

Vanky Industry LR-ZB250AP

KEYENCE LR-ZB250AP CMOS Distance Sensor User Manual

Model: LR-ZB250AP | Brand: Vanky Industry (KEYENCE Product)

1. INTRODUCTION

This manual provides essential information for the safe and effective use of the KEYENCE LR-ZB250AP CMOS Distance Sensor. Please read this manual thoroughly before installation and operation to ensure correct usage and to prevent potential hazards or damage to the product.

The LR-ZB250AP is a distance-based CMOS sensor designed for industrial applications, featuring a PNP output and a 2-meter cable connection. It offers reliable detection over a range of 35 to 250 mm.

2. SAFETY INFORMATION

Observe the following safety precautions to prevent injury to personnel and damage to the equipment.

- **Electrical Safety:** Ensure power is disconnected before wiring or performing any maintenance. Incorrect wiring can lead to electric shock or fire.
- **Operating Environment:** Do not use the sensor in environments with flammable or explosive gases.
- **Proper Installation:** Mount the sensor securely according to the instructions to prevent it from falling or causing injury.
- **Power Supply:** Use only the specified power supply voltage (10 to 30 VDC). Exceeding this range may damage the sensor.
- **Laser Safety:** This device uses a Class 1 laser product. Avoid direct exposure to the laser beam.

3. PRODUCT OVERVIEW

The KEYENCE LR-ZB250AP is a compact, rectangular CMOS distance sensor. It is equipped with a 3-digit 7-segment display for indicators and offers selectable response times.



Figure 1: KEYENCE LR-ZB250AP CMOS Distance Sensor in its original packaging.

Key Features:

- **Distance-based Detection:** Detectable range of 35 to 250 mm (1.38" to 9.84").
- **PNP Output:** Open collector control output.
- **Selectable Response Time:** 1.5 ms / 10 ms / 50 ms.
- **Integrated Indicators:** 3-digit 7-segment display (red), output indicator (yellow), DATUM indicator (orange), 1 spot indicator (green).
- **Timer Function:** OFF/ON delay, OFF delay, One-shot.
- **Robust Design:** IP68, IP69K, NEMA 4X, 6P, 13 enclosure ratings.

Model	LR-ZB250AP
Type	Distance based laser sensor
Appearance	Rectangular
Output	PNP
Cable connection	2 m cable
Detectable distance	35 to 250 mm 1.38" to 9.84" (215 to 0)*1
Standard detectable distance	35 to 180 mm 1.38" to 7.09"; 9 mm 0.35"
Deviation	180 to 250 mm 7.09" to 9.84"; 25 mm 0.98"

Deviation	±0.05 to ±0.10 mm (0.002 to 0.004 in) ±0.10 mm (0.004 in)	
Display resolution	1 to 3 (1 to 3 mm 0.04" to 0.12")	
Spot size	Approx. 2.4 × 1.2 mm 0.09" × 0.05" at 250 mm 9.84"	
Response time	1.5 ms / 10 ms / 50 ms selectable	
Light source	Type	Red laser (660 nm)
	Laser class	Class 1 laser product (IEC60825-1, FDA (CDRH) Part1040.10*2)
Function	Indicator	3-digit 7-segment display (red), output indicator (yellow), DATUM indicator (orange), 1 spot indicator (green)
	Timer	OFF/ON delay/OFF delay/One-shot
Specifications	Power voltage	10 to 30 VDC, including 10% ripple (P-P), Class 2 or LPS
	Power consumption	450 mW or less (18 mA or less at 24 V, 34 mA or less at 12 V)
	Control output	PNP Open collector, Applied voltage 30 VDC or less, Control current 100 mA or less, Residual voltage 1.2 V or less at 10 mA or less, 2 V or less at 10 to 100 mA
	Protection circuit	Protection against reverse power connection, output overcurrent, output surge, reverse output connection
	Output operation	Light-ON / Dark-ON selectable
	External input	Input time calibration: 35 ms or more ON, 35 ms or more OFF Laser emission stop: 2 ms or more ON, 20 ms or more OFF Short-circuit current NPN: 1 mA or less/PNP: 2 mA or less
Environmental resistance	Enclosure rating	IP68 (IEC60529), IP69K (DIN40050-9), NEMA 4X, 6P, 13 (NEMA250), ECOLAB*3, Diversey*3
	Insulation resistance	20 MΩ or more (500 VDC)
	Ambient light	Incandescent lamp: 2,000 lux or less Sunlight: 4,000 lux or less*4
	Ambient temperature	-10 to +50 °C 14 to 122 °F (No freezing)
	Storage temperature	-25 to +75 °C -13 to 167 °F (No freezing)
	Relative humidity	35 to 85 % RH (No condensation)
	Withstand voltage	1,000 VAC, 50/60 Hz, 1 min
	Vibration resistance	10 to 55 Hz, Double amplitude 1.5 mm 0.06", 2 hours in each of the X, Y, and Z directions
	Shock resistance	1,000 m/s ² , 6 times in each of the X, Y, and Z directions
Material	Case: SUS316L, Display: PES, Lens cover: PMMA with scratch-resistant coating, Packing/Connector ring: FKM	
Accompanying items	Instruction Manual, Certification/Identification label (FDA)	
Weight	Approx. 110 g (Including cable)	
<p>*1 Display readings can be used as a guide for the detecting distance. When the setting value is tuned, the readout shifts. When the value exceeds "-99", "--FF" is displayed.</p> <p>*2 The laser classification for FDA (CDRH) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No.50.</p> <p>*3 Have passed resistance tests with cleaning agents from multiple manufactures.</p> <p>*4 When the response time is 10 ms</p>		

Figure 2: Close-up view of the LR-ZB250AP sensor unit.

4. SETUP AND INSTALLATION

4.1 Mounting

The LR-ZB250AP sensor is designed for flange mounting. Ensure the mounting surface is stable and free from vibration. Secure the sensor firmly using appropriate fasteners.

4.2 Wiring

Connect the sensor to the power supply and control system according to the following specifications. Always ensure power is OFF before making any connections.

- **Power Voltage:** 10 to 30 VDC (including 10% ripple P-P), Class 2 or LPS.
- **Power Consumption:** 450 mW or less (18 mA or less at 24 V, 34 mA or less at 12 V).
- **Control Output:** PNP Open collector, Applied voltage 30 VDC or less, Control current 100 mA or less, Residual voltage 1.2 V or less at 10 mA or less, 2 V or less at 10 to 100 mA.
- **Protection Circuit:** Protection against reverse power connection, output overcurrent, output surge, reverse output connection.

The sensor comes with a 2-meter cable for connection. Refer to the wiring diagram provided with the product for specific pin assignments.

5. OPERATING INSTRUCTIONS

5.1 Basic Operation

Once powered, the sensor will initiate. The 3-digit 7-segment display will show detection values or settings. The output indicator (yellow) illuminates when the output is active.

5.2 Output Operation Selection

The sensor supports both Light-ON and Dark-ON output operations. This setting determines whether the output is active when light is detected (Light-ON) or when light is interrupted (Dark-ON). Consult the detailed product manual for instructions on how to switch between these modes.

5.3 Timer Functions

The LR-ZB250AP includes various timer functions:

- **OFF/ON Delay:** Delays both the turn-off and turn-on of the output.
- **OFF Delay:** Delays the turn-off of the output.
- **One-shot:** Provides a momentary output pulse.

These timer settings can be configured via the sensor's interface. Refer to the full product documentation for detailed programming steps.

6. MAINTENANCE

Regular maintenance ensures optimal performance and longevity of the sensor.

- **Cleaning:** Periodically clean the sensor lens and housing with a soft, dry cloth. For stubborn dirt, use a mild, non-abrasive cleaner. Avoid harsh chemicals that could damage the housing or lens.
- **Inspection:** Regularly check the cable for any signs of damage, fraying, or loose connections. Ensure the sensor is securely mounted.
- **Environmental Conditions:** Verify that the operating environment remains within the specified temperature and humidity ranges to prevent sensor malfunction.

7. TROUBLESHOOTING

If the sensor is not functioning as expected, consider the following common issues and solutions:

- **No Power/Indicator Off:**
 - Check power supply connections and voltage.
 - Ensure the power supply is within the 10-30 VDC range.
- **Inconsistent Detection:**
 - Clean the sensor lens.
 - Verify the target is within the detectable distance range (35-250 mm).
 - Check for excessive ambient light interference (Sunlight: 4,000 lux or less; Incandescent lamp: 2,000 lux or less).
 - Adjust the sensor's position or angle relative to the target.
- **Output Not Activating:**
 - Confirm the output operation mode (Light-ON/Dark-ON) is correctly set for your application.
 - Check wiring for the control output.
 - Ensure the target is properly detected by observing the output indicator.

For persistent issues, consult the full product manual or contact technical support.

8. SPECIFICATIONS

Detailed technical specifications for the KEYENCE LR-ZB250AP CMOS Distance Sensor are provided below.



Figure 3: Detailed specifications table for the LR-ZB250AP sensor.

Category	Specification
Model	LR-ZB250AP
Type	Distance based sensor
Appearance	Rectangular
Output	PNP
Cable connection	2 m cable
Detectable distance	35 to 250 mm (1.38" to 9.84")
Standard detectable deviation	35 to 180 mm (1.38" to 7.09"): 9 mm (0.35"); 180 to 250 mm (7.09" to 9.84"): 25 mm (0.98")
Display resolution	1 to 3 (1 to 3 mm / 0.04" to 0.12")
Spot size	Approx. 2.4 × 1.2 mm (0.09" × 0.05") at 250 mm (9.84")
Response time	1.5 ms / 10 ms / 50 ms selectable
Light source	Red laser (680 nm), Class 1 laser product (IEC60825-1, FDA (CDRH) Part1040.10+2)
Function - Indicator	3-digit 7-segment display (red), output indicator (yellow), DATUM indicator (orange), 1 spot indicator (green)

Category	Specification
Function - Timer	OFF/ON delay / OFF delay / One-shot
Power voltage	10 to 30 VDC, including 10% ripple (P-P), Class 2 or LPS
Power consumption	450 mW or less (18 mA or less at 24 V, 34 mA or less at 12 V)
Control output	PNP Open collector, Applied voltage 30 VDC or less, Control current 100 mA or less, Residual voltage 1.2 V or less at 10 mA or less, 2 V or less at 10 to 100 mA
Protection circuit	Protection against reverse power connection, output overcurrent, output surge, reverse output connection
Output operation	Light-ON / Dark-ON selectable
External input	Input time calibration: 35 ms or more ON, 35 ms or more OFF; Emission stop: 2 ms or more ON, 20 ms or more OFF; Short-circuit current NPN: 1 mA or less / PNP: 2 mA or less
Enclosure rating	IP68 (IEC60529), IP69K (DIN40050-9), NEMA 4X, 6P, 13 (NEMA250), ECOLAB, Diversey
Insulation resistance	20 MΩ or more (500 VDC)
Ambient light	Incandescent lamp: 2,000 lux or less; Sunlight: 4,000 lux or less
Ambient temperature	-10 to +50 °C (14 to 122 °F) (No freezing)
Storage temperature	-25 to +75 °C (-13 to 167 °F) (No freezing)
Relative humidity	35 to 85 % RH (No condensation)
Withstand voltage	1,000 VAC, 50/60 Hz, 1 min
Vibration resistance	10 to 55 Hz, Double amplitude 1.5 mm (0.06"), 2 hours in each of the X, Y, and Z directions
Shock resistance	1,000 m/s ² , 6 times in each of the X, Y, and Z directions
Material	Case: SUS316L, Display: PES, Lens cover: PMMA with scratch-resistant coating, Packing/Connector ring: FKM
Weight	Approx. 110 g (Including cable)

9. WARRANTY AND SUPPORT

For warranty information, please refer to the terms and conditions provided by the seller, Vanky Industry, or

contact KEYENCE directly. For technical support or further inquiries, please reach out to your product supplier.