Fiber Photoelectric Sensors

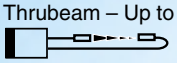
FS2/FS-T22 Series

Features

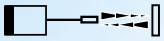
- 5 amplifiers and over 40 fiber units to choose from
- One-touch calibration (FS-T22)
- Detect objects as small as 0.09-mm 0.003" dia.
- High-speed response as short as 50 µs
- Accurate detection in unstable conditions

Detecting Distance

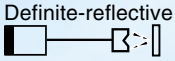
Thrubeam – Up to 1100 mm (43.31")



Diffuse-reflective – Up to 130 mm (5.12")



Definite-reflective – Up to 6 mm (0.24")



CE

Description

FS-T22(P)

One-touch calibration

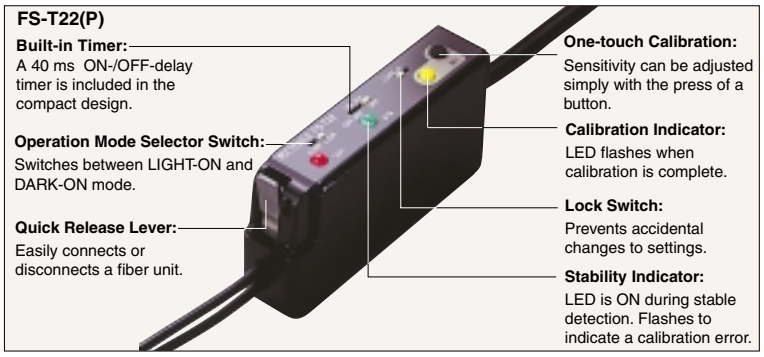
The FS-T22(P) can be adjusted with the simple press of a button, making calibration during product changeover easy. This unique calibration system ensures optimum detection every time.

Convenient setup

All FS-T22(P) settings can be made by the operator or through external equipment. This is especially convenient when the amplifier is inaccessible.

Detection in unstable conditions

Critical detection can be made even in unstable conditions and the FS-T22 reliably detects any target without detecting the background.



FS2 Series

High-intensity beam (FS2-62(P))

The FS2-62(P) has twice the detecting distance of conventional amplifiers. The beam penetrates dusty environments to reliably detect targets.

High-speed response (FS2-65(P))

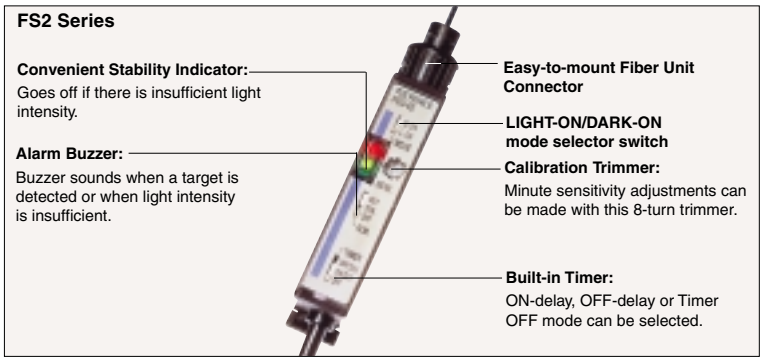
With a 50-µs response speed, the FS2-65(P) can handle almost any application. This amplifier is ideally suited for detecting very small targets, like ICs on a high-speed production line.

Versatility (FS2-60(P))

A combination of response speed, detecting distance and easy-to-use functions makes the FS2-60(P) one of the most versatile amplifiers of its kind. An unbeatable price/performance ratio makes this amplifier a great deal.

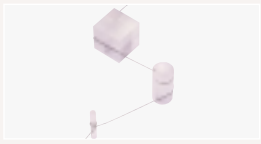
Alarm buzzer

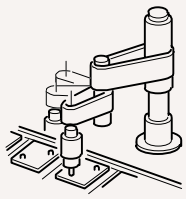
All FS2 Series amplifiers come equipped with an alarm buzzer that can be configured to sound when a target is detected or when there is insufficient light.



Fiber Unit Selection Guide (major models only)

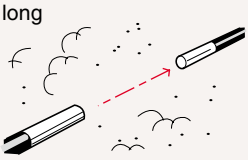
High-flex: FU-48, 68, 49X, 59, 79
High-flex fiber units deliver long service-life on moving production lines machinery.





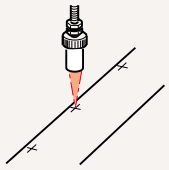
Robotic arm position sensing

Long-detecting distance: FU-6F, 66, 5F, F-2+FU-7F/84C/86
Fiber units for stable and accurate long distance detection, even in harsh environments.



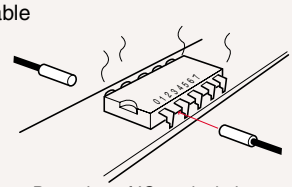
Detection of targets in dusty, oily, or steamy conditions

Focusing lens: FU-35FA + F-2HA, 3HA, FU-22X
Focused-beam fiber units detect very small targets in limited spaces.



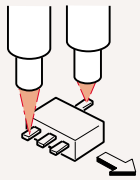
Detection of register mark on printed paper

Heat-resistant: FU-81C, 82C, 83C, 84C
Heat-resistant-free-cut: FU-85, 86, 87, 88
Heat-resistant fiber units for stable detection at up to 350°C.



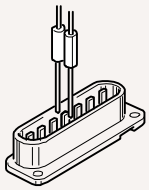
Detection of IC packs in heat testing

Narrow-beam: FU-22X, 36X
Focused-beam fiber units have a diffuse angle of only 10° and a beam spot one-sixth the diameter of conventional focused- beam sensors.



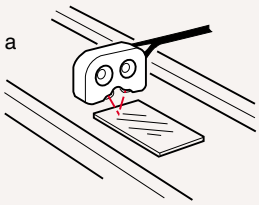
Detection of lead of miniature tip transistor

Side-view: FU-32, 33, 34, F-1+FU-7F/84C/86
Side-view fiber units provide mounting flexibility and detection in normally inaccessible areas.



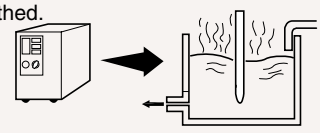
Detection of connection pins

Definite-reflective: FU-37
Definite-reflective fiber unit detects targets of any color or finish and is useful for positioning control. Even a wafer can be detected.



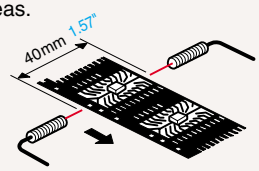
Wafer detection

Liquid-level-detection: FU-93, 94, 95
Liquid-level-detection fiber units are simple to install and have easy-to-adjust high and low tolerance limits. FU-93, 94 are Teflon®-sheathed.



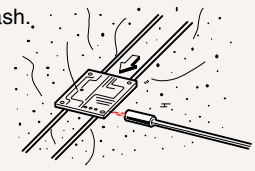
Level control of lubricating or hydraulic oils

Thin-sleeve: FU-45X, 65X, 75F
Fiber units with a thin-sleeve for detecting tiny targets in limited areas.



Detection of IC on lead frame

Teflon®-sheathed: FU-91, 92
Teflon®-sheathed fiber units can function in harsh environments, like where water, oil and chemicals splash.



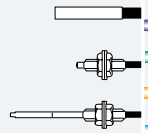
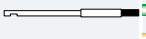
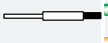
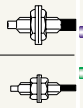
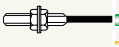
PCB detection during cleaning process

Note: (X) indicates a model with a special "X" version for use only with the FS-T22(P) amplifier.

FS2/FS-T22 Fiber Photoelectric Sensors

Selection Chart

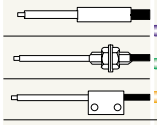
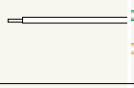
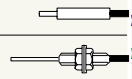
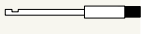
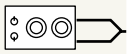
Fiber unit

Type		Shape	Detecting distance	Smallest detectable object	Minimum bend radius	Features	Weight (Approx.)	Model
Thrubeam	Standard		320 mm 12.60" 160 mm 6.30" 70mm 2.76" 27mm 1.06"	ø0.3 mm ø0.02"	R25 mm R0.98" Free-cut	Long-detecting distance	19g	FU-5F
							21g	FU-7F
						Long-detecting distance, sleeve	24g	FU-73
	Built-in Lens		250 mm 9.84" 130 mm 5.12" 35 mm 1.38"	ø0.3 mm ø0.02"	R25 mm R0.98"	Narrow-beam type	11g	FU-36X
	ToughFlex		100 mm 3.94" 50 mm 1.97" 14 mm 0.55"	ø0.1 mm ø0.004"	R4 mm R0.16" Free-cut	High-flex fiber	3g	FU-59
							6g	FU-79
	Thin-sleeve		90 mm 3.54" 45 mm 1.77" 12 mm 0.47"	ø0.1 mm ø0.004"	R10 mm R0.39 Free-cut	Thin-sleeve	10g	FU-75F
	Side-view		100 mm 3.94" 50 mm 1.97" 14 mm 0.55"	ø0.2 mm ø0.008"	R25 mm R0.98" Free-cut	Space-saving sleeve	17g	FU-34
			30 mm 1.18" 20 mm 0.79" 5 mm 0.20"	ø0.9 mm ø0.04"	R25 mm R0.98" Free-cut	Space-saving, thin-sleeve	5g	FU-32
Diffuse-reflective	Standard		100 mm 3.94" 65 mm 2.56" 20 mm 0.79"	ø0.01 mm ø0.004" ø0.03 mm ø0.001"	R25 mm R0.98" Free-cut	Long-detecting distance	21g	FU-6F
							10g	FU-66
	Coaxial		8 mm 0.31"	ø0.2 mm ø0.008"	R25 mm R0.98"	Suitable for positioning	4g	FU-23X
			80 mm 3.15" 55 mm 2.17" 16 mm 0.63" 6 mm 0.24"	ø0.01 mm ø0.0004" ø0.03 mm ø0.001" ø0.1 mm ø0.004" ø0.3 mm ø0.02"	R25 mm R0.98" Free-cut		18g	FU-25
			35 mm 1.38" 17 mm 0.67" 5 mm 0.20"	ø0.01 mm ø0.0004" ø0.03 mm ø0.001" ø0.1 mm ø0.004"	R25 mm R0.98" Free-cut	Coaxial fiber 0.4 mm 0.16" spot diameter when used with F-2HA.	6g	FU-35FA
	ToughFlex		30 mm 1.18" 20 mm 0.79" 4 mm 0.16"	ø0.01 mm ø0.0004" ø0.8 ø0.03 mm"	R4 mm R0.16" Free-cut	High-flex fiber	7g	FU-48
							8g	FU-68
			15 mm 0.59" 8 mm 0.31"	ø0.01 mm ø0.0004"	R4 mm R0.16"		3g	FU-49X
			3mm 0.12"	ø0.3 mm ø0.02"	R4 mm R0.16" Free-cut		3g	FU-69

When using the FS2-62(P). When using the FS2-60(P)/FS-T22(P). When using the FS2-65(P). When using the FS2-60G.

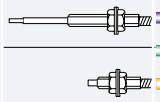
Note: Models with an "X" in the name can only be used with the FS-T22(P) amplifier.

Fiber unit

Type		Shape	Detecting distance	Smallest detectable object	Minimum bend radius	Features	Weight (Approx.)	Model
Diffuse-reflective	Thin-sleeve		36 mm 1.42"	ø0.01 mm ø0.0004"	R25 mm R0.98" Free-cut	Flush-mounting type	8g	FU-43
			18mm 0.71"	ø0.3 mm ø0.02"		Screw type	10g	FU-63
			8 mm 0.31"			Flat type		FU-63T
			25 mm 0.98"	ø0.01 mm ø0.0004"	R10 mm R0.39"	Sleeve	2g	FU-39*
			20 mm 0.79"	ø0.1 mm ø0.004"				
			7 mm 0.28"	ø0.1 mm ø0.004"				
			8mm 0.31"	ø0.01 mm ø0.0004"	R4 mm R0.16"	High-flex fiber, flush-mounting type	4g	FU-45X
			4 mm 0.16"	ø0.015 mm ø0.0006"		High-flex fiber, screw type	5g	FU-65X
	Narrow-beam		8mm 0.31"	ø0.01 mm ø0.0004"	R25 mm R0.98"	Small beam spot	4g	FU-22X
			7 mm 0.28"	ø0.03 mm ø0.001"				
			2 mm 0.08"					
	Side-view		20 mm 0.79"	ø0.3 mm ø0.01"	R25 mm R0.98" Free-cut	Space-saving	10g	FU-33
			10 mm 0.39"					
			3 mm 0.12"					
Definite-reflective	Definite-reflective		3 mm 0.12"	ø0.01 mm ø0.0004"	R10 mm R0.39" Free-cut	Almost unaffected by target color, background.	6g	FU-37
			3 mm 0.12"					
			6 mm 0.24"	ø0.01 mm ø0.0004"			5g	FU-38
			6 mm 0.24"					
			0 ~ 4 mm 0 to 0.16"	ø0.08 mm ø0.003"		Almost unaffected by target color, background. Side-by-side detection available		FU-38V
			2 ± 1.4 mm 0.08" ± 0.06"	ø0.3 mm ø0.01"				

When using the FS2-62(P). When using the FS2-60(P)/FS-T22(P). When using the FS2-65(P). When using the FS2-60G.
Note: Models with an "X" in the name can only be used with the FS-T22(P) amplifier.
* These fiber units cannot be combined with the FS-T22(P) amplifier.

Heat-resistant & Oil-proof fiber unit

Type		Shape	Detecting distance	Smallest detectable object	Minimum bend radius	Features	Weight (Approx.)	Model
Diffuse-reflective	Heat-resistant		60 mm 2.36"	ø0.01 mm ø0.0004"	R25 mm R0.98"	350°C resistance Glass fiber with sleeve	24g	FU-81C
			40 mm 1.57"	ø0.03 mm ø0.001"				
			12 mm 0.47"	ø0.1 mm ø0.004"				
			70 mm 2.76"	ø0.01 mm ø0.0004"		300°C resistance Glass fiber with sleeve	29g	FU-82C
			50 mm 1.97"	ø0.03 mm ø0.001"				
			14 mm 0.55"	ø0.1 mm ø0.004"		300°C resistance Glass fiber	23g	FU-83C
			100 mm 3.94"	ø0.01 mm ø0.0004"	R25 mm R0.98" Free-cut	105°C resistance Plastic fiber	21g	FU-85
			65 mm 2.56"	ø0.03 mm ø0.001"				
			20 mm 0.79"	ø0.1 mm ø0.004"				
			8 mm 0.31"	ø0.3 mm ø0.01"				
			70 mm 2.76"	ø0.03 mm ø0.001"	R35 mm R1.38" Free-cut	180°C resistance Plastic fiber	33g	FU-87
			50 mm 1.97"	ø0.03 mm ø0.001"				
			15 mm 0.59"	ø0.3 mm ø0.01"				
	Oil-proof, chemical proof		60 mm 2.36"	ø0.01 mm ø0.0004"	R40 mm R1.57" Free-cut	Teflon®-fiber	32g	FU-91
			50 mm 1.97"	ø0.03 mm ø0.001"				
			15 mm 0.59"	ø0.1 mm ø0.004"				

When using the FS2-62(P). When using the FS2-60(P)/FS-T22(P). When using the FS2-65(P). When using the FS2-60G.
Note: Models with an "X" in the name can only be used with the FS-T22(P) amplifier.
* These fiber units cannot be combined with the FS-T22(P) amplifier.

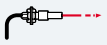
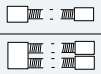
FS2/FS-T22 Fiber Photoelectric Sensors

Heat-resistant & Oil-proof fiber unit

Type		Shape	Detecting distance	Smallest detectable object	Minimum bend radius	Features	Weight (Approx.)	Model
Thrubeam	Heat-resistant		150 mm 5.91" 90 mm 3.54" 35 mm 1.38"	ø0.3 mm ø0.01"	R25 mm R0.98"	300°C resistance Glass fiber with sleeve	66g	**FU-84C**
			320 mm 12.60" 160 mm 6.30" 70 mm 2.76" 27 mm 1.06"	ø0.3 mm ø0.01"	R25 mm R0.98" Free-cut	105°C resistance Plastic fiber	22g	**FU-86**
			200 mm 7.87" 150 mm 5.91" 40 mm 1.57"	ø0.3 mm ø0.01"	R35 mm 1.38" Free-cut	180°C resistance Plastic fiber	36g	**FU-88**
	Oil-proof, chemical proof		1100 mm 43.31" 600mm 23.62" 180 mm 7.09"	ø0.9 mm ø0.04"	R40 mm R1.57" Free-cut	Teflon®-fiber	71g	**FU-92**
			350 mm 13.78" 200 mm 7.87" 50mm 1.97"	ø0.6 mm ø0.02"		Teflon®-fiber Side-view type	71g	**FU-96**

When using the FS2-62(P). When using the FS2-60(P)/FS-T22(P). When using the FS2-65(P). When using the FS2-60G.

Attachment

Type	Configuration	Features	Applicable fiber units	Model
Side-view		Space-saving, side-view type	FU-7F, FU-84C, FU-86	**F-1**
Long-detecting distance		Greater detecting distance		**F-2**
Focusing lens		0.4 mm 0.16" beam spot diameter	FU-35FA	**F-2HA**
		Beam spot diameter: 4 mm 0.16" Detecting distance: 19 ±2 mm0.75"± 0.08"		**F-3HA**
Protective tube		Stainless-steel spiral tube	FU-63, FU-66, FU-68	**OP-6630**
			FU-7F, FU-73, FU-84C, FU-86	**OP-6631**

Type		Side-view			Long-detecting distance			Focusing lens	
Model		F-1			F-2			F-2HA	F-3HA
Fiber unit		FU-7F	FU-84C[1.]	FU-86[1.]	FU-7F	FU-84C	FU-86	FU-35FA	
Detecting distance (mm)	FS-T22 (P)	220 8.66"	—	220 8.66"	1100 43.31"	—	1100 43.31"	Center of detecting distance: 7 ± 1 0.28" ± 0.04"	Center of detecting distance: 19 ± 2 0.75" ± 0.08"
	FS2-62 (P)	400 15.75"	220 8.66"	400 15.74"	1800 70.86"	1500 59.06"	1800 70.86"		
	FS2-60 (P)	220 8.66"	160 6.30"	220 8.66"	1100 43.31"	900 35.43"	1100 43.31"		
	FS2-65 (P)	70 2.76"	60 2.36"	70 2.76"	300 11.81"	240 9.45"	300 11.81"		
	FS2-60G	35 1.38"	—	351.38"	150 5.91"	—	150 5.91"	—	—
Smallest detectable object		0.6 mm 0.02" dia. opaque material			0.9 mm 0.04" dia. opaque material			0.03 mm 0.001" dia. copper wire	0.1 mm 0.004" dia. copper wire

1. To use the F-1 with the FU-84C or FU-86, specify the heat-resistant F-1 when ordering.

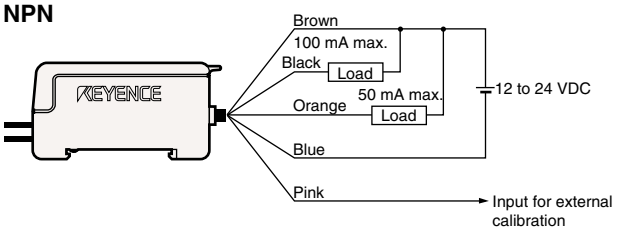
Specifications

Amplifier

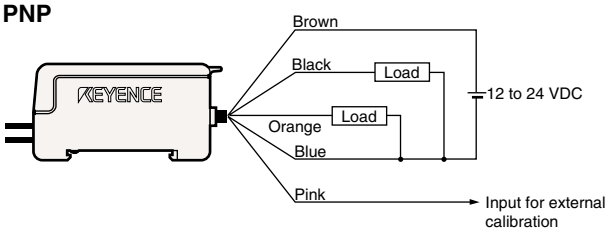
Type		One-touch calibration	Ultra-long detecting distance	Long-detecting distance	High-speed response	Color differentiation
Mode	NPN	FS-T22	FS2-62	FS2-60	FS2-65	FS2-60G
	PNP	FS-T22P	FS2-62P	FS2-60P	FS2-65P	—
Light source		Red LED	Red LED	Red LED	Red LED	Green LED
Sensitivity adjustment		Pushbutton	8-turn trimmer	8-turn trimmer	8-turn trimmer	8-turn trimmer
Response time		500 µs	500 µs	250 µs	50 µs	250 µs
Operation mode		LIGHT-ON/DARK-ON (switch-selectable)				
Indicators		Output: Red LED, Tuning: Yellow LED, Stable operation and sensitivity setting error: Green LED	Output: Red LED, Stable operation: Green LED	Output: Red LED, Stable operation: Green LED	Output: Red LED, Stable operation: Green LED	Output: Red LED, Stable operation: Green LED
Timer mode		ON-delay 40 ms/OFF-delay 40 ms/Timer OFF (switch-selectable)				
Buzzer mode		—	Buzzer ON when control output turns ON/ Buzzer ON when alarm output turns ON/ Buzzer OFF (switch-selectable)			
Output	Control	NPN or PNP : 100 mA max. (40 V max.), Residual voltage: 1 V max.				
	Alarm	NPN or PNP : 50 mA max. (40 V max.), Residual voltage: 1 V max.				
Protection circuit		Reversed polarity, Overcurrent protection, Surge absorber				
Power supply		12 to 24 VDC ±10%	12 to 24 VDC ±10%	12 to 24 VDC ±10%	12 to 24 VDC ±10%	12 to 24 VDC ±10%
Current consumption		50 mA max.	35 mA max.	35 mA max.	35 mA max.	35 mA max.
Ambient light		Incandescent lamp: 10,000 lux max., Sunlight: 20,000 lux max.				
Ambient temperature		-10 to +55° C	-10 to +55° C	-10 to +55° C	-10 to +55° C	-10 to +55° C
Housing		Polycarbonate	Polycarbonate	Polycarbonate	Polycarbonate	Polycarbonate
Weight (including 2-m 6.6' cable)		Approx. 75 g	Approx. 61 g	Approx. 61 g	Approx. 61 g	Approx. 61 g

Connections

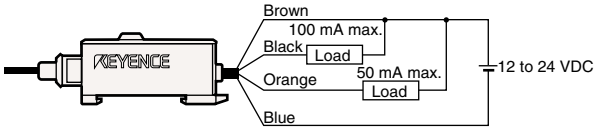
FS-T22
NPN



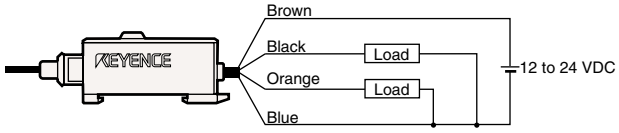
FS-T22P
PNP



FS2-60/FS2-62/FS2-65/FS2-60G
NPN



FS2-60P/FS2-62P/FS2-65P
PNP

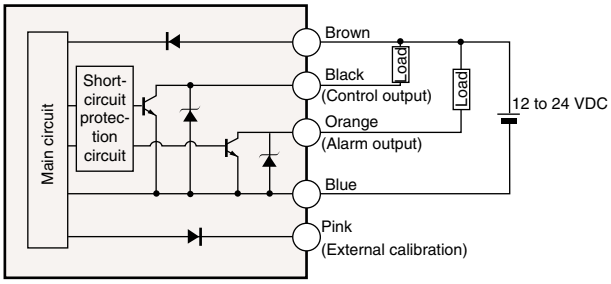


FS2/FS-T22 Fiber Photoelectric Sensors

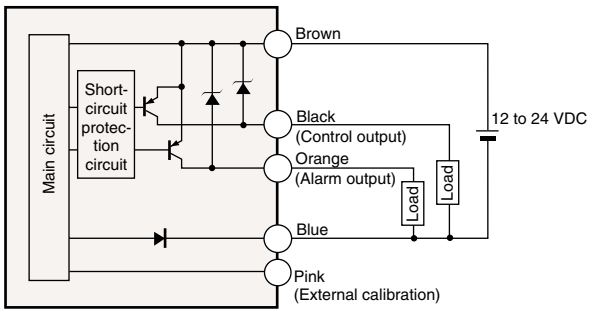
Input/Output Circuits

FS-T22 Output circuit

NPN

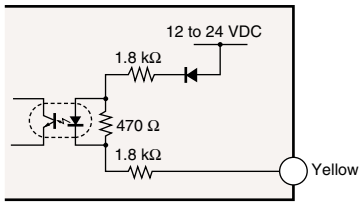


PNP



FS-T22(P) Input circuit

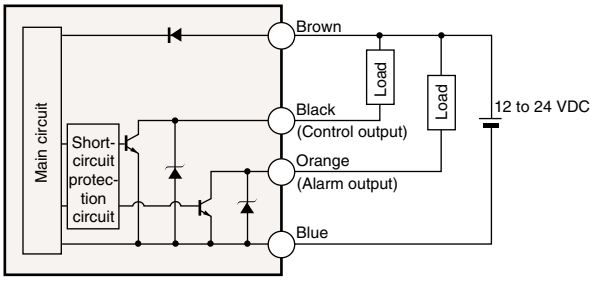
Input circuit for external calibration



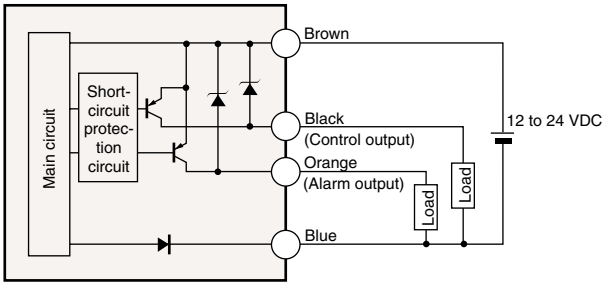
Input impedance: Approx. 4 kΩ

FS2 Output circuit

NPN



PNP

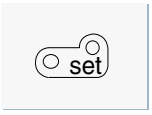


Adjustment

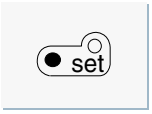
FS-T22

Thrubeam type/ Diffuse-reflective type

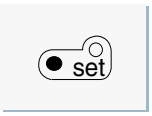
Setting the sensitivity



1. With a target in place, press the SET pushbutton. The yellow LED lights.



2. With no target, press the SET pushbutton. The yellow LED turns off. Setting is complete. If sensitivity cannot be set because the received light quantity with and without a target is too small, the green LED flashes for approx. 2 seconds.

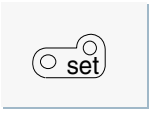


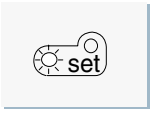
3. Check sensor operation.

Procedures 1 and 2 can be reversed.

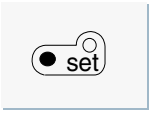
Setting to maximum sensitivity

When a reflective sensor is used for long distance detection or a thrubeam sensor is used for detection in an unstable environment, follow the procedure given below to set the sensitivity to maximum.





1. With (thrubeam), or without (reflective) a target in place, hold the SET pushbutton down for 3 seconds. When the yellow LED starts flashing, setting is complete. With a reflective sensor, if there is a background object, set the sensitivity to the highest setting that will not detect the background object.



2. Check sensor operation.

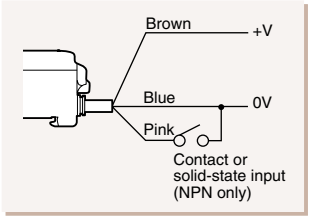
Precautions

Stability indicator

When setting the sensitivity, it flashes to indicate the sensitivity setting has been rejected due to small excess gain and that the current sensitivity remains valid.

External sensitivity adjustment

The sensitivity can be set from external device, rather than using the SET pushbutton on the amplifier unit. Use an input signal of 40 ms or more.



Sensitivity setting protection

To prevent the sensitivity from being accidentally changed, set the sensitivity setting protector switch to LOCK. The sensitivity will not change even if the SET pushbutton is pressed.

[Note]
This function does not prevent changes in sensitivity input externally, or operation mode or timer mode changes.

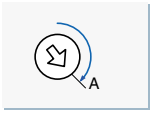
Self-diagnosis

- If the sensitivity cannot be set, the green LED flashes and the alarm signal is output for 2 seconds.
- If, after the sensitivity has been set, the received light quantity falls below a specified level due to dirt on the lens or misalignment of the optical axis, the alarm output is triggered.

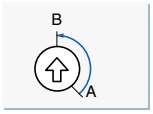
FS2

Thrubeam type

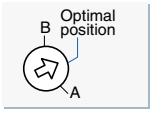
DARK-ON mode (When LIGHT-ON mode is specified, refer to words in parentheses.)



1. With a target in place, turn the trimmer clockwise until the red LED indicator turns off (lights). – Point A



2. With no target, turn the trimmer counter-clockwise until the green LED lights (turns off). – Point B

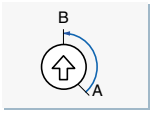


3. Set the trimmer midway between points A and B. Confirm sensor operation.

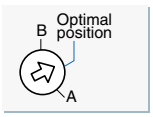
Diffuse-reflective type

LIGHT-ON mode (When DARK-ON mode is specified, refer to words in parentheses.)

1. With no target, turn the trimmer clockwise until the red LED indicator lights (turns off). – Point A



2. With a target in place, turn the trimmer counterclockwise until the green LED turns off (lights). – Point B



3. Set the trimmer midway between points A and B. Confirm sensor operation.

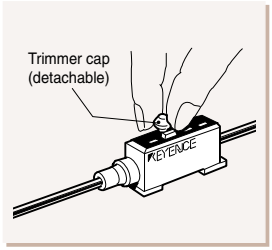
Precautions

Adjustment with alarm buzzer

- The output indicator operates in conjunction with a built-in buzzer when the alarm selector switch on the top of the amplifier unit is set to the OUT position, facilitating adjustment.
- When the alarm selector switch is set to the STB position, the alarm buzzer sounds when light quantity is reduced by an accumulation of dust or dirt on the lens surface, or when the optical axis is out of alignment (through-beam sensor).
- Set the alarm switch to the OFF position to deactivate the buzzer function.

Adjustment with the trimmer cap

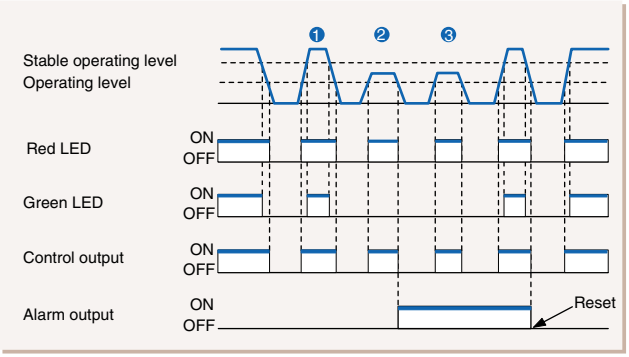
- Adjust the trimmer with the trimmer cap or with a screwdriver.



FS2/FS-T22 Fiber Photoelectric Sensors

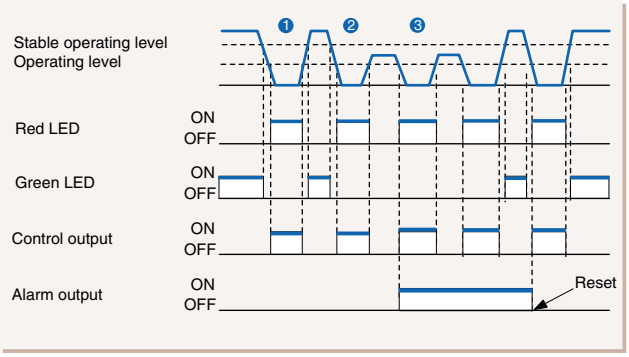
Timing Chart

LIGHT-ON mode



- If the light quantity received by the receiver of the sensor drops from a stable level 1 to an unstable level 2, the alarm output is triggered.
- If the alarm output is triggered, clean the lens surface and/or realign the optical axis so that the stable operation indicator lights again. Operating the sensor with the green LED lit resets the alarm output.

DARK-ON mode



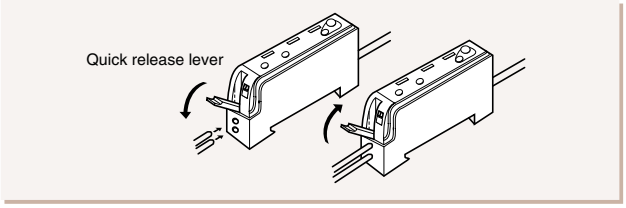
- If the light quantity is not restored to a stable level after detection of a target 2, the alarm output is triggered when detecting a second target 3.

Hints on Correct Use

FS-T22 (P)

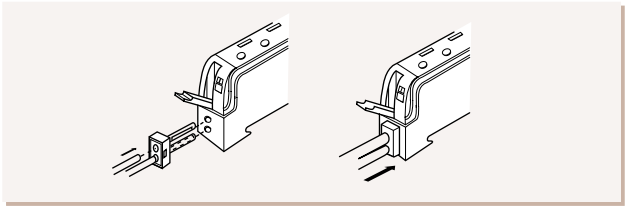
Mounting the fiber unit

- Pull open the quick release lever. Insert the fiber unit as far as possible. Close the quick release lever.

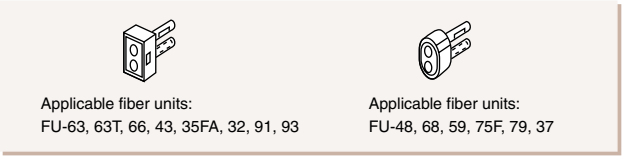


- When mounting the FU 63, 63T, 66, 43,48, 68, 35FA, 59,79, 75F, 32, 91, 37, or 93 fiber unit to the amplifier, use the adapter supplied.

1. Fully insert the adapter into the holes.
2. Insert the fiber unit into the adapter as far as possible.



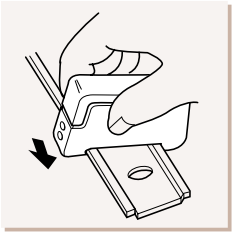
- Two adapter types are supplied. Select the proper one for the fiber unit to be used. If the wrong adapter is used, the fiber unit cannot be securely mounted.



- The mounting ring and connector attached to the fiber unit are not used.

Mounting the amplifier to a DIN rail

Hook the claw located at the bottom of the amplifier to a DIN rail, and push the amplifier against the DIN rail. To detach the amplifier, pull it up while drawing it toward the fiber unit side.



Amplifier

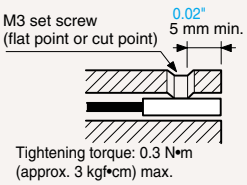
- When the external tuning input is not used, cut the pink cable very short or connect it to the positive terminal of the power supply.
- Limit the length of extension to within 100 m 328.1'.

FS2(P) & FS-T22(P)

Fiber unit

- Avoid strong impact to the surface of the fiber unit head.
- When mounting the fiber unit using a mounting screw, do not exceed the tightening torque specified below.

Mounting with set screw



Mounting with nut and bolt

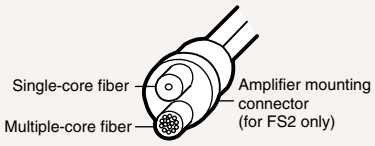
Screw size	Tightening torque
M3	0.6 N•m max.
M4	0.8 N•m max.
M6	

- Do not apply undue force to the fiber unit.
- Fiber units other than those listed below have a tensile strength of 3 kg for 3 seconds maximum.

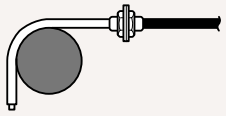
Model	Tensile strength
FU-81C, 82C, 83C, 84C	2 kg for 3 sec max.
FU-63, 63T, 43, 65, 65X, 45, 45X, 49, 49X, 59, 79, 75F, 32, 36, 36X, 35FA, 22, 37	1 kg for 3 sec max.

- When mounting the coaxial type fiber unit (FU-23, 23X, 25, 35A, 35FA, 22, 22X) to the amplifier, connect the single-core fiber to the transmitter, and multiple-core fiber to the receiver.

[Note]
The transmitter emits light from the upper hole of the FS-T22 and from the lower hole of the FS2.



- Bend the sleeve type fiber unit by manually bending it around a cylindrical object of a minimum radius of 10 mm 0.39" (25 mm 0.98" for FU-33/34. Do not bend FU-65, 65X, 75F, 43, 32.) Do not bend the sleeve more than three times.
- Do not heat the sleeve of the heat-resistant type fiber unit after heating the unit.

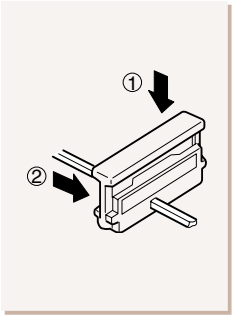


- Do not use the fiber unit in an environment where organic solvents such as thinner are present.

Using the cutter

Cut the free-cut fiber unit to the desired length using the attached cutter.

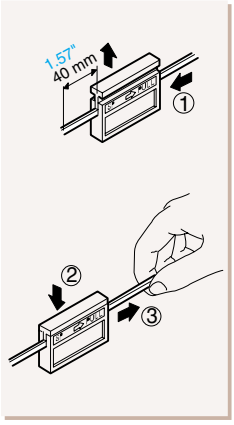
1. Insert the fiber unit into the corresponding cutter hole to the desired length.
2. Cut the fiber by quickly pushing the blade all the way down. Stopping the blade midway will prevent a clean cut, thereby lessening the detecting distance. Do not use a cutter hole more than once.



Using the splitter

To split the tip of the free-cut fiber unit after cutting it, use the attached splitter (for FU-4F, 66, 63, 63T, 43, 91 and 93 only). If you use any device other than the attached splitter, the sheath of the fiber unit may tear.

1. Lift the head of the splitter. Insert the fiber unit straight into the splitter in the opposite direction to the arrow (-PULL) until it protrudes approximately 40 mm 1.57".
2. Firmly press the head of the splitter down.
3. Pull the fiber unit straight out from the splitter in the direction of the arrow (-PULL). It will be split at approximately 50 mm 1.97" from the inserted end.



Mounting the amplifier

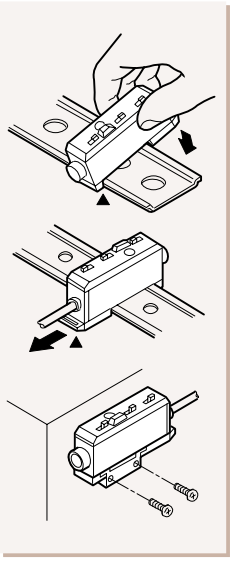
Do not extend the cable beyond 100 m 328.1'.

Mounting the FS2 amplifier to a DIN rail

Hook the claws located at the bottom of the amplifier to a DIN rail, and push the amplifier against the DIN rail to hold it. To detach the amplifier, pull it up while drawing the DIN-rail fixtures located in the cable side of the amplifier as indicated by the arrow.

Side mounting

Use the attached mounting bracket. Secure the mounting bracket in place with two screws.



FS2/FS-T22 Fiber Photoelectric Sensors

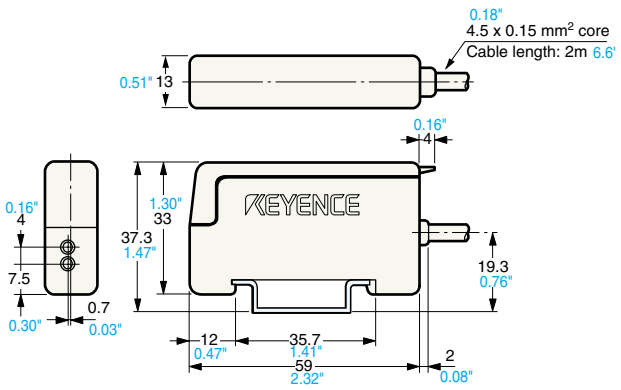
Dimensions

CAD

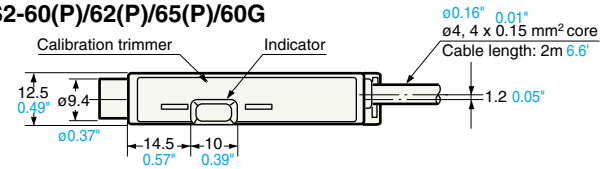
Amplifier unit

Unit: mm Inch

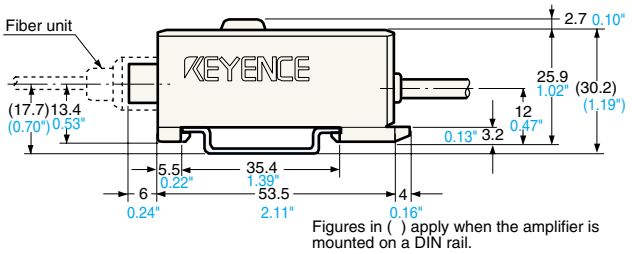
FS-T22(P)



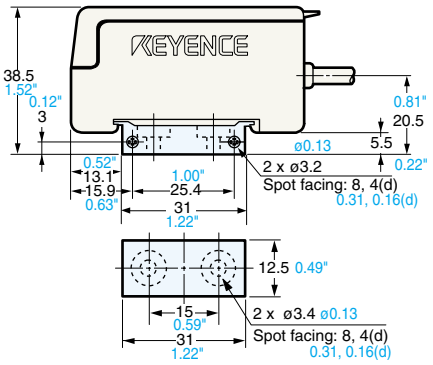
FS2-60(P)/62(P)/65(P)/60G



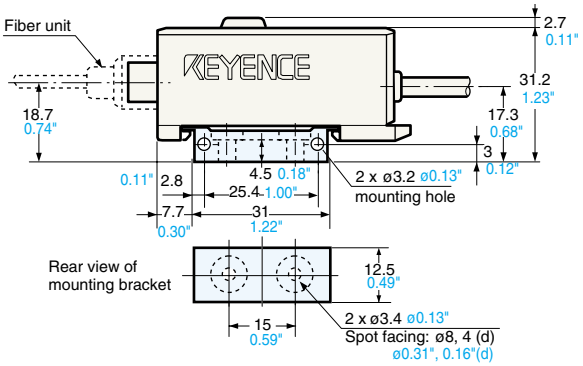
When the amplifier is mounted to a DIN rail



Figures in ( ) apply when the amplifier is mounted on a DIN rail.



When the mounting bracket (standard) is used



Fiber unit

For dimensions of the fiber units, refer to the FS01 Series dimensions.