

Lighting Monitoring and Illumination Check Sensor

MDF Series

Patent registered

The industry's first solution for light-brightness management by numerical values

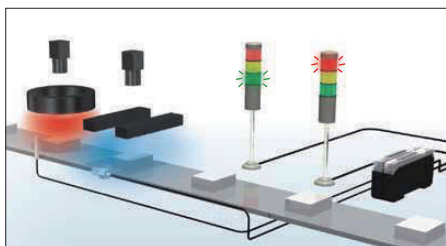
- Automatic measurement of continuous lighting and ON/OFF lighting control using an internal trigger
- Clear maintenance timing of lighting
- Reduced wiring with the possibility to link up to 8 devices (inter-connection types)



Applications

- Manage brightness of image inspection lighting using numerical values
- Verify infrared lighting impossible to confirm visually
- Measure brightness variations of LED lighting
- Verify halogen lighting linearity
- Measure fluctuations in brightness caused by ambient temperatures of fluorescent lamps

Brightness monitoring of camera lighting



The fiber unit receives the lighting output in order to monitor the amount of illumination. The measurements are displayed digitally, and a signal is output when exceeding the set range (upper/lower limits).

LED illumination verification (high gain type)



Verification of LED illumination on a phone

Specifications

Amplifier unit

Type	Shape	Output	Model	Outline Drawing
Normal	Stand-alone	NPN	MDF-TN	①
	Inter-connection master		MDF-TMN	②
	Inter-connection slave		MDF-TSN	
High-gain	Stand-alone	NPN	MDF-HTN	①

Fiber unit

Type	Shape	Bending radius	Model	Weight [g]
M4 screw		R = 2 mm	NF-MT77	20
ø3 cylinder			NF-MT05	

Options

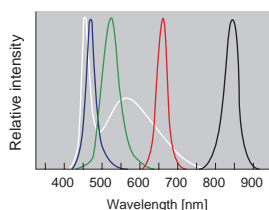
Model	Application	Model	Weight [g]
NF-MTA02	Side-view lens For M4 screw (NF-MT77)		5
BEF-EB01-W190	Expansion endplates (2)		10

Features

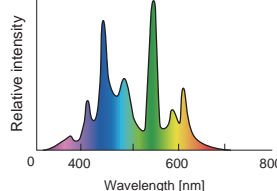
■ Adaptive light source

- Compatible with white, blue, green, red, and infrared LED light sources (Receivable wavelength range: 400 to 1000 nm)
- Effective for infrared light detection incapable of confirmation through visual inspection
- Also compatible with fluorescent lamps and halogen lighting

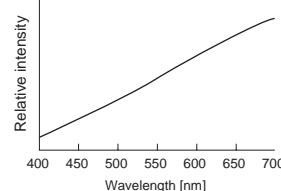
LED spectrum distribution



Fluorescent lamp emission spectrum distribution



Halogen emission spectrum distribution



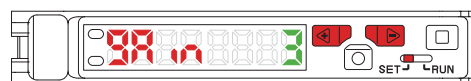
■ Compatible with various light emission modes

Patent registered

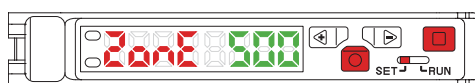
Automatic measurement of continuous lighting, pulse lighting (PWM), and ON/OFF lighting control through the built-in trigger Acceptability determination for sudden non-lighting with synchronous input from an external input line

■ Settings configurable to match lighting brightness

Manual gain (5-level switching)

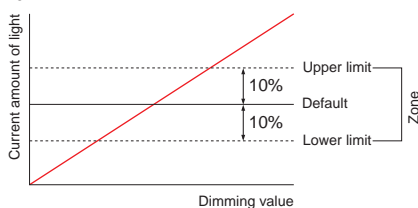


■ 3 teaching modes



① Zone teaching

Automatic measurement of the internal upper and lower limit settings (default: 10%) is done through teaching of the currently received light amount.

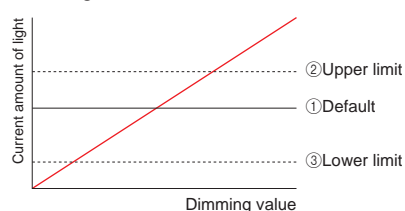


② Lower limit teaching

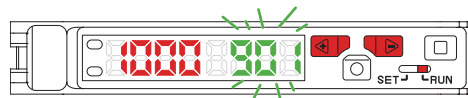
The lighting amount is dimmed to the default value and then the lower limit, and each value is used as the individual setting for teaching.

③ Upper/lower limit teaching

The lighting amount is dimmed to the default value, the upper limit, and then the lower limit, and each value is used as the individual setting for teaching.



■ Manual configuration of upper/lower limits



Fine-tune upper and lower limit values even after teaching

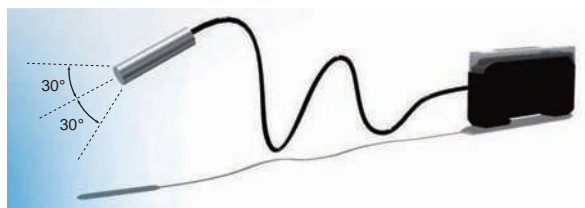
■ External teaching input

Teach externally using a signal to the external input

Re-teach from the operation panel using embedded devices (Synchronous mode: only with Auto/OFF)

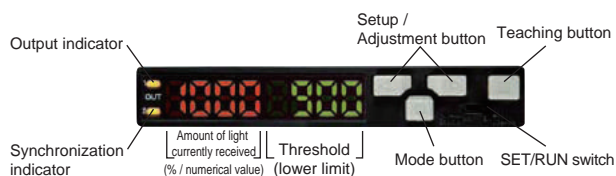
■ Flexible fiber

No changes to measured values even when the fiber is bent
Bending radius: 2 mm, Receiving angle: $\pm 30^\circ$



Ring	OPR
	OPR-SF
Bar	OPB
	OPB-S
Backlight	OPF
Coaxial	OPX
Spot	OPS-S
Controllers / Power Supplies	OPPD
	OPPF
	OPPCW
Options	OP
	MDF

■ Manage lighting brightness using numerical values



Display examples

Percentage display



Displays percentage of current received light amount compared to the received light amount during teaching, which is defined as 100%. (0.0 to 999.9%)

Numerical value display



Displays the normal digital values. (0000 to 1000)

Display OFF



The display turns off.

■ Equipped with timer function

Configurable from 1 to 9999 ms at 1 ms intervals

The time setting for the timer is configurable. Choose from 3 modes: Off delay, On delay, or One-shot.

Display examples

Timer function OFF



ON delay



One-shot output



OFF delay



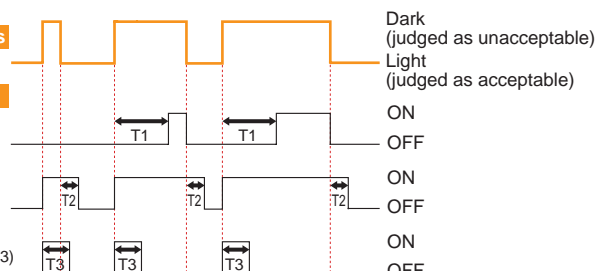
Detection status

Output status

ON delay (T1)

OFF delay (T2)

One-shot output (T3)



(*Operation mode: Dark ON)

Link up to 8 devices

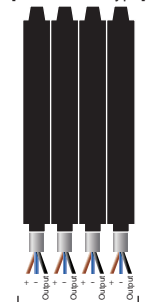
■ Up to 8 units for less wiring

Reduced wiring

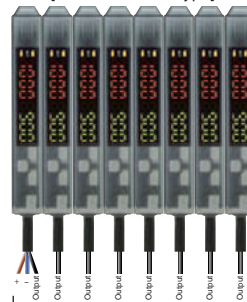
Up to 8 units of inter-connection type can be connected.

Wiring for slave units only requires an output line, so wiring work can be reduced to 1/2 or more.

[Stand-alone type]



[Inter-connection type]

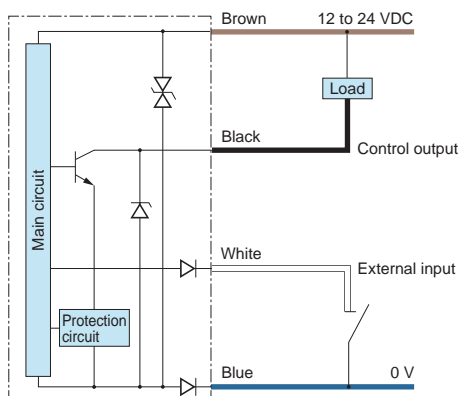


*When using control output only

Specifications

Type	Normal			High-gain
	Stand-alone	Master unit	Slave unit	Stand-alone
Model	MDF-TN	MDF-TMN	MDF-TSN	MDF-HTN
Measurement range (with white light source)	300 to 50,000 lx (reference values)			10 to 1,500 lx (reference values)
Power supply voltage	12 to 24 VDC (±10%; including ripple)			
Current consumption	45 mA or less / 24 V			
Response time	38.4 ms (min) *The shortest integration time is used with pulse illumination.			
Input settings	External input setting (monitoring synchronous input, external teaching input)			
Indicator/digital display	Output indicator: orange / 7-segment, 8-digit display			
Control output	1 NPN open collector output			
	100 mA / 30 V or less, Load current: 100 mA or less, Residual voltage: 1.8 V or less			
Output method	Light on / dark on (switchable)			
Short-circuit protection	Equipped			
Gain settings	Manual configuration			
Timer function	OFF, On delay timer, Off delay timer, One-shot timer			
Timer time	1 to 9999 ms			
Ambient temperature/humidity	-25 to 55°C, 35 to 85% RH (no freezing or condensation)			
Storage temperature/humidity	-40 to 70°C, 35 to 85% RH (no freezing or condensation)			
Vibration resistance	10 to 55 Hz; amplitude 1.5 mm; 2 hours in each of the X, Y, and Z directions			
Protection rating	IP50 (IEC 60529: 1989 / A1: 1999 + A2: 2013)			
Applicable regulations	EMC (2014/30/EU) / RoHS (2011/65/EU, MIIT Order No.32)			
Applicable standards	EN 61000-6-2: 2005 / AC: 2005, EN 61000-6-4: 2007 / A1: 2011			
Material	Case: PPE, Cover: PC			
Weight	Approximately 65 g			

I/O Circuit Diagram



Connecting

■ When not used for external input, cut the lead wire and wrap it individually with insulating tape, and do not connect it to any other terminal.

Important points

■ When using a switching regulator for the power supply, be sure to ground the frame ground terminal.

■ Because wiring sensor wires with high-voltage wires or power supply wires can result in malfunctions due to noise, which can cause damage, make sure to wire separately.

■ Avoid using the transient state while the power is on (approx. 100 ms).

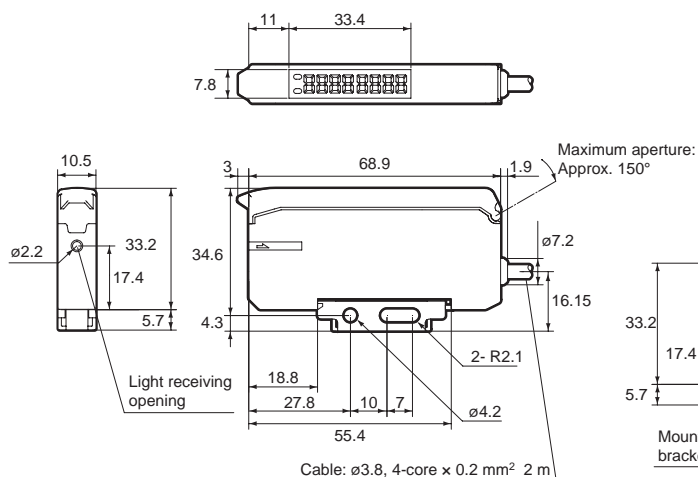
*MDF-TSN inter-connection type slave unit does not have power supply wires (brown/blue) because power is supplied from the master unit.

Dimensions

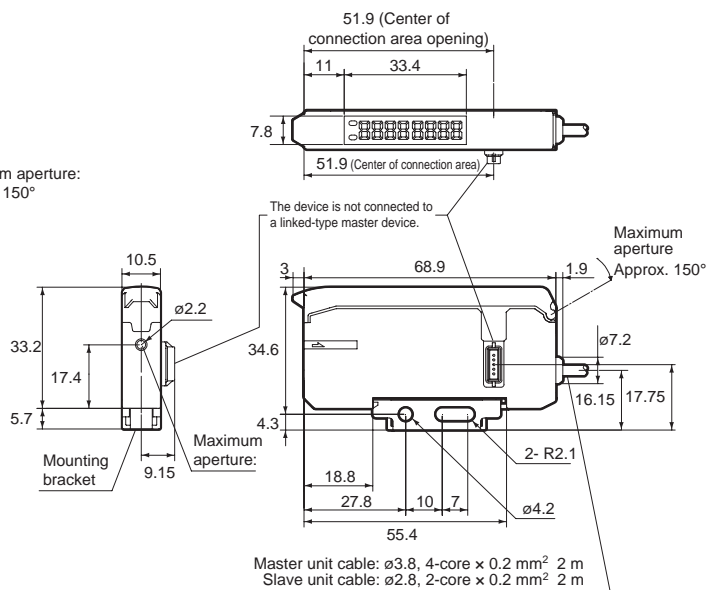
(unit: mm)

Amplifier unit

① Stand-alone MDF-TN / MDF-HTN

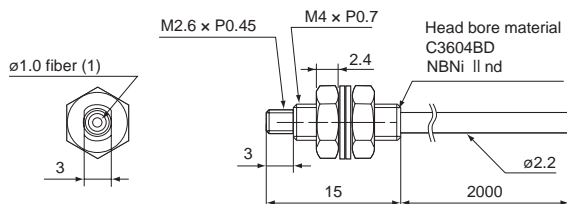


② Inter-connection type MDF-TMN / MDF-TSN

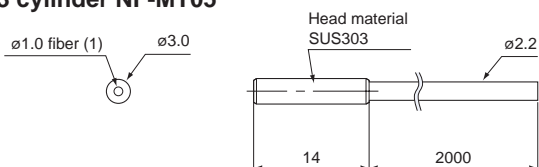


Fiber unit

M4 screw NF-MT77

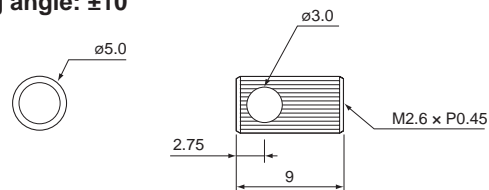


ø3 cylinder NF-MT05



NF-MTA02 side-view lens

Receiving angle: ±10°

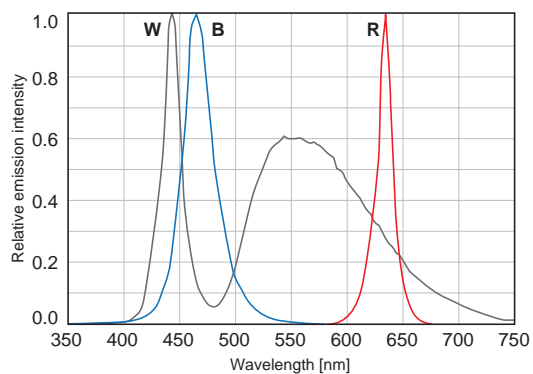


Technical Guide

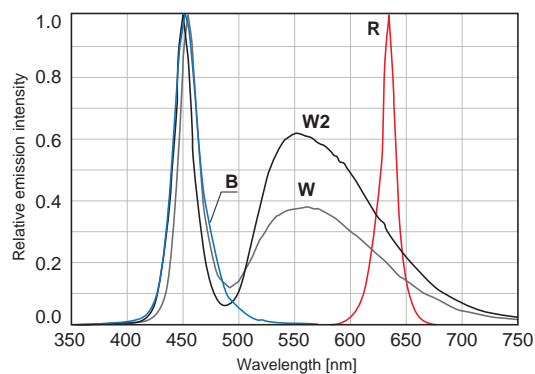
Emission spectrum diagram

The lamp emission spectrum distributions for each LED lighting series are displayed here. The horizontal axis is the wavelength (nm), and the vertical axis is the relative emission intensity. Data is for reference purposes. Please note that actual products will vary slightly.

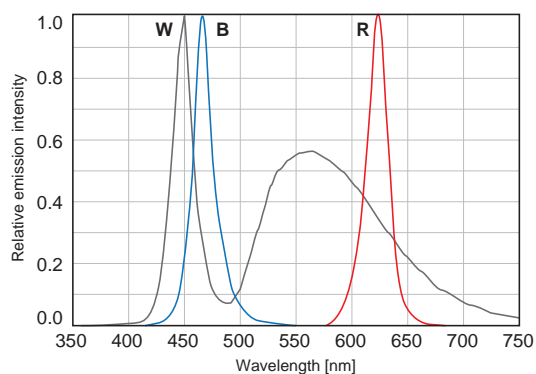
① OPR / OPR-SF



② OPB / OPB-S



③ OPF / OPX



④ OPS-S

