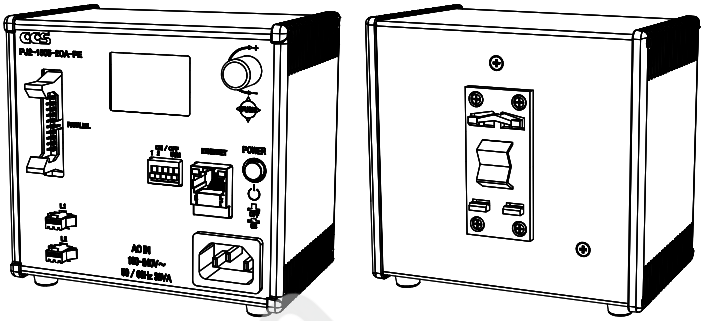
PJ2-1505-2CA-PE

Instruction Guide

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 Spot Lights. It is mainly used to control LED Spot Lights that are used for machine vision or industrial inspections.



Features

- Status confirmation and operation settings can be performed on the LCD.
- External control can be performed with either Ethernet communications (TCP/UDP) or parallel communications.
- Applicable to the Spot Lights with an input current of 1,000 mA max.

■ INDEX

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	Indicates that incorrect usage may result in serious injury or death.	⚠ Caution	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 These symbols indicate prohibited actions.	MANDATORY ACTIONS, UNPLUG These symbols indicate required actions.

⚠ Warning			
Do not disassemble or modify the Control Unit. Doing so may result in fire or electric shock. (DISASSEMBLY PROHIBITED)		Do not touch the plugs or switches with wet hands. Doing so may result in electric shock. (DO NOT TOUCH WITH WET HANDS)	
Make sure that the Control Unit is free of water or any other liquid. Exposure to water or other liquid may result in fire or electric shock. (DO NOT SUBJECT TO MOISTURE)		Before connecting or disconnecting cables, make sure that the AC power cord is unplugged from the Control Unit or the power source is turned OFF. Failure to do so may results in fire, electric shock or failure of the Spot Lights. (MANDATORY ACTIONS)	
Do not touch the AC power cord during thunderstorms. This may result in electric shock. (PROHIBITED)		If an abnormal condition, such as smoking, abnormal heating, abnormal odor, or noise, occurs, stop using the Control Unit immediately, unplug the AC power cord from the Conrol Unit or wall socket, or turn off the power source. Continued use may result in fire or electric shock. (UNPLUG)	

⚠ Caution			
Make sure that the AC power cord meets the following specifications. 100 to 120-V regions: SVT or SJT, AWG18, length: 3 m max., dielectric strength: 125 V min. 200 to 240-V regions: H05VV-F, AWG18, length: 3 m max., dielectric strength: 250 V min. (MANDATORY ACTIONS)			
Do not connect any devices other than CCS LED Spot Lights. Doing so may cause the Control Unit to fail. The warranty is void if the Control Unit is connected to any other device. (PROHIBITED)		Plug the AC power cord directly into the wall socket. Using a power strip or connecting many loads from one electrical socket may cause fire or electric shock. (MANDATORY ACTIONS)	
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. (MANDATORY ACTIONS)		Do not bundle Control Unit cables with high-voltage lines or power lines. Doing so may cause the Control Unit to malfunction. Allow leeway between the cables when installing them. (MANDATORY ACTIONS)	
Do not place any objects within 20 mm from the air inlets and fan exhaust outlet. Insufficient ventilation may cause heat to accumulate inside the Control Unit and result in fire. (PROHIBITED)		Always ground the power cord. Not doing so may cause Control Unit failure due to static electricity, which may destroy electrical components, including those in the Spot Lights. (MANDATORY ACTIONS)	
Do not place the Control Unit in direct sunlight or in a very humid environment. Doing so may result in fire due to internal temperature rise. (PROHIBITED)		Use Spot Lights that are suitable for the Control Unit ratings. Exceeding the ratings may cause Control Unit failure. (MANDATORY ACTIONS)	
Always place the Control Unit on a stable and flat surface. Not doing so may result in the Control Unit falling or toppling, which may cause bodily injury or Control Unit malfunction. (PROHIBITED)		Always hold onto the plug or connector when disconnecting a cable. Pulling on the cable may damage the cable and result in fire or electric shock. (MANDATORY ACTIONS)	
Do not bend a cable past its natural bending radius or jam a cable into a narrow space when wiring the Control Unit. Doing so may cause Control Unit failure. (PROHIBITED)		Before moving the Control Unit, disconnect all connecting cables. Damaging the cables may result in fire or electric shock. (MANDATORY ACTIONS)	
Do not wipe the Control Unit with organic solvents, such as paint thinner or benzene. Discoloration or deterioration of the Control Unit surfaces may occur. (PROHIBITED)		If there is dust or other foreign matter on the electrodes, unplug the AC power cord from the Control Unit or 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. (MANDATORY ACTIONS)	

2 Names and Functions of Parts

LCD ····· **Page 4**

Displays the light intensity, external control method, status of the Control Unit, and other information. Also displays the menus to set the operation of the Control Unit.

Note: Do not continuously use the Control Unit under high-temperature and high-humidity environment. Doing so may make the LCD difficult to see.

Parallel Communications Connector ····· **Page 8**

Connect the Parallel Communications cable.
(MIL connector, MIL-C-83503 compliant, 20-pole)

Trigger Input Terminal Block ····· **Page 10**

Connect a trigger input cable to control the Spot Lights from external devices with trigger signal inputs.
(Terminal block, 5-pole)

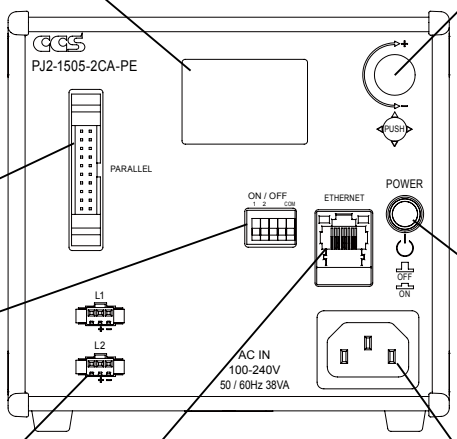
Output Connectors ····· **Page 2**

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

LAN Connector ····· **Page 2**

Used for Ethernet communications.
Connect a LAN cable to this connector.
(RJ-45)

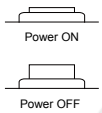
Front View



Operating Knob ····· **Page 4**

- Pressing the knob up, down, to the left, or to the right:
  Used to select the item on the LCD.
- Turning the knob: Changes the setting.
- Pressing in the knob: Sets the selection.
- Pressing for at least 3 seconds:
  Switches the Status Mode Display to the Setting Mode Display.

Power Switch ····· **Page 3**



Press the power switch to turn the power ON and OFF.
The power switch remains pressed in while the power is ON. Press the power switch again to release it and turn the power OFF.

AC Inlet ····· **Page 3**

Supply power to the Control Unit.
(EN 60320-1 certified C14 type)

3 Connections

> **⚠ Warning** Before you connect the Control Unit, make sure that the AC power cord is unplugged from the Control Unit or the power source is turned off. Making connections while the power is supplied may result in fire, electric shock or failure of the Spot Lights.

1 Place the Control Unit on a stable and flat location with its bottom side with rubber feet facing downward.

> **⚠ Warning** Do not place any objects within 20 mm from the fan air inlets or fan exhaust outlets. Insufficient ventilation may cause heat to accumulate inside the product and result in a fire.

The optional brackets (sold separately), Base Brackets (model BK-PD3) is available. Please note that if the rubber feet are removed and the Control Unit is secured without the Base Brackets, the Control Unit may be damaged. An alternative way is to ues the DIN rail bracket of the Control Unit and mount the Control Unit to DIN rail.
For information on the Base Brackets and DIN rail bracket, refer to *13. Dimensions*.

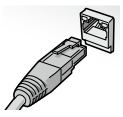
2 Connect the Spot Light cable to the output connector on the Control Unit.

Insert the Spot Light connector all the way in.

Note: The Control Unit identifies the type of the Spot Lights with their Light ID and supply power corresponding to their rating.

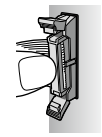
3 To control the Control Unit from an external device, connect a suitable cable for the control method.

Controlling the Control Unit via Ethernet Communications



The LAN cable must be provided by the customer. (Cable length must be less than 30 m.)
The Control Unit does not support Auto MDI/MDI-X which automatically identifies straight and crossover cables. When you connect the Control Unit to an external device that does not support Auto MDI/MDI-X, use a crossover cable for PLCs or PCs, and use a straight cable for network devices, such as hubs.

Controlling the Control Unit via Parallel Communications



The optional cable (sold separately), Parallel Communications Cable (model EXCB2-M20-3) is available.

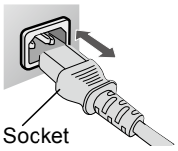
Note: You must provide a cable with a length of 3 m max.

3 Connections (Continued)

4 Connect the trigger input cable when inputting trigger signal through Trigger Input Terminal Block.
For information on Trigger Input Terminal Block, refer to *10. Trigger Input*.

Note: You must provide a cable with a length of 3 m max.

5 Connect the AC power cord to the AC inlet and a wall socket.



If you want to use the Control Unit with 200 to 240 VAC, you must procure appropriate AC power cord.

Recommended specifications

Wire diameter	Line-to-line insulation withstand voltage	Ratings	Withstand voltage	Socket standards
1.0 mm^2 min.	100 MΩ min.	250 V min., 10 A min.	2,000 VAC/minute	EN 60320-1 certified C13 type

The disconnecting device for power circuit is the AC power cord. Unplug the AC power cord from the Control Unit or wall socket to disconnect the power circuit. When wiring the AC power cord, make it always available for disconnecting. If it is difficult to plug and unplug the AC power cord, the customer must provide the disconnecting device.

4 Main Functions

Control Methods

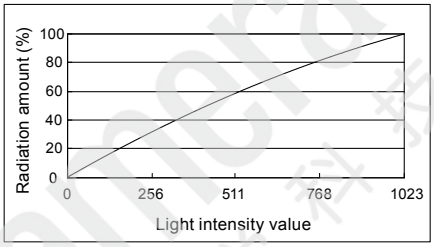
You can control the Control Unit with one of the following methods.

Manual Control (Default)
You can control the Control Unit with the operating knob on the front panel.

External Control
- **Ethernet Communications**
  You can control the Control Unit with commands I/O through the LAN connector.
- **Parallel Communications**
  You can control the Control Unit with control signal I/O through parallel communications connector.

Light Control Characteristics (Reference Values)

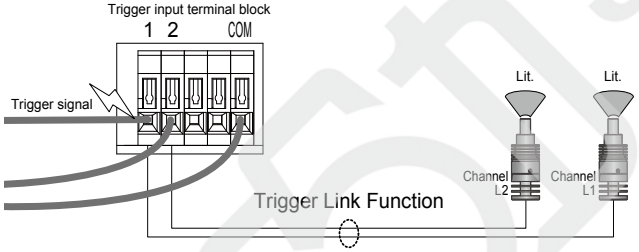
When the light intensity value is set to 0, the Spot Lights will be turned OFF.



Note: Settings that are required for manual light control are internally stored separately from those for external control. The light intensity settings for external control are stored as shared values with Ethernet communications and parallel communications.

Trigger Link Function

You can make the Spot Lights on both channels turn ON (or OFF) linked to a trigger signal that is input through one of the pins (Trigger Input L1 or L2) in the trigger input terminal block.
Sets the TRG-LINK item on the COM Menu on the LCD.



5 Main Operation Flow

This section shows the main operation flow after the required cables are connected until the Spot Lights are turned ON.

1. Turning ON the power supply

1. Push the power switch to turn ON the power supply. When the power supply is ON, the LCD will light.
   Note: When you turn the power OFF, leave it OFF for at least 10 seconds before you turn it back ON.

2. Setting the control method, etc. on the menu
Refer to *6. Operation Methods*.

2. Select the control method that is suitable for your application environment.
   Use the CONTROL item on the COM Menu on the LCD to specify the control method.

3. **Setting with manual control**
Refer to *6. Operation Methods*.

Setting via Ethernet Communications
Refer to *7. Controlling Operation with Ethernet Communications*.

Setting via Parallel Communications
Refer to *8. Controlling Operation with Parallel Communications*.

3. Set the light intensity value with the selected control method.

4. Turning ON the Spot Lights

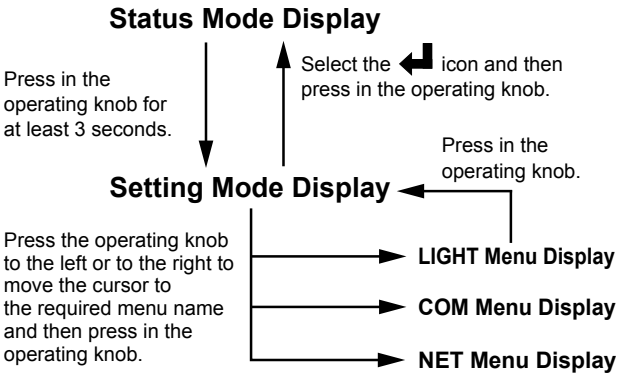
a) Trigger signal input	b) L command	c) Continuous light ON
Refer to *10. Trigger Inputs*.	Refer to *7. Controlling Operation with Ethernet Communications*.	Refer to *6. Operation Methods*.

4. You can use the Control Unit to turn the Spot Lights ON and OFF with the following methods:
   a) Trigger Signal Input through Trigger Input Terminal Block
   (available whether the Control Unit is controlled manually or externally)
   b) L Command via Ethernet Communications
   c) Continuously turning ON the Spot Lights with the settings shown below
   (without connecting any external control cables)

Menu	Item	Setting
COM	CONTROL	*MANUAL*
	LGC-TRG	*ACTIVE HI*

6 Operation Methods

When the power to the Control Unit is turned ON, the Status Mode Display will appear on the LCD.



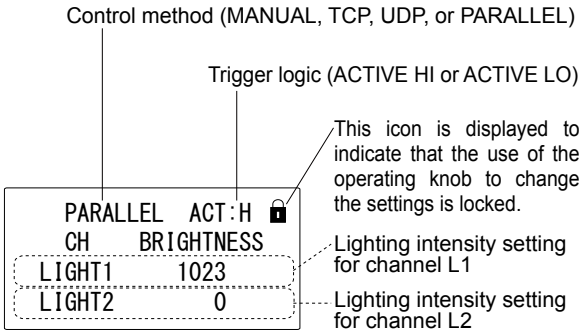
Manual Control

Set the CONTROL item on the COM Menu to *MANUAL*.
The BRIGHTNESS item on the LIGHT Menu specifies the light intensity for the corresponding channel.

External Control

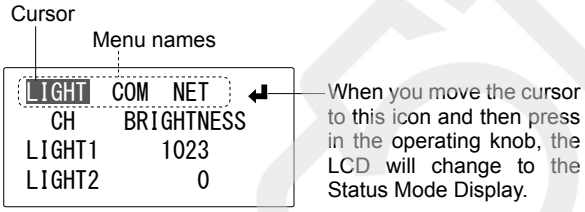
Set the CONTROL item on the COM Menu to the control method. Also set the other items for the corresponding control method on the COM and NET Menus.

Status Mode Display



In addition to the operation status of the Control Unit, such as the control method and trigger logic, the lighting intensity settings for each channel are displayed on the Status Mode Display. For information on the settings for the channel, refer to *LIGHT Menu Display*, below.
Press in the operating knob for at least 3 seconds in the Status Mode Display. The LCD will change to the Setting Mode Display.

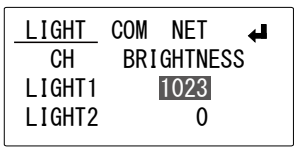
Setting Mode Display



Manipulating the Operating Knob

Highlighting shows the current position of the cursor. Press the operating knob to the left or to the right to move the cursor to the required menu name and then press in the operating knob. The corresponding menu will appear.

• LIGHT Menu Display



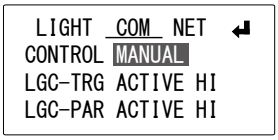
The LIGHT Menu is used to specify the light intensity settings for the channels.
Press the operating knob up, down, to the left, or to the right to move the cursor to the required setting item and then turn the operating knob to change the setting. You can change the setting on the LIGHT Menu only when the CONTROL item on the COM Menu is set to *MANUAL*. For other types of control, you cannot change them with the operating knob even though the settings are displayed.

Note: Settings on the LIGHT Menu will be saved after the power supply is turned OFF.

Item	Setting	Default	Description
BRIGHTNESS	0 to 1023*	0	Sets the light intensity.

* When the Spot Light is not connected, "----" will be displayed. Additionally, when the connected Spot Light is not applicable to the Control Unit, "EID" will be displayed.

• COM Menu Display



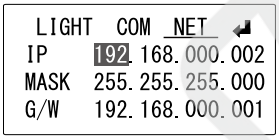
The COM Menu is used to specify the operation of the Control Unit.

Note: The settings on the COM Menu will be saved after the power supply is turned OFF.

Item	Setting	Default	Description
CONTROL	MANUAL, ETHER TCP, ETHER UDP, or PARALLEL	MANUAL	Sets the control method. MANUAL: Manual control with the operating knob on the front panel. ETHER TCP: External control with Ethernet communications using TCP protocol ETHER UDP: External control with Ethernet communications using UDP protocol PARALLEL: External control with parallel communications
LGC-TRG	ACTIVE HI or ACTIVE LO	ACTIVE HI	Sets the trigger logic to turn the Spot Lights ON and OFF. Refer to *10. Trigger Inputs* for details.
LGC-PAR	ACTIVE HI or ACTIVE LO	ACTIVE HI	Sets the logic for control with parallel communications. Refer to *8. Controlling Operation with Parallel Communications* for details.
TRG-LINK1	2 digits,* each digit is a number or "–".	1– (The 1st digit is always 1.)	You can make the Spot Lights on both channels turn ON (or OFF) linked to a trigger signal that is input through one of the pins in the trigger input terminal block. The TRG-LINK1 item sets the channels whose corresponding Spot Light will be turned ON (or OFF) at the same time when a trigger signal is input through pin 1 (Trigger Input L1) of the trigger input terminal block. The TRG-LINK2 item corresponds to pin 2, of the trigger input terminal block. Each of the two digits to set corresponds to the L1 or L2 channel in order from the leftmost digits and is either of the following: Number (1 and 2): The Spot Light on the channel that corresponds to the digit will be turned ON (or OFF). –: The Spot Light on the channel that corresponds to the digit will not respond. Ex: TRG-LINK1 12 When a trigger signal is input through pin 1, the Spot Lights on the L1 and L2 channels will be turned ON (or OFF) at the same time.
TRG-LINK2	2 digits,* each digit is a number or "–".	–2 (The 2nd digit is always 2.)	
RESET	RESET ---, RESET LIGHT, RESET COM, RESET NET, or RESET ALL	RESET ---	Resets the settings on the menus. For the external control, the settings that are counterparts of the LIGHT Menu Display are not reset. RESET ---: Does not reset any settings. RESET LIGHT: Resets the settings on the LIGHT Menu to the defaults. RESET COM: Resets the settings on the COM Menu to the defaults. RESET NET: Resets the settings on the NET Menu to the defaults. RESET ALL: Resets the settings on all menus to the defaults. Press in the operating knob. The confirmation message will be displayed. If you select *Yes* and press in the operating knob, the settings will be reset.

* Move the cursor to each digit and change the setting.

• NET Menu Display



The NET Menu is used to specify the network addresses for the Ethernet communications.

Note: The settings on the NET Menu will be saved after the power supply is turned OFF.

Item	Setting	Default	Description
IP	000.000.000.000 to 255.255.255.255	192.168.000.002	Sets the IP address of the Control Unit.
MASK	000.000.000.000 to 255.255.255.255	255.255.255.000	Sets the subnet mask of the Control Unit.
G/W	000.000.000.000 to 255.255.255.255	192.168.000.001	Sets the default gateway of the Control Unit.
PORT	00000 to 65535*1	40001	Sets the receiving port number of the Control Unit.
RE-IP*2	000.000.000.000 to 255.255.255.255	192.168.000.016	Sets the IP address to which the Control Unit returns the execution results.
RE-PO*2	00000 to 65535*1	30001	Sets the port number through which the Control Unit returns the execution results.
KPALV	ON or OFF	ON	Enables/disables the KeepAlive function.*3

*1 Move the cursor to each digit and change the value.

*2 You need to set these items when the CONTROL item on the COM Menu is set to *ETHER UDP*.

*3 The KeepAlive function is used when the Control Unit does not receive any data from the external device for a certain time to confirm whether the external device is not connected to the network or whether the external device just does not have any data to send.
- The setting of the this function is effective only when the CONTROL item on the COM Menu is set to *ETHER TCP*.
- When the KeepAlive function is enabled, the Control Unit automatically sends confirmation data to the external device. If the Control Unit does not receive a reply, the Control Unit will disconnect the connection. If the Control Unit receives a reply, the Control Unit will keep the connection.
- When the KeepAlive function is disabled, the Control Unit keeps the connection until a disconnection request is received from the external device.

7 Controlling Operation with Ethernet Communications

You can set up the operation and confirm the status of the Control Unit with commands I/O through the LAN connector.
To control operation with Ethernet communications, set the menu items as given below and then connect the Control Unit to the network.

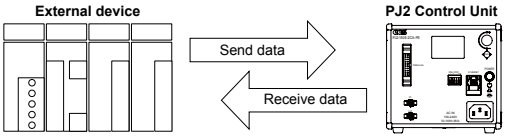
1. Set the CONTROL item on the COM Menu to *ETHER TCP* or *ETHER UDP*.
2. Set the network addresses on the items on the NET Menu.

Refer to *6. Operation Methods* for details on the menus.

Communications Specifications

TCP/IP protocol or UDP/IP protocol, and Ethernet (Baud rate: 10 Mbps or 100 Mbps, automatically detected; Transmission medium: 10BASE-T or 100BASE-TX)
Note: The Control Unit supports only one TCP connection at one time.
You must provide a LAN cable with a length of less than 30 m.

Setting Command Formats



An external device such as a PLC, image processing device, or PC 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*1		
Sets the **light intensities** for the channels.	@	00: L1, 01: L2, FF: Both channels	F	0000 to 1023*2	<CR><LF>	0000
Turns ON or OFF the Spot Lights.			L*3	0: Not lit, 1: Lit*2		1
Initializes the settings for both channels.		FF: Both channels	R*4	–		–
Registers the IP address of the Control Unit.			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".)		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 IP address to which the Control Unit sends the execution results.			E05*5			192.168.000.016
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
Registers the port number through which the Control Unit returns the execution results.			E06*5			30001
Updates the operation of the Control Unit during operation based on the values that were set with the E01 to E06 commands.			E10*6	–		–
Deletes the detected error information and restarts suspended operation.			N*7	–		–

*1 Specify the same number of digits as given in the above table. For example, do not specify 12, but rather specify 0012 for the light intensity.
*2 **When You Specify "FF" for the Channel Specification**
When you specify the data in the form "aaaa/bbbb" to the F command, you can set the light intensities for both channels with a single send data at a time. If you specify "FFFF" for a data, the light intensity of the corresponding channel will not be changed.
Example) @FFF1020/FFFF: Setting the light intensity to 1020 for L1. The light intensity for L2 will not be changed.
When you specify the data in the form "a/b" to the L command, you can set ON/OFF signals for both channels with a single send data at a time. If you specify "F" for a data, the ON/OFF status of the corresponding channel will not be changed.
Example) @FFL1/F: Setting the signal to ON for L1. The ON/OFF status for L2 will not be changed.
*3 Actual operation of the Spot Lights depends on the trigger logic and the ON/OFF state of the trigger signal input. For details, refer to *10. Trigger Inputs*. The ON/OFF settings for the Spot Lights (settings for the L command data) will not be saved after the power supply is turned OFF.
*4 The settings of the manual control (the settings on the LIGHT Menu Display) are not reset.
*5 These commands are valid when the CONTROL item on the COM Menu is set to *ETHER UDP*.
*6 The addresses and port numbers registered with the E01 to E06 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.
*7 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 to the Control Unit. Refer to *9. Error Status* for details on the errors.

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, or when the CONTROL item on the COM Menu is set to *MANUAL* or *PARALLEL* and the Control Unit receives send data.

Query Command Formats

Send Data

Description	Header	Channel specification	Send command		Delimiter
			Command	Data	
Requests the light intensities set with send data and the connection statuses of the Spot Light for the specified channels.	@	00: L1, 01: L2, FF: Both channels	M	–	<CR><LF>
Requests the error status.		FF: Both channels	C	–	

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	FiiiiLoIDcc *1 iiii: Light intensity (0000 to 1023) o: Not lit (0), Lit (1) cc: Connection status (00: Connected, 01: Not connected, 02: Light ID error)	N	01: Invalid command error 03: Setting out of range error	<CR><LF>
C				00: Normal 06: Light ID error 03, 13, 15, 16, or other value: Internal error *2			

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

Command Examples

Setting Commands

Command	Description of send data	Send data	Receive data	
			Normal send data	Send data error
F	Sets the light intensity to 123 for L1.	@00F0123<CR><LF>	@00O<CR><LF>	@00N01<CR><LF>
L	Turns ON the Spot Light on L1	@00L1<CR><LF>		
R	Initializes the settings of both channels.	@FFR<CR><LF>	@FFO<CR><LF>	@FFN01<CR><LF>
E01	Registers the IP address of the Control Unit Unit to 192.168.0.5.	@FFE01192.168.000.005<CR><LF>		

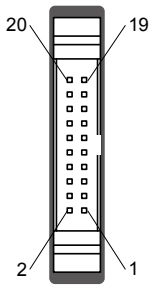
Query Commands

Command	Description of send data	Send data	Receive data	
			Normal send data	Send data error
M	Requests the set status of both channels.	@FFM<CR><LF>	@FFOF0123L0ID00/F0234L1ID01<CR><LF>	@FFN01<CR><LF>
C	Requests the error status.	@FFC<CR><LF>	@FFO00<CR><LF>	

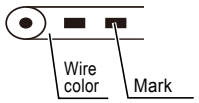
8 Controlling Operation with Parallel Communications

You can set up the operation of the Control Unit and confirm the presence/absence of an error with control signal I/O through parallel communications connector.
If you would like to control the operation with parallel communications, set the CONTROL item on the COM Menu to *PARALLEL*. Refer to *6. Operation Methods* for details of the menus.

Parallel Communications Connector Layout (Plug)



Enlarged Cable Diagram



Pin number	Signal	Contents	Cable EXCB2-M20-3 Wire color	Cable EXCB2-M20-3 Marks
1	B0	Setting	Orange	Black 1
2	B1		Orange	Red 1
3	B2		Gray	Black 1
4	B3		Gray	Red 1
5	B4		White	Black 1
6	B5		White	Red 1
7	B6		Yellow	Black 1
8	B7		Yellow	Red 1
9	CS0	Channel	Pink	Black 1
10	CS1	Channel	Pink	Red 1
11	NC	Not used.	---	---
12	COMMON	Common	Orange	Red 2
13	BRTWR	Light intensity writing	Gray	Black 2
14, 15	NC	Not used.	---	---
16	B8	Setting	White	Red 2
17	B9		Yellow	Black 2
18	NC	Not used.	Yellow	Red 2
19	OC	Error output	Pink	Black 2
20	OE		Pink	Red 2

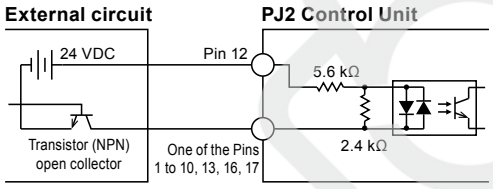
Turning ON and OFF the signal input from the parallel communications connector sets and writes data.

Connection specifications (for each terminal)				
Rated input voltage	Maximum input voltage	Signal input ON voltage / ON current	Signal input OFF voltage / OFF current	Response time
24 VDC	26.4 VDC	21.6 VDC min./ 3 mA min.	1.5 VDC max./ 1 mA max.	Refer to the sequence diagrams.

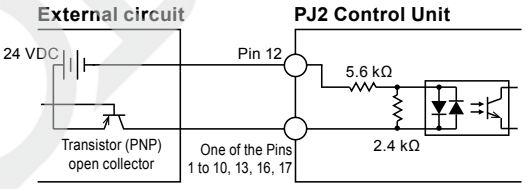
External Signal Connection Example

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

Sinking (NPN)



Sourcing (PNP)



Signal Input and the Set Value for Data

The LGC-PAR item on the COM Menu specifies the set value for data when you turn the signal input ON and OFF.

Setting of the LGC-PAR item on the COM Menu	Signal input	Set value for data
ACTIVE HI (default)	ON	1
	OFF	0
ACTIVE LO	ON	0
	OFF	1

Channel Setting

Channel	Data CS1	Data CS0
L1	0	0
L2	0	1

Logic Table (Light Intensity Value)

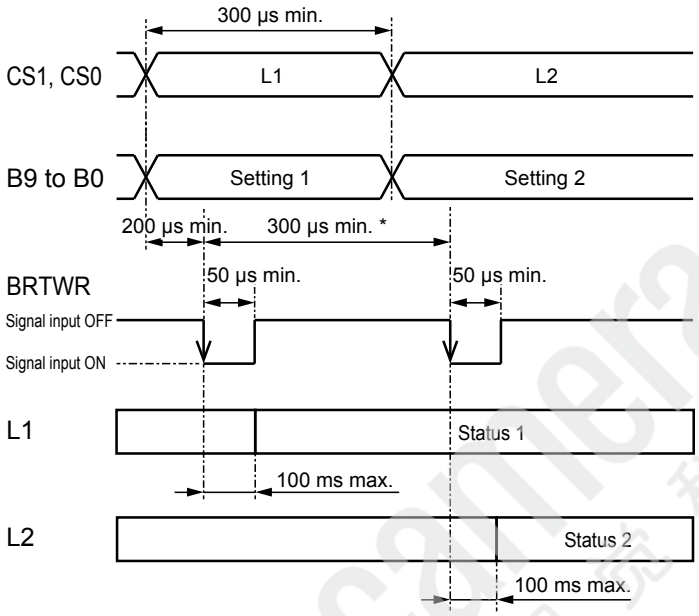
Setting	Data B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	1
:	:									
1022	1	1	1	1	1	1	1	1	1	0
1023	1	1	1	1	1	1	1	1	1	1

Note: The data other than the above is not valid.

Sequence for Writing Data

Used the following procedure to set the light intensity with parallel signal inputs.
If you would like to change two or more settings, perform this procedure repeatedly.

1. Use pins 1 to 8, 16, and 17 (B0 to B9) of the parallel communications connector to input signals and specify the value. For details, refer to *Logic Table* on the previous page. Also use pin 9 (CS0) and pin 10 (CS1) to specify the target channel of the setting. For details, refer to *Channel Setting* on the previous page. Pin 12 (COMMON) is the common pin.
2. Turn ON the signal input to pin 13 (BRTWR) and write the data. Pin 12 (COMMON) is the common pin also when you write the data.
3. Turn OFF the signal input that you turned ON in step 2.



* Writing data at intervals of less than 300 µs will not update the operation of the Control Unit with the specified value.

9 Error Status

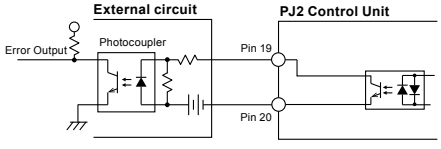
The Control Unit detects following errors.

Error	Description	LCD
Light ID error	A coonection with an inapplicable Spot Light was detected. The light output for the relevant channel will stop. Disconnect the relevant Spot Light to resolve the error.	"EID" in the BRIGHTNESS item
Internal error	An error was detected internally. The light outputs will stop. Check the operationg evironment, such as temperature and humidity, around the Control Unit and provide proper airflow. If detection of this error continues, contact CCS.	EEPROM ERROR, TEMP ERROR, SYSTEM ERROR

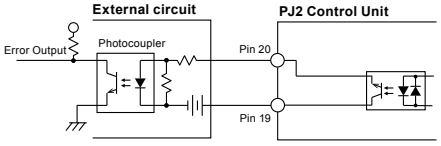
Confirmation Methods

- LCD
  If any of the above errors is detected, the error name is displayed on the LCD. For information on error names, refer to *LCD* column in the above table.
- Ethernet Communications
  Transmit the send data with the C command through Ethernet communications from the external device to check the error status. For details on the C command, refer to *7. Controlling Operation with Ethernet Communications*.
- Parallel communications
  If the internal error described above is detected, the error status is output from pins 19 and 20 of the parallel communications connector. For details on the parallel communications connector, refer to *8. Controlling Operation with Parallel Communications*. This output occurs regardless of the setting of the CONTROL item on the COM Menu.

Sinking (NPN)



Sourcing (PNP)



Error Output

Normal operation	Error
Pins 19 and 20 are open.	Pins 19 and 20 are closed.

Signal Specifications

Rated input voltage	Maximum input voltage	Residual voltage (Vce)	Load current	Leak current
24 VDC	26.4 VDC	0.2 V max.	10 mA max.	50 µA max.

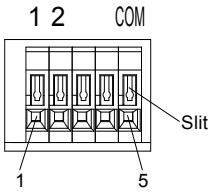
Countermeasures

Eliminate the error and cycle the power supply to use the Control Unit. Alternatively, transmit the send data with the N command through Ethernet communications from the external device. For details on the N command, refer to *7. Controlling Operation with Ethernet Communications*.

10 Trigger Inputs

You can turn a Spot Light ON and OFF by turning ON and OFF a trigger signal input through the trigger input terminal block. Trigger inputs can be used for both manual control and external control.

Trigger Input Terminal Block Layout



Pin number	Signal
1	Trigger input (L1)
2	Trigger input (L2)
3, 4	NC
5	COMMON

Connection specifications (for each terminal)				
Rated input voltage	Maximum input voltage	Trigger signal ON voltage/ ON current	Trigger signal OFF voltage/ OFF current	Response time
24 VDC	26.4 VDC	21.6 VDC min./ 3 mA min.	1.5 VDC max./ 1 mA max. or open-circuit	Refer to the sequence diagrams.

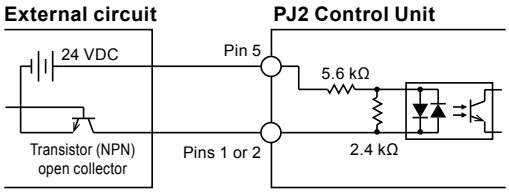
Applicable Cables: Solid wires or stranded wires with an AWG value of 28 to 22. The stripping length must be between 9 and 10 mm.

Note Connect or disconnect the wires to or from the terminal block while pushing down the slits with a falt-blade screwdriver or similar tool. Pay attention to the polarity and do not short-circuit the wires when you connect them.

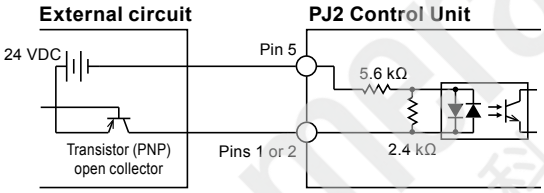
External Signal Connection Example

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

Sinking (NPN)



Sourcing (PNP)



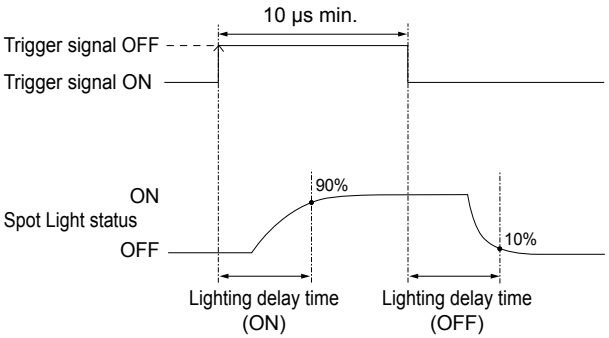
Trigger Signal and the Operation of the Spot Light

The LGC-TRG item on the COM Menu specifies the operation of the Spot Lights when you turn the trigger signal ON and OFF.
For the Ethernet communications, the operation of the Spot Lights varies depending on the ON/OFF setting with the send command.

Setting of the LGC-TRG item on the COM Menu	Trigger signal	Manual control / Parallel communications	Ethernet communications Send command: ON (default)	Ethernet communications Send command: OFF
ACTIVE HI (default)	ON	Spot Light OFF	Spot Light OFF	Spot Light OFF
	OFF	Spot Light ON	Spot Light ON	Spot Light OFF
ACTIVE LO	ON	Spot Light ON	Spot Light ON	Spot Light ON
	OFF	Spot Light OFF	Spot Light ON	Spot Light OFF

Trigger Input Sequence Diagrams

The following diagrams show the operation with manual control when the LGC-TRG item on the COM Menu is set to *ACTIVE HI*. If the LGC-TRG item is set to *ACTIVE LO*, you will need to interpret the description for when the trigger signal is ON as for when the trigger signal is OFF.
Maintain an ON signal for at least 10 µs.



Lighting Delay Time

The lighting delay time varies, depending on the radiation amount and Spot Light. For information on the radiation amount, refer to *5. Main Operation Flow.*

Radiation amount (%)	HLV3-14 HLV2-14 HLV-14-PJ		HLV3-22-1 HLV2-22 HLV-24		HLV3-22-2 HLV3-22-2-1220 HLV2-22-3W HLV-24-3W		HLV3-22-4 HLV3-22IR860 HLV3-22-4-NR HLV3-3M-RGB-4	
	ON	OFF	ON	OFF	ON	OFF	ON	OFF
20	102 µs	72 µs	85 µs	71 µs	62 µs	59 µs	50 µs	53 µs
40	70 µs	60 µs	61 µs	56 µs	41 µs	42 µs	33 µs	37 µs
60	56 µs	52 µs	45 µs	45 µs	29 µs	36 µs	26 µs	28 µs
80	44 µs	46 µs	39 µs	40 µs	28 µs	31 µs	24 µs	26 µs
100	44 µs	43 µs	34 µs	37 µs	25 µs	27 µs	19 µs	21 µs

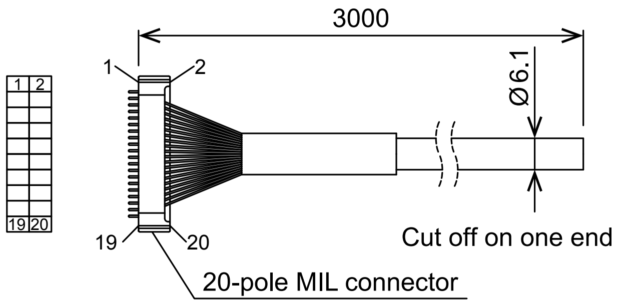
Note: The data included in the above table is when a light cable length is 10 m, and is only for a reference. Actual values may vary.

11 Optional Accessories (Sold Separately)

(Unit: mm)

Parallel Communications Cable

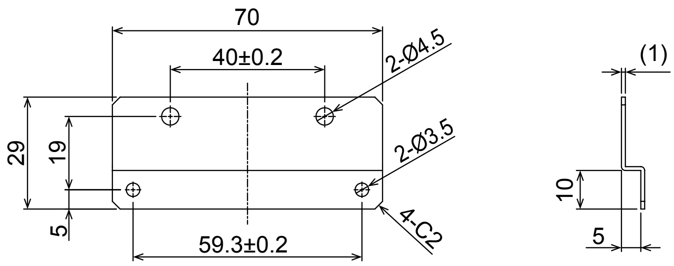
Model: EXCB2-M20-3



20-pole connector: XG4M-2030-T (manufactured by OMRON)

Base Brackets

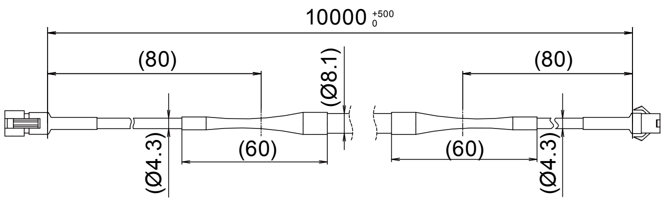
Model: BK-PD3



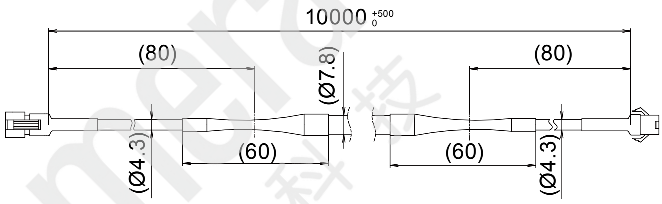
Includes two Base Brackets and four mounting screws (+ one spare screw)

Connecting Cable for the Spot Lights

Model: FCB-HLV3-10



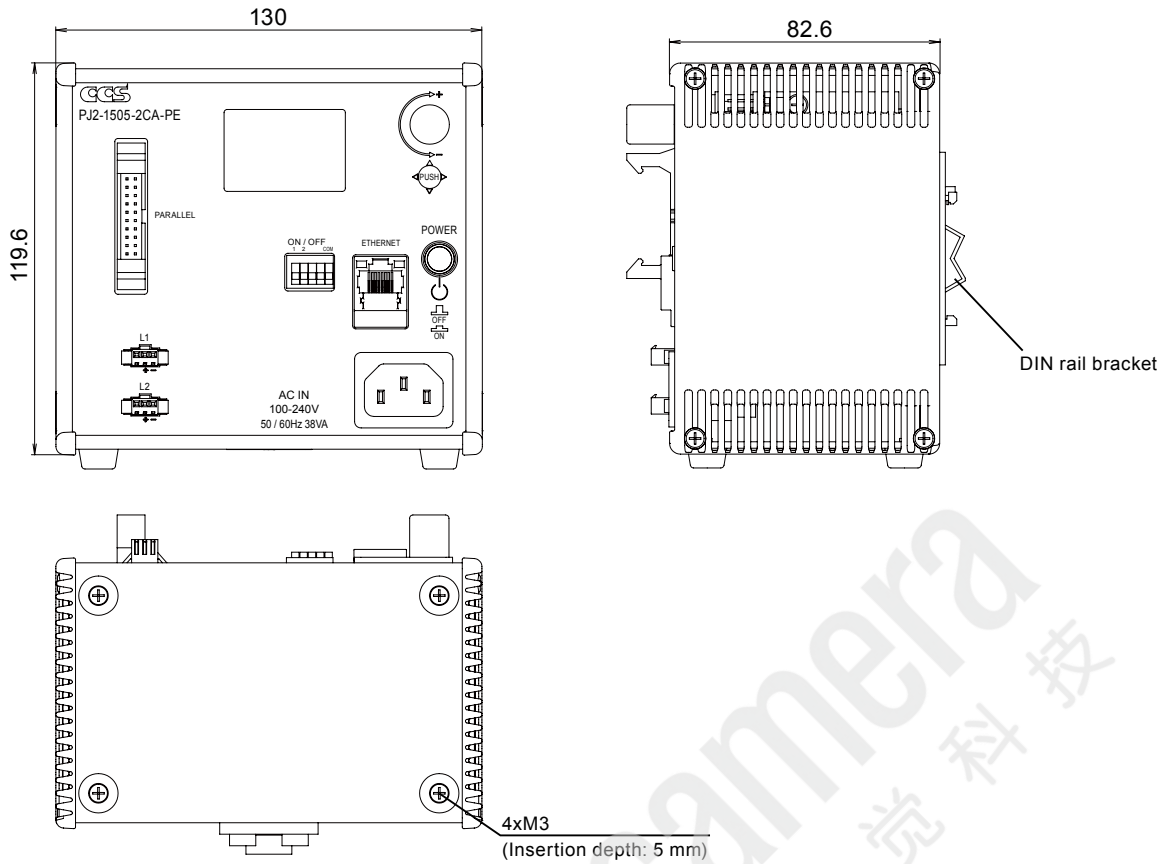
Model: FRCB-HLV3-10 (robot cable)



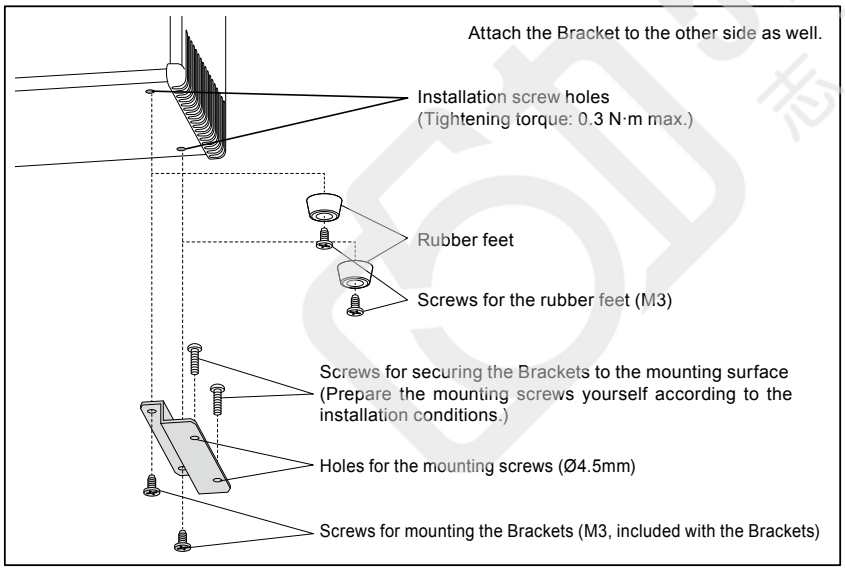
12 Main Specifications

Model name	PJ2-1505-2CA-PE
Product name	Control Unit for LED Light Units
Lighting method	Continuous lighting
Drive method	Costant-current system
Intensity control method	Variable-current control
Number of channels	2 channels
Applicable Light Units	HLV2- and HLV3-series Spot Lights (The type of Spot Light is automatically detected.)
Output voltage (ratings)	5.5 VDC
Output current	1,000 mA max./channel (Depends on the maximum input current of the Spot Light.)
Input power	100 to 240 VAC (+10%, -15%), 50/60 Hz
Power consumption	38 VA max.
Inrush current (typ.)	15 A (at 100 VAC), 36 A (at 240 VAC) from a cold start
Ground leakage current	3.5 mA max. (264 VAC, 60 Hz, with no load)
Insulation withstand voltage (input-output, input-FG)	1500 VAC for one minute, Cutoff current: 10 mA, 500 VDC, 20 MΩ min.
Overvoltage category	Category II
Operating environment	Temperature: 0 to 40°C, Humidity: 20% to 85% (with no condensation), Altitude: 2,000 m max., Protective ground class: Class I, Pollution degree: 2, Indoor use only
Storage environment	Temperature: −20 to 60°C, Humidity: 20% to 85% (with no condensation)
Cooling method	Natural air cooling
CE marking	Safety standard: Conforms to EN 61010-1 EMC standard: Conforms to EN61000-3-2, EN61000-3-3, EN61000-6-2, and EN61000-6-4
PSE	Specified Electrical Appliance and Material (DC power supply units), Conforms to Technical Standards
Material, coating, and surface processing	Material: Aluminum and resin, Surface processing: Blue alumite
Weight	700 g max.
Accessories	Instruction Guide, 2-m-long 3-prong AC power cord with ground terminal

13 Dimensions (mm)



Installing the Control Unit with Base Brackets (Optional Accessories)



Do not use the product in the following situations.

- Under conditions or in an environment not described in this instruction guide.
- In nuclear energy control systems, railroad systems, aviation systems, vehicles, combustion equipment, medical equipment, amusement machines, or safety equipment.
- In applications involving serious risk to life or property, particularly applications demanding a high level of safety.

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