication self device number	R	Common
LOC	Lock	1: Prohibit setting value change by panel operation.	R/W	Common
UNL	Unlock	4-character pass code If the pass code matches the current pass code, setting value change by panel operations becomes possible.	W	Common
PSC	PASS CODE	Character string, 8 characters \$\$\$\$#### \$\$\$\$: Current pass code ####: New pass code Normal response if codes match	W	Common
OPT	OPERATING TIME	0 - 4,294,967,295 (sec)	R	Common
PWR	TOTAL POWER	0 - 2000 2000: 200.0 W	R	Common
CST	LAMP n CAP STATUS	0 - 1000 1000: 100.0%	R	Individual
ERC	Error check	0: No error or warning 1: Warning 2: Error 3: Error and warning If the main device, includes the status of expansion devices.	R	Common
SSV	STOP SAVING	0: Setting value changes are saved. 1: Setting value changes are not saved. Saved at time when setting is changed from OFF to ON. Settings written to a recipe other than the selected recipe number are saved.	R/W	Common

Command	Name	Data	Read/write	Lamp
MUQ	Unique ID	ASCII 24 characters Station number 0: Main microcomputer 17 characters Station number 1-2: Sub microcomputer 16 characters Remaining characters blank	R	Common
EBO	BYTE ORDER	0:LITTLE 1:BIG	R/W	Common
EFM	CYCLIC FORMAT	0:FIX 1:USER	R/W	Common
Xn (n:00-15)	LAMPn O2T USER FORMAT	LAMP1:0x0000 to 0xFFFF ... LAMP16:0x0000 to 0xFFFF	R/W	Common
Yn (n:00-15)	LAMPn T2O USER FORMAT	LAMP1:0x00000000 to 0xFFFFFFFF ... LAMP16:0x00000000 to 0xFFFFFFFF	R/W	Common
Lighting information				
MON	MONITOR	0 - 2047	R	Individual
LAB	ABSOLUTE MONITOR	0 - 4095	R	Individual
FBR	FB RATE	0 - 2047	R	Individual
TM0	TEMP	-99 - 155	R	Individual
LVR	SW VERSION		R	Individual
LPC	SERIAL NUM	Character string, maximum length 20 characters	R	Individual
LPN	LAMP MODEL	Character string, maximum length 20 characters	R	Individual
LPW	RATED POWER	Character string, maximum length 6 characters 100.0 W, 12.3 W, etc.	R	Individual
LWL	CCT/WAVELENGTH	Character string, maximum length 6 characters 7000 K, 630 nm, 1000 nm, etc.	R	Individual
LEC	LED TOTAL TIME	0 - 999,999,999 Write 0: Clear Write other than 0: Data error	R/W	Individual
LTM	LED USER TIME (sec)	0 - 4,294,967,295	R	Individual
LRT	Reset-permit illumination time	0 - 4,294,967,295 Write 0: Clear Write other than 0: Data error	R/W	Individual
LPV	APPLIED VOLTAGE	0 - 6000 2 digits after decimal point	R	Individual
LTL	TEMP LIMIT	0 - 254	R	Individual
LDM	DC MON LIMIT	0 - 999	R	Individual
LLM	L-INT MON LIMIT	0 - 999	R	Individual

Command	Name	Data	Read/write	Lamp
LST	Lamp status	b0: Illuminated b1: Lighting output overvoltage or lighting output correction error b2: Lighting output low voltage b3: Lighting output operation error b4: Lighting output gate power supply error b5: Lighting erroneous discharge detection b6: Lighting overcurrent b7: Lighting high temperature detection b8: Monitor brightness alarm b9: Feedback error b10: Lighting output start error b11: Lighting output high temperature detection b12: Lighting communication overcurrent b13: Lighting power too high	R	Individual

*1: Set the subjects for synchronization input (SYNC1 - 4) and the input polarity for each SYNC as shown below.

Setting value		Setting status (synchronization input, input polarity)			
Decimal	Bit	SYNC1	SYNC2	SYNC3	SYNC4
0	0000	OFF	OFF	OFF	OFF
1	0001	ON	OFF	OFF	OFF
2	0010	OFF	ON	OFF	OFF
3	0011	ON	ON	OFF	OFF
4	0100	OFF	OFF	ON	OFF
5	0101	ON	ON	ON	OFF
6	0110	OFF	ON	ON	OFF
7	0111	ON	ON	ON	OFF
8	1000	OFF	OFF	OFF	ON
9	1001	ON	OFF	OFF	ON
10	1010	OFF	ON	OFF	ON
11	1011	ON	ON	OFF	ON
12	1100	OFF	OFF	ON	ON
13	1101	ON	OFF	ON	ON
14	1110	OFF	ON	ON	ON
15	1111	ON	ON	ON	ON

- Synchronization input

ON (1): Subject to synchronization control input, OFF (0): Not subject to synchronization input

- Synchronization input polarity

ON (1): POS, OFF (0): NEG

*2: Enter the sequence number (1 - 16) to set in the “n” part.

When the number is a single digit, add a 20H (space) at the end. For number 1, enter B1_. For number 10, enter B10.

*3: The copy source station number is copied to the range of station numbers indicated by copy destination station number 1/2. The copy source station number may be within the destination range. The data to be copied are the recipe and the ALARM HIGH/LOW values.

9-5 Ethernet Communication

9-5-1 General description


Communication via Ethernet can be used with Ethernet support models (OPPX-xxWx) and EtherNet/IP support models (OPPX-xxEPx). By using a LAN cable to connect to a PC, PLC, or other external device, it is possible to change and save various parameters such as the lighting INTENSITY, and also to read various data. Ethernet communication supports UDP, TCP, and iQSS* (Mitsubishi Electric iQ Sensor Solution).

* iQSS is not supported for TTL specifications and EtherNet/IP support models.

When a DHCP client is installed and a DHCP server exists on the network, the IP address is assigned automatically.

When multiple OPPX devices are connected, the device MAC address can be used to identify the device.


The MAC address can be checked from the device LCD > Ethernet tab.

For details, refer to  "3-3-1 Parameter Setting Screen: Setting Tabs" (page 3-14).

CAUTION

Information for users of the OPPD-30E OPTEX FA LED lighting controller

The main parameter IDs from the OPPD-30E can be used unchanged, however there are some parameter IDs which are not supported.

For details, refer to  "OPPD-30E compatible parameter IDs" (page 9-48).

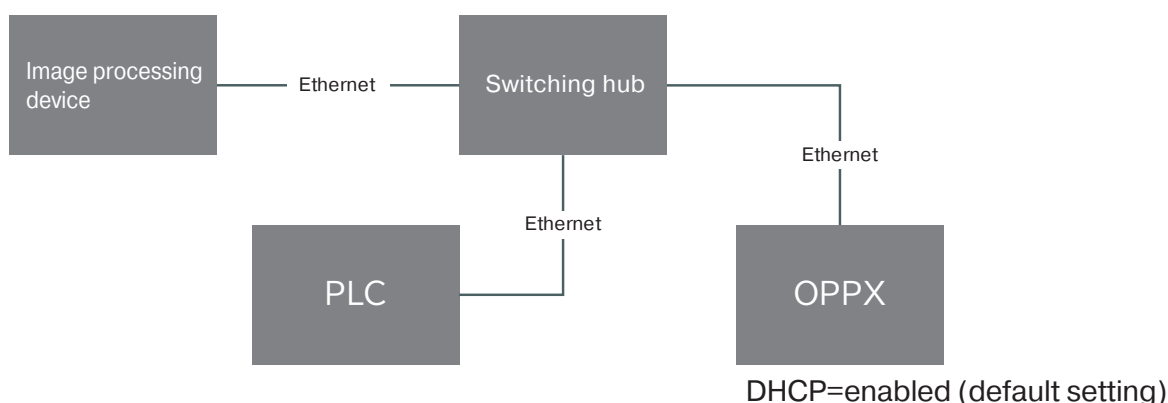
* iQSS can only be used with UDP.

9-5-2 Network Settings

When connecting this product and an external device using a LAN cable and performing Ethernet communication, first configure the network settings for the devices. The network settings for this product can be checked and changed by device operation ([Parameter setting screen] > Ethernet).

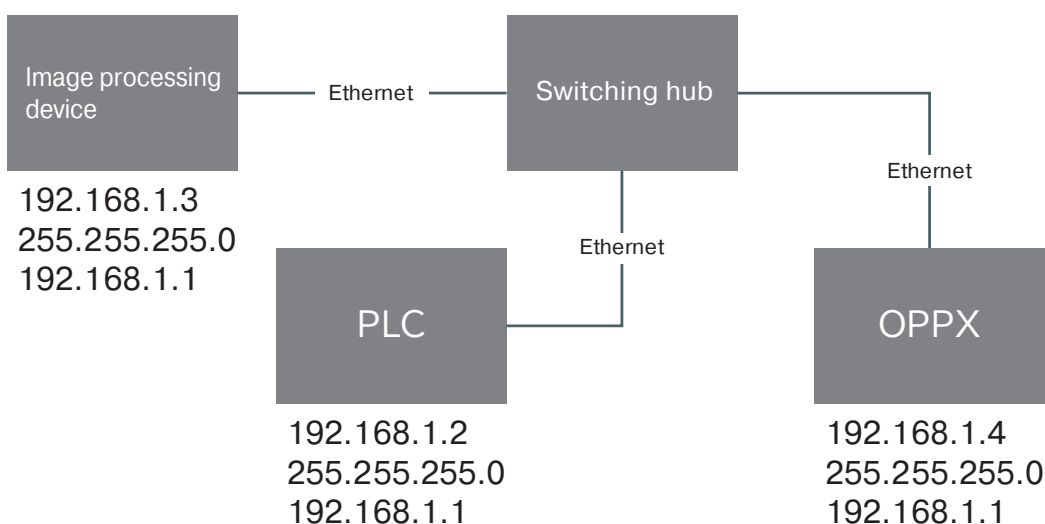
■ Example of network settings: When using the IP address assignment function [DHCP] (default setting)

When there is a switching hub or similar device with DHCP server functions on the same network and the DHCP function is enabled (default setting) in the settings of this product, an IP address is assigned automatically, making communication possible.



■ Example of network settings: When using a fixed IP address

This setting example is for a case of specifying a fixed IP address at this product to match the network surrounding the equipment without using the DHCP function. The operating procedure is explained below using a case of specifying the IP address and configuring the network settings as the example.



■ Required operations:

- ① Turn OFF (cancel) the [DHCP] automatic assignment function for IP address and other network settings.
- ② Set the IP address, subnet mask, and gateway to the specified addresses.

■ Operating procedure

- 1** [Basic Screen] Press and hold the MODE key to change to the [Parameter Setting Screen].
- 2** Rotate the dial and change to the “ETHERNET” tab, then press the dial key.
- 3** Rotate the dial to select [DHCP]. Press the dial key and change the setting value, then select [OFF] and press and hold the dial key. (Confirming the setting change)
- 4** Select [OFF] for the [DHCP] setting value, then press and hold the dial key to confirm the edit. (① Completion)
- 5** Rotate the dial and select [IP ADDRESS]. Press the dial key and change the setting value. Change the [IP ADDRESS] setting value to “192.168.1.4,” then press and hold the dial key to confirm the IP address. To change the value, rotate the dial. To change digits, press the dial key.
- 6** Next rotate the dial and select [SUBNET MASK]. Press the dial key and change the setting value. Here, set the [SUBNET MASK] setting value to “255.255.255.0.” The operating procedure is the same as in Step 5.
- 7** Next rotate the dial and select [GATEWAY]. Press the dial key and change the setting value. Here, set the [GATEWAY] setting value to “192.168.1.1.” The operating procedure is the same as in Step 5.

This completes configuration of the network settings. Use Ethernet and perform communication with the devices that are used.

9-5-3 Communication Specifications

Item	Description
Specifications	10BASE-T/100BASE-TX
Communication method	TCP, UDP, DHCP
Ports used	61440
Cable	CAT5 or higher

Item	Description
Other	<ul style="list-style-type: none"> IP fragmentation is not supported. Configure so that the transfer size for a single request or response is less than 1472 bytes. Communication responses are returned to the sender IP address: sender port. Simultaneous TCP connections: 4 TCP Keep-Alive: 10 seconds Retry count: 8 times, retry interval: 600 ms Timeout based on Keep-Alive is approx. 20 seconds. Auto MDI/MDI-X are not supported. Select a LAN cable to match the port of the connected Ethernet device. Auto MDI/MDI-X supported: Both straight and cross cables can be used. Auto MDI/MDI-X not supported & MDI port: Only a cross cable can be used. Auto MDI/MDI-X not supported & MDI-X port: Only a straight cable can be used.

9-5-4 Communication Commands

Communication commands are broadly divided into four categories. The details of each are listed individually.

List of communication commands

Command name	Communication command*	Description
Host name read	0x48 0x00	Host name refers to the name that is set individually to identify the connected product in the network.
Host name write	0x48 0x01	
Parameter read	0x52 0x00	These are the various parameters that can be set by device operation of this product. These commands perform write of the light intensity value, read of the monitor value, and other actions. The lamp selection and setting value are added to the communication commands at left to perform command read/write.
Parameter write	0x57 0x00	

* "0x**" indicates hexadecimal.

List of error response operations

When an error occurs at a request command, the following response status is returned. For details, refer to the explanation of each command.

Response status	Description
0x00 0x01	Undefined command
0x00 0x02	Write not possible
0x00 0x03	Invalid character / Number of characters upper limit
0x00 0x04	Request command (subheader) not 0x41 0x00
0x00 0x05	Transfer size less than 6 bytes / Transfer length different from actual data
0x00 0x06	Response command exceeds 1472 bytes. (Excess portion is discarded.)
0x00 0x07	Set data is value outside range
0x00 0x08	Station number error (Specified lamp does not exist.)

* "0x**" indicates hexadecimal.

■ Host name read

Read the host name.

● Request command

No.	Element name	Byte	Description
1	Header	-	Ethernet, IP, TCP, or UDP header
2	Subheader	2	0x41 0x00
3	Command	2	0x48 0x00
4	Data transfer length	2	0x00 0x00

* "0x**" indicates hexadecimal.

● Response command

No.	Element name	Byte	Description
1	Header	-	Ethernet, IP, TCP, or UDP header
2	Subheader	2	0x00 0x41
3	Command	2	0x48 0x00
4	Response data length	2	Host name size + 2
5	Response status	2	0x00 0x00: Success 0x00 0x01: Undefined command 0x00 0x04: Request command (subheader) not 0x41 0x00 0x00 0x05: Transfer size less than 6 bytes / Transfer length different from actual data
6	Host name		* The host name (character string) is displayed in hexadecimal. * List of characters that can be used 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz-._

* "0x**" indicates hexadecimal.

● Command examples

Setting contents	Command (Indicated in hexadecimal. 0x is omitted.)	
Host name read	Request	41 00 48 00 00 00
	Response	00 41 48 00 00 <u>06</u> 00 00 <u>4f 50 50 58</u> (Host name: OPPX, 4 bytes)

■ Host name write

Write the host name. When using multiple products, it will be convenient to configure so that each of the products can be identified.

● Request command

No.	Element name	Byte	Description
1	Header	-	Ethernet, IP, TCP, or UDP header
2	Request message	2	0x41 0x00
3	Command	2	0x48 0x01
4	Data transfer length	2	Length for host name. Maximum 63 characters
5	Host name		* Indicate the below characters which can be used using hexadecimal ASCII code, and send as a command. * List of characters that can be used 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz-:._

* "0x**" indicates hexadecimal.

● Response command

No.	Element name	Byte	Description
1	Header	-	Ethernet, IP, TCP, or UDP header
2	Response message	2	0x00 0x41
3	Command	2	0x48 0x01
4	Data transfer length	2	0x00 0x02
5	Response status	2	0x00 0x00: Success 0x00 0x01: Undefined command 0x00 0x03: Invalid character or number of characters upper limit 0x00 0x04: Request command (subheader) not 0x41 0x00 0x00 0x05: Transfer size less than 6 bytes / Transfer length different from actual data


* "0x**" indicates hexadecimal.

● Command examples

Host name write


Setting contents	Command (Indicated in hexadecimal. 0x is omitted.)	
Write host name "OPPX-No.1."	Request	41 00 48 01 00 09 4f 50 50 58 2d 4e 6f 2e 31
	Response	00 41 48 01 00 02 00 00 (Success)
Write host name "OPPX-#1"*. (Example of failure when invalid character is used)	Request	41 01 48 01 00 07 4f 50 50 58 2d 23 31
	Response	00 41 48 01 00 02 00 03 (Invalid character ⇒ "#" cannot be used.)

■ Parameter read

These commands read the setting values (parameters) that are written in this product. Because a setting value is associated with an individual parameter ID (refer to  “List of parameter IDs” (page 9-38)), specify the parameter ID of the setting value that you want to read when reading.


When attempting to read from a lighting that does not exist in the device configuration (such as LAMP3 in 2ch specifications or an expansion device lamp which is not connected), “Station number error (0x00 0x08)” is returned in the response status.

● Request command

No.	Element name	Byte	Description
1	Header	-	Ethernet, IP, TCP, or UDP header
2	Request message	2	0x41 0x00
3	Command	2	0x52 0x00: Parameter of the recipe number that is currently set 0x52 0x10: Parameter of recipe number 1 0x52 0x11: Parameter of recipe number 2 ... 0x52 0x1F: Parameter of recipe number 16
4	Data transfer length	2	2n
5	Parameter ID 1	2	Refer to  “List of parameter IDs” (page 9-38).
	...		
	Parameter ID n		

* “0x**” indicates hexadecimal.

● Response command

No.	Element name	Byte	Description
1	Header	-	Ethernet, IP, TCP, or UDP header
2	Response message	2	0x00 0x41
3	Command	2	0x52 0x00: Parameter of the recipe number that is currently set 0x52 0x10: Parameter of recipe number 1 0x52 0x11: Parameter of recipe number 2 ... 0x52 0x1F: Parameter of recipe number 16
4	Data transfer length	2	4n + 2 * When the setting value is 4 bytes, increase by that amount.
5	Response status	2	0x00 0x00: Success 0x00 0x01: Undefined command 0x00 0x04: Request command (subheader) not 0x41 0x00 0x00 0x05: Transfer size less than 6 bytes / Transfer length different from actual data 0x00 0x06: Response message exceeds 1472 bytes. 0x00 0x08: Station number error
6	Parameter ID 1	2	Refer to  “List of parameter IDs” (page 9-38).
7	Setting value 1	x	Varies depending on the parameter.
	:		
	Parameter ID n	2	
	Setting value n	y	Varies depending on the parameter.


* “0x**” indicates hexadecimal.

● Command examples

Parameter read


Setting contents	Command (Indicated in hexadecimal. 0x is omitted.)	
Read LAMP1 INTENSITY in current recipe.	Request	41 00 52 00 00 02 00 67
	Response	00 41 52 00 00 06 00 00 00 67 <u>00 64</u> (INTENSITY 100)
Read LAMP2 INTENSITY in recipe number 2.	Request	41 00 52 11 00 02 04 4f
	Request	00 41 52 11 00 06 00 00 04 4f <u>02 37</u> (INTENSITY 567)
Read LAMP3 and LAMP5 (expansion device 1 ch1) INTENSITYs in recipe number 13. (Example of failure: When expansion device 1 does not exist) ⇒	Request	41 00 52 1c 00 04 08 37 10 07
	Response	00 41 52 1c 00 0a 00 00 08 37 <u>03 84</u> 10 07 <u>01 c2</u> (LAMP3 INTENSITY 900, LAMP5 INTENSITY 450)
	Response	00 41 52 1c 00 02 <u>00 08</u> (Station number error)
Read LAMP1 MONITOR in current recipe.	Request	41 00 52 00 00 02 00 c6
	Response	00 41 52 00 00 06 00 00 00 c6 <u>00 ea</u> (Monitor value 234)
Read LAMP2 INTENSITY, MONITOR, TEMP, and LED TOTAL TIME in recipe number 3.	Request	41 00 52 12 00 08 04 4f 04 ae 04 b0 04 b7
	Response	00 41 52 12 00 14 00 00 04 4f <u>00 37</u> 04 ae <u>00 37</u> 04 b0 <u>00 23</u> 04 b7 <u>00 01 51 80</u> (INTENSITY 55, monitor value 55, TEMP 35°C, total illumination time (4 bytes) 86,400 s [24 h])
Read main device FW version.	Request	41 00 52 00 00 02 00 bd
	Response	00 41 52 00 00 0c 00 00 00 bd <u>33 31 33 31 36 42 31 32</u> (31316b12 in ASCII character code)
Read lamp status of LAMP2.	Request	41 00 52 00 00 02 04 cf
	Response	00 41 52 00 00 06 00 00 04 cf <u>01 01</u> (Convert hexadecimal to binary, and assign b0 - b15 in order starting from the bottom. 0x01 0x01⇒0000 0001 0000 0001 ⇒ Monitor brightness alarm active b8, illuminated b0)

■ Parameter write

These commands write various setting values (parameters) such as INTENSITY, WIDTH, and FEEDBACK ON/OFF to this product. Because a setting value is associated with an individual parameter ID (refer to  “9-5-5 Ethernet parameter IDs” (page 9-36)), specify the parameter ID of the setting value that you want to write when writing.

When attempting to write to a lighting that does not exist in the device configuration (such as LAMP3 in 2ch specifications or an expansion device lamp which is not connected), “Station number error (0x00 0x08)” is returned in the response status.

● Request command

No.	Element name	Byte	Description
1	Header	-	Ethernet, IP, TCP, or UDP header
2	Request message	2	0x41 0x00
3	Command	2	0x57 0x00: Current recipe 0x57 0x10: Recipe number 1 0x57 0x11: Recipe number 2 ... 0x57 0x1F: Recipe number 16
4	Data transfer length	2	4n * Change to match the ID + setting value.
5	Parameter ID 1	2	Refer to  “9-5-5 Ethernet parameter IDs” (page 9-36).
6	Setting value 1	x	Varies depending on the parameter.
	...		
	Parameter ID n	2	
	Setting value n	y	Varies depending on the parameter.

* “0x**” indicates hexadecimal.

● Response command

No.	Element name	Byte	Description
1	Header	-	Ethernet, IP, TCP, or UDP header
2	Response message	2	0x00 0x41
3	Command	2	0x57 0x00: Current recipe 0x57 0x10: Recipe number 1 0x57 0x11: Recipe number 2 ... 0x57 0x1F: Recipe number 16
4	Data transfer length	2	0x00 0x02

No.	Element name	Byte	Description
5	Response status	2	0x00 0x00: Success 0x00 0x01: Undefined command 0x00 0x02: Write not possible (writing in progress) 0x00 0x04: Request command (subheader) not 0x41 0x00 0x00 0x05: Transfer size less than 6 bytes / Transfer length different from actual data 0x00 0x06: Request message exceeds 1472 bytes. 0x00 0x07: Setting value for write is out of range 0x00 0x08: Station number error

* "0x**" indicates hexadecimal.

● Command examples

Parameter write

Setting contents	Command (Indicated in hexadecimal. 0x is omitted.)	
Set LAMP1 INTENSITY in current recipe to 100.	Request	41 00 57 00 00 04 00 67 00 64
	Response	00 41 57 00 00 02 00 00
Set LAMP4 INTENSITY in recipe number 5 to 255.	Request	41 00 57 14 00 04 0c 1f 00 ff
	Response	00 41 57 14 00 02 00 00
Set LAMP2 and LAMP6 (expansion device 1 ch2) WIDTH in LAMP n SYNC to 150 and 700 in recipe number 11 respectively.. (Example of failure: When expansion device 1 does not exist) →	Request	41 00 57 1a 00 08 04 50 00 96 13 f0 02 bc
	Response	00 41 57 1a 00 02 00 00
	Response	00 41 57 1a 00 02 00 08 (Station number error)
In the current recipe, change the synchronization input SYNC1 and SYNC2 to NEG and SYNC3 and SYNC4 to POS.	Request	41 00 57 00 00 04 00 70 00 0c
	Response	00 41 57 00 00 02 00 00
Engage operation lock.	Request	41 00 57 00 00 04 00 2a 00 01
	Response	00 41 57 00 00 02 00 00
Disengage operation lock. (Pass code: 0000)	Request	41 00 57 00 00 06 01 2e <u>30 30 30 30</u> (Decimal 0 ⇒ ASCII character code 48 ⇒ Hexadecimal 0x30)
	Response	00 41 57 00 00 02 00 00 (Unlock success)

9-5-5 Ethernet parameter IDs

The setting values (parameters) that can be read/written by Ethernet communication from/to this product have an individual ID that is set as the parameter ID. When reading/writing, refer to the table below and specify the parameter ID.

CAUTION

LAMP selection (station number selection)

With this product, a main device and maximum three expansion devices can be connected and used. The parameters can be changed for a maximum of 16ch of lightings including expansion devices by Ethernet communication to the main device. When setting for an individual lamp, it is necessary to specify the lamp (specify the station number). For a setting that is common for this product (used for all lamps) (main device, expansion devices), specify lamp numbers that are included in the product to be set.

(1) Specifying an individual lamp

⇒ Add the value of the lamp number minus 1 multiplied by 1000 to the parameter ID and set.

Example: For lamp 3, add $(3 - 1) * 1000 = 2000$.

↓ Setting for parameter ID: 103 (INTENSITY)

Lamp number n	Parameter ID	Added value	(Hexadecimal notation)
LAMP1	103	+0	0x00 0x67
LAMP3	2103	+2000 $[(3 - 1)*1000]$	0x08 0x37
LAMP12	11103	+11000 $[(12 - 1)*1000]$	0x2b 0x5f

(2) Common setting for this product


⇒ Specify LAMP1 to 4 for the main device, LAMP5 to 8 for expansion device 1, LAMP9 to 12 for expansion device 2, and LAMP13 to 16 for expansion device 3, and set by adding the value to the parameter ID in the same way as (1).

*When attempting to read from a lighting that does not exist in the device configuration (such as LAMP3 in 2ch specifications), 0 is returned. When writing, "Station number error" is returned in the response status.

List of added value for each lamp number

Device	Lamp number	Added value
Main device	LAMP1	0
	LAMP2	1,000
	LAMP3	2,000
	LAMP4	3,000
Expansion device 1	LAMP5	4,000
	LAMP6	5,000
	LAMP7	6,000
	LAMP8	7,000
Expansion device 2	LAMP9	8,000
	LAMP10	9,000
	LAMP11	10,000
	LAMP12	11,000
Expansion device 3	LAMP13	12,000
	LAMP14	13,000
	LAMP15	14,000
	LAMP16	15,000

List of parameter IDs

The parameter IDs for this product start from 100 and are as shown below. Parameter IDs 99 and below are compatible IDs with the OPPD-30E OPTEx FA LED lighting controller. For the compatible IDs, refer to  “OPPD-30E compatible parameter IDs” (page 9-48).

* Setting values in the table are 2 bytes unless otherwise specified.

MEMO

When turning on/off the lighting, use the parameter ID “110” below.

Note that this ID is the same as “ID110 Lighting control mode”.

ID	Hexadecimal	Name	Setting value	Read/wire	Lamp
110	0x00 0x6e	ENABLE	0: OFF 1: ON	R/W	Individual


ID	Hexadecimal	Name	Setting value	Read/write	Lamp
100	0x00 0x64	MODE (in LAMP n INTENSITY)	0: PWM 1: Strobe 2: Variable voltage 3: L-INT 4: L-INT Strobe	R/W	Individual
101	0x00 0x65	PWM FREQ	0: 50 kHz 1: 100 kHz 2: 100 kHz DC 3: 130 kHz DC	R/W	Individual
102	0x00 0x66	PWM FREQ ADJ	0: AUTO 1: -1 2: -2 3: -3 4: OFF	R/W	Common
103	0x00 0x67	INTENSITY	0 to 999	R/W	Individual
104	0x00 0x68	WIDTH (in LAMP n SYNC)	0 to 999	R/W	Individual
105	0x00 0x69	WIDTH units (in LAMP n SYNC)	0: μ s 1: ms	R/W	Individual
106	0x00 0x6a	DELAY	0 to 999	R/W	Individual
107	0x00 0x6b	DELAY units	0: μ s 1: ms	R/W	Individual
108	0x00 0x6c	DC RANGE	0: LOW 1: HIGH * Valid only for 24 V output specifications	R/W	Individual
110	0x00 0x6e	MODE (in LAMP n SYNC) Use this command when performing communication to turn a lighting ON/OFF. 0: OFF, 1: ON	0: External 1: Internal 2: OFF	R/W	Individual

ID	Hexadecimal	Name	Setting value	Read/write	Lamp
111	0x00 0x6f	ENABLE	0 to 15 (bit flag) Bit0: SYNC1 Bit1: SYNC2 Bit2: SYNC3 Bit3: SYNC4 0:OFF, 1:ON * For details of the setting procedure, refer to the separate table (*1).	R/W	Individual
112	0x00 0x70	POLARITY	0 to 15 (bit flag) Bit0: SYNC1 Bit1: SYNC2 Bit2: SYNC3 Bit3: SYNC4 0: NEG, 1: POS * For details of the setting procedure, refer to the separate table (*1).	R/W	Common
113	0x00 0x71	FILTER (μs)	1 - 1000	R/W	Common
114	0x00 0x72	TOTAL NUM OF SEQ	0 to 15 0: Sequence control OFF 1: 2 times 15: 16 times	R/W	Common
115	0x00 0x73	SEQ NUM NOW	0 to 16 0: Sequence control OFF 1: 1st time 16: 16th time	R	Individual
116	0x00 0x74	SEQ NUM FIX	0 to 16 0: Not fixed 1: Fixed at 1st time 16: Fixed at 16th time	R/W	Common
117	0x00 0x75	RESET INPUT	0: SQRST 1: SYNC1 2: SYNC2 3: SYNC3 4: SYNC4	R/W	Common
118	0x00 0x76	RESET EXE	1: Execute	W	Common
119	0x00 0x77	Sequence control 1 INTENSITY	0 to 999	R/W	Individual
120	0x00 0x78	Sequence control 1 WIDTH	0 to 999	R/W	Individual
121	0x00 0x79	Sequence control 1 WIDTH units	0: μs 1: ms	R/W	Individual
122	0x00 0x7a	Sequence control 2 INTENSITY	0 to 999	R/W	Individual
123	0x00 0x7b	Sequence control 2 WIDTH	0 to 999	R/W	Individual
124	0x00 0x7c	Sequence control 2 WIDTH units	0: μs 1: ms	R/W	Individual
125	0x00 0x7d	Sequence control 3 INTENSITY	0 to 999	R/W	Individual
126	0x00 0x7e	Sequence control 3 WIDTH	0 to 999	R/W	Individual

ID	Hexadecimal	Name	Setting value	Read/write	Lamp
127	0x00 0x7f	Sequence control 3 WIDTH units	0: μ s 1: ms	R/W	Individual
128	0x00 0x80	Sequence 4th time INTENSITY	0 to 999	R/W	Individual
129	0x00 0x81	Sequence control 4 WIDTH	0 to 999	R/W	Individual
130	0x00 0x82	Sequence control 4 WIDTH units	0: μ s 1: ms	R/W	Individual
131	0x00 0x83	Sequence control 5 INTENSITY	0 to 999	R/W	Individual
132	0x00 0x84	Sequence control 5 WIDTH	0 to 999	R/W	Individual
133	0x00 0x85	Sequence control 5 WIDTH units	0: μ s 1: ms	R/W	Individual
134	0x00 0x86	Sequence control 6 INTENSITY	0 to 999	R/W	Individual
135	0x00 0x87	Sequence control 6 WIDTH	0 to 999	R/W	Individual
136	0x00 0x88	Sequence control 6 WIDTH units	0: μ s 1: ms	R/W	Individual
137	0x00 0x89	Sequence control 7 INTENSITY	0 to 999	R/W	Individual
138	0x00 0x8a	Sequence control 7 WIDTH	0 to 999	R/W	Individual
139	0x00 0x8b	Sequence control 7 WIDTH units	0: μ s 1: ms	R/W	Individual
140	0x00 0x8c	Sequence control 8 INTENSITY	0 to 999	R/W	Individual
141	0x00 0x8d	Sequence control 8 WIDTH	0 to 999	R/W	Individual
142	0x00 0x8e	Sequence control 8 WIDTH units	0: μ s 1: ms	R/W	Individual
143	0x00 0x8f	Sequence control 9 INTENSITY	0 to 999	R/W	Individual
144	0x00 0x90	Sequence control 9 WIDTH	0 to 999	R/W	Individual
145	0x00 0x91	Sequence control 9 WIDTH units	0: μ s 1: ms	R/W	Individual
146	0x00 0x92	Sequence control 10 INTENSITY	0 to 999	R/W	Individual
147	0x00 0x93	Sequence control 10 WIDTH	0 to 999	R/W	Individual
148	0x00 0x94	Sequence control 10 WIDTH units	0: μ s 1: ms	R/W	Individual
149	0x00 0x95	Sequence control 11 INTENSITY	0 to 999	R/W	Individual
150	0x00 0x96	Sequence control 11 WIDTH	0 to 999	R/W	Individual
151	0x00 0x97	Sequence control 11 WIDTH units	0: μ s 1: ms	R/W	Individual
152	0x00 0x98	Sequence control 12 INTENSITY	0 to 999	R/W	Individual
153	0x00 0x99	Sequence control 12 WIDTH	0 to 999	R/W	Individual
154	0x00 0x9a	Sequence control 12 WIDTH units	0: μ s 1: ms	R/W	Individual
155	0x00 0x9b	Sequence control 13 INTENSITY	0 to 999	R/W	Individual
156	0x00 0x9c	Sequence control 13 WIDTH	0 to 999	R/W	Individual
157	0x00 0x9d	Sequence control 13 WIDTH units	0: μ s 1: ms	R/W	Individual
158	0x00 0x9e	Sequence control 14 INTENSITY	0 to 999	R/W	Individual
159	0x00 0x9f	Sequence control 14 WIDTH	0 to 999	R/W	Individual


ID	Hexadecimal	Name	Setting value	Read/write	Lamp
160	0x00 0xa0	Sequence control 14 WIDTH units	0: μ s 1: ms	R/W	Individual
161	0x00 0xa1	Sequence control 15 INTENSITY	0 to 999	R/W	Individual
162	0x00 0xa2	Sequence control 15 WIDTH	0 to 999	R/W	Individual
163	0x00 0xa3	Sequence control 15 WIDTH units	0: μ s 1: ms	R/W	Individual
164	0x00 0xa4	Sequence control 16 INTENSITY	0 to 999	R/W	Individual
165	0x00 0xa5	Sequence control 16 WIDTH	0 to 999	R/W	Individual
166	0x00 0xa6	Sequence control 16 WIDTH units	0: μ s 1: ms	R/W	Individual
167	0x00 0xa7	FEEDBACK	0: MONITOR 1: ON 2: OFF 3: ABSOLUTE AUTO ADJUST	R/W	Individual
168	0x00 0xa8	FB RATE	0 to 2047	R	Individual
169	0x00 0xa9	OUT POL	0: NEG 1: POS	R/W	Common
170	0x00 0xaa	IN POL	0: NEG 1: POS	R/W	Common
171	0x00 0xab	IN MODE	0: INTENSITY 1: Recipe number	R/W	Common
172	0x00 0xac	IN FILTER	0: 5 μ s 1: 25 μ s 2: 50 μ s 3: 100 μ s 4: 300 μ s 5: 500 μ s 6: 1000 μ s	R/W	Common

ID	Hexadecimal	Name	Setting value	Read/write	Lamp
173	0x00 0xad	USER1	0: Always OFF 1: RUN output 2: LAMP1 illuminated 3: LAMP1 synchronization control ready	R/W	Common
174	0x00 0xae	USER2	4: LAMP1 sequence control 1st time 5: LAMP2 illuminated 6: LAMP2 synchronization control ready	R/W	Common
175	0x00 0xaf	USER3	7: LAMP2 sequence control 1st time 8: LAMP3 illuminated 9: LAMP3 synchronization control ready	R/W	Common
176	0x00 0xb0	USER4	10: LAMP3 sequence control 1st time 11: LAMP4 illuminated 12: LAMP4 synchronization control ready	R/W	Common
177	0x00 0xb1	USER5	13: LAMP4 sequence control 1st time 14: Any of LAMP1 - 4 illuminated	R/W	Common
229	0x00 0xe5	USER6	15: Error output 16: Warning output 17: Main device error output 18: Main device warning output	R/W	Common
178	0x00 0xb2	NUMBER	1 - 16	R/W	Common
179	0x00 0xb3	MEMO	ASCII maximum 64 characters 64 bytes	R/W	Common
180	0x00 0xb4	INT STB PERIOD	1 to 2000	R/W	Common
181	0x00 0xb5	INT STB PERIOD units	0: 0.1 ms 1: 1 ms	R/W	Common
182	0x00 0xb6	ALARM LOW	0 to 200	R/W	Individual
183	0x00 0xb7	ALARM HIGH	0 to 255	R/W	Individual
184	0x00 0xb8	Control substrate microcomputer temperature	-100 to 255	R	Common
185	0x00 0xb9	Power substrate 1 microcomputer temperature	-100 to 255	R	Common
186	0x00 0xba	Power substrate 2 microcomputer temperature	-100 to 255	R	Common
187	0x00 0xbb	TEMP	-100 to 130	R	Individual
189	0x00 0xbd	FW VERSION	ASCII, 8 characters 8 bytes	R	Common

ID	Hexadecimal	Name	Setting value	Read/write	Lamp
190	0x00 0xbe	Specify response command type	0: Variable length 1: Fixed length	R/W	Common
191	0x00 0xbf	LANGUAGE	0: English 1: Japanese	R/W	Common
192	0x00 0xc0	Copy setting value	3 characters specified Copy source station number/ copy destination station number 1/copy destination station number 2	W	Common
193	0x00 0xc1	INIT	1: Current recipe setting values 2: All recipe setting values 3: Common setting values (except for communication setting values) 4: Language	W	Common
194	0x00 0xc2	DHCP	0: OFF 1: ON	R/W	Common
313	0x01 0x39	BOOTP	0: OFF 1: ON DHCP = 1 is given priority.	R/W	Common
195	0x00 0xc3	iQSS TX PERIOD	0: OFF 1: ON	R/W	Common
196	0x00 0xc4	iQSS TX PERIOD time	1 to 999 Units: ms	R/W	Common
197	0x00 0xc5	iQSS DEVICE NUM	First device number (D0 - D993) of iQSS regular transmission data	R/W	Common
228	0x00 0xe4	Lx-ON OFF DELAY	0 to 999	R/W	Individual
230	0x00 0xe6	Device status	Refer to  "Device status" (page 9-47).	R	Common

ID	Hexadecimal	Name	Setting value	Read/write	Lamp
232	0x00 0xe8	Device connection information	Returns the configuration of devices connected via infrared communication in the following ASCII code (4 bytes in total) for each device. The configuration is stored in the order of Main device, Expansion device 1, Expansion device 2, and Expansion device 3, starting with the lower byte. 0: Not connected 1: 12 V/2 ch 2: 12 V/4 ch 3: 24 V/2 ch 4: 24 V/4 ch 6: Dual/4 ch	R	Common
233	0x00 0xe9	POWER DROP	0 to 9999	R	Common
298	0x01 0x2A	5 V SYNC	0: OFF 1: ON	R/W	Common
301	0x01 0x2d	ERROR RESET / ERROR CLEAR	1: Execute reset Resets the currently detected error, warning, overcurrent stop status, and low voltage detection count. Lighting output turns off momentarily.	W	Common
42	0x00 0x2a	Operation lock	1: Prohibit setting value changes by device panel operation. Unlock uses ID302 unlock.	R/W	Common
302	0x01 0x2e	Unlock	4-character pass code	W	Common
303	0x01 0x2f	PASS CODE	Character string, 8 characters \$\$\$\$#### \$\$\$\$: Current pass code ####: New pass code Normal response if codes match	W	Common
304	0x01 0x30	Operating time (sec)	0 to 4,294,967,295	R	Common
305	0x01 0x31	LAMP n CAP STATUS	0 to 1000 Returns the ratio (out of 1,000) between the output capacitor capacitance that was measured when the product started and the capacitance at the time of production. 1000: 100.0%	R	Individual

ID	Hexadecimal	Name	Setting value	Read/write	Lamp
306	0x01 0x32	TOTAL POWER	0 to 2000 This is the total power for all lighting output.	R	Common
309	0x01 0x35	Error check	0: No error or warning 1: Warning 2: Error 3: Error and warning If the main device, includes the status of expansion devices.	R	Common
310	0x01 0x36	STOP SAVING	0: Setting value changes are saved. 1: Setting value changes are not saved. Saved at time when setting is changed from OFF to ON. Settings written to a recipe other than the selected recipe number are saved.	R/W	Common
311	0x01 0x37	Unique ID	ASCII 24 characters Station number 0: Main microcomputer 17 characters Station number 1-2: Sub microcomputer 16 characters remaining characters blank	R	Individual
315	0x01 0x3b	BYTE ORDER	0:LITTLE 1:BIG	R/W	Common
316	0x01 0x3c	CYCLIC FORMAT	0:FIX 1:USER	R/W	Common
400 - 415	0x04 0x90 - 0x01 0x9F	LAMPn O2T USER FORMAT	LAMP1:0x0000 to 0xFFFF ... LAMP16:0x0000 to 0xFFF	R/W	Common
416 - 431	0x01 0xA0 - 0x01 0xAF	LAMPn T2O USER FORMAT	LAMP1:0x00000000 to 0xFFFFFFFF ... LAMP16:0x00000000 to 0xFFFFFFFF	R/W	Common
Lighting information etc.					
198	0x00 0xc6	MONITOR	0 to 2047	R	Individual
199	0x00 0xc7	ABSOLUTE MONITOR	0 to 4095	R	Individual
200	0x00 0xc8	TEMP	-99 to 155	R	Individual
201	0x00 0xc9	SW VERSION		R	Individual
203	0x00 0xcb	SERIALNUM	20 characters 20 bytes	R	Individual
204	0x00 0xcc	LAMP MODEL	7 - 20 characters 20 bytes	R	Individual

ID	Hexadecimal	Name	Setting value	Read/ write	Lamp
205	0x00 0xcd	RATED POWER	6 characters	R	Individual
206	0x00 0xce	CCT/WAVELENGTH	6 characters	R	Individual
207	0x00 0xcf	LED TOTAL TIME (sec)	0 to 4,294,967,295 4 bytes	R	Individual
208	0x00 0xd0	LED USER TIME	Read R 0 to 4,294,967,295 4 bytes Write W 0: Reset value Other than 0: Write error	R/W	Individual
231	0x00 0xe7	Lamp status	Refer to  (page 9-47).	R	Individual
234	0x00 0xea	APPLIED VOLTAGE	0 to 6000 2 digits after decimal point	R	Individual
294	0x01 0x26	TEMP LIMIT	0 to 254	R	Individual
296	0x01 0x28	Total illumination count	Read: R 0 to 999,999,999 4 bytes Write: W 0: Reset value Other than 0: Write error	R/W	Individual
307	0x01 0x33	DC MON LIMIT	0 to 999	R	Individual
308	0x01 0x34	L-INT MON LIMIT	0 to 999	R	Individual

*1: Set the subjects for synchronization input (SYNC1 to 4) and the input polarity for each SYNC as shown below.

Setting value			Setting status (synchronization input, POLARITY)			
Decimal	Hexadecimal	Bit	SYNC1	SYNC2	SYNC3	SYNC4
0	0	0000	OFF	OFF	OFF	OFF
1	1	0001	ON	OFF	OFF	OFF
2	2	0010	OFF	ON	OFF	OFF
3	3	0011	ON	ON	OFF	OFF
4	4	0100	OFF	OFF	ON	OFF
5	5	0101	ON	ON	ON	OFF
6	6	0110	OFF	ON	ON	OFF
7	7	0111	ON	ON	ON	OFF
8	8	1000	OFF	OFF	OFF	ON
9	9	1001	ON	OFF	OFF	ON
10	a	1010	OFF	ON	OFF	ON
11	b	1011	ON	ON	OFF	ON
12	c	1100	OFF	OFF	ON	ON
13	d	1101	ON	OFF	ON	ON
14	e	1110	OFF	ON	ON	ON
15	f	1111	ON	ON	ON	ON

- Synchronization input
ON (1): Subject to synchronization input, OFF (0): Not subject to synchronization input
- POLARITY
ON (1): POS, OFF (0): NEG

■ Device status

Bit	Status
b0	1: Memory error
b1	1: FPGA error
b2	1: Firmware update failed
b3	1: Power substrate 1 communication error
b4	1: Power substrate 2 communication error
b5	1: Low input voltage
b6	1: Power supply high temperature detection or power supply high temperature detection warning
b7	1: Lighting power too high
b8	1: IP error
b9	1: DHCP error
b10	1: Network error
b11	1: Parallel output terminal overcurrent
b12 - 15	Infrared communication self device number

■ Lamp n status (n = 1 to 16, lamp number)

Bit	Status
b0	1: Illuminated
b1	1: Lighting output overvoltage or lighting output correction error
b2	1: Lighting output low voltage
b3	1: Lighting output operation error
b4	1: Lighting output gate power supply error
b5	1: Lighting erroneous discharge detection
b6	1: Lighting overcurrent
b7	1: Lighting high temperature detection
b8	1: Monitor brightness alarm
b9	1: Feedback error
b10	1: Lighting output start error
b11	1: Lighting output high temperature detection
b12	1: Lighting communication overcurrent
b13	1: Lighting power too high
b14	Empty
b15	Empty

■ OPPD-30E compatible parameter IDs

Some functions have IDs which are compatible with the OPPD-30 series.

The method of specifying station numbers is different between the OPPD-30 series and this product, and there are commands with different setting values.

For this reason, using exactly the same commands may not produce the intended control.

ID	Hexadecimal	Name	Setting value	Read/write	Name in OPPD-30
1	0x00 0x01	PWM FREQ	0: 50 kHz 1: 100 kHz 2: 100 kHz DC 3: 130 kHz DC	R/W	PWM frequency
2	0x00 0x02	FILTER (μs)	1 to 1000	R/W	Synchronization control input filter time
3	0x00 0x03	TOTAL NUM OF SEQ	0 to 15 0: Sequence control OFF 1: 2 counts, 15: 16 counts	R/W	Lighting control sequence
4	0x00 0x04	LAMP 1 DELAY	0 to 999	R/W	LAMP1 lighting delay time
5	0x00 0x05	LAMP 1 DELAY units	0: 10μs 1: 1 ms	R/W	LAMP1 lighting delay time unit
6	0x00 0x06	LAMP 1 WIDTH units	0: μs 1: ms	R/W	LAMP1 light emitting width unit

ID	Hexadecimal	Name	Setting value	Read/write	Name in OPPD-30
7	0x00 0x07	POLARITY	0 to 15 (bit flag) Bit0: SYNC1 Bit1: SYNC2 Bit2: SYNC3 Bit4: SYNC4 0: NEG, 1: POS	R/W	LAMP1 synchronization control input (polarity switching)
8	0x00 0x08	LAMP 1 FEEDBACK	0: MONITOR, 1: ON, 2: OFF, 3: ABSOLUTE AUTO ADJUST	R/W	LAMP1 feedback function
9	0x00 0x09	LAMP 1 ALARM LOW	0 to 200	R/W	LAMP1 monitor alarm lower limit value
10	0x00 0x0a	LAMP 1 ALARM HIGH	0 to 255	R/W	LAMP1 monitor alarm upper limit value
12	0x00 0x0c	LAMP 1 INTENSITY	0 to 999	R/W	LAMP1 synchronization control input selection 1
13	0x00 0x0d	LAMP 1 WIDTH	0 to 999	R/W	LAMP1 INTENSITY 1
15	0x00 0x0f	LAMP 1 Sequence 2nd time INTENSITY	0 to 999	R/W	LAMP1 light emitting width 1
16	0x00 0x10	LAMP 1 Sequence 2nd time WIDTH	0 to 999	R/W	LAMP1 synchronization control input selection 2
18	0x00 0x12	LAMP 1 Sequence 3rd time INTENSITY	0 to 999	R/W	LAMP1 INTENSITY 3
19	0x00 0x13	LAMP 1 Sequence 3rd time WIDTH	0 to 999	R/W	LAMP1 light emitting width 3
21	0x00 0x15	LAMP 1 Sequence 4th time INTENSITY	0 to 999	R/W	LAMP1 INTENSITY 4
22	0x00 0x16	LAMP 1 Sequence 4th time WIDTH	0 to 999	R/W	LAMP1 light emitting width 4
23	0x00 0x17	LAMP 2 DELAY	0 to 999	R/W	LAMP2 lighting delay time
24	0x00 0x18	LAMP 2 DELAY units	0: 10 μ s 1: 1 ms	R/W	LAMP2 lighting delay time unit
25	0x00 0x19	LAMP 2 WIDTH units	0: μ s 1: ms	R/W	LAMP2 light emitting width unit
27	0x00 0x1b	LAMP 2 FEEDBACK	0: MONITOR, 1: ON, 2: OFF, 3: ABSOLUTE AUTO ADJUST	R/W	LAMP2 feedback function
28	0x00 0x1c	LAMP 2 ALARM LOW	0 to 200	R/W	LAMP2 monitor alarm lower limit value

ID	Hexadecimal	Name	Setting value	Read/write	Name in OPPD-30
29	0x00 0x1d	LAMP 2 ALARM HIGH	0 to 255	R/W	LAMP2 monitor alarm upper limit value
31	0x00 0x1f	LAMP 2 INTENSITY	0 to 999	R/W	LAMP2 INTENSITY 1
32	0x00 0x20	LAMP 2 WIDTH	0 to 999	R/W	LAMP2 light emitting width 1
34	0x00 0x22	LAMP 2 Sequence 2nd time INTENSITY	0 to 999	R/W	LAMP2 INTENSITY 2
35	0x00 0x23	LAMP 2 Sequence 2nd time WIDTH	0 to 999	R/W	LAMP2 light emitting width 2
37	0x00 0x25	LAMP2 Sequence 3rd time INTENSITY	0 to 999	R/W	LAMP2 INTENSITY 3
38	0x00 0x26	LAMP 2 Sequence 3rd time WIDTH	0 to 999	R/W	LAMP2 light emitting width 3
40	0x00 0x28	LAMP 2 Sequence 4th time INTENSITY	0 to 999	R/W	LAMP2 INTENSITY 4
41	0x00 0x29	LAMP 2 Sequence 4th time WIDTH	0 to 999	R/W	LAMP2 light emitting width 4
44	0x00 0x2c	MODE (in LAMP n SYNC)	0: External 1: Internal 2: OFF	R/W	Forced lighting/turning OFF
45	0x00 0x2d	RESET EXE	1: Execute	W	Lighting control sequence reset
46	0x00 0x2e	iQSS TX PERIOD	0: OFF 1: ON	R/W	iQSS periodic transmission
48	0x00 0x30	iQSS iQSS TX PERIOD time	1 to 999 Units: ms	R/W	iQSS periodic transmission time
50	0x00 0x32	iQSS DEVICE NUM	First device number (D0 - D993) of iQSS regular transmission data	R/W	iQSS device number
55	0x00 0x37	LAMP 1 MONITOR	0 to 4095	R	LAMP1 monitor value
56	0x00 0x38	LAMP 1 ABSOLUTE MONITOR	0 to 4095	R	LAMP1 absolute brightness
57	0x00 0x39	LAMP 1 TEMP	-100 to +155°C	R	LAMP1 internal temperature
66	0x00 0x42	LAMP 2 MONITOR	0 to 4095	R	LAMP2 monitor value
67	0x00 0x43	LAMP 2 ABSOLUTE MONITOR	0 to 4095	R	LAMP2 absolute brightness
68	0x00 0x44	LAMP 2 TEMP	-100 - +155°C	R	LAMP2 internal temperature

ID	Hexadecimal	Name	Setting value	Read/ write	Name in OPPD-30
77	0x00 0x4d	LAMP 1 intensity correction value	Correction rate based on feedback	R	LAMP1 corrected INTENSITY
78	0x00 0x4e	LAMP 2 intensity correction value	Correction rate based on feedback	R	LAMP2 corrected INTENSITY
81	0x00 0x51	Sequence reset assignment	0 to 4 0: SYNC 1 1: SYNC 2 2: SYNC 3 3: SYNC 4 4: SQRST	R/W	Sequence reset assignment

9-6 EtherNet/IP Communication

Periodic (cyclic) communication and non-periodic (message) communication via EtherNet/IP communication are possible on EtherNet/IP support model "OPPX-xxEPx".

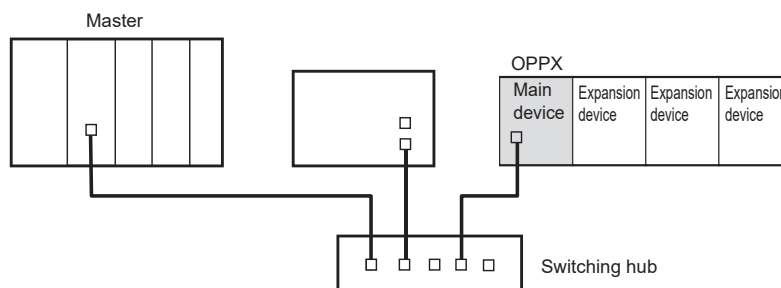
It is possible to change and save various parameters including the lighting INTENSITY, and also to read various data from a PLC or other external device through a master unit that supports EtherNet/IP.

9-6-1 System Configuration

■ Ethernet connection configuration

This product supports the star Ethernet connection configuration.

Star networks use a topology in which various devices are connected through a switching hub.



■ Network settings (setting the IP address)

The built-in DHCP client automatically assigns an IP address if a DHCP server is present on the network (default setting).

The assigning of an IP address from a BOOTP server is also supported. (If DHCP and BOOTP are both enabled, DHCP is given priority.)

It is also possible to configure settings manually to specify a fixed IP address at this product to match the network surrounding the equipment.

For details on the IP address setting, "9-6-5 Procedure Required for Communicating with a EtherNet/IP master (Periodic Communication)" (page 9-64)

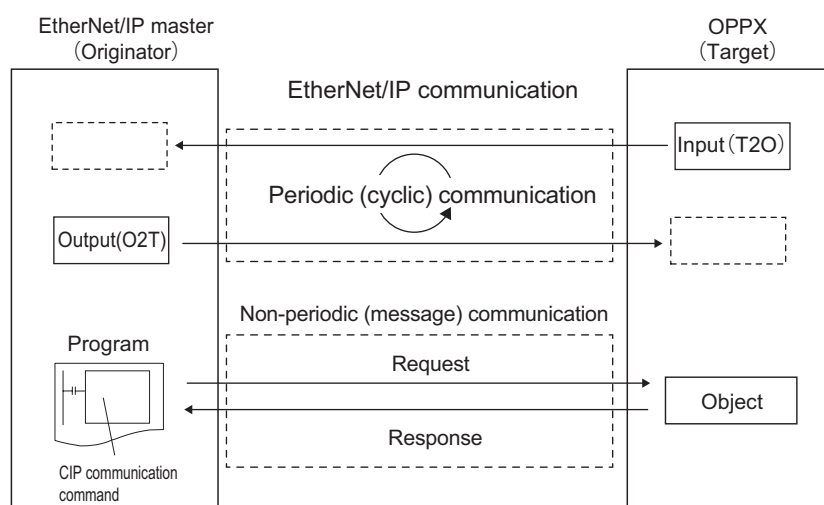
When multiple OPPX devices are connected, the device MAC address can be used to identify the device. For details on how to check the MAC address, "3-3-1 Parameter Setting Screen: Setting Tabs" (page 3-14)

9-6-2 Communication Settings and Specifications

Item	Specification
Supported version	EtherNet/IP adapter
Certification version	CT20
Compatible standard	IEEE802.3u
Transmission distance	Max. 100 m
Transmission speed	10/100 Mbps
Cable	STP; Category 5, 5e or higher
Transmission path format	Star
Supported functions	Implicit message (Class1) Explicit message (Class3, UCMM) ACD (Address Conflict Detection) IP address setting (fixed IP, DHCP, BOOTP)
Maximum number of connections	Class1:8, Class3:8, UCMM:8,
Packet interval (RPI)	1 to 32767 ms

9-6-3 EtherNet/IP Communication with This Product

This section explains the communication that this product can carry out with a EtherNet/IP master. This product can carry out the following periodic (cyclic) communication and non-periodic (message) communication with a EtherNet/IP master.



■ Periodic (cyclic) communication

Communication is performed between the OPPX and the EtherNet/IP master at a fixed period.

This product has two formats for periodic communication, and the input/output items differ as shown below.

Input/output direction Periodic communication format	Input (T2O) (OPPX → EtherNet/IP master)	Output (O2T) (EtherNet/IP master → OPPX)
User	You can arbitrarily select the input items. <ul style="list-style-type: none">• Lamp status• Light intensity value (MODE (in LAMP n INTENSITY) / INTENSITY (in LAMP n INTENSITY))• Synchronization control (such as WIDTH/ DELAY)• Lighting controller information• Lighting information (such as MONITOR and TEMP)	You can arbitrarily select the output items. <ul style="list-style-type: none">• Lighting mode• Light intensity value• Illumination time (WIDTH / WIDTH units)• Synchronization delay time (DELAY / DELAY units)• MODE (in LAMP n SYNC)
Fix	The input items are fixed. <ul style="list-style-type: none">• Error check• LAMP1 to LAMP16 MONITOR• LAMP1 to LAMP16 TEMP	The output items are fixed. <ul style="list-style-type: none">• LAMP1 to LAMP16 INTENSITY (in LAMP n INTENSITY)• LAMP1 to LAMP16 WIDTH

■ Non-periodic (message) communication

Communication commands are issued with arbitrary timing from the EtherNet/IP master to read/write the specified data on this product.

All the data of the objects in this product can be read/written.

This method is mainly used when you want to write/read the setting parameters via Ethernet communication and when you want to read the error status.

9-6-4 Mechanisms of Periodic (Cyclic) Communication

In periodic communication, one device opens a logical communication line known as a “connection” to the other device. When the connection is successful, periodic communication starts.

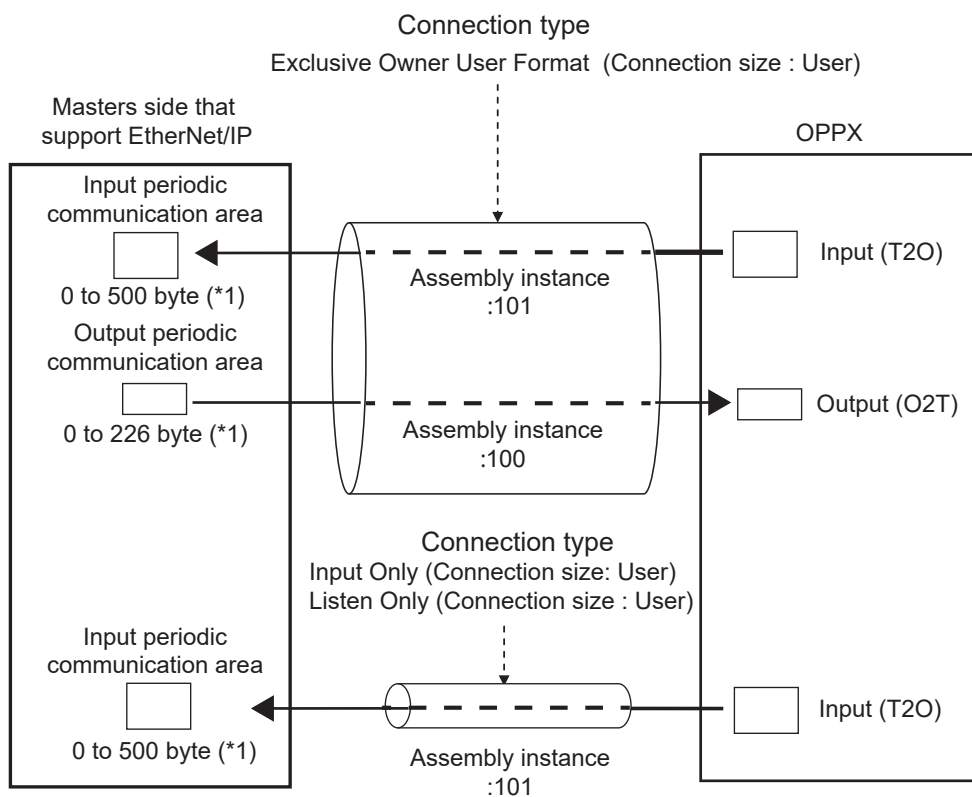
The side that opens the connection is known as the “originator,” and the side that receives the connection is known as the “target.” This product is the “target.”

■ Outline of periodic communication with this product

The outline varies depending on the periodic communication format (user/fix) as shown below.

● “User” periodic communication format

With this format, the user can arbitrarily select the input/output items to communicate periodically. The connection size varies depending on the number of items specified by the user.

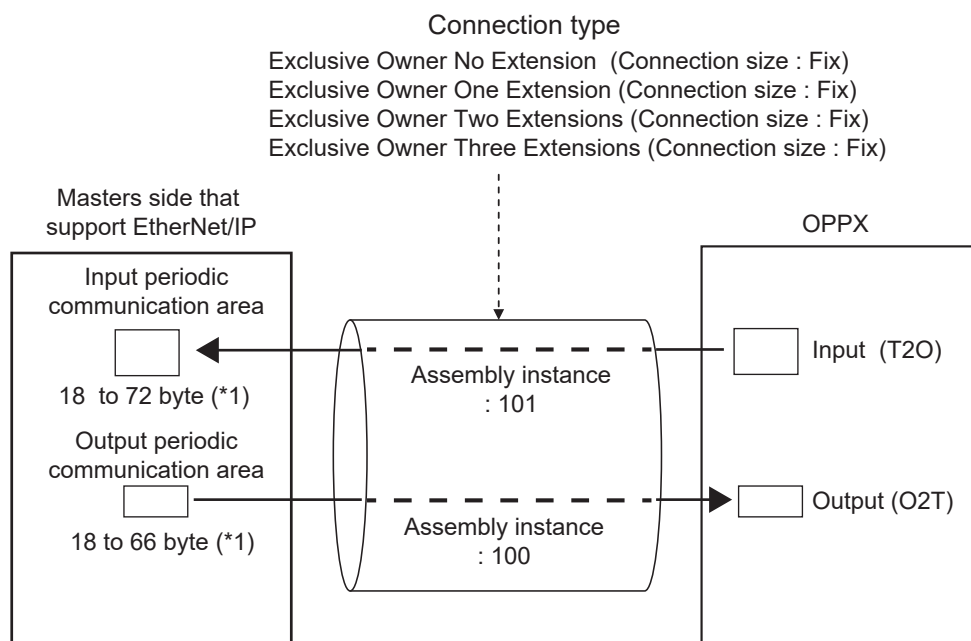


*1 The user arbitrarily sets the connection size handled in periodic communication to match the number of input/output items selected by the user.

● “Fix” periodic communication format

The predetermined items are input and output.

Select the type of connection according to the number of connected expansion devices.



*1 The connection size handled in periodic communication is set to the predetermined size for each connection type.

■ Connections supported by this product

The following seven connections are available in the EDS file of this product.

Select the connection according to the number of connected expansion devices and the items to input/output (the periodic communication format).

Connection	No. of connected expansion devices	Connection size (bytes)		Supported periodic communication format	
		Output (O2T)	Input (T2O)	Output (O2T)	Input (T2O)
Exclusive Owner No Extension	0	18	18	Fix	Fix
Exclusive Owner One Extension	1	34	36		
Exclusive Owner Two Extensions	2	50	54		
Exclusive Owner Three Extensions	3	66	72		
Exclusive Owner User Format	0 to 3	0 to 226	0 to 500	User	User
Input Only		Impossible	0 to 500	—	
Listen Only		Impossible	0 to 500	—	

■ Assembly instances

You can set the following assembly instances on this product's connections.

Assembly instance	Data direction	Connection type	
		Multi-cast	Point to Point
101	Input (T2O)	✓	✓
100	Output (O2T)		✓

■ Periodic communication format (user/fix)

This product has two formats (user/fix) for periodic communication. Select the format to use before performing periodic communication.

The items that can be input/output vary depending on the periodic communication format, so select the appropriate periodic communication format according to the items that you want to input/output.

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The periodic communication format cannot use different formats for input and output.

Therefore, select a periodic communication format that can be used for both input and output.

● “User” format

With this format, the user can arbitrarily select the input/output items to communicate periodically.

With the default settings, particular items are selected as the input/output items. Change these items as necessary for the purposes of the user.

Use communication commands via serial communication or Ethernet communication to specify the input/output items.

Refer to “Specifying output items” (page 9-74) and “Specifying input items” (page 9-85).

Data direction		Data contents
Input (T2O)		<ul style="list-style-type: none"> • Device status (device status / error check) • Lamp status • Light intensity value (MODE (in LAMP n INTENSITY) / INTENSITY (in LAMP n INTENSITY)) • Synchronization control (WIDTH / DELAY / MODE (in LAMP n SYNC)) • Lighting controller information (such as POWER DROP) • Lighting information (such as MONITOR)
Output (O2T)	O2T user header	Set this header in the first 2 bytes of the output data. This header controls whether to apply the output data on the OPPX side. 0: Do not apply the output data to the OPPX. 1: Apply the output data to the OPPX.
	Data area	<ul style="list-style-type: none"> • Light intensity value (MODE (in LAMP n INTENSITY) / INTENSITY (in LAMP n INTENSITY)) • Synchronization control (WIDTH / DELAY / MODE (in LAMP n SYNC))

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When inputting/outputting data with the “user” format, set the connection type to “Exclusive Owner User Format (Input/Output)” when setting the connection.

● “Fix” format

Use this format to input/output the predetermined items.

The OPPX automatically sets the format size according to the number of connected expansion devices.

Data direction		Data contents
Input (T2O)		<ul style="list-style-type: none">• Error check (main device, expansion devices)• LAMP1 to LAMP16 MONITOR• LAMP1 to LAMP16 TEMP
Output (O2T)	O2T user header	Set this header in the first 2 bytes of the output data. This header controls whether to apply the output data on the OPPX side. 0: Do not apply the output data to the OPPX. 1: Apply the output data to the OPPX.
	Data area	<ul style="list-style-type: none">• LAMP1 to LAMP16 INTENSITY (in LAMP n INTENSITY)• LAMP1 to LAMP16 WIDTH

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When using the “fix” format, set the connection type to one of the following options when setting the connection.

Exclusive Owner No Extension: (number of connected expansion devices: 0)

Exclusive Owner One Extension: (number of connected expansion devices: 1)

Exclusive Owner Two Extensions: (number of connected expansion devices: 2)

Exclusive Owner Three Extensions: (number of connected expansion devices: 3)

● Writing output (O2T) data

Be sure to set the first 2 bytes of the output data (O2T) to the value of the “user header” (“0” or “1”).

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Note that if the value of the “user header” is “0,” even if the output data is written to the OPPX, this data will not be applied to the actual operations.

Output data	Setting value
O2T user header	<p>Specifies whether to apply the contents of the output data to the OPPX side. 0: Do not apply the output data to the OPPX. 1: Apply the output data to the OPPX.</p> <ul style="list-style-type: none">• Setting this value to “1” (to apply the output data) causes the output data from the EtherNet/IP master to be applied to the OPPX.• You can store data unaffected by the data storage order (little endian/big endian) setting.

■ Size of the data sent/received in periodic (cyclic) communication

In EtherNet/IP communication by the OPPX, there are two types of sizes of the data sent/received: the “connection size” and the “format size.”

- **Connection size:** This is the size of the data that is actually sent/received in periodic communication. Set this size on the originator side. For some connections, this is a fixed value.
- **Format size:** This is the size of the data that is actually sent/received inside the OPPX. However, data actually communicated with a EtherNet/IP master conforms to the “connection size.”

● Connection size

The data size is determined by the connection type selected when the connection is set.

If you selected “Exclusive Owner User Format,” set a value that is the same as the format size.

Connection I/O type	No. of connected expansion devices	Output (O2T)	Input (T2O)
Exclusive Owner No Extension	0	Fixed to 18 bytes	Fixed to 18 bytes
Exclusive Owner One Extension	1	Fixed to 34 bytes	Fixed to 36 bytes
Exclusive Owner Two Extensions	2	Fixed to 50 bytes	Fixed to 54 bytes
Exclusive Owner Three Extensions	3	Fixed to 66 bytes	Fixed to 72 bytes
Exclusive Owner User Format	0 to 3	0 to 226 bytes (user defined)	0 to 500 bytes (user defined)
Input Only		—	0 to 500 bytes (user defined)
Listen Only		—	0 to 500 bytes (user defined)

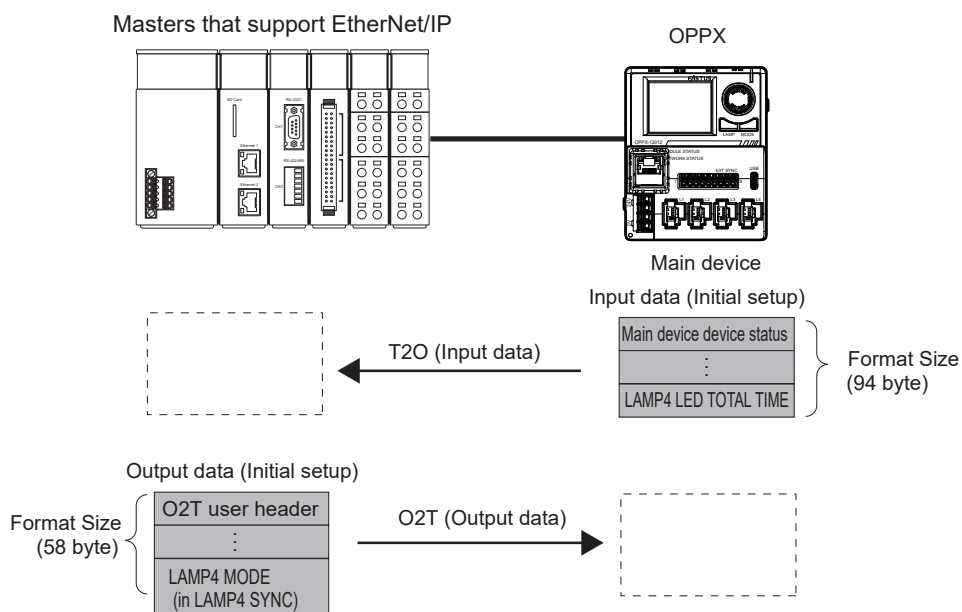
● Format size

This size is set according to the periodic communication format (user/fix) as shown below.

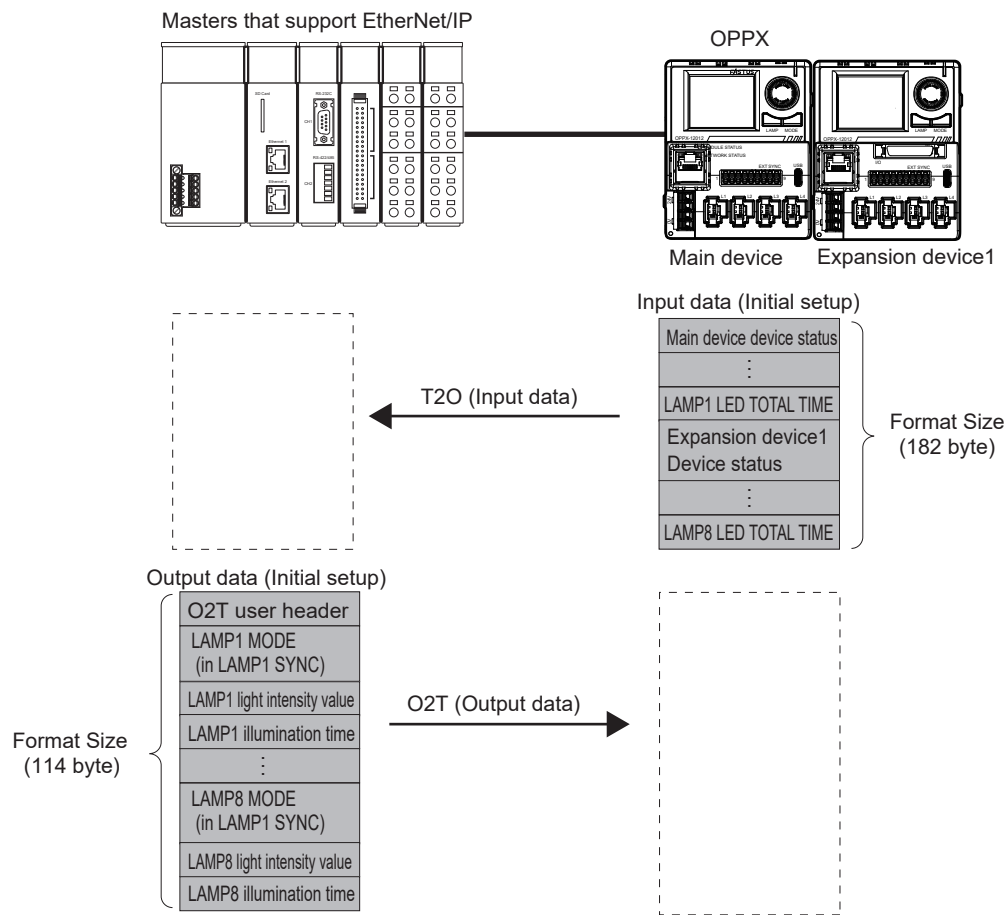
User format

The format size is finalized according to the number of input/output items specified by the user and the number of connected expansion devices.

Example 1) Only main device and inputting/outputting data with the default settings of the user format

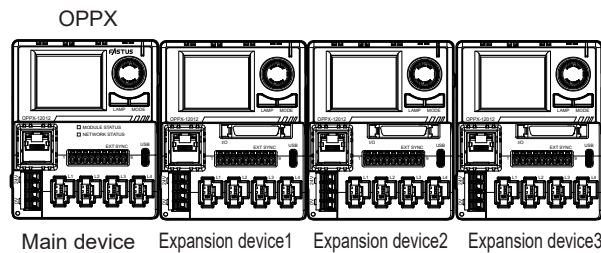


Example 2) One expansion device connected and inputting/outputting data with the default settings of the user format



Fix format

The format size is set automatically according to the number of connected expansion devices.



Number of expansion devices	0 (only main device)	1	2	3
Data direction				
Output (O2T)	18 Byte	34 Byte	50 Byte	66 Byte
Input (T2O)	18 Byte	36 Byte	54 Byte	72 Byte

● Relationship between the connection size and the format size

Basically, set the “connection size” and the “format size” to the same data size.

If these sizes differ, the behavior is as follows.

• When the “connection size” is larger than the “format size”

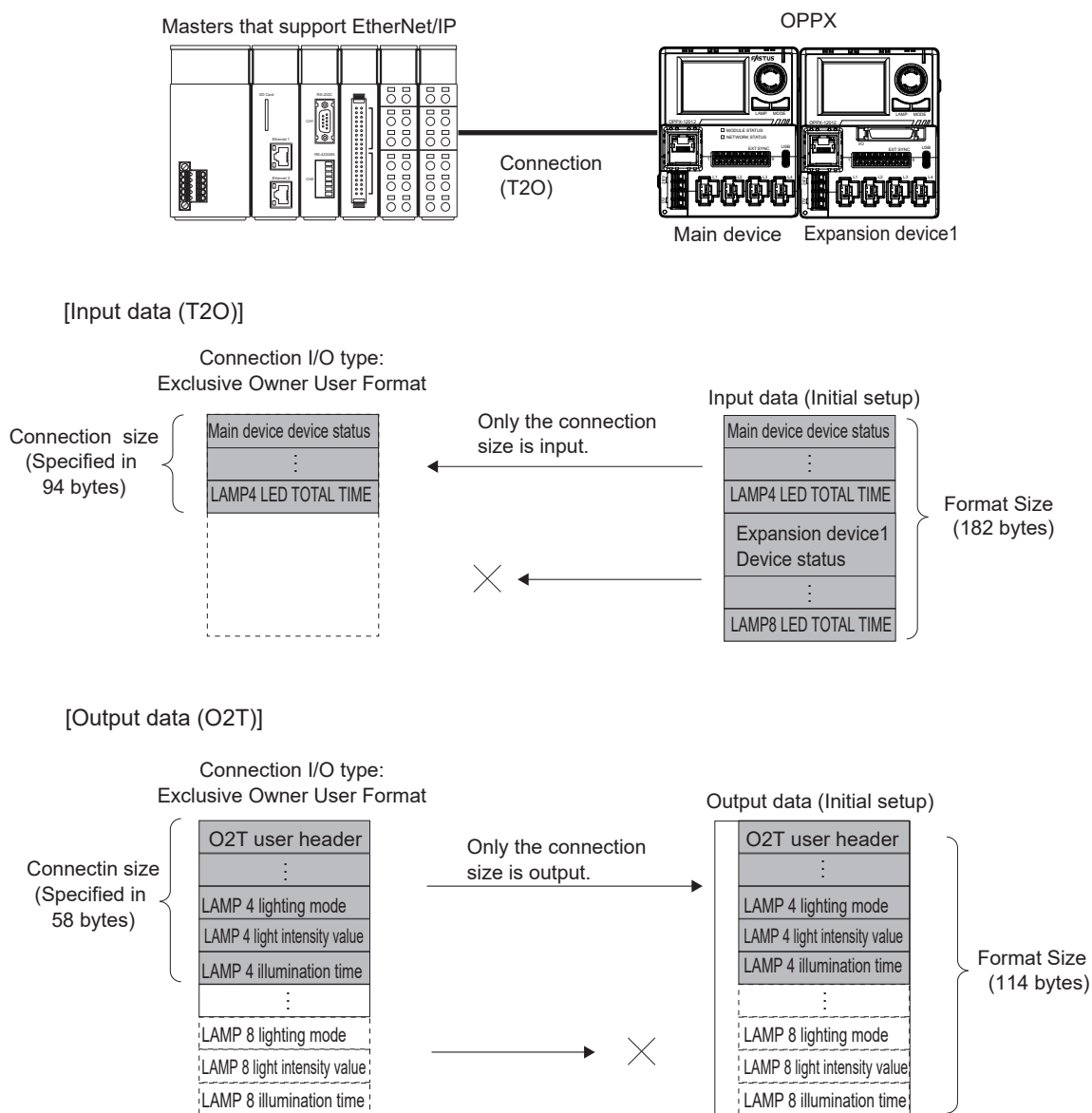
All the contents of the “format size” are sent, so no sent items are omitted. However, more bandwidth is used by the periodic communication than is necessary.

• When the “connection size” is smaller than the “format size”

Only data up to the connection size is sent/received, so some sent items are omitted.

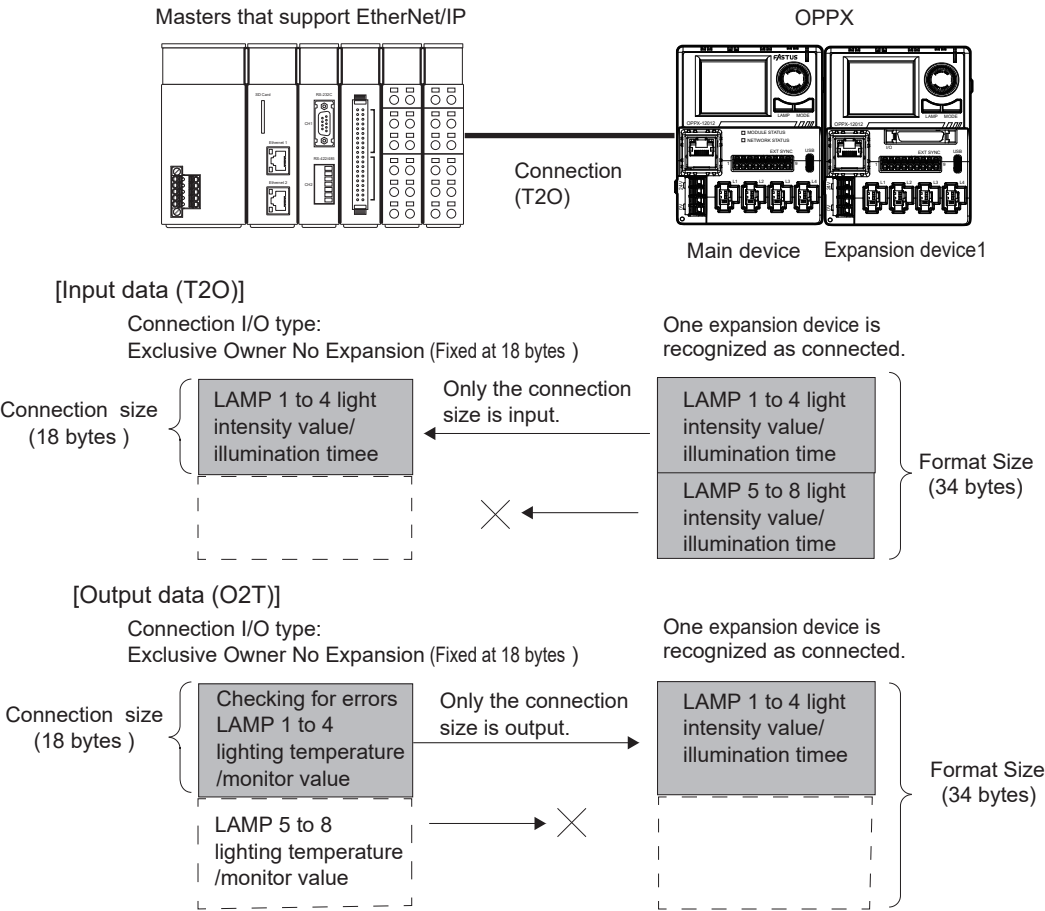
Example 1: User format

When the connection size set on the connection is smaller than the format size required for the input/output items specified with the default settings, some input/output items are not sent.



Example 2: Fix format

If the combination of connection type and number of connected expansion devices is not appropriate, sent items are omitted per unit.



How to check the connection size and the format size

You can check the connection size and the format size with the following methods.

MEMO

If the number of connected expansion devices is changed unintentionally, the format size will be changed to an unexpected data size, which may cause the communication size and the format size to differ. Therefore, if periodic communication will not be performed with the intended data size, use the methods in this section to check the actual format size.

Checking on the displayed screen of this product

You can check the current connection size and format size on the following tabs.

Tab	Setting item	Setting value
CYCLIC O2T	CONNECT SIZE	0 to 226
	FORMAT SIZE	0 to 226
CYCLIC T2O	CONNECT SIZE	0 to 500
	FORMAT SIZE	0 to 500

Checking with communication commands

You can check only the format size with communication commands.

Type	Serial communication command	Ethernet communication command ID
O2T format size	XFS	432
T2O format size	YFS	433

9-6-5 Procedure Required for Communicating with a EtherNet/IP master (Periodic Communication)

This section explains the operations required for starting periodic communication with this product.

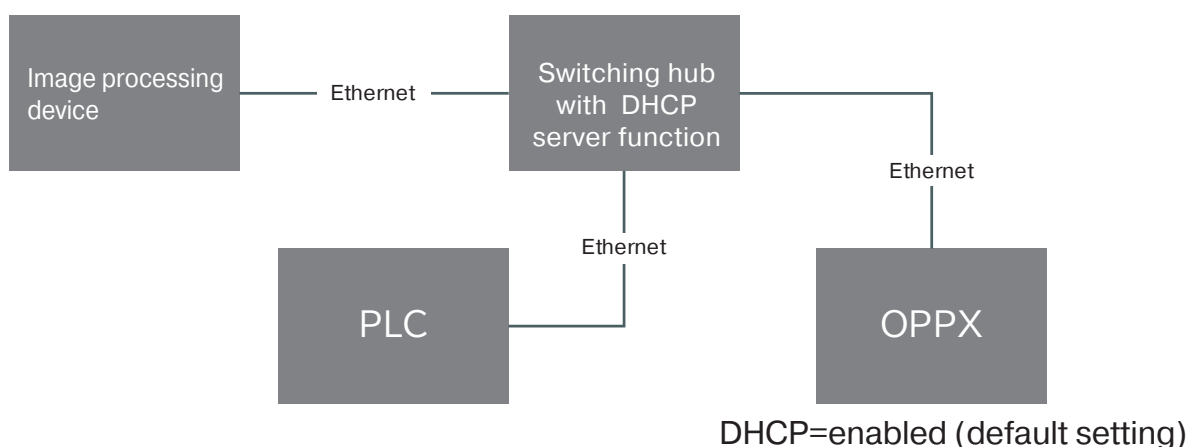
1 Set the IP address.

Set the IP address of this product.

The IP address can be set to “DHCP,” “BOOTP,” or “IP address.”

This product’s default IP address setting method is “DHCP.”

The IP address is assigned automatically from a switching hub with DHCP server function on the same network, making communication possible.



You can also change the IP address setting method to “BOOTP,” in which the IP address is obtained automatically, or “fixed IP address,” in which the IP address is specified directly.

- Setting the IP address with “BOOTP”

The IP address and similar information set on a BOOTP server on the same network are assigned.

Configure the “ETHERNET” settings of this product as shown below.

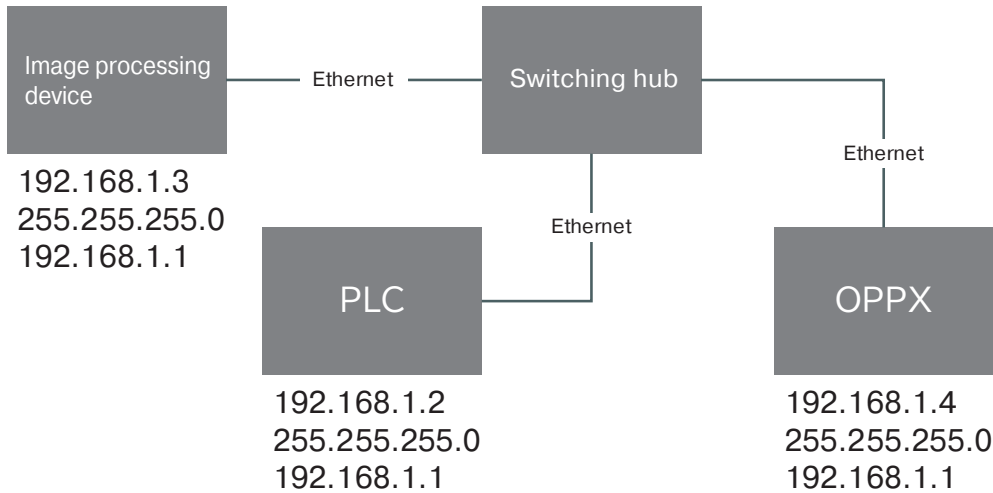
Tab	Setting item	Setting value
ETHERNET	DHCP	OFF (changed from the default value of ON)*1
	BOOTP	ON (changed from the default value of OFF)

*1 When DHCP is set to “ON,” the DHCP settings are given priority.

- Setting the IP address with “fixed IP address”

Specify the IP address directly when, for example, you are specifying a fixed IP address at this product to match the network surrounding the equipment without using the DHCP/BOOTP function.

Setting example)



Configure the “ETHERNET” settings of this product as shown below.

Tab	Setting item	Setting value/description
ETHERNET	IP ADDRESS	Specify an arbitrary IP address (default value: 169.254.0.31).
	SUBNET MASK	Specify an arbitrary subnet mask (default value: 255.255.0.0).
	GATEWAY	Specify an arbitrary gateway (default value: 0.0.0.0).
	DHCP	OFF (changed from the default value of ON)
	BOOTP	OFF (the same as the default value)

2 Select the periodic communication format.

Select whether to set the input/output items of EtherNet/IP periodic communication to the user-selected contents (the user format) or to the predetermined contents (the fix format).

For details on the user format and the fix format, refer to “9-6-6 Details of the User Format” (page 9-69) and “9-6-7 Details of the Fix Format” (page 9-88).

Tab	Setting item	Setting value/description
ETHERNET	CYCLIC FORMAT	USER (default value), FIX

MEMO

The periodic communication format cannot use different formats for input and output.



Therefore, select a periodic communication format that can be used for both input and output.

3 Select the input/output items for the periodic communication (“User” periodic communication format).

Select the items to input/output with the “user”^{*1} periodic communication format.

(With the default settings, particular items are selected as the input/output items. Change these items as necessary for the purposes of the user.)

Use serial communication commands via the external parallel/USB connector or communication commands via the Ethernet connector to write the selections of the input/output items. (You cannot select these items with setup operations on this product.)

For details on how to select input/output items for the user format, refer to  “Specifying output items” (page 9-74) and  “Specifying input items” (page 9-85).

^{*1} If you are using the “fix” periodic communication format, the input/output items are predetermined, so this setting is not necessary.

4 Select the byte order.

Select the method for receiving/sending communication data.

Tab	Setting item	Setting value/description
ETHERNET	BYTE ORDER	LITTLE (default value), BIG

- LITTLE (little endian)
Data is stored in the smallest memory address in sequence from the lowest-position byte.
- BIG (big endian)
Data is stored in the smallest memory address in sequence from the highest-position byte.

With a total of 6 bytes

Byte
n + 0
n + 1
n + 2
n + 3



“Little endian”

Word	High position	Low position
N + 0	Byte n + 2	Byte n + 3
N + 1	Byte n + 0	Byte n + 1

“Big endian”

Word	High position	Low position
N + 0	Byte n + 1	Byte n + 0
N + 1	Byte n + 3	Byte n + 2

5 Set periodic communication via the configuration software.

Use the configuration software to configure the settings for starting the periodic communication between this product and the EtherNet/IP master.

For details on the settings for the configuration software, refer to the manual of the EtherNet/IP master or the manual of the EtherNet/IP configuration software you are using.

- Downloading and installing the EDS file for this product
 1. Download the EDS file for this product from the following OPTEX FA corporate website.
<https://www.optex-fa.jp/>
 2. Install the EDS file for this product into the EtherNet/IP configuration software.
- EtherNet/IP connection settings

Use the EtherNet/IP configuration software to set the connection between this product and the EtherNet/IP master.

The connection settings on this product are as follows.

Setting item	Output direction	Output (O2T)	Input (T2O)
CONNECTION I/O TYPE		Exclusive Owner No Extension Exclusive Owner One Extension Exclusive Owner Two Extensions Exclusive Owner Three Extensions Exclusive Owner User Format	
		—	Input Only Listen Only
ASSEMBLY INSTANCE		100	101
CONNECTION TYPE		Point to Point	<ul style="list-style-type: none"> • Point to Point • Multi-cast^{*1}
PACKET INTERVAL (RPI)		1 to 32767 ms ^{*2}	
CONNECTION SIZE (DATA SIZE)		Depends on CONNECTION I/O TYPE ^{*3}	

^{*1} Only when CONNECTION I/O TYPE is “Input Only” or “Listen Only”

^{*2} When connected to another OPPX so that OPPX is the expansion device and this OPPX is the main device, a certain amount of time is required to write to and read from the expansion device. When connected to another OPPX so that OPPX is the expansion device and this OPPX is the main device, set the RPI (communication cycle) to a value that provides leeway. If the RPI is shorter than the access time with the expansion device, the writing of data may be omitted or delays may occur in the reading of data.

Calculate the time required to access the expansion device as follows.

$$(\text{Writing size} + \text{reading size}) [\text{bytes}] \times 4 [\text{ms}]$$

^{*3} The connection size setting depends on CONNECTION I/O TYPE as follows.

Fixed size:

- Exclusive Owner No Extension
- Exclusive Owner One Extension
- Exclusive Owner Two Extensions
- Exclusive Owner Three Extensions

User-specified:

- Exclusive Owner User Format
- Input Only
- Listen Only

6 Download the connection settings.

Use the EtherNet/IP configuration software to download the set connection to the master.
Periodic communication starts automatically.

7 Check periodic communication via EtherNet/IP.

Check whether the periodic communication data is being updated.

When checking the data, if you do not want to immediately apply to the OPPX operations the data (O2T) output from the EtherNet/IP master to the OPPX, set "SUSPEND" to ON.

While "SUSPEND" is ON, the OPPX does not apply to its operations the received output data.

After checking the periodic communication, set "SUSPEND" to OFF to apply the output data (O2T) to the OPPX.

9-6-6 Details of the User Format

This section shows the details of the input/output data for the user format.

■ Output data (O2T)

Users can arbitrarily select the items to output to the OPPX.

With the default settings, particular items are selected as the output items. Change these items as necessary for the purposes of the user.

The format size is set according to the number of selected items and the number of connected expansion devices.

●●● MEMO ●●●

Set the connection size in the connection settings to match the total data size (format size) of the selected output items. The only items actually sent in periodic communication are those that are within the range of the connection size. Items outside the range of the connection size are not output.

With the user format, select the following connection type and set a data size that is greater than or equal to the total size (format size) of the selected output items.

- Exclusive Owner User Format (0 to 226 bytes)

● Output item types

You can write the following contents from the EtherNet/IP master to the OPPX.

By default, all output items are selected for each LAMP.

Data contents	Value	Data type	Size [bytes]	Default output status	Remarks
User header	Specifies whether to apply the contents of the output data to the OPPX side. 0: Do not apply the output data to the OPPX. 1: Apply the output data to the OPPX.	UINT	2	Output target	Be sure to place this at the front of the output data. Also, note that if the value of the "User header" remains "0," even if the output data is written to the OPPX, this data will not be applied to the actual operations.
MODE (in LAMP n INTENSITY)	0:PWM 1: STB 2: DC 3:L-INT 4: L-INT STB	UINT	2	Output target	
INTENSITY (in LAMP n INTENSITY)	0 to 999	UINT	2	Output target	
WIDTH	0 to 999	UINT	2	Output target	
WIDTH units	0: μ s 1:ms	UINT	2	Output target	
DELAY	0 to 999	UINT	2	Output target	
DELAY units	0: μ s 1:ms	UINT	2	Output target	
MODE (in LAMP n SYNC)	0: External 1: Internal 2:OFF	UINT	2	Output target	

● Default output contents

Output format size

The output format size depends on the number of expansion devices connected to the OPPX, as follows.

- 0 expansion devices (LAMP1 to LAMP4): 58 bytes
- 1 expansion device (LAMP5 to LAMP8): 114 bytes
- 2 expansion devices (LAMP9 to LAMP12): 170 bytes
- 3 expansion devices (LAMP13 to LAMP16): 226 bytes

●●● MEMO ●●●

Set the connection size in the connection settings to match this format size.

The only items actually sent in periodic communication are those that are within the range of the connection size. Items outside the range of the connection size are not output.

Store the output data in the following order.

Word address (leading number +)	Data contents	Data type	Size [bytes]	No. of connected expansion devices
0	O2T user header	UINT	2	0
+1	LAMP1 MODE (in LAMP1 INTENSITY)	UINT	2	
+2	LAMP1 INTENSITY (in LAMP1 INTENSITY)	UINT	2	
+3	LAMP1 WIDTH	UINT	2	
+4	LAMP1 WIDTH units	UINT	2	
+5	LAMP1 DELAY	UINT	2	
+6	LAMP1 DELAY units	UINT	2	
+7	LAMP1 MODE (in LAMP1 SYNC)	UINT	2	
+8	LAMP2 MODE (in LAMP2 INTENSITY)	UINT	2	
+9	LAMP2 INTENSITY (in LAMP2 INTENSITY)	UINT	2	
+10	LAMP2 WIDTH	UINT	2	
+11	LAMP2 WIDTH units	UINT	2	
+12	LAMP2 DELAY	UINT	2	
+13	LAMP2 DELAY units	UINT	2	
+14	LAMP2 MODE (in LAMP2 SYNC)	UINT	2	
+15	LAMP3 MODE (in LAMP3 INTENSITY)	UINT	2	
+16	LAMP3 INTENSITY (in LAMP3 INTENSITY)	UINT	2	
+17	LAMP3 WIDTH	UINT	2	
+18	LAMP3 WIDTH units	UINT	2	
+19	LAMP3 DELAY	UINT	2	
+20	LAMP3 DELAY units	UINT	2	
+21	LAMP3 MODE (in LAMP3 SYNC)	UINT	2	
+22	LAMP4 MODE (in LAMP4 INTENSITY)	UINT	2	
+23	LAMP4 INTENSITY (in LAMP4 INTENSITY)	UINT	2	

Word address (leading number +)	Data contents	Data type	Size [bytes]	No. of connected expansion devices
+24	LAMP4 WIDTH	UINT	2	0
+25	LAMP4 WIDTH units	UINT	2	
+26	LAMP4 DELAY	UINT	2	
+27	LAMP4 DELAY units	UINT	2	
+28	LAMP4 MODE (in LAMP4 SYNC)	UINT	2	
+29	LAMP5 MODE (in LAMP5 INTENSITY)	UINT	2	1
+30	LAMP5 INTENSITY (in LAMP5 INTENSITY)	UINT	2	
+31	LAMP5 WIDTH	UINT	2	
+32	LAMP5 WIDTH units	UINT	2	
+33	LAMP5 DELAY	UINT	2	
+34	LAMP5 DELAY units	UINT	2	
+35	LAMP5 MODE (in LAMP5 SYNC)	UINT	2	
+36	LAMP6 MODE (in LAMP6 INTENSITY)	UINT	2	
+37	LAMP6 INTENSITY (in LAMP6 INTENSITY)	UINT	2	
+38	LAMP6 WIDTH	UINT	2	
+39	LAMP6 WIDTH units	UINT	2	
+40	LAMP6 DELAY	UINT	2	
+41	LAMP6 DELAY units	UINT	2	
+42	LAMP6 MODE (in LAMP6 SYNC)	UINT	2	
+43	LAMP7 MODE (in LAMP7 INTENSITY)	UINT	2	
+44	LAMP7 INTENSITY (in LAMP7 INTENSITY)	UINT	2	
+45	LAMP7 WIDTH	UINT	2	
+46	LAMP7 WIDTH units	UINT	2	
+47	LAMP7 DELAY	UINT	2	
+48	LAMP7 DELAY units	UINT	2	
+49	LAMP7 MODE (in LAMP7 SYNC)	UINT	2	
+50	LAMP8 MODE (in LAMP8 INTENSITY)	UINT	2	
+51	LAMP8 INTENSITY (in LAMP8 INTENSITY)	UINT	2	
+52	LAMP8 WIDTH	UINT	2	
+53	LAMP8 WIDTH units	UINT	2	
+54	LAMP8 DELAY	UINT	2	
+55	LAMP8 DELAY units	UINT	2	
+56	LAMP8 MODE (in LAMP8 SYNC)	UINT	2	

Word address (leading number +)	Data contents	Data type	Size [bytes]	No. of connected expansion devices
+57	LAMP9 MODE (in LAMP9 INTENSITY)	UINT	2	2
+58	LAMP9 INTENSITY (in LAMP9 INTENSITY)	UINT	2	
+59	LAMP9 WIDTH	UINT	2	
+60	LAMP9 WIDTH units	UINT	2	
+61	LAMP9 DELAY	UINT	2	
+62	LAMP9 DELAY units	UINT	2	
+63	LAMP9 MODE (in LAMP9 SYNC)	UINT	2	
+64	LAMP10 MODE (in LAMP10 INTENSITY)	UINT	2	
+65	LAMP10 INTENSITY (in LAMP10 INTENSITY)	UINT	2	
+66	LAMP10 WIDTH	UINT	2	
+67	LAMP10 WIDTH units	UINT	2	
+68	LAMP10 DELAY	UINT	2	
+69	LAMP10 DELAY units	UINT	2	
+70	LAMP10 MODE (in LAMP10 SYNC)	UINT	2	
+71	LAMP11 MODE (in LAMP11 INTENSITY)	UINT	2	
+72	LAMP11 INTENSITY (in LAMP11 INTENSITY)	UINT	2	
+73	LAMP11 WIDTH	UINT	2	
+74	LAMP11 WIDTH units	UINT	2	
+75	LAMP11 DELAY	UINT	2	
+76	LAMP11 DELAY units	UINT	2	
+77	LAMP11 MODE (in LAMP11 SYNC)	UINT	2	
+78	LAMP12 MODE (in LAMP12 INTENSITY)	UINT	2	
+79	LAMP12 INTENSITY (in LAMP12 INTENSITY)	UINT	2	
+80	LAMP12 WIDTH	UINT	2	
+81	LAMP12 WIDTH units	UINT	2	
+82	LAMP12 DELAY	UINT	2	
+83	LAMP12 DELAY units	UINT	2	
+84	LAMP12 MODE (in LAMP12 SYNC)	UINT	2	

Word address (leading number +)	Data contents	Data type	Size [bytes]	No. of connected expansion devices
+85	LAMP13 MODE (in LAMP13 INTENSITY)	UINT	2	3
+86	LAMP13 INTENSITY (in LAMP13 INTENSITY)	UINT	2	
+87	LAMP13 WIDTH	UINT	2	
+88	LAMP13 WIDTH units	UINT	2	
+89	LAMP13 DELAY	UINT	2	
+90	LAMP13 DELAY units	UINT	2	
+91	LAMP13 MODE (in LAMP13 SYNC)	UINT	2	
+92	LAMP14 MODE (in LAMP14 INTENSITY)	UINT	2	
+93	LAMP14 INTENSITY (in LAMP14 INTENSITY)	UINT	2	
+94	LAMP14 WIDTH	UINT	2	
+95	LAMP14 WIDTH units	UINT	2	
+96	LAMP14 DELAY	UINT	2	
+97	LAMP14 DELAY units	UINT	2	
+98	LAMP14 MODE (in LAMP14 SYNC)	UINT	2	
+99	LAMP15 MODE (in LAMP15 INTENSITY)	UINT	2	
+100	LAMP15 INTENSITY (in LAMP15 INTENSITY)	UINT	2	
+101	LAMP15 WIDTH	UINT	2	
+102	LAMP15 WIDTH units	UINT	2	
+103	LAMP15 DELAY	UINT	2	
+104	LAMP15 DELAY units	UINT	2	
+105	LAMP15 MODE (in LAMP15 SYNC)	UINT	2	
+106	LAMP16 MODE (in LAMP16 INTENSITY)	UINT	2	
+107	LAMP16 INTENSITY (in LAMP16 INTENSITY)	UINT	2	
+108	LAMP16 WIDTH	UINT	2	
+109	LAMP16 WIDTH units	UINT	2	
+110	LAMP16 DELAY	UINT	2	
+111	LAMP16 DELAY units	UINT	2	
+112	LAMP16 MODE (in LAMP16 SYNC)	UINT	2	

● Specifying output items

To change output items from the defaults, use serial communication commands via the external parallel/USB connector or communication commands via the Ethernet connector to write the changes. (You cannot select these items with setup operations on the OPPX.)

●●● MEMO ●●●

On the screen of “OPPX Utility,” a piece of software that you can download from the OPTEx FA website, you can intuitively specify the items to output as the output data (O2T).

You can also use the screen to check the results set in the same manner, which reduces setting mistakes.

For details on OPPX Utility, refer to the “OPPX Utility User’s Manual.”

Supported communication commands

Use a different communication command per LAMP to specify the output data items.

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Write “0” for LAMPs whose output items you will not specify.

Specification target	Serial communication command	Ethernet communication command ID
LAMP1	X00	400
LAMP2	X01	401
LAMP3	X02	402
LAMP4	X03	403
LAMP5	X04	404
LAMP6	X05	405
LAMP7	X06	406
LAMP8	X07	407
LAMP9	X08	408
LAMP10	X09	409
LAMP11	X10	410
LAMP12	X11	411
LAMP13	X12	412
LAMP14	X13	413
LAMP15	X14	414
LAMP16	X15	415

Selecting output data

Set the data with bit flags. Specify the data with two bytes per LAMP.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
-	-	-	-	-	-	-	-	-	(7)	(6)	(5)	(4)	(3)	(2)	(1)

Output target	Bit position (format setting value)
(1) MODE (in LAMP n INTENSITY)	b0 (0x0001)
(2) INTENSITY (in LAMP n INTENSITY)	b1 (0x0002)
(3) WIDTH	b2 (0x0004)
(4) WIDTH units	b3 (0x0008)
(5) DELAY	b5 (0x0010)
(6) DELAY units	b5 (0x0020)
(7) MODE (in LAMP n SYNC)	b6 (0x0040)

Checking the specified user format

You can check the specified user format value on the displayed screen of this product.

Tab	Setting item	Setting value
CYCLIC O2T	USER FORMAT	LAMP1: 0x0000 to 0xFFFF ... LAMP16: 0x0000 to 0xFFFF

Setting examples

- Setting example 1

Outputting the following items with a configuration including only the main device

LAMP1: INTENSITY (in LAMP1 INTENSITY), WIDTH

LAMP2: INTENSITY (in LAMP2 INTENSITY)

LAMP3: INTENSITY (in LAMP3 INTENSITY), WIDTH

LAMP4: INTENSITY (in LAMP4 INTENSITY)

Setting values

Write the following values with communication commands or Ethernet parameter IDs, and then use originator output to set the items to write.

Communication command	Ethernet parameter ID	Item	Value (hex)
X00	400	LAMP1 O2T format	0x6
X01	401	LAMP2 O2T format	0x2
X02	402	LAMP3 O2T format	0x6
X03	403	LAMP4 O2T format	0x2

Contents to write

The OPPX writes data in the following order.

Word address (leading number +)	Output target	Data type	Size [bytes]
+0	O2T user header	UINT	2
+1	LAMP1 INTENSITY (in LAMP1 INTENSITY)	UINT	2
+2	LAMP1 WIDTH	UINT	2
+3	LAMP2 INTENSITY (in LAMP2 INTENSITY)	UINT	2
+4	LAMP3 INTENSITY (in LAMP3 INTENSITY)	UINT	2
+5	LAMP3 WIDTH	UINT	2
+6	LAMP4 INTENSITY (in LAMP4 INTENSITY)	UINT	2

- Setting example 2

Outputting the following items with one connected expansion device

LAMP6: WIDTH, WIDTH units

LAMP8: WIDTH, WIDTH units

Setting values

Write the following values with communication commands or Ethernet parameter IDs, and then use originator output to set the items to write.

Also, write "0" for LAMPs whose output items you will not specify.

Communication command	Ethernet parameter ID	Item	Value (hex)
X00	400	LAMP1 O2T format	0x0
X01	401	LAMP2 O2T format	0x0
X02	402	LAMP3 O2T format	0x0
X03	403	LAMP4 O2T format	0x0
X04	404	LAMP5 O2T format	0x0
X05	405	LAMP6 O2T format	0xC
X06	406	LAMP7 O2T format	0x0
X07	407	LAMP8 O2T format	0xC
X08	408	LAMP9 O2T format	0x0

Output contents

The following contents are output from the leading word address.

Word address (leading number +)	Output target	Data type	Size [bytes]
0	O2T user header	UINT	2
+1	LAMP6 WIDTH	UINT	2
+2	LAMP6 WIDTH units	UINT	2
+3	LAMP8 WIDTH	UINT	2
+4	LAMP8 WIDTH units	UINT	2

■ Input data (T2O)

Users can arbitrarily select the items to input to the EtherNet/IP master.

With the default settings, particular items are selected as the input items. Change these items as necessary for the purposes of the user.

The data size (format size) is set according to the number of selected items and the number of connected expansion devices.

● MEMO ●

Set the connection size in the connection settings to match the total data size (format size) of the selected input items.

The only items actually sent in periodic communication are those that are within the range of the connection size. Items outside the range of the connection size are not output.

With the user format, select one of the following connection types and set a data size that is greater than or equal to the total size (format size) of the selected input items.

- Exclusive Owner User Format (0 to 226 bytes)
- Input Only (0 to 500 bytes)
- Listen Only (0 to 500 bytes)

● Input item types

You can input the following contents from the OPPX to the EtherNet/IP master.

Input item	Value	Data type	Size [bytes]	Default input status
Device status* ¹	b0: Memory error b1: FPGA error b2: FW update failed b3: Power substrate 1 communication error b4: Power substrate 2 communication error b5: Low power supply voltage b6: Power supply high temperature detection warning b7: Power too high b8: IP error b9: DHCP error b10: Network error b11: Output terminal overcurrent b12 to b15: Infrared communication self device number	WORD	2	Input target
Error check* ¹ , * ²	0: No error or warning 1: Warning 2: Error 3: Error and warning	UINT	2	Input target
OPERATING TIME* ¹	0 to 4,294,967,295 (sec)	UDINT	4	Input target
POWER DROP* ¹	0 to 9999	UINT	2	Input target
24V MIN PEAK* ¹	Displays the minimum voltage value of 24 V (mV) detected since the start of operation.	UINT	2	Input target
Control substrate microcomputer temperature* ¹	-100 to 255	INT	2	Input target
Power substrate 1 microcomputer temperature* ¹	-100 to 255	INT	2	—

Input item	Value	Data type	Size [bytes]	Default input status
Power substrate 2 microcomputer temperature*1	–100 to 255	INT	2	—
TOTAL POWER*1, *3	0 to 2000 2000: 200.0 W	UINT	2	Input target
Device connection information*4	0001 to 6666	UINT	2	Input target
O2T format size*4	0 to 226	UINT	2	Input target
T2O format size*4	0 to 500	UINT	2	Input target
MODE (in LAMP n INTENSITY)	0: PWM 1: STB 2: DC 3: L-INT 4: L-INT STB	UINT	2	—
INTENSITY (in LAMP n INTENSITY)	0 to 999	UINT	2	—
WIDTH	0 to 999	UINT	2	—
WIDTH units	0: μ s 1: ms	UINT	2	—
DELAY	0 to 999	UINT	2	—
DELAY units	0: 1 μ s 1: 1ms	UINT	2	—
MODE (in LAMP n SYNC)	0: External 1: Internal 2: OFF	UINT	2	—
Lamp status	b0: Illuminated b1: Lighting output overvoltage or lighting output correction error b2: Lighting output low voltage b3: Lighting output operation error b4: Lighting output gate power supply error b5: Lighting erroneous discharge detection b6: Lighting overcurrent b7: Lighting high temperature detection b8: Monitor brightness alarm b9: Feedback error b10: Lighting output start error b11: Lighting output high temperature detection b12: Lighting communication overcurrent b13: Lighting power too high	WORD	2	Input target
MONITOR	0 to 2047	UINT	2	Input target
ABSOLUTE MONITOR	0 to 4095	UINT	2	—
FB RATE	0 to 2047	UINT	2	—
LAMP Temperature	–99 to 155	INT	2	Input target
Lighting output section temperature	–100 to 130	INT	2	Input target

Input item	Value	Data type	Size [bytes]	Default input status
SEQ NUM NOW	0 to 16 0: Sequence control OFF 1: 1st time to 16: 16th time	UINT	2	—
LAMP n CAP STATUS* ³	0 to 1000 Returns the ratio (out of 1,000) between the output capacitor capacitance that was measured when the product started and the capacitance at the time of production. 1000: 100.0%	UINT	2	Input target
Total illumination count	Read: R 0 to 999,999,999 Write: W 0: Reset value Other than 0: Write error	UDINT	4	Input target
LED TOTAL TIME	0 to 4,294,967,295 (sec)	UDINT	4	Input target
Reset-permit illumination time	0 to 4,294,967,295 Write 0: Clear Write other than 0: Data error	UDINT	4	—

*1 This can be set to the leading station number (LAMP1, LAMP5, LAMP9, LAMP13) of each device. It is not valid to set this to any other station numbers.

*2 If the main device, includes the status of expansion devices.

*3 The return value is the integer value multiplied by 10. For 12.3, 123 is returned.

*4 This can only be set for LAMP1 of the main device.

*5 0x0000 is obtained.

● Default input contents

The format size depends on the number of expansion devices connected to the OPPX, as follows.

- 0 expansion devices: 94 bytes
- 1 expansion device: 182 bytes
- 2 expansion devices: 270 bytes
- 3 expansion devices: 368 bytes

The data from the OPPX is input in the following order.

Word address (leading number +)	Data contents	Data type	Size [bytes]	No. of connected expansion devices
0	Main device device status	WORD	2	0
+1	Main device error check	UINT	2	
+2	Main device OPERATING TIME	UDINT	4	
+3				
+4	Main device POWER DROP	UINT	2	
+5	Main device 24V MIN PEAK	UINT	2	
+6	Main device control substrate microcomputer temperature	INT	2	
+7	Main device TOTAL POWER	UINT	2	
+8	Main device device connection information	UINT	2	
+9	O2T format size	UINT	2	
+10	T2O format size	UINT	2	
+11	Lamp1 status	WORD	2	
+12	LAMP1 MONITOR	UINT	2	
+13	LAMP1 TEMP	INT	2	
+14	LAMP1 lighting output section temperature	INT	2	
+15	LAMP1 CAP STATUS	UINT	2	
+16	LAMP1 total illumination count	UDINT	4	
+17				
+18	LAMP1 LED TOTAL TIME	UDINT	4	
+19				
+20	Lamp2 status	WORD	2	
+21	LAMP2 MONITOR	UINT	2	
+22	LAMP2 TEMP	INT	2	
+23	LAMP2 lighting output section temperature	INT	2	
+24	LAMP2 CAP STATUS	UINT	2	
+25	LAMP2 total illumination count	UDINT	4	
+26				
+27	LAMP2 LED TOTAL TIME	UDINT	4	
+28				
+29	Lamp3 status	WORD	2	
+30	LAMP3 MONITOR	UINT	2	

Word address (leading number +)	Data contents	Data type	Size [bytes]	No. of connected expansion devices
+31	LAMP3 TEMP	INT	2	0
+32	LAMP3 lighting output section temperature	INT	2	
+33	LAMP3 CAP STATUS	UINT	2	
+34	LAMP3 total illumination count	UDINT	4	
+35				
+36	LAMP3 LED TOTAL TIME	UDINT	4	
+37				
+38	Lamp4 status	WORD	2	
+39	LAMP4 MONITOR	UINT	2	
+40	LAMP4 TEMP	INT	2	
+41	LAMP4 lighting output section temperature	INT	2	
+42	LAMP4 CAP STATUS	UINT	2	
+43	LAMP4 total illumination count	UDINT	4	
+44				
+45	LAMP4 LED TOTAL TIME	UDINT	4	
+46				
+47	Expansion device 1 device status	WORD	2	1
+48	Expansion device 1 error check	UINT	2	
+49	Expansion device 1 OPERATING TIME	UDINT	4	
+50				
+51	Expansion device 1 POWER DROP	UINT	2	
+52	Expansion device 1 24V MIN PEAK	UINT	2	
+53	Expansion device 1 control substrate microcomputer temperature	INT	2	
+54	Expansion device 1 TOTAL POWER	UINT	2	
+55	Lamp5 status	WORD	2	
+56	LAMP5 MONITOR	UINT	2	
+57	LAMP5 TEMP	INT	2	
+58	LAMP5 lighting output section temperature	INT	2	
+59	LAMP5 CAP STATUS	UINT	2	
+60	LAMP5 total illumination count	UDINT	4	
+61				
+62	LAMP5 LED TOTAL TIME	UDINT	4	
+63				
+64	Lamp6 status	WORD	2	
+65	LAMP6 MONITOR	UINT	2	
+66	LAMP6 TEMP	INT	2	
+67	LAMP6 lighting output section temperature	INT	2	

Word address (leading number +)	Data contents	Data type	Size [bytes]	No. of connected expansion devices
+68	LAMP6 CAP STATUS	UINT	2	1
+69	LAMP6 total illumination count	UDINT	4	
+70				
+71	LAMP6 LED TOTAL TIME	UDINT	4	
+72				
+73	Lamp7 status	WORD	2	
+74	LAMP7 MONITOR	UINT	2	
+75	LAMP7 TEMP	INT	2	
+76	LAMP7 lighting output section temperature	INT	2	
+77	LAMP7 CAP STATUS	UINT	2	
+78	LAMP7 total illumination count	UDINT	4	
+79				
+80	LAMP7 LED TOTAL TIME	UDINT	4	
+81				
+82	Lamp8 status	WORD	2	
+83	LAMP8 MONITOR	UINT	2	
+84	LAMP8 TEMP	INT	2	
+85	LAMP8 lighting output section temperature	INT	2	
+86	LAMP8 CAP STATUS	UINT	2	
+87	LAMP8 total illumination count	UDINT	4	
+88				
+89	LAMP8 LED TOTAL TIME	UDINT	4	
+90				
+91	Expansion device 2 device status	WORD	2	2
+92	Expansion device 2 error check	UINT	2	
+93	Expansion device 2 OPERATING TIME	UDINT	4	
+94				
+95	Expansion device 2 POWER DROP	UINT	2	
+96	Expansion device 2 24V MIN PEAK	UINT	2	
+97	Expansion device 2 control substrate microcomputer temperature	INT	2	
+98	Expansion device 2 TOTAL POWER	UINT	2	
+99	Lamp9 status	WORD	2	
+100	LAMP9 MONITOR	UINT	2	
+101	LAMP9 TEMP	INT	2	
+102	LAMP9 lighting output section temperature	INT	2	
+103	LAMP9 CAP STATUS	UINT	2	
+104	LAMP9 total illumination count	UDINT	4	
+105				

Word address (leading number +)	Data contents	Data type	Size [bytes]	No. of connected expansion devices
+106	LAMP9 LED TOTAL TIME	UDINT	4	2
+107				
+108	Lamp10 status	WORD	2	
+109	LAMP10 MONITOR	UINT	2	
+110	LAMP10 TEMP	INT	2	
+111	LAMP10 lighting output section temperature	INT	2	
+112	LAMP10 CAP STATUS	UINT	2	
+113	LAMP10 total illumination count	UDINT	4	
+114				
+115	LAMP10 LED TOTAL TIME	UDINT	4	
+116				
+117	Lamp11 status	WORD	2	
+118	LAMP11 MONITOR	UINT	2	
+119	LAMP11 TEMP	INT	2	
+120	LAMP11 lighting output section temperature	INT	2	
+121	LAMP11 CAP STATUS	UINT	2	
+122	LAMP11 total illumination count	UDINT	4	
+123				
+124	LAMP11 LED TOTAL TIME	UDINT	4	
+125				
+126	Lamp12 status	WORD	2	
+127	LAMP12 MONITOR	UINT	2	
+128	LAMP12 TEMP	INT	2	
+129	LAMP12 lighting output section temperature	INT	2	
+130	LAMP12 CAP STATUS	UINT	2	
+131	LAMP12 total illumination count	UDINT	4	
+132				
+133	LAMP12 LED TOTAL TIME	UDINT	4	
+134				
+135	Expansion device 3 device status	WORD	2	3
+136	Expansion device 3 error check	UINT	2	
+137	Expansion device 3 OPERATING TIME	UDINT	4	
+138				
+139	Expansion device 3 POWER DROP	UINT	2	
+140	Expansion device 3 24V MIN PEAK	UINT	2	
+141	Expansion device 3 control substrate microcomputer temperature	INT	2	
+142	Expansion device 3 TOTAL POWER	UINT	2	

Word address (leading number +)	Data contents	Data type	Size [bytes]	No. of connected expansion devices
+143	Lamp13 status	WORD	2	3
+144	LAMP13 MONITOR	UINT	2	
+145	LAMP13 TEMP	INT	2	
+146	LAMP13 lighting output section temperature	INT	2	
+147	LAMP13 CAP STATUS	UINT	2	
+148	LAMP13 total illumination count	UDINT	4	
+149				
+150	LAMP13 LED TOTAL TIME	UDINT	4	
+151				
+152	Lamp14 status	WORD	2	
+153	LAMP14 MONITOR	UINT	2	
+154	LAMP14 TEMP	INT	2	
+155	LAMP14 lighting output section temperature	INT	2	
+156	LAMP14 CAP STATUS	UINT	2	
+157	LAMP14 total illumination count	UDINT	4	
+158				
+159	LAMP14 LED TOTAL TIME	UDINT	4	
+160				
+161	Lamp15 status	WORD	2	
+162	LAMP15 MONITOR	UINT	2	
+163	LAMP15 TEMP	INT	2	
+164	LAMP15 lighting output section temperature	INT	2	
+165	LAMP15 CAP STATUS	UINT	2	
+166	LAMP15 total illumination count	UDINT	4	
+167				
+168	LAMP15 LED TOTAL TIME	UDINT	4	
+169				
+170	Lamp16 status	WORD	2	
+171	LAMP16 MONITOR	UINT	2	
+172	LAMP16 TEMP	INT	2	
+173	LAMP16 lighting output section temperature	INT	2	
+174	LAMP16 CAP STATUS	UINT	2	
+175	LAMP16 total illumination count	UDINT	4	
+176				
+177	LAMP16 LED TOTAL TIME	UDINT	4	
+178				

● Specifying input items

To change input items from the defaults, use serial communication commands via the external parallel/USB connector or communication commands via the Ethernet connector to write the changes. (You cannot select these items with setup operations on the OPPX.)

●●● MEMO ●●●

On the screen of “OPPX Utility,” a piece of software that you can download from the OPTEX FA website, you can intuitively specify the items to output as the input data (T2O).

You can also use the screen to check the results set in the same manner, which reduces setting mistakes.

For details on OPPX Utility, refer to the “OPPX Utility User’s Manual.”

Supported communication commands

Use a different communication command per LAMP to specify the input data items.

●●● MEMO ●●●

Write “0” for LAMPs whose input items you will not specify.

Specification target	Serial communication command	Ethernet communication command ID
LAMP1	Y00	416
LAMP2	Y01	417
LAMP3	Y02	418
LAMP4	Y03	419
LAMP5	Y04	420
LAMP6	Y05	421
LAMP7	Y06	422
LAMP8	Y07	423
LAMP9	Y08	424
LAMP10	Y09	425
LAMP11	Y10	426
LAMP12	Y11	427
LAMP13	Y12	428
LAMP14	Y13	429
LAMP15	Y14	430
LAMP16	Y15	431

Selecting input data

Set the data with bit flags. Specify the data with four bytes per LAMP.

b31	b30	b29	b28	b27	b26	b25	b24	b23	b22	b21	b20	b19	b18	b17	b16
—	(30)	(29)	(28)	(27)	(26)	(25)	(24)	(23)	(22)	(21)	(20)	—	(19)	(18)	(17)

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
(16)	(15)	(14)	(13)	(12)	(11)	(10)	(9)	(8)	(7)	(6)	(5)	(4)	(3)	(2)	(1)

Input item	Bit position (format setting value)
(1) Device status* ¹	b0 (0x0001)
(2) Error check* ¹ , * ²	b1 (0x0002)
(3) OPERATING TIME* ¹	b2 (0x0004)
(4) POWER DROP* ¹	b3 (0x0008)
(5) 24V MIN PEAK* ¹	b4 (0x0010)
(6) Control substrate microcomputer temperature* ¹	b5 (0x0020)
(7) Power substrate 1 microcomputer temperature* ¹	b6 (0x0040)
(8) Power substrate 2 microcomputer temperature* ¹	b7 (0x0080)
(9) TOTAL POWER* ¹ , * ³	b8 (0x0100)
(10) Device connection information* ⁴	b9 (0x0200)
(11) O2T format size* ⁴	b10 (0x0400)
(12) T2O format size* ⁴	b11 (0x0800)
(13) MODE (in LAMP n INTENSITY)	b12 (0x1000)
(14) INTENSITY (in LAMP n INTENSITY)	b13 (0x2000)
(15) WIDTH	b14 (0x4000)
(16) WIDTH units	b15 (0x8000)

Input item	Bit position (format setting value)
(17) DELAY	b16 (0x10000)
(18) DELAY units	b17 (0x20000)
(19) MODE (in LAMP n SYNC)	b18 (0x40000)
(20) Lamp status	b20 (0x100000)
(21) MONITOR	b21 (0x200000)
(22) ABSOLUTE MONITOR	b22 (0x400000)
(23) FB RATE	b23 (0x800000)
(24) LAMP Temperature	b24 (0x1000000)
(25) Lighting output section temperature	b25 (0x2000000)
(26) SEQ NUM NOW	b26 (0x4000000)
(27) LAMP n CAP STATUS* ³	b27 (0x8000000)
(28) Total illumination count	b28 (0x10000000)
(29) LED TOTAL TIME	b29 (0x20000000)
(30) Reset-permit illumination time	b30 (0x40000000)

*1 This can be set to the leading station number (LAMP1, LAMP5, LAMP9, LAMP13) of each device. It is not valid to set this to any other station numbers.

*2 If the main device, includes the status of expansion devices.

*3 The return value is the integer value multiplied by 10. For 12.3, 123 is returned.

*4 This can only be set for LAMP1 of the main device.

Checking the specified user format

You can check the specified user format value on the displayed screen of this product.

Tab	Setting item	Setting value
CYCLIC T2O	USER FORMAT	LAMP1: 0x00000000 to 0xFFFFFFFF ... LAMP16: 0x00000000 to 0xFFFFFFFF

Setting example

- Setting example 1

Inputting the following items with one expansion device connected

- Device status
- Error check
- LAMP1: Lamp status, MONITOR
- LAMP2: Lamp status, MONITOR
- LAMP3: Lamp status, MONITOR
- LAMP4: Lamp status, MONITOR
- LAMP5: Lamp status, MONITOR

Setting values

Write the following values with communication commands or Ethernet parameter IDs.

Also, write "0" for LAMPs whose input items you will not specify.

Communication command	Ethernet parameter ID	Item	Value (hex)
Y00	400	LAMP1 T2O format	0x3
Y01	401	LAMP2 T2O format	0x3
Y02	402	LAMP3 T2O format	0x3
Y03	403	LAMP4 T2O format	0x3
Y04	404	LAMP5 T2O format	0x3
Y05	405	LAMP6 T2O format	0x0
Y06	406	LAMP7 T2O format	0x0
Y07	407	LAMP8 T2O format	0x0

Input contents

The data from the OPPX is input in the following order.

Word address (leading number +)	Input item	Data type	Size [bytes]
0	Device status	WORD	2
+1	Error check	UINT	2
+2	Lamp1 status	WORD	2
+3	LAMP1 MONITOR	UINT	2
+4	Lamp2 status	WORD	2
+5	LAMP2 MONITOR	UINT	2
+6	Lamp3 status	WORD	2
+7	LAMP3 MONITOR	UINT	2
+8	Lamp4 status	WORD	2
+9	LAMP4 MONITOR	UINT	2
+10	Lamp5 status	WORD	2
+11	LAMP5 MONITOR	UINT	2

9-6-7 Details of the Fix Format

This section shows the details of the input/output data for the fix format.

● Output data (O2T)

The predetermined items are output.

The data size (format size) is set automatically according to the number of connected expansion devices.

Output data items

The following contents are output from the EtherNet/IP master to the OPPX.

Data contents	Value	Data type	Size [bytes]	Read/write	Remarks
User header	Specifies whether to apply the contents of the output data to the OPPX side. 0: Do not apply the output data to the OPPX. 1: Apply the output data to the OPPX.	UINT	2	W	Be sure to place this at the front of the output data. Also, note that if the value of the "user header" remains "0," even if the output data is written to the OPPX, this data will not be applied to the actual operations.
LAMP n INTENSITY (in LAMP n INTENSITY)	0 to 999	UINT	2	W	
LAMP n WIDTH	0 to 999	UINT	2	W	

• Output data contents

The OPPX writes data in the following order.

Word address (leading number +)	Data contents	Data type	Size [bytes]	Number of connected expansion devices
0	O2T user header	UINT	2	0
+1	LAMP1 INTENSITY (in LAMP1 INTENSITY)	UINT	2	
+2	LAMP1 WIDTH	UINT	2	
+3	LAMP2 INTENSITY (in LAMP2 INTENSITY)	UINT	2	
+4	LAMP2 WIDTH	UINT	2	
+5	LAMP3 INTENSITY (in LAMP3 INTENSITY)	UINT	2	
+6	LAMP3 WIDTH	UINT	2	
+7	LAMP4 INTENSITY (in LAMP4 INTENSITY)	UINT	2	
+8	LAMP4 WIDTH	UINT	2	

Word address (leading number +)	Data contents	Data type	Size [bytes]	Number of connected expansion devices
+9	LAMP5 INTENSITY (in LAMP5 INTENSITY)	UINT	2	1
+10	LAMP5 WIDTH	UINT	2	
+11	LAMP6 INTENSITY (in LAMP6 INTENSITY)	UINT	2	
+12	LAMP6 WIDTH	UINT	2	
+13	LAMP7 INTENSITY (in LAMP7 INTENSITY)	UINT	2	
+14	LAMP7 WIDTH	UINT	2	
+15	LAMP8 INTENSITY (in LAMP8 INTENSITY)	UINT	2	
+16	LAMP8 WIDTH	UINT	2	
+17	LAMP9 INTENSITY (in LAMP9 INTENSITY)	UINT	2	2
+18	LAMP9 WIDTH	UINT	2	
+19	LAMP10 INTENSITY (in LAMP10 INTENSITY)	UINT	2	
+20	LAMP10 WIDTH	UINT	2	
+21	LAMP11 INTENSITY (in LAMP11 INTENSITY)	UINT	2	
+22	LAMP11 WIDTH	UINT	2	
+23	LAMP12 INTENSITY (in LAMP12 INTENSITY)	UINT	2	
+24	LAMP12 WIDTH	UINT	2	
+25	LAMP13 INTENSITY (in LAMP13 INTENSITY)	UINT	2	3
+26	LAMP13 WIDTH	UINT	2	
+27	LAMP14 INTENSITY (in LAMP14 INTENSITY)	UINT	2	
+28	LAMP14 WIDTH	UINT	2	
+29	LAMP15 INTENSITY (in LAMP15 INTENSITY)	UINT	2	
+30	LAMP15 WIDTH	UINT	2	
+31	LAMP16 INTENSITY (in LAMP16 INTENSITY)	UINT	2	
+32	LAMP16 WIDTH	UINT	2	

MEMO

Set the connection size in the connection settings to match this format size.

The only items actually sent in periodic communication are those that are within the range of the connection size. Items outside the range of the connection size are not output.

With the fix format, the connection size is set when you select the connection type that matches the number of connected expansion devices.

- Only main device: Exclusive Owner No Extension (18 bytes)
- 1 expansion device connected: Exclusive Owner One Extension (34 bytes)
- 2 expansion devices connected: Exclusive Owner Two Extensions (50 bytes)
- 3 expansion devices connected: Exclusive Owner Three Extensions (66 bytes)

● Input data (T2O)

The predetermined items are input.

The data size (format size) is set automatically according to the number of connected expansion devices.

- Input data items

The following contents are input from the OPPX to the EtherNet/IP master.

Data contents	Value	Data type	Size [bytes]	Read/write	Remarks
Error check	0: No error or warning 1: Warning 2: Error 3: Error and warning	UINT	2	R	If the main device, includes the status of expansion devices.
LAMP n MONITOR	0 to 2047	UINT	2	R	
LAMP n TEMP	-99 to 155	INT	2	R	

- Input data contents

The data from the OPPX is input in the following order.

Word address (leading number +)	Data contents	Data type	Size [bytes]	Number of connected expansion devices
0	Error check (main device + expansion devices)	UINT	2	0
+1	LAMP1 MONITOR	UINT	2	
+2	LAMP1 TEMP	INT	2	
+3	LAMP2 MONITOR	UINT	2	
+4	LAMP2 TEMP	INT	2	
+5	LAMP3 MONITOR	UINT	2	
+6	LAMP3 TEMP	INT	2	
+7	LAMP4 MONITOR	UINT	2	
+8	LAMP4 TEMP	INT	2	1
+9	Error check (expansion device 1)	UINT	2	
+10	LAMP5 MONITOR	UINT	2	
+11	LAMP5 TEMP	INT	2	
+12	LAMP6 MONITOR	UINT	2	
+13	LAMP6 TEMP	INT	2	
+14	LAMP7 MONITOR	UINT	2	
+15	LAMP7 TEMP	INT	2	
+16	LAMP8 MONITOR	UINT	2	
+17	LAMP8 TEMP	INT	2	

Word address (leading number +)	Data contents	Data type	Size [bytes]	Number of connected expansion devices
+18	Error check (expansion device 2)	UINT	2	2
+19	LAMP9 MONITOR	UINT	2	
+20	LAMP9 TEMP	INT	2	
+21	LAMP10 MONITOR	UINT	2	
+22	LAMP10 TEMP	INT	2	
+23	LAMP11 MONITOR	UINT	2	
+24	LAMP11 TEMP	INT	2	
+25	LAMP12 MONITOR	UINT	2	
+26	LAMP12 TEMP	INT	2	3
+27	Error check (expansion device 3)	UINT	2	
+28	LAMP13 MONITOR	UINT	2	
+29	LAMP13 TEMP	INT	2	
+30	LAMP14 MONITOR	UINT	2	
+31	LAMP14 TEMP	INT	2	
+32	LAMP15 MONITOR	UINT	2	
+33	LAMP15 TEMP	INT	2	
+34	LAMP16 MONITOR	UINT	2	
+35	LAMP16 TEMP	INT	2	

MEMO

Set the connection size in the connection settings to match this format size.

The only items actually sent in periodic communication are those that are within the range of the connection size. Items outside the range of the connection size are not output.

With the fix format, the connection size is set when you select the connection type that matches the number of connected expansion devices.

- Only main device: Exclusive Owner No Extension (18 bytes)
- 1 expansion device connected: Exclusive Owner One Extension (34 bytes)
- 2 expansion devices connected: Exclusive Owner Two Extensions (50 bytes)
- 3 expansion devices connected: Exclusive Owner Three Extensions (66 bytes)

9-6-8 Mechanisms of Non-periodic (Message) Communication

A EtherNet/IP master can use non-periodic (message) communication to write settings to and read data from this product when necessary.

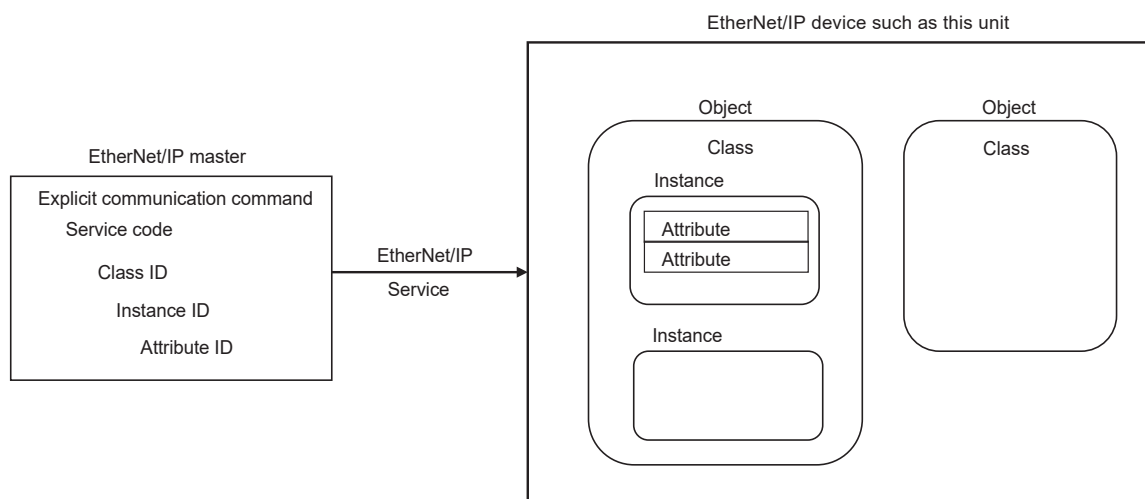
EtherNet/IP communication commands or something similar are used from the EtherNet/IP master to read and write the data specified with an object class ID, instance ID, and attribute ID.

■ Mechanisms of non-periodic (message) communication

In EtherNet/IP, the units that define the communication specifications or the data and operations of each device are called “objects.”

In explicit message communication, use explicit communication commands on the EtherNet/IP master side to specify the following items according to the way to access this object and the data that will be accessed.

- Service code: code indicating how to access the object
- Class ID: object ID
- Instance ID: ID of the entity in the object
- Attribute ID: ID of the detailed information in the instance



■ List of services supported by the objects inside this product

This product has internal parameter sets known as “objects.” Masters that support EtherNet/IP read these objects and write to them to performing monitoring and to configure settings.


The services supported by the objects inside this product are as follows.

Object name	Class ID	Details	Application
This unit's object	64 h	This object reads and writes data from this unit.	<ul style="list-style-type: none"> When the setting value number in this unit is specified, and the master parameters are written
Identity object	01 h	This object provides identification information and general information on this unit.	Confirm the vendor ID of this unit, perform a reset operation, etc.
Message Router object	02 h	This object is located within the node and is used to distribute explicit message requests to the appropriate application objects. It has no class attributes or instance attributes.	—
Assembly object	04 h	This object binds the attributes of multiple objects. This allows data between each object to be sent and received using a single connection.	Acyclically execute functions similar to cyclic communication Read whether error diagnosis is enabled or disabled
Connection Manager object	06 h	This object assigns and manages internal resources associated with both cyclic communication and Explicit message communication.	—
QoS object	48 h	This object manages all data and activity related to the Quality of Service (QoS) function of a device. It includes the DSCP setting in the IP header.	Configure QoS-related settings
TCP/IP Interface object	F5 h	This object writes and reads settings such as the IP address, subnet mask, and default gateway.	When configuring/monitoring TCP/IP-related settings Specifically shown below. <ul style="list-style-type: none"> Enable/disable the Address Conflict Detection (ACD) function
Ethernet Link object	F6 h	This object provides parameters, error counters, and status information for the Ethernet IEEE 802.3 communication interface.	Confirm the current communication speed

■ Object for this product (class ID: 64 h)

This object reads and writes the data in this product.

● Instance/attribute range


Instance ID	Attribute ID
Refer to  "9-3-5 Parallel Communication Setting Items" (page 9-9).	00 h to 10 h ("0" is the current recipe.)

● Service codes

Service code	Service name	Description
0E h	Get_Attribute_Single	Reads the value of the specified instance ID (various settings).
10 h	Set_Attribute_Single	Writes the value of the specified instance ID (various settings).

● Instance ID

Specifies the Ethernet parameter ID whose setting value will be read/written.

Instance ID	Attribute	Data type
Refer to  "9-3-5 Parallel Communication Setting Items" (page 9-9).	R/W	UINT

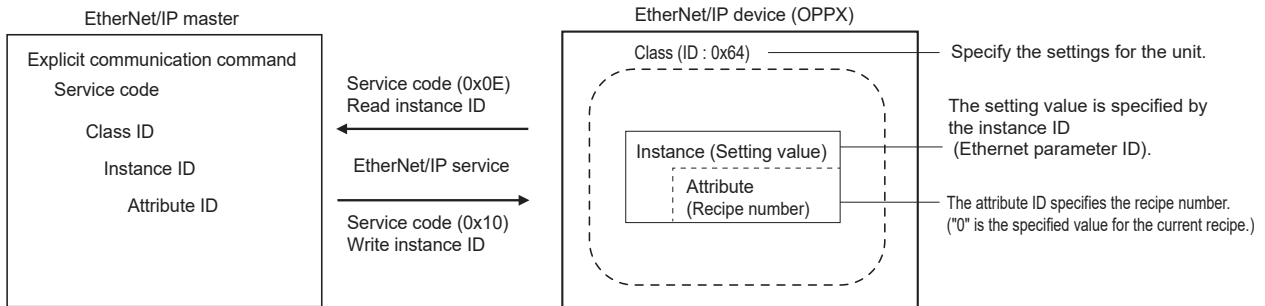
● List of attribute IDs

Use recipe numbers to specify the setting value of a given recipe number (1 to 16).

Attribute ID	Description	Attribute	Data type
00 h	Writes to the setting value of the current recipe number.	R/W	UINT
01 h	Writes to the setting value of recipe number 1.	R/W	UINT
02 h	Writes to the setting value of recipe number 2.	R/W	UINT
03 h	Writes to the setting value of recipe number 3.	R/W	UINT
04 h	Writes to the setting value of recipe number 4.	R/W	UINT
05 h	Writes to the setting value of recipe number 5.	R/W	UINT
06 h	Writes to the setting value of recipe number 6.	R/W	UINT
07 h	Writes to the setting value of recipe number 7.	R/W	UINT
08 h	Writes to the setting value of recipe number 8.	R/W	UINT
09 h	Writes to the setting value of recipe number 9.	R/W	UINT
0A h	Writes to the setting value of recipe number 10.	R/W	UINT
0B h	Writes to the setting value of recipe number 11.	R/W	UINT
0C h	Writes to the setting value of recipe number 12.	R/W	UINT
0D h	Writes to the setting value of recipe number 13.	R/W	UINT
0E h	Writes to the setting value of recipe number 14.	R/W	UINT
0F h	Writes to the setting value of recipe number 15.	R/W	UINT
10 h	Writes to the setting value of recipe number 16.	R/W	UINT

● Reading/writing the data of this product

When reading/writing the data of this product with EtherNet/IP communication, specify the information as follows.



■ Identity Object (Class ID: 01 h)

This object provides identification information and general information on this unit.

● Instance/Attribute Range

Instance ID	Attribute ID
01 h	01 h to 09 h

● Service Codes

Service code	Service name	Details
01 h	Get_Attributes_All	Read the values of all attributes.
05 h	Reset	Soft reset this unit. 0: Restarts the network chip. The OPPX device does not restart. 1: This is not supported by the OPPX series.
0E h	Get_Attribute_Single	Read the value of the specified attribute

● Attribute ID List

Attribute ID	Parameter name	Details	Attribute	Data	
				Data type	Default value
01 h	Vendor ID	Vendor ID	Read	UINT	05F6 h
02 h	Device Type	Device type	Read	UINT	28 h
03 h	Product Code	Product code	Read	UINT	2707 h
04 h	Revision	Identity object revision	Read	Struct	-
	Major Revision	Major revision	Read	USINT	01 h
	Minor Revision	Minor revision	Read	USINT	01 h
05 h	Status	Device status	Read	WORD	Value varies depending on device status. Refer to "List of services supported by the objects inside this product" for further information. Refer to "**1: Device status" for further information.
06 h	Serial Number	Serial number	Read	UDINT	Sets the last 4 bytes of the MAC address.
07 h	Product Name	Product name	Read	S H O R T _ STRING	"OPPX-EP"
08 h	State	Device operation state	Read	USINT	Value varies depending on device operation state. Refer to "**2: Device operation state" for further information.

*1: Device status

Bit	Name	Description
0	Owned by Master	Set to 1 (ON) when connection with master complete
1	Reserved	Always 0
2	Configured	Set to 1 (ON) when configuration complete
3	Reserved	Always 0
4 to 7	Extended Device Status	Not used
8	Minor Recoverable Fault	Recoverable minor error
9	Minor Unrecoverable Fault	Unrecoverable minor error
10	Major Recoverable Fault	Recoverable major error
11	Major Unrecoverable Fault	Unrecoverable major error
12 to 15	Reserved	Always 0

*2: Device operation state

Value	Description
00 h	Nonexistent
01 h	Self-test
02 h	Standby
03 h	Operating
04 h	Recoverable major error
05 h	Unrecoverable major error
FF h	Default value

■ Reset Service Parameters

Specify the reset type when the service code is 05 h (Reset).

Data	Parameter name	Details	Attribute
0	Reset type 0	Restarts the network chip. The OPPX device does not restart.	Write

■ Message Router Object (Class ID: 02 h)

This object is located within the node and is used to distribute explicit message requests to the appropriate application objects. It has no class attributes or instance attributes.

■ Assembly Object (Class ID: 04 h)

This object binds the attributes of multiple objects. This allows data between each object to be sent and received using a single connection.

● Instance/Attribute Range

Instance ID		Attribute ID
Output	64 h(100)	04 h
Input	65 h(101)	

● Service Codes

Service code	Service name	Details
0E h	Get_Attribute_Single	Read the value of the specified attribute

● Attribute ID List

- For instance ID 64 h (100)

Attribute ID	Parameter name	Details	Attribute	Data	
				Data type	Default value
04 h	Size	Size (bytes)	Read	UINT	00E2 h(226)

- For instance ID 65 h (101)

Attribute ID	Parameter name	Details	Attribute	Data	
				Data type	Default value
04 h	Size	Size (bytes)	Read	UINT	01F8 h(500)

■ Connection Manager Object (Class ID: 06 h)

There are no instances.

This object assigns and manages internal resources associated with both cyclic communication and Explicit message communication.

■ QoS Object (Class ID: 48 h)

This object manages all data and activity related to the Quality of Service (QoS) function of a device. It includes the DSCP setting in the IP header.

● Instance/Attribute Range

Instance ID	Attribute ID
01 h	04 h to 08 h

● Service Codes

Service code	Service name	Details
0E h	Get_Attribute_Single	Read the value of the specified attribute
10 h	Set_Attribute_Single	Write the value to the specified attribute.

● Attribute ID List

Attribute ID	Parameter name	Details	Attribute	Data	
				Data type	Default value
04 h	DSCP Urgent	Differentiated Services Code Point (DSCP) value of Urgent Priority message in cyclic communication (Valid range: 0 to 63)	Read/write	USINT	55(37 h)
05 h	DSCP Scheduled	DSCP value of Scheduled Priority message in cyclic communication (Valid range: 0 to 63)	Read/write	USINT	47(2F h)
06 h	DSCP High	DSCP value of High Priority message in cyclic communication (Valid range: 0 to 63)	Read/write	USINT	43(2B h)
07 h	DSCP Low	DSCP value of Low Priority message in cyclic communication (Valid range: 0 to 63)	Read/write	USINT	31(1F h)
08 h	DSCP Explicit	DSCP value of message (Class 3 or UCMM) in Explicit message communication (Valid range: 0 to 63)	Read/write	USINT	27(1B h)

■ TCP/IP Interface Object (Class ID: F5 h)

This object writes and reads settings such as the IP address, subnet mask, and default gateway.

● Instance/Attribute Range

Instance ID	Attribute ID
01 h	01 h to 0D h

● Service Codes

Service code	Service name	Details
01 h	Get_Attributes_All	Read the values of all attributes.
0E h	Get_Attribute_Single	Read the value of the specified attribute.
10 h	Set_Attribute_Single	Write the value to the specified attribute.

● Attribute ID List

Attribute ID	Parameter name	Details	Attribute	Data	
				Data type	Default value
01 h	Interface Status	Interface status Bit 0 to 3: 0=The setting of the IP address is not complete. 1 = DHCP, BOOTP, or the address set as the static address has been applied. 2=Setting applied by hardware (This is not supported on OPPX models that support EtherNet/IP.) Bit 4: Indicates that a new TTL or Mcast Config value was set. The value will be applied upon reset. Bit 5: Indicates that a new value is pending for Interface On OPPX models that support EtherNet/IP, the reset is carried out as soon as a value is set, so this bit is not set. Bit 6: Indicates that an address conflict was detected in the network by the ACD function. Bit 7: Indicates that an address conflict was detected in the network by the ACD function, and that the port cannot currently be used.	Read	DWORD	00000001 h

Attribute ID	Parameter name	Details	Attribute	Data	
				Data type	Default value
02 h	Configuration Capability	List of functions supported by the TCPIP object Bit 0: BOOTP client Bit 1: DNS client (unsupported) Bit 2: DHCP client Bit 3: DHCP/DNS client (unsupported) Bit 4: Configurable via configuration Bit 5: Configurable via hardware Bit 6: A reset operation is required to change Interface Configuration. Bit 7: ACD function support	Read	DWORD	00000095 h
03 h	Configuration Control	IP address configuration method Bit 0 to 3: 0=Set static IP address 1=Obtain address using BOOTP function 2=Obtain address using DHCP function Bit 4: DNS function support (unsupported)	Read/write	DWORD	00000000 h
04 h	Physical Link Object	The path to the link object in the physical layer	Read	Struct	None
	Path Size	Path size (set to 0 and cannot be changed for models with Multi Port)		UINT	0000 h
	Path	The path to the link object in the physical layer		Padded EPATH	None
05 h	Interface Configuration	EtherNet/IP unit settings	Read/write	Struct	-
	IP Address	IP address		UDINT	169.254.0.31
	Network Mask	Subnet mask		UDINT	255.255.255.0
	Gateway Address	Default gateway		UDINT	0.0.0.0
	Name Server	Primary name server		UDINT	0.0.0.0
	Name Server2	Secondary name server		UDINT	0.0.0.0
	Domain Name	Domain name		STRING	""
06 h	Host Name	Host name	Read/write	STRING	""
07 h	Safety Network Number	Safety network	Read	6 octets	No support
08 h	TTL Value	TTL value for multicast packets (valid range: 1 to 255)	Read/write	USINT	1

Attribute ID	Parameter name	Details	Attribute	Data	
				Data type	Default value
09 h	Mcast Config	Multicast address settings	Read/write	Struct	
	Alloc Control	Multicast determination method 0=The multicast address and number of addresses are determined automatically (default value) 1=The multicast address and number of addresses are determined by the user		USINT	00 h
	Reserved	Reserved	-	USINT	-
	Num Mcast	Number of multicast addresses		UINT	Assigned automatically
	Mcast Start Addr	Starting multicast address		UDINT	Assigned automatically
0A h	SelectAcd	Address Conflict Detection (ACD) function enabled/disabled 0=Disabled 1=Enabled (default value) Specify whether to enable or disable the function that searches for IP address conflicts with other devices on the network.	Read/write	BOOL	01 h
0B h	LastConflict Detected	Information on the address conflict that was last detected	Read/write	Struct	
	AcdActivity	ACD status when a conflict is detected 0=No conflict detected (default value) 1=Conflict while generating an IPV4 address 2=Conflict during operation 3=Conflict during semi-active probe		USINT	00 h
	Remote MAC	MAC address of the device with a conflicting IP address detected by ARP		ARRAY of 6 USINTs	0
	ArpPdu	Copy of the IP address conflict information from ARP		ARRAY of 28 USINTs	0
0C h	EtherNet/IP Quick Connect	Quick Connect enabled/disabled 0 = Disabled 1 = Enabled	Read/write	BOOL	00 h
0D h	Encapsulation Inactivity Timeout	Timeout during packet generation. The TCP socket will be closed if the specified time is exceeded. 0=Function disabled Default value: 120 seconds (valid range: 1 to 3600 seconds, 0001 to 0E10 h)	Read/write	UINT	0078 h (120 seconds)

■ Ethernet Link Object (Class ID: F6 h)

This object provides parameters, error counters, and status information for the Ethernet IEEE 802.3 communication interface.

● Instance/Attribute Range

Instance ID		Attribute ID
Port1	01 h	01 h to 0B h
Port2	02 h	

● Service Codes

Service code	Service name	Details
01 h	Get_Attributes_All	Read the values of all attributes.
0E h	Get_Attribute_Single	Read the value of the specified attribute
10 h	Set_Attribute_Single	Write the value to the specified attribute.
4C h	Get And Clear	Reset and read the specified attribute.

● Attribute ID List

Attribute ID	Parameter name	Details	Attribute	Data	
				Data type	Default value
01 h	Interface Speed	Interface communication speed 0=0M Speed 10=10M Speed 100=100M Speed	Read	UDINT	The set communication speed
02 h	Interface Flags	Interface status flag Bit 0: Link status Bit 1: Half-duplex (0) or full-duplex (1) Bits 2 - 4: 0: Performing auto negotiation 1: Failed to perform auto negotiation and detect speed 2: Failed to perform auto negotiation but detected speed successfully 3: Successfully performed auto negotiation 4: Auto negotiation not attempted Bit 5: Reset required to apply settings Bit 6: Hardware fault (always 0)	Read	DWORD	Value varies depending on settings
03 h	Physical Address	Device MAC address	Read	ARRAY of 6 USINTs	Device MAC address

Attribute ID	Parameter name	Details	Attribute	Data	
				Data type	Default value
04 h	Interface Counters	Counter value related to packets received on interface	Read/ read and clear	Struct	0
	In Octets	Octets received on interface		UDINT	0
	In Ucast Packets	Unicast packets received on interface		UDINT	0
	In NUcast Packets	Packets other than unicast packet received on interface		UDINT	0
	In Discards	Inbound packets discarded after receipt		UDINT	0
	In Errors	Inbound packets including errors (not including those discarded)		UDINT	0
	In Unknown Protos	Inbound packets received via unknown protocol		UDINT	0
	Out Octets	Octets sent on interface		UDINT	0
	Out Ucast Packets	Unicast packets sent on interface		UDINT	0
	Out Nucast Packets	Packets other than unicast packet sent on interface		UDINT	0
	Out Discards	Discarded outbound packets		UDINT	0
	Out Errors	Outbound packets including errors		UDINT	0
05 h	Media Counters	Counter values related to Ethernet media	Read/ read and clear	Struct	0
	Alignment Errors	Received frames not composed of octets where the data length is an integer value		UDINT	0
	FCS Errors	Received frames that did not pass through FCS check		UDINT	0
	Single Collisions	Frames successfully sent for which a collision was predicted		UDINT	0
	Multiple Collisions	Frames successfully sent for which at least one collision was predicted		UDINT	0
	SQE Test Errors	Number of SQE test error messages generated		UDINT	0
	Deferred Transmissions	Frames where the initial transmission was delayed due to busy status		UDINT	0
	Late Collisions	Number of times where a collision was detected after the 512-bit time when sending a packet		UDINT	0
	Excessive Collisions	Frames for which sending failed due to excessive collisions		UDINT	0
	MAC Transmit Errors	Frames for which sending failed due to an internal MAC sublayer transmission error		UDINT	0
	Carrier Sense Errors	Time where assertion was not performed due to loss of carrier detection function for frame transmission		UDINT	0
	Frame Too Long	Frames received exceeding the maximum size allowed		UDINT	0
	MAC Receive Errors	Frames for which receipt failed due to an internal MAC sublayer receive error		UDINT	0

Attribute ID	Parameter name	Details	Attribute	Data	
				Data type	Default value
06 h	Interface Control	Physical layer interface settings	Read/write	Struct	0
	Control Bits	Interface management bit Bit 0: Auto negotiation status (1: Yes, 0: No [fixed setting]) Bit 1: Type of fixed setting (0: Half-duplex, 1: Full-duplex)		WORD	0001 h (auto negotiation)
	Forced Interface Speed	Interface speed 10 Mbps: 000A h 100 Mbps: 0064 h Set to 0 (0000 h) for auto negotiation.		UINT	0000 h
07 h	Interface Type	Interface type Bit 0: Unknown interface type Bit 1: Device dedicated interface Bit 2: Twisted pair Bit 3: Optical fiber	Read	USINT	02 h
08 h	Interface State	Interface status Bit 0: Unknown status Bit 1: Normal Bit 2: Interface disabled Bit 3: Interface test status	Read	USINT	Value varies depending on interface status
09 h	Admin State	Administrator permissions enabled/disabled 1=Enabled (default value) 2=Disabled	Read/write	USINT	01 h
0A h	Interface Label	Label name for each interface	Read	SHORT_STRING	Instance 1: "Port1" Instance 2: "Port2"

Attribute ID	Parameter name	Details	Attribute	Data	
				Data type	Default value
0B h	Interface Capability	Functions supported by interface	Read	Struct	
	Capability Bits	Functions supported by interface Bit 0: Reset required to apply manual settings Bit 1: Auto negotiation support Bit 2: Auto MDIX support Bit 3: Manual speed/communication method can be configured		DWORD	0000000F h
	Speed/Duplex Options	List of communication speeds/communication methods supported by interface	Read	Struct	
		Number of component elements		USINT	04 h
		Communication speed/communication method		ARRAY of Struct	
		Communication speed 1 000A h =10M Speed 0064 h =100M Speed		UINT	000A h
		Communication method 1 00 h = Half-duplex 01 h = Full-duplex		USINT	00 h
		Communication speed 2		UINT	000A h
		Communication method 2		USINT	01 h
		Communication speed 3		UINT	0064 h
		Communication method 3		USINT	00 h
		Communication speed 4		UINT	0064 h
		Communication method 4		USINT	01 h

9-7 iQSS

iQSS Ethernet from Mitsubishi Electric Corporation is supported.

Refer to the “IQ Sensor Solution Reference Manual.”

Turn [DHCP] at this product [OFF] before connecting to the network.

If you connected when [DHCP] was [ON] (default value), wait 20 seconds and then execute “Automatic detection of connected devices” from the engineering tools.

For the port number from this product to the PLC, specify one of the following: 1025 - 4999, 5010 - 45236, 45238 - 61439.

Do not specify 45237 as the port number for any other device in the same network domain.

Do not specify 61440 - 65534 as the self station port number.

MEMO

iQSS is not supported for TTL specifications and EtherNet/IP support models.

9-7-1 Status Monitor

Item name	Current value
L1Mon	LAMP 1 monitor value
L1Tmp	LAMP 1 internal temperature
L2Mon	LAMP 2 monitor value
L2Tmp	LAMP 2 internal temperature
L3Mon	LAMP 3 monitor value
L3Tmp	LAMP 3 internal temperature
L4Mon	LAMP 4 monitor value
L4Tmp	LAMP 4 internal temperature
L5Mon	LAMP 5 monitor value
L5Tmp	LAMP 5 internal temperature
L6Mon	LAMP 6 monitor value
L6Tmp	LAMP 6 internal temperature
L7Mon	LAMP 7 monitor value
L7Tmp	LAMP 7 internal temperature
L8Mon	LAMP 8 monitor value
L8Tmp	LAMP 8 internal temperature
L9Mon	LAMP 9 monitor value
L9Tmp	LAMP 9 internal temperature

Item name	Current value
L10Mon	LAMP 10 monitor value
L10Tmp	LAMP 10 internal temperature
L11Mon	LAMP 11 monitor value
L11Tmp	LAMP 11 internal temperature
L12Mon	LAMP 12 monitor value
L12Tmp	LAMP 12 internal temperature
L13Mon	LAMP 13 monitor value
L13Tmp	LAMP 13 internal temperature
L14Mon	LAMP 14 monitor value
L14Tmp	LAMP 14 internal temperature
L15Mon	LAMP 15 monitor value
L15Tmp	LAMP 15 internal temperature
L16Mon	LAMP 16 monitor value
L16Tmp	LAMP 16 internal temperature
MsSt	Device status
D1St	Device status
D2St	Device status
D3St	Device status

Other Functions

This section explains how to set sequence control and recipes.

10-1 Sequence Control

10-1-1 General description

Sequence control is control which carries out operations one after another according to a predetermined sequence.

With this product, sequence control is possible by registering a lighting, light intensity adjustment, and illumination pattern for each lighting in advance.

Because this allows multiple different lightings to be illuminated in sequence with a single trigger input, it can reduce the number of triggers and shorten the communication time.

The parameters which can be registered for sequence control are the light intensity value, lighting width, and lighting width units.

The maximum count of sequence control that can be registered is 16 for each lighting. Parameters can be set individually for each of the 16 counts. The illumination delay time uses the value that was set for each lighting.

10-1-2 Sequence Setting Method

List of setting items

Item	Values that can be set	Default value	Description
TOTAL NUM OF SEQ	0 to 15	0	Sequence control count 0 = No sequence 1 = 2 times sequence control 15 = 16 times sequence control
SEQ NUM FIX	0 to 16	0	Sequence number fix 0 = Cancel number selection 1 to 16: Fixed at sequence control count n
SEQ NUM NOW [Display only]	0 to 16		Current sequence number 0 = No sequence control 1 to 16: Sequence control count n
RESET INPUT	SEQ RESET SYNC 1 to 4	SEQRST	Selects the pin name to assign sequence reset to.
RESET EXE	ON/OFF	OFF	Executes sequence reset. When this setting item is "ON", sequence reset is executed for all lightings. This is used when sequence reset is executed by key operation.
INTENSITY 1	0 to 999	0	Sequence control 1st time light intensity value

Item	Values that can be set	Default value	Description
WIDTH 1	Value: 0 to 999 Units: μ s/ms	0 ms	Sequence control 1st time lighting width/units
:	:		:
INTENSITY16	0 - 999	0	Sequence control 16th time light intensity value
WIDTH 16	Value: 0 - 999 Units: μ s/ms	0 ms	Sequence control 16th time lighting width/units

■ Setting process

Setting procedure	
①	[Required] Setting item: TOTAL NUM OF SEQ Set the number of times to perform the series of the repeating pattern.
②	[Required] Setting item: MODE (in LAMP n SYNC). For details, refer to “External Synchronization Input” (page 7-1). Set to EXT in MODE.
③	[Required] Setting items: WIDTH (in LAMP n SEQUENCE), INTENSITY (in LAMP n SEQUENCE) Set the lighting width and light intensity value for each TOTAL NUM OF SEQ.
④	Setting items: ENABLE, POLARITY. For details, refer to “External Synchronization Input” (page 7-1). Set the operating logic for the connected lighting relative to the input signal.
⑤	Setting item: RESET INPUT Assign the signal which resets the sequence before it is completed and returns it to 1st time.

■ Setting examples

When switching between two lightings and performing imaging as shown below
The light intensity value and lighting duration are examples.



LAMP 1: Coaxial lighting



LAMP 2: Backlight lighting

Setting value

	TOTAL NUM OF SEQ	Synchronization input	Sequence control 1		Sequence control 2		ENABLE		POLARITY		RESET INPUT
			INTENSITY 1	WIDTH 1	INTENSITY 2	WIDTH 2	SYNC1	SYNC2	SYNC1	SYNC2	
Common for all lamps	1	-	-	-	-	-	-	-	POS	POS	-
LAMP1	-	ON	800	800 μ s	0	0	ON	OFF	-	-	SEQRST
LAMP2	-	ON	0	0	600	400 μ s	ON	OFF	-	-	SEQRST

10-1-3 Sequence Control Specifications

■ RESET INPUT

Executing sequence reset is a function that can return sequence control to 1st time.

Sequence reset is performed simultaneously for all lightings.

Five inputs can be assigned: synchronization input 1 - 4 and sequence reset input. Sequence reset input is the default value for all lightings.

Sequence reset should be input when the lighting is off.

If sequence reset is input while the lighting is on, the sequence reset input may not be recognized.

Also, note that even if the synchronization control input and sequence reset input are used on the same pin of the controller, the sequence reset may be input while the lighting is on.

■ SEQ NUM FIX

The sequence number can be fixed for the purpose of checking operation. Only the light intensity value, lighting width, and lighting width units for the specified sequence number are enabled.

To cancel, either set sequence number fix to 0 or else restart the controller.

To cancel the sequence number fix, perform sequence reset at the same time. After the sequence number is unfixed, the sequence number will take an undefined value

■ Restrictions on sequence control

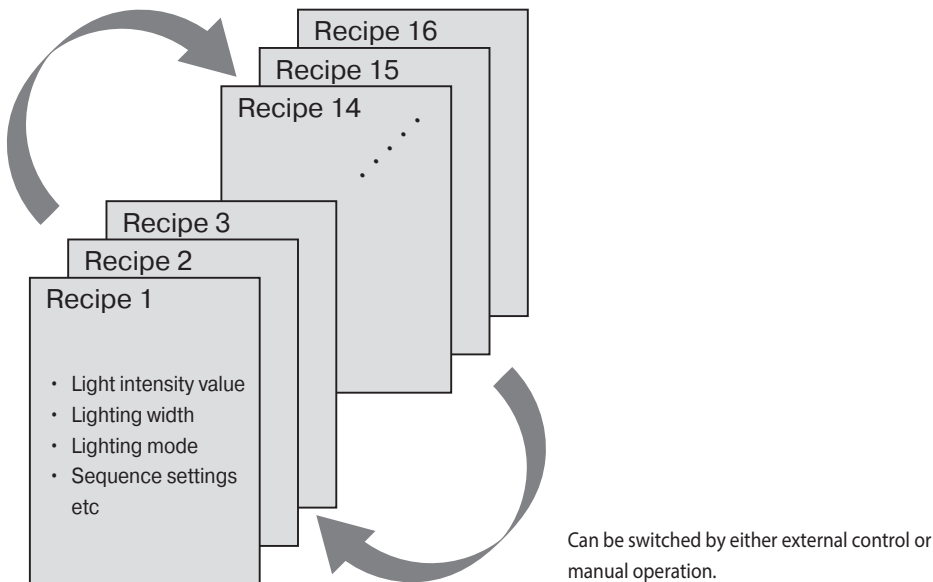
- The lighting mode cannot be changed for each sequence.
- When the lighting mode is variable voltage, L-INT, or L-INT strobe, sequence control cannot be used.
- When the lighting mode is strobe, it is necessary to set the same lighting width units and to set a lighting width that is only either 1000 μ s or less or higher than 1000 μ s. If not constant, ms is automatically applied to the lighting width units, and the intended operation will not occur.
- The feedback function cannot be used because high-speed changes in light intensity value occur with short lighting widths.
It is recommended that this be handled by reading the monitor value or using the monitor brightness alarm.
- Do not input synchronization input during sequence reset or input sequence reset input during illumination.

10-2 Recipe Settings

The collection of settings related to lighting illumination conditions is referred to as a “RECIPE.”

With this product, 16 recipes can be registered for one device. By changing the recipe for setup or at other times, it is possible to easily call settings which correspond to the illumination conditions.

The recipe number can be changed by panel operation or by external control.



10-2-1 Recipe Save Items

This is the list of items which can be saved in a recipe.

For details of each item, refer to the corresponding separate page.

Item	Tab	Serial communication commands	Ethernet communication commands ID
MODE	LAMP n INTENSITY	MOD	100
INTENSITY		EVO	103
PWM FREQ		PFR	101
DC RANGE		DCR	108
DELAY/unit	LAMP n SYNC	DL _┘ /DLU	106/107
WIDTH/unit		STB/STU	104/105
Input selection		TSL	111
FEEDBACK	LAMP n COMM	FB _┘	167
INTENSITY 1	LAMP n SEQUENCE	E1	119
WIDTH 1/unit		W1/U1	120/121
⋮		⋮	⋮
INTENSITY 16		E16	164
WIDTH 16/unit		W16/U16	165/166
TOTAL NUM OF SEQ		SQM	114

10-2-2 Recipe Operations

■ Read recipe

Setting procedure
Setting item: RECIPE
① Rotate the dial button and select the recipe number to use.
② Press the dial button.

* When performing via communication, refer to the section for each communication type.

* When a recipe for a specific LAMP is read out, the recipes for all individual OPPX series LAMPs including that LAMP will be switched as well.

Example: Change LAMP1 recipe from 1 to 2 → All recipes for LAMP1-4 are changed to 2.

Change LAMP7 recipe from 1 to 2 → All recipes for LAMP5-8 are changed to 2.

■ Save recipe

When the light intensity value or setting contents are changed, the changes are automatically applied to the recipe that is in use.

10-2-3 MEMO for RECIPE

It is possible to set MEMOs for each recipe.

By adding a MEMO of the application or status to each recipe, it will be easier to identify them.

MEMO can only be set by communication. They cannot be set from the device.

They use ASCII code and 64 characters can be set. The following characters and spaces (ASCII code: 0x20) can be used.

List of characters that can be used
0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
-.:_

10-2-4 Response time

When the recipe number was changed by each input, the change occurs at the time shown in the table below.

It shows the time from the measurement start position until the change in PWM light intensity value is applied to the output.

When the recipe setting values were changed, save time for the pre-change recipe setting values is added.

The response time for expansion devices may not be as shown here if retry has occurred in the infrared communications.

Input	Main device	Expansion device	Measurement start position
External parallel input	2 to 23 ms	6 to 36 ms	Rise of the write signal
RS-232C	4 to 30 ms	6 to 34 ms	Receiving waveform stop bit
USB/Ethernet	4 to 30 ms	6 to 34 ms	Received command analysis end

Measurement conditions

- External parallel input: From BRTWR rise to the change in PWM lamp intensity value
- Serial communication (RS-232C): From the RS-232C transmission waveform end position to the change in PWM lamp intensity value
- Serial communication (USB): From detection of the recipe change command to the change in PWM lamp intensity value
- Ethernet: From detection of the recipe change command to the change in PWM lamp intensity value

Output is temporarily stopped when any of the conditions below occurs.

- The lighting mode was changed.
- PWM FREQ was changed.
- FEEDBACK was changed from "OFF" or was changed to "OFF."
- WIDTH was changed from more than 1,000 μ s to less than 1,000 μ s, or the reverse, in strobe or L-INT STB mode.
- Sequence control was enabled.

10-3 Other Functions

10-3-1 Settings Copy

It is possible to copy the settings of a particular lamp to other lamps including connected expansion devices. This is used when setting the same settings for multiple lamps.

■ Setting item

Item	Setting value	Description
COPY FROM	LAMP1 to LAMP16	Select the lamp to copy settings from.
COPY TO BEGIN	LAMP1 to LAMP16	The settings are copied to multiple consecutive lamps starting from the lamp specified here. The copy source lamp may be contained within the multiple selected lamps.
COPY TO END	LAMP1 to LAMP16	The settings are copied to lamps from the start number to the end number specified here. The copy source lamp may be contained within the multiple selected lamps.
COPY EXE	OFF/ON	Copies the setting values when this is turned ON.

■ Copyable menu (Copyable item)

- RECIPE
- ALARM HIGH
- ALARM LOW

■ Copy execution procedure

Setting procedure	
①	Setting item: COPY FROM Select the lamp to copy settings from.
②	Setting item: COPY TO BEGIN/COPY TO END Select the lamps to copy settings to.
③	Setting item: COPY EXE Turn execute copy ON to copy based on the settings of ① and ②.

10-3-2 Initialization

This initializes/resets the settings. It is possible to specify several ranges to initialize. Check the range which each will initialize before executing.

■ Setting item

Tab name	Item	Setting value	Description
SYSTEM	INIT	BACK	BACK: Returns without executing reset.
		CURRENT RECIPE	SET RECIPE: The settings of the currently selected recipe are reset.
		ALL RECIPES	ALL RECIPES: The settings of all recipes are reset.
		COMMON SETTING	COMMON SETTING: The common settings are reset except for the recipe internal settings, language, baud rate, DHCP, IP, subnet mask, and gateway.
		LANGUAGE	LANGUAGE: The language selection screen will be displayed at the next startup.

10-3-3 Controller Lifetime Display

Displays the capacitor capacitance for each controller lamp, and the predicted decline time.

When the capacitance of the output capacitor declines, the output waveform will become dulled and output voltage will drop, preventing the lighting from illuminating with its original brightness.

Item	Setting value	Description
LAMP 1 CAP STATUS [Display only]	100.0 % 0 h/%	Indicates the LAMP1 output capacitor status. Top:Capacitance ratio. Displays the ratio (out of 1,000) when the capacitance that was measured at startup is compared with the capacitance at the time of production. Bottom:Capacitance decline time. This is the estimated value for the time required for capacitance to decline by 1%. It is updated when a certain amount of capacitance decline is detected. 0 is displayed until the first update.
LAMP 2 CAP STATUS [Display only]	100.0 % 0 h/%	Indicates the LAMP 2 output capacitor status.
LAMP 3 CAP STATUS [Display only]	100.0 % 0 h/%	Indicates the LAMP 3 output capacitor status.
LAMP 4 CAP STATUS [Display only]	100.0 % 0 h/%	Indicates the LAMP 4 output capacitor status.

10-3-4 Language Setting

The language display setting supports Japanese and English.

Tab name	Item	Setting value	Description
SYSTEM	LANGUAGE	ENGLISH 日本語	The default value is set when the controller is started for the first time.

10-3-5 Other Display Items

Item	Setting value	Description
MODEL [display only]		Production information
OPERATING TIME [display only]		Total operating time D:HH:MM:SS format
PASS CODE	0000 (default value) to 9999	Pass code for unlocking the operation lock
MODULE POSITION [display only]	Main device Expansion devices 1 to 3	Displays the corresponding status of infrared communication at that device.
MY CONFIG [display only]	Output voltage/ number of channels	Displays the output voltage and number of channels of the selected device.
E1 CONFIG [display only]	Output voltage/ number of channels NONE	Displays the output voltage and number of channels of the expansion device connected to that device. When no such expansion device exists, "NONE" is displayed.
E2 CONFIG [display only]		
E3 CONFIG [display only]		
FW VERSION [display only]		Displays the firmware version of the controller and EtherNet/IP. • Controller firmware version 2 characters each for SUM1 SUB2 MAIN FPGA in sequence • EtherNet/IP firmware version (6 digits)
UNIQUE ID [display only]		Displays the unique ID of the controller as 17 digits.
POWER DROP [display only]		Displays the number of times that low voltage in the 24 V input was detected.
24V MIN PEAK [display only]		Displays the minimum voltage value of 24 V (mV) detected since the start of operation.

Errors and Warnings

This section explains the error and warning contents and responses.

11-1 List of Errors

Item	Display	Cause	Error cancellation	Description
Memory error	MEMORY ERR	Controller	Possible	Memory recognition failed. Please restart. If the error occurs again after restarting, contact OPTEx FA support.
FPGA error	FPGA ERR	Controller	Possible	FPGA start failed. Or, communication could not be established for 3 seconds or longer. Please restart. If the error occurs again after restarting, contact OPTEx FA support.
Firmware update failure	FW UPDATE ERR	Controller	Possible	Firmware update failed. Contact OPTEx FA support.
Controller substrate 1 communication error	PWR1 COM ERR	Controller	Possible	Communication with the internal substrate could not be established for 3 seconds or longer. Please restart. If the error occurs again after restarting, contact OPTEx FA support.
Controller substrate 2 communication error	PWR2 COM ERR	Controller	Possible	Communication with the internal substrate could not be established for 3 seconds or longer. Please restart. If the error occurs again after restarting, contact OPTEx FA support.
Controller high temperature detection	OVERHEAT	Controller	Possible	A temperature of 110°C or higher was detected inside the case. INTENSITY of all lightings is reduced to 1/4 until the temperature drops below 95°C. If lighting output temperature exceeding 110°C continued for 3 seconds or longer, lighting output is stopped. It is possible that the ambient temperature is high or that the environment provides poor heat radiation.
Configuration error	CONFIG ERR	Controller	Impossible	Lighting output is stopped because a device configuration which is different from the settings was detected. Contact OPTEx FA support.
Lighting output overvoltage	Lx HIGH VOLT ERR	Lighting	Impossible	Lighting output is stopped because an output voltage exceeding the maximum output voltage was detected. Check that the power consumption of the connected lighting is within the service range of this product.
Lighting output low voltage	Lx LOW VOLT ERR	Lighting	Impossible	Lighting output is stopped because an output voltage that was less than 70% of the set voltage was detected. Check that the power consumption of the connected lighting is within the service range of this product.
Lighting output start error	Lx START ERR	Lighting	Impossible	Lighting output is stopped because output voltage conforming to the operation setting was not output. Contact OPTEx FA support.


Item	Display	Cause	Error cancellation	Description
Lighting output gate controller error	Lx GATE ERR	Lighting	Impossible	Lighting output is stopped because an error was detected at the gate signal controller IC. Please restart. If the error occurs again after restarting, contact OPTEx FA support.
Lighting erroneous discharge detection	Lx DISCH ERR	Lighting	Impossible	Lighting output is stopped because an unintended discharge operation was detected. Please restart. If the error occurs again after restarting, contact OPTEx FA support.
Lighting overcurrent	Lx OVER CURRENT	Lighting	Possible	Lighting output is stopped because overcurrent was detected in the lighting output. Check that the power consumption of the connected lighting is within the service range of this product.
Lighting power too high	Lx OVER POWER	Lighting	Possible	The current that is output to the connected lighting exceeds the value in the product specifications. The connected lighting load may be too large.
Lighting output correction error	Lx CALIB ERR	Lighting	Impossible	The lighting output voltage offset value has not been set. Contact OPTEx FA support.
Lighting high temperature detection	Lx OVERHEAT	Lighting	Possible	Lighting output was stopped because a temperature exceeding the product specifications was detected in the lighting. The ambient temperature may be high or the environment may be difficult to dissipate heat.
Lighting communication overcurrent	Lx COM OVER CURR	Lighting	Impossible	Lighting communication and lighting output are stopped because overcurrent was detected at the lighting communication terminal. Check the conditions of the lighting and cable.
Lighting output high temperature detection	Lx HEAT SURGE	Lighting	Impossible	Lighting output is stopped because a rapid temperature rise exceeding the prescribed value was detected in the lighting output circuit. A product malfunction is possible. Contact OPTEx FA support.
Lighting output operation error	Lx DCDC ERR	Lighting	Impossible	Lighting output is stopped because an error was detected in the lighting output circuit control IC. A product malfunction is possible. Contact OPTEx FA support.



11-2 List of Warnings

Item	Display	Cause	Warning cancellation	Description
Low input voltage	POWER LOW	Controller	Possible	The number of times that low voltage occurred is increased because low voltage was detected in the 24 VDC controller. Check the conditions of the controller power supply.
Controller high temperature detection warning	OVERHEAT ALERT	Controller	Possible	High temperature was detected inside the case (main microcomputer temperature or any of lighting output section temperatures 1 - 4).
Output terminal overcurrent	POUT OVER CURRENT	Controller	Possible	Overcurrent was detected in the general output. General output is stopped. Check the configuration at the connection destination.
IP error	IP ERR	Controller	Possible	The set IP address already exists in the network. Check the IP setting. Or use DHCP.
DHCP error	DHCP ERR	Controller	Possible	This occurs when an IP address was not assigned by the DHCP server. Configure the network manually.
Network error	NETWORK ERR	Controller	Possible	An error was detected in Ethernet communication control. If the error is not corrected by turning the power OFF and back ON, contact support.
Setting value copy failure	COPY FAIL	Controller	Possible	A failure to acquire lighting data from the copy source, or an expansion device specifying a lighting other than its own device was detected. Check the copy source and copy destination lighting numbers.
Monitor brightness alarm	Lx MONITOR	Controller	Possible	This occurs when the brightness of the monitored lighting was less than the lower limit or above the upper limit for the ratio [%] compared to the brightness at the time of factory shipping. Check the conditions of the lighting.
Feedback error	Lx FEEDBACK	Controller	Possible	This notification occurs when the intended brightness was not achieved as a result of voltage adjustment intended so the brightness of the monitored lighting matches the light intensity value. If the monitor brightness alarm was set, that takes priority. Check the conditions of the lighting.

11-3 Canceling an Error/Warning

An error or warning can be canceled by either changing the setting item or by an operation in error/warning display mode.

For the operation in error/warning display mode, refer to  “3-2-5 ERROR/WARNING Mode” (page 3-13).

For details on whether or not to cancel each error/warning item, see “ 11-1 List of Errors” (page 11-2),
 “11-2 List of Warnings” (page 11-4).

Tab name	Item	Setting value	Description
SYSTEM	ERROR RESET	OFF	OFF: Returns without canceling the error.
		ON	ON: Cancels the error.

Appendix

The appendix contains the specifications and dimension drawings of the product.

12-1 Specifications

12-1-1 Series List

12 V output type

Model			Total output power	Number of lighting output channels	Ethernet	EtherNet/IP
OPPX series		OPPX-EP series				
Standard	TTL level model					
OPPX-6012P2	OPPX-6012P2-TTL	-	Maximum 60 W for all channels (Maximum 30 W per ch)	2		
OPPX-6012E2	OPPX-6012E2-TTL	-			✓	
-	-	OPPX-6012EP2			✓	✓
OPPX-12012P4	OPPX-12012P4-TTL	-	Maximum 120 W for all channels (Maximum 30 W per ch)	4		
OPPX-12012E4	OPPX-12012E4-TTL	-			✓	
-	-	OPPX-12012EP4			✓	✓

24 V output type

Model			Total output power	Number of lighting output channels	Ethernet	EtherNet/IP
OPPX series		OPPX-EP series				
Standard	TTL level model					
OPPX-10024P2	OPPX-10024P2-TTL	-	Maximum 100 W for all channels (Maximum 50 W per ch)	2		
OPPX-10024E2	OPPX-10024E2-TTL	-			✓	
-	-	OPPX-10024EP2			✓	✓
OPPX-20024P4	OPPX-20024P4-TTL	-	Maximum 200 W for all channels (Maximum 50 W per ch)	4		
OPPX-20024E4	OPPX-20024E4-TTL	-			✓	
-	-	OPPX-20024EP4			✓	✓

12 V/24 V dual output type

Model		Total output power	Number of lighting output channels	Ethernet	EtherNet/IP
OPPX series	OPPX-EP series				
OPPX-1601224P4	-	Maximum 160 W for all channels (12 V output: Maximum 30 W per ch, 24 V output: Maximum 50 W per ch)	12 V output: 2 (L1, L2) 24 V output: 2 (L3, L4)		
OPPX-1601224E4	-			✓	
-	OPPX-1601224EP4			✓	✓

12-1-2 OPPX Series Specifications

12 V Output Type Specifications

General specifications

Model	Standard	OPPX-6012P2/-6012E2	OPPX-12012P4/-12012E4
	TTL level model	OPPX-6012P2-TTL/ -6012E2-TTL	OPPX-12012P4-TTL/ -12012E4-TTL
Supply voltage		24 VDC \pm 10%	
Output channels		2 ch	4 ch
Connectable illumination rating	All channels max.	60 W	120 W
	Max. per channel	30W/ch	30W/ch
illumination output voltage	PWM mode	12 VDC	
	STB mode	18 VDC	
	DC mode	8 to 12 VDC	
	L-INT mode	12 VDC	
	L-INT STB mode	18 VDC	
Illumination output current	PWM/ DC/ L-INT	2.5 A/ch	
	STB/ L-INT STB	8.0A/ch (Duty 10%)	
Light intensity control		PWM intensity control Frequency: 50 kHz, 100 kHz, 100 kHz DC, 130kHz DC voltage variable mode	
Strobe	PWM frequency: 50 kHz	Light emitting time: 20 μ s to 19980 μ s (20 μ s step)	
	PWM frequency: 100 kHz, 100 kHz DC	Light emitting time: 10 μ s to 9990 μ s (10 μ s step), 1 ms to 999 ms(1 ms step)	
	PWM frequency: 130 kHz DC	Light emitting time: 7.7 μ s to 7684.6 μ s (7.7 μ s step), 1 ms to 999 ms (1 ms step)	
	Flash cycle limit	10% Duty (10 times or more the pulse width cycle required)	
Display and operation device		1.77 inch LCD, Dial key, Dial button, MODE button, LAMP button	
Communication interface	USB (Full-speed, Type-C connector)	Serial communication via virtual COM port	
	RS-232C	4800/9600/19200/38400/57600/115200 bps	
	Ethernet (10BASE-T/100BASE-TX) *1	UDP, TCP, DHCP, iQSS *2 (Mitsubishi Electric's iQ Sensor Solution)	
Protective functions		Lighting overcurrent Lighting overvoltage Controller internal temperature monitor (PWM output reduced to 1/4 at 110°C or higher.) Lighting internal temperature monitor Lighting low brightness alarm Input power monitor Feedback error Output voltage monitor	
Ambient temperature/humidity		0 to +40°C/20 to 85 % RH (no condensation)	
Storage temperature/humidity		-20 to +70°C/20 to 95 % RH (no condensation)	

Model		Standard	OPPX-6012P2/-6012E2	OPPX-12012P4/-12012E4
		TTL level model	OPPX-6012P2-TTL/ -6012E2-TTL	OPPX-12012P4-TTL/ -12012E4-TTL
Vibration resistance			10 to 55 Hz; Double amplitude: 1.5 mm; 2 hours in each of the X, Y, and Z directions	
Shock resistance			10 G; 3 times in each of the X, Y, and Z directions	
Material			Polycarbonate	
Weight			2 ch type : 260 g, 4 ch type : 360 g	
Degree of protection			IP20 (IEC 60529)	
Applicable regulations	EMC		EU EMC directive (2014/30/EU), UK EMC (The Electromagnetic Compatibility Regulations 2016)	
	Environment		EU RoHS directive (2011/65/EU), China RoHS (MIIT Order No.32) UK RoHS (The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012)	
Applicable standards			EN 61326-1, EN 55011 Group 1, Class A	
Installation method			DIN rail mounting (can also stand alone)	
Design life			7 years (maximum load, 24 hours continuous use, 40°C environment)	
Accessories			External illumination control connector, Power connector, Instruction manual	

*1 Only installed in OPPX-xxxEx

*2 Not displayed for models with TTL specification.

● External Synchronous Input/Output Specifications

Standard

Model			OPPX-6012P2/-6012E2	OPPX-12012P4/-12012E4
Input	External illumination control pin (SYNC1 to 4,SEQRST)	When "5 V SYNC": is OFF	ON voltage: 12 to 24 VDC, OFF voltage: 1 VDC or less NPN input response time: OFF to ON; 2 μs or less, ON to OFF; 10 μs or less PNP input response time: OFF to ON; 2 μs or less, ON to OFF; 12 μs or less	
		When "5 V SYNC": is ON	ON voltage: 5 to 24 VDC, OFF voltage: 1 VDC or less NPN input response time: OFF to ON; 24 μs or less, ON to OFF; 78 μs or less PNP input response time: OFF to ON; 32 μs or less, ON to OFF; 76 μs or less	
	External parallel control pin		For response time of the control pins of the external parallel control connector, see "9-3-7 Response time" on 9-11 page and "9-3-8 Input timing chart" on 9-11 page.	
Output			6x general-purpose outputs that can be changed Photocoupler open collector output Max. 50 mA/30 VDC Residual voltage 1.5 V (at 10 mA)	

TTL level model

Model	OPPX-6012P2/-6012E2-TTL	OPPX-12012P4/-12012E4-TTL
Input	ON voltage: 2.0 VDC or higher, OFF voltage: 0.8 VDC or less, Max. input voltage: 8 V •External illumination control (SYNC1 to 4, SEQRST): NPN input response time: OFF to ON; 2 μs or less, ON to OFF; 10 μs or less, PNP input response time: OFF to ON; 2 μs or less, ON to OFF; 12 μs or less For response time of the control pins of the external parallel control connector, see "9-3-7 Response time" and "9-3-8 Input timing chart" on 9-11 page,	
Output	6x general-purpose outputs that can be changed Non-isolated open collector output (NPN output) Max. 20 mA/30 VDC, Residual voltage 0.4 V or less	

24 V Output Type Specifications

General specifications

Model	Standard	OPPX-10024P2/-10024E2	OPPX-20024P4/-20024E4
	TTL level model	OPPX-10024P2-TTL/-10024E2-TTL	OPPX-20024P4-TTL/-20024E4-TTL
Supply voltage		24 VDC ± 10%	
Output channels		2 ch	4 ch
Connectable illumination rating	All channels max.	100 W	200 W
	Max. per channel	50W/ch	50W/ch
illumination output voltage	PWM mode	24 VDC	
	STB mode	48 VDC	
	DC mode	LOW: 12 to 24 VDC, HIGH: 18 to 24 VDC	
	L-INT mode	24 VDC	
	L-INT STB mode	36 VDC	
Illumination output current	PWM/ DC/ L-INT	2.0 A/ch	
	STB/ L-INT STB	5.0 A/ch (Duty 10%)	
Light intensity control		PWM intensity control Frequency: 100 kHz DC, 130kHz DC voltage variable mode	
Strobe	PWM frequency: 100 kHz DC	Light emitting time: 10 μs to 9990 μs (10 μs step), 1 ms to 999 ms(1 ms step)	
	PWM frequency: 130 kHz DC	Light emitting time: 7.7 μs to 7684.6 μs (7.7 μs step), 1 ms to 999 ms (1 ms step)	
	Flash cycle limit	7% Duty (14.3 times or more the pulse width cycle required)	
Display and operation device		1.77 inch LCD, Dial key, Dial button, MODE button, LAMP button	
Communication interface	USB (Full-speed, Type-C connector)	Serial communication via virtual COM port	
	RS-232C	4800/9600/19200/38400/57600/115200 bps	
	Ethernet (10BASE-T/100BASE-TX) *1	UDP, TCP, DHCP, iQSS*2 (Mitsubishi Electric's iQ Sensor Solution)	

Model		Standard	OPPX-10024P2/-10024E2	OPPX-20024P4/-20024E4
		TTL level model	OPPX-10024P2-TTL/-10024E2-TTL	OPPX-20024P4-TTL/-20024E4-TTL
Protective functions			Lighting overcurrent Lighting overvoltage Controller internal temperature monitor (PWM output reduced to 1/4 at 110°C or higher.) Lighting internal temperature monitor Lighting low brightness alarm Input power monitor Feedback error Output voltage monitor	
Ambient temperature/humidity			0 to +40°C/20 to 85 % RH (no condensation)	
Storage temperature/humidity			-20 to +70°C/20 to 95 % RH (no condensation)	
Vibration resistance			10 to 55 Hz; Double amplitude: 1.5 mm; 2 hours in each of the X, Y, and Z directions	
Shock resistance			10 G; 3 times in each of the X, Y, and Z directions	
Material			Polycarbonate	
Weight			2 ch type : 260 g, 4 ch type : 360 g	
Degree of protection			IP20 (IEC 60529)	
Applicable regulations	EMC*3		EU EMC directive (2014/30/EU), UK EMC (The Electromagnetic Compatibility Regulations 2016)	
	Environment		EU RoHS directive (2011/65/EU), China RoHS (MIIT Order No.32) UK RoHS (The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012)	
Applicable standards			EN 61326-1, EN 55011 Group 1, Class A	
Installation method			DIN rail mounting (can also stand alone)	
Design life			7 years (maximum load, 24 hours continuous use, 40°C environment)	
Accessories			External illumination control connector, Power connector, Instruction manual	

*1 Only installed in OPPX-xxxEx

*2 Not displayed for models with TTL specification.

*3 When the light intensity value is set to 900 or higher with a 24 V output model, noise may increase depending on the conditions of the customer's cable connections.

In this case, install a ferrite core onto the end of the lighting output cable on the product side.

Recommended ferrite core product: NFT-13S (Takeuchi Industry product, maximum cable diameter Φ 13.5 mm)

● External Synchronous Input/Output Specifications

Standard

Model			OPPX-10024P2/-10024E2	OPPX-20024P4/-20024E4
Input	External illumination control pin (SYNC1 to 4,SEQRST)	When "5 V SYNC": is OFF	ON voltage: 12 to 24 VDC, OFF voltage: 1 VDC or less NPN input response time: OFF to ON; 2 μs or less, ON to OFF; 10 μs or less PNP input response time: OFF to ON; 2 μs or less, ON to OFF; 12 μs or less	
		When "5 V SYNC": is ON	ON voltage: 5 to 24 VDC, OFF voltage: 1 VDC or less NPN input response time: OFF to ON; 24 μs or less, ON to OFF; 78 μs or less PNP input response time: OFF to ON; 32 μs or less, ON to OFF; 76 μs or less	
	External parallel control pin		For response time of the control pins of the external parallel control connector, see “9-3-7 Response time” on 9-11 page and “9-3-8 Input timing chart” on 9-11 page.	
Output			6x general-purpose outputs that can be changed Photocoupler open collector output Max. 50 mA/30 VDC Residual voltage 1.5 V (at 10 mA)	

TTL level model

Model	OPPX-10024P2/-10024E2-TTL	OPPX-20024P4/-20024E4-TTL
Input	ON voltage: 2.0 VDC or higher, OFF voltage: 0.8 VDC or less, Max. input voltage: 8 V •External illumination control (SYNC1 to 4, SEQRST): NPN input response time: OFF to ON; 2 μ s or less, ON to OFF; 10 μ s or less, PNP input response time: OFF to ON; 2 μ s or less, ON to OFF; 12 μ s or less For response time of the control pins of the external parallel control connector, see "9-3-7 Response time" and "9-3-8 Input timing chart" on 9-11 page,	
Output	6x general-purpose outputs that can be changed Non-isolated open collector output (NPN output) Max. 20 mA/30 VDC, Residual voltage 0.4 V or less	

■ 12 V/24 V Dual Output Type Specifications

● General specifications

Model		OPPX-1601224P4/-1601224E4	
Supply voltage		24 VDC \pm 10%	
Output channels		2 ch (L1, L2)	2 ch (L3, L4)
Connectable illumination rating	All channels max.	160 W (12 V output: 60 W+24 V output: 100 W)	
	Max. per channel	12 V output: 30W/ch	24 V output: 50W/ch
illumination output voltage	PWM mode	12 VDC	24 VDC
	STB mode	18 VDC	48 VDC
	DC mode	8 to 12 VDC	LOW: 12 to 24 VDC HIGH: 18 to 24 VDC
	L-INT mode	12 VDC	24 VDC
	L-INT STB mode	18 VDC	36 VDC
Illumination output current	PWM/ DC/ L-INT	2.5 A/ch	2.0 A/ch
	STB/ L-INT STB	8.0 A/ch (Duty 10%)	5.0 A/ch (Duty 7%)
Light intensity control		PWM intensity control Frequency: 50 kHz, 100 kHz, 100 kHz DC, 130kHz DC voltage variable mode	PWM intensity control Frequency: 100 kHz DC, 130kHz DC voltage variable mode
Strobe	PWM frequency: 50 kHz	Light emitting time: 20 μ s to 19980 μ s (10 μ s step)	-
	PWM frequency: 100 kHz / 100 kHz DC (Only 100kHz DC for 24V output)	Light emitting time: 10 μ s to 9990 μ s (10 μ s step), 1 ms to 999 ms(1 ms step)	
	PWM frequency: 130 kHz DC	Light emitting time: 7.7 μ s to 7684.6 μ s (7.7 μ s step), 1 ms to 999 ms (1 ms step)	
	Flash cycle limit	10% Duty (10 times or more the pulse width cycle required)	7% Duty (14.3 times or more the pulse width cycle required)
Display and operation device		1.77 inch LCD, Dial key, Dial button, MODE button, LAMP button	
Communication interface	USB (Full-speed, Type-C connector)	Serial communication via virtual COM port	
	RS-232C	4800/9600/19200/38400/57600/115200 bps	
	Ethernet (10BASE-T/100BASE-TX) *1	UDP, TCP, DHCP, iQSS (Mitsubishi Electric's iQ Sensor Solution)	
Protective functions		Lighting overcurrent Lighting overvoltage Controller internal temperature monitor (PWM output reduced to 1/4 at 110°C or higher.) Lighting internal temperature monitor Lighting low brightness alarm Input power monitor Feedback error Output voltage monitor	
Ambient temperature/humidity		0 to +40°C/20 to 85 % RH (no condensation)	
Storage temperature/humidity		-20 to +70°C/20 to 95 % RH (no condensation)	

Model		OPPX-1601224P4/-1601224E4
Vibration resistance		10 to 55 Hz; Double amplitude: 1.5 mm; 2 hours in each of the X, Y, and Z directions
Shock resistance		10 G; 3 times in each of the X, Y, and Z directions
Material		Polycarbonate
Weight		360 g
Degree of protection		IP20 (IEC 60529)
Applicable regulations	EMC*2	EU EMC directive (2014/30/EU), UK EMC (The Electromagnetic Compatibility Regulations 2016)
	Environment	EU RoHS directive (2011/65/EU), China RoHS (MIIT Order No.32) UK RoHS (The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012)
Applicable standards		EN 61326-1, EN 55011 Group 1, Class A
Installation method		DIN rail mounting (can also stand alone)
Design life		7 years (maximum load, 24 hours continuous use, 40°C environment)
Accessories		External illumination control connector, Power connector, Instruction manual

*1 Only installed in OPPX-xxxEx

*2: When the light intensity value is set to 900 or higher with a 24 V output model, noise may increase depending on the conditions of the customer's cable connections.

In this case, install a ferrite core onto the end of the lighting output cable on the product side.

Recommended ferrite core product: NFT-13S (Takeuchi Industry product, maximum cable diameter Φ 13.5 mm)

● External Synchronous Input/Output Specifications

Model			OPPX-6012P2/-6012E2	OPPX-12012P4/-12012E4
Input	External illumination control pin (SYNC1 to 4,SEQRST)	When "5 V SYNC": is OFF	ON voltage: 12 to 24 VDC, OFF voltage: 1 VDC or less NPN input response time: OFF to ON; 2 μs or less, ON to OFF; 10 μs or less PNP input response time: OFF to ON; 2 μs or less, ON to OFF; 12 μs or less	
		When "5 V SYNC": is ON	ON voltage: 5 to 24 VDC, OFF voltage: 1 VDC or less NPN input response time: OFF to ON; 24 μs or less, ON to OFF; 78 μs or less PNP input response time: OFF to ON; 32 μs or less, ON to OFF; 76 μs or less	
	External parallel control pin		For response time of the control pins of the external parallel control connector, see "9-3-7 Response time" on 9-11 page and "9-3-8 Input timing chart" on 9-11 page.	
Output			6x general-purpose outputs that can be changed Photocoupler open collector output Max. 50 mA/30 VDC Residual voltage 1.5 V (at 10 mA)	

12-1-3 OPPX-EP Series Specifications

12 V Output Type Specifications

General specifications

Model		OPPX-6012EP2	OPPX-12012EP4
Supply voltage		24 VDC \pm 10%	
Output channels		2 ch	4 ch
Connectable illumination rating	All channels max.	60 W	120 W
	Max. per channel	30W/ch	30W/ch
illumination output voltage	PWM mode	12 VDC	
	STB mode	18 VDC	
	DC mode	8 to 12 VDC	
	L-INT mode	12 VDC	
	L-INT STB mode	18 VDC	
Illumination output current	PWM/ DC/ L-INT	2.5 A/ch	
	STB/ L-INT STB	8.0A/ch (Duty 10%)	
Light intensity control		PWM intensity control Frequency: 50 kHz, 100 kHz, 100 kHz DC, 130kHz DC voltage variable mode	
Strobe	PWM frequency: 50 kHz	Light emitting time: 20 μ s to 19980 μ s (20 μ s step)	
	PWM frequency: 100 kHz, 100 kHz DC	Light emitting time: 10 μ s to 9990 μ s (10 μ s step), 1 ms to 999 ms(1 ms step)	
	PWM frequency: 130 kHz DC	Light emitting time: 7.7 μ s to 7684.6 μ s (7.7 μ s step), 1 ms to 999 ms (1 ms step)	
	Flash cycle limit	10% Duty (10 times or more the pulse width cycle required)	
Display and operation device		1.77 inch LCD, Dial key, Dial button, MODE button, LAMP button	
Communication interface	USB (Full-speed, Type-C connector)	Serial communication via virtual COM port	
	Ethernet (10BASE-T/100BASE-TX)	UDP, TCP, DHCP	
Protective functions		Lighting overcurrent Lighting overvoltage Controller internal temperature monitor (PWM output reduced to 1/4 at 110°C or higher.) Lighting internal temperature monitor Lighting low brightness alarm Input power monitor Feedback error Output voltage monitor	
Ambient temperature/humidity		0 to +40°C/20 to 85 % RH (no condensation)	
Storage temperature/humidity		-20 to +70°C/20 to 95 % RH (no condensation)	
Vibration resistance		10 to 55 Hz; Double amplitude: 1.5 mm; 2 hours in each of the X, Y, and Z directions	

Model		OPPX-6012EP2	OPPX-12012EP4
Shock resistance		10 G; 3 times in each of the X, Y, and Z directions	
Material		Polycarbonate	
Weight		2 ch type : 260 g, 4 ch type : 360 g	
Degree of protection		IP20 (IEC 60529)	
Applicable regulations	EMC	EU EMC directive (2014/30/EU), UK EMC (The Electromagnetic Compatibility Regulations 2016)	
	Environment	EU RoHS directive (2011/65/EU), China RoHS (MIIT Order No.32) UK RoHS (The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012)	
Applicable standards		EN 61326-1, EN 55011 Group 1, Class A	
Installation method		DIN rail mounting (can also stand alone)	
Design life		7 years (maximum load, 24 hours continuous use, 40°C environment)	
Accessories		External illumination control connector, Power connector, Instruction manual	

● External Synchronous Input/Output Specifications

Model			OPPX-10024EP2	OPPX-20024EP4
Input	External illumination control pin (SYNC1 to 4,SEQRST)	When "5 V SYNC": is OFF	ON voltage: 12 to 24 VDC, OFF voltage: 1 VDC or less NPN input response time: OFF to ON; 2 μs or less, ON to OFF; 10 μs or less PNP input response time: OFF to ON; 2 μs or less, ON to OFF; 12 μs or less	
		When "5 V SYNC": is ON	ON voltage: 5 to 24 VDC, OFF voltage: 1 VDC or less NPN input response time: OFF to ON; 24 μs or less ON to OFF; 78 μs or less, PNP input response time: OFF to ON; 32 μs or less ON to OFF; 76 μs or less	
Output			2x general-purpose outputs that can be changed Photocoupler open collector output Max. 50 mA/30 VDC Residual voltage 1.5 V (at 10 mA)	

■ 24 V Output Type Specifications

● General specifications

Model		OPPX-10024EP2	OPPX-20024EP4
Supply voltage		24 VDC \pm 10%	
Output channels		2 ch	4 ch
Connectable illumination rating	All channels max.	100 W	200 W
	Max. per channel	50W/ch	50W/ch
illumination output voltage	PWM mode	24 VDC	
	STB mode	48 VDC	
	DC mode	LOW: 12 to 24 VDC, HIGH: 18 to 24 VDC	
	L-INT mode	24 VDC	
	L-INT STB mode	36 VDC	
Illumination output current	PWM/ DC/ L-INT	2.0 A/ch	
	STB/ L-INT STB	5.0 A/ch (Duty 10%)	
Light intensity control		PWM intensity control Frequency: 100 kHz DC, 130kHz DC voltage variable mode	
Strobe	PWM frequency: 100 kHz DC	Light emitting time: 10 μ s to 9990 μ s (10 μ s step), 1 ms to 999 ms (1 ms step)	
	PWM frequency: 130 kHz DC	Light emitting time: 7.7 μ s to 7684.6 μ s (7.7 μ s step), 1 ms to 999 ms (1 ms step)	
	Flash cycle limit	7% Duty (14.3 times or more the pulse width cycle required)	
Display and operation device		1.77 inch LCD, Dial key, Dial button, MODE button, LAMP button	
Communication interface	USB (Full-speed, Type-C connector)	Serial communication via virtual COM port	
	Ethernet (10BASE-T/100BASE-TX)	UDP, TCP, DHCP	
Protective functions		Lighting overcurrent Lighting overvoltage Controller internal temperature monitor (PWM output reduced to 1/4 at 110°C or higher.) Lighting internal temperature monitor Lighting low brightness alarm Input power monitor Feedback error Output voltage monitor	
Ambient temperature/humidity		0 to +40°C/20 to 85 % RH (no condensation)	
Storage temperature/humidity		-20 to +70°C/20 to 95 % RH (no condensation)	
Vibration resistance		10 to 55 Hz; Double amplitude: 1.5 mm; 2 hours in each of the X, Y, and Z directions	
Shock resistance		10 G; 3 times in each of the X, Y, and Z directions	
Material		Polycarbonate	
Weight		2 ch type : 260 g, 4 ch type : 360 g	
Degree of protection		IP20 (IEC 60529)	

Model		OPPX-10024EP2	OPPX-20024EP4
Applicable regulations	EMC*1	EU EMC directive (2014/30/EU), UK EMC (The Electromagnetic Compatibility Regulations 2016)	
	Environment	EU RoHS directive (2011/65/EU), China RoHS (MIIT Order No.32) UK RoHS (The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012)	
Applicable standards		EN 61326-1, EN 55011 Group 1, Class A	
Installation method		DIN rail mounting (can also stand alone)	
Design life		7 years (maximum load, 24 hours continuous use, 40°C environment)	
Accessories		External illumination control connector, Power connector, Instruction manual	

*1 When the light intensity value is set to 900 or higher with a 24 V output model, noise may increase depending on the conditions of the customer's cable connections.
In this case, install a ferrite core onto the end of the lighting output cable on the product side.
Recommended ferrite core product: NFT-13S (Takeuchi Industry product, maximum cable diameter $\Phi 13.5$ mm)

● External Synchronous Input/Output Specifications

Model			OPPX-10024EP2	OPPX-20024EP4
Input	External illumination control pin (SYNC1 to 4,SEQRST)	When "5 V SYNC": is OFF	ON voltage: 12 to 24 VDC, OFF voltage: 1 VDC or less NPN input response time: OFF to ON; 2 μs or less, ON to OFF; 10 μs or less PNP input response time: OFF to ON; 2 μs or less, ON to OFF; 12 μs or less	
		When "5 V SYNC": is ON	ON voltage: 5 to 24 VDC, OFF voltage: 1 VDC or less NPN input response time: OFF to ON; 24 μs or less, ON to OFF; 78 μs or less PNP input response time: OFF to ON; 32 μs or less, ON to OFF; 76 μs or less	
Output			2x general-purpose outputs that can be changed Photocoupler open collector output Max. 50 mA/30 VDC Residual voltage 1.5 V (at 10 mA)	

■ 12 V/24 V Dual Output Type Specifications

● General specifications

Model		OPPX-1601224EP4	
Supply voltage		24 VDC \pm 10%	
Output channels		2 ch (L1, L2)	2 ch (L3, L4)
Connectable illumination rating	All channels max.	160 W (12 V output: 60 W+24 V output: 100 W)	
	Max. per channel	12 V output: 30W/ch	24 V output: 50W/ch
illumination output voltage	PWM mode	12 VDC	24 VDC
	STB mode	18 VDC	48 VDC
	DC mode	8 to 12 VDC	LOW: 12 to 24 VDC HIGH: 18 to 24 VDC
	L-INT mode	12 VDC	24 VDC
	L-INT STB mode	18 VDC	36 VDC
Illumination output current	PWM/ DC/ L-INT	2.5 A/ch	2.0 A/ch
	STB/ L-INT STB	8.0 A/ch (Duty 10%)	5.0 A/ch (Duty 7%)
Light intensity control		PWM intensity control Frequency: 50 kHz, 100 kHz, 100 kHz DC, 130kHz DC voltage variable mode	PWM intensity control Frequency: 100 kHz DC, 130kHz DC voltage variable mode
Strobe	PWM frequency: 50 kHz	Light emitting time: 20 μ s to 19980 μ s (10 μ s step)	-
	PWM frequency: 100 kHz / 100 kHz DC (Only 100kHz DC for 24V output)	Light emitting time: 10 μ s to 9990 μ s (10 μ s step), 1 ms to 999 ms(1 ms step)	
	PWM frequency: 130 kHz DC	Light emitting time: 7.7 μ s to 7684.6 μ s (7.7 μ s step), 1 ms to 999 ms (1 ms step)	
	Flash cycle limit	10% Duty (10 times or more the pulse width cycle required)	7% Duty (14.3 times or more the pulse width cycle required)
Display and operation device		1.77 inch LCD, Dial key, Dial button, MODE button, LAMP button	
Communication interface	USB (Full-speed, Type-C connector)	Serial communication via virtual COM port	
	Ethernet (10BASE-T/100BASE-TX)	UDP, TCP, DHCP	
Protective functions		Lighting overcurrent Lighting overvoltage Controller internal temperature monitor (PWM output reduced to 1/4 at 110°C or higher.) Lighting internal temperature monitor Lighting low brightness alarm Input power monitor Feedback error Output voltage monitor	
Ambient temperature/humidity		0 to +40°C/20 to 85 % RH (no condensation)	
Storage temperature/humidity		-20 to +70°C/20 to 95 % RH (no condensation)	
Vibration resistance		10 to 55 Hz; Double amplitude: 1.5 mm; 2 hours in each of the X, Y, and Z directions	

Model		OPPX-1601224EP4
Shock resistance		10 G; 3 times in each of the X, Y, and Z directions
Material		Polycarbonate
Weight		360 g
Degree of protection		IP20 (IEC 60529)
Applicable regulations	EMC*1	EU EMC directive (2014/30/EU), UK EMC (The Electromagnetic Compatibility Regulations 2016)
	Environment	EU RoHS directive (2011/65/EU), China RoHS (MIIT Order No.32) UK RoHS (The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012)
Applicable standards		EN 61326-1, EN 55011 Group 1, Class A
Installation method		DIN rail mounting (can also stand alone)
Design life		7 years (maximum load, 24 hours continuous use, 40°C environment)
Accessories		External illumination control connector, Power connector, Instruction manual

*1: When the light intensity value is set to 900 or higher with a 24 V output model, noise may increase depending on the conditions of the customer's cable connections.

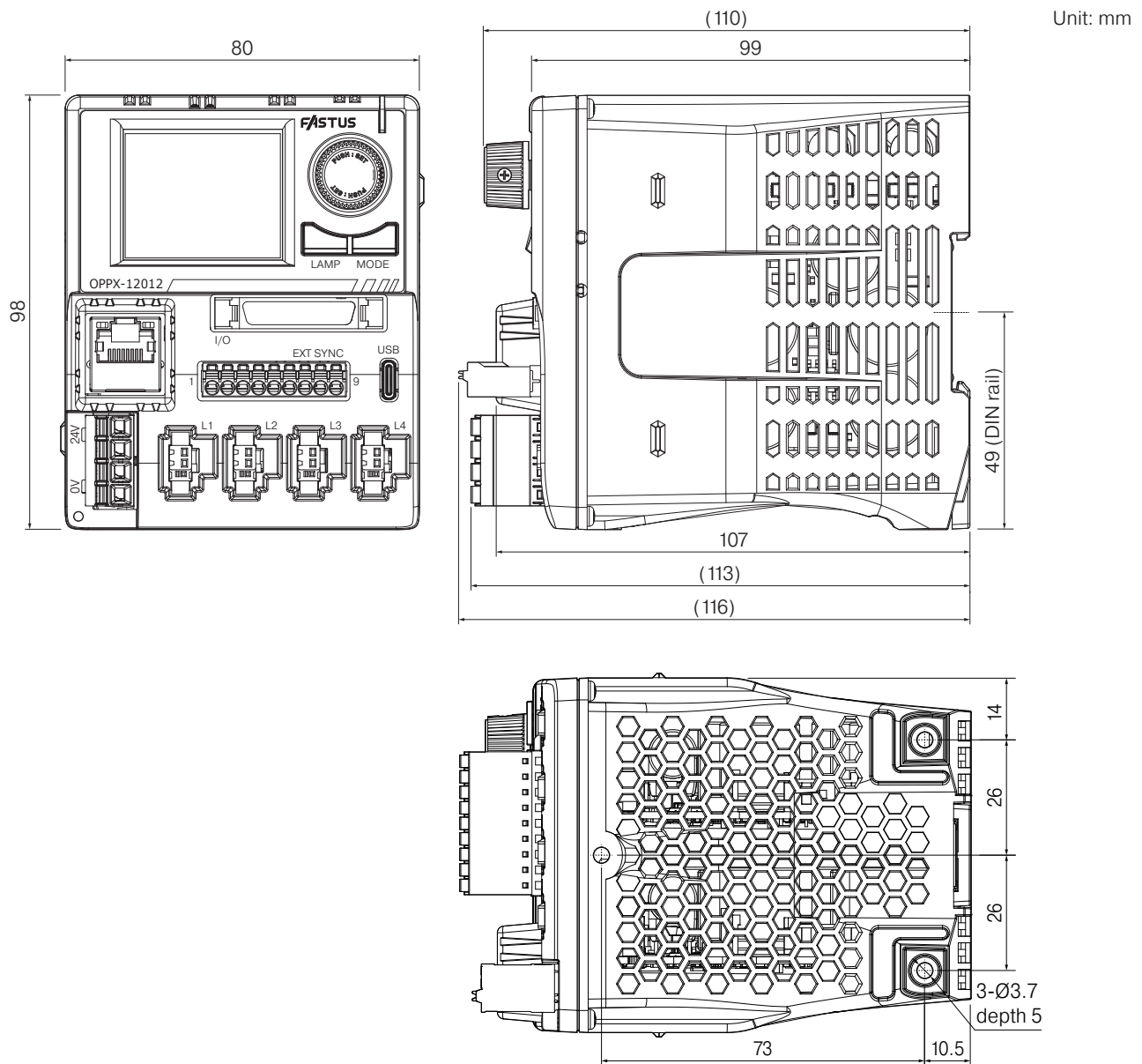
In this case, install a ferrite core onto the end of the lighting output cable on the product side.

Recommended ferrite core product: NFT-13S (Takeuchi Industry product, maximum cable diameter Φ 13.5 mm)

● External Synchronous Input/Output Specifications

Model			OPPX-6012P2/-6012E2	OPPX-12012P4/-12012E4
Input	External illumination control pin (SYNC1 to 4,SEQRST)	When "5 V SYNC": is OFF	ON voltage: 12 to 24 VDC, OFF voltage: 1 VDC or less NPN input response time: OFF to ON; 2 μs or less, ON to OFF; 10 μs or less PNP input response time: OFF to ON; 2 μs or less, ON to OFF; 12 μs or less	
		When "5 V SYNC": is ON	ON voltage: 5 to 24 VDC, OFF voltage: 1 VDC or less NPN input response time: OFF to ON; 24 μs or less, ON to OFF; 78 μs or less PNP input response time: OFF to ON; 32 μs or less, ON to OFF; 76 μs or less	
Output			2x general-purpose outputs that can be changed Photocoupler open collector output Max. 50 mA/30 VDC Residual voltage 1.5 V (at 10 mA)	

12-2 Dimension Drawings



12-3 24 VDC Power Supply Capacity

Select the 24 VDC power supply based on the total power consumption of the connected LED lighting.
For the total power consumption of the connected LED lighting, refer to the graph below.

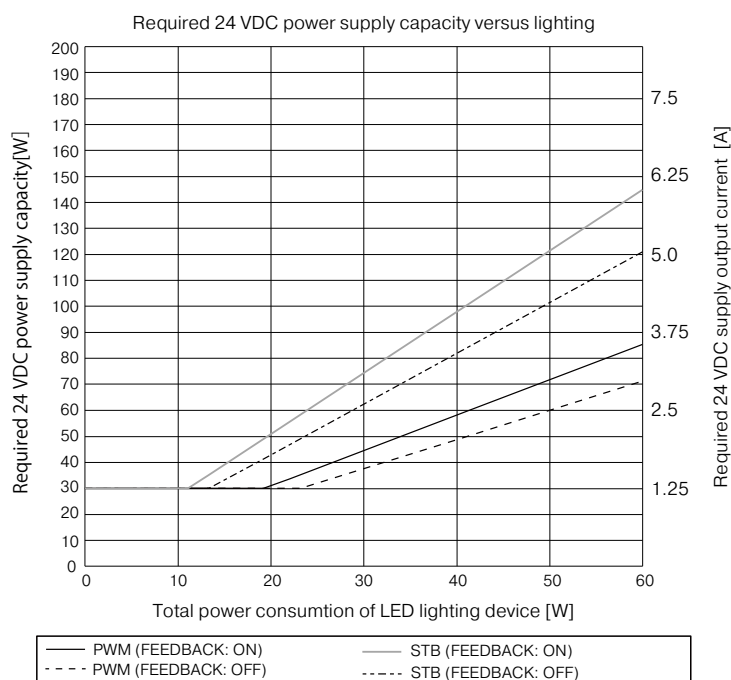
Notes on selection

- The graph is a guideline for the required capacity. Since power supplies have different output characteristics depending on the manufacturer, please check the actual usage environment and operating conditions and select a power supply with sufficient power capacity.
- When using strobe or overdrive, it is recommended to use a peak-capable power supply.

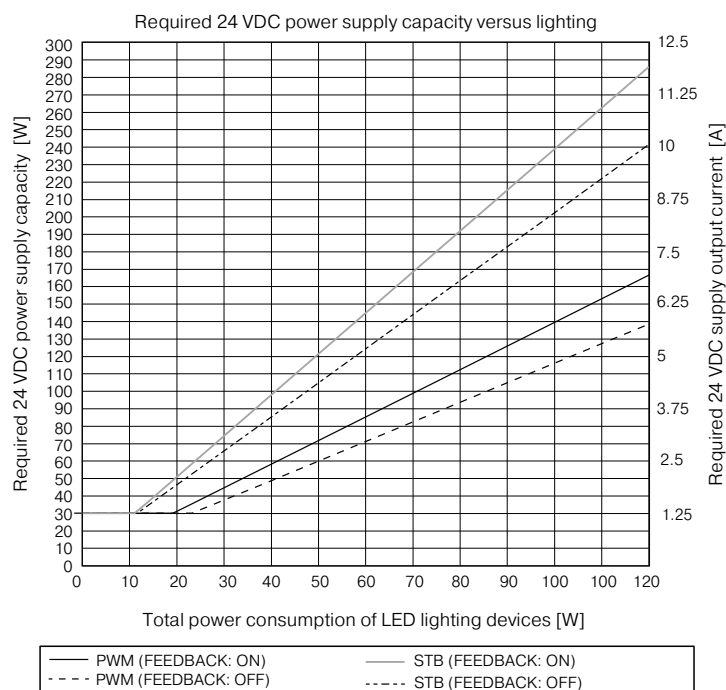
Precautions in the actual operating environment

- Please check the actual equipment to avoid malfunctions.
- When using with other equipment, please check the condition of the other equipment as well.
- When using a circuit breaker or other device for input, please note that a voltage drop due to internal impedance will occur especially during strobe overdrive operation, resulting in a drop in OPPX input voltage.

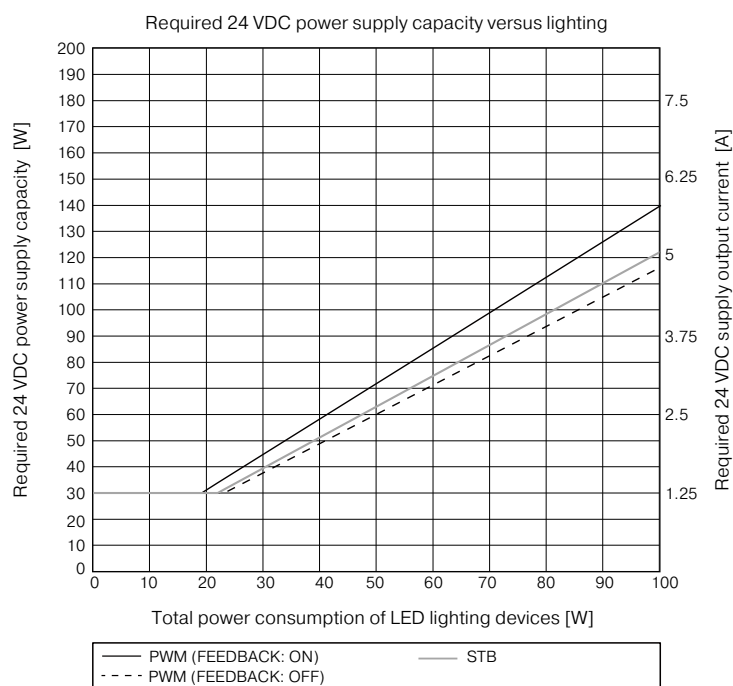
● OPPX-6012P2/-6012E2/-6012EP2/-6012P2-TTL/-6012E2-TTL



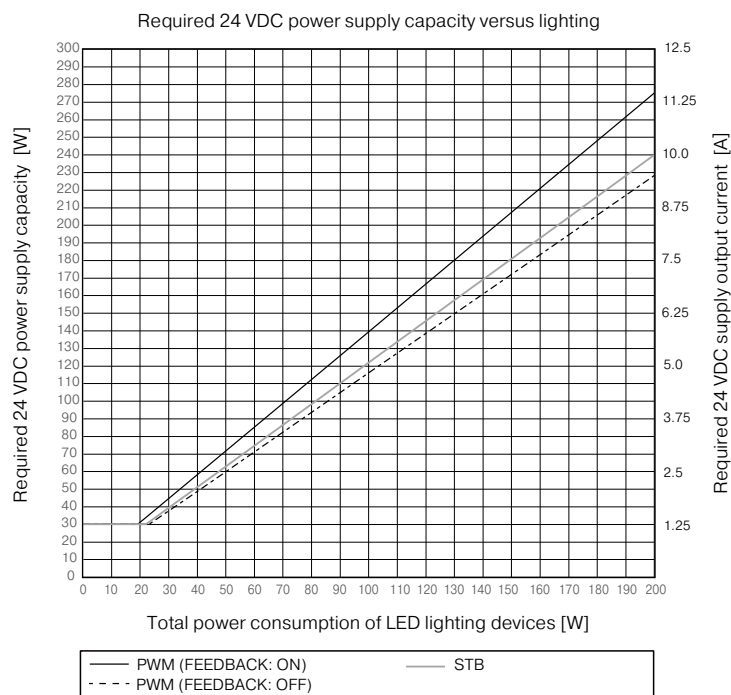
● OPPX-12012P4/-12012E4/-12012EP4/-12012P4-TTL/-12012E4-TTL



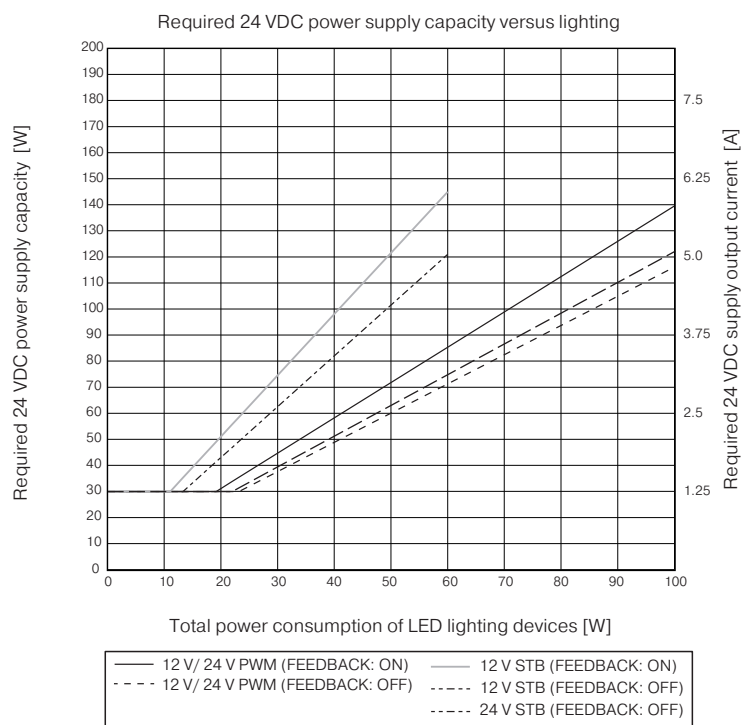
● OPPX-10024P2/-10024E2/-10024EP2/-10024P2-TTL/-10024E2-TTL



● OPPX-20024P4/-20024E4/-20024EP4/-20024P4-TTL/-20024E4-TTL



● OPPX-1601224P4/-1601224E4/-1601224EP4



Revision History



Revision number	Revision date	Revised contents
001	April 2024	First revision
002	June 2024	Rename modes, menus, and setting values
003	April 2025	Added models with TTL OPPX-6012P2-TTL/OPPX-6012E2-TTL/OPPX-12012P4-TTL/OPPX-12012E4-TTL/OPPX-10024P2-TTL/OPPX-10024E2-TTL/OPPX-20024P4-TTL/OPPX-20024E4-TTL
004	August 2025	Added EtherNet/IP support models OPPX-6012EP2/OPPX-12012EP2/OPPX-1601224EP2/OPPX-10024EP2/OPPX-20024EP2



Attention: Not to be Used for Personnel Protection.

Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death.
These sensors do not include the self-checking redundant circuitry necessary to allow their use in personnel safety applications.
A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.
Please consult our distributors about safety products which meet OSHA, ANSI and IEC standards for personnel protection.

- Specifications are subject to change without prior notice.
- Specifications and technical information not mentioned here are written in Instruction Manual. Or visit our website for details.
- All the warnings and cautions to know prior to use are given in Instruction Manual.

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The information in this user's manual is correct as of August 2025

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