# BANNER ZMX Series 3D Time of Flight Sensor User Guide



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**ZMX Series 3D Time of Flight Sensor User Guide**

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### ZMX Series 3D Time of Flight Sensor

Simple, reliable, volume and height monitoring with ZMX Series. Patent pending.
This guide is designed to help you set up and install the ZMX Series. For complete information on programming, performance, troubleshooting, dimensions, and accessories, please refer to the Instruction Manual at **www.bannerengineering.com.** Search for p/n 230551 to view the Instruction Manual. Use of this document assumes familiarity with pertinent industry standards and practices.

### Features and Indicators

LED indicators provide ongoing indication of sensing status.

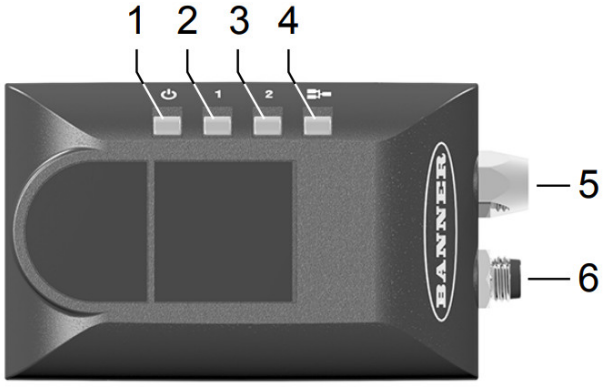



**Figure 1.** Features

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

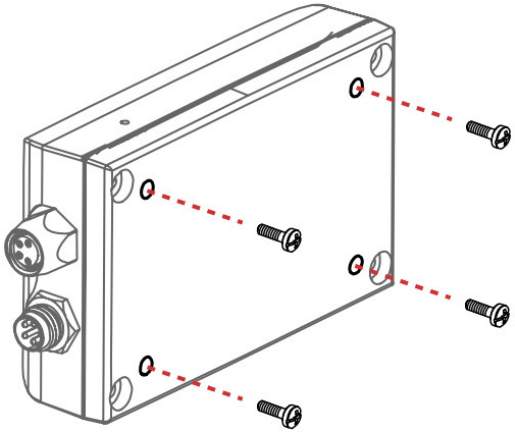
1. If a bracket is needed, mount the device onto the bracket.
2. Mount the device (or the device and the bracket) to the machine or equipment at the desired location. Do not tighten the mounting screws at this time.

**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.

**Figure 2.** 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, use cables with shields.
Tighten the cables finger tight only.

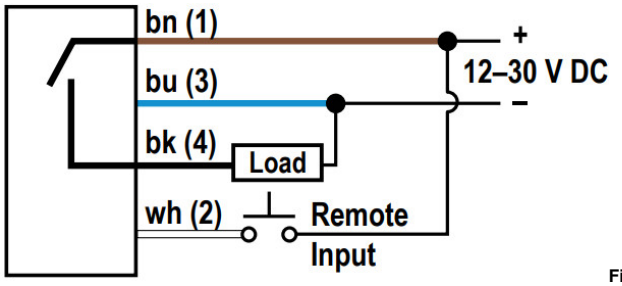



**Figure 3.** Channel 1 as PNP Output, Channel 2 as Trigger Input

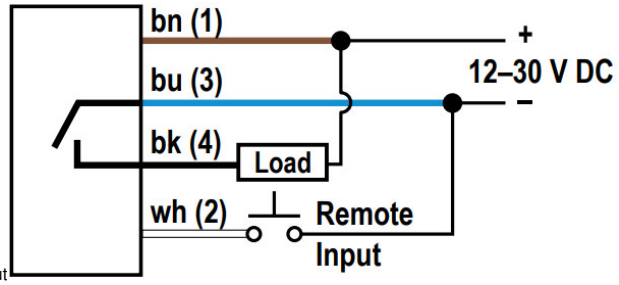



**Figure 4.** Channel 1 as NPN Output, Channel 2 as Trigger Input


**Figure 5.** M8 Male Connector

**Table 1:** 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**

**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
UP/IP Port 19995

**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.

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

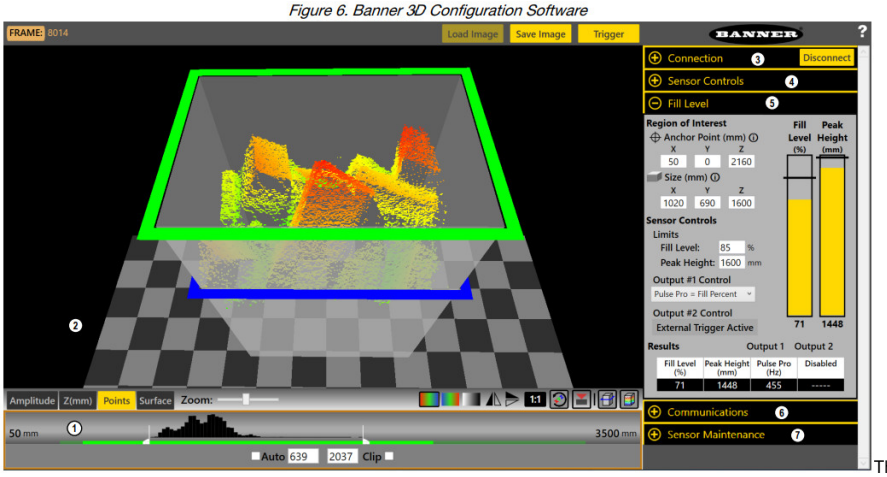
## Getting Started

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.

*Figure 6. 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.

## 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[3]
**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[4]**

Modbus® TCP/IP
EtherNet/IP™
**Boresighting**
±20 mm at 1 m range
**Delay at Power Up**
< 10s
**Recommended Warm Up Time**
15 minutes
**Output Rating**
Current rating: 50 mA maximum
**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
**Ambient Light Immunity**
10,000 lux
**Torque—Tapped Holes for Mounting Screws**
8 in·lbf (0.904 Nm) maximum torque
**Torque—Cables**
Finger tighten only
**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

**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 (Amps) |
|---|---|
| 20 | 5.0 |
| 22 | 3.0 |
| 24 | 2.0 |
| 26 | 1.0 |
| 28 | 0.8 |
| 30 | 0.5 |

**Certifications**

c UL us LISTED
E526767

EtherNet/IP

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

UKCA Turck Banner LTD Blenheim House, Blenheim Court, Wickford, Essex SS11 8YT, Great Britain

**Advanced Capabilities**

PULSE® PRO I/O

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

**4.** Modbus® is a registered trademark of Schneider Electric USA, Inc. EtherNet/IP™ is a trademark of ODVA, Inc.
Refer to the Instruction Manual, p/n 230551, for FCC and Industry Canada notification statements.

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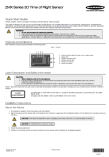
## Documents / Resources



**BANNER ZMX Series 3D Time of Flight Sensor** [pdf] User Guide
ZMX Series, 3D Time of Flight Sensor, ZMX Series 3D Time of Flight Sensor, Flight Sensor, Sensor

## References

- **Banner Engineering**
- **Patents**
- **Terms and Conditions of Sale**