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ZMX Series 3D Time of Flight Sensor Quick Start Guide

Product Description

Simple, reliable, volume and height monitoring with ZMX Series 3D Time of Flight Sensor. Patent pending.

This guide is designed to help you set up and install the ZMX Series 3D Time of Flight Sensor. For complete information on programming, performance, troubleshooting, dimensions, and accessories, please refer to the Instruction Manual at www.bannerengineering.com. Search for part number 230551 to view the Instruction Manual. Use of this document assumes familiarity with pertinent industry standards and practices.

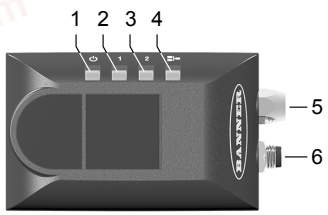
WARNING:

- **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.

Features and Indicators

LED indicators provide ongoing indication of sensing status.

Features



1. Power and Fault LED (off, green, red, or flashing red)
2. Ready LED
3. Image Transmitted LED
4. Ethernet Activity LED
5. Ethernet connection
6. Power connection

Laser Description and Safety Information

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.

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

CLASS 1 LASER PRODUCT	Complies with 21 CFR 1040.10 and 1040.11, except for deviations pursuant to Laser Notice No. 56, dated May 8, 2019. Complies with IEC 60825-1:2014 and EN 60825-1:2014+A11:2021.

Installation Instructions

Mount the Device

1. If a bracket is needed, mount the device onto the bracket.
2. Mount the device (or the device and the bracket) to the machine or equipment at the desired location. Do not tighten the mounting screws at this time.

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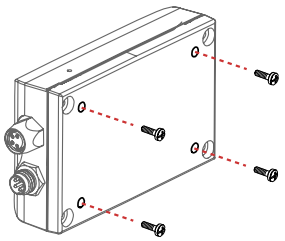
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CAUTION: This device accepts M4 screws. Engaging the screws more than 4 mm will damage the device.

CAUTION: 8 in·lbf (0.904 Nm) maximum torque

3. Check the device alignment.
4. Tighten the mounting screws to secure the device (or the device and the bracket) in the aligned position.

Mounting Holes



NOTE: Do not remove the housing screws.

NOTE: Provide adequate dissipation of heat. A good heat conductor, such as aluminum, may be required.

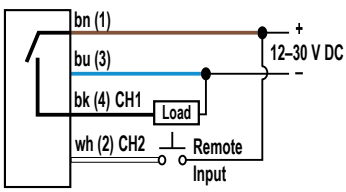
Mounting Surface Thickness	Length of Mounting Screws
≤ 2 mm	4 mm
2 mm to 4 mm	6 mm
4 mm to 6 mm	8 mm

Wiring

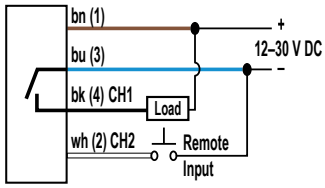
To maintain the ratings listed in the Specifications, the ZMX Series 3D Time of Flight Sensor requires using a specific type of shielded cable. Refer to the Instruction Manual's accessories list for more information.

Tighten the cables finger tight only.

Channel 1 as PNP Output, Channel 2 as Trigger Input



Channel 1 as NPN Output, Channel 2 as Trigger Input



M8 Male Connector



Power and I/O Pinouts

Pin	Wire Color	Description
1	Brown	12 V DC to 30 V DC
2	White	Trigger Input or Output (selectable PNP, NPN, or push-pull)
3	Blue	Common
4	Black	Output (selectable PNP, NPN, or push-pull)

Install the Software

Use the following instructions to install the Banner 3D Configuration software on your computer.

PC Requirements

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Operating System
Microsoft® Windows® operating system version 8, 10, or 11[1]

Hard Drive Space
100 MB

Screen Resolution
1024 × 768 pixels

Memory (RAM)
500 MB

Ports Needed
TCP/IP port 32000
TCP/IP port 32200
UDP/IP Port 19995

[1] Microsoft and Windows are registered trademarks of Microsoft Corporation in the United States and/or other countries.

IMPORTANT: Administrative rights may be required to install the Banner 3D Configuration software.

1. Download the latest version of the software from www.bannerengineering.com.
2. Navigate to and open the downloaded file.
3. Run the downloaded installer.
4. Check the agreement for license terms and conditions.
5. Click **Install** to install the software.
   A Windows security message displays. This indicates that the installer is signed and is from Banner.
6. Click **Yes**.
7. Click **Close** to exit the installer when the installation is complete.
8. Locate the program icon on the desktop or in the **Start** menu and open the Banner 3D Configuration software.

Getting Started

Connect to the Sensor

These instructions use Windows® operating system version 8, 10, or 11.[2]

1. Confirm the network connections.
   a. Click the **Start** button, then on the **Start** menu, click **Control Panel**.
   b. In **Control Panel**, click **Network and Internet**, then click **Network and Sharing Center**, and then click **Change adapter settings**.
   c. Right-click on the connection that you want to change, then click **Properties**.
      If you are prompted for an administrator password or confirmation, enter the password or provide confirmation.
   d. In the connection properties, click **Internet Protocol Version 4 (TCP/IPv4)**, and then click **Properties**.
   e. In the **Internet Protocol (TCP/IPv4) Properties**, select **Use the following IP address**.
   f. Make sure that the IP address is 192.168.0.2 (or an unused IP address within the 192.168.0.x subnet), and the subnet mask is 255.255.255.0.
2. Open the Banner 3D Configuration software from the desktop or the **Start** menu.
3. Connect to the ZMX sensor using one of the following options:
   - From the **Connection** pane, enter the IP address of the desired ZMX sensor into the **Sensor IP Address** field, then click **Connect**.
   - From the **Connection** pane, locate the IP address of the desired sensor in the list of discovered sensors, then click ➡ next to **IP Address**.

   The default IP address for the sensor is 192.168.0.10.

Banner 3D Configuration Workspace

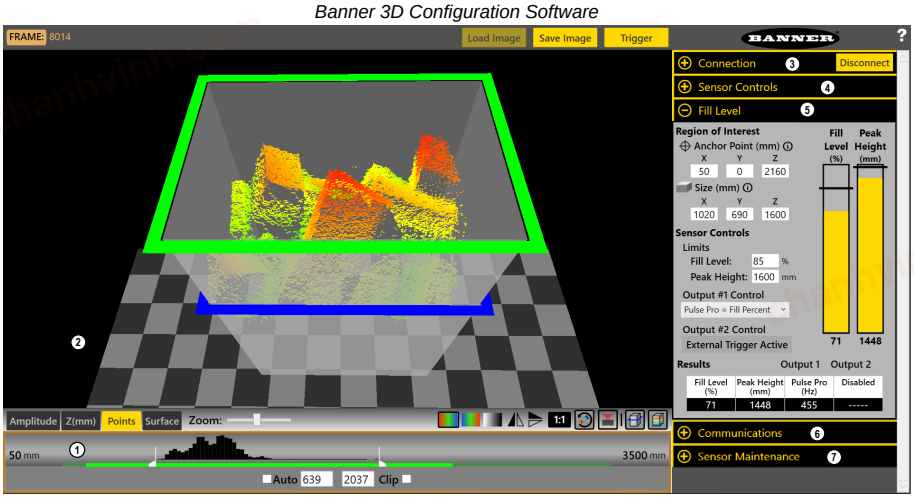
The Banner 3D Configuration software displays the information needed to modify sensor parameters.

[2] Windows is a registered trademark of Microsoft Corporation in the United States and/or other countries.

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Banner 3D Configuration Software



The workspace is divided into several panes.

1. Image Pane Parameters—Includes zoom; x, y, z coordinates; image color; view selection (Amplitude, Z(mm), Points, Surface). The options vary depending on the selected view.
2. Image pane—Displays the current image captured by the sensor and includes the buttons:
   - **Load Image**—Loads a previously saved file for viewing while disconnected from the sensor
   - **Save Image**—Save file as a .t3f
   - **Trigger**—Manually triggers the sensor when Trigger mode is set to **External** or **Software**
3. **Connection** pane—Enables connection to a sensor and includes settings and information related to the sensor's IP address.
4. **Sensor Controls** pane—Controls the trigger mode and illumination output.
5. **Fill Level** pane— Includes options for the region of interest and sensor controls, as well as live fill and peak height data.
6. **Communications** pane—Sets the communication protocol and DHCP option for the sensor.
7. **Sensor Maintenance** pane—Includes sensor information and options to update the firmware, restore the sensor to the default settings, to backup the current sensor settings, or restore the sensor to previously saved settings.

ZMX Specifications

Sensing Range

200 mm to 2500 mm (7.9 in to 8.2 ft) on a 90% reflectance white target

200 mm to 2500 mm (7.9 in to 8.2 ft) on a 20% reflectance gray target

200 mm to 1700 mm (7.9 in to 5.6 ft) on a 6% reflectance black target

Supply Voltage

12 V DC to 30 V DC

Current: 200 mA average, 2.5 A peak (exclusive of load and lights)

Use only with a suitable Class 2 power supply, or current-limiting power supply rated 12 V DC to 30V DC, 2.5 A

Discrete I/O Configuration

Channel 1: Push-pull, PNP or NPN discrete output, or Pulse Pro/Pulse Frequency Modulation (PFM) output

Channel 2: PNP or NPN discrete output, or Pulse Pro/Pulse Frequency Modulation (PFM) output, or remote trigger

Flatness (Pixel-to-Pixel Accuracy)

±20 mm for > 10x excess gain

±60 mm for 2x to 10x excess gain

Response Time

150 ms in Free Run mode

Accuracy

±30 mm for > 10x excess gain(1)

(1) For 6% to 90% diffuse targets in the center 25% of the field of view; ±60 mm accuracy for 2x to 10x excess gain.

Repeatability (1-sigma)

Peak excess gain: 2 mm

> 10x excess gain, 10 mm

> 2x excess gain, 40 mm

Communication Interface

Ethernet; 100 Mbps

Communication Protocol

Modbus® TCP/IP

EtherNet/IP™

Modbus® is a registered trademark of Schneider Electric USA, Inc. EtherNet/IP™ is a trademark of ODVA, Inc.

Boresighting

±20 mm at 1 m range

Delay at Power Up

< 10 s

Recommended Warm Up Time

15 minutes

Light Source

Infrared, 850 nm

Temperature Effect

< 0.5 mm/°C

Resolution

272 horizontal × 208 vertical pixels

Field of View

60 horizontal × 45 vertical degrees

Reading Rate, Full Resolution

Up to 6 frames per second in Free Run mode

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Ambient Light Immunity
10,000 lux

Torque—Tapped Holes for Mounting Screws
8 in·lbf (0.904 Nm) maximum torque

Torque—Cables
Only finger tighten the connectors
Minimize cable pull or hanging weight, including right-angle installations

Construction
Housing: Aluminum
Lens Cover: Acrylic with optical coating
Light Pipe: Polycarbonate

Connections
4-pin M8 male for power and discrete I/O
4-pin M8 female for Ethernet

Storage Conditions
–30 °C to +65 °C (–22 °F to +149 °F)

Operating Conditions
–10 °C to +40 °C (+14 °F to +104 °F), assuming adequate mounting and ventilation

Environmental Rating
IP65 per IEC60529

Vibration
MIL-STD-202G, Method 201A (Vibration: 10 Hz to 55 Hz, 0.06 inch (1.52 mm) double amplitude, 2 hours each along X, Y and Z axes), with device operating

Shock
MIL-STD-202G, Method 213B, Condition I (100G 6x along X, Y, and Z axes, 18 shocks), with device operating

Weight
205 g

Output Rating
Current rating: 50 mA maximum

White wire specifications per configuration		
PNP	Output High	≥ Vsupply − 2.5 V
	Output Low	≤ 2.5 V (loads ≤ 70 kΩ)
NPN	Output High	≥ Vsupply − 2.5 V
	Output Low	≤ 2.5 V

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

Banner Engineering BV
Park Lane, Culliganlaan 2F bus 3
1831 Diegem, BELGIUM

Turck Banner LTD Blenheim House
Blenheim Court
Wickford, Essex SS11 8YT
GREAT BRITAIN

E526767

Advanced Capabilities

Refer to the Instruction Manual, p/n 230551, for FCC and Industry Canada notification statements.

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