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.
### Specifications

<table>
<thead>
<tr>
<th></th>
<th>Stand-Alone</th>
<th>Main Unit</th>
<th>Expansion Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SENSING RANGE</strong></td>
<td>Determined by cable*</td>
<td>Determined by cable*</td>
<td>Determined by cable*</td>
</tr>
<tr>
<td><strong>SENSITIVITY ADJUSTMENT</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>OUTPUT</strong></td>
<td>/102a 1 NPN</td>
<td>/102a 1 NPN</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>/103a 1 PNP</td>
<td>/103a 1 PNP</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>/21 2 NPN</td>
<td>/21 2 NPN</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>/20 2 NPN</td>
<td>/20 2 NPN</td>
<td>—</td>
</tr>
<tr>
<td><strong>LOAD CURRENT</strong></td>
<td>100 mA max.</td>
<td>100 mA max.</td>
<td>30 mA max.</td>
</tr>
<tr>
<td><strong>SHORT CIRCUIT AND OVERLOAD PROTECTION</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>REVERSE POLARITY PROTECTION</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>SUPPLY VOLTAGE</strong></td>
<td>12-24 VDC</td>
<td>12-24 VDC</td>
<td>12-24 VDC</td>
</tr>
<tr>
<td><strong>VOLTAGE RIPPLE</strong></td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td><strong>LED(s)</strong></td>
<td>Yes (1)</td>
<td>Yes (1)</td>
<td>Yes (2)</td>
</tr>
<tr>
<td><strong>CURRENT CONSUMPTION</strong></td>
<td>≤ 30 mA</td>
<td>≤ 30 mA</td>
<td>≤ 30 mA</td>
</tr>
<tr>
<td><strong>OPERATING MODE</strong></td>
<td>Light on/dark on</td>
<td>Light on/dark on</td>
<td>Light on/dark on</td>
</tr>
<tr>
<td><strong>RESPONSE TIME</strong></td>
<td>High Speed: 50 µs (NPN), 58 µs (PNP)</td>
<td>High Speed: 50 µs (NPN), 58 µs (PNP)</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Fast: 250 µs</td>
<td>Fast: 250 µs</td>
<td>140 µs</td>
</tr>
<tr>
<td></td>
<td>Semi-Fast: 500 µs</td>
<td>Semi-Fast: 500 µs</td>
<td>500 µs</td>
</tr>
<tr>
<td></td>
<td>Normal: 1 ms</td>
<td>Normal: 1 ms</td>
<td>1 ms</td>
</tr>
<tr>
<td></td>
<td>High Power: 5 ms</td>
<td>High Power: 5 ms</td>
<td>5 ms</td>
</tr>
<tr>
<td><strong>TIMER FUNCTION</strong></td>
<td>On Delay, Off Delay, One Shot, On Delay + Off Delay</td>
<td>On Delay, Off Delay, One Shot, On Delay + Off Delay</td>
<td>On Delay, Off Delay, One Shot, On Delay + Off Delay, Heartbeat</td>
</tr>
<tr>
<td><strong>SWITCHING FREQUENCY</strong></td>
<td>8 kHz</td>
<td>8 kHz</td>
<td>3.5 kHz</td>
</tr>
<tr>
<td><strong>PROTECTION (IEC)</strong></td>
<td>IP40</td>
<td>IP40</td>
<td>IP40</td>
</tr>
<tr>
<td><strong>LIGHT SOURCE</strong></td>
<td>Visible Red LED</td>
<td>Visible Red LED</td>
<td>Visible Red LED</td>
</tr>
<tr>
<td><strong>AMBIENT LIGHT RESISTANCE</strong></td>
<td>≤ 20,000 lux (sunlight) ≤ 5,000 lux (incandescent)</td>
<td>≤ 20,000 lux (sunlight) ≤ 5,000 lux (incandescent)</td>
<td>≤ 20,000 lux (sunlight) ≤ 5,000 lux (incandescent)</td>
</tr>
<tr>
<td><strong>TEMPERATURE RANGE</strong></td>
<td>Working: -4 °F to +131 °F</td>
<td>Working: -4 °F to +131 °F</td>
<td>-4 °F to +131 °F</td>
</tr>
<tr>
<td></td>
<td>Storage: -4 °F to +158 °F</td>
<td>Storage: -4 °F to +158 °F</td>
<td>-4 °F to +158 °F</td>
</tr>
<tr>
<td><strong>HOUSING MATERIAL</strong></td>
<td>PC resin</td>
<td>PC resin</td>
<td>PC resin</td>
</tr>
<tr>
<td><strong>WEIGHT</strong></td>
<td>2.6 oz</td>
<td>1.2 oz</td>
<td>2.6 oz</td>
</tr>
<tr>
<td><strong>APPROVALS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ELECTRICAL CONNECTION</strong></td>
<td>2-meter cable, PVC covered, 4-conductor</td>
<td>152 mm pigtail, PVC covered, quick disconnect type V1</td>
<td>2-meter cable, PVC covered, 4-conductor</td>
</tr>
<tr>
<td><strong>ADDITIONAL DATA</strong></td>
<td>See pages 757-760</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"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.

† When the number of units exceeds 1, the ambient temperature may be lower than -4 °F.

‡ Stocked item

§ Typical delivery 4 weeks or less

Consult factory for all other
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.
  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.
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.
(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.

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.
(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.

■ 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.

■ 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.
(2) To finish full auto tuning, press AUTO/OK again. When tuning is complete, [FULL $\text{GOOD}$] 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.
  
  ![2-point tuning](image1)

  (2) Then, push the AUTO/OK button with a target.
  
  ![2-point tuning](image2)

  When tuning is complete, [2Pnt $\text{GOOD}$] 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.
  
  ![BGS tuning](image3)

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

  When tuning is complete, [BGS $\text{GOOD}$] 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.)
  
  (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.
  
  ![Maximum sensitivity setting](image4)

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

  When tuning is complete, [BGS $\text{GOOD}$] 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.
  
  ![Percent tuning](image5)

  (2) Set a percentage (%) of the threshold level with the [+ or -] button. The setting range is from 10% to 999%.
  
  ![Percent tuning](image6)

  (3) Push the AUTO/OK button.

  When tuning is complete, [Pcnt $\text{GOOD}$] 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.
  (1) Push the AUTO/OK button.
  
  ![Position tuning](image7)

  (2) Set the threshold level percentage to 100 with the [+] or [-] button.
  
  ![Position tuning](image8)

  (3) Push the AUTO/OK button.

  When tuning is complete, [Pcnt $\text{GOOD}$] 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.
  
  ![Remote tuning](image9)

  (2) Put the unit in the same detection conditions (target present or not) and installation conditions as those in step (1).
  
  ![Remote tuning](image10)

  (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.
  
  ![Remote tuning](image11)

  - 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.
Dimensions (mm)

SU17.1 Series

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.