Digital type

D2RF series

Fiber amplifiers featuring dual outputs, dual displays, and dual sensitivity correction functions

- Enables detection for any application
- Water resistant types (IP66) and models with analog outputs are also available
- Adapts to usage environments with its numerous functions

Related products

High-speed digital
D3RF
● P.110

Potentiometer type
BRF
● P.130

Amplifier separate type
DS
● P.280

Selection table

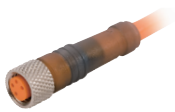
Type	Shape	Input/output	Light source	Degree of protection	Model (Models in parentheses are connector types)	
					NPN type	PNP type
Inter-connection master		Control output: Dual output (CH1 & CH2*)	Red 4 element LED	IP50	**D2RF-TMN** (**D2RF-TMCN4**)	**D2RF-TMP** (**D2RF-TMCP4**)
Inter-connection slave					**D2RF-TSN** (**D2RF-TSCN4**)	**D2RF-TSP** (**D2RF-TSCP4**)
Stand-alone type					**D2RF-TN** (**D2RF-TCN4**)	**D2RF-TP** (**D2RF-TCP4**)
Stand-alone type Equipped with analog output		Control output: Single output Analog output: 4 to 20 mA			**D2RF-TAN**	**D2RF-TAP**
Water resistant stand-alone type		Control output: Dual output (CH1 & CH2*)		IP66	**D2RF-2TN** (**D2RF-2TCN4**)	**D2RF-2TP** (**D2RF-2TCP4**)
Water resistant stand-alone type Equipped with analog output		Control output: Single output Analog output: 4 to 20 mA			**D2RF-2TAN**	**D2RF-2TAP**

*CH2 can be switched to control output (CH2), alarm output, teach input, or counter reset input.
● For the connector type, please purchase an optional JCN series connector cable.

Options/Accessories

Connector cables

Straight

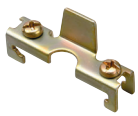


JCN-S
Cable length: 2 m
JCN-5S
Cable length: 5 m
JCN-10S
Cable length: 10 m

L-shaped

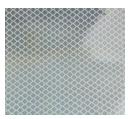
JCN-L
Cable length: 2 m
JCN-5L
Cable length: 5 m
JCN-10L
Cable length: 10 m

End plate



BEF-EB01-W190
(2 pieces)

Reflective sheet



Diamond grade sheet
100 × 100 mm (adhesive type)

Reflector heat resistant to 300°C

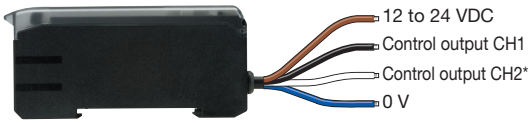
SW50
ø80 × 20 mm (ø50 mm reflective surface)

Dual outputs, displays and sensitivity correction functions

Dual output

Features 2 control outputs as standard. For each output channel, you can set Light ON/Dark ON, timer and threshold independently. Also, a dual output type with a control output and analog output (4 to 20 mA) is available. (Analog output type is stand-alone type only)

Control output ×2CH type

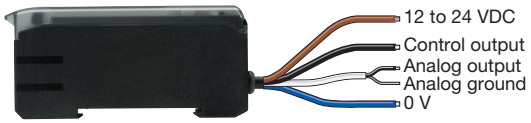


*Control output CH2 can be set to one of the following functions.

If using as an output line
- ○Control output CH2
- ○Alarm output (attenuations in the receiving light quantity are output in advance)

If using as an input line
- ○Teach input
- ○Counter reset input (when using counter function)

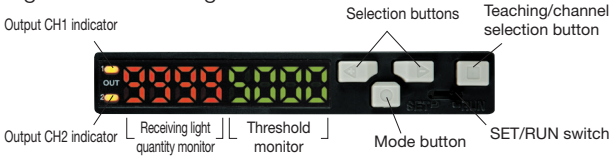
Control output + analog output type



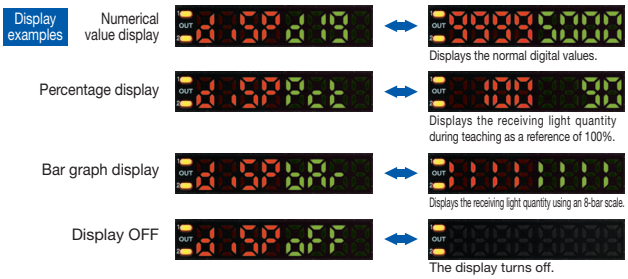
- ○The receiving light quantity indicator of the type equipped with an analog output displays from 0 to 4000.
- ○Although scaling (span adjusting) is possible, inversion and shifting are not supported.

0 to 9999 dual digital display (0 to 4000 when in Fast response time mode and in the case of analog output equipped types)

Current receiving light quantity and threshold are shown using dual displays. Fine sensitivity adjustments can easily be made after teaching. Also, through the adoption of a high brightness LED, numerical values can be confirmed at a glance even in bright worksites.



Display examples

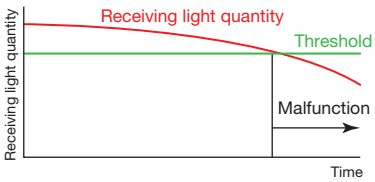


An industry first! Dual sensitivity correction function “ASC” (Automatic sensitivity correction/restoration)

*When using transparent object teaching

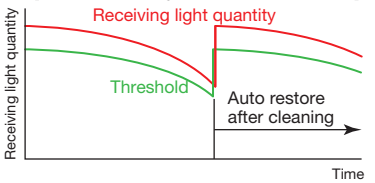
This function works to maintain optimal sensitivity levels over long periods of time by automatically performing sensitivity corrections when light level decreases occur due to contamination of fiber tips caused by dust, etc. Because threshold levels will be automatically restored after cleaning, re-teaching is not necessary. (ASC can be switched ON/OFF)

[Conventional sensitivity fixed type]



Optical system becomes dirty, resulting in decreased threshold values and malfunction. Also, teaching is necessary again after cleaning.

[Dual sensitivity correction function]



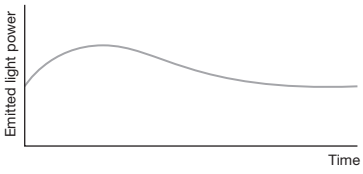
Monitors the receiving light quantity and automatically corrects the threshold value when decreases are confirmed. Also, after cleaning the optical system, threshold values are automatically restored to the optimal value.

Dual support for difficult detection conditions

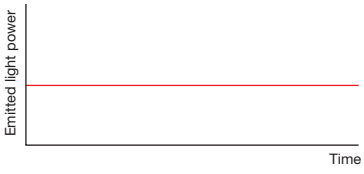
Automatic power control “APC” + 4 element red LED light source

The D2RF employs a newly developed 4 element red LED for the light source. In addition to minimizing the decreases in emitted light that occur over time, the “APC” (Automatic Power Control) automatically corrects changes in light emission levels. This function is effective when a change to the emitted light power occurs, causing instability and difficulty in performing detection. (APC can be switched ON/OFF)

[Conventional]



[APC]



Digital type D2RF series

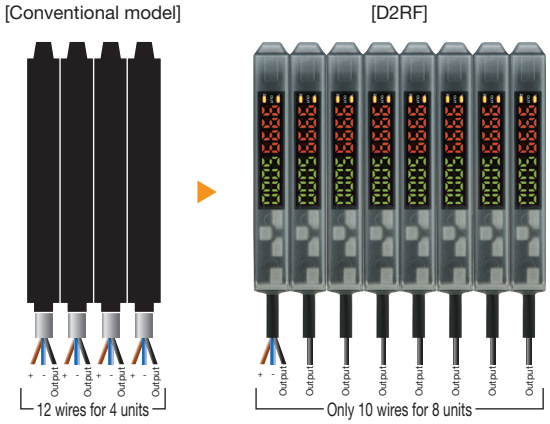
Interconnection

Up to 8 units can be connected

Wiring can be reduced

Up to 8 inter-connection type master and slave units can be linked. (cross talk prevention functionality for up to 4 units) Because only output line wiring is necessary for slave units, necessary man-hours for wiring can be cut in half.

Linking up to 8 units is possible

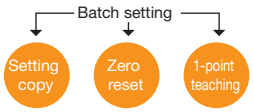


When using only output CH1

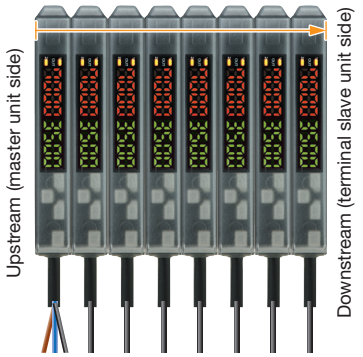
Batch setting for amplifier settings

Batch setting is possible

This function enables simultaneous setting of all linked (expanded) amplifiers. Zero reset and 1-point teaching, as well as copying of amplifier settings from upstream (master unit side) to downstream (terminal slave unit side) can be performed. Because separately sold setting tools are not required, convenience is maximized.



Batch setting from the amplifier in which copying was initiated to downstream slave unit



Settings are not applied to the amplifier in which operation was locked.

Cross talk prevention

Installing fiber cables side by side (only for Long mode and Standard mode)

By linking the master and slave units, light emission timing can be shifted electronically to prevent malfunctions caused by cross talk. (Up to 4 amplifiers)

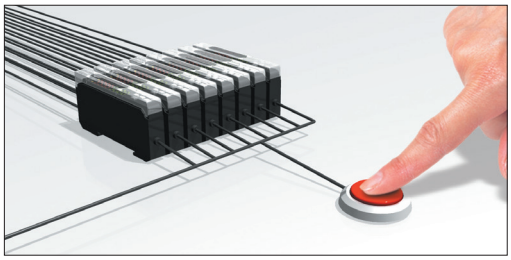
User-friendly

External teaching is available

Teach input

By setting CH2 of the control output as the teach input, adjustments to the optimal sensitivity for multiple sensors can be made simultaneously with one teaching. This is very useful for amplifier units installed in narrow space.

*Analog output equipped types do not have a teach input.
*Teaching mode will be the mode performed in advance on the amplifier main unit (default: 1-point teaching)



Specifications

Type			Inter-connection master	Inter-connection slave	Stand-alone type	Water resistant stand-alone type
Model	NPN	Cable type	**D2RF-TMN**	**D2RF-TSN**	**D2RF-TN**	**D2RF-2TN**
		Connector type	**D2RF-TMCN4**	**D2RF-TSCN4**	**D2RF-TCN4**	**D2RF-2TCN4**
	PNP	Cable type	**D2RF-TMP**	**D2RF-TSP**	**D2RF-TP**	**D2RF-2TP**
		Connector type	**D2RF-TMCP4**	**D2RF-TSCP4**	**D2RF-TCP4**	**D2RF-2TCP4**
Light source			4 element red LED			
Response time			60 µs (Fast mode) / 250 µs (Std mode) / 2 ms (Long mode)			
Distance adjustment			Teaching / manual adjustment			
Indicators			Output indicator (orange LED) × 2 (CH1/CH2)			
Digital display			7-segment, 8-digit display (red: 4-digit, green: 4-digit)			
Control output			2CH output*1 (CH1/CH2) NPN/PNP open collector Max. 100 mA/30 VDC or less Load current: 100 mA or less*2 Residual voltage: 1.8 V or less (CH2 can be set for use as an alarm output)			
Analog output			–			
Input settings			Teach input*3 / counter reset input Selectable by setting (using control output CH2)			
Timer function			OFF delay / ON delay / one-shot / no delay 1 to 9000 ms (adjustment is possible in 1 ms increments)			
Output mode			Light ON / Dark ON selectable by setting			
Connectable units*2			Up to 8 units		–	
Cross talk prevention No. of units (including master unit)		Fast	Unusable		–	
		Std	Up to 4 units		–	
		Long	Up to 4 units		–	
Connection type			Cable type: Cable length: 2 m (master unit: ø3.8 mm, slave unit: ø2.8 mm) Connector type: M8, 4-pin			
Insulation resistance			20 MΩ or more (with 500 VDC)			
Rating	Supply voltage		12 to 24 VDC, including 10% ripple (p-p)			
	Current consumption		45 mA or less / 24 V			
Applicable regulations			EMC directive (2004/108/EC)			
Applicable standards			EN 60947-5-2			
Company standards			Noise resistance: Feilen Level 3 cleared			
Environmental resistance	Ambient temperature/humidity		-25 to +55°C*4 / 35 to 85% RH (no freezing or condensation)			
	Ambient illuminance		Sunlight: 10000 lx or less Incandescent light: 3000 lx or less			
	Vibration resistance		10 to 55 Hz; double amplitude 1.5 mm; 2 hours in each of the X, Y, and Z directions			
	Shock resistance		Approx. 50 G (500 m/s²), 3 times in each of the X, Y, and Z directions			
	Degree of protection		IP50			IP66
Material			Housing: PPE Cover: PC			
Weight			Cable type: Approx. 65 g (including cable) Connector type: Approx. 25 g			
Included accessories			Mounting bracket			

● Specifications are subject to change without prior notice for product improvement purposes.
*1 Threshold adjustment/timer settings and Light ON/Dark ON switching can be set individually for CH1 and CH2.
*2 Total No. of connectable units when used stand-alone or including the master unit: 2 to 3 units. Please use an output current of 50 mA or less when linking a total of 4 to 8 units.
*3 Teaching mode from external input will be the mode performed in advance on the amplifier main unit (default: 1-point teaching).
*4 Total No. of connectable units when including the master unit: 1 to 3 (in the case of inter-connection types) Keep at -25 to +50°C when linking a total of 4 to 8 units.

Digital type D2RF series

Specifications

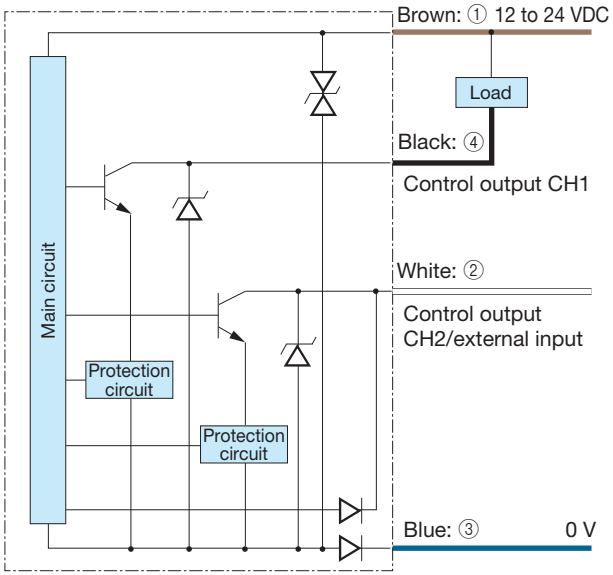
Type			Equipped with stand-alone analog output	Equipped with water resistant stand-alone analog output
Model	Cable type		**D2RF-TAN**	**D2RF-2TAN**
	Connector type		–	–
Light source			4 element red LED	
Response time			60 µs (Fast mode) / 250 µs (Std mode) / 2 ms (Long mode)	
Distance adjustment			Teaching / manual adjustment	
Indicators			Output indicator (orange LED)	
Digital display			7-segment, 8-digit display (red: 4-digit, green: 4-digit)	
Control output			NPN/PNP open collector Max. 100 mA/30 VDC or less Load current: 100 mA or less Residual voltage: 1.8 V or less	
Analog output			4 to 20 mA Load impedance 300 Ω or less	
Input settings			–	
Timer function			OFF delay / ON delay / one-shot / no delay 1 to 9000 ms (adjustment is possible in 1 ms increments)	
Output mode			Light ON / Dark ON selectable by setting	
Connectable units			–	
Cross talk prevention No. of units (including master unit)		Fast	–	
		Std	–	
		Long	–	
Connection type			Cable type: Cable length: 2 m, ø4 mm	
Insulation resistance			20 MΩ or more (with 500 VDC)	
Rating	Supply voltage		12 to 24 VDC, including 10% ripple (p-p)	
	Current consumption		45 mA or less / 24 V	
Applicable regulations			EMC directive (2004/108/EC)	
Applicable standards			EN 60947-5-7	
Company standards			Noise resistance: Feilen Level 3 cleared	
Environmental resistance	Ambient temperature/humidity		-25 to +55°C / 35 to 85% RH (no freezing or condensation)	
	Ambient illuminance		Sunlight: 10000 lx or less Incandescent light: 3000 lx or less	
	Vibration resistance		10 to 55 Hz; double amplitude 1.5 mm; 2 hours in each of the X, Y, and Z directions	
	Shock resistance		Approx. 50 G (500 m/s^2), 3 times in each of the X, Y, and Z directions	
	Degree of protection		IP50	IP66
Material			Housing: PPE Cover: PC	
Weight			Cable type: Approx. 65 g (including cable) Connector type: Approx. 25 g	
Included accessories			Mounting bracket	

● Specifications are subject to change without prior notice for product improvement purposes.

I/O circuit diagram

D2RF-2TN/D2RF-2TCN4, D2RF-TN/D2RF-TCN4, D2RF-TMN/D2RF-TMCN4, D2RF-TSN/D2RF-TSCN4

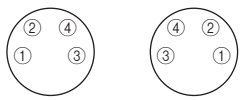
■ NPN output type



*The D2□F-TS□□□ slave unit does not have power supply wires (brown/blue) because power is supplied from the master unit.

■ Connector type

(Pin configuration) Sensor side Connector cable side



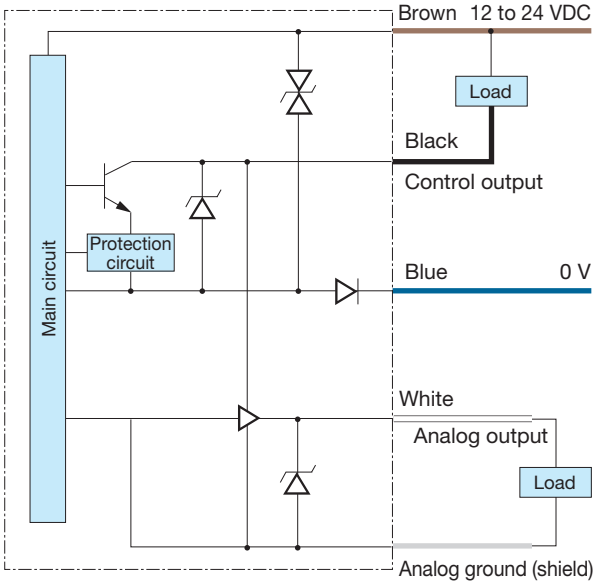
① 12 to 24 VDC
② Control output CH2/ external input
③ 0 V
④ Control output CH1

Connecting

■ When not used for control output CH2 or external input, cut the lead wire and wrap it individually with insulating tape, and do not connect it to any other terminal.
■ ① to ④ correspond to connector pin No.

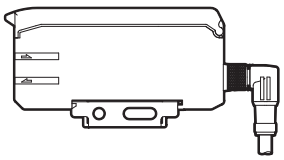
D2RF-TAN, D2RF-2TAN

■ NPN output type



Notes

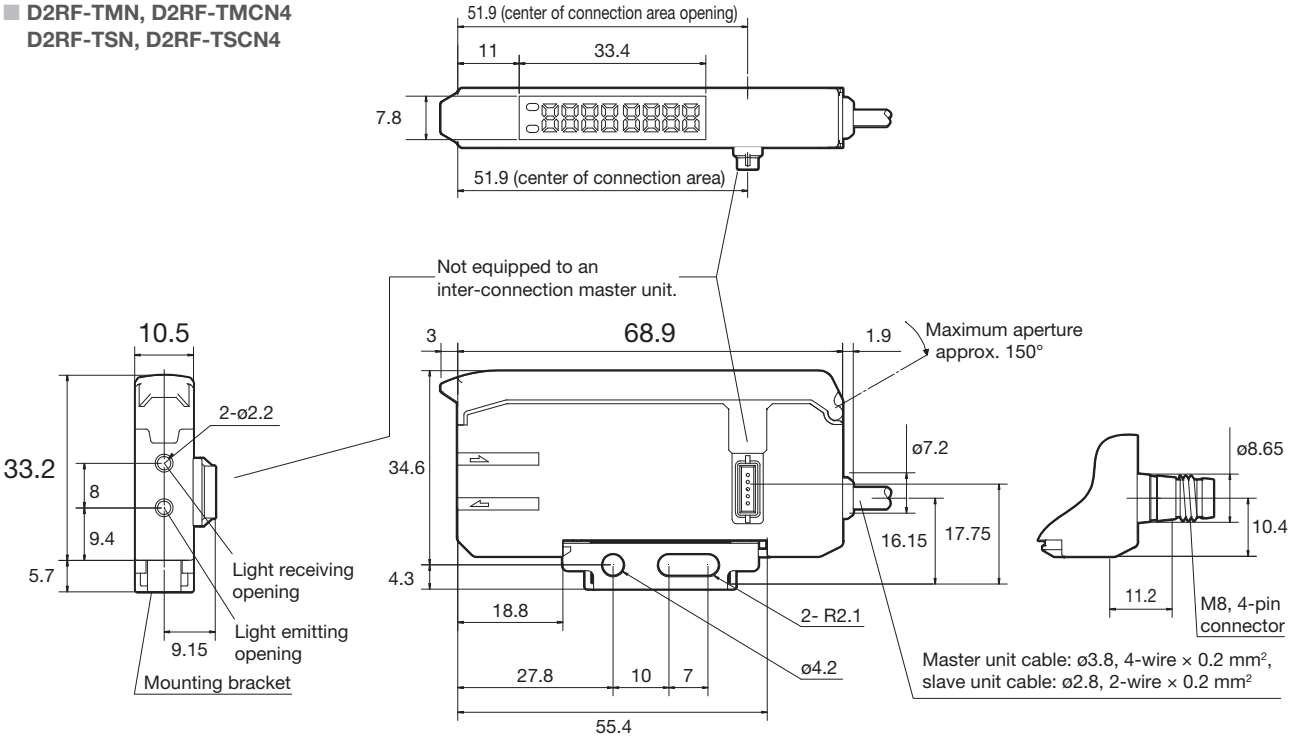
■ When using a switching regulator for the power supply, be sure to ground the frame ground terminal.
■ Because wiring sensor wires with high-voltage wires or power supply wires can result in malfunctions due to noise, which can cause damage, make sure to wire separately.
■ Avoid using the transient state while the power is on (approx. 100 ms).
■ The connector direction is set as in the diagram below when using the L-shaped connector cable. Be aware that rotation is not possible.



Dimensions

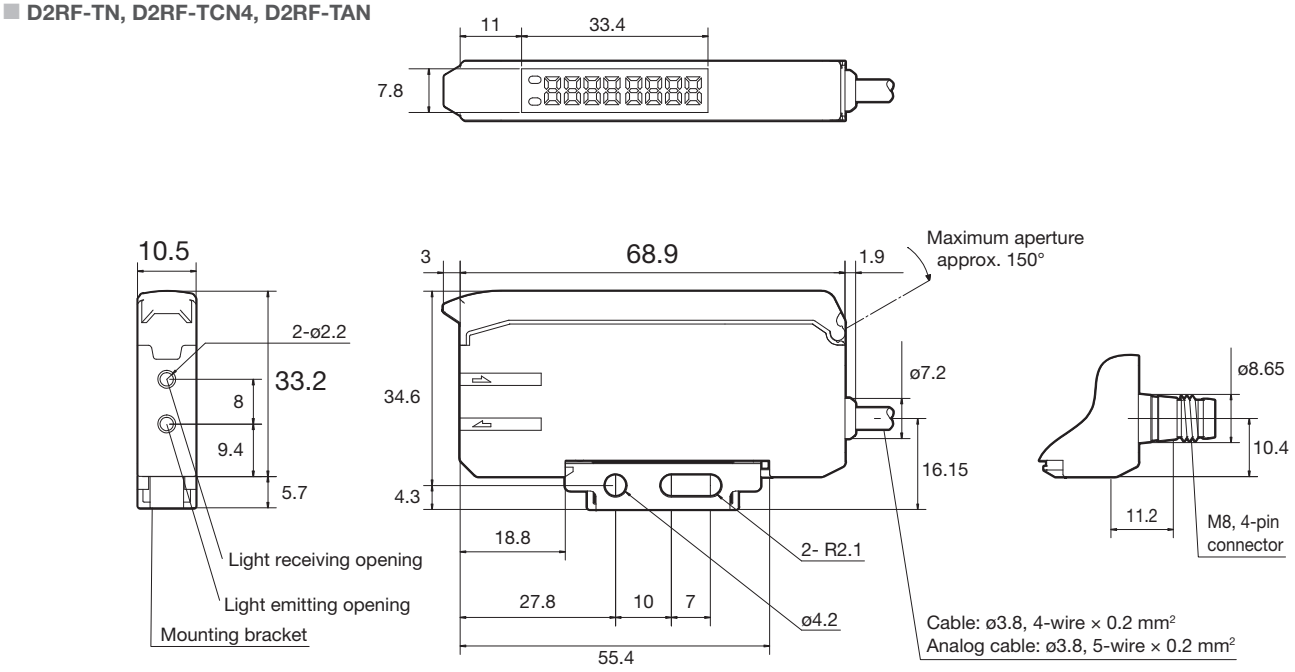
Inter-connection type

■ **D2RF-TMN, D2RF-TMCN4**
D2RF-TSN, D2RF-TSCN4



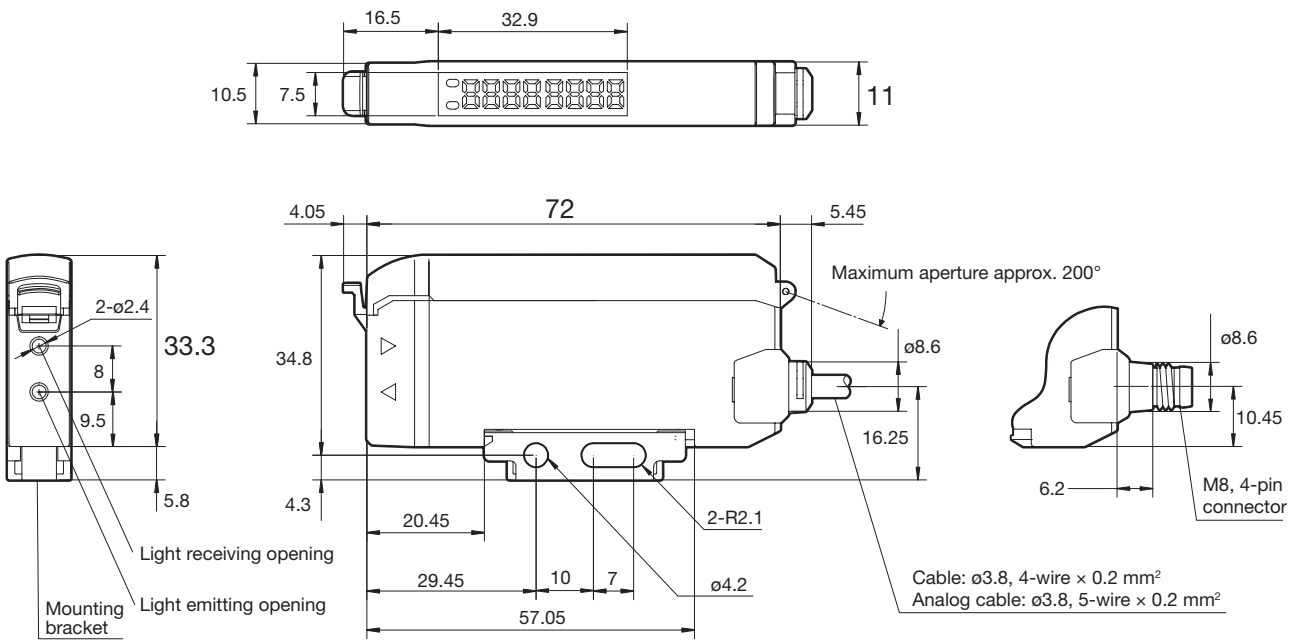
Stand-alone type

■ **D2RF-TN, D2RF-TCN4, D2RF-TAN**



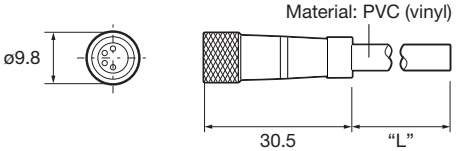
Water resistant stand-alone type

■ **D2RF-2TN, D2RF-2TCN4, D2RF-2TAN**



Connector cable (optional)

■ **JCN-S, JCN-5S, JCN-10S**



■ **JCN-L, JCN-5L, JCN-10L**