LED Lighting Controller Advanced

OPPF Series

Increased-capacity controller with built-in sensing function

- Increased capacity with up to 48 W in PWM mode and up to 24 W in strobe mode
- “FALUX sensing” for monitoring brightness and temperature monitoring and for controlling feedback
- Support for RS232, parallel, and 0 to 5 V analog input for external light inttensity control

Specifications

Type	Model	Type	Weight [g]	Illumination Output	Capacity
Standard type	**OPPF-48MN**	**Master device NPN output**	385	2ch	<PWM mode> Max. 30 W per channel Max. 48 W for 2 channels (total) **See table 1** <Strobe mode> Max. 24 W per channel Max. 48 W for 2 channels (total)
	OPPF-48MP	Master device PNP output			
	OPPF-48SN	**Slave device NPN output**	375		
	OPPF-48SP	Slave device PNP output			

Select NPN or PNP output according to the type of the input device used for error and lighting ON/OFF output. The type (NPN/PNP) is common for lighting ON/OFF output and light intensity input.

■ **Table 1**
OPPF-48 <PWM mode>
Max. lighting combination examples

*Max 30 W/ch

Lighting 1		Lighting 2		Total
24 W	+	24 W	→	**48 W**
25 W	+	20 W	→	**45 W**
26 W	+	16 W	→	**42 W**
27 W	+	12 W	→	**39 W**
28 W	+	8 W	→	**36 W**
29 W	+	4 W	→	**33 W**
30 W	+	0 W	→	**30 W**

Options

Connection cable

Type	Model	Specifications	Length [m]
External ON/OFF control	**EXCB2-M14-3**	**MIL 14 → Loose wires**	3
	EXCB2-M14-5		5
External intensity control	**EXCB2-M26-3**	**MIL 26 → Loose wires**	3
	EXCB2-M26-5		5
RS232 communication	**OP-ECBF232-2**	**MIL 26 → 9-pin D-sub for PC**	2
	OP-ECBF232ME-2	**MIL 26 → 9-pin D-sub for MELSEC**	

Features

■ Support for both PWM light intesity control and strobe illumination

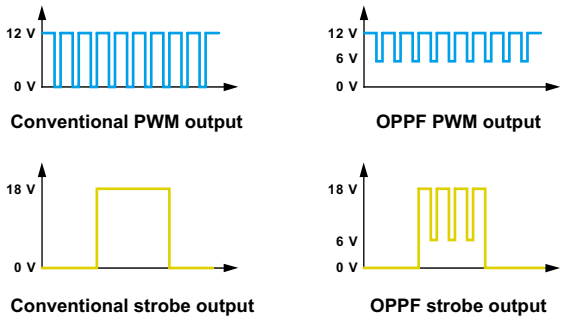
PWM mode

High-brightness settings with 1,000 intensity steps are possible with a PWM frequency of 100 kHz.
Lighting with up to 48 W total for 2 LAMP outputs can be connected. (Max. 30 W per channel)

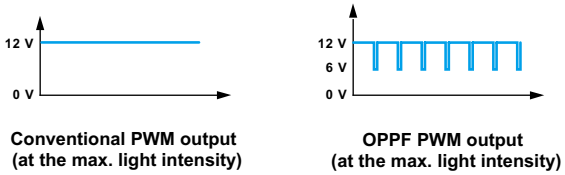
Strobe mode

High-brightness settings with 1,000 intesnity steps are possible.
In addition, 1,000 steps with light emission widths from 10 µs to 9.99 ms at 10 µs intervals can be set.
The minimum settable light emission width is 1 µs (light emission width: 10 µs, intesity setting: 10%).
Light emission widths of 1 ms or less offer 3 times the brightness with 18 V overdrive output.
Lighting with up to 24 W for each LAMP output can be connected.

- Approx. 6 V will be applied to drive the internal circuit of the lighting while it is not lit. The LEDs will not illuminate in this case.



- The illumination state is not the same as that of with DC current even at 100% intensity illumination because the communication signals are superimposed.



- Other settings
  - Automatic strobe flash cycle
  - ON/OFF control input polarity
  - Lighting delay time
  - PWM frequency switching
  - ON/OFF control input filter time (noise reduction)

Connect lighting equipped with “FALUX sensing” to monitor brightness and temperature and to control feedback

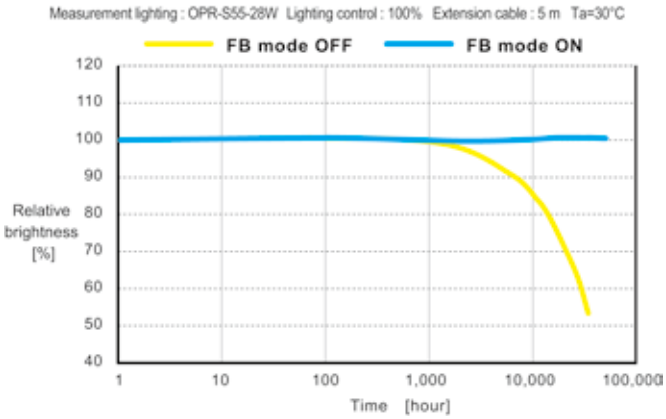
Monitoring function

- Accurately measure brightness not only during continuous illumination but also with ON/OFF control and strobe illumination.
- This makes it possible to output an alarm when brightness decreases to a predetermined value.
- Absolute brightness monitoring makes it possible to adjust for lighting instrumental errors.
- In addition to brightness, measurement of internal temperatures is also possible.

Feedback (FB) control

- FB control eliminates not only variations over long periods but also the need to perform periodic adjustments to the light intensity setting. By comparing the measured emission brightness with the lighting’s recorded reference brightness, FB control fine tunes the output voltage to match the standard brightness.
- FB control also allows for compensation of reductions in brightness due to a voltage drop in the extension cable.
- A signal is output as a feedback error when the upper or lower output voltage adjustment limit is reached.

Comparison of relative brightness with and without feedback control (estimated values)



- Output voltage
  PWM mode: 11 to 18 VDC
  Strobe mode: 16 to 22 VDC
- FB accuracy: ±1.5% or less (typ.)

The OPPF Series not only provides power for lighting from two conventional main line cables but also superimposes signals for communication with lighting. This allows for conventional use even with lighting that is not equipped with “FALUX sensing”.

Features

■ External light intensity control

Using RS232 communication and external parallel input, centralized intesnity control of all lamps is possible from the master device. Intensity control is possible by 0 to 5 V analog input to the individual lamps of each unit.

■ Multi-channel support

- With 2 channels per unit, support for up to 8 channels is possible by linking (DIN mounting) 3 master and slave devices.
- Communication between units is connector-less and uses infrared.
- A setting copy function allows settings to be batch copied to all channels.
- Connecting a single slave device or just a slave device is possible.

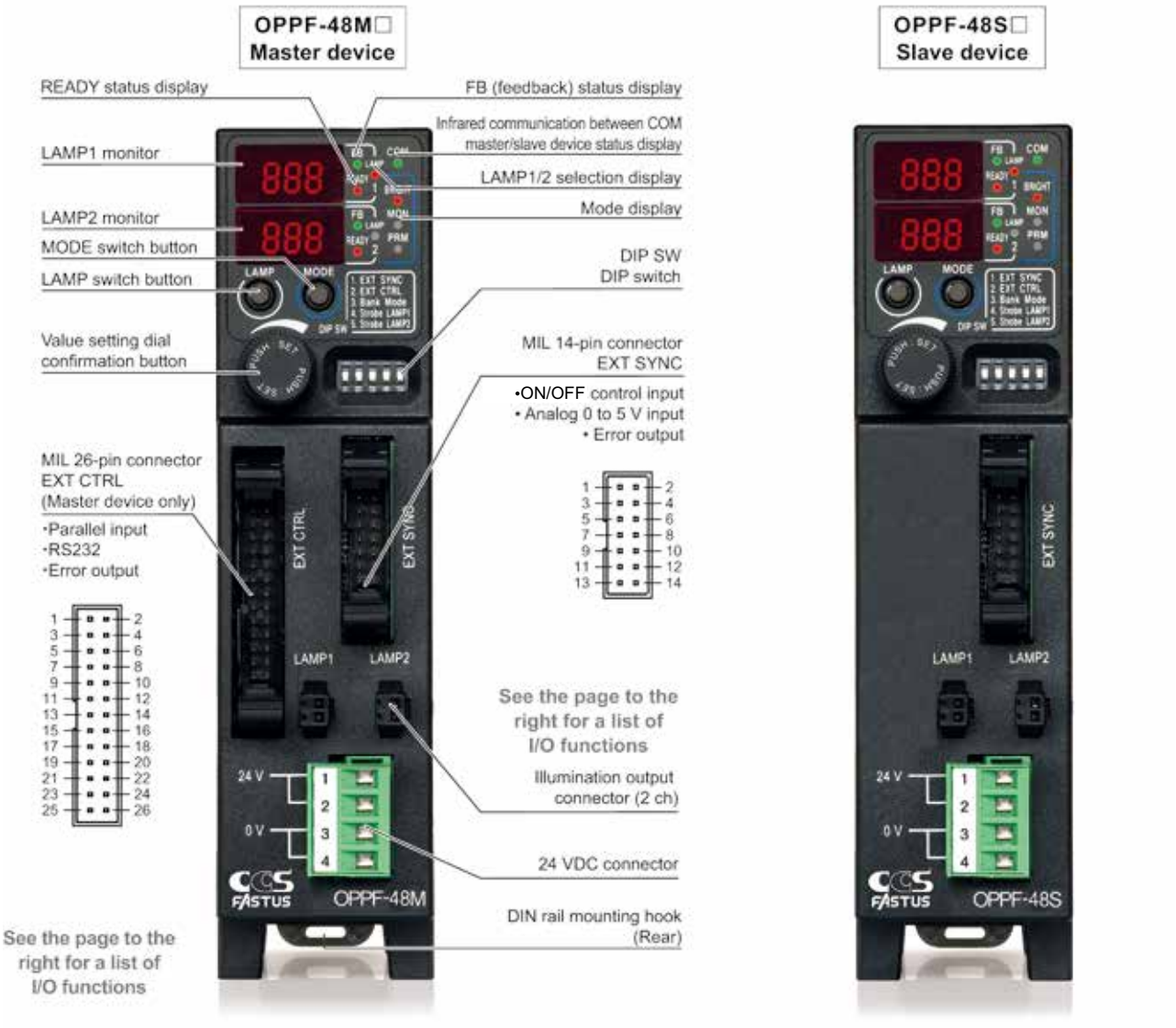
■ Bank registration of light intensity values

- Pre-set intensity values can be configured and saved in the main unit, allowing for switching between intesnity values with fewer inputs.
- Up to 16 banks can be registered for each LAMP.
- In addition to settings from the operation panel, switching is also possible through external parallel input and RS232 communication.

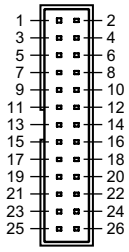
■ Surprisingly low price for provided functionality

- Progressively expanding functionality to meet the diverse needs of customers.
- Even with these functions, prices are kept lower than general-purpose controllers.
- Lowest price range available for strobe-equipped devices.

Part Names

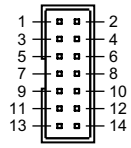


I/O Function List



Master device MIL 26-pin connector — EXT CTRL

Pin No.	Name	Input/output	Signal name	Description
1	D0	Input	Intensity bit 0 / Bank selection 0 (LSB)	For external light intensity control (DSW2-ON) not in bank mode (DSW3-OFF), these terminals correspond to lower bits 0 to 3 for setting the light intensity value through external parallel input. For external light intensity control (DSW2-ON) in bank mode (DSW3-ON), these terminals are used to specify the bank number.
2	D1	Input	Intensity bit 1 / Bank selection 1	
3	D2	Input	Intensity bit 2 / Bank selection 2	
4	D3	Input	Intensity bit 3 / Bank selection 3	
5	D4	Input	Intensity bit 4	Correspond to upper bits 4 to 9 when switching the light intensity value through external parallel input. Values are specified in binary. Available for light intensity control (DSW2-ON) not in bank mode (DSW3-OFF).
6	D5	Input	Intensity bit 5	
7	D6	Input	Intensity bit 6	
8	D7	Input	Intensity bit 7	
9	D8	Input	Intensity bit 8	
10	D9	Input	Intensity bit 9	
11	L0	Input	LAMP select 0	Specifies the station number of the target lamp with external intensity control or when switching banks. With a master device, LAMP1 is selected when L2, L1, and L0 = OFF, and LAMP2 is selected when L2 and L1 = OFF while L0 = ON.
12	L1	Input	LAMP select 1	
13	L2	Input	LAMP select 2	
14	WR	Input	Light intensity writing	Turning ON this input allows light intensity values to be written. If bank numbers are specified, this function is not necessary.
15	COMINA	-	Input COM	This is the common terminal for input. The corresponding input can be turned ON by applying 5 to 24 V between each input and this common terminal. (No polarity)
16	COMOUTA	-	Output COM	This is the common terminal for output. When output is ON, the current flows from the output terminal to this common terminal. (Opposite direction for PNP types)
17	ERR	Output	Error output (FB, overcurrent)	This output turns ON when a feedback error or monitor brightness alarm occurs, when the internal temperature is abnormal, or when the overcurrent protection circuit of the lighting is operating. Error output also turns on if an error is output for any connected slave device. (A delay of up to 250 ms will occur before a slave device error status is reflected.)
18 to 23	-	-	-	-
24	TXD	Output	Serial TXD	This is the transmission output for RS232.
25	RXD	Input	Serial RXD	This is the reception input for RS232.
26	SG	-	Serial GND	This is the common terminal for RS232.



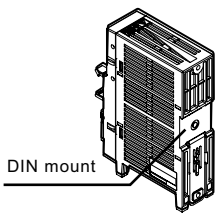
Master/slave device MIL 14-pin connector — EXT SYNC

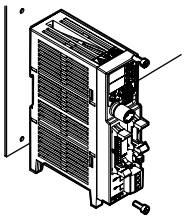
Pin No.	Name	Input/output	Signal name	Description
1	SYNC1	Input	LAMP1 ON/OFF control input	With external ON/OFF control (DWS1=ON), the polarity can be switched from tPL in the PRM settings while this input is ON. LAMP1 becomes illuminated. In strobe mode (DSW4=ON), LAMP1 illuminates on the leading edge of this input.
2	SYNC2	Input	LAMP2 ON/OFF control input	With external ON/OFF control (DWS1=ON), the polarity can be switched from tPL in the PRM settings while this input is ON. LAMP2 becomes illuminated. In strobe mode (DSW5=ON), LAMP2 illuminates on the leading edge of this input.
3	COMINB	-	Input COM	This is the common terminal for input. The corresponding input can be turned ON by applying 5 to 24 V between this common terminal and either ON/OFF control input or analog intensity control switching input. (Nopolarity)
4	COMOUTB	-	Output COM	This is the common terminal for output. When each output is ON, the current flows from the output terminal to this common terminal. (Opposite direction for PNP types)
5	OVC	Output	Overcurrent error	Overcurrent error output turns ON if an overcurrent occurs for either LAMP1 or LAMP2 lighting.
6	FBERR1	Output	LAMP1 feedback error	This output turns ON when a LAMP1 feedback error or monitor brightness alarm occurs.
7	LON1	Output	LAMP1 ON output	This output turns ON while LAMP1 is outputting.
8	FBERR2	Output	LAMP2 feedback error	This output turns ON when a LAMP2 feedback error or monitor brightness alarm occurs.
9	LON2	Output	LAMP2 ON output	This output turns ON while LAMP2 is outputting.
10	ANALOG	Input	Analog intensity control switching input	Turning ON this input allows light intensity control to be performed using analog input AIN1 and AIN2 voltage. Only turning ON/OFF for both LAMP1 and LAMP2 is allowed. Applying 5 to 24 V between this terminal and COMINB will turn ON analog intensity control. Also, the ASL item in the PRM settings can specify force analog intensity control to be enabled.
11	AIN1	Input	LAMP1 analog input	This is the analog input for LAMP1. At 0 to 5 V, the corresponding light intensity value will be between 0 and 999.
12	5 V	Output	Auxiliary 5 V output	This is the 5 V output that can be used for analog input.
13	AIN2	Input	LAMP2 analog input	This is the analog input for LAMP2. At 0 to 5 V, the corresponding light intensity value will be between 0 and 999.
14	ACOM	-	Analog common	This is the common terminal for analog input.

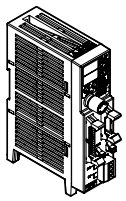
Installation

■ Installation examples

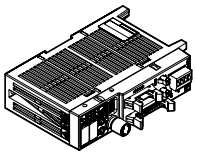
Rear DIN mounting or screw mounting is possible.



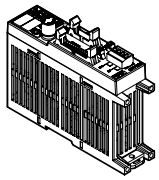




Good



No-good



No-good

Always use upright to allow for heat dissipation. Do not use in any position other than the upright.

■ Cable connectivity

Master/slave device: 24 VDC input (power source)
Applicable wiring: 0.2 to 2.1 mm^2, 24 to 14 AWG
Insulation strip length: 7 mm
Upper 2-pole: 24 VDC, Lower 2-pole: 0 V

Note: Use open terminals to pass power between units with 1 pole per wire.

Master device: MIL 26-pin connector (EXT CTRL)
Master/slave device: MIL 14-pin connector (EXT SYNC)

[Optional cables]
MIL socket connector harness (type with one side trimmed)
28 AWG twisted-pair double-shielded cable

For master device, MIL 26-pin : OP-ECBF26-3 (3 m)
OP-ECBF26-5 (5 m)

For master/slave device, MIL 14-pin : OP-ECBF14-3 (3 m)
OP-ECBF14-5 (5 m)

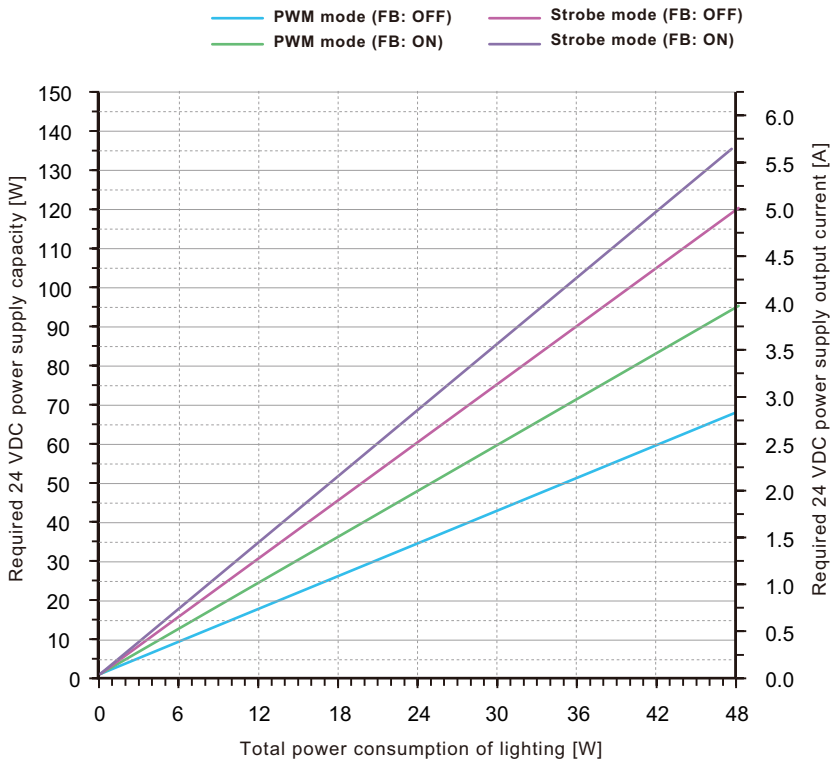
Note: Please use shielded cables in environments susceptible to noise.

■ Required 24 VDC power supply capacity to handle power consumption of lighting

Based on the total power consumption of the LED lighting to be connected, select a 24 VDC power source that offers more than the required capacity.

Note: When using in conjunction with other equipment, the characteristics of the other equipment will affect the power supply, so be sure to choose a power supply that has a sufficient margin (about twice as much) as that shown in the graph.

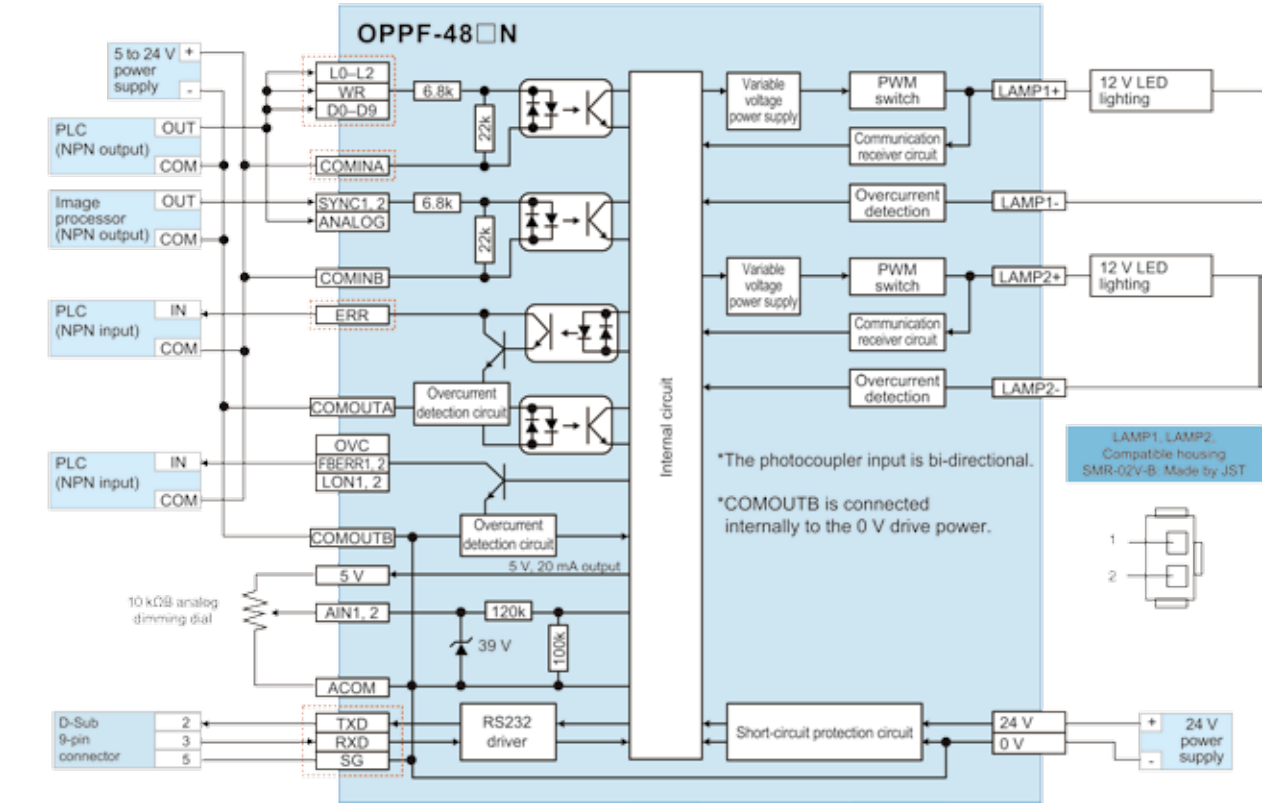
*Evaluation power source: IDEC PS5R-SF24 (120 W), PS5R-SG24 (240 W)



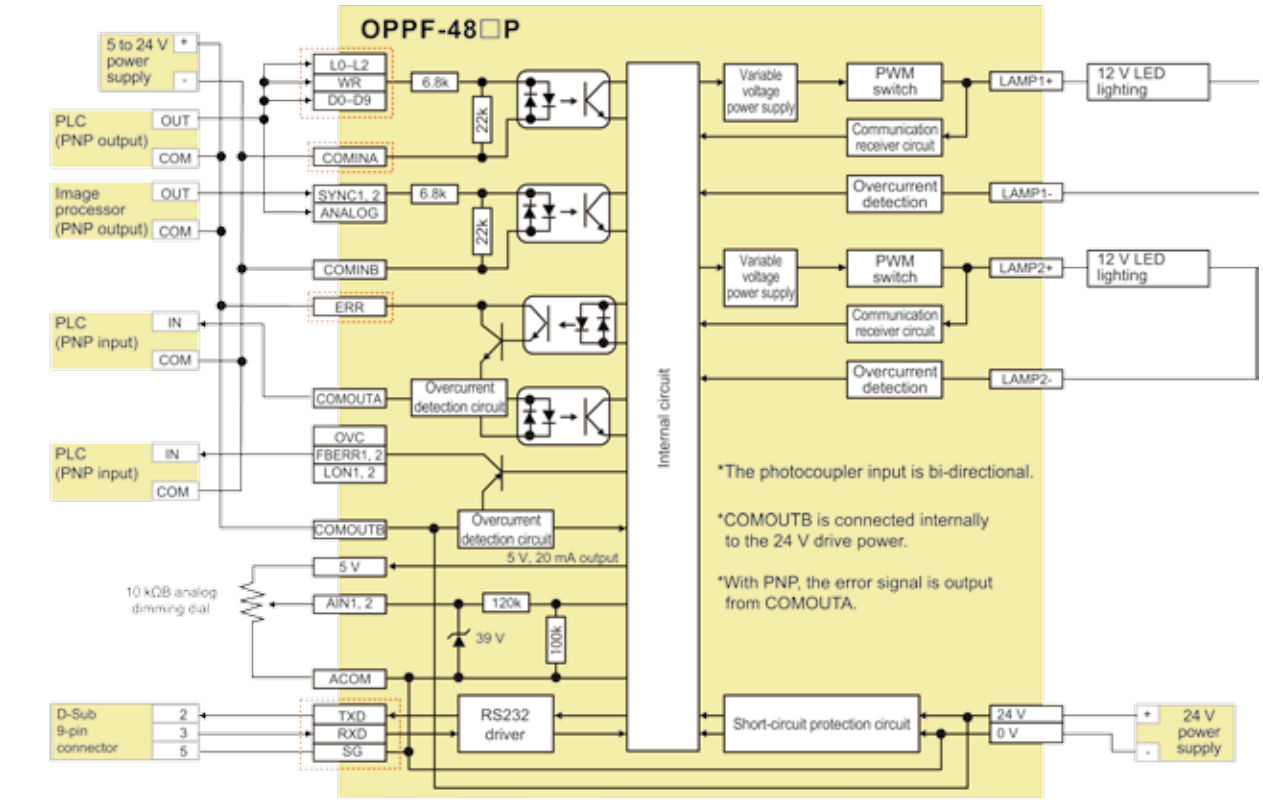
Connection to External Device

■ Standard type

NPN type



PNP type



Specifications

Model	OPPF-48MN	OPPF-48MP	OPPF-48SN	OPPF-48SP
Type	Master device NPN output	Master device PNP output	Slave device NPN output	Slave device PNP output
Power supply voltage	24 VDC ±10%			
Current consumption	PWM mode — Feedback OFF: Max. 2.9 A, Feedback ON: Max. 4.0 A Strobe mode — Feedback OFF: Max. 5.0 A, Feedback ON: Max. 5.7 A			
Illumination output	2 channels			
Connectable lighting	PWM mode: Max. 48 W (2 ch total) *Max 30 W/ch, Strobe mode: Max. 24 W (per channel)			
Illumination output voltage	PWM mode: 12 VDC (standard), Strobe mode: 18 VDC (standard)			
Illumination output current	PWM mode: Max. 4.0 A (2 ch total), Strobe mode: 8.0 A (per channel)			
Light intensity control	PWM light intensity control, Frequency: 20/50/100/99/98/97 kHz 1,000 steps *Common for PWM mode and strobe mode			
Strobe	Luminescence width: 10 µs to 9.99 ms (10 µs steps) or 1 ms to 999 ms (1 ms steps) *12 VDC driving when exceeding 1 ms Strobe cycle limit at 18 VDC: 10% Duty (10 times or more the pulse width cycle required)			
Monitoring	Lighting brightness monitor / Lighting internal temperature monitor, Monitor brightness alarm lower limit value setting, Update cycle per communication between lighting and controller: 21 ms for received light amount, 105 ms for temperature			
Feedback	Voltage variable method — PWM mode: 11 to 18 VDC Strobe mode: 16 to 22 VDC, Accuracy: ±1.5% or less (typ.) *This specification is for reference only and is not a guarantee of the performance of this product.			
Input	External ON/OFF control × 2, Analog intensity control select × 1, Parallel intensity control input × 10 (bank select × 4 shared), Parallel intensity control writing input × 1, Channel select input × 3		External ON/OFF control × 2, Analog intensity control select × 1	
	ON voltage: 5 V or more, OFF voltage: 1.2 V or less, Max. input voltage: 30 V ON/OFF control input response time (actual value) With 24 V input (OFF→ON: 5 µs, ON→OFF: 60 µs), With 5 V input (OFF→ON: 44 µs, ON→OFF: 41 µs) Input resistance: 6.8 kΩ, insulated; Other input response time: 1.1 to 14.8 ms			
Analog input	0 to 5 V, Input resistance: 220 kΩ, Non-insulated			
Output	Lighting overcurrent error output × 1, Feedback warning output × 2, Lighting ON/OFF output × 2 Open collector, Max. 100 mA / 30 VDC, Residual voltage 1.0 V max.			
	Lighting overcurrent / internal temperature abnormal / feedback error output × 1 Open collector, Max. 100 mA / 30 VDC, Residual voltage 1.5 V max.		—	
Communication interface	RS232: 1 ch, Baud rate: 4,800/9,600/19,200/38,400/57,600/115,200		—	
Master–slave communication	Infrared communication method — RS232 from master device to slave device, External input control (light intensity control, bank selection), Transmission from slave device to master device (error information, RS232 reading), Setting copy function Communication cycle: Approx. 15 ms (equivalent response time for controlling slave device with RS232, external input)			
Lighting output protection circuit	Overcurrent			
Signal output protection circuit	Overcurrent			
Other protective functions	Controller internal temperature monitoring (PWM output cut to 1/4 at 105°C) Lighting internal temperature monitoring, Lighting brightness lower limit alarm			
Ambient temperature/ humidity	0 to 45°C / 35 to 85% RH (no condensation)			
Storage temperature/ humidity	-20 to 70°C / 35 to 95% RH (no condensation)			
Vibration resistance	10 to 55 Hz; amplitude 1.5 mm; 2 hours in each of the X, Y, and Z directions			
Shock resistance	Approximately 10 G, 3 times in each of the X, Y, and Z directions			
Insulation resistance	500 VDC, 10 MΩ or more			
Material	Polycarbonate			
Weight	385 g		375 g	
Protection rating	IP20 (IEC 60529: 1989 / A1: 1999 + A2: 2013)			
Regulations	Conforms to EMC (2014/30/EU) / RoHS (2011/65/EU, MIIT Order No.32)			
Standards	Conforms to EN 61000-6-2: 2005 / AC: 2005, EN 55011: 2009 / A1: 2010 (EN 55011 testing was performed with the lighting cable passed through shielded tubing grounded to FG.)			
Accessories	Simple Operation Guide, Instruction manual CD-ROM			

Dimensions

(unit: mm)

Main unit

Master device: OPPF-48MN / OPPF-48MP Slave device: OPPF-48SN / OPPF-48SP