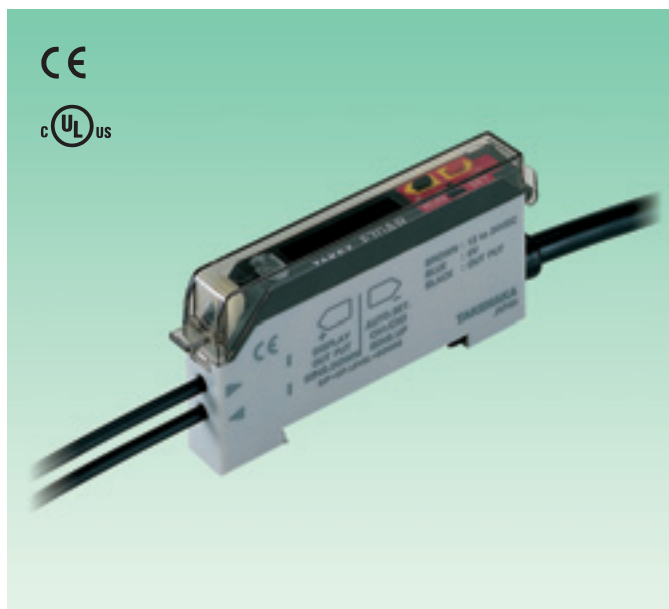


F70A series

Digital display
Fiber optic sensors



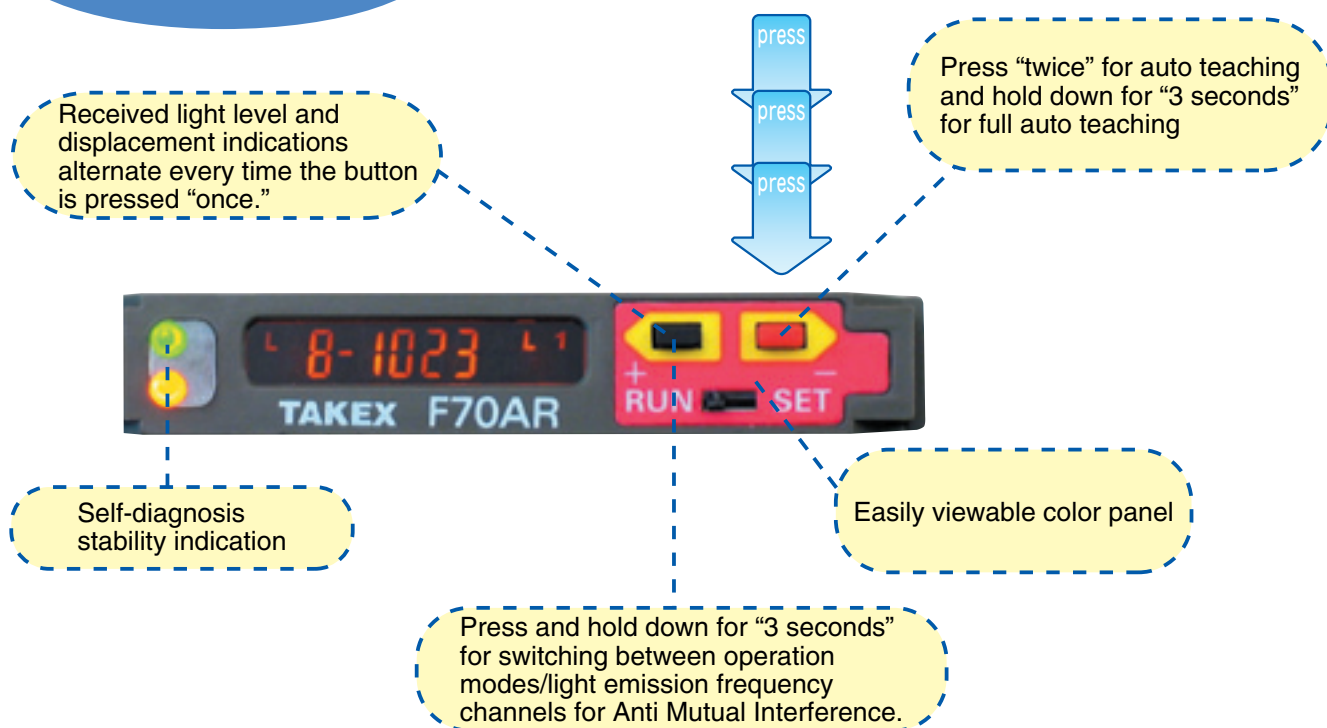
- Digital indication of sensing information
- Simple operation for setting functions
- Direct reading of stability level is available along with received light level and displacement indications
- LCD with backlight for ease of reading
- Various convenient functions provided
 - Full auto/auto teaching
 - Anti Mutual Interference
 - Manual sensitivity setting
 - Off-delay timer

Variation

Type	Model		Light source	Output mode
	NPN output	PNP output		
Digital display general- purpose type	F70AR	F70ARPN	Red LED	Open collector (NPN/PNP)
	F70AG	F70AGPN	Green LED	
	F70AB	F70ABPN	Blue LED	
	F70AW	F70AWPN	White LED	

Simple operation

Simple operation featured



2 types of received light level indication

Level indication mode



The level of received light is indicated in 4-digit number.
Min. = 0 / Max. = 1023

Position on the electronic volume: 8

The sensitivity position on the electronic volume and the current received light level are displayed.

There may be an error of $\pm 1-2$ between the value on the LCD and the actual value.

Displacement indication mode



The example above shows that the current receive light level is -123 with reference to the activation level.

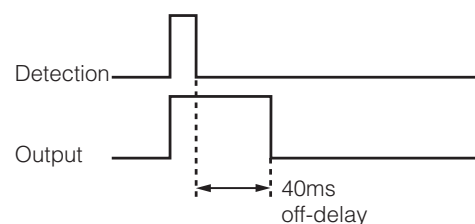
The level of received light is indicated in positive or negative value with reference to the activation level.

The activation level is taken as the reference (± 0) and the level of received light with work used is indicated as a deviation from the reference in a positive or negative value.

Enhanced teaching features (sensitivity setting)

- **Full auto teaching**
Simply pressing the button allows easy teaching; even for an object moving at a high speed.
- **Auto teaching**
2-point teaching "with" and "without" the work allows the detection of slight level difference such as the thickness of a piece of work and the presence of a film.
- **Position teaching**
This feature is ideal for high-accuracy positioning that requires accurate determination of a detecting point.
- **Maximum sensitivity setting**
For applications requiring maximum sensitivity setting such as the detection of work with a through-beam type fiber optic cable, the extra-powerful light allows for use in an adverse environment.
- **Manual setting**
Arbitrary manual increase and decrease of a "set-point" allows level setting while checking the operation.

Secure detection of an instantaneous signal is ensured with the off-delay timer



A small object moving at a high speed can be securely detected, thus allowing for a wider range of input conditions for the connected devices.

F70A • F70series

■ Type

- Amplifier (main unit)

Type	Model		Light source	Output mode	Connection
	NPN output	PNP output			
Digital display general-purpose type	F70AR	F70ARPN	Red LED	Open collector (NPN/PNP)	Permanently attached cord [M8 connector type also available]
	F70AG	F70AGPN	Green LED		
	F70AB	F70ABPN	Blue LED		
	F70AW	F70AWPN	White LED		
Digital display high-speed type	F70R	F70RPN	Red LED		
	F70G	F70GPN	Green LED		
	F70B	F70BPN	Blue LED		
	F70W	F70WPN	White LED		

- Fiber optic cable

For different types of fiber optic cables, see pp. 59-.

- M8 connector type

M8 connector connection type is separately available for all models, which is identified by “-J” following the model number. “-JE” and “-JS” are available depending on the input/output specification.

For connector specifications, see p. 23.

<Type of cords with M8 connector>

- Model : FBC-4R2S (equipped with straight M8 connector and 2-m cord)
- Model : FBC-4R2L (equipped with angled M8 connector and 2-m cord)



End unit



- Optional parts

Type	Model	Description
End unit	FA7EU	DIN rail mounting stopper
Mounting bracket*	AC-BF2	Amplifier unit mounting bracket

*Accessory

F70A • F70series

Rating/Performance/Specification

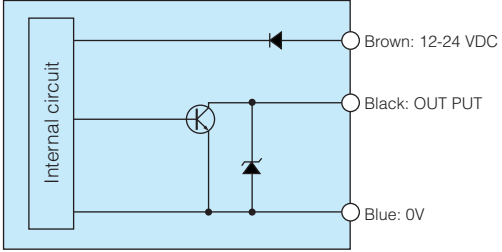
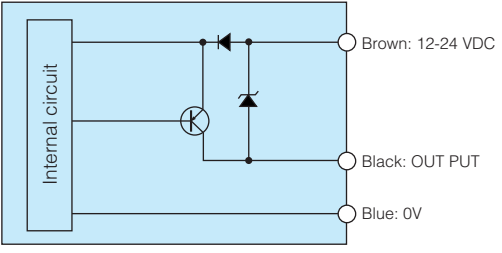
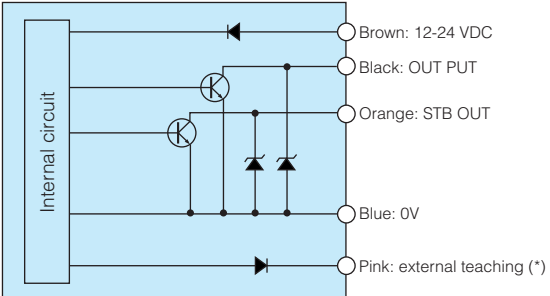
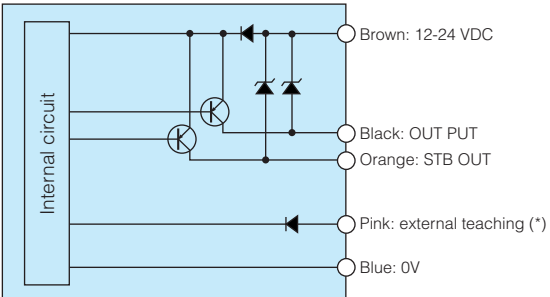
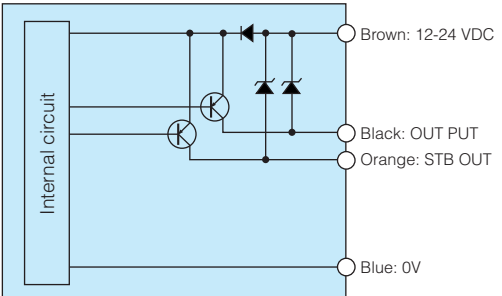
Model	NPN type	F70AR	F70AG	F70AB	F70AW	F70R	F70G	F70B	F70W	
	PNP type	F70ARPN	F70AGPN	F70ABPN	F70AWPN	F70RPN	F70GPN	F70BPN	F70WPN	
Rating/performance	Power supply	12-24V DC $\pm 10\%$ / Ripple 10% max.								
	Current consumption	NPN type	39 mA max.							
		PNP type	50 mA max.							
	Output mode	Control output (*)	NPN type	Open collector output / Rating: sink current 100 mA (30 VDC max.) / Residual voltage: 1 V or less						
			PNP type	Open collector output / Rating: source current 100 mA (30 VDC max.) / Residual voltage: 2 V or less						
	Stability output (*)	NPN type					Open collector output / Rating: sink current 50 mA (30 VDC max.) / Residual voltage: 1 V or less			
		PNP type					Open collector output / Rating: source current 50 mA (30 VDC max.) / Residual voltage: 2 V or less			
	Operation mode	Light-ON/Dark-ON selectable								
	Timer	Off delay/disabled selectable Delay time: 40 ms fixed					On delay/off delay/on-off delay/disabled selectable Delay time: selectable between 10, 20, 40, 60, 80, 100 and 120 ms / Default: 40 ms			
		Response time								
Specification	Light source (wavelength)	Red LED (660nm)	Green LED (525nm)	Blue LED (470nm)	White LED	Red LED (660nm)	Green LED (525nm)	Blue LED (470nm)	White LED	
	Indicator	Operation indicator: orange LED / Stability (STB) indicator: green LED								
	Display	LCD display with backlight								
	Switch	2 set buttons / Mode selector switch: RUN/SET				2 set buttons / Mode selector switch: RUN/SELECT/MODE				
	Sensitivity setting	Full auto teaching / Auto teaching								
	Sensitivity setting input	Set button input				Set button input/external input				
	Sensitivity adjustment function	Provided (manual sensitivity adjustment)								
	Functions	<ul style="list-style-type: none"> • Anti Mutual Interference feature • Short circuit protection feature 				<ul style="list-style-type: none"> • Sensor function: AUTO/TEACH/LOCK • Auxiliary function: <ul style="list-style-type: none"> S for manual adjustment of sensitivity and activation level H for manual hysteresis setting V for displacement indication and absolute value indication modes • Anti Mutual Interference feature • Self-diagnosis feature • Short circuit protection feature 				
	Material	Polycarbonate								
	Connection	Permanently attached cord (outer dimension: dia. 4.8) 0.2sq. 3 core 2 m length					Permanently attached cord (outer dimension: dia. 4.8) 0.2sq. 5 core 2 m length			
		For M8 connector specifications, see p. 23.								
	Mass	Approx. 80 g (including 2-m cord and mounting bracket)								
	Accessory	Mounting bracket / Operation manual								

(*) Avoid the transient condition (0.5 seconds) immediately after power-up for output.

Environmental Specification

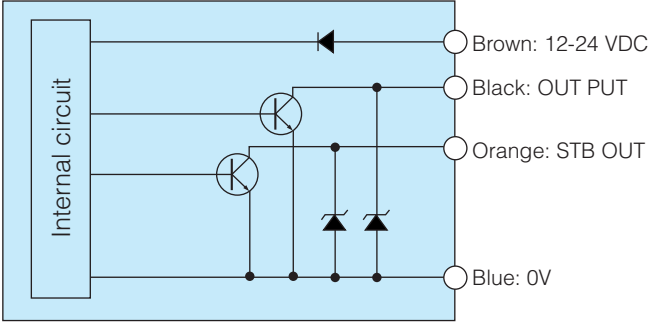
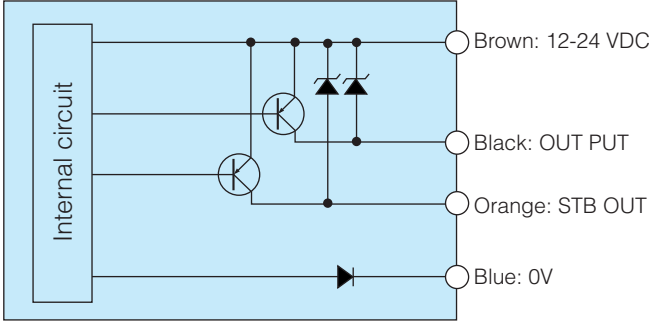
Environment	Ambient light	Incandescent lamp: 10,000 lx / Sunlight: 20,000 lx
	Ambient temperature	1-3 adjacent units in operation: $-25 - +55$ °C
		4-10 adjacent units in operation: $-25 - +50$ °C
		11-16 adjacent units in operation: $-25 - +45$ °C
		Storage: $-40 - +70$ °C (non-freezing)
	Ambient humidity	35-85%RH (non-condensing)
Protective structure	IP40	
Vibration	10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction	
Shock	500 m/s ² / 3 times each in 3 directions	

Input/Output Circuit and Connection

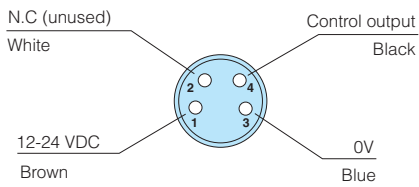
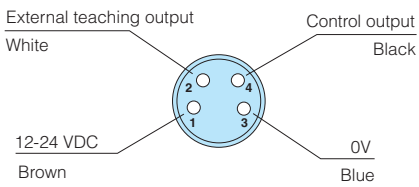
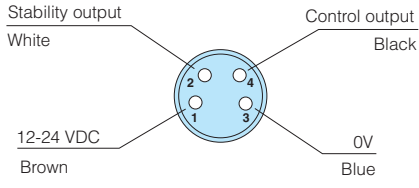
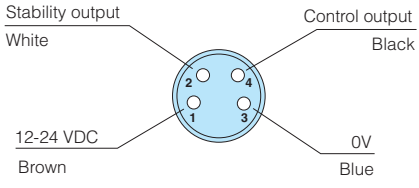
Model	Output circuit diagram
<p>NPN output type</p> <p>F70AR F70ABK F70AG F70AWK F70AB F70AW F70ARK F70AGK</p>	
<p>PNP output type</p> <p>F70ARPN F70ABKPN F70AGPN F70AWKPN F70ABPN F70AWPN F70ARKPN F70AGKPN</p>	
<p>NPN output type</p> <p>F70R F70G F70B F70W</p>	
<p>PNP output type</p> <p>F70RPN F70GPN F70BPN F70WPN</p>	
<p>PNP output type</p> <p>F70RKPN F70GKPN F70BKPN F70WKPN</p>	

(*) When not using external teaching, cut the pink lead at the base or connect it to the positive terminal (for NPN type) or 0V (PNP type) of the power supply.

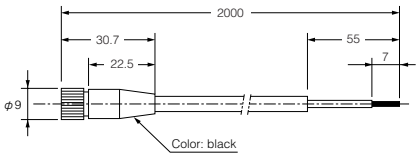
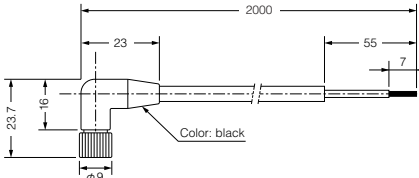
Input/Output Circuit and Connection

Model	Output circuit diagram
<p>NPN output type</p> <p>F70RK F71R F71RK F70GK F71G F71GK F70BK F71B F71BK F70WK F71W F71WK F71RH F71RHK F71GH F71GHK F71BH F71BHK F71WH F71WHK</p>	
<p>PNP output type</p> <p>F71RPN F71RKPN F71GPN F71GKPN F71BPN F71BKPN F71WPN F71WKPN F71RHPN F71RHKPN F71GHPN F71GHKPN F71BHPN F71BHKPN F71WHPN F71WHKPN</p>	

M8 Connector Type IO Specification/Pin Arrangement/Lead Colors

<p>F70A" -J"</p> 	<p>F70" -JE"</p> 
<p>F71" -J"</p> 	<p>F70" -JS"</p> 

- Dimensions of cord with M8 connector (optional) (in mm)

<p>FBC-4R2S (straight)</p> 	<p>FBC-4R2L (angled)</p> 
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Common to F70A/F70/F71 Series

For Correct Use

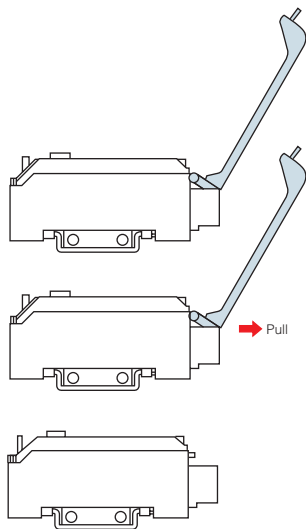
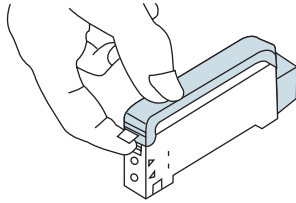
Be sure to follow the instructions in the operation manual provided for correct use of the product.

● Handling of amplifier case cover

① Opening the case cover

While pressing down the front part of the case cover, lift the cover by pulling up the tab.

Just roughly pulling the case cover tab for opening may damage the cover. Be sure to press the front part of the cover when pulling the tab.



The cover opens up to the connector on the back and stays at the half-opened position.

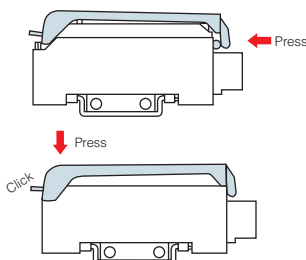
Pulling at the hinge with the cover half open allows removal of the cover.

Cover removed

② Attaching the cover

Put the case cover on the amplifier as shown on the figure on the right and push in at the hinge.

Press down the front part of the cover until it clicks and make sure that the tab is hooked.

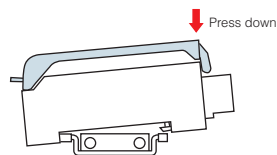


● Attaching amplifier on DIN rail or mounting bracket

The mounting bracket is optional. The amplifier cannot be side-mounted with a mounting bracket used.

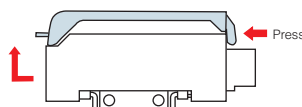
① Attachment

Put the front hook of the amplifier on the rail (or mounting bracket) and press down the back of the amplifier.



② Detachment

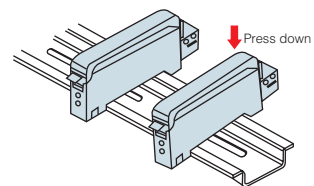
While pressing the amplifier forward, lift the front part and detach the front hook.



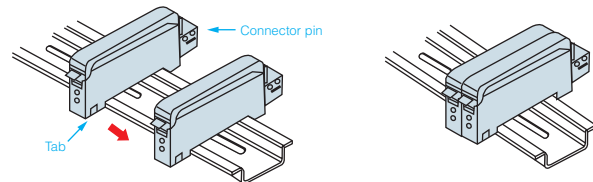
● Attachment of amplifiers for joined use

When using two or more amplifiers by joining them together, be sure to use a DIN rail for mounting. Up to 16 units can be joined for use. Be sure to cut the power supply before attempting to join or separate units.

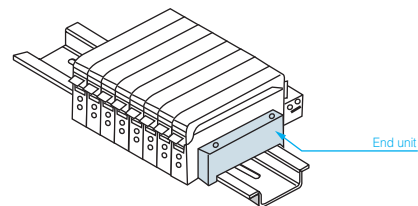
① Mount one amplifier at a time on the DIN rail while keeping a certain space between amplifiers.



② Slide the amplifiers so that the tabs on the front and the connector pins on the back are respectively joined together.



③ To prevent the connections from coming loose due to vibration, etc., attach end units (optional) on the ends of the group of amplifiers to secure them.



④ To detach the amplifiers, follow the steps in reverse order and remove one amplifier at a time.

Removing the amplifiers as they are joined together without sliding may damage the amplifiers.

Common to F70A/F70/F71 Series

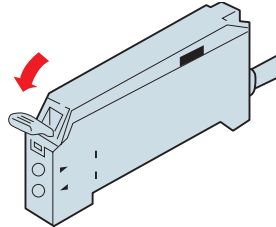
■ For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

● Attachment of fiber optic cable

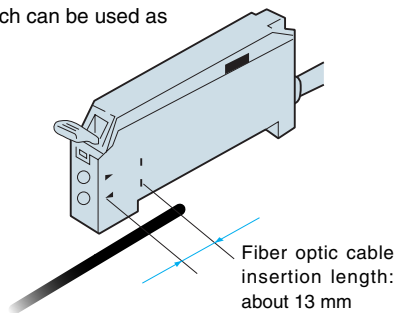
Attachment to amplifier

1. Open the case cover and press down the single-touch lock lever.

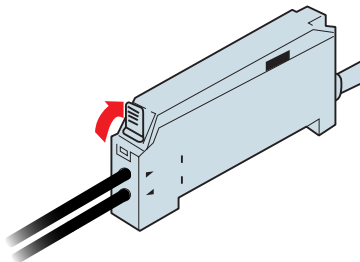


2. Insert the fiber optic cable all the way until it stops.

To prevent inadequate insertion of a fiber optic cable, marks to indicate the insertion length are provided on the case side, which can be used as gauges.

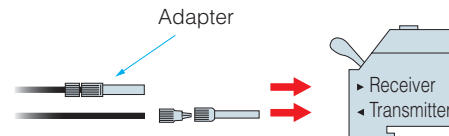


3. Lift the single-touch lock lever.



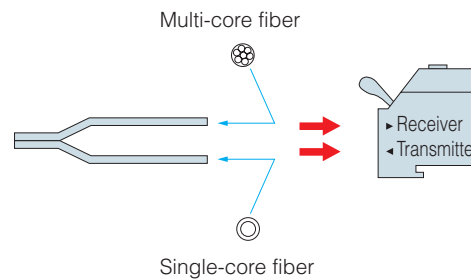
Attachment of small-diameter fiber optic cable

When attaching a small-diameter fiber optic cable, use the adapter that comes with the fiber optic cable.



Attachment of coaxial reflective fiber optic cable

Attach the multi-core fiber to the receiver and single-core fiber to the transmitter.



● Notes on usage

- When using two or more amplifiers joined together, be sure to use a DIN rail for mounting. Different ambient temperatures apply according to the number of joined amplifiers.

No. of amplifiers	Ambient temperature
1-3	-25 - +55 °C
4-10	-25 - +50 °C
11-16	-25 - +45 °C

- Be sure to turn off the power supply before wiring.
- To extend the cord, use wires of at least 0.3 mm² and limit the length to within 100 m.
- Using the same conduit for the amplifier wiring and power transmission or high-voltage lines may cause faulty operation

or damage due to noise. Be sure to route them separately.

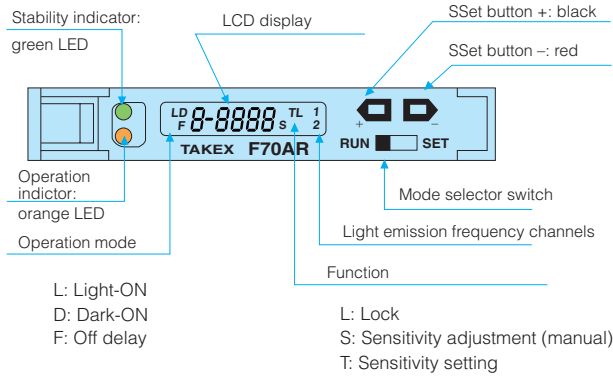
- Make sure that the power fluctuation is within an allowable range so that the power input will not exceed the rating.
- When using a commercially-available switching regulator, use the frame ground or ground terminal.
- For output, avoid the transient condition (0.5 seconds) immediately after power-up.
- Do not use the sensor in a place subject to steam, large amount of dust or direct exposure to water or oil.
- Do not use the sensor outdoors or in a place subject to direct disturbing light on the light receiving surface.
- Use of a reflective-type fiber optic cable at the maximum sensitivity may cause inadequate light blocking. Be sure to use a work for sensitivity setting.

F70A Series

For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

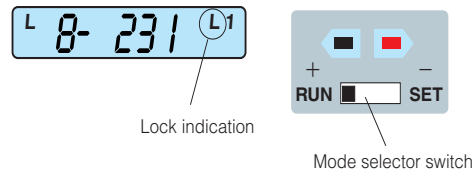
Part names



Operation

Mode selector switch

This switch should be set to RUN for normal object detection, which enables the lock mode and disables all operations on the sensor. Setting the mode selector switch to SET releases the lock, which allows operations on the sensor.



Mode selector switch	Function and operation button	Operation
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