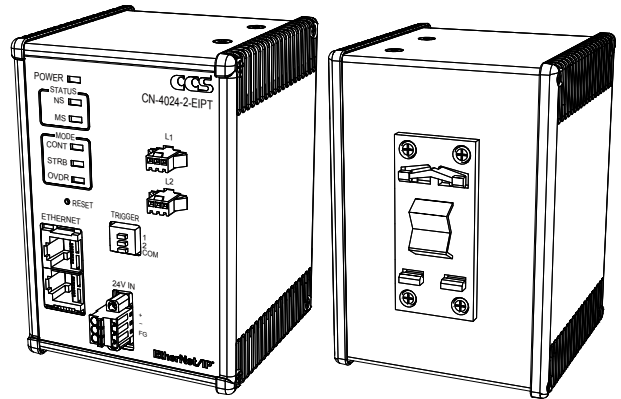


CN-4024-2-EIPT

Instruction Guide CE

Thank you for purchasing a CCS product. To ensure proper use of the product, please read this Instruction Guide before use and keep it for your future reference.

This Control Unit is used to control the light intensity of CCS LED Light Units. It is mainly used to control LED Light Units that are used for machine vision or industrial inspections.



EtherNet/IP and CIP are trademarks of ODVA, Inc.

Features

- Operated only through external control via Ethernet communications.
- Light intensity and other settings can be controlled with explicit/implicit messages via EtherNet/IP communications and with I/O commands via TCP/IP communications.
- Works in any one of the following three lighting modes: Overdrive Mode, Continuous Mode, or Strobe Mode.

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1 Important Information for Equipment Safety - Read Before Use -

This product has been designed with full consideration of safety. However, incorrect usage of the product may result in fire, electric shock, or other serious accidents. Observe the following precautions.

■ The following symbols are used in this Instruction Guide to indicate and classify the relative importance of warnings and cautions.

	Warning		Caution
	Indicates that incorrect usage may result in serious injury or death.		Indicates that incorrect usage may result in injury or property damage.

■ The following symbols indicate and classify the precautions in this Instruction Guide.

 PROHIBITED DISASSEMBLY PROHIBITED DO NOT TOUCH WITH WET HANDS DO NOT SUBJECT TO MOISTURE	 MANDATORY ACTIONS
These symbols indicate prohibited actions.	This symbol indicates required actions.

Warning	
Do not disassemble or modify the Control Unit. Doing so may result in fire or electric shock.	
Make sure that the Control Unit is free of moisture or any liquid. Doing so may result in fire or electric shock.	
Do not touch the power cords and do not connect the peripherals during lightning. This may result in electric shock.	
Do not touch the plugs or switches with wet hands. Doing so may result in electric shock.	
Before connecting or disconnecting cables, make sure that the power source is turned OFF. Not doing so may result in fire or electric shock or breakdown in the Light Unit.	
If abnormal condition occurs such as fuming, heat, smell, noise, or so on, stop using the Control Unit immediately, and turn off the power source. A fire or electric shock may result if the Control Unit is kept used.	

Caution	
Do not connect any Light Units other than CCS LED Light Units. Doing so may cause overcurrent and the device may overheat or ignite.	
Do not use user-made branch cables. Doing so may cause Control Unit failure.	
Do not place the Control Unit in direct sunlight or in a high-humidity environment. Doing so may result in fire due to internal temperature rise.	
Always place the Control Unit on a stable and flat location. Not doing so may result in the Control Unit falling or toppling, which may cause malfunction, accidents, or bodily injury.	
Do not drop the Control Unit or subject it to impact. Doing so may cause Control Unit failure.	
Do not bend cables or jam them between objects when wiring. Doing so may cause Control Unit failure.	
Do not intentionally short-circuit the positive and negative output terminals.	
Be sure to use the Control Unit within the range of input voltage. Applying the voltage beyond the range may cause Control Unit failure.	
Do not bundle Control Unit cables with high-voltage lines or power lines. Doing so may cause the Control Unit to malfunction. Allow leeway when installing the cables.	
Use Light Units that are suitable for the Control Unit ratings. Exceeding the ratings may cause Control Unit failure.	
Use a standard Extension Cable that is manufactured by CCS. However, if the cable is too long, the light intensity will decrease due to voltage drop caused by the DC resistance of the cable.	
Always hold onto the plug or connector when disconnecting the cables. Pulling on the cable may damage the cable and result in fire or electric shock.	
Before moving the Control Unit, disconnect all connection cables. Damaging the cables may result in fire or electric shock.	
If there is dust or other foreign matter on the electrodes, turn OFF the power source and then use a dry cloth to remove the dust or foreign matter. Failure to do so may result in fire.	
Do not wipe the Control Unit with volatiles such as paint thinner or benzene. Discoloration or deterioration of the Control Unit surfaces may occur.	

2 Names and Functions of Parts

Power Lamp

Lights in green when the power source is ON.
Lights in red if an error occurs in the Control Unit.

Status Lamps

Light or flash to indicate the communications status of the Control Unit. For the detailed information, refer to 9. *Status Outputs*.

Lighting Mode Lamps

CONT: Lights in green when the lighting mode is set to Continuous Mode.
STRB: Lights in green when the lighting mode is set to Strobe Mode.
OVDR: Lights in green when the lighting mode is set to O/D Mode.

Reset Switch

Press and hold for at least 3 seconds with a pointed object to reset all settings including network settings to their default values.

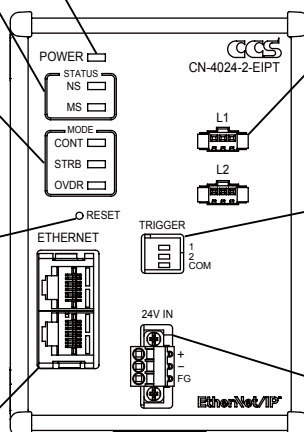
Note: Please note that also the values for accumulated trigger count and accumulated lighting duration will be reset at the same time.

LAN Connectors

Used for Ethernet communications. Connect a LAN cable to either of the connectors. (RJ-45)

Note: The Control Unit is compatible with the Device Level Ring (DLR) function of EtherNet/IP communications.

Front View



Output Connectors

Connect the Light Units to supply power. Each connector corresponds to the setting of the channel (L1 or L2). (SMP-03V-BC)

Trigger Input Terminal Block

Connect a Trigger Input Cable to control the Light Units with trigger signal inputs from external devices. (ML-700-NH-3P, 3-pole)

Power Terminal Block

Connect the power cable to supply power to the Control Unit.

3 Connections



Warning

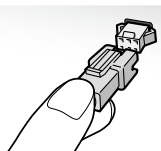
Before you connect the Control Unit, make sure that the power source is turned OFF.
Making connections with the power source turned ON may result in fire, electric shock or failure of the Light Units.

1 Use the DIN rail bracket on the back of the Control Unit and mount the Control Unit on a DIN rail. For detailed dimensions, refer to 11. *Dimensions*.

2 Connect the Light Unit cable to the output connector on the Control Unit.

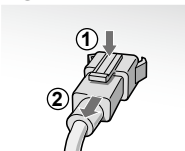
Connecting

Insert the Light Unit connector all the way in.



Disconnecting

Press the lock and pull out the connector.

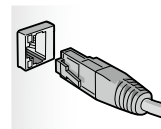


Note: Confirm the output ratings of the Control Unit before connecting the Light Units. For information on the output ratings, refer to 12. *Main Specifications*.

3 Connect the LAN cable to the LAN connector on the Control Unit.

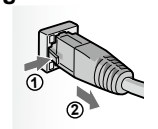
Connecting

Firmly insert the cable connector.



Disconnecting

Press the lock and pull out the connector.



4 Connect the trigger input cable to the trigger input terminal block.

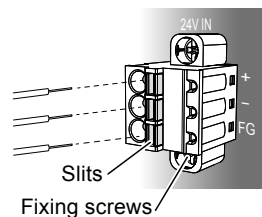
When you insert the wires of the cable into the trigger input terminal block, push and hold the slits with a flat-blade screwdriver. Pay attention to the polarity and do not short-circuit the wires when you insert them.

Applicable wires to the trigger input terminal block

Solid wires or stranded wires AWG 28 to 22
The stripping length must be between 9 and 10 mm.
The cable length must be 5 m or less.

5 Connect the power cable to the power terminal block.

When you insert the wires of the cable into the power terminal block, push and hold the slits with a flat-blade screwdriver. Pay attention to the polarity and do not short-circuit the wires when you insert them.



Applicable wires to the power terminal block

Solid wires or stranded wires AWG 24 to 16
The stripping length must be between 8 and 9 mm.

6 Use screws to fix the power terminal block on the front panel.

Control Methods

The Control Unit supports three communications methods as given below. You can externally control the Control Unit with a combination of them.

EtherNet/IP Communications

Explicit Messaging

The Control Unit will be operated with explicit messages through the LAN connector. You can send and receive data at any time in this communication method. The Control Unit provides the vendor-specific application data object (class code: 0xA2). Instances are used for setting the light intensity, querying the status, and other purposes.

Implicit Messaging

The Control Unit will be operated with implicit messages through the LAN connector. Data is sent and received periodically in this communication method (i.e., cyclic communication). The Control Unit provides the vendor-specific data (Assembly object). This data is used for setting the light intensity, querying the status, and other purposes.

Communications specifications				
Device classification	Message type	Connection type for implicit messaging	Requested packet interval	DLR function
Adapter	Explicit (UCMM, Class 3), Implicit	Exclusive owner, Input only	10 to 3200 ms	Available

Communications specifications			
Port number to use (TCP)	Port number to use (UDP)	DHCP	Conformity
44818	2222, 44818	Available (Default: fixed IP address)	ODVA Composite Conformance Test Revision CT15

The above specifications depend on the TCP/IP communications. Also refer to the table below.

TCP/IP Communications

Operation is performed with I/O commands through the LAN connector. Commands are available for setting the light intensity, querying the status, and other purposes.

Communications specifications			
TCP protocol*1	UDP protocol*2	IPv4 protocol	Ethernet*3
Standards: Based on RFC793	Standards: Based on RFC768	Standards: Based on RFC791	Standards: Based on IEEE802.3, IEEE802.3u, and IEEE802.3x Baud rate: 10 Mbps or 100 Mbps, automatically detected Transmission medium: 10BASE-T or 100BASE-TX

*1 The Control Unit supports two TCP connections at one time.

*2 UDP is used for Ethernet/IP implicit messaging only.

*3 You must provide a LAN cable with a length of less than 30 m. The Control Unit uses Auto MDI/MDI-X to automatically recognize either a cross cable or a straight cable. If you want to change the cable type, turn OFF the power source, change the cable, and then turn ON the power source again.

Operating Status Outputs

The Control Unit outputs its status to the Status Lamps and Power Lamp on the front panel and also expresses it in an error status number that you can obtain via Ethernet communications. For details, refer to 9. *Status Outputs*.

Lighting Modes

Both channels of the Control Unit operate in the same lighting mode. The operation of the Light Units and required settings for light control vary, depending on the lighting mode.

The following three lighting modes are supported.

O/D Mode (Overdrive Mode, Default)

- When an external trigger signal is input to the Control Unit, the corresponding Light Unit flashes. By overdriving the voltage that is applied to the Light Unit, you can make the Light Unit flash a few times brighter than when the channels operate in any other lighting modes.



Caution The Light Units must support overdrive. Contact CCS to find out if your Light Units support overdrive. Incorrect usage of overdrive may result in failure of the Light Units.

- The Light Units are driven with the constant voltage system (48 VDC). The strobe time settings are required for light intensity control. You can also set lighting delays to synchronize the flashing of the Light Units with a camera shutter.

Continuous Mode

- The Light Unit will be ON (or OFF) as long as there is an external trigger signal input to the Control Unit.
- The light control for the Light Units is performed through PWM control. The light intensity settings are required for light intensity control.

Strobe Mode

- When an external trigger signal is input to the Control Unit, the corresponding Light Unit flashes.
- The Light Units are driven with the constant voltage system (24 VDC). The strobe time settings are required for light intensity control. You can also set lighting delays to synchronize the flashing of the Light Units with a camera shutter.

5 Main Operation Flow

This section describes the main operation flow after the required cables are connected until the Light Units are made to flash.

1 Turning ON the Power Source

Turn ON the power source to the Control Unit. When the power source is ON, the Power Lamp on the front panel will light in green.

Note: When you turn OFF the power source, leave it OFF for at least 10 seconds before you turn it back ON.

2 Setting the Network and Other Configurations

First change the network settings from the default settings, including the IP address. And then set the lighting mode and other settings required for light intensity control.

For detailed information, refer to 6. *Controlling Operation with EtherNet/IP Explicit Messaging*, 7. *Controlling Operation with EtherNet/IP Implicit Messaging*, or 8. *Controlling Operation with TCP/IP Communications*.

3 Making the Light Units Flash

You can use the Control Unit to make the Light Units flash with the following methods:

- Trigger Signal Input through Trigger Input Terminal Block
You can make the Light Units flash through the trigger signal input. For details, refer to 10. *Trigger Inputs*.
- Set_Attribute_Single service via EtherNet/IP Explicit Messaging
You can make the Light Units flash by setting values for the instances (ID50 for L1, ID51 for L2) within the application data object. For details, refer to 6. *Controlling Operation with EtherNet/IP Explicit Messaging*.
- Writing the data via EtherNet/IP Implicit Messaging
You can make the Light Units flash by writing values in the data (Data for Writing, offset: 2 for L1, 3 for L2). For details, refer to 7. *Controlling Operation with EtherNet/IP Implicit Messaging*.
- L Command via TCP/IP Communications
You can make the Light Units flash through command input. For details, refer to 8. *Controlling Operation with TCP/IP Communications*.
- If you want to continuously turn ON the Light Units (without connecting a trigger input cable), set the values as shown in the following tables.

Setting	EtherNet/IP Explicit Messaging	EtherNet/IP Implicit Messaging	Set value
	Instance ID within the application data object	Offset within Data for Writing (byte)	
Lighting mode: Continuous Mode	20	0	0
ON/OFF setting: Lit. (default)	50 (for L1), 51 (for L2)	2 (for L1), 3 (for L2)	1

Setting	TCP/IP communications	
	Command	Set value
Lighting mode: Continuous Mode	MD01	00
ON/OFF setting: Lit. (default)	L	1

Note: When the lighting mode is set to Continuous Mode, you can turn the Light Units ON and OFF.

6 Controlling Operation with EtherNet/IP Explicit Messaging

You can set up the operation and confirm the status of the Control Unit with explicit messages through the LAN connector. EtherNet/IP is a set of industrial network protocols that work on TCP/IP and UDP/IP.

▶ EDS Files and Sample Files

The following files are available on our website. Please download them as required.

- **Electronic Data Sheet (EDS) files:** Files that describe the communications configuration of the device.
- **Sample files:** Project files and other files to be used as a reference for creating ladder programs.

▶ Setting the Network

The default IP address of the Control Unit is 192.168.0.2.

Use the TCP/IP interface objects (class code: 0xF5) to set the network settings of the Control Unit to those that will be used in the actual application.

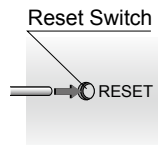
Note: An alternative way is to send network setting commands to the Control Unit. For detailed information, refer to 8. *Controlling Operation with TCP/IP Communications*.

Also note that when you use the TCP/IP interface objects to set the network settings, you do not have to cycle the power source to the Control Unit.

▶ Initializing the Network Setting

If the IP address and other settings are incorrect, you will not be able to connect to the Control Unit. You will also not be able to reset the IP address and others. If that occurs, use a pointed object to press and hold the Reset Switch on the front panel for at least 3 seconds to reset all settings including the network settings to their default values.

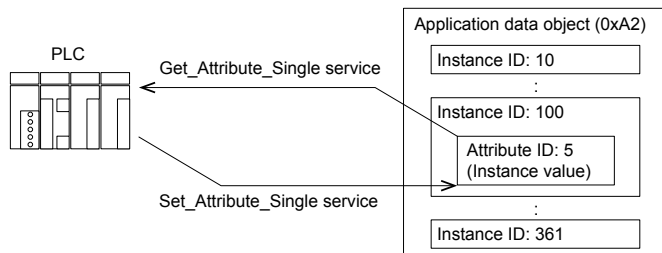
Note: Please note that also the values for accumulated trigger count and accumulated lighting duration will be reset at the same time.



▶ Formats of the Instances within the Application Data Object (Class Code: 0xA2)

An external device such as a PLC or image processing device accesses the instances within the vendor-specific application data object provided with the Control Unit: use the `Get_Attribute_Single` service to get the instance values and the `Set_Attribute_Single` service to set instance values*. The instance value is a stored value in the attribute (ID: 5) within the instances. For information on the related attributes for the instance value, refer to the next page.

* The settings are used as shared values between EtherNet/IP communications and TCP/IP communications and are stored internally, except for the Light Unit ON/OFF settings, when the power source is turned OFF.



The following table lists the instances within the application data object provided with the Control Unit. Also refer to the Common Industrial Protocol (CIP™) specification sheets for information on standard objects and functionality.

Instance ID	Description	Data type for the instance value	Data	Default
10	Error status	Unsigned 8-bit integer	0: Normal, 1: Output voltage error, 2: Overcurrent error, 4: Re-trigger detection, Other value: Internal error • For detailed information on errors, refer to 9. <i>Status Outputs</i> . • If an error occurs, remove the cause of the error and then you can restart the suspended operation with the <code>Set_Attribute_Single</code> service (specify any value for the parameter), which deletes the detected error information. You can also restart the operation by cycling the power source to the Control Unit.	0
20	Lighting mode	Unsigned 8-bit integer	0: Continuous Mode, 1: Strobe Mode, 2: O/D Mode It will take from a few seconds to a few tens of seconds to change the lighting mode. The Light Units of both channels will be turned OFF and you cannot change the settings during that period.	2
21	Trigger logic	Unsigned 8-bit integer	0: Reversed logic, 1: Normal logic	1
50	ON/OFF setting for the Light Unit (L1)	Unsigned 8-bit integer	When Using the Set_Attribute_Single Service And the Lighting Mode Is Set to O/D or Strobe Mode 1: Flash And the Lighting Mode Is Set to Continuous Mode * ¹ 0: Not lit, 1: Lit When Using the Get_Attribute_Single Service And the Lighting Mode Is Set to O/D or Strobe Mode Always 0 And the Lighting Mode Is Set to Continuous Mode 0: Not lit, 1: Lit	0/1* ²
51	ON/OFF setting for the Light Unit (L2)			

*1 Actual operation of the Light Units depends on the trigger logic and the ON/OFF state of the photocouplers for the trigger signal input. For details, refer to 10. *Trigger Inputs*.

When the lighting mode is set to Continuous Mode, the ON/OFF settings for the Light Units will not be saved after the power source is turned OFF.

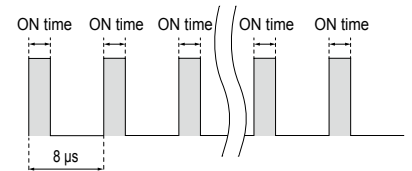
*2 When the lighting mode is set to O/D or Strobe Mode: 0, When the lighting mode is set to Continuous Mode: 1

6 Controlling Operation with EtherNet/IP Explicit Messaging (Continued)

Instance ID	Description	Data type for the instance value	Data	Default
60	Accumulated trigger count (L1)	Unsigned 32-bit integer	0 to 4000000000 <ul style="list-style-type: none"> Trigger signal input through the trigger input terminal block and the settings for flash and Light Unit ON via Ethernet communications will be counted. This value will increase even when the Light Unit is not connected to the Control Unit. This value will be saved internally even when the power source to the Control Unit is turned OFF. Use the Set_Attribute_Single service (specify any value for the parameter) to reset the data to the default value. 	0
61	Accumulated trigger count (L2)			
70	Accumulated lighting duration (L1)	Unsigned 32-bit integer	0 to 999999 (Unit: h) <ul style="list-style-type: none"> For O/D and Strobe Mode: When a signal is input through the trigger input terminal block, the value set for the strobe time will be added to this value. For Continuous Mode: The LED lighting duration will be added to this value. For detailed information, refer to <i>LED Lighting Duration in Continuous Mode</i> below this table. The accumulated lighting duration is the total of the values added in each lighting mode. The unit for this value is hours. Fractions of an hour are truncated when you get this value. This value will increase even when the Light Unit is not connected to the Control Unit. This value will be saved internally even when the power source to the Control Unit is turned OFF. Use the Set_Attribute_Single service (specify any value for the parameter) to reset the data to the default value. 	0
71	Accumulated lighting duration (L2)			
100	Light intensity (L1) for Continuous Mode	Unsigned 16-bit integer	1 to 512	1
101	Light intensity (L2) for Continuous Mode			
250	Strobe time (L1) for Strobe Mode	Unsigned 16-bit integer	1 to 10000 (Unit: μ s)	1
251	Strobe time (L2) for Strobe Mode			
260	Lighting delay (L1) for Strobe Mode	Unsigned 16-bit integer	0 to 10000 (Unit: μ s)	0
261	Lighting delay (L2) for Strobe Mode			
350	Strobe time (L1) for O/D Mode	Unsigned 16-bit integer	1 to 1000 (Unit: μ s)	1
351	Strobe time (L2) for O/D Mode			
360	Lighting delay (L1) for O/D Mode	Unsigned 16-bit integer	0 to 10000 (Unit: μ s)	0
361	Lighting delay (L2) for O/D Mode			

LED Lighting Duration in Continuous Mode

The Control Unit adjusts the light with PWM control of 125 kHz in Continuous Mode. A light pulse is generated in 8 μ s cycles, in which LEDs are ON only during the ON time shown in the figure to the right. Thus, the ON time will be added to the accumulated lighting duration. The duration of each ON time varies depending on the light intensity setting (1 to 512).



Related Attributes for the Instance Value

Attribute ID	Description	Access with the Get_Attribute_Single service	Access with the Set_Attribute_Single service
5	Instance value	Supported	Supported
6	Maximum acceptable value	Supported	N/A
7	Minimum acceptable value	Supported	N/A
8	Default value	Supported	N/A

7 Controlling Operation with EtherNet/IP Implicit Messaging

You can set up the operation and confirm the status of the Control Unit with implicit messages through the LAN connector. EtherNet/IP is a set of industrial network protocols that work on TCP/IP and UDP/IP.

▶ EDS Files

Electronic Data Sheet (EDS) files that describe the communications configuration of the device are available on our website. Please download them as required.

▶ Setting the Network

The default IP address of the Control Unit is 192.168.0.2.

Use the TCP/IP interface objects (class code: 0xF5) to set the network settings of the Control Unit to those that will be used in the actual application.

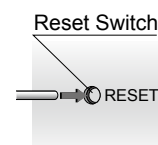
Note: An alternative way is to send network setting commands to the Control Unit. For detailed information, refer to 8. *Controlling Operation with TCP/IP Communications*.

Also note that when you use the TCP/IP interface objects to set the network settings, you do not have to cycle the power source to the Control Unit.

▶ Initializing the Network Setting

If the IP address and other settings are incorrect, you will not be able to connect to the Control Unit. You will also not be able to reset the IP address and others. If that occurs, use a pointed object to press and hold the Reset Switch on the front panel for at least 3 seconds to reset all settings including the network settings to their default values.

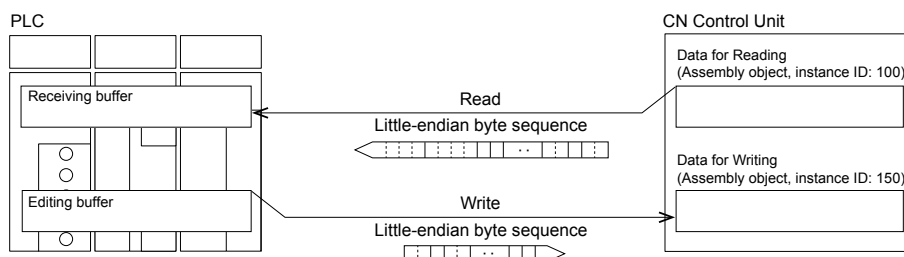
Note: Please note that also the values for accumulated trigger count and accumulated lighting duration will be reset at the same time.



▶ Elements within the Data

Access the vendor-specific data provided by the Control Unit from an external device, such as a PLC or image processing device. Read the values from Data for Reading (Assembly object, instance ID: 100) and write the values* to Data for Writing (Assembly object, instance ID: 150). These elements in the data represent the settings of the Control Unit.

* The values of the settings are shared between EtherNet/IP communications and TCP/IP communications and stored internally when the power source is turned OFF, except for the Light Unit ON/OFF settings.



The two tables on the next page list the elements within the data and show the byte sequences transferred between the external device and the Control Unit.

- When the external device reads the data, the byte sequence will be in a little-endian byte format and in the order shown in Byte Sequence in Reading on the next page.
- When the external device writes the data, the byte sequence must be in a little-endian byte format and in the order shown in Byte Sequence in Writing on the next page.

Also note that the data stored in the buffers of the external device is not necessarily in the same endian format and order as those of the byte sequence.

Refer to the Common Industrial Protocol (CIP™) specification sheets for information on standard objects and functionality.

7 Controlling Operation with EtherNet/IP Implicit Messaging (Continued)

Byte Sequence in Reading

You can read the data on the Control Unit to get its setting values.

For information on the possible values and data types of each element, refer to the descriptions of the instance IDs in explicit messaging.

Offset	Length (byte)	Description	Relevant instance ID in explicit messaging
0	4	Accumulated trigger count (L1)*	60
4	4	Accumulated trigger count (L2)*	61
8	4	Accumulated lighting duration (L1)*	70
12	4	Accumulated lighting duration (L2)*	71
16	1	Reserved (always 0x00)*	–
17	1	Error status*	10
18	1	Lighting mode	20
19	1	Trigger logic	21
20	1	ON/OFF setting for the Light Unit (L1)	50
21	1	ON/OFF setting for the Light Unit (L2)	51
22	2	Light intensity (L1) for Continuous Mode	100
24	2	Light intensity (L2) for Continuous Mode	101
26	2	Strobe time (L1) for Strobe Mode	250
28	2	Strobe time (L2) for Strobe Mode	251
30	2	Lighting delay (L1) for Strobe Mode	260
32	2	Lighting delay (L2) for Strobe Mode	261
34	2	Strobe time (L1) for O/D Mode	350
36	2	Strobe time (L2) for O/D Mode	351
38	2	Lighting delay (L1) for O/D Mode	360
40	2	Lighting delay (L2) for O/D Mode	361
42	2	Reserved (always 0x00)	–

* Although the external device can set the values for the relevant instances in explicit messaging, it cannot write the values for these elements in implicit messaging.

Byte Sequence in Writing

You can write data to the Control Unit to specify its setting values.

For information on the available values and data types of each element, refer to the description of the instance IDs in explicit messaging.

Offset	Length (byte)	Description	Relevant instance ID in explicit messaging
0	1	Lighting mode	20
1	1	Trigger logic	21
2	1	ON/OFF setting for the Light Unit (L1)	50
3	1	ON/OFF setting for the Light Unit (L2)	51
4	2	Light intensity (L1) for Continuous Mode	100
6	2	Light intensity (L2) for Continuous Mode	101
8	2	Strobe time (L1) for Strobe Mode	250
10	2	Strobe time (L2) for Strobe Mode	251
12	2	Lighting delay (L1) for Strobe Mode	260
14	2	Lighting delay (L2) for Strobe Mode	261
16	2	Strobe time (L1) for O/D Mode	350
18	2	Strobe time (L2) for O/D Mode	351
20	2	Lighting delay (L1) for O/D Mode	360
22	2	Lighting delay (L2) for O/D Mode	361

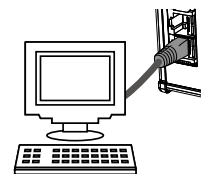
You can set up the operation* and confirm the status of the Control Unit with I/O commands through the LAN connector.

* The settings are used as shared values between EtherNet/IP communications and TCP/IP communications and are stored internally, except for the Light Unit ON/OFF settings, when the power source is turned OFF.

▶ Setting the Network

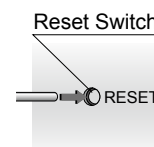
The default IP address of the Control Unit is 192.168.0.2. To make initial settings, we recommend that you connect a computer with the same network address class (e.g., an IP address of 192.168.0.3 and a subnet mask of 255.255.255.0) to the Control Unit on a 1:1 basis with a LAN cable.

Send the network setting commands from the computer to set the network settings of the Control Unit to those that will be used in the actual application. After you change the settings, turn OFF the power source to the Control Unit and connect it to the network for the actual application. The new network settings will be used when you turn ON the power source again or send the E10 command.



▶ Initializing the Network Setting

If the IP address and other settings are incorrect, you will not be able to connect to the Control Unit. You will also not be able to reset the IP address and others. If that occurs, use a pointed object to press and hold the Reset Switch on the front panel for at least 3 seconds to reset all settings including the network settings to their default values.



Note: Please note that also the values for accumulated trigger count and accumulated lighting duration will be reset at the same time.

▶ Network Setting Command Formats

An external device such as a PLC or image processing device transmits the send data to the Control Unit. The Control Unit processes the data and returns the results. The external device gets the receive data as the execution results.

Send Data

Description	Header	Channel specification	Send command		Delimiter	Default
			Command	Data		
Registers the IP address of the Control Unit.	@	FF: All channels	E01	000.000.000.000 to 255.255.255.255 (Specify all digits, e.g., specify "192.168.000.005" instead of "192.168.0.5".)	<CR><LF>	192.168.000.002
Registers the subnet mask of the Control Unit.			E02			255.255.255.000
Registers the default gateway of the Control Unit.			E03			192.168.000.001
Registers the port number through which the Control Unit receives send data.			E04	00000 to 65535 (Specify all digits, e.g., specify "04561" instead of "4561")		40001
Updates the operation of the Control Unit during operation based on the values that were set with the E01 to E04 commands.			E10*	-		-

* The addresses and port numbers registered with the E01 to E04 commands are loaded into and applied to the operation of the Control Unit when the Control Unit is turned ON. Alternatively, you can update the operation of the Control Unit with the E10 command while the Control Unit is in use. When the Control Unit receives the E10 command, the TCP connection will be automatically disconnected.

Receive Data

Header	Channel specification	Receive command		Delimiter
		Normal send data	Send data error	
@	Same value as for the send data.	O	N 01: Invalid command error* 03: Setting out of range error	<CR><LF>

* This error occurs when the command in the send data is invalid.

Command Examples

Command	Description of send data	Send data	Receive data	
			Normal send data	Send data error
E01	Registers the IP address of the Control Unit to 192.168.0.5.	@FFE01192.168.000.005<CR><LF>	@FFO<CR><LF>	@FFN01<CR><LF>
E04	Registers the port number of the Control Unit to 40002.	@FFE0440002<CR><LF>		

Control Command Formats

Send Data When the Lighting Mode Is Set to O/D or Strobe Mode

Description	Header	Channel specification	Send command		Delimiter	Default
			Command	Data* ¹		
Sets the strobe times for the channels.	@	00: L1 01: L2 FF: All channels	F	O/D Mode: 00001 to 01000* ² (Unit: μs) Strobe Mode: 00001 to 10000* ² (Unit: μs)	<CR><LF>	00001
Sets the lighting delays for the channels.			S	00000 to 10000* ² (Unit: μs)		00000
Makes the Light Units flash .			L	1: Flash* ²		-

Send Data When the Lighting Mode Is Set to Continuous Mode

Description	Header	Channel specification	Send command		Delimiter	Default
			Command	Data* ¹		
Sets the light intensity for the channels.	@	00: L1 01: L2 FF: All channels	F	00001 to 00512* ²	<CR><LF>	00001
Turns ON or OFF the Light Units.			L* ³	0: Not lit, 1: Lit* ²		1

Send Data for Any Mode

Description	Header	Channel specification	Send command		Delimiter	Default
			Command	Data* ¹		
Sets the lighting mode .	@	FF: All channels	MD01* ⁴	00: Continuous Mode, 01: Strobe Mode, 02: O/D Mode	<CR><LF>	02
Initializes the settings for all channels.			R	-		-
Deletes the detected error information and restarts suspended operation.			N* ⁵	-		-
Switches the trigger logics.			TC	0: Reversed logic, 1: Normal logic		1
Initializes the accumulated trigger counts.		00: L1 01: L2 FF: All channels	ATTRST	-		-
Initializes the accumulated lighting durations.			ATMRST	-		-

*1 Specify the same number of digits as given in the above table. For example, do not specify 123, but rather specify 00123 for the strobe time.

*2 When you have two or more data to specify, separate the data with slashes (/). For example, specify 00510/00511 in the F command data.

*3 Actual operation of the Light Units depends on the trigger logic and the ON/OFF state of the photocouplers due to the trigger signal input. For details, refer to 10. *Trigger Inputs*.

When the lighting mode is set to Continuous Mode, the ON/OFF settings for the Light Units will not be saved after the power source is turned OFF.

*4 It will take from a few seconds to a few tens of seconds to change the lighting mode. The Light Units of both channels will be turned OFF and you cannot change the settings during that period.

*5 If an error occurs, remove the cause of the error and then you can restart the suspended operation with the N command. You can also restart the operation by cycling the power source to the Control Unit.

Receive Data

Header	Channel specification	Receive command		
		Normal send data	Send data error	
@	Same value as for the send data.	O	N	01: Invalid command error* 03: Setting out of range error 04: Lighting mode change in progress error

* This error occurs when the command in the send data is invalid.

Command Examples

Command	Description of send data	Send data	Receive data	
			Normal send data	Send data error
MD01	Sets the Continuous mode for the Control Unit.	@FFMD0100<CR><LF>	@FFO<CR><LF>	@FFN01<CR><LF>
F	O/D Mode, Strobe Mode: Sets the strobe time to 123 μs for L1. Continuous Mode: Sets the light intensity to 123 for L1.	@00F00123<CR><LF>	@00O<CR><LF>	@00N01<CR><LF>
R	Initializes the settings of all channels.	@FFR<CR><LF>	@FFO<CR><LF>	@FFN01<CR><LF>

▶ Query Command Formats

Send Data

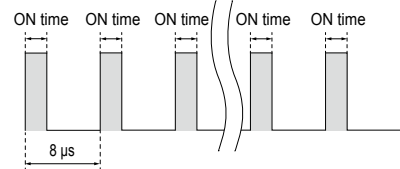
Description	Header	Channel specification	Send command		Delimiter
			Command	Data	
Requests the strobe times, lighting delays, and light intensities for the specified channels and the lighting mode set with send data.	@	00: L1 01: L2 FF: All channels	M	-	<CR><LF>
Requests the accumulated trigger counts* ¹ .			ATR	-	
Requests the accumulated lighting durations* ² .			ATM	-	
Requests the trigger logics.		TCL	-		
Requests the error status.		FF: All channels	C	-	
Requests the model name.			ML	-	

*1 • Trigger signal input through the trigger input terminal block and the settings for flash and Light Unit ON via Ethernet communications will be counted.
 • This value will increase even when the Light Unit is not connected to the Control Unit.
 • This value will be saved internally even when the power source to the Control Unit is turned OFF.

*2 • For O/D and Strobe Mode: When a signal is input through the trigger input terminal block, the value set for the strobe time will be added to this value.
 • For Continuous Mode: The LED lighting duration will be added to this value. For detailed information, refer to *LED Lighting Duration in Continuous Mode* below.
 • The accumulated lighting duration is the total of the values added in each lighting mode.
 • The unit for this value is hours. Fractions of an hour are truncated when you get this value.
 • This value will increase even when the Light Unit is not connected to the Control Unit.
 • This value will be saved internally even when the power source to the Control Unit is turned OFF.

LED Lighting Duration in Continuous Mode

The Control Unit adjusts the light with PWM control of 125 kHz in Continuous Mode. A light pulse is generated in 8 μs cycles, in which LEDs are ON only during the ON time shown in the figure to the right. Thus, the ON time will be added to the accumulated lighting duration. The duration of each ON time varies depending on the light intensity setting (1 to 512).



Receive Data

Send data command	Header	Channel specification	Receive command		Delimiter	
			Normal send data	Send data error		
M	@	Same value as for the send data.	O	When the Lighting Mode Is Set to O/D or Strobe Mode MDmmFttttSddddd * ¹ mm: Lighting mode, tttt: Strobe time, dddd: Lighting delay When the Lighting Mode Is Set to Continuous Mode MDmmFiiiiLo * ¹ mm: Lighting mode, iiii: Light intensity, o: Not lit (0)/Lit (1)	N	<CR><LF>
ATR				0000000000 to 4000000000 * ¹		
ATM				000000 to 999999 * ¹ (Unit: h)		
TCL				0: Reversed logic, 1: Normal logic		
C				00: Normal, 01: Output voltage error, 02: Overcurrent error, 04: Re-trigger detection, Other value: Internal error * ²		
ML				When in the normal operation: CN-4024-2-EIPT		

*1 When you specified FF (all channels) for the send data, the parameters for all channels are set in order from L1 and the values are separated with slashes (/).
 *2 For detailed information on errors, refer to 9. Status Outputs.

Command Examples

Command	Description of send data	Send data	Receive data	
			Normal send data	Send data error
M	Requests the set status of all channels.	@FFM<CR><LF>	@FFOMD02F01234S01234/F01111S01111<CR><LF>	@FFN01<CR><LF>
ATR	Requests the accumulated trigger count for L1.	@00ATR<CR><LF>	@0001234567899<CR><LF>	@00N01<CR><LF>
C	Requests the error status.	@FFC<CR><LF>	@FFO01<CR><LF>	@FFN01<CR><LF>

The Control Unit outputs its status to the Status Lamps and Power Lamp on the front panel and also expresses it in an error status number that you can obtain via Ethernet communications.

▣ **Status Lamps**

The Status Lamps consist of an NS Lamp and MS Lamp. The following table shows possible states of each lamp. When the Control Unit detects an error, one or both of lamps will light or flash in red. When you use only TCP/IP communications, both lamps will flash in green.

NS Lamp (Network Status)

Status	Description
Not lit.	The power source is turned OFF or a valid IP address is not set for the Control Unit.
Lit in green.	EtherNet/IP connection is established.
Flashing in green.	EtherNet/IP connection is not established.
Lit in red.	Severe error or IP address duplication
Flashing in red.	EtherNet/IP connection timeout

MS Lamp (EtherNet/IP Module Status)

Status	Description
Not lit.	The power source is turned OFF.
Lit in green.	The Control Unit is under the control of the Scanner in a "Run" state.
Flashing in green.	The Scanner is not set for the Control Unit, or is in an "Idle" state.
Lit in red.	Severe error
Flashing in red.	Recoverable fault (any of the errors included in the following table in <i>Error Status Number via Ethernet Communications</i>)

▣ **Power Lamp**

The Power Lamp lights in green when the power source is ON and also lights in red when any of the errors included in the following table in *Error Status Number via Ethernet Communications* occur in the Control Unit.

▣ **Error Status Number via Ethernet Communications**

You can check the error status number of the Control Unit from an external device via EtherNet/IP Explicit Messaging (instance ID: 10), EtherNet/IP Implicit Messaging (Data for Reading, offset: 17), or TCP/IP communications (C command). Refer to the following table and remove the cause of the error.

For detailed information on Ethernet communications, refer to 6. *Controlling Operation with EtherNet/IP Explicit Messaging*, 7. *Controlling Operation with EtherNet/IP Implicit Messaging*, or 8. *Controlling Operation with TCP/IP Communications*.

Error	Description	Error status number
Output voltage error	An output voltage drop was detected. The light outputs will stop.	01
Overcurrent error	An overcurrent error was detected. The light outputs will stop.	02
Internal error	An error was detected internally. The light outputs will stop. If detection of this error continues, contact CCS.	Other value

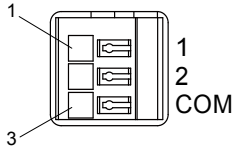
Note: Only when the lighting mode is set to O/D Mode, you can also check for the occurrence of a re-trigger via Ethernet communications. A re-trigger is a trigger signal that had failed to meet the interval requirement.

After you remove the cause of the error, cycle the power source to the Control Unit. Alternatively, use EtherNet/IP Explicit Messaging (instance ID: 10) or TCP/IP communications (N command) to delete the detected error information and restarts the suspended operation from the external device.

10 Trigger Inputs

When the lighting mode is set to O/D or Strobe Mode, you can make a Light Unit flash by turning ON and OFF the photocoupler with a trigger signal input through the trigger input terminal block. When the lighting mode is set to Continuous Mode, you can turn the Light Unit ON and OFF.

Trigger Input Terminal Block Layout



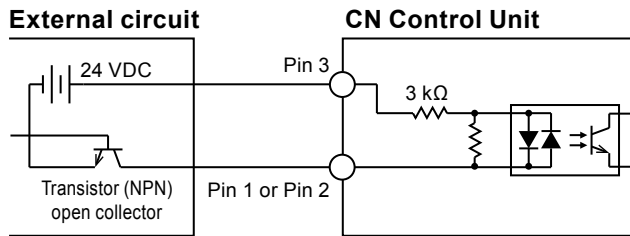
Pin number	Signal
1	Trigger input (L1)
2	Trigger input (L2)
3	COMMON

Connection specifications (for each terminal)				
Rated input voltage	Maximum input voltage	Photocoupler ON voltage/ ON current	Photocoupler OFF voltage/ OFF current	Response time
24 VDC	26.4 VDC	21.6 VDC min./ 6 mA min.	1.5 VDC max./ 1 mA max.	Refer to the sequence diagrams on the next page.

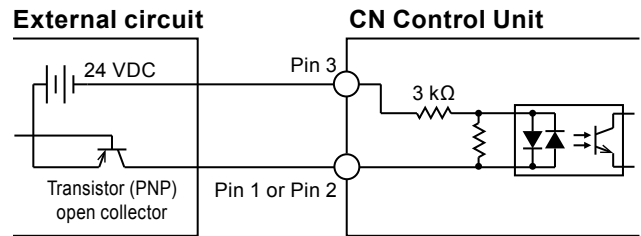
External Signal Connection Example

Both sinking and sourcing input are available for the Control Unit.

Sinking (NPN)



Sourcing (PNP)



Photocoupler and the Operation of the Light Unit

The trigger logic setting specifies the operation of the Light Units when you turn the photocoupler ON and OFF.

For information on how to set the trigger logic and how to confirm it, refer to 6. *Controlling Operation with EtherNet/IP Explicit Messaging*, 7. *Controlling Operation with EtherNet/IP Implicit Messaging*, or 8. *Controlling Operation with TCP/IP Communications*.

When the lighting mode is set to Continuous Mode, the operation of the Light Units varies depending on the Light Unit ON/OFF setting via Ethernet communications.

Trigger logic setting	Photocoupler	When the lighting mode is set to O/D or Strobe Mode	When the lighting mode is set to Continuous Mode	
			ON/OFF setting via Ethernet communications: Lit (default)	ON/OFF setting via Ethernet communications: Not lit
Normal logic (default)	ON	No change	Light Unit OFF	Light Unit OFF
	OFF	Light Unit flashes for the strobe time.	Light Unit ON	Light Unit OFF
Reversed logic	ON	Light Unit flashes for the strobe time.	Light Unit ON	Light Unit ON
	OFF	No change	Light Unit ON	Light Unit OFF

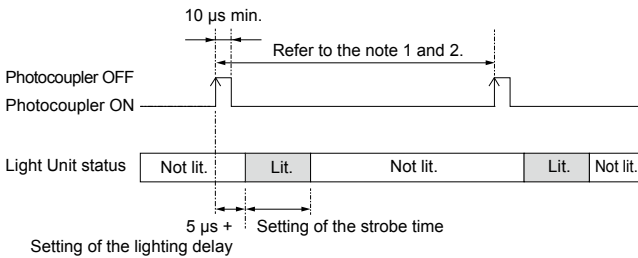
10 Trigger Inputs (Continued)

▶ Trigger Input Sequence Diagrams

The following diagrams show the operation when the normal logic is specified for the trigger logic setting. When the reversed logic is specified, you will need to interpret the description for when the photocoupler is ON as for when the photocoupler is OFF.

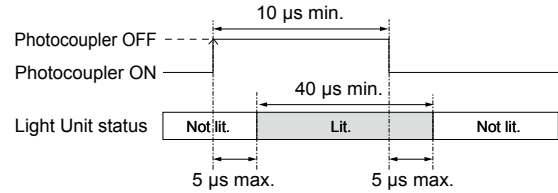
When the Lighting Mode Is Set to O/D or Strobe Mode

Maintain a trigger signal for at least 10 μs .



When the Lighting Mode Is Set to Continuous Mode

Maintain an ON signal for at least 10 μs . The Light Unit will be turned ON for at least 40 μs , even when the input signal is ON for less than 40 μs .



Note:

1. When the Lighting Mode Is Set to O/D Mode:

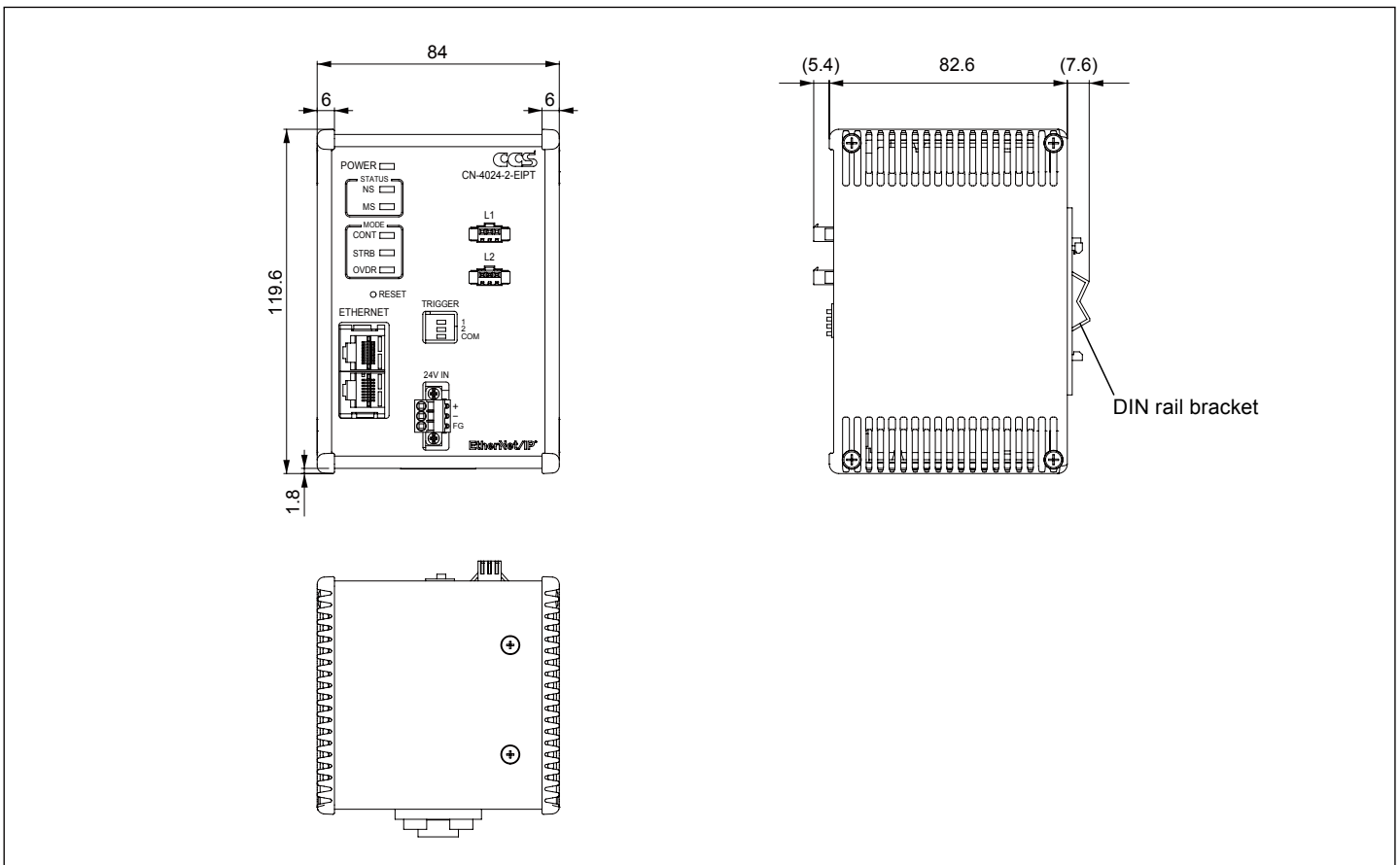
The strobe time duty is 7% max. Any trigger signals are ignored within approximately 14.3 times the strobe time after the last signal.

2. When the Lighting Mode Is Set to Strobe Mode:

If another trigger is input before the expiration of the lighting delay and strobe time, the strobe time will be cut short. The starting point of the reentered trigger is taken as the start time of flash.

3. If the setting of the strobe time is small, the lighting time may be shorter than the setting or the light may not be strobed, depending on the Light Unit and the cable length.

11 Dimensions (mm)



12 Main Specifications

Model name	CN-4024-2-EIPT
Product name	Controller with EtherNet/IP Interface
Lighting method	O/D Mode, Strobe Mode: Strobe lighting Continuous Mode: Continuous lighting
Drive method	Constant-voltage system
Intensity control method	O/D Mode, Strobe Mode: Lighting time control Continuous Mode: PWM control
PWM frequency	125 kHz
Number of channels	2 channels
Output ratings (O/D Mode)	48 VDC 5 A max./connector, Total for 2 channels: 7 A max.* ¹
Output ratings (Strobe Mode, Continuous Mode)	24 VDC 40 W max./connector, Total for 2 channels: 40 W max.
Input voltage (ratings)	24 VDC
Input voltage (range)	21.6 to 26.4 VDC
Average power consumption (typ.)	45 W
Peak power consumption (max.)	71.3 W* ²
Inrush current (typ.)	6.9 A, 21.4 μs (reference values)
Insulation withstand voltage, Insulation resistance (input/output - FG)	250 VAC for one minute, Cutoff current: 10 mA, 500 VDC, 20 MΩ min.
Operating environment	Temperature: 0 to 40°C, Humidity: 20% to 85% (with no condensation), Indoor use only
Storage environment	Temperature: -20 to 60°C, Humidity: 20% to 85% (with no condensation)
Cooling method	Natural air cooling
CE marking	EMC standard: Conforms to EN61000-6-2, EN61000-6-4
Material and surface processing	Material: Aluminum and resin, Surface processing: Black alumite
Weight	500 g max.
Accessories	Instruction guide

*1 Confirm the peak current of the LED Light Units and use the Light Units within the above output current. For information on the availability of your Light Units, refer to our website. <https://www.ccs-grp.com/support/matching/check/>

*2 When you select a power source device, the rated output power must be larger than the above peak power consumption.

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