



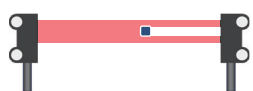
Digital Fiber Amplifier for Short-Range and Small Object Detection

Feature

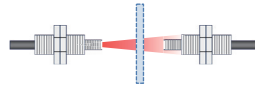
■ Detects small objects in a clean environment

■ Detects minute changes in light intensity

- Detection of small objects with only minute changes in light intensity



Passing Detection of Small Objects



Transparent-object Detection

- Short-range detection of small objects



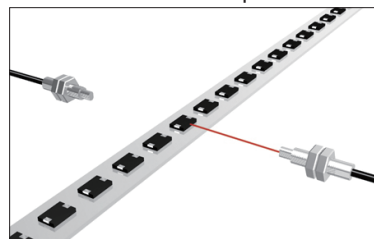
Digital Fiber Amplifier Short-range/High accuracy type



D4RF Series Y type

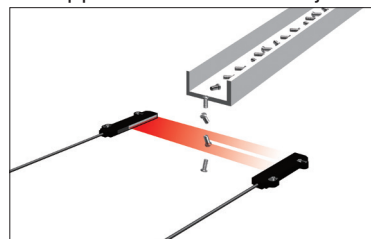
Applications

Passing Detection of Electronics Components



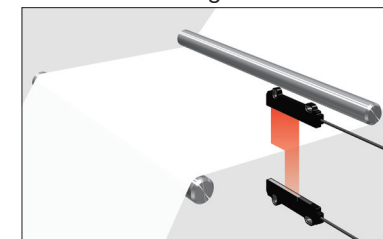
Sufficient light intensity ensures stable detection of passing objects.

Counting the Number of Dropped Screws/Small Objects



Sufficient light intensity ensures stable detection of passing objects.

Detecting Edge of Film Alignment



The intensity of light is also enough to detect film edges.

Lineup

Connection	Type		Shape	No. of wires	OLED display	Interface			Model
Cable	Stand-alone models			5	Yes	2 outputs	1 input	-	D4RF-TD-Y IO-Link
				5	Yes	1 output	1 input	1 analog output	D4RF-TA-Y
	Interconnection models	Main unit		5	Yes	2 outputs	1 input	-	D4RF-TDM-Y
		Expansion unit		3	Yes	2 outputs	1 input	-	D4RF-TDS-Y

Specifications

Type			Stand-alone model (IO-Link device)	Standard inter-connection With display and keys		Stand-alone mode Analog output	
				Main unit	Expansion unit		
Model			D4RF-TD-Y	D4RF-TDM-Y	D4RF-TDS-Y	D4RF-TA-Y	
Light source			4-element Red LED (wavelength: 660 nm)				
Response time	Stand-alone use		16 μs, 70 μs, 250 μs, 500 μs, 1 ms, 2 ms, 8 ms	16 μs, 70 μs, 250 μs, 500 μs, 1 ms, 2 ms, 8 ms	-	16 μs, 70 μs, 250 μs, 500 μs, 1 ms, 2 ms, 8 ms	
	Inter-connection use		-	22 μs, 70 μs, 250 μs, 500 μs, 1 ms, 2 ms, 8 ms		-	
Teach Mode			1 point, 2 points, Auto, Through, 1-point Zone, 2-point Zone, Manual	1 point, 2 points, Auto, Through, 1-point Zone, 2-point Zone, Manual		Channel A (analog output) setting: Analog 2 points teach, Analog auto teach, Manual Channel 1 (control output) setting: 1 point, 2 points, Auto, Through, 1-point Zone, 2-point Zone, Manual	
Display	Digital display		OLED display 128 × 22 pixel Menu languages: English, Japanese, Korean, Simplified Chinese, Spanish				
	Indicators		2 × Output indicator (orange), Power indicator (green): Lights up when power is on (blinks during IO-Link communication for stand-alone unit)	2 × Output indicator (orange), Power indicator (green): Lights up when power is on		Control output indicator (orange), Analog output indicator (orange), Power indicator (green): Lights up when power is on	
Interface	Control output		2 outputs: NPN/PNP open collector or Push-pull selectable by setting Max. 50 mA/30 VDC, residual voltage: 1.8 V or less	2 outputs: NPN/PNP open collector or Push-pull selectable by setting Max. 50 mA/30 VDC, residual voltage: 1.8 V or less* ¹		NPN/PNP open collector or Push-pull selectable by setting Max. 50 mA/30 VDC, residual voltage: 1.8 V or less	
	Analog output		-	-		Current output: 4 to 20 mA, load impedance: 300 ohm or less Voltage output: 0 to 10 V, 1 to 5 V, output impedance: 100 ohm or less, selectable by setting	
	External input		Teach, Counter-reset, Emitter off or Preset loading	Teach, Counter-reset, Emitter off or Preset loading		Teach, Counter-reset, Emitter off, Hold out reset or Preset loading	
IO-Link	IO-Link		Control output 1 is switchable to IO-Link	-		-	
	Revision		1.1	-		-	
	Baud rate		COM 3 (230.4 kbps)	-		-	
	Number of process input data bytes		4 bytes	-		-	
	Minimum cycle time		0.5 ms	-		-	
Number of units with cross talk prevention			-	Response time 22 μs: 2 units, 70 μs: 3 units, 250 μs: 4 units, 500 μs: 9 units, 1 ms: 9 units, 2 ms: 12 units, 8 ms: 14 units (including main unit)		-	
Timer function							On delay, Off delay, On/off delay, Pulse output, On delay pulse, Adjustable 1 to 30,000 ms
Output mode			Light ON/Dark ON, selectable by setting				
Number of connectable units			-	Max. 16 units (including main unit)		-	
Connection			Cable model: 2 m, 5 wires with 2-output and 1-input models, Minimum bending radius: 4 × cable diameter	Cable model: 2 m, Minimum bending radius: 4 × cable diameter 5 wires with 2-outputs and 1-input main unit models, 3 wires with 2-outputs and 1-input expansion unit models		Cable length 2 m, Minimum bending radius: 4 × cable diameter	
Insulation resistance			20 Megohm or more (with 500 VDC)				
Rating	Supply voltage		12 to 30 VDC ± 10% including 10% ripple (p-p): SIO mode 18 to 30 VDC ± 10% including 10% ripple (p-p): IO-Link mode	Supplied directly or from communication unit* ² 12 to 24 VDC ± 10 % including 10% ripple (p-p)	Supplied from main unit or communication unit* ² 12 to 24 VDC ± 10 % including 10% ripple (p-p)	12 to 24 VDC ± 10% including 10% ripple (p-p)	
	Current consumption	Eco mode: Off Eco mode: On	870 mW max. (29 mA or less at 30 VDC, 33 mA or less at 24 VDC, 52 mA or less at 12 VDC) 780 mW max. (26 mA or less at 30 VDC, 29 mA or less at 24 VDC, 43 mA or less at 12 VDC)	792 mW max. (33 mA or less at 24 VDC, 52 mA or less at 12 VDC)* ¹ 696 mW max. (29 mA or less at 24 VDC, 43 mA or less at 12 VDC)* ¹		840 mW max. (35 mA or less at 24 VDC, 52 mA or less at 12 VDC) 744 mW max. (31 mA or less at 24 VDC, 43 mA or less at 12 VDC)	
Warm-up time			300 ms				
Applicable regulations	EMC		EU EMC directive (2014/30/EU) UK directive EMC (The Electromagnetic Compatibility Regulations 2016)				
	Environment		EU RoHS directive (2011/65/EU) UK RoHS (The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012) China RoHS (MIIT Order No.32)				
Applicable standards			EN 60947-5-2				
NRTL certification			UL Listed or Recognized Components Proximity Switch Certified for US and Canada	UL Listed or Recognized Components Proximity Switch Certified for US and Canada		UL Recognized Component Proximity Switch Certified for US and Canada	
Company standards			Noise resistance: Feilen Level 4 cleared				
Protection circuit			Reverse connection protection, Overcurrent protection				
Environmental resistance	Ambient temperature/humidity		-25 to 55 °C/35 to 85% RH (no freezing or condensation)	-25 to 55 °C*/35 to 85% RH (no freezing or condensation)		-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		IP54				
Material			Housing, cover: PC				
Weight			Approx. 71 g				
Included items			Mounting bracket, Instruction manual				

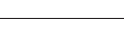
*1: The load current is limited by the number of connected units (including inter-connection main unit) as follow. Standard inter-connection use: 20 mA when connected with a 1-output setting or 10 mA with a 2-output setting.

*2: For details on supplying power from the communication unit, refer to the instruction manual of the respective communication unit.

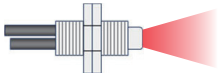
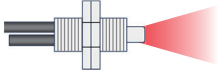
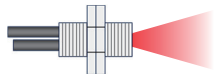
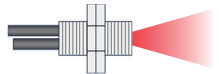
*3: The upper ambient temperature limit is as follows depending on the number of connected units. 3 to 5 connected units: 50 °C, 6 to 16 connected units: 45 °C (When used as UL certified product, 6 to 8 connected units: 45 °C, 9 to 16 connected units: 40 °C)



Sensing distance

Reflection mode	Model	Type	Shape	Wire				Sensing distance by response time (Unit: mm) Upper row: D4RF Lower row: D4RF-Y						
				Type	Minimum bending radius	Fiber length	Light axis diameter	16 μ s	70 μ s	250 μ s	500 μ s	1 ms	2 ms	8 ms
Through-beam type	NF-TB02	M4	M2.6, Lens attachable 	Standard	R25	2 m Free cut	ϕ 1.0	325	975	1,455	1,960	2,215	2,780	3,600
								55	165	240	295	340	445	545
	NF-TK77	M4	M2.6, Lens attachable 	Flexible	R1	2 m Free cut	ϕ 1.0	310	915	1,415	1,770	2,010	2,710	3,600
								55	165	240	295	340	445	545
	NF-TR01	M4	M2.6, Lens attachable 	Flexible	R4	2 m Free cut	ϕ 1.0	320	955	1,505	1,835	2,055	2,880	3,600
								55	165	240	295	340	445	545
	NF-TR02	M3	M2.6, Lens attachable 	Flexible	R4	2 m Free cut	ϕ 0.25 x 4	85	265	420	525	595	865	1,310
								14	40	60	70	85	110	140
	NF-TM02	M3	Sleeve: 5mm long 	Standard	R15	2 m Free cut	ϕ 0.5	100	290	465	600	680	965	1,540
								15	50	75	95	110	150	190
	NF-TR14	M4	Straight view/Side view switchable type 	Flexible	R2	2 m Free cut	ϕ 0.5	305	885	1,430	1,845	2,200	2,730	3,600
								50	140	200	255	295	385	470
	NF-TS40	Screen		Flexible	R2	2 m Free cut	40 mm	3,600	3,600	3,600	3,600	3,600	3,600	3,600
								55	165	240	295	340	445	545
	NF-TZ07	Screen		Flexible	R1	2 m Free cut	32 mm	3,600	3,600	3,600	3,600	3,600	3,600	3,600
								55	165	240	295	340	445	545
	NF-TZ08	Screen		Standard	R10	2 m Free cut	32 mm	3,600	3,600	3,600	3,600	3,600	3,600	3,600
								55	165	240	295	340	445	545
	NF-TZ09	Screen		Flexible	R1	2 m Free cut	11 mm	2,305	3,600	3,600	3,600	3,600	3,600	3,600
								14	40	60	70	85	110	140
	NF-TZ10	Screen		Standard	R10	2 m Free cut	11 mm	2,765	3,600	3,600	3,600	3,600	3,600	3,600
								15	50	75	95	110	150	190

Sensing distance

Reflection mode	Model	Type	Shape	Wire				Sensing distance by response time (Unit: mm) Upper row: D4RF Lower row: D4RF-Y						
				Type	Minimum bending radius	Fiber length	Light axis diameter	16 μ s	70 μ s	250 μ s	500 μ s	1 ms	2 ms	8 ms
Diffuse type	NF-DK06	M6		Standard	R25	2 m Free cut	Parallel	120	300	500	600	700	800	1,250
								14	45	65	75	90	130	160
	NF-DB01	M6		Standard	R25	2 m Free cut	Coaxial	120	300	500	600	700	800	1,250
								14	45	65	75	90	130	160
	NF-DM02	M4		Standard	R15	2 m Free cut	Coaxial	45	170	265	320	380	505	710
								7	20	30	35	40	60	75
	NF-DK21	M3		Standard	R15	0.5 m	Coaxial	15	60	95	115	135	180	260
								3	8	12	15	17	25	34
	NF-DK67	M6		Flexible	R2	2 m Free cut	Parallel	95	315	485	525	645	840	1,130
								13	40	60	70	80	120	150
	NF-DR01	M6		Flexible	R4	2 m Free cut	Parallel	120	300	500	600	700	800	1,250
								14	45	65	75	90	130	160

● Specifications are subject to change without prior notice.



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