# K50 Pro Optical Sensor with IO-Link Product Manual

Original Instructions
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# Chapter 1 Features

*50 mm Programmable Multicolor RGB Optical Sensor and Indicator*



- Three default colors in one device (Green, Red, Yellow)
- Devices are completely self-contained—no controller needed
- Teachable modes with color feedback for ease of use
- Touchless activation removes the need for physical force to activate
- Rugged IP66, IP67, IP69K per ISO 20653 and UL Type 4X and UL Type 13 design
- Resistant to ambient light, EMI, and RFI interference
- Sensing and indication in one device
- Bright, uniform indicator light
- Translucent polycarbonate dome

**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

| Family | Style | Color and Input | Connector[1] |
|---|---|---|---|
| **K50PS** | **AF1000** | **K** | **Q** |
| | AF1000 = 1000 mm Adjustable Field Sensor | K = IO-Link | Q = Integral 4-pin M12 male quick-disconnect connector |

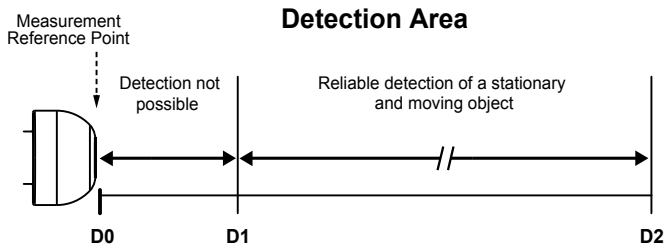
## Overview

The K50 Pro Optical Sensor with IO-Link is an adjustable field optical sensor that can detect a wide variety of materials and objects.

Configure the sensor using software or remote input wires to sense objects up to a specific distance, ignoring objects beyond this distance (background suppression), or within a windowed range.

[1] Models with a quick-disconnect connector require a mating cordset.


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| Model | D0 (mm) | Switch Point D1 (mm) | Switch Point D2 (mm) |
|---|---|---|---|
| K50PSAF1000KQ | 0 | 20 | 1000 |

# 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.

**CLASS 1 LASER PRODUCT**

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.


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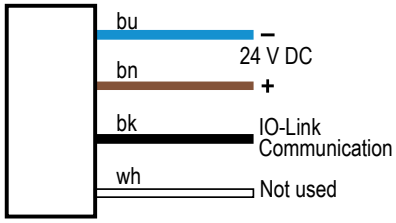
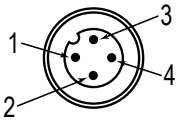
**For safe laser use:**

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


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Chapter Contents

# Chapter 2 Wiring

| Diagram | Pinout |
| --- | --- |
|  | <br>1 = Brown (bn)<br>2 = White (wh)<br>3 = Blue (bu)<br>4 = Black (bk) |


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# Chapter 3 IO-Link®

IO-Link® is a point-to-point communication link between a master device and a sensor and/or light. It can be used to automatically parameterize sensors or lights and to transmit process data. For the latest IO-Link protocol and specifications, please visit www.io-link.com.

For the latest IODD files, please refer to the Banner Engineering Corp website at: www.bannerengineering.com.

## IO-Link Process Data In (Device to Master)

Use process data to read the device output state. When the device is in Four State Full Logic mode, use process data to read the device logic state in addition to the output state.

| Name | Description |
|---|---|
| **Output State** | Output state follows touch, optical sensor, or push button input |
| **Device State** | Current state (State 1, State 2, State 3, State 4). Only available with Operation Mode set to Four State Full Logic, Multicolor, or Coarse Distance |

## IO-Link Process Data Out (Master to Device)

Use process data out to define device states. Use parameter data to define device modes, states, output settings, and custom colors.

### Multicolor Mode

Use process data to activate the defined device state. Use parameter data to define output settings, control delays, color, intensity, flash, and other animation types for State 1, State 2, State 3, and State 4.

### Four State Full Logic Mode

Use process data to define the Job Input state and device state (State 1, State 2, State 3, State 4). See below for more information about how to achieve legacy logic types (C, D, E, and H). Use parameter data to change color, intensity, flash, speed, select animation type, and define output settings.

### Advanced Mode

Use process data to control delays, color, intensity, flash, and other animation types. Process data is also used to control the sequence value dynamically. Use parameter data to create custom colors, intensity, speeds, and to define output settings.

*Definitions for device states in Multicolor Mode, Four State Full Logic Mode, and Advanced Mode*

| Name | Description |
|---|---|
| **Animation Type** | |
| Off | Indicator is off |
| Steady | Color 1 is solid on at defined intensity |
| Flash | Color 1 flashes at defined speed, color intensity, and pattern |
| Two Color Flash | Color 1 and Color 2 flash alternately at defined speed, color intensities, and pattern |
| 50/50 | Color 1 is displayed on 50% of the indicator and Color 2 is displayed on the other 50% of the indicator at the defined color intensities |

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| Name | Description |
|---|---|
| 50/50 Rotate | Color 1 is displayed on 50% of the indicator and Color 2 is displayed on the other 50% of the indicator while rotating at the defined speed, color intensities, and rotational direction |
| Chase | Color 1 is displayed as a single spot against the background of Color 2 while rotating at the defined speed, color intensities, and rotational direction |
| Intensity Sweep | Color 1 repeatedly increases and decreases intensity between 0% to 100% at defined speed and color intensity |
| Color Sweep | Color 1 and Color 2 transition alternately at defined speed and color intensities |
| Sequence | Color 1 increments against the background of Color 2 at defined Dynamic or Static Sequence Value (Advanced mode and other modes respectively) |
| Wave | Color 2 increments across the background of Color 1 |
| Double Wave | Color 2 increments across the background of Color 1, and then the reverse occurs |
| **Animation Direction** | Defines the direction of rotation for the 50/50 rotate, chase, and sequence animations (CW or CCW) |
| **Animation Pattern** | Defines the flash pattern for flash and two color flash animations (normal, strobe, three pulse, SOS, or random); also defines the pattern of the vibration feedback |
| **Animation Speed** | Defines the animation speed (slow, medium, fast, or custom); also defines the speed of the vibration feedback pattern |
| **Off Delay Type** | Defines if the Off Delay should be measured from when the conditions for the State began (Leading Edge) or from when the conditions ended (Trailing Edge) |
| **Off Delay (ms)** | The duration of the animation Off Delay. Leading Edge Off Delays can be used to ensure the animation is active for at least a minimum amount of time. |
| **Static Sequence Value** | Defines the span of Color 1 in the Sequence animation [0-255]. 0 means no portion of the animation will be Color 1, and it increases in a circular manner to 255 which indicates the full circumference will be Color 1. In Advanced Mode, this is in process data and is called Dynamic Sequence Value. In the other modes, this is in parameter data and is called Static Sequence Value. |
| **Sequence Start Location** | Shifts the beginning of the sequence animation to the specified LED (LED1 at 12 o'clock continuing in the direction indicated by the Animation Direction parameter) |
| **Color 1** | Defines Color 1 of defined animation |
| **Color 1 Intensity** | Defines the intensity of Color 1 in the animation (high, medium, low, off, or custom) |
| **Color 2** | Defines Color 2 of defined animation |
| **Color 2 Intensity** | Defines the intensity of Color 2 in the animation (high, medium, low, off, or custom) |

### LED Control Mode

Use process data to define the color and intensity of each individual LED. Use parameter data to define customer colors and intensities. LED1 is oriented at the 12 o'clock position, continuing clockwise through LED8 near 11 o'clock position.

### Distance Mode

Use process data to set the device to operate as a gauge, which allows the user to configure a background color and a fill color to display how far an object is within the Detection Area. As an object moves along the sensing range, the proportion of fill color to background color changes in a clockwise (CW) or counter-clockwise (CCW) direction. The proportion of fill color increases as an object approaches the maximum range, and decreases as it moves towards the minimum.

### Coarse Distance Mode

Use process data to divide the Detection Area into custom zones to generate a unique animation when an object is present within that zone distance. Configure up to five zones for animation and output state. The minimum zone distance is 50 mm.

### Demo Mode

The device cycles through color spectrum, 50/50 rotate, intensity sweep, and sequence mode. It also speeds the cycle rate up or down (can be either Momentary or Latching), and initiates a state showing individually colored LEDs. When set


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to demo mode, the device cycles through the defined sequence when power is applied regardless of its connection to an IO-Link master.

# IO-Link Data Map

This section refers to the following IODD file: Banner_Engineering-K50PSAF1000KQ-20250107-IODD1.1-en.html. The IODD file and support files can be found on www.bannerengineering.com under the download section of the product family page.

## Communication Parameters

The following communication parameters are used.

| Parameter | Value | Parameter | Value |
|---|---|---|---|
| IO-Link revision | V1.1 | Port class | A |
| Process data in length | 32 bits | SIO mode | No |
| Process data out length | 320 bits | Smart sensor profile | Yes |
| Bit rate | 38400 bps | Block parameterization | Yes |
| Minimum cycle time | 5 ms | Data storage | Yes |
| Device ID | 0×060012 | | |

## Process Data: Multicolor

ProcessData id=V_Pd_Multicolor (condition V_OperationMode == 0)

### IO-Link Process Data In (Device to Master)

ProcessDataIn id=V_Pd_InMulticolor

- Bit Length: 32
- Data Type: 32-bit Record (subindex access not supported)

| Subindex | Bit Offset | Data Type | Allowed Values | Name | Description |
|---|---|---|---|---|---|
| 1 | 24 | Boolean | false = Inactive, true = Active | Output State | Output State. Related parameters are defined in output and touch settings parameter data. |
| 2 | 16 | 3-bit UInteger | 0 = State 1, 1 = State 2, 2 = State 3, 3 = State 4 | State | Output State. Related parameters are defined in output and touch settings parameter data. |
| 3 | 0 | 16-bit UInteger | | Distance | The measured distance in millimeters. |

| Octet 0 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 |
| Subindex | - | - | - | - | - | - | - | 1 |

| Octet 1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| Subindex | - | - | - | - | - | 2 | | |
| Element bit | | | | | | 2 | 1 | 0 |

| Octet 2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
| Subindex | 3 | | | | | | | |
| Element bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 0 |

| Octet 3 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

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| Octet 3 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Subindex | 3 | | | | | | | |
| Element bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

## IO-Link Process Data Out (Master to Device)

ProcessDataOut id=V_Pd_OutMulticolor

- Bit Length: 64
- Data Type: 64-bit Record (subindex access not supported)

| Subindex | Bit Offset | Data Type | Allowed Values | Name | Description |
|---|---|---|---|---|---|
| 1 | 56 | 3-bit UInteger | 0 = State 1, 1 = State 2, 2 = State 3, 3 = State 4 | State | Animation State. Related parameters are defined in Four State Full Logic/Multicolor parameter data. |

| Octet 0 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 |
| Subindex | - | - | - | - | - | 1 | | |
| Element bit | | | | | | 2 | 1 | 0 |

| Octet 1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 3 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 4 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 5 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 6 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 7 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Subindex | - | - | - | - | - | - | - | - |


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# Process Data: Four State Full Logic

ProcessData id=V_Pd_FourStateFullLogic (condition V_OperationMode == 1)

## IO-Link Process Data In (Device to Master)

ProcessDataIn id=V_Pd_InFourStateFullLogic

- Bit Length: 32
- Data Type: 32-bit Record (subindex access not supported)

| Subindex | Bit Offset | Data Type | Allowed Values | Name | Description |
|---|---|---|---|---|---|
| 1 | 24 | Boolean | false = Inactive, true = Active | Output State | Output State. Related parameters are defined in output and touch settings parameter data. |
| 2 | 16 | 2-bit UInteger | 0 = State 1, 1 = State 2, 2 = State 3, 3 = State 4 | State | Animation State. Related parameters are defined in Four State Full Logic/Multicolor parameter data. |
| 3 | 0 | 16-bit UInteger | | Distance | The measured distance in millimeters. |

| Octet 0 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 |
| Subindex | - | - | - | - | - | - | - | 1 |

| Octet 1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| Subindex | - | - | - | - | - | - | 2 | |
| Element bit | | | | | | | 1 | 0 |

| Octet 2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
| Subindex | 3 | | | | | | | |
| Element bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |

| Octet 3 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Subindex | 3 | | | | | | | |
| Element bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

## IO-Link Process Data Out (Master to Device)

ProcessDataOut id=V_Pd_OutFourStateFullLogic

- Bit Length: 64
- Data Type: 64-bit Record (subindex access not supported)

| Subindex | Bit Offset | Data Type | Allowed Values | Name | Description |
|---|---|---|---|---|---|
| 1 | 56 | Boolean | false = Off, true = On | Job Input | The Job Input for Four State Full Logic mode. |

| Octet 0 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 |
| Subindex | - | - | - | - | - | - | - | 1 |

| Octet 1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| Subindex | - | - | - | - | - | - | - | - |


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| Octet 2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 3 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 4 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 5 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 6 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 7 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Subindex | - | - | - | - | - | - | - | - |

# Process Data: Advanced

ProcessData id=V_Pd_Advanced (condition V_OperationMode == 2)

## IO-Link Process Data In (Device to Master)

ProcessDataIn id=V_Pd_InAdvanced

- Bit Length: 32
- Data Type: 32-bit Record (subindex access not supported)

| Subindex | Bit Offset | Data Type | Allowed Values | Name | Description |
|---|---|---|---|---|---|
| 1 | 24 | Boolean | false = Inactive, true = Active | Output State | Output State. Related parameters are defined in output and touch settings parameter data. |
| 2 | 0 | 16-bit UInteger | | Distance | The measured distance in millimeters. |

| Octet 0 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 |
| Subindex | - | - | - | - | - | - | - | 1 |

| Octet 1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
| Subindex | 2 | | | | | | | |

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| Octet 2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Element bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |

| Octet 3 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Subindex | 2 | | | | | | | |
| Element bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

## IO-Link Process Data Out (Master to Device)

ProcessDataOut id=V_Pd_OutAdvanced

- Bit Length: 64
- Data Type: 64-bit Record (subindex access not supported)

| Subindex | Bit Offset | Data Type | Allowed Values | Name | Description |
|---|---|---|---|---|---|
| 1 | 56 | 4-bit UInteger | 0 = Off, 1 = Steady, 2 = Flash, 3 = Two Color Flash, 4 = 50/50, 5 = 50/50 Rotate, 6 = Chase, 7 = Intensity Sweep, 8 = Color Sweep, 9 = Sequence, 10 = Wave, 11 = Double Wave | Animation Type | The animation type |
| 2 | 60 | Boolean | false = CW, true = CCW | Animation Direction | The direction the animation rotates |
| 3 | 61 | 3-bit UInteger | 0 = Flash, 1 = Strobe, 2 = Three Pulse, 3 = SOS, 4 = Random | Animation Pattern | The pattern of the animation |
| 4 | 48 | 2-bit UInteger | 0 = Slow, 1 = Medium, 2 = Fast, 3 = Custom | Animation Speed | The speed of the animation |
| 5 | 24 | 8-bit UInteger | 0..255 | Static Sequence Value (0-255) | The value that describes the LED position of the device. LED state is defined in Parameters Set Using IO-Link. |
| 6 | 16 | 3-bit UInteger | 0 = LED 1, 1 = LED 2, 2 = LED 3, 3 = LED 4, 4 = LED 5, 5 = LED 6, 6 = LED 7, 7 = LED 8 | Sequence Start Location | Defines the LED location where the sequence animation is initiated. |
| 7 | 8 | 5-bit UInteger | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | Color 1 | The main color of the animation. Custom Colors are defined in Parameters Set Using IO-Link. |
| 8 | 13 | 3-bit UInteger | 0 = High, 1 = Medium, 2 = Low, 3 = Off, 4 = Custom | Color 1 Intensity | The intensity of Color 1. Custom Intensity is defined in Parameters Set Using IO-Link. |
| 9 | 0 | 5-bit UInteger | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | Color 2 | The secondary color of the animation. Custom Colors are defined in Parameters Set Using IO-Link. |
| 10 | 5 | 3-bit UInteger | 0 = High, 1 = Medium, 2 = Low, 3 = Off, 4 = Custom | Color 2 Intensity | The intensity of Color 2. Custom Intensity is defined in Parameters Set Using IO-Link. |

| Octet 0 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 |
| Subindex | 3 | | | 2 | 1 | | | |
| Element Bit | 2 | 1 | 0 | | 3 | 2 | 1 | 0 |

| Octet 1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| Subindex | - | - | - | - | - | - | 4 | |

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| Octet 1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Element Bit | | | | | | | 1 | 0 |

| Octet 2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 3 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 4 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 |
| Subindex | 5 | | | | | | | |
| Element Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

| Octet 5 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| Subindex | - | - | - | - | - | 6 | | |
| Element Bit | | | | | | 2 | 1 | 0 |

| Octet 6 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
| Subindex | 8 | | | 7 | | | | |
| Element Bit | 2 | 1 | 0 | 4 | 3 | 2 | 1 | 0 |

| Octet 7 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Subindex | 10 | | | 9 | | | | |
| Element Bit | 2 | 1 | 0 | 4 | 3 | 2 | 1 | 0 |

# Process Data: LED Control

ProcessData id=V_Pd_LedControl (condition V_OperationMode == 3)

## IO-Link Process Data In (Device to Master)

ProcessDataIn id=V_Pd_InLedControl

- Bit Length: 32
- Data Type: 32-bit Record (subindex access not supported)

| Subindex | Bit Offset | Data Type | Allowed Values | Name | Description |
|---|---|---|---|---|---|
| 1 | 24 | Boolean | false = Inactive, true = Active | Output State | Output State. Related parameters are defined in output and touch settings parameter data. |
| 2 | 0 | 16-bit UInteger | | Distance | The measured distance in millimeters. |

| Octet 0 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 |
| Subindex | - | - | - | - | - | - | - | 1 |


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| Octet 1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
| Subindex | 2 | | | | | | | |
| Element bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |

| Octet 3 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Subindex | 2 | | | | | | | |
| Element bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

## IO-Link Process Data Out (Master to Device)

ProcessDataOut id=V_Pd_OutLedControl

- Bit Length: 64
- Data Type: 64-bit Record (subindex access not supported)

| Subindex | Bit Offset | Data Type | Allowed Values | Name | Description |
|---|---|---|---|---|---|
| 1 | 56 | 4-bit UInteger | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | LED 1 Color | Defines the color of the designated LED. LED 1 is oriented at the 12 o'clock position. |
| 2 | 60 | 4-bit UInteger | 0..10 | LED 1 Intensity (0-10) | Defines the intensity of the designated LED |
| 3 | 48 | 4-bit UInteger | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | LED 2 Color | Defines the color of the designated LED |
| 4 | 52 | 4-bit UInteger | 0..10 | LED 2 Intensity (0-10) | Defines the intensity of the designated LED |
| 5 | 40 | 4-bit UInteger | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | LED 3 Color | Defines the color of the designated LED |
| 6 | 44 | 4-bit UInteger | 0..10 | LED 3 Intensity (0-10) | Defines the intensity of the designated LED |
| 7 | 32 | 4-bit UInteger | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | LED 4 Color | Defines the color of the designated LED |
| 8 | 36 | 4-bit UInteger | 0..10 | LED 4 Intensity (0-10) | Defines the intensity of the designated LED |
| 9 | 24 | 4-bit UInteger | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | LED 5 Color | Defines the color of the designated LED |

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| Subindex | Bit Offset | Data Type | Allowed Values | Name | Description |
|---|---|---|---|---|---|
| 10 | 28 | 4-bit UInteger | 0..10 | LED 5 Intensity (0-10) | Defines the intensity of the designated LED |
| 11 | 16 | 4-bit UInteger | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | LED 6 Color | Defines the color of the designated LED |
| 12 | 20 | 4-bit UInteger | 0..10 | LED 6 Intensity (0-10) | Defines the intensity of the designated LED |
| 13 | 8 | 4-bit UInteger | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | LED 7 Color | Defines the color of the designated LED |
| 14 | 12 | 4-bit UInteger | 0..10 | LED 7 Intensity (0-10) | Defines the intensity of the designated LED |
| 15 | 0 | 4-bit UInteger | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | LED 8 Color | Defines the color of the designated LED |
| 16 | 4 | 4-bit UInteger | 0..10 | LED 8 Intensity (0-10) | Defines the intensity of the designated LED |

| Octet 0 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 |
| Subindex | 2 | | | | 1 | | | |
| Element Bit | 3 | 2 | 1 | 0 | 3 | 2 | 1 | 0 |

| Octet 1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| Subindex | 4 | | | | 3 | | | |
| Element Bit | 3 | 2 | 1 | 0 | 3 | 2 | 1 | 0 |

| Octet 2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 |
| Subindex | 6 | | | | 5 | | | |
| Element Bit | 3 | 2 | 1 | 0 | 3 | 2 | 1 | 0 |

| Octet 3 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| Subindex | 8 | | | | 7 | | | |
| Element Bit | 3 | 2 | 1 | 0 | 3 | 2 | 1 | 0 |

| Octet 4 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 |
| Subindex | 10 | | | | 9 | | | |
| Element Bit | 3 | 2 | 1 | 0 | 3 | 2 | 1 | 0 |


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| Octet 5 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| Subindex | 12 | | | | 11 | | | |
| Element Bit | 3 | 2 | 1 | 0 | 3 | 2 | 1 | 0 |

| Octet 6 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
| Subindex | 14 | | | | 13 | | | |
| Element Bit | 3 | 2 | 1 | 0 | 3 | 2 | 1 | 0 |

| Octet 7 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Subindex | 16 | | | | 15 | | | |
| Element Bit | 3 | 2 | 1 | 0 | 3 | 2 | 1 | 0 |

# Process Data: Distance

ProcessData id=V_Pd_Distance (condition V_OperationMode == 5)

## IO-Link Process Data In (Device to Master)

ProcessDataIn id=V_Pd_InDistance

- Bit Length: 32
- Data Type: 32-bit Record (subindex access not supported)

| Subindex | Bit Offset | Data Type | Allowed Values | Name | Description |
|---|---|---|---|---|---|
| 1 | 24 | Boolean | false = Inactive, true = Active | Output State | Output State. Related parameters are defined in output and touch settings parameter data. |
| 2 | 0 | 16-bit UInteger | | Distance | The measured distance in millimeters. |

| Octet 0 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 |
| Subindex | - | - | - | - | - | - | - | 1 |

| Octet 1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
| Subindex | 2 | | | | | | | |
| Element bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |

| Octet 3 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Subindex | 2 | | | | | | | |
| Element bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

## IO-Link Process Data Out (Master to Device)

ProcessDataOut id=V_Pd_OutDistance

- Bit Length: 64


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- Data Type: 64-bit Record (subindex access not supported)

| Subindex | Bit Offset | Data Type | Allowed Values | Name | Description |
|---|---|---|---|---|---|
| 1 | 56 | 2-bit UInteger | 0 | Reserved | Reserved |

| Octet 0 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 |
| Subindex | - | - | - | - | - | - | 1 | |
| Element bit | | | | | | | 1 | 0 |

| Octet 1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 3 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 4 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 5 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 6 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
| Subindex | - | - | - | - | - | - | - | - |

| Octet 7 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bit offset | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Subindex | - | - | - | - | - | - | - | - |

## Parameters Set Using IO-Link

| Index | Subindex | Name | Length | Value Range | Default | Access Rights | Data Storage? |
|---|---|---|---|---|---|---|---|
| 0 | 1-16 | Direct Parameters 1 | 128 | | | rw | |
| 1 | 1-16 | Direct Parameters 2 | 128 | | | rw | |
| 2 | | Standard Command | 8 | 65 = Teach Object Mode<br>66 = Teach Background Mode<br>67 = Teach Window Mode<br>68 = Teach Cancel<br>69 = Teach Off<br>130 = Restore Factory Settings | | wo | |

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| Index | Subindex | Name | Length | Value Range | Default | Access Rights | Data Storage? |
|---|---|---|---|---|---|---|---|
| 3-11 | | | | | | | |
| 12 | | **Direct Access Locks** | 16 | | | | |
| | 1 | Parameter (write) Access Lock | 1 | 0 = Off, 1 = On | False | rw | y |
| | 2 | Data Storage Lock | 1 | 0 = Off, 1 = On | False | rw | y |
| | 3 | Local Parameterization Lock | 1 | 0 = Off, 1 = On | | rw | y |
| | 4 | Local User Interface Lock | 1 | 0 = Off, 1 = On | | rw | y |
| 13-15 | | | | | | | |
| 16 | | Vendor Name string | 240 | Banner Engineering Corporation | | ro | |
| 17 | | Vendor Text string | 232 | More Sensors. More Solutions. | | ro | |
| 18 | | Product Name string | 256 | K50 | | ro | |
| 19 | | Product ID string | 256 | K50PSAF1000KQ | | ro | |
| 20 | | Product Text string | 256 | K50 ToF with IOL | | ro | |
| 21 | | Serial Number | 128 | | | ro | |
| 22 | | Hardware Version | 512 | | | ro | |
| 23 | | Firmware Version | 128 | | | ro | |
| 24 | | App Specific Tag (user defined) | 256 | | | rw | y |
| 25-35 | | | | | | | |
| 36 | | Device Status | 8 | 0 = Device is OK<br>1 = Maintenance required<br>2 = Out of specification<br>3 = Functional check<br>4 = Failure<br>5–255 = Reserved | | ro | |
| 37 | | Detailed Device Status | Array[6] of 3-octet | | | ro | |
| 38-79 | | | | | | | |
| 80 | | Operation Mode | 3 | 0 = Multicolor<br>1 = Full State Full Logic<br>2 = Advanced<br>3 = LED Control<br>4 = Demo | 2 | rw | y |
| 81 | | **Setting** | 24 | | | | |
| | 1 | Custom Intensity (0 - 100%) | 8 | 0..100 | 100 | rw | y |
| | 2 | Custom Flash Rate (0.5 - 25.5 Hz) | 8 | 5..255 | 15 | rw | y |
| | 3 | Restrict To Gamut | 8 | 0 = Off, 1 = On | 0 | rw | y |
| 82 | | **User Input Settings** | 56 | | | | |
| | 1 | Function | 1 | false = Momentary, true = Latched | False | rw | |
| | 2 | Mute Enable | 1 | false = Off, true = On | False | rw | |
| | 3 | On Delay (ms) | 16 | 0..65535 | 0 | rw | |
| | 4 | Target Threshold Low (mm) | 16 | 20..1500 | 20 | rw | |
| | 5 | Target Threshold High(mm) | 16 | 20..1500 | 500 | rw | |
| 83 | | **Output Settings** | 24 | | | | |
| | 1 | Output State | 1 | false = Normally Closed, true = Normally Open | True | rw | |
| | 2 | Off Delay Type | 1 | false = Leading Edge, true = Trailing Edge | False | rw | |
| | 3 | Off Delay (ms) | 16 | 0..65535 | 0 | rw | |
| 84 | | **State 1 Parameters** | | | | | |
| | 1 | Animation Type | 4 | 0 = Off, 1 = Steady, 2 = Flash, 3 = Two Color Flash, 4 = 50/50, 5 = 50/50 Rotate, 6 = Chase, 7 = Intensity Sweep, 8 = Color Sweep, 9 = Sequence, 10 = Wave, 11 = Double Wave | 1 | rw | y |
| | 2 | Animation Direction | 1 | false = CW, true = CCW | False | rw | y |

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| Index | Subindex | Name | Length | Value Range | Default | Access Rights | Data Storage? |
|---|---|---|---|---|---|---|---|
| | 3 | Animation Pattern | 3 | 0 = Flash, 1 = Strobe, 2 = Three Pulse, 3 = SOS, 4 = Random | 0 | rw | y |
| | 4 | Animation Speed | 2 | 0 = Slow, 1 = Medium, 2 = Fast, 3 = Custom | 1 | rw | y |
| | 5 | Reserved | 2 | 0 | 0 | rw | y |
| | 6 | Off Delay Type | 1 | false = Leading Edge, true = Trailing Edge | False | rw | y |
| | 7 | Off Delay (ms) | 16 | 0..65535 | 0 | rw | y |
| | 8 | Static Sequence Value (0-255) | 8 | 0..255 | 0 | rw | y |
| | 9 | Sequence Start Location | 3 | 0 = LED 1, 1 = LED 2, 2 = LED 3, 3 = LED 4, 4 = LED 5, 5 = LED 6, 6 = LED 7, 7 = LED 8 | 0 | rw | y |
| | 10 | Color 1 | 5 | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | 0 | rw | y |
| | 11 | Color 1 Intensity | 3 | 0 = High, 1 = Medium, 2 = Low, 3 = Off, 4 = Custom | 0 | rw | y |
| | 12 | Color 2 | 5 | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | 0 | rw | y |
| | 13 | Color 2 Intensity | 3 | 0 = High, 1 = Medium, 2 = Low, 3 = Off, 4 = Custom | 0 | rw | y |
| 85 | | **State 2 Parameters** | | | | | |
| | 1 | Animation Type | 4 | 0 = Off, 1 = Steady, 2 = Flash, 3 = Two Color Flash, 4 = 50/50, 5 = 50/50 Rotate, 6 = Chase, 7 = Intensity Sweep, 8 = Color Sweep, 9 = Sequence, 10 = Wave, 11 = Double Wave | 1 | rw | y |
| | 2 | Animation Direction | 1 | false = CW, true = CCW | False | rw | y |
| | 3 | Animation Pattern | 3 | 0 = Flash, 1 = Strobe, 2 = Three Pulse, 3 = SOS, 4 = Random | 0 | rw | y |
| | 4 | Animation Speed | 2 | 0 = Slow, 1 = Medium, 2 = Fast, 3 = Custom | 1 | rw | y |
| | 5 | Reserved | 2 | 0 | 0 | rw | y |
| | 6 | Off Delay Type | 1 | false = Leading Edge, true = Trailing Edge | False | rw | y |
| | 7 | Off Delay (ms) | 16 | 0..65535 | 0 | rw | y |
| | 8 | Static Sequence Value (0-255) | 8 | 0..255 | 0 | rw | y |
| | 9 | Sequence Start Location | 3 | 0 = LED 1, 1 = LED 2, 2 = LED 3, 3 = LED 4, 4 = LED 5, 5 = LED 6, 6 = LED 7, 7 = LED 8 | 0 | rw | y |
| | 10 | Color 1 | 5 | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | 0 | rw | y |
| | 11 | Color 1 Intensity | 3 | 0 = High, 1 = Medium, 2 = Low, 3 = Off, 4 = Custom | 0 | rw | y |
| | 12 | Color 2 | 5 | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | 0 | rw | y |
| | 13 | Color 2 Intensity | 3 | 0 = High, 1 = Medium, 2 = Low, 3 = Off, 4 = Custom | 0 | rw | y |
| 86 | | **State 3 Parameters** | | | | | |
| | 1 | Animation Type | 4 | 0 = Off, 1 = Steady, 2 = Flash, 3 = Two Color Flash, 4 = 50/50, 5 = 50/50 Rotate, 6 = Chase, 7 = Intensity Sweep, 8 = Color Sweep, 9 = Sequence, 10 = Wave, 11 = Double Wave | 1 | rw | y |
| | 2 | Animation Direction | 1 | false = CW, true = CCW | False | rw | y |
| | 3 | Animation Pattern | 3 | 0 = Flash, 1 = Strobe, 2 = Three Pulse, 3 = SOS, 4 = Random | 0 | rw | y |
| | 4 | Animation Speed | 2 | 0 = Slow, 1 = Medium, 2 = Fast, 3 = Custom | 1 | rw | y |
| | 5 | Reserved | 2 | 0 | 0 | rw | y |
| | 6 | Off Delay Type | 1 | false = Leading Edge, true = Trailing Edge | False | rw | y |
| | 7 | Off Delay (ms) | 16 | 0..65535 | 0 | rw | y |

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| Index | Subindex | Name | Length | Value Range | Default | Access Rights | Data Storage? |
|---|---|---|---|---|---|---|---|
| | 8 | Static Sequence Value (0-255) | 8 | 0..255 | 0 | rw | y |
| | 9 | Sequence Start Location | 3 | 0 = LED 1, 1 = LED 2, 2 = LED 3, 3 = LED 4, 4 = LED 5, 5 = LED 6, 6 = LED 7, 7 = LED 8 | 0 | rw | y |
| | 10 | Color 1 | 5 | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | 0 | rw | y |
| | 11 | Color 1 Intensity | 3 | 0 = High, 1 = Medium, 2 = Low, 3 = Off, 4 = Custom | 0 | rw | y |
| | 12 | Color 2 | 5 | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | 0 | rw | y |
| | 13 | Color 2 Intensity | 3 | 0 = High, 1 = Medium, 2 = Low, 3 = Off, 4 = Custom | 0 | rw | y |
| 87 | | **State 4 Parameters** | | | | | |
| | 1 | Animation Type | 4 | 0 = Off, 1 = Steady, 2 = Flash, 3 = Two Color Flash, 4 = 50/50, 5 = 50/50 Rotate, 6 = Chase, 7 = Intensity Sweep, 8 = Color Sweep, 9 = Sequence, 10 = Wave, 11 = Double Wave | 1 | rw | y |
| | 2 | Animation Direction | 1 | false = CW, true = CCW | False | rw | y |
| | 3 | Animation Pattern | 3 | 0 = Flash, 1 = Strobe, 2 = Three Pulse, 3 = SOS, 4 = Random | 0 | rw | y |
| | 4 | Animation Speed | 2 | 0 = Slow, 1 = Medium, 2 = Fast, 3 = Custom | 1 | rw | y |
| | 5 | Reserved | 2 | 0 | 0 | rw | y |
| | 6 | Off Delay Type | 1 | false = Leading Edge, true = Trailing Edge | False | rw | y |
| | 7 | Off Delay (ms) | 16 | 0..65535 | 0 | rw | y |
| | 8 | Static Sequence Value (0-255) | 8 | 0..255 | 0 | rw | y |
| | 9 | Sequence Start Location | 3 | 0 = LED 1, 1 = LED 2, 2 = LED 3, 3 = LED 4, 4 = LED 5, 5 = LED 6, 6 = LED 7, 7 = LED 8 | 0 | rw | y |
| | 10 | Color 1 | 5 | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | 0 | rw | y |
| | 11 | Color 1 Intensity | 3 | 0 = High, 1 = Medium, 2 = Low, 3 = Off, 4 = Custom | 0 | rw | y |
| | 12 | Color 2 | 5 | 0 = Green, 1 = Red, 2 = Orange, 3 = Amber, 4 = Yellow, 5 = Lime Green, 6 = Spring Green, 7 = Cyan, 8 = Sky Blue, 9 = Blue, 10 = Violet, 11 = Magenta, 12 = Rose, 13 = White, 14 = Custom 1, 15 = Custom 2 | 0 | rw | y |
| | 13 | Color 2 Intensity | 3 | 0 = High, 1 = Medium, 2 = Low, 3 = Off, 4 = Custom | 0 | rw | y |
| 88 | | **Custom Color 1** | 24 | | | | |
| | 1 | Red | 8 | 0..255 | 255 | rw | y |
| | 2 | Green | 8 | 0..255 | 255 | rw | y |
| | 3 | Blue | 8 | 0..255 | 255 | rw | y |
| 89 | | **Custom Color 2** | 24 | | | | |
| | 1 | Red | 8 | 0..255 | 255 | rw | y |
| | 2 | Green | 8 | 0..255 | 255 | rw | y |
| | 3 | Blue | 8 | 0..255 | 255 | rw | y |

# IO-Link Events

Events and Error Types are acyclic transmissions from the IO-Link device to the IO-Link master. Events can be error messages and/or warning or maintenance data.

| Event Types | | |
|---|---|---|
| **Code** | **Type** | **Description** |
| 0 (0x0000) | Notification | No malfunction |
| 20480 (0x5000) | Error | Device hardware fault/Device exchange |


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| Error Types | | | |
|---|---|---|---|
| **Code** | **Additional Code** | **Name** | **Description** |
| 128 (0x80) | 0 (0x00) | Device application error - no details | Service has been refused by the device application and no detailed information of the incident is available |
| | 17 (0x11) | Index not available | Access occurs to a not existing device |
| | 18 (0x12) | Subindex not available | Access occurs to a not existing subindex |
| | 32 (0x20) | Service temporarily not available | Parameter is not accessible because of the current state of the device application |
| | 35 (0x23) | Access denied | Write access on a read-only parameter |
| | 48 (0x30) | Parameter value out of range | Written parameter value is outside its permitted value range |
| | 49 (0x31) | Parameter value above limit | Written parameter value is above its specific value limit |
| | 51 (0x33) | Parameter length overrun | Written parameter length is above its predefined length |
| | 52 (0x34) | Parameter length underrun | Written parameter length is below its predefined length |
| | 53 (0x35) | Function not available | Written command is not supported by the device application |
| | 54 (0x36) | Function temporarily unavailable | Written command is not available because of the current state of the device application |
| | 65 (0x41) | Inconsistent parameter set | Parameter inconsistencies were found at the end of the block parameter transfer, device plausibility check failed |


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# Chapter 4 Specifications

**Supply Voltage and Current**

18 V DC to 30 V DC

- 220 mA at 10 V DC (exclusive of load)
- 190 mA at 12 V DC (exclusive of load)
- 115 mA at 24 V DC (exclusive of load)
- 100 mA at 30 V DC (exclusive of load)

**Supply Protection Circuitry**

Protected against transient voltages and output short-circuit

**Leakage Current Immunity**

400 µA

**Vibration and Mechanical Shock**

Meets IEC 60068-2-6 requirements (Vibration: 10 Hz to 55 Hz, 1.0 mm amplitude, 5 minutes sweep, 30 minutes dwell)

Meets IEC 60068-2-27 requirements (Shock: 30G 11 ms duration, half sine wave)

**Operating Conditions**

–20 °C to +50 °C (–4 °F to +122 °F)

90% at +50 °C maximum relative humidity (non-condensing)

Storage Temperature: –40 °C to +70 °C (–40 °F to +158 °F)

**Environmental Rating**

IP66, IP67, IP69K per ISO 20653

**Connections**

Integral 4-pin M12 male quick-disconnect connector

**Mounting**

M30 by 1.5 threaded base, maximum torque 4.5 N·m (40 inch-lbf)

Mounting nut included

**Construction**

Base and Dome: Polycarbonate

Mounting Nut: Polybutylene terephthalate (PBT)

**Application Note**

For the most accurate measurements, allow 5 minutes for the sensor to warm up

**Remote Input**

Allowable Input Voltage Range: 0 to Vsupply

Active High (internal weak pull-down): High state > (Vsupply - 2.25 V) at 2 mA maximum

Active Low (internal weak pull-up): Low state < 2.25 V at 2 mA maximum

**Repeatability**

5 mm from 20 to 300 mm

8 mm from 300 mm to 600 mm

14 mm from 600 mm to 1000 mm

**Temperature Effect**

<±5 mm from –20 °C to +50 °C (–4 °F to +122 °F)

**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 | 1.0 | 30 | 0.5 |

**Certifications**

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1831 Diegem, BELGIUM

**Range**

The sensor can detect an object at the following ranges, depending on the material and size of the target: 20 mm to 1000 mm

**Sensing Beam**

Infrared, 940 nm


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### Default Indicator Characteristics

| Color | Dominant Wavelength (nm) or Color Temperature (CCT) | Color Coordinates[2] | | Lumen Output Per Segment (Typical at 25 °C) |
|---|---|---|---|---|
| | | X | Y | |
| Green | 522 | 0.154 | 0.7 | 19.5 |
| Red | 620 | 0.689 | 0.309 | 10.3 |
| Yellow | 576 | 0.477 | 0.493 | 25.8 |
| Blue | 466 | 0.14 | 0.054 | 3.6 |
| White | 5700K | 0.328 | 0.337 | 30.5 |
| Cyan | 493 | 0.17 | 0.34 | 22.1 |
| Magenta | - | 0.379 | 0.172 | 12.7 |
| Amber | 589 | 0.556 | 0.42 | 17.9 |
| Rose | - | 0.525 | 0.237 | 10.6 |
| Lime Green | 562 | 0.383 | 0.523 | 25.3 |
| Sky Blue | 486 | 0.145 | 0.24 | 17.8 |
| Orange | 599 | 0.616 | 0.37 | 14.3 |
| Violet | - | 0.224 | 0.099 | 14.3 |
| Spring Green | 508 | 0.155 | 0.524 | 20 |

# FCC Part 15 Class B for Unintentional Radiators

(Part 15.105(b)) This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

(Part 15.21) Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

# Industry Canada ICES-003(B)

This device complies with CAN ICES-3 (B)/NMB-3(B). Operation is subject to the following two conditions: 1) This device may not cause harmful interference; and 2) This device must accept any interference received, including interference that may cause undesired operation.

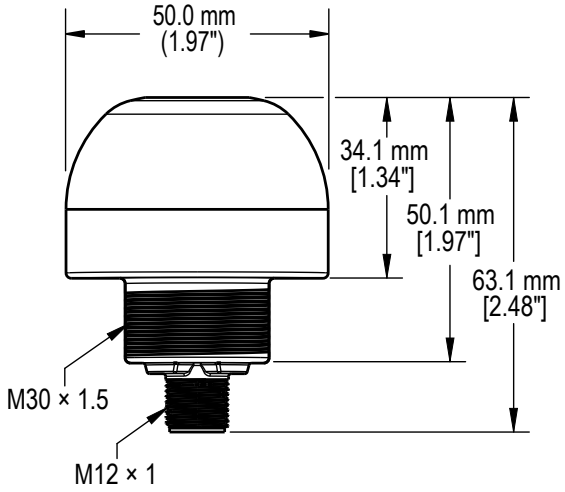
Cet appareil est conforme à la norme NMB-3(B). Le fonctionnement est soumis aux deux conditions suivantes : (1) ce dispositif ne peut pas occasionner d'interférences, et (2) il doit tolérer toute interférence, y compris celles susceptibles de provoquer un fonctionnement non souhaité du dispositif.

[2] Refer to CIE 1931 chromaticity diagram or color chart to show equivalent color with indicated color coordinates. Actual coordinates may differ by 10%.


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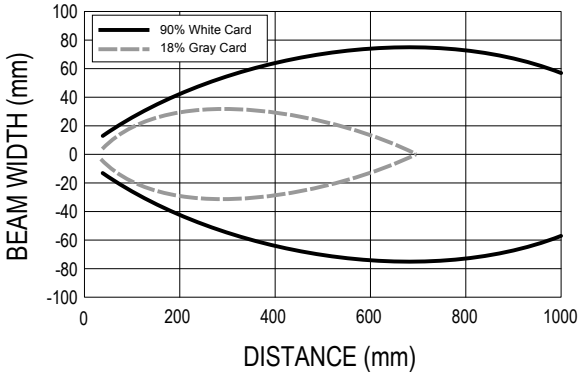
# Dimensions

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




# Beam Pattern

*Typical beam pattern, in millimeters*





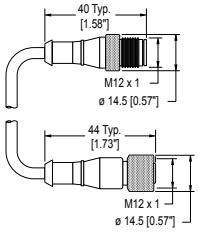
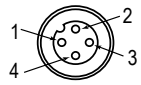
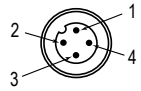
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# Chapter 5 Accessories

## Cordsets

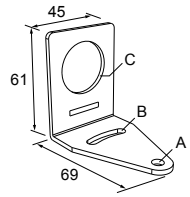
| 4-pin A-Code Double-Ended M12 Female to M12 Male Cordsets | | | | |
|---|---|---|---|---|
| **Model** | **Length** | **Dimensions (mm)** | **Pinouts** | |
| **BC-M12F4-M12M4-22-1** | 1 m (3.28 ft) |  | Female<br><br>Male<br> | 1 = Brown<br>2 = White<br>3 = Blue<br>4 = Black |
| **BC-M12F4-M12M4-22-2** | 2 m (6.56 ft) | | | |
| **BC-M12F4-M12M4-22-3** | 3 m (9.84 ft) | | | |
| **BC-M12F4-M12M4-22-4** | 4 m (13.12 ft) | | | |
| **BC-M12F4-M12M4-22-5** | 5 m (16.4 ft) | | | |
| **BC-M12F4-M12M4-22-10** | 10 m (30.81 ft) | | | |
| **BC-M12F4-M12M4-22-15** | 15 m (49.2 ft) | | | |

## Brackets

**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

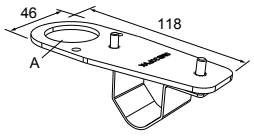
**Hole center spacing:** A to B=40
**Hole size:** A=ø 6.3, B= 27.1 × 6.3, C=ø 30.5




**SMB30FVK**

- V-clamp, flat bracket and fasteners for mounting to pipe or extensions
- Clamp accommodates 28 mm dia. tubing or 1 in. square extrusions
- 30 mm hole for mounting sensors

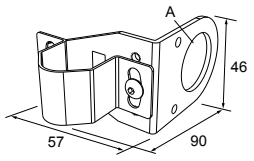
**Hole size:** A= ø 31




**SMB30RAVK**

- V-clamp, right-angle bracket and fasteners for mounting sensors to pipe or extrusion
- Clamp accommodates 28 mm dia. tubing or 1 in. square extrusions
- 30 mm hole for mounting sensors

**Hole size:** A = ø 30.5



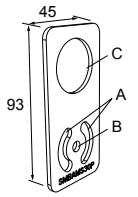


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**SMBAMS30P**

- Flat SMBAMS series bracket
- 30 mm hole for mounting sensors
- Articulation slots for 90°+ rotation
- 12-gauge 300 series stainless steel

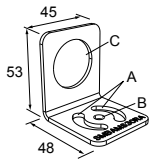
**Hole center spacing:** A=26.0, A to B=13.0
**Hole size:** A=26.8 × 7.0, B=ø 6.5, C=ø 31.0




**SMBAMS30RA**

- Right-angle SMBAMS series bracket
- 30 mm hole for mounting sensors
- Articulation slots for 90°+ rotation
- 12-gauge (2.6 mm) cold-rolled steel

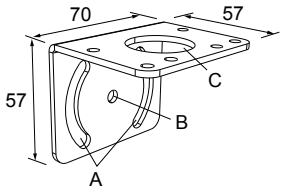
**Hole center spacing:** A=26.0, A to B=13.0
**Hole size:** A=26.8 × 7.0, B=ø 6.5, C=ø 31.0




**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

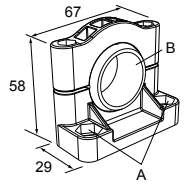
**Hole center spacing:** A = 51, A to B = 25.4
**Hole size:** A = 42.6 × 7, B = ø 6.4, C = ø 30.1




**SMB30SC**

- Swivel bracket with 30 mm mounting hole for sensor
- Black reinforced thermoplastic polyester
- Stainless steel mounting and swivel locking hardware included

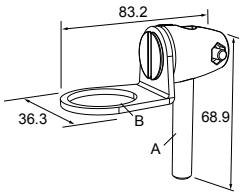
**Hole center spacing:** A=ø 50.8
**Hole size:** A=ø 7.0, B=ø 30.0




**SMB30FA**

- Swivel bracket with tilt and pan movement for precise adjustment
- Mounting hole for 30 mm sensor
- 12-gauge 304 stainless steel
- Easy sensor mounting to extrude rail T-slot
- Metric- and inch-size bolt available

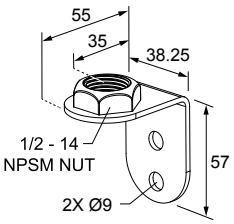
**Bolt thread:** SMB30FA, A= 3/8 - 16 × 2 in; SMB30FAM10, A= M10 - 1.5 × 50
**Hole size:** B= ø 30.1




**LMBE12RA35**

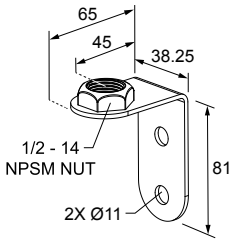
- Direct mounting of stand-off pipe, with common bracket type
- Zinc-plated steel
- 1/2-14 NPSM nut
- Mounting distance from the wall to the center of the 1/2-14 NPSM nut is 35 mm

**Hole center spacing:** 20.0





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| | |
|---|---|
| **LMBE12RA45**<br>• Direct mounting of stand-off pipe, with common bracket type<br>• Zinc-plated steel<br>• 1/2-14 NPSM nut<br>• Mounting distance from the wall to the center of the 1/2-14 NPSM nut is 45 mm<br>**Hole center spacing:** 35.0 |  |

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

# Elevated Mount System

| Model | | Description | Components |
|---|---|---|---|
| **SA-M30E12P** - Black Acetal | | • Streamlined black acetal stand-off pipe adapter/cover<br>• Connects between 30 mm light base and ½ in. NPSM/ DN15 pipe<br>• Mounting hardware included |  |
| **Black Anodized Aluminum** | **Clear Anodized Aluminum** | • Elevated-use stand-off pipe (½ in. NPSM/DN15)<br>• Polished 304 stainless steel, black anodized aluminum, or clear anodized aluminum surface<br>• ½ in. NPT thread at both ends: one end screws into the internal threads of the light's base, and one end screws into the mounting base adapter/cover<br>• Compatible with most industrial environments |  |
| **SOP-E12-150A**<br>150 mm (6 in) long | **SOP-E12-150AC**<br>150 mm (6 in) long | | |
| **SOP-E12-300A**<br>300 mm (12 in) long | **SOP-E12-300AC**<br>300 mm (12 in) long | | |
| **SOP-E12-600A**<br>600 mm (24 in) long | **SOP-E12-600AC**<br>600 mm (24 in) long | | |
| **SOP-E12-900A**<br>900 mm (36 in) long | **SOP-E12-900AC**<br>900 mm (36 in) long | | |


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# Chapter 6 Product Support and Maintenance

## Clean with Mild Detergent and Warm Water

Wipe down the device with a soft cloth dampened with a mild detergent and warm water solution. Do not use any other chemicals for cleaning.

## Repairs

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.

## Contact Us

Banner Engineering Corp. headquarters is located at: 9714 Tenth Avenue North | Plymouth, MN 55441, USA | Phone: + 1 888 373 6767

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

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