U-GAGE® T30UX/T30U
Compact Sensors in Universal Housing

- Features T-style right-angle sensor package with popular 30 mm threaded barrel and a wide variety of mounting brackets
- Offers choice of three ranges for reliable sensing from 100 mm to 3 m
- Includes models with a single analog or single discrete, two discrete, or analog and discrete in the same sensor
- Simplifies setup with push-button TEACH programming of custom sensing window
- Allows remote programming with an external switch, computer or controller for added security and convenience
- Presents sensor operating status using highly visible indicators LEDs
- Resists harsh environments with rugged IP67 (NEMA 6) housing and fully encapsulated electronics
- Provides digital filtering for exceptional electrical and noise immunity

T30UX
- Built-in temperature compensation for high-accuracy across a wide range of ambient temperatures
- Extended sensing ranges and short dead zones with 100 mm to 1 m, 200 mm to 2 m or 300 mm to 3 m
- Models with either analog or configurable discrete output
- Analog output models for applications requiring a continuous current or voltage output
- Wide operating temperature range of -40° to +70° C

T30U
- Range of 150 mm to 1 m or 300 mm to 2 m, depending on model
- Models with either dual-discrete or analog/discrete outputs
- Dual-discrete models for ON/OFF switching or pump/level control
- Independently programmable outputs
- Analog output models for applications requiring a continuous current or voltage output
- Chemically resistant models with a Teflon® coating to protect the transducer

U-GAGE® T30UX/T30U Sensors

T30UX and T30U (Long-range) Models

T30U Teflon-protected Models Suffix -CRFV

T30U (Short-range) Models

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com

More information online at bannerengineering.com
### U-GAGE® T30UX, 10-30V dc

<table>
<thead>
<tr>
<th>Range</th>
<th>Frequency</th>
<th>Connection</th>
<th>Response Time</th>
<th>Output</th>
<th>Models*</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mm to 1 m</td>
<td>224 kHz</td>
<td>2 m</td>
<td>45 ms</td>
<td>Discrete: NPN, PNP, NO, NC, Selectable</td>
<td>T30UXDA</td>
</tr>
<tr>
<td>200 mm to 2 m</td>
<td>174 kHz</td>
<td>2 m</td>
<td>92 ms</td>
<td>NPN</td>
<td>T30UXDAQ8</td>
</tr>
<tr>
<td>300 mm to 3 m</td>
<td>114 kHz</td>
<td>2 m</td>
<td>135 ms</td>
<td>NPN</td>
<td>T30UXBQ8</td>
</tr>
</tbody>
</table>

**Connection options:** A model with a QD requires a mating cordset (see page 325).

For 9 m cable, add suffix W/30 to the 2 m model number (example, T30UXDA W/30).

For sensors with Teflon®-protected face and transducer (long-range models only), add suffix -CRFV to the model number (example, T30UXDA-CRFV).

*Contact factory to request chemically resistant flap or fill-level control models.

### U-GAGE® T30U, 12-24V dc

<table>
<thead>
<tr>
<th>Range</th>
<th>Frequency</th>
<th>Connection</th>
<th>Response Time</th>
<th>Discrete Output(s)</th>
<th>Analog Output</th>
<th>Models*</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 mm - 1 m</td>
<td>228 kHz</td>
<td>2 m</td>
<td>48 ms</td>
<td>NPN</td>
<td>4 to 20 mA</td>
<td>T30UNA</td>
</tr>
<tr>
<td>300 mm - 2 m†</td>
<td>128 kHz</td>
<td>2 m</td>
<td>96 ms</td>
<td>NPN</td>
<td>4 to 20 mA</td>
<td>T30UNB</td>
</tr>
</tbody>
</table>

**Connection options:** A model with a QD requires a mating cordset (see page 325).

For 9 m cable, add suffix W/30 to the 2 m model number (example, T30UNA W/30).

For sensors with Teflon®-protected face and transducer (long-range models only), add suffix -CRFV to the model number (example, T30UNB-CRFV).

† Teflon®-encapsulated models have a range of 300 mm - 1.5 m.

Teflon® is a registered trademark of Dupont™.
U-GAGE® T30U, 12-24V dc

<table>
<thead>
<tr>
<th>Range</th>
<th>Frequency</th>
<th>Connection</th>
<th>Response Time</th>
<th>Discrete Output(s)</th>
<th>Analog Output</th>
<th>Models*</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 mm - 2 m²</td>
<td>128 kHz</td>
<td>2 m</td>
<td>96 ms</td>
<td>Dual NPN</td>
<td>None</td>
<td>T30UDNB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-pin Euro QD</td>
<td></td>
<td></td>
<td></td>
<td>T30UDNBQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 m</td>
<td></td>
<td></td>
<td></td>
<td>T30UDPB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-pin Euro QD</td>
<td></td>
<td></td>
<td></td>
<td>T30UDPBQ</td>
</tr>
<tr>
<td>150 mm - 1 m</td>
<td>228 kHz</td>
<td>2 m</td>
<td>48 ms</td>
<td>Pump/Level</td>
<td>None</td>
<td>T30UHNA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Control Dual NPN</td>
<td></td>
<td>T30UHNAQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T30UHNB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T30UHNBQ</td>
</tr>
<tr>
<td>300 mm - 2 m²</td>
<td>128 kHz</td>
<td>2 m</td>
<td>96 ms</td>
<td>Dual NPN</td>
<td>None</td>
<td>T30UHPA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-pin Euro QD</td>
<td></td>
<td></td>
<td></td>
<td>T30UHPAQ</td>
</tr>
<tr>
<td>150 mm - 1 m</td>
<td>228 kHz</td>
<td>2 m</td>
<td>48 ms</td>
<td>Pump/Level</td>
<td>None</td>
<td>T30UHPB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Control Dual NPN</td>
<td></td>
<td>T30UHPBQ</td>
</tr>
<tr>
<td>300 mm - 2 m²</td>
<td>128 kHz</td>
<td>2 m</td>
<td>96 ms</td>
<td>Dual NPN</td>
<td>None</td>
<td>T30UHPB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-pin Euro QD</td>
<td></td>
<td></td>
<td></td>
<td>T30UHPBQ</td>
</tr>
</tbody>
</table>

Connection options: A model with a QD requires a mating cordset (see page 325).

For 9 m cable, add suffix W/30 to the 2 m model number (example, T30UDNB W/30).

* For sensors with Teflon®-protected face and transducer (long-range models only), add suffix -CRFV to the model number (example, T30UDNB-CRFV).

† Teflon®-encapsulated models have a range of 300 mm - 1.5 m.

U-GAGE® T30UX Specifications

Effective Beam
See Chart EPBC-1 to EPBC-6 on page 326.

Sensing Range
"A" suffix models: 100 mm to 1 m
"B" suffix models: 200 mm to 2 m
"C" suffix models: 300 mm to 3 m

Ultrasonic Frequency
"A" suffix models: 224 kHz
"B" suffix models: 174 kHz
"C" suffix models: 114 kHz

Supply Voltage and Current
10 to 30V dc (10% max. ripple) at 40 mA, exclusive of load

Supply Protection Circuitry
Protected against reverse polarity and transient voltages.

Output Configuration
Discrete (switched) output models: SPST solid-state switch. Configurable as NPN (sinking) or PNP (sourcing) via Mode push button. Normally Open (NO) or Normally Closed (NC) operation is also selectable via Mode push button.
The default setting is PNP/NO.
Analog output models: 0 to 10V dc or 4 to 20 mA, depending on model

For 9 m cable, add suffix W/30 to the 2 m model number (example, T30UUNA W/30).

* For sensors with Teflon®-protected face and transducer (long-range models only), add suffix -CRFV to the model number (example, T30UUNA-CRFV).

† Teflon®-encapsulated models have a range of 300 mm - 1.5 m.

Teflon® is a registered trademark of DuPont™.
## U-GAGE® T30UX Specifications

### Output Ratings
Discrete output models: 100 mA max.
- Off-state leakage current: NPN: < 200 µA @ 30V dc (see NOTE 1)
- On-state saturation voltage: NPN: < 1.6V @ 100 mA

Analog output models:
- Analog Voltage Output: 2.5 kΩ min. load resistance
  - Minimum supply for a full 10V output is 12V dc (for supply voltages between 10 and 12, V out max. is at least V supply -2)
- Analog Current Output: 1 kΩ max. @ 24V input; max. load resistance = (Vcc-4)/0.02Ω

For current output (4-20 mA) models, ideal results are achieved when the total load resistance R = [(Vin – 4)/0.020]Ω. Example, at Vin = 24V dc, R = 1 kΩ (1 watt).

### Output Protection Circuitry
- Protected against short circuit conditions

### Output Response Time
- “A” suffix models: 45 milliseconds
- “B” suffix models: 92 milliseconds
- “C” suffix models: 135 milliseconds

### Delay at Power-up
500 milliseconds

### Temperature Effect
0.02% of distance°C

### Linearity (analog models)
0.25% of distance

### Repeatability/Resolution
- “A” suffix models: 0.1% of distance (0.5 mm min.)
- “B” suffix models: 0.1% of distance (1.0 mm min.)
- “C” suffix models: 0.1% of distance (1.5 mm min.)

### Sensing Hysteresis (discrete models)
- “A” suffix models: 2 mm
- “B” suffix models: 3 mm
- “C” suffix models: 4 mm

### Minimum Window Size
10 mm

### Adjustments
- Sensing window limits: TEACH-Mode configuration of near and far window limits may be set using the push button or remotely via TEACH input
- Advanced configuration options:
  - Push button enabled/disabled, temperature compensation enabled/disabled

#### Discrete output models:
- Output Configuration: NPN, PNP, Normally Open (NO), Normally Closed (NC) select
- Advanced configuration options:
  - Push button enabled/disabled, temperature compensation enabled/disabled

#### Analog output models:
- Response speed selection: Fast or Slow
- Advanced configuration options:
  - Analog output slope, push button enabled/disabled, temperature compensation enabled/disabled

### Indicators
- Green Power LED ON: Power ON, RUN mode
- Red Signal LED: Target signal strength
- Amber Output LED: Output enabled; sensor receiving a signal within the window limits
- Amber Mode LED: Currently selected mode

### Loss of Signal Indication
(Analog models)
- 0 to 10V dc models: Analog output goes to 0V
- 4 to 20 mA models: Analog output goes to 3.6 mA

### Construction
- Housing: PBT polyester
- Push buttons: polyester
- Transducer: epoxy/ceramic composite

### Environmental Rating
- Leakproof design, rated IEC IP67 (NEMA 6)

### Connections
- 2 m or 9 m shielded 4-conductor (with drain) PVC cable, 150 mm PUR Euro-style pigtail (QPMA), or 4-pin integral Euro-style connector (Q8). OD cordsets ordered separately. See page 325.

### Operating Conditions
- Temperature: -40° to +70° C
- Relative humidity: 95% at 50°C non-condensing

### Vibration and Mechanical Shock
- All models meet Mil. Std. 202F requirements. Method 201A (Vibration: 10 to 60Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half sine wave.

### Application Notes
- The temperature warmup drift upon power-up is less than 1% of the sensing distance.

### Certifications
- ISO 9001:2015 certified
- CE Marked

### Hookup Diagrams
- Discrete Models: MI13 (p. 761)
- Analog Models: MI14 (p. 761)

---

**NOTE 1:** NPN < 200 µA for load impedance > 3 kΩ; for load current of 100 mA, leakage < 1% of load current
**U-GAGE® T30U Specifications**

**Effective Beam**
See Chart EPBC-7 to EPBC-11 on page 327.

**Sensing Range**
- "A" suffix models: 150 mm min. near limit; 1 m max. far limit
- "B" suffix models: 300 mm min. near limit; 2 m max. far limit
- "-CRFV" models: 300 mm min. near limit; 1.5 m max. far limit

**Supply Voltage and Current**
- Current sourcing analog output models: 12 to 24V dc (10% max. ripple); 90 mA (exclusive of load)
- Voltage sourcing analog output models: 15 to 24V dc (10% max. ripple); 90 mA (exclusive of load)
- Dual-discrete output models: 12 to 24V dc (10% max. ripple); 90 mA (exclusive of load)

**Ultrasonic Frequency**
- Short Range: 228 kHz
- Long Range: 128 kHz

**Supply Protection Circuitry**
Protected against reverse polarity and transient voltages.

**Output Protection**
Protected against continuous overload and short-circuit; transient over-voltage; no false pulse on power-up.

**Output Configuration**
- Discrete (switched) output: Solid-state switch conducts when target is sensed within sensing window; choose NPN (current sinking) or PNP (current sourcing) models.
- Analog output: Choose 0 to 10V dc sourcing or 4 to 20 mA sourcing output models; output slope may be selected using TEACH sequence.

**Output Ratings**
- Discrete (switched) output: 100 mA max., total—both outputs
  - OFF-state leakage current: less than 10 µA
  - ON-state saturation voltage: less than 1V at 10 mA and less than 1.5V at 100 mA
- Analog Output:
  - Voltage sourcing: 0 to 10V dc (at 1 kΩ min. resistance)
  - Current sourcing: 4 to 20 mA, 1 Ω to Rmax.

\[
R_{\text{max}} = \frac{V_{\text{supply}} - 7V}{20 \text{ mA}}
\]

**Output Response Time**
- Discrete output: "A" suffix models: 48 milliseconds
- "B" suffix models: 96 milliseconds
- Analog output: "A" suffix models: 48 milliseconds average, 16-millisecond update
- "B" suffix models: 96 milliseconds average, 32-millisecond update

**Sensing Performance**
(Specified using a 100 x 100 mm aluminum target at 25˚ C under fixed sensing conditions.)
- Analog sensing resolution or discrete output repeatability: ±0.25% of measured distance
- "A" suffix models: 5 mm min
- "B" suffix models: 1 mm min
- Analog linearity: ±0.5% of full-scale span
- Min. window size: 10 mm
- Hysteresis of discrete output: 2.5 mm
- Temperature effect: 0.2% of sensing distance per ° C

**Adjustments**
- Sensing window limits (analog or discrete): TEACH-mode programming of near and far window limits may be set using membrane push buttons on sensor or remotely using TEACH input. Window limits may be programmed separately, or together.
- Analog output slope: the first limit taught is assigned to the minimum output value (4 mA or 0V).

**Indicators**
- Four status LEDs: In RUN mode:
  - Green ON Steady: Power ON, RUN mode
  - Green Flashing: Discrete output is overloaded
  - Red Flashing: Relative received signal strength
  - Yellow analog ON Steady: Target is inside window limits
  - Yellow discrete ON Steady: Output conducting
- In Program mode:
  - Green OFF: PROGRAM mode
  - Red Flashing: Relative received signal strength
  - Yellow ON Steady: Ready for first window limit
  - Yellow Flashing: Ready for second limit
  - Yellow OFF: Not teaching this output

**Construction**
Molded reinforced thermoplastic polyester housing.

**Environmental Rating**
Leakproof design is rated IEC IP67; NEMA 6P

**Connections**
2 m or 9 m 5-conductor PVC-covered attached cable, or 5-pin Euro-style quick-disconnect fitting.
QD cordsets are ordered separately. See page 325.

**Operating Conditions**
Temperature: -20° to +70° C
Relative humidity: 100%

More information online at [bannerengineering.com](http://bannerengineering.com)
# U-GAGE® T30U Specifications (cont’d)

| Vibration and Mechanical Shock | All models meet Mil. Std. 202F requirements. Method 201A (Vibration: 10 to 60Hz max., double amplitude 0.06”, maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half sine wave. |
| Application Notes | Objects passing inside the specified near limit will produce a false response. NOTE: For more information about out-of-range and signal loss response of the analog output, see product literature. |
| Certifications | CE |

## Cordsets

### Euro QD (With Shield)

<table>
<thead>
<tr>
<th>Length</th>
<th>Threaded 4-Pin</th>
<th>Threaded 5-Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 m</td>
<td>MQDEC2-406</td>
<td>MQDEC2-506</td>
</tr>
<tr>
<td></td>
<td>MQDEC2-406RA</td>
<td>MQDEC2-506RA</td>
</tr>
<tr>
<td>5 m</td>
<td>MQDEC2-415</td>
<td>MQDEC2-515</td>
</tr>
<tr>
<td></td>
<td>MQDEC2-415RA</td>
<td>MQDEC2-515RA</td>
</tr>
<tr>
<td>9 m</td>
<td>MQDEC2-430</td>
<td>MQDEC2-530</td>
</tr>
<tr>
<td></td>
<td>MQDEC2-430RA</td>
<td>MQDEC2-530RA</td>
</tr>
</tbody>
</table>

See page 683

Additional cordset information available. See page 620.

## Brackets

<table>
<thead>
<tr>
<th>T30UX/T30U</th>
</tr>
</thead>
<tbody>
<tr>
<td>pg. 637</td>
</tr>
<tr>
<td>pg. 639</td>
</tr>
<tr>
<td>pg. 640</td>
</tr>
</tbody>
</table>

SMB1815SF SMB30A SMB30FA...

Additional brackets and information available. See page 620.

---

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com

More information online at bannerengineering.com
Effective Beam Patterns

**T30U with Plate Target (Typical)**

1-Meter Models

- Lateral Distance vs. Target Distance

**T30U with Rod Target (Typical)**

1-Meter Models

- Lateral Distance vs. Target Distance

**T30U with Plate Target (Typical)**

2-Meter Models

- Lateral Distance vs. Target Distance

**T30U with Rod Target (Typical)**

2-Meter Models

- Lateral Distance vs. Target Distance

**T30U Teflon®-Encapsulated (Typical)**

- Lateral Distance vs. Target Distance

---

**EBPC-7**

**EBPC-8**

**EBPC-9**

**EBPC-10**

**EBPC-11**

---

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Measurement and Inspection Hookups

**MI13**  Current Sinking (NPN) with Shield

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown</td>
<td>White</td>
<td>Blue</td>
<td>Black</td>
</tr>
</tbody>
</table>

**MI14**  Analog Output with Shield

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown</td>
<td>White</td>
<td>Blue</td>
<td>Black</td>
</tr>
</tbody>
</table>

**MI15**  T30U with Discrete Outputs Current Sinking (NPN)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown</td>
<td>White</td>
<td>Blue</td>
<td>Black</td>
<td>Gray</td>
</tr>
</tbody>
</table>

**MI16**  T30U with Analog & Discrete Outputs Current Sinking (NPN)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown</td>
<td>White</td>
<td>Blue</td>
<td>Black</td>
<td>Gray</td>
</tr>
</tbody>
</table>

Key

- It is recommended that the shield wire be connected to either earth ground or DC common.