# QS30LD Diffuse-Mode Laser Sensor

Original Instructions
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# Chapter 1 Features

- Visible laser beam for diffuse sensing
- Available with Class 1 or long-range Class 2 laser
- Excellent optical performance throughout sensing range, even close-up
- Easy-to-set Expert-style TEACH options[1] including Static, Dynamic, and Single-Point programming plus manual adjustment for fine-tuning
- Easy-to-read operating status indicators, with 8-segment bar graph display
- Bipolar discrete outputs, PNP, and NPN
- Selectable 30-millisecond OFF-delay
- Models available with 2 m or 9 m (6.5 ft or 30 ft) cable or integral quick-disconnect
- Compact housing, mounting versatility – popular 30 mm threaded nose or side-mount




**WARNING:**

- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

# Models

| Models | Laser Class | Range | Spot Size at Focus | Connection |
|---|---|---|---|---|
| **QS30LD** | Class 1 | 400 mm (16 in) | Approx. 1 mm at 400 mm (0.039 in at 16 in) | 2 m (6.5 ft) unterminated 5-wire PVC-jacketed cable |
| **QS30LDQ** | | | | Integral 5-pin M12 male quick-disconnect connector |
| **QS30LDL** | Class 2 | 800 mm (32 in) | Approx. 1 mm at 800 mm (0.039 in at 32 in) | 2 m (6.5 ft) unterminated 5-wire PVC-jacketed cable |
| **QS30LDL W/30** | | | | 9 m unterminated 5-wire PVC-jacketed cable |
| **QS30LDLQ** | | | | Integral 5-pin M12 male quick-disconnect connector |

A model with a quick-disconnect connector requires a mating cable.

The following models are no longer available for order but are still covered by the information in this document.

- QS30LD W/30 (9 m cable)

# Overview

The QS30 is an easy-to-use, high-performance laser sensor whose many configuration options make it suitable for demanding applications.

It provides high-performance sensing in low-contrast applications at relatively long range. It features static, dynamic and single-point TEACH-mode programming, in addition to manual fine adjustment, remote programming, and security lockout options. A SETUP mode also may be used to change the sensor's output response.




[1] U.S. Patent #5,808,296


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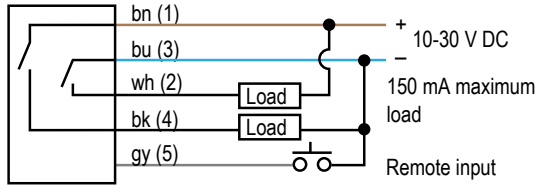
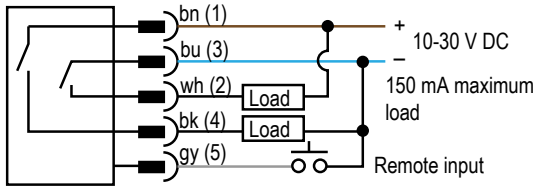
The sensor features two identically configured outputs, one each NPN and PNP. The sensor's compact housing has a large, easy-to-see bar graph display plus bright LEDs for easy programming and status monitoring during operation.

The sensor can be side-mounted, using its integral mounting holes, or front-mounted, using its 30 mm threaded barrel.

# Wiring Diagrams

| Cabled Models | Quick-Disconnect Models |
|---|---|
|  |  |



# Specifications

**Supply Voltage**
10 V DC to 30 V DC (10% maximum ripple at 10% duty cycle) at 35 mA maximum current, exclusive of load

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

**Laser Classification**
Class 1 or Class 2, depending on model

**Output Configuration**
Bipolar: 1 current sourcing (PNP) and 1 current sinking (NPN)
Rating: 150 mA maximum load
OFF-state leakage current: < 10 µA at 30 V DC
ON-state saturation voltage: NPN: < 1.0 V at 150 mA load; PNP: < 2.0 V at 150 mA load

**Output Protection Circuitry**
Protected against output short-circuit and continuous overload

**Output Response Time**
500 microseconds

**Indicators**
8-segment red bar graph: Signal strength relative to switch-point
Green LED: Power ON
Amber LED: Output conducting

**Environmental Rating**
IP67

**Operating Conditions**
–10 °C to +50 °C (+14 °F to +122 °F)
95% at +50 °C maximum relative humidity (non-condensing)

**Vibration and Mechanical Shock**
All models meet MIL-STD-202F, Method 201A (Vibration: 10 Hz to 60 Hz maximum, 0.06 inch (1.52 mm) double amplitude, 10G maximum acceleration) requirements. Also meets IEC 60947-5-2 (Shock: 30G 11 ms duration, half sine wave) requirements.

**Certifications**

**Sensing Beam**
Class 1 Laser: Visible red, 650 nm
Class 2 Laser: Visible red, 658 nm

**Beam Size at Aperture**
Approximately 2 mm

**Delay at Power Up**
1 second maximum; outputs do not conduct during this time

**Repeatability**
70 microseconds

**Adjustments**
2 push buttons and remote wire
Expert Teach programming (two-point static, dynamic, window set, light set, dark set)
Manually adjust (+/–) thresholds (from buttons only)
LO/DO and OFF-delay configuration options
Push-button lockout (from remote wire only)
Reset to factory defaults (from remote wire only)

**Factory Default Settings**
Maximum gain
Single threshold set at midpoint range
Light operate
No delays

**Construction**
ABS housing; acrylic lens cover

**Connections**
5-conductor 2 m (6.5 ft) PVC cable, 9 m (30 ft) PVC cable, or 5-pin integral M12 male quick-disconnect fitting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**Required Overcurrent Protection**

**WARNING:** Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

Overcurrent protection is required to be provided by end product application per the supplied table.

Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

Supply wiring leads < 24 AWG shall not be spliced.

For additional product support, go to www.bannerengineering.com.

| Supply Wiring (AWG) | Required Overcurrent Protection (A) | Supply Wiring (AWG) | Required Overcurrent Protection (A) |
|---|---|---|---|
| 20 | 5.0 | 26 | 1.0 |
| 22 | 3.0 | 28 | 0.8 |
| 24 | 2.0 | 30 | 0.5 |

## Class 1 Laser Description and Safety Information



**Laser light. Do not stare into the beam.**

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 56, dated May 8, 2019.




CAUTION:

- **Never stare directly into the sensor lens.**
- Laser light can damage your eyes.
- Avoid placing any mirror-like object in the beam. Never use a mirror as a retroreflective target.

CAUTION:

- **Return defective units to the manufacturer.**
- Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Do not attempt to disassemble this sensor for repair. A defective unit must be returned to the manufacturer.

CAUTION:

- **Ne regardez jamais directement la lentille du capteur.**
- La lumière laser peut endommager la vision.
- Évitez de placer un objet réfléchissant (de type miroir) dans la trajectoire du faisceau. N'utilisez jamais de miroir comme cible rétro-réfléchissante.

CAUTION:

- **Tout dispositif défectueux doit être renvoyé au fabricant.**
- L'utilisation de commandes, de réglages ou de procédures autres que celles décrites dans le présent document peut entraîner une exposition dangereuse aux radiations.
- N'essayez pas de démonter ce capteur pour le réparer. Tout dispositif défectueux doit être renvoyé au fabricant.

Class 1 lasers are lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing.

Complies with IEC 60825-1:2014 and EN 60825-1:2014+A11:2021.

**For safe laser use:**

- Do not stare at the laser.
- Do not point the laser at a person’s eye.
- Mount open laser beam paths either above or below eye level, where practical.


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- Terminate the beam emitted by the laser product at the end of its useful path.

**Class 1 Laser Characteristics**

Output power: <0.15 mW
Laser wavelength: 650 nm
Pulse duration: <5 µs

## Class 2 Laser Description and Safety Information



**Laser light. Do not stare into the beam.**

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 56, dated May 8, 2019.






CAUTION:

- **Never stare directly into the sensor lens.**
- Laser light can damage your eyes.
- Avoid placing any mirror-like object in the beam. Never use a mirror as a retroreflective target.



CAUTION:

- **Return defective units to the manufacturer.**
- Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Do not attempt to disassemble this sensor for repair. A defective unit must be returned to the manufacturer.



CAUTION:

- **Ne regardez jamais directement la lentille du capteur.**
- La lumière laser peut endommager la vision.
- Évitez de placer un objet réfléchissant (de type miroir) dans la trajectoire du faisceau. N'utilisez jamais de miroir comme cible rétro-réfléchissante.



CAUTION:

- **Tout dispositif défectueux doit être renvoyé au fabricant.**
- L'utilisation de commandes, de réglages ou de procédures autres que celles décrites dans le présent document peut entraîner une exposition dangereuse aux radiations.
- N'essayez pas de démonter ce capteur pour le réparer. Tout dispositif défectueux doit être renvoyé au fabricant.

Class 2 lasers are lasers that emit visible radiation in the wavelength range from 400 nm to 700 nm, where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing.

Complies with IEC 60825-1:2014 and EN 60825-1:2014+A11:2021.

**Class 2 Laser Safety Notes**. Low-power lasers are, by definition, incapable of causing eye injury within the duration of a blink (aversion response) of 0.25 seconds. They also must emit only visible wavelengths (400 nm to 700 nm). Therefore, an ocular hazard may exist only if individuals overcome their natural aversion to bright light and stare directly into the laser beam.

**For safe laser use:**

- Do not stare at the laser.
- Do not point the laser at a person’s eye.
- Mount open laser beam paths either above or below eye level, where practical.


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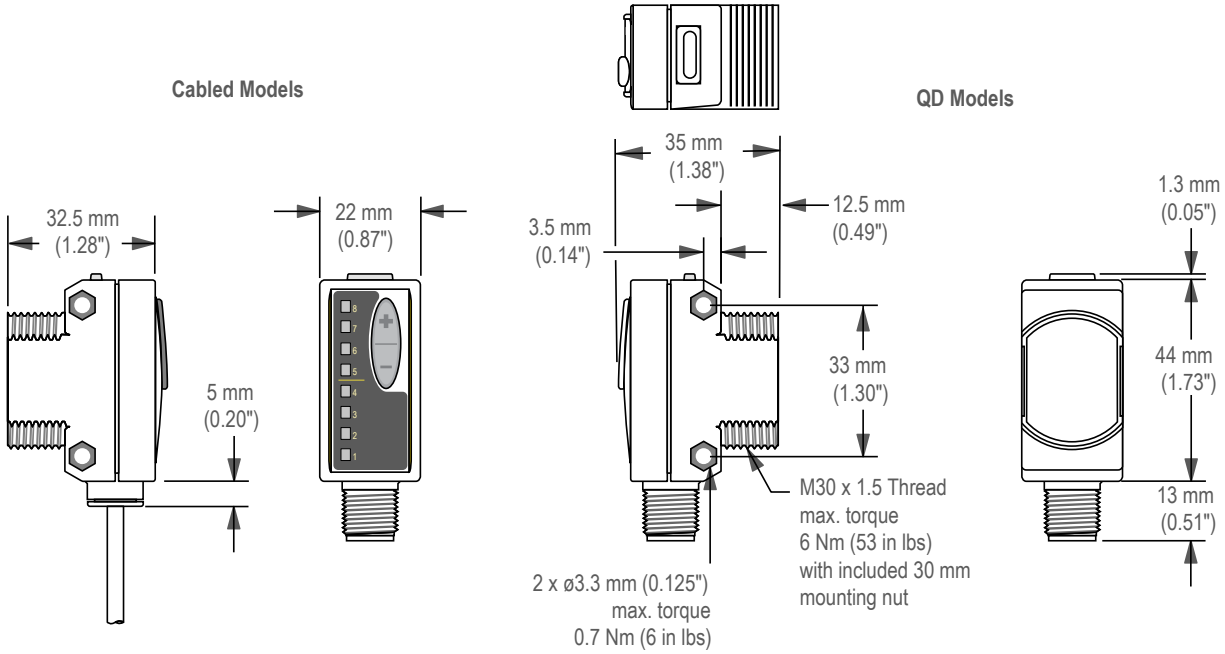
- Terminate the beam emitted by the laser product at the end of its useful path.

**IMPORTANT:** This laser device is not bore-sighted.

**Class 2 Laser Characteristics**

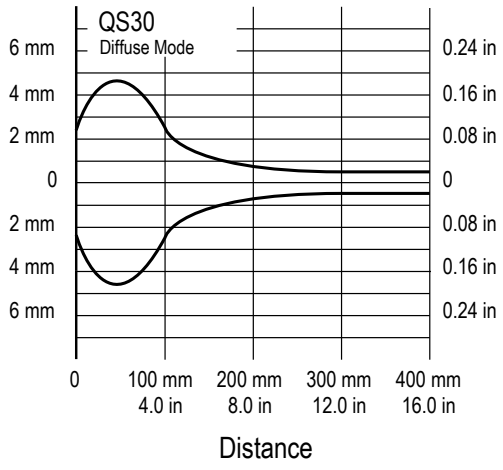
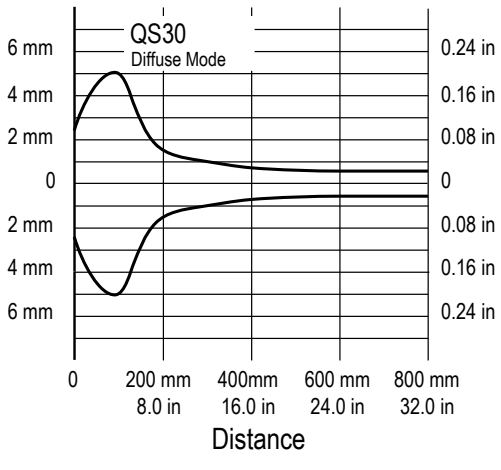
Output power: <5.6 mW
Laser wavelength: 658 nm
Pulse duration: 4.5 µs

## Dimensions




Hardware Included: (2) M3 × 0.5 × 28 stainless steel machine screws, nuts, and washers

## Performance Curves

| Class 1 Laser Models | Class 2 Laser Models |
|---|---|
|  |  |





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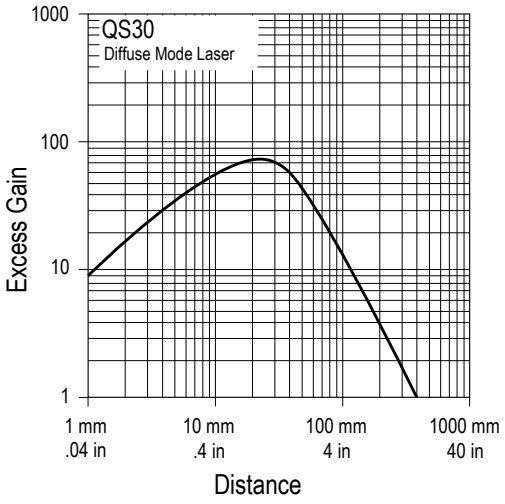
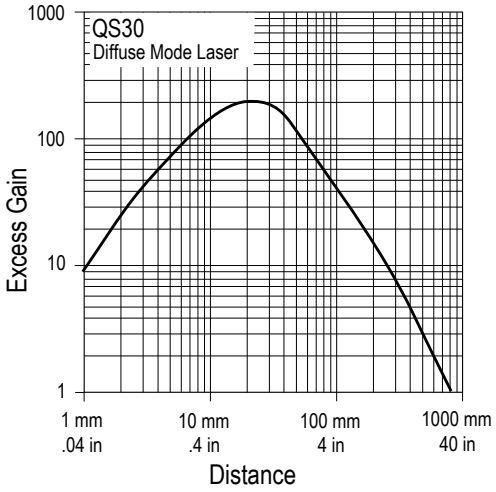
| Class 1 Laser Models | Class 2 Laser Models |
| --- | --- |
|  |  |

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# Chapter 2 Sensor Configuration

Configure the sensor configuration by using the TEACH or Set options, plus Setup mode.

After TEACH or Set have defined the sensing parameters, use the Setup mode to enable the delay or to change the Light Operate/Dark Operate status.

Use the Manual Adjust to fine-tune the thresholds. Two push buttons, Dynamic (+) and Static (-), or the remote wire, may be used to access and set the parameters.

Sensor configuration options include:

- Two-Point Static TEACH: a single switching threshold, determined by two taught conditions
- Dynamic (on-the-fly) TEACH: a single switching threshold, determined by multiple sampled conditions
- Window Set: a sensing window, centered on a single sensing condition
- Light Set and Dark Set: a single switching threshold, offset from a single sensing condition

In light operate (LO) mode, the output is ON when the target returns the same or more light to the sensor and OFF when the sensor detects less light than the configured/taught target. In dark operate (DO) mode, the output is ON when the target returns less light to the sensor than the configured target and OFF when the sensor detects more light than the configured/taught target.

In **diffuse** sensing modes, light operate means the output is on when the target is present and within the sensing range. Dark operate means the output is on when no target is detected.

## Remote Configuration

The remote function can be used to configure the sensor remotely or to disable the push button for security. Connect the gray wire of the sensor to ground (0 V DC), with a remote programming switch connected between them. Pulse the remote line according to the diagrams in the configuration procedures. The length of the individual programming pulses is equal to the value T where: 0.04 seconds ≤ “T” ≤ 0.8 seconds

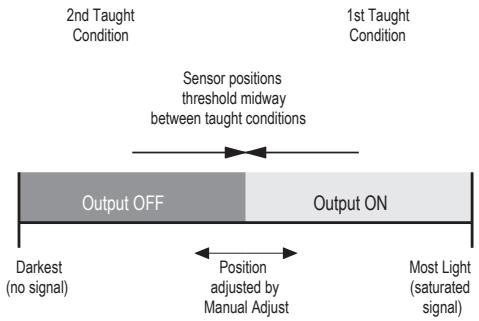
## Returning to Run Mode

Configuration modes each may be exited either after the 60-second time-out or by exiting the process in one of the two following ways:

- In static TEACH or SET modes, press and hold the Static (-) button (or hold the remote line) for 2 seconds. The sensor returns to Run mode without saving any new settings.
- In SETUP mode, press and hold both the Static (-) and Dynamic (+) buttons (or hold the remote line) for 2 seconds. The sensor returns to Run mode and saves the current setting.

## Two-Point Static TEACH (Threshold)

- Sets a single switching threshold (switching point)
- Threshold position is adjustable using “+” and “-” buttons (Manual Adjust)
- Recommended for applications where two conditions can be presented by the user




Two-Point TEACH is the traditional configuration method. The sensor locates a single sensing threshold (switch point) midway between the two taught conditions, with the Output ON condition on one side and the Output OFF condition on the other.

The first condition taught is the ON condition. The Output ON and OFF conditions can be reversed by changing Light/Dark Operate status in *Setup Mode*.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### Two-Point TEACH and Manual Adjust

Using Manual Adjust with Two-Point TEACH moves the switching threshold position. The lighted LED on the bar graph moves to exhibit the received signal, relative to the threshold.

| Bar graph LED (Following TEACH) | Relative Signal Difference/Recommendation |
|---|---|
| 6 to 8 | Excellent: Very stable operation. |
| 4 to 5 | Good: Minor variables will not affect sensing reliability. |
| 2 to 3 | Low: Minor sensing variables may affect sensing reliability. |
| 1 | Unreliable: Consider an alternate sensing scheme. |

1. Access TEACH Mode.

| Method | Action | Result |
|---|---|---|
| Push Button[2] | Press and hold Static (-) button for more than 2 seconds. | Power LED: OFF<br>Output LED: ON<br>Bar graph: #5 and 6 flash |
| Remote Line[3] | No action required; sensor is ready for 1st TEACH condition. | |

2. TEACH Output ON Condition.

| Method | Action | Result |
|---|---|---|
| Push Button | Present Output ON condition and click the Static (-) button. | Power LED: OFF<br>Output LED: OFF<br>Bar graph: #5 and 6 flash |
| Remote Line | Present Output ON condition and single-pulse the remote line. | |

3. TEACH Output OFF Condition.

| Method | Action | Result |
|---|---|---|
| Push Button | Present Output OFF condition and click the Static (-) button. | **TEACH Accepted**<br>Power LED: ON<br>Bar graph: One LED flashes to show relative contrast (good signal difference shown; see table above)<br>Sensor returns to RUN mode<br>**TEACH Unacceptable**<br>Power LED: OFF<br>Bar graph: #1, 3 and 6, 8 flash to show failure<br>Sensor returns to “TEACH Output ON Condition” |
| Remote Line | Present Output OFF condition and single-pulse the remote line. | |

[2] Push Button: 0.04 seconds ≤ “Click” ≤ 0.8 seconds
[3] Remote Line: 0.04 seconds ≤ T ≤ 0.8 seconds


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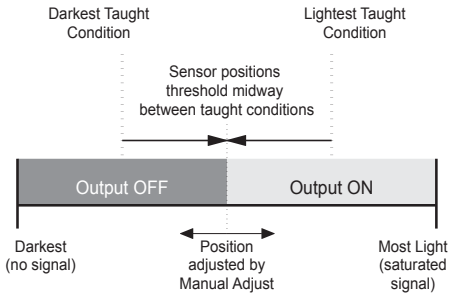
# Dynamic TEACH and Adaptive Thresholds

- Teach on-the-fly
- Sets a single switching threshold (switching point)
- Threshold position is adjustable using “+” and “-” buttons (Manual Adjust)
- Recommended for applications where a machine or process may not be stopped for teaching




Dynamic TEACH is a variation of two-point TEACH. It programs the sensor during actual machine run conditions, taking multiple samples of the light and dark conditions and automatically setting the threshold at the optimum level.

Dynamic TEACH activates the sensor’s adaptive threshold system, which continuously tracks minimum and maximum signal levels, and automatically maintains centering of the threshold between the light and dark conditions. The adaptive threshold system remains in effect during Run mode. The adaptive routine saves to non-volatile memory at least once per hour.

When Dynamic TEACH mode is used, the output ON state (Light or Dark Operate) will remain as it was last programmed. To change the output ON state, use Setup Mode.

The sensing threshold may be adjusted (fine-tuned) whenever the sensor is in RUN mode by clicking the “+” and “-” buttons. However, when a manual adjustment is made, the adaptive threshold system is disabled (cancelled).

| Bar graph LED (Following TEACH) | Relative Signal Difference/Recommendation |
|---|---|
| 6 to 8 | Excellent: Very stable operation. |
| 4 to 5 | Good: Minor variables will not affect sensing reliability. |
| 2 to 3 | Low: Minor sensing variables may affect sensing reliability. |
| 1 | Unreliable: Consider an alternate sensing scheme. |

1. Access Dynamic TEACH Mode.

| Method | Action | Result |
|---|---|---|
| Push Button[4] | Press and hold Dynamic (+) push button for more than 2 seconds. | Power LED: OFF<br>Output LED: OFF<br>Bar graph: #7 and 8 flash |
| Remote Line[5] | Hold the remote line low (to ground) for more than 2 seconds. | |

2. TEACH Sensing Conditions.

| Method | Action | Result |
|---|---|---|
| Push Button | Continue to hold push button (+) and present the Output ON and OFF conditions. | Power LED: OFF<br>Output LED: OFF<br>Bar graph: #7 and 8 flash |
| Remote Line | Continue to hold remote line low (to ground) and present the Output ON and OFF conditions. | |

3. Return to Run Mode.

[4] Push Button: 0.04 seconds ≤ “Click” ≤ 0.8 seconds
[5] Remote Line: 0.04 seconds ≤ T ≤ 0.8 seconds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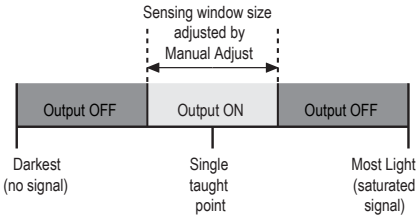
| Method | Action | Result |
|---|---|---|
| Push Button | Release push button (+). | **TEACH Accepted**<br>Power LED: ON<br>Bar graph: One LED flashes to show relative contrast (good signal difference shown; see table above)<br>Sensor returns to RUN mode with new settings |
| Remote Line | Release the remote line/switch. | **TEACH Unacceptable**<br>Power LED: OFF<br>Bar graph: #1, 3 and 6, 8 flash to show failure<br>Sensor returns to RUN mode without changing settings |

# Single-Point Window Set

- Sets a single ON condition
- All other conditions (lighter or darker) result in OFF output
- Sensing window size (sensitivity) is adjustable using “+” and “-” buttons (Manual Adjust)




Single-Point TEACH is most useful when a product may not always appear in the same place or when other signals may appear. Single-Point TEACH programs a sensing window, with the Output ON condition inside the window, and the Output OFF conditions outside the window. Output ON and OFF conditions can be reversed by changing Light/Dark Operate status in SETUP mode.

Single-Point TEACH programming may be accomplished only using Static TEACH. The sensor learns a single sensing condition and adds switching thresholds above and below the taught condition to create a sensing window.

### Single-Point Window Set and Manual Adjust

Using Manual Adjust with Single-Point Window Set expands or contracts the size of the window. The lighted LEDs on the light bar separate to a greater or lesser extent to exhibit the relative sensing window size.

1. Access Set Mode.

| Method | Action | Result |
|---|---|---|
| Push Button[6] | Press and hold Static (-) push button for more than 2 seconds. | Power LED: OFF<br>Output LED: ON (Push Button)<br>Output LED: OFF (Remote)<br>Bar graph: #5 and 6 flash |
| Remote Line[7] | Present the output ON condition and single-pulse the remote line. | |

2. Teach Set Point (Output ON) Condition.

[6] Push Button: 0.04 seconds ≤ “Click” ≤ 0.8 seconds
[7] Remote Line: 0.04 seconds ≤ T ≤ 0.8 seconds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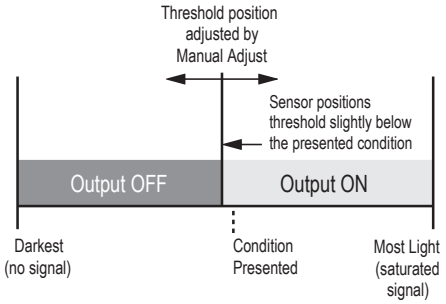
| Method | Action | Result |
|---|---|---|
| Push Button | Present the output ON condition and double-click the Static (-) push button. | **TEACH Accepted**<br>Power LED: ON<br>Bar graph: #3, 6 flash together to show single-point TEACH<br>Sensor returns to RUN mode with new settings |
| Remote Line | Double-pulse the remote line. | **TEACH Unacceptable**<br>Power LED: OFF<br>Bar graph: #1, 3, and 6, 8 flash to show failure, then 5 and 6 flash<br>Sensor waits for valid TEACH condition |

# Single-Point Light Set

- Sets a threshold slightly below the taught condition
- Any condition darker than the threshold condition causes the output to change state
- Threshold position is adjustable using the “+” and “-” buttons (Manual Adjust)
- Recommended for applications where only one condition is known, for example a stable light background with varying darker targets




A single sensing condition is presented, and the sensor positions a threshold below the presented condition. When a condition darker than the threshold is sensed, the output either turns ON or OFF, depending on the Light/Dark Operate setting (see "Setup Mode" on page 15).

### Light Set and Light/Dark Operate Selection

In Light Operate mode, Light Set teaches the Output ON condition. In Dark Operate mode, Light Set teaches the Output OFF condition.

1. Access Set Mode.

| Method | Action | Result |
|---|---|---|
| Push Button[8] | Press and hold Static (-) push button for more than 2 seconds. | Power LED: OFF<br>Output LED: ON (Push Button)<br>Output LED: OFF (Remote)<br>Bar graph: #5 and 6 alternately flash |
| Remote Line[9] | Single-pulse the remote line. | |

2. Set Sensing Condition.

[8] Push Button: 0.04 seconds ≤ “Click” ≤ 0.8 seconds
[9] Remote Line: 0.04 seconds ≤ T ≤ 0.8 seconds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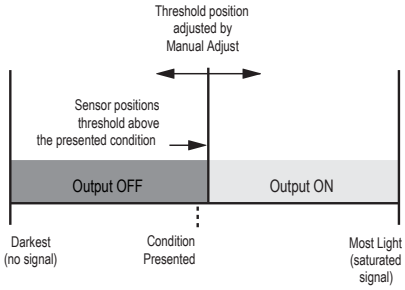
| Method | Action | Result |
|---|---|---|
| Push Button | Present the sensing condition and click the Static (-) push button four times. | **Threshold Condition Accepted**<br>Power LED: ON<br>Bar graph: Indicators #5 to 8 flash together to show that the threshold condition is accepted<br>Sensor returns to RUN mode with new settings |
| Remote Line | Present the sensing condition and four-pulse the remote line. | **Threshold Condition Unacceptable**<br>Power LED: OFF<br>Bar graph: #1, 3 and 5, 7 alternately flash to show failure<br>Sensor returns to “SET Sensing Condition” |

# Single-Point Dark Set

- Sets a threshold slightly above the taught condition
- Any condition lighter than the threshold condition causes the output to change state
- Threshold position is adjustable using the “+” and “-” buttons (Manual Adjust)
- Recommended for applications where only one condition is known, for example a stable dark background with varying lighter targets




A single sensing condition is presented, and the sensor positions a threshold above the taught condition. When a condition lighter than the threshold is sensed, the output either turns ON or OFF, depending on the Light/Dark Operate setting (see "Setup Mode" on page 15).

### Dark Set and Light/Dark Operate Selection

In Light Operate mode, Dark Set teaches the Output OFF condition. In Dark Operate mode, Dark Set teaches the Output ON condition.

1. Access Set Mode.

| Method | Action | Result |
|---|---|---|
| Push Button[10] | Press and hold the Static (-) push button for more than 2 seconds. | Power LED: OFF<br>Output LED: ON (Push Button)<br>Output LED: OFF (Remote)<br>Bar graph: #5 and 6 alternately flash |
| Remote Line[11] | Single-pulse remote line. | |

2. Set Sensing Condition.

[10] Push Button: 0.04 seconds ≤ “Click” ≤ 0.8 seconds
[11] Remote Line: 0.04 seconds ≤ T ≤ 0.8 seconds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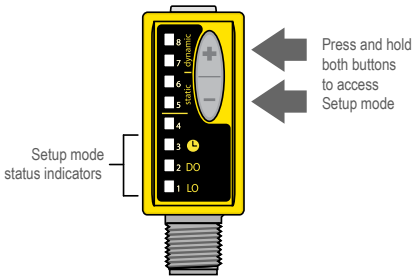
| Method | Action | Result |
|---|---|---|
| Push Button | Present the sensing condition and click the Static (-) push button five times. | **Threshold Condition Accepted**<br>Power LED: ON<br>Bar graph: Indicators #1 to 4 flash together to show that the threshold condition is accepted<br>Sensor returns to Run mode with new settings<br>**Threshold Condition Unacceptable**<br>Power LED: OFF<br>Bar graph: #1, 3 and 5, 7 alternately flash to show failure<br>Sensor returns to “Set Sensing Condition” |
| Remote Line | Present the sensing condition and five-pulse the remote line. | |

# Setup Mode

SETUP mode is used to change sensor output response for:

- Light or dark operate
- 30-millisecond pulse stretcher (OFF delay), if required




In dark operate (DO) mode, the output is ON when the target returns less light to the sensor than the configured target and OFF when the sensor detects more light than the configured/taught target.In light operate (LO) mode, the output is ON when the target returns the same or more light to the sensor and OFF when the sensor detects less light than the configured/taught target.

In **diffuse** sensing modes, light operate is active when the target is present and dark operate is active when the target is absent.

The status LEDs, active only during Setup mode, indicate the output response configuration when the sensor is in Run mode. Four combinations are possible:

Light Operate, No Delay
Dark Operate, No Delay
Dark Operate, 30 ms Delay
Light Operate, 30 ms Delay

To access SETUP mode and change the output response settings:

1. Press and hold BOTH push buttons (or double-pulse Remote line) until the green LED indicator turns OFF.
2. Click EITHER push button (or pulse Remote line) to toggle through the four possible setting combinations.
3. Press and hold both push buttons (or hold Remote line) until the green LED indicator turns ON, indicating return to RUN mode.

**NOTE:**

- If Setup mode programming is interrupted and remains inactive for 60 seconds, the sensor returns to Run mode with the most recent settings (that is, exits and saves current selection).
- Setup mode operates in the “background”, while the outputs are active.

# Manual Adjust

Manual adjust is used during Run mode via the push buttons only. Its behavior depends on whether a switching threshold or sensing window is used.

**Switching Threshold** (Static TEACH, Dynamic TEACH, Light Set, and Dark Set):

- Fine-tunes sensing threshold set-point value
- Press “+” to increase; press “-” to decrease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**Sensing Window** (Window Set):

- Adjusts sensing window size
- Press “+” to increase; press “-” to decrease

The lighted bar graph LEDs move to reflect the increase or decrease.

# Push Button Disable

In addition to its programming function, Remote Programming may be used to disable the push buttons for security. Disabling the push buttons prevents undesired tampering with the programming settings. Connect the gray wire of the sensor as described and four-pulse to enable or disable the push buttons.

# Reset to Factory Defaults

To reset the sensor back to its factory default settings, eight-pulse the remote input wire.

Where T is: $0.04 \text{ seconds} \leq T \leq 0.8 \text{ seconds}$.


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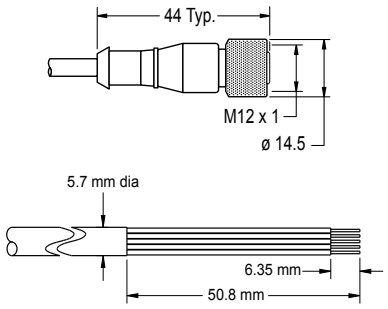
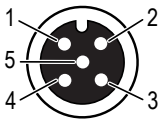
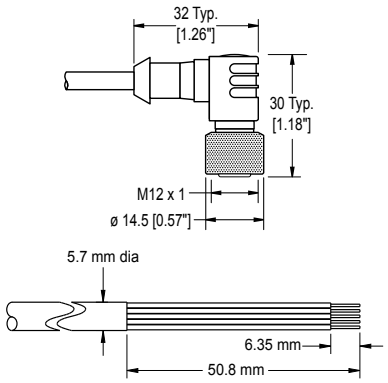
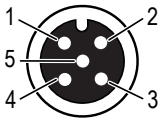
# Chapter 3 Accessories

## Quick-Disconnect Cordsets

| 5-Pin A-Code Single-Ended M12 Female Cordsets (datasheet p/n 235936) | | | | |
|---|---|---|---|---|
| **Model** | **Length** | **Dimensions (mm)** | **Pinout (Female)** | |
| **BC-M12F5-22-1** | 1 m (3.28 ft) |  |  | 1 = Brown<br>2 = White<br>3 = Blue<br>4 = Black<br>5 = Gray<br>c UL us LISTED |
| **BC-M12F5-22-2** | 2 m (6.56 ft) | | | |
| **BC-M12F5-22-5** | 5 m (16.4 ft) | | | |
| **BC-M12F5-22-8** | 8 m (26.25 ft) | | | |
| **BC-M12F5-22-10** | 10 m (30.81 ft) | | | |
| **BC-M12F5-22-15** | 15 m (49.2 ft) | | | |

| 5-Pin A-Code Single-Ended M12 Female Right-Angle Cordsets (datasheet p/n 235936) | | | | |
|---|---|---|---|---|
| **Model** | **Length** | **Dimensions (mm)** | **Pinout (Female)** | |
| **BC-M12F5A-22-1** | 1 m (3.28 ft) |  |  | 1 = Brown<br>2 = White<br>3 = Blue<br>4 = Black<br>5 = Gray<br>c UL us LISTED |
| **BC-M12F5A-22-2** | 2 m (6.56 ft) | | | |
| **BC-M12F5A-22-5** | 5 m (16.4 ft) | | | |
| **BC-M12F5A-22-8** | 8 m (26.25 ft) | | | |
| **BC-M12F5A-22-10** | 10 m (30.81 ft) | | | |
| **BC-M12F5A-22-15** | 15 m (49.2 ft) | | | |

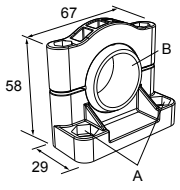
## Brackets

All measurements are listed in millimeters, unless noted otherwise. The measurements provided are subject to change.

**SMB30SC**

- Swivel bracket with 30 mm mounting hole for sensor
- Black reinforced thermoplastic polyester
- Stainless steel mounting and swivel locking hardware included
- CAD Files: DXF, PDF, IGS, STP

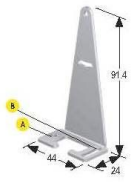
**Hole center spacing:** A=ø 50.8
**Hole size:** A=ø 7.0, B=ø 30.0




**SMBQS30LT**

- Tall right-angle bracket for QD models
- ± 8° tilt adjustment
- 14-gauge stainless steel
- CAD Files: DXF, PDF, IGS, STP

**Hole center spacing:** A to B=35.0
**Hole size:** A=ø 4.3, B=ø 4.25×16.3




Continued on page 18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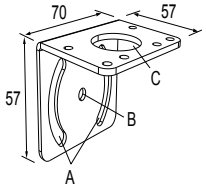
Continued from page 17

**SMB30MM**

- 12-gauge stainless steel bracket with curved mounting slots for versatile orientation
- Clearance for M6 (¼ in) hardware
- Mounting hole for 30 mm sensor
- CAD Files: DXF, PDF, IGS, STP

**Hole center spacing:** A=51, A to B=25.4
**Hole size:** A=42.6 × 7, B=ø 6.4, C=ø 30.1




**SMBQS30L**

- Right-angle bracket for cable sensor models
- Clearance for M4 (#8) hardware
- ± 12° tilt adjustment
- 14-gauge stainless steel
- CAD Files: DXF, PDF, IGS, STP

**Hole center spacing:** A to B=35.0
**Hole size:** A=ø 4.3, B=ø 4.25×16.3




**SMBQS30Y**

- Heavy-duty die-cast bracket
- M18 vertical mount option
- ± 8° tilt adjustment with cabled units
- Includes nuts and lock washer
- CAD Files: DXF, PDF, IGS, STP

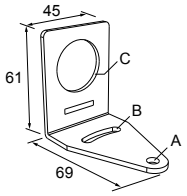
**Hole size:** A=ø 15.3




**SMB30A**

- Right-angle bracket with curved slot for versatile orientation
- Clearance for M6 (¼ in) hardware
- Mounting hole for 30 mm sensor
- 12-gauge stainless steel
- CAD Files: DXF, PDF, IGS, STP

**Hole center spacing:** A to B=40
**Hole size:** A=ø 6.3, B= 27.1 × 6.3, C=ø 30.5





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# Chapter 4 Product Support and Maintenance

## Repairs and Translations (No Field-Replaceable Parts)

**English**

Contact Banner Engineering for troubleshooting of this device. **Do not attempt any repairs to this Banner device; it contains no field-replaceable parts or components.** If the device, device part, or device component is determined to be defective by a Banner Applications Engineer, they will advise you of Banner's RMA (Return Merchandise Authorization) procedure.

```
IMPORTANT: If instructed to return the device, pack it with care. Damage that occurs in return shipping is not covered by warranty.
```

Obtain assistance with product repairs by contacting your local Banner Engineering Corp distributor or by calling Banner directly at (763) 544-3164. Access literature translated into your native language on the Banner website at www.bannerengineering.com or contact Banner directly at (763) 544-3164.

**Deutsch**

Wenden Sie sich zur Fehlerbehebung dieses Geräts an Banner Engineering. **Versuchen Sie nicht, Reparaturen an diesem Banner-Gerät vorzunehmen. Das Gerät enthält keine am Einsatzort auszuwechselnden Teile oder Komponenten.** Wenn ein Banner-Anwendungstechniker zu dem Schluss kommt, dass dieses Gerät, ein Teil oder eine Komponente davon defekt ist, erhalten Sie von dem Techniker Erläuterungen zu Banners RMA-Verfahren (Return Merchandise Authorization) für die Warenrückgabe.

```
WICHTIG: Wenn Sie der Techniker anweist, das Gerät zurückzusenden, verpacken Sie es bitte sorgfältig. Transportschäden bei der Rücksendung werden von der Garantie nicht abgedeckt.
```

Unterstützung bei Produktreparaturen erhalten Sie von Ihrem örtlichen Banner Engineering Corp Händler oder direkt von Banner unter Tel. (763) 544-3164. Die in Ihre Muttersprache übersetzte Literatur finden Sie auf der Banner-Website unter www.bannerengineering.com oder kontaktieren Sie Banner direkt unter Tel. (763) 544-3164.

**Français**

Pour plus d'informations sur le dépannage du produit, contactez Banner Engineering. **Ne tentez pas de réparer ce dispositif Banner. Il ne contient aucun composant ou pièce qui puisse être remplacé sur place.** Si un ingénieur de Banner conclut que le dispositif ou l'une de ses pièces ou composants est défectueux, il vous informera de la procédure à suivre pour le retour des produits (RMA).

```
Important : Si vous devez retourner le dispositif, emballez-le avec soin. Les dégâts occasionnés pendant le transport de retour ne sont pas couverts par la garantie.
```

Pour vous aider lors de la réparation de produits, contactez votre distributeur Banner local our appelez directement Banner au (763) 544-3164. La documentation traduite dans votre langue est disponible sur le site internet de Banner www.bannerengineering.com ou contactez directement Banner au (763) 544-3164.

**Italiano**

Per le procedure di individuazione e riparazione dei guasti di questo dispositivo, contattare Banner Engineering. **Non tentare di riparare questo dispositivo Banner, in quanto non contiene parti o componenti sostituibili dall'utente.** Se il dispositivo, una parte del dispositivo o un componente del dispositivo viene riscontrato difettoso da un tecnico Banner, il nostro personale vi comunicherà la procedura da seguire per ottenere l'autorizzazione al reso.

```
Importante: Se si ricevono istruzioni di rispedire il dispositivo al produttore, imballarlo con cura. I danni dovuti al trasporto non sono coperti dalla garanzia.
```

Per assistenza nelle riparazioni dei prodotti, contattare il distributore locale Banner Engineering Corp o contattare direttamente Banner al numero (763) 544-3164. È possibile accedere alla documentazione tradotta nella propria lingua madre sul sito Web Banner all'indirizzo www.bannerengineering.com o contattare direttamente Banner al numero (763) 544-3164.


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**Español**

Comuníquese con Banner Engineering para solucionar de problemas de este dispositivo. **No intente ninguna reparación a este dispositivo de Banner, contiene piezas o componente que no se pueden cambiar en terreno.** Si algún ingeniero de aplicaciones de Banner determina que el dispositivo, alguna de las piezas o alguno de los componentes del dispositivo está defectuoso, le informará el procedimiento de autorización de devolución de mercancía (RMA, por sus siglas en inglés) de Banner.

**Importante:** Si se le solicita devolver el dispositivo, empáquelo con cuidado. Puede haber daños durante el envío de devolución que no estén cubiertos por la garantía.

Para reparaciones de productos, por favor contacte a su distribuidor local de Banner Engineering o llame a Banner directamente al 00 1 (763) 544-3164. Vea la literatura traducida en su idioma en el sitio web Banner en www.bannerengineering.com o comuníquese con Banner directamente al 00 1 (763) 544-3164.

**中国人**

如需对本装置进行故障排查，请联系邦纳。**请勿尝试自行维修该邦纳装置；本装置不包含任何可在现场更换的部件或组件。** 若经邦纳应用工程师确认设备、设备部件或组件存在缺陷，他们将告知您邦纳退货授权 (RMA) 流程。

**重要注意事项：** 如被要求退回装置，请妥善包装后寄回。退货运输过程中发生的损坏不在保修范围内。

请联系当地的 Banner Engineering Corp 经销商或直接致电 Banner +1 (763) 544-3164，以获得产品维修帮助。请访问邦纳网站 www.bannerengineering.com 或直接拨打 +1 (763) 544-3164 联系邦纳，获取翻译成您母语的资料。

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**중요:** 제품을 반송하도록 안내 받으셨다면 잘 포장해주십시오. 반송 도중에 발생한 손상은 보증 서비스가 적용되지 않습니다.

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**重要 ：** 返品を指示された場合は、装置を丁寧に梱包してください。返品時に発生した破損は保証の対象外となります。

製品の修理については、最寄りのBanner Engineering Corp代理店にお問い合わせいただくか、米国+1 (763) 544-3164まで直接お電話でお問い合わせください。バナーのウェブサイト（www.bannerengineering.com）でお客様の言語に翻訳された資料にアクセスするか、米国+1 (763) 544-3164まで直接お電話でお問い合わせください。

**čeština**

Pro řešení problémů se zařízením kontaktujte společnost Banner Engineering. **Neprovádějte žádné opravy zařízení Banner. Neobsahují žádné komponenty nebo části, které by byly vyměnitelné.** Pokud je zařízení, jeho část nebo díl označen technikem společnosti Banner jako poškozený, bude Vám doporučeno vyplnit reklamační RMA protokol.

**Důležité:** Pokud byl vydán požadavek na vrácení zařízení, pečlivě ho zabalte. Poškození vzniklé při dopravě není považováno za záruční opravu.

Pokud produkt potřebuje opravu, vyžádejte si pomoc od místního distributora společnosti Banner Engineering Corp nebo přímo na telefonním čísle (763) 544-3164. Dokumentaci přeloženou do vašeho jazyka si vyhledejte na webových stránkách společnosti Banner na adrese www.bannerengineering.com nebo se obraťte přímo na společnost Banner na telefonním čísle (763) 544-3164.


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**Polski**

W celu rozwiązania problemów z urządzeniem należy skontaktować się z działem technicznym firmy Banner Engineering. **Pod żadnym pozorem nie próbuj naprawiać tego urządzenia firmy Banner; nie zawiera ono części ani elementów, które można wymieniać samodzielnie.** Jeśli urządzenie, jego część lub element zostaną uznane za wadliwe przez inżyniera technicznego Banner, poinformuje on użytkownika o firmowej procedurze zwrotu towaru (RMA) firmy Banner.

**Ważne:** Jeśli urządzenie ma zostać zwrócone, należy je starannie zapakować. Uszkodzenia powstałe podczas odsyłki nie są objęte gwarancją.

Aby uzyskać pomoc w zakresie naprawy produktu, należy skontaktować się z lokalnym dystrybutorem Banner Engineering Corp lub zadzwonić bezpośrednio do firmy Banner pod numer (763) 544-3164. Dostęp do literatury przetłumaczonej na swój język ojczysty można uzyskać na stronie internetowej firmy Banner pod adresem www.bannerengineering.com lub kontaktując się bezpośrednio z firmą Banner pod numerem (763) 544-3164.

**Português**

Entre em contato com a Engenharia da Banner para a solução de problemas deste dispositivo. **Não tente fazer nenhum reparo neste dispositivo Banner; ele não contém peças ou componentes substituíveis em campo.** Se um técnico de aplicações da Banner determinar que o dispositivo, peça ou componente do dispositivo está com defeito, ele o informará sobre o procedimento de RMA (Autorização de Devolução de Mercadoria) da Banner.

**Importante:** Se for instruído a devolver o dispositivo, embale-o com cuidado. Os danos ocorridos no transporte de devolução não são cobertos pela garantia.

Obtenha assistência para reparos do produto entrando em contato com o distribuidor local da Banner Engineering Corp ou ligando diretamente para a Banner no telefone (763) 544-3164. Acesse a literatura traduzida para seu idioma nativo no site da Banner em www.bannerengineering.com ou entre em contato diretamente com a Banner pelo telefone (763) 544-3164.

**Türkçe**

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**ÖNEMLİ:** İade etmeniz istenirse, cihazı dikkatli bir şekilde paketleyin. İade nakliyesinde meydana gelecek hasarlar garanti kapsamında değildir.

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# Contact Us

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For worldwide locations and local representatives, visit www.bannerengineering.com.

# Banner Engineering Corp Limited Warranty

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