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# TABLE OF CONTENTS

**SECTION 1 - SAFETY**
- Safety Information Responsibility 4
- Safety Messages 4

**SECTION 2 - OVERVIEW**
- General Product Overview 5
- Structure 5
- Status Indicator Lights 5

**SECTION 3 - INSTALLATION**
- Mechanical Installation 6
  - Reflector Mounting 6
  - Sensor Mounting 6
  - Sensor to Bracket Assembly 7
  - Sensor Targeting 8
  - Controller 9
- Electrical Installation 10
  - Sensor Cable 10
  - Control and Power Cable 10
  - Sensor Calibration 11

**SECTION 4 - MAINTENANCE**
- Mechanical Maintenance 13
  - Reflector 13
  - Sensor 13
- Electrical Maintenance 13

**SECTION 5 - TROUBLESHOOTING**
14
SECTION 1 - SAFETY

Safety Information Responsibility
All owner, operator, and maintenance personnel must read and understand all manuals associated with this product before installation, operation, or maintenance.

The manual provides information on the recommended installation, operation, and maintenance of this product. Failure to read and follow the information provided could cause harm to yourself or others and/or cause product damage. No one should install, operate, or attempt maintenance of this product prior to familiarizing themselves with the information in this manual.

Safety Messages
Safety messages in this manual are preceded by the HAZARD SYMBOL and one of three words: CAUTION, DANGER, OR WARNING. These safety messages are intended to alert you to potential hazards that could cause harm to you or others and/or cause product damage.

⚠️ CAUTION
- The HAZARD SYMBOL used with the word CAUTION indicates unsafe actions or situations that have the potential to cause injury, and/or minor equipment or property damage.

⚠️ DANGER
- The HAZARD SYMBOL used with the word DANGER describes immediate hazards that have the potential to cause severe personal injury or death.

⚠️ WARNING
- The HAZARD SYMBOL used with the word WARNING describes unsafe actions or situations that have the potential to cause severe injury, death, and/or major equipment or property damage.

NOTE
- The word NOTE is used to alert you to installation, operation, programming, or maintenance information that is important, but not hazard related.
SECTION 2 - OVERVIEW

General Product Overview
BridgeGuard Plus prevents crane to crane or crane to structure collision during operation, either from human error or from system malfunction.

Structure

---

**CAUTION**

- The original equipment manufacturer must assure that the system is properly configured. Safety is ultimately the responsibility of the user.

Overall features of BridgeGuard Plus can be seen below. See Figure 5-1.

---

Status Indicator Lights
The sensor box for BridgeGuard Plus features status indicator LEDs that provide information on the supply voltage activity, signal strength, and output activity. See Figure 5-2.

<table>
<thead>
<tr>
<th>Status</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator LED 1</td>
<td>Green</td>
<td>Operating voltage indicator</td>
</tr>
<tr>
<td>Indicator LED 1</td>
<td>Yellow</td>
<td>Switching output indicator</td>
</tr>
<tr>
<td>Indicator LED 2</td>
<td>Yellow</td>
<td>Switching output indicator</td>
</tr>
</tbody>
</table>

Table 5-2

Function
Q1 and Q2 are used as switching outputs, the following modes are available
- Distance to Object (Dto)
- Window (Wnd)
- Object between Sensor and Background (ObSB)

The distance measurement value can be transferred cyclically over IO-Link.
SECTION 3 - INSTALLATION

Function
Q1 and Q2 are used as switching outputs, the following modes are available

- Window (Wnd)
- Object between Sensor and Background (ObSB)

To Unlock Sensor:

- Push and hold Select button for 3-4 seconds to enter TEACH MODE. The top LED (Q1 NEAR) will come on
- Press the Select button. This will cycle through the Q1 and Q2 relays.
- To set up the sensor speed, cycle to SLOW. There are 5 speeds, and the LED will blink 1-5 times according to the selected speed. Push the SET button until the proper speed setting is achieved.
- To close out of the sensor’s function, press and hold SELECT for at 5 seconds. Also, not operating the sensor for 5 minutes will lock in functions.

Window (Wnd) program:

- Push and hold SELECT button for 3-4 seconds to enter TEACH MODE. The top LED (Q1 NEAR) will come on.
- Place the object at the minimum detection distance to the sensor. Press SET, and the distance between the object and the sensor is saved as a switch point. The LEDs for Q1 and Q2 will flash in sync twice. When the minimum detection distance is reached, the relay goes from a “1” state (active, green light) to a “0” state (inactive, red light) and triggers the STOP feature.
- Push the SELECT button to switch to Q2 FAR. Place the object at the maximum detection distance to the sensor. Press SET, and the distance between the object and the sensor is saved as a switch point. The LEDs for Q1 and Q2 will flash twice. When the maximum detection distance is reached, the relay goes from a “0” state (inactive, red light) to a “1” state (active, green light) and triggers the SLOW feature.
- To close out of the sensor’s function, press and hold SELECT for 5 seconds. Also, not operating the sensor for 5 minutes will lock in functions.

Object between Sensor and Background (ObSB) program:

- Remove all objects between the sensor and the background.
- Push and hold SELECT button for 3-4 seconds to enter TEACH MODE. The top LED (Q1 NEAR) will come on.
- Push the SELECT button two more times so the Q1 NEAR and Q1 FAR LEDs are both lit.
- Push the SET button. The Q1 and Q2 LEDs will flash twice, then the Q2 LED stays lit. This means the background is set. When an object is placed in the path of the sensor, the relay goes from a “0” state (inactive, red light) to a “1” state (active, green light). When the object is removed from the path of the sensor, relay goes from a “1” state (active, green light) to a “0” state (inactive, red light).
- To close out of the sensor’s function, press and hold SELECT for 5 seconds. Also, not operating the sensor for 5 minutes will lock in functions.
SECTION 3 - INSTALLATION

Mechanical Installation

Reflector Mounting

**NOTE**
- Reflector plate comes with 6 pre-drilled holes predrilled. See Figure 7-1.
- A minimum of 4 fasteners should be used to mount reflector to I-Beam web.

1. Mount reflector to the I-Beam using appropriate hardware. See Figure 7-1.

**NOTE**
- A spacer must be used between the I-Beam’s web and the reflector back plate.
- A lock washer must be used to prevent loosening.
- The plate can be mounted to other surfaces using the same holes, the beam is only an example.

Sensor Mounting

1. Mount sensor in desired location and make adjustments appropriate to your specific assembly. See Figure 7-2

**WARNING**
- Maximum sensor trigger distance should be no more than 115 feet.

**NOTE**
- The sensor can be mounted to the flange of the beam or other alternative surfaces.
SECTION 3 - INSTALLATION

Sensor to Bracket Assembly

Figure 8-1  Sensor to Bracket Assembly

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>WASHER 8 SCREW LK SST</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>WASHER 8 FLAT SST</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>SENSOR</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>SCREW 8-32 X 1-1/4 SST PHP</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>NUT HEX 8-32 NARROW SST</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>SENSOR MOUNTING SET</td>
<td>1</td>
</tr>
</tbody>
</table>
SECTION 3 - INSTALLATION

Sensor Targeting

Included below is a general sensor target installation, your specific installation may vary. See Figure 9-1.

Figure 9-1 General Sensor Target Installation
SECTION 3 - INSTALLATION

Controller

Included below is the controller wiring diagram for reference if experiencing issues. See Figure 10-1.

Figure 10-1  Controller Wiring Diagram
SECTION 3 - INSTALLATION

Electrical Installation

Sensor Cable

Use the Sensor Cable Wiring Table for sensor cable installation. See Table 11-1.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brown</td>
<td>Supply Voltage Input</td>
</tr>
<tr>
<td>2</td>
<td>Blue</td>
<td>Supply Voltage: OV/Ground</td>
</tr>
<tr>
<td>3</td>
<td>Black</td>
<td>Digital Output Q1</td>
</tr>
<tr>
<td>4</td>
<td>White</td>
<td>Digital Output Q2</td>
</tr>
<tr>
<td>5</td>
<td>Gray</td>
<td>Multifunctional Input MF</td>
</tr>
</tbody>
</table>

Table 11-1  Sensor Cable Wiring Table

Control and Power Cable

Use the Power and Control Cable Table for control and power cable installation. See Table 11-2.

<table>
<thead>
<tr>
<th>Conductor #</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Black</td>
<td>120 VAC Power Supply (L)</td>
</tr>
<tr>
<td>2</td>
<td>White</td>
<td>120 VAC Power Supply (N)</td>
</tr>
<tr>
<td>3</td>
<td>Red</td>
<td>Multifunctional Input (Terminal 5)</td>
</tr>
<tr>
<td>4</td>
<td>Green</td>
<td>120 VAC Power Supply (GND)</td>
</tr>
<tr>
<td>5</td>
<td>Orange</td>
<td>Q1 Relay Normally Open or Closed (N.O. or N.C.)</td>
</tr>
<tr>
<td>6</td>
<td>Blue</td>
<td>Q1 Relay Common</td>
</tr>
<tr>
<td>7</td>
<td>White/Black</td>
<td>Q2 Relay Normally Open or Closed (N.O. or N.C.)</td>
</tr>
<tr>
<td>8</td>
<td>Red/Black</td>
<td>Q2 Relay Common</td>
</tr>
</tbody>
</table>

Table 11-2  Power and Control Cable Table
**SECTION 3 - INSTALLATION**

**Sensor Calibration**

**STOP and SLOWDOWN Distance Detection Settings**

Make sure that the sensor and the reflector are properly mounted and make sure the visible laser light can be seen on the reflector before setting range detection.

Setting the range detection distances will require movement of the crane to the desired STOP and SLOWDOWN distances

**Setting up STOP distance Detection**

1. With the sensor mounted to the crane, move crane to the STOP distance point.
2. Press and hold (it will take approximately 5 seconds) “SELECT” pushbutton until “Q1 near” LED light turns ON.
3. Press “SET” pushbutton; “Q1” and “Q2” LEDs should flash twice simultaneously indicating that the setup was successful. In the contrary, please start over.
4. Press and Hold “SELECT” pushbutton for at least for 6 seconds to exit setting up STOP distance setup mode. “Q1” and “run” LED lights should both stay on with the crane at the STOP distance.

**Setting up SLOWDOWN distance Detection**

1. With the sensor mounted to the crane, move crane to the SLOWDOWN distance point.
2. Press and hold (it will take approximately 5 seconds) “SELECT” pushbutton until “Q1 near” LED light turns ON.
3. Press select until “Q2 near” LED light turns ON (Hint: press “SELECT” 3 times).
4. Press “SET” pushbutton; “Q1” and “Q2” LEDs should flash twice simultaneously indicating that the setup was successful. In the contrary, please start over.
5. Press and Hold “SELECT” pushbutton for at least for 6 seconds to exit setting up SLOWDOWN distance setup mode. “Q2” and “run” lights should both stay on with the crane at the SLOWDOWN distance.
6. Move the crane back and forth couple times to verify relays are triggered at the correct distances.

![Figure 12-1](image)

**Figure 12-1**

1. Q1 Indicator Light
2. Q2 Indicator Light
3. Run Indicator Light
4. Q1 near Indicator Light
5. Q1 far Indicator Light
6. Q2 near Indicator Light
7. Q2 far Indicator Light
8. Slow Indicator Light
9. Select Push Button
10. Set Push Button
11. Q1 Indicator Light
12. Q2 Indicator Light
13. Run Light/Status Indicator Light
SECTION 4 - MAINTENANCE

Mechanical Maintenance

Reflector
Ensure that the reflector is clean and clear of dirt and other debris at all times.

Sensor
Ensure the sensor is clean and clear of dirt and debris at all times.
Ensure sensor-target path is clear of obstructions.

Electrical Maintenance

WARNING

• Equipment damage due to improper cleaning!
• Never use cleaning agents containing aggressive substance
• Never use pointed objects for cleaning

<table>
<thead>
<tr>
<th>Interval</th>
<th>Maintenance work</th>
<th>To be performed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning interval depends on ambient conditions and climate</td>
<td>Clean housing</td>
<td>Specialist</td>
</tr>
<tr>
<td>Every 3 months depending on the application conditions with regard to shock and vibration</td>
<td>Check the screw connections and plug connections.</td>
<td>Specialist</td>
</tr>
</tbody>
</table>

Table 13-1

NOTE

• Compressed air should be used to clean.
### SECTION 5 - TROUBLESHOOTING

Potential issues and solutions are shown below. Contact the factory for additional support. See Table 14-1.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Potential Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of signals</td>
<td>Electrical Connections</td>
<td>Inspect the electrical connections to the sensors and to the control box.</td>
</tr>
<tr>
<td>Unable to read output signals</td>
<td>Electrical Connection</td>
<td>Inspect the connection to terminal blocks in control box and to the sensor.</td>
</tr>
<tr>
<td></td>
<td>Laser is not on reflector plate</td>
<td>Realign sensor and reflector plate.</td>
</tr>
<tr>
<td>Sensor not working even when plugged in</td>
<td>Sensor-target misalignment</td>
<td>Check to see if sensor is working by holding the reflector close to the sensor.</td>
</tr>
<tr>
<td></td>
<td>Sensor-target misalignment</td>
<td>If the sensor is working, check sensor-target alignment and make adjustments.</td>
</tr>
</tbody>
</table>

Table 14-1