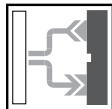# SU17.1 Series
Fiber Optic Sensors

- Dual 4-digit displays
- Simple auto-tuning
- Dual output models available
- Reduced wiring via expansion units
- Built-in timer functions
- Mutual interference protection
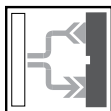- Automatically monitors transmitter light level to ensure sensor stability

Fiber Optic Diffuse and Thru-Beam Mode

See page 756

Sensing Range: Determined by fiber optic cable
Output: NPN, PNP

See page 757-760 for SU17.1 Series specifications, wiring and dimensions.

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Fiber Optic Diffuse and Thru-Beam Mode

Photoelectric SU17.1 Series Fiber Optic

Specifications		Stand-Alone		Main Unit	Expansion Unit
SENSING RANGE		**Determined by cable***	**Determined by cable***	**Determined by cable***	**Determined by cable***
SENSITIVITY ADJUSTMENT		Yes	Yes	Yes	Yes
MODEL NUMBER(S)		**SU17.1-K-Z/102a/115/123** ⚡	**SU17.1-K-Z/102a/115b/123**	**SU17.1M-K-Z/21/115** ●	**SU17.1S-K-Z/21/115**
		SU17.1-K-Z/103a/115/123 ⚡	**SU17.1-K-Z/103a/115b/123**	**SU17.1M-K-Z/20/115** ●	**SU17.1S-K-Z/20/115**
OUTPUT: Transistor, Open Collector	**/102a**	1 NPN	1 NPN	—	—
	/103a	1 PNP	1 PNP	—	—
	/21	—	—	2 NPN	2 NPN
	/20	—	—	2 PNP	2 PNP
LOAD CURRENT		100 mA max.	100 mA max.	30 mA max.	30 mA max.
SHORT CIRCUIT AND OVERLOAD PROTECTION		Yes	Yes	Yes	Yes
REVERSE POLARITY PROTECTION		Yes	Yes	Yes	Yes
SUPPLY VOLTAGE		12-24 VDC	12-24 VDC	12-24 VDC	12-24 VDC
VOLTAGE RIPPLE		10%	10%	10%	10%
LED(s)		Yes (1)	Yes (1)	Yes (2)	Yes (2)
CURRENT CONSUMPTION		≤ 30 mA	≤ 30 mA	≤ 30 mA	≤ 30 mA
OPERATING MODE		Light on/dark on	Light on/dark on	Light on/dark on	Light on/dark on
RESPONSE TIME (by Sensing Type)	*High Speed*	50 µs (NPN), 58 µs (PNP)	50 µs (NPN), 58 µs (PNP)	—	—
	Fast	250 µs	250 µs	140 µs	140 µs
	Semi-Fast	500 µs	500 µs	500 µs	500 µs
	Normal	1 ms	1 ms	1 ms	1 ms
	High Power	5 ms	5 ms	5 ms	5 ms
TIMER FUNCTION		On Delay, Off Delay, One Shot, On Delay + One Shot, On Delay + Off Delay	On Delay, Off Delay, One Shot, On Delay + One Shot, On Delay + Off Delay	On Delay, Off Delay, One Shot, On Delay + One Shot, On Delay + Off Delay, Heartbeat	On Delay, Off Delay, One Shot, On Delay + One Shot, On Delay + Off Delay, Heartbeat
SWITCHING FREQUENCY		8 kHz	8 kHz	3.5 kHz	3.5 kHz
PROTECTION (IEC)		IP40	IP40	IP40	IP40
LIGHT SOURCE		Visible Red LED	Visible Red LED	Visible Red LED	Visible Red LED
AMBIENT LIGHT RESISTANCE		≤ 20,000 lux (sunlight) ≤ 5,000 lux (incandescent)	≤ 20,000 lux (sunlight) ≤ 5,000 lux (incandescent)	≤ 20,000 lux (sunlight) ≤ 5,000 lux (incandescent)	≤ 20,000 lux (sunlight) ≤ 5,000 lux (incandescent)
TEMPERATURE RANGE	*WORKING†*	-4 ºF to +131 ºF	-4 ºF to +131 ºF	-4 ºF to +131 ºF	-4 ºF to +131 ºF
	STORAGE	-4 ºF to +158 ºF	-4 ºF to +158 ºF	-4 ºF to +158 ºF	-4 ºF to +158 ºF
HOUSING MATERIAL		PC resin	PC resin	PC resin	PC resin
WEIGHT		2.6 oz	1.2 oz	2.6 oz	1.4 oz
APPROVALS		CE	CE	CE	CE
ELECTRICAL CONNECTION		2-meter cable, PVC covered, 4-conductor	152 mm pigtail, PVC covered, quick disconnect type V1	2-meter cable, PVC covered, 4-conductor	2-meter cable, PVC covered, 2-conductor
ADDITIONAL DATA		*See pages 757-760*			

† When the product is gang-mounted, the operating temperature may vary depending on the number of units, as described below:

2 units: -4 to +131 °F, 3 units: -4 to +122 °F,
4 or 5 units: -4 to +113 °F, 6 units or more: -4 to +104 °F

If the operating temperature becomes higher than the above level, avoid tight gang-mounting.
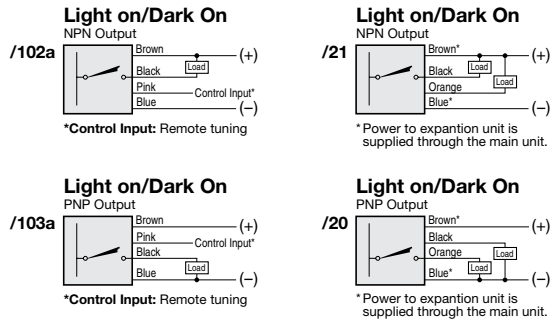
⚡ Stocked item
● Typical delivery 4 weeks or less
Consult factory for all other

Wiring Diagrams

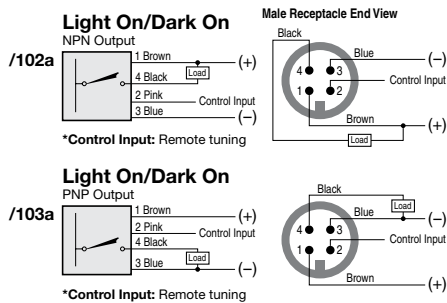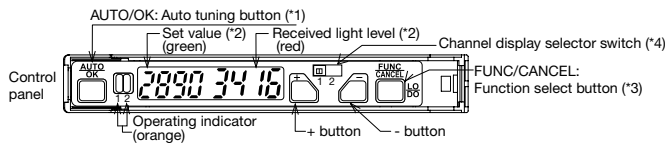### DC

Cable Connection

Light on/Dark On
NPN Output
/102a
Brown — (+)
Black — Load
Pink — Control Input*
Blue — (−)
*Control Input: Remote tuning

Light on/Dark On
NPN Output
/21
Brown* — (+)
Black — Load
Orange — Load
Blue* — (−)
* Power to expantion unit is supplied through the main unit.

Light on/Dark On
PNP Output
/103a
Brown — (+)
Pink — Control Input*
Black — Load
Blue — (−)
*Control Input: Remote tuning

Light on/Dark On
PNP Output
/20
Brown* — (+)
Black — Load
Orange — Load
Blue* — (−)
* Power to expantion unit is supplied through the main unit.

Quick Disconnect

Note: Wiring diagrams show quick disconnect pin numbers.

V1 Type

Light On/Dark On
NPN Output
/102a
1 Brown — (+)
4 Black — Load
2 Pink — Control Input
3 Blue — (−)
*Control Input: Remote tuning

Male Receptacle End View
Black
Blue — (−)
Control Input
4 3
1 2
Brown — (+)
Load

Light On/Dark On
PNP Output
/103a
1 Brown — (+)
2 Pink — Control Input
4 Black
3 Blue — (−)
*Control Input: Remote tuning

Black
Load
Blue — (−)
Control Input
4 3
1 2
Brown — (+)

Names of Parts

AUTO/OK: Auto tuning button (*1)
Set value (*2) (green)
Received light level (*2) (red)
Channel display selector switch (*4)
Control panel
AUTO OK
FUNC CANCEL
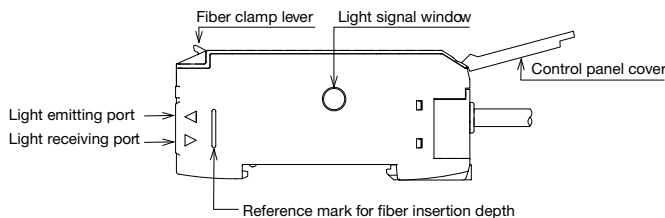FUNC/CANCEL: Function select button (*3)
Operating indicator (orange)
+ button
- button

*1: This button is also used as the SET button during setup.
*2: Display can be set by selecting a display type in the function selection menu.
*3: This button is also used for LO/DO setup or cancellation.
*4: This switch is on the Main and Expansion units only.

Fiber clamp lever
Light signal window
Control panel cover
Light emitting port
Light receiving port
Reference mark for fiber insertion depth

Features

Digital display: Dual 4-digit display indicates incoming light level and preset output value side by side. This allows the user to easily check the current scanning status while setting up the sensor.

Easy operation: Simple one-touch auto-tuning, easy-to-read digital displays, step-by-step menus and manual digital tuning as easy to operate as a conventional potentiometer.

Selectable sensing modes: Twelve sensing modes are available ranging from High Power to High Speed to Low Saturation.

Auto-tuning: 2-point tuning, percent tuning, position tuning, BGS tuning, full auto tuning, remote tuning and simple manual tuning.

Built-in Timer Functions: On-delay, off-delay, one-shot, on-delay/off-delay, and on-delay/one-shot from 250 microseconds to 90 seconds.

Dual Outputs: Main units and expansion units have two independently set outputs that allow them to handle applications formerly requiring 2 sensors.

Reduced wiring: Up to 16 units can be gang-mounted together using a main unit along with expansion units. Since power is supplied through the main unit via the expansion connections, only an output wire is required for the expansion units. This reduces wiring by up to 60%.

Light stability: The sensor automatically monitors the level of light emitted by the LED and regulates the current to maintain light emission at a constant level.
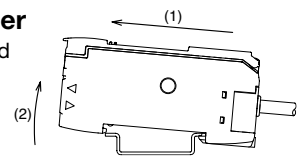
Mounting

■ Mounting the amplifier

(1) Insert one side of the DIN rail into the slot at point A.

(2) Push the unit downwards until the second rail clicks into place at point B.
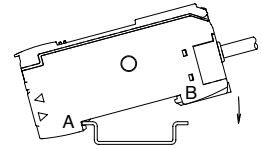
■ Dismounting the amplifier

If the amplifier is pushed forward firmly (1), the front lock will release. The amplifier can then be pulled out (2) and detached, as shown in the figure.

■ Expansion-unit attachment to the main unit for reduced wiring models

(1) Peel the seal off the connector of the units to be attached.

(2) Mount side by side on a DIN rail.

(3) Slide the expansion units over to so that the connectors connect.

(4) Use an end plate (EW35, sold separately) to hold the expansion units in place.

(5) When dismounting, slide each expansion unit off one by one.

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SU17.1 Series Programming

■ Inserting optical fibers into the amplifier

(1) Open the cover.

(2) Move the fiber clamp lever forwards to the release position.

(3) Firmly insert the tip of each fiber into the holes in the amplifier. For the insertion depth of the fiber, refer to the reference mark on the side of the unit.

Fiber insertion depth reference mark
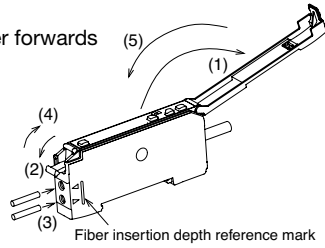
(4) Return the lever to the clamp position.

(5) Close the cover.

⚠ Handling Precautions

• If the fiber is thin, first insert it into the thin fiber adapter so that the fiber projects approximately 0.5 to 1mm from the top of the adapter. After that, insert the adapter into the hole in the amplifier until it is in contact with the end, and then fix it firmly.

• Do not bend the cable within 40mm (in case of thin fiber: 10mm) of its junction with the amplifier unit or the sensing head.

40mm min.
R
R
Amplifier
Sensor
40mm min.
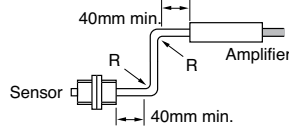
When connecting a coaxial diffuse type fiber unit to the amplifier, insert the single-core fiber into the port for light emission and the multi-core fiber into the port for light reception.

Single-core — Light emitting port
Multi-core — Light receiving port
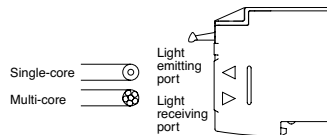
Amplifier cautions

• Output is disabled upon power-up for approx. 300ms so the unit can stabilize.

• Use a cover or change the mounting direction to ensure the sensor's correct operation if interference from ambient light is considerable.

• When using a load which generates an inrush current, connect a current-limiting resistor between the load and the output terminal to avoid activating the short-circuit protection.

Cutting optical fibers

⚠ Caution

• To avoid injury, do not disassemble the dedicated cutter.

Use the dedicated cutter (included with the unit) to cut the fiber. High and low temperature-proof fibers cannot be cut.

(1) Insert the fiber cable to the desired cutting length into one of the previously unused holes in the cutter.

(2) Push down the blade in one strong and smooth motion.

Fiber

(3) Do not reuse a hole once used to cut a fiber cable.

• If the sensing face is dirty, wipe with a soft, clean cloth. Do not use benzine, thinner or other organic solvents.
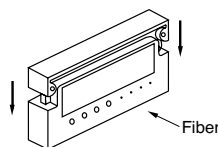
Settings

■ Channel display selection

Slide the switch to the channel (1 or 2) to be used in normal operation. [ch 1] or [ch 2] displays, and the set value and the received light level will be displayed. Operating indicator 1 or 2 will light up.

The following settings are available for both channels 1 and 2 independently:

• Light-ON (LO) / dark-ON (DO) output selection

• Manual tuning preset value

• Auto tuning preset value

• Timer function selection

Note: When the switch is used to change between preset values 1 and 2, the unit returns to normal operation mode, and any changes can be made.

### ■ Setting LO/DO

Set the light-ON (LO) or dark-ON (DO) setting.

(1) Keep the FUNC/CANCEL button pushed for 3s or more.
(2) Select LO or DO with the [+] or [-] button.
(3) Push the AUTO/OK button to complete the selection.

(1)
Lodo Lo
(3)   (2)
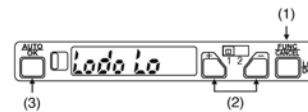
■ Manual tuning

Values are set manually. When the (+) or (-) button is pushed in normal operation mode, the unit changes to manual tuning setup mode.

(1) Pushing the [-] button will decrease the set value and pushing the [+] button will increase the set value.

2890 3416
Set value
(1)
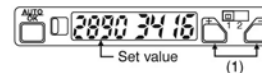
The settable range differs depending upon the sensing type.
It is also possible to be fine tuning after auto-tuning.

■ Auto tuning

For details about error messages after tuning, refer to "Corrective actions against tuning errors".
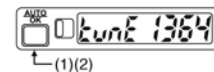
⚠ Handling Precautions

• The control output turns OFF during auto tuning.

• After tuning, check that detection is stable and that no problems occur in the actual operation. Additionally, if some factor, such as detection condition, changes after tuning, carry out the tuning again using the proper procedures.

● Full auto tuning (for main and expansion units)

While the workpiece is moving, the middle point between the light level when the workpiece is present and when it is not present is used as the set value. This function is useful for applications where the workpiece cannot be stopped.

Setting procedure:
(1) Keep the AUTO/OK button pushed for 3s or more. [FULL] is displayed, and full auto tuning starts. Pass a workpiece through the detection location.

tunE 1364
(1)(2)

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(2) To finish full auto tuning, press AUTO/OK again. When tuning is complete, [*FULL good*] is displayed.

(3) After completion of setting, check that the workpiece can be detected.

Depending on the size and speed of the workpiece, tuning might not be possible.
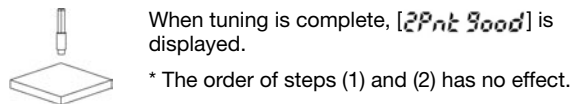
● **2-point tuning**
The middle point between the target-present state and not-present state is used as the set value.

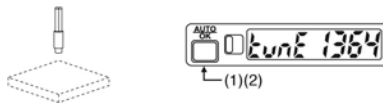Example of setting:
(1) Push the AUTO/OK button without a target.

(1)(2) *tunE 1364*

(2) Then, push the AUTO/OK button with a target.

When tuning is complete, [*2Pnt good*] is displayed.
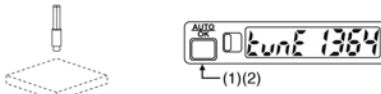
* The order of steps (1) and (2) has no effect.

● **BGS tuning**
The maximum level at which the diffuse type fiber unit detects a target without a background is used as the set value. BGS tuning should be done without a target.
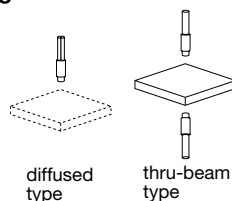
(1) Push the AUTO/OK button.

(1)(2) *tunE 1364*

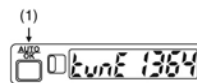(2) Then, push the AUTO/OK button again and hold for 3s or more.

When tuning is complete, [*b95 good*] is displayed.
Note: Do not use a target for tuning.

● **Maximum sensitivity setting**
To detect a target without a background using the diffuse type fiber unit or to completely detect a shaded target using the thru-beam type fiber unit, use this setting for maximum sensitivity. This ensures the correct and reliable settings. (This setting procedure is the same as for BGS tuning.)

diffused type   thru-beam type

(1) For diffuse type fiber units, push the AUTO/OK button without a target. For thru-beam type fiber units, briefly push the AUTO/OK button with a target in place.

(1) *tunE 1364*

(2) Then, push the AUTO/OK button again and hold for 3s or more.

When tuning is complete, [*b95 good*] is displayed.
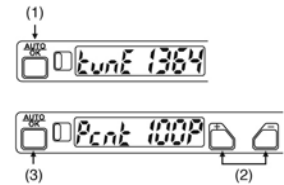Note: Do not use a target for tuning in step 2.

● **Percent tuning**
Using the current light receiving level as a reference level, specify a percentage (%) of this reference level and use it as the set value. Tuning should be done without a target.

(1) Push the AUTO/OK button.

(1) *tunE 1364*
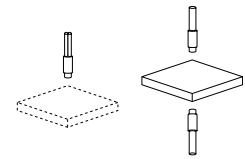
(2) Set a percentage (%) of the threshold level with the [+] or [-] button. The setting range is from 10% to 999%.
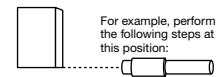
(3) *Pcnt 100P*   (2)

(3) Push the AUTO/OK button.

When tuning is complete, [*Pcnt good*] is displayed.
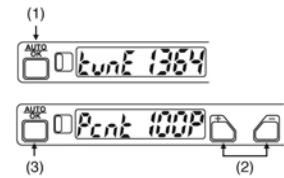Note: Do not use a target for tuning.

● **Position tuning**
With the percentage (%) of the percent tuning set at 100, it is possible to set the device so that the target is detected at a specified position.

For example, perform the following steps at this position:

(1) Push the AUTO/OK button.

(1) *tunE 1364*

(2) Set the threshold level percentage to 100 with the [+] or [-] button.

(3) *Pcnt 100P*   (2)

(3) Push the AUTO/OK button.

When tuning is complete, [*Pcnt good*] is displayed.
Note: Do not use a target for tuning.

● **Remote tuning (for stand-alone units)**
The same sensitivity settings as described above can be enabled by external remote tuning input signals. Once the sensitivity setting has been made with the auto tuning, this sensitivity setting can be made subsequently using the remote tuning input signals.
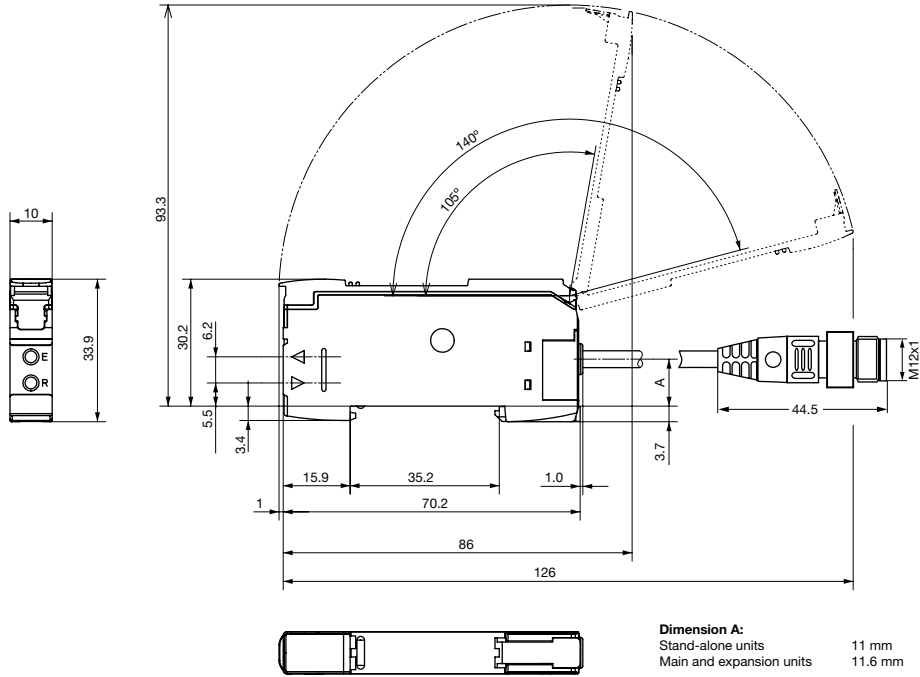
(1) Perform auto tuning.

(2) Put the unit in the same detection conditions (target present or not) and installation conditions as those in step (1).

(3) Input the remote tuning signals.

- For NPN, connect the pink wire to ground for 100ms or more, then disconnect for 1s or more, then reconnect to ground for 100ms or more, then disconnect. If remote tuning is not needed, cut the pink wire or connect it to the plus terminal of the power supply.

- For PNP, connect the pink wire to the plus terminal of the power supply for 100ms or more, then disconnect for 1s or more, then reconnect to the plus terminal of the power supply for 100ms or more, then disconnect. If remote tuning is not needed, cut the pink wire or connect it to the minus terminal of the power supply.
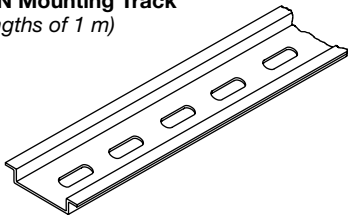
Photoelectric SU17.1 Series Fiber Optic

Photoelectric SU17.1 Series Fiber Optic

Dimensions (mm)

SU17.1 Series

140°
105°
93.3
10
33.9
30.2
6.2
5.5
3.4
15.9
35.2
1.0
70.2
1
86
126
A
3.7
44.5
M12x1

Dimension A:

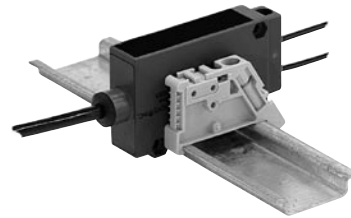|	
Stand-alone units	11 mm
Main and expansion units	11.6 mm

Accessories

35 mm DIN Mounting Track
(sold in lengths of 1 m)

DIN Track End Bracket Model EW35

See pages 761-796 for fiber optic lengths and specifications.

See pages 855-896 for additional accessories

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