Installation Instructions

Original Instructions

Miniature Sensor

Catalog Numbers 42KD-P2LAT1-A2, 42KD-B2LAR1-A2, 42KD-B2LAR2-A2, 42KD-B2LAR3-A2, 42KD-B2LAT1-A2, 42KD-P2LAT1-Y4, 42KD-B2LAR1-Y4, 42KD-B2LAR2-Y4, 42KD-B2LAR3-Y4, 42KD-B2LAT1-Y4

At the end of life, this equipment should be collected separately from any unsorted municipal waste.

IMPORTANT Save these instructions for future use.

Summary of Changes

This manual contains a new Operating Temperature attribute in the Specifications on page 1.

Description

The Miniature Sensor provides a solution for applications in small confined spaces. The Miniature Sensor is the smallest sensor in the Photoelectric sensor portfolio. It offers various sensing modes, sensing distances, auto PNP/NPN, push button/remote teach, and push button lock options. Although miniature in size, these sensors feature excellent reliability and competitive performance.

The Miniature Sensor is available in visible red status indicator models in polarized retroreflective and fixed/adjustable background suppression sensing modes. The teach button simplifies the setup process and even provides the option to remote teach the sensor. The sensor also has the option of light operate (L.O.) or dark operate (D.O.). All Miniature Sensors have a unique “auto PNP/NPN” output, which reduces the cost of stock and, simplifies selection, installation, and maintenance.

The Miniature Sensor is an excellent solution to a broad range of applications including industries such as automotive, packaging, and material handling. These features make the Miniature Sensor easy to apply in difficult applications, especially where space is a limitation.

Features

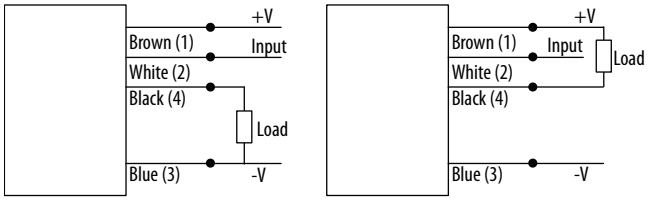
- Smallest sensor in the Rockwell Automation portfolio
- Auto NPN/PNP output
- Easy setup of switch points with teach button
- External teach capability
- IP67 enclosure
- Self-contained sensor
- Mounting accessory included with product

Specifications

Certifications	c-UL-us and CE Marked for all applicable directives
Enclosure Type Rating	IP67
Operating Temperature	-20…+50 °C (-4…+122 °F); UL(1): -20…+30 °C (-4…+86 °F)
Storage Temperature	-20…+80 °C (-4…+176 °F)
Vibration	10…55 Hz, 1 mm (0.04 in.) amplitude, meets or exceeds IEC 60947-5-2
Shock	30 g (1.06 oz) with 11 ms pulse duration, meets or exceeds IEC 60947-5-2
Optical	
Status Indicators	Green: Operating voltage on Yellow: Object detected/switching output active
Electrical	
Operating Voltage	10…30V DC
No Load Supply Current	Status indicator models: ≤30 mA
Protection Type	Short circuit and reverse polarity
Outputs	
Response Time	500 µs
Output Type	Auto PNP/NPN
Output Function	Complimentary light and dark operate via push button and remote teach fixed background suppression models; Complimentary light and dark operate via remote teach
Output Current	≤50 mA
Switching Frequency	1000 Hz
Mechanical	
Housing Material	PUR
Lens Material	PMMA

(1) Designed for use on models with straight- or right-angle (-Y4). The connector base is made of R/C (CYJV2).

Wiring Diagram



PNP Operation **NPN Operation**

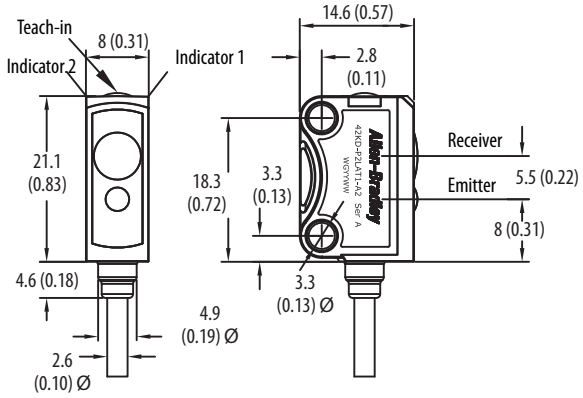
Pinout

The quick-disconnect is shown. The pin numbers correspond to male connectors on the sensor.

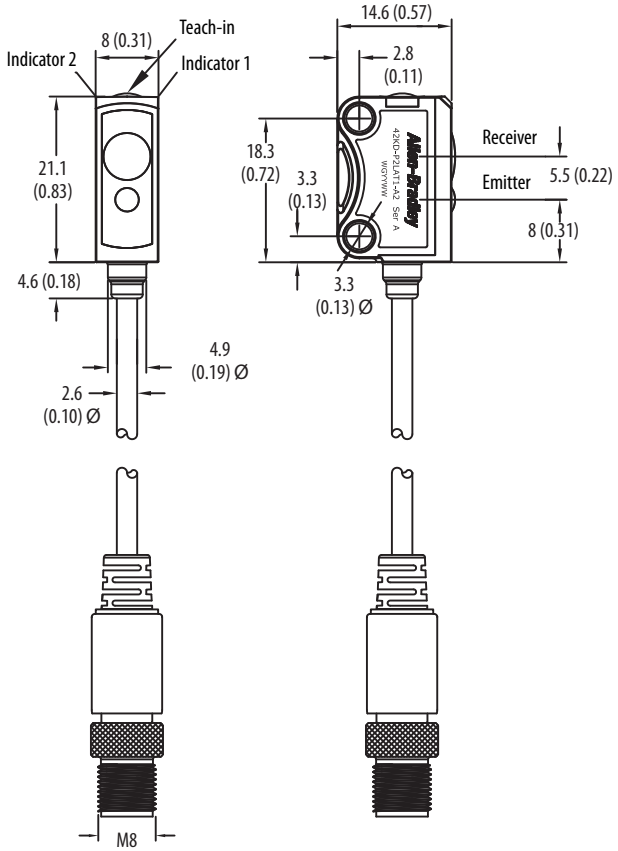
M8 Male

Dimensions [mm (in.)]

2 m (6.56 in.) Cable



M8 with Pico Pigtail



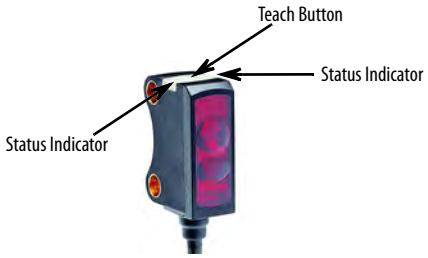
Teach Interface Default Settings

The factory default settings are as follows:

- Sensing Range: Maximum Setting
- Output Type: Auto PNP/NPN. In Auto PNP/NPN mode, the sensor continuously monitors the load connection and automatically configures the output to PNP or NPN.

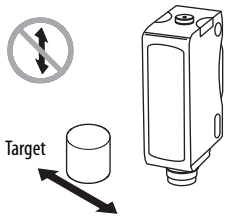
Sensor User Interface

Familiarize yourself with the status indicators.



Mounting the Sensor

Securely mount the sensor on a firm, stable surface, or support. An application subject to excessive vibration or shift can cause intermittent operation.



IMPORTANT Due to the detection method, targets traveling horizontally to the sensor optics are detected. Targets that travel vertically cannot be accurately detected. For more dependable background suppression, a minimum separation distance is recommended between the target and the background.

Sensor Configuration

Polarized Retroreflective and Adjustable Background Suppression

The Miniature Sensor is configured using the push button or Remote Teach, and the status indicators on the sensor. Four features can be configured:

- Standard or precision teach for sensitivity/sensing range
- Light operate (LO) or dark operate (DO) output
- Auto PNP/NPN, dedicated NPN, or dedicated PNP
- Push button lock/unlock

The sensor output is disabled during Teach.

Teach Sensitivity/Sensing Range

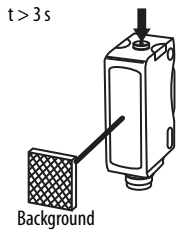
The default setting is the maximum sensitivity/range.

When you teach the sensitivity/sensing range, it is a two-step process: teach the background (first condition) and teach "target" (second condition). Switching threshold for output ON vs. OFF is set in between the two conditions.

Standard Teach

1. Teach the Background (First Condition)

t > 3 s



Align the sensor to the background. Press and hold button for three seconds until yellow LED starts flashing. Release the button. The first condition has now been taught.

2. Teach "Target" (Second Condition)

IMPORTANT If there are multiple reflectivity targets, choose the darkest/least reflective target that is placed in its farthest position for install.

t < 0.5 s

Insert the target between the sensor and the background. Press and release the button. The teach process is complete.

If the push button is not pressed within 30 seconds, the sensor exits teach mode and returns to RUN mode without learning the new setting.

If there's no background surface in the field of view in Step 1, the switching threshold is set between the distance to the target and the maximum sensing range. The sensor can also be taught by teaching the target as the first condition and background as the second condition.

Precision Teach: For a more precise setting with a smaller hysteresis, teach the sensor to the target in step 1 and keep the target present in step 2).

Restore the maximum range to the factory default: Perform steps 1 and 2 with "no target" in the sensor field of view and nothing in the background.

Teach Light Operate (L.O.) or Dark Operate (D.O.)

The default setting of the output is dark operate (D.O.)

L.O. setting means that output turns ON when the target is detected. If the application requires the output to turn OFF when the target is detected, the setting can be changed to dark operate (D.O.).

1. Access the Teach Output Mode Setting

t > 6 s

Press and hold button for six seconds until the green status indicator flashes. Release the button. The yellow light indicates the current setting:
L.O.: Yellow indicator ON
D.O.: Yellow indicator OFF

2. Change the Sensor Output Mode Setting

t < 0.5 s

Press and release the button within ten seconds to toggle from L.O. to D.O., the selection indicated by the yellow indicator.

The sensor retains the setting per the last button depression and returns to the RUN mode ten seconds after the last button is depressed.

Output Type Selection: Auto PNP/NPN, Dedicated NPN, Dedicated PNP

The default setting is Auto PNP/NPN. The sensor monitors the load connection and automatically configures for proper operation, for example, PNP or NPN. If no load is connected, the sensor defaults to PNP. The following applications are covered with dedicated PNP or dedicated NPN selection:

- Parallel wiring of multiple sensor outputs: select dedicated PNP or dedicated NPN setting, as needed.
- If the load is connected for NPN configuration but to a different power supply. Select dedicated NPN.
- If the load is connected as an enabling contact (for example, a relay contact in series with the load). Select dedicated NPN.

Selection can be made as follows:

1. Access output type: Press and hold the push button for nine seconds (until both status indicators flash synchronously). Upon release of the button, the slow flash indicates the current setting of output type as follows:
   - Auto PNP/NPN: both indicators flash
   - Dedicated NPN: green indicators flash
   - Dedicated PNP: yellow indicators flash
2. Change output type: To select desired type, press and release the push button within 10 seconds. Each button activation cycles to the next output setting. The indicator shows the type that is selected. The sensor retains the setting per the last button depression and returns to the RUN mode 10 seconds after the last button is pressed.

Push Button Lock/Unlock

The push button or remote teach (RT) can be used to help prevent unauthorized users from changing teach settings.

- Lock the push button: Press and release the button three times within three seconds. Both indicators flash asynchronously for three seconds to show that the push button is now unlocked.
- Unlock the push button: Press and release the button three times within Miniature Sensor three seconds. Both indicators flash asynchronously for three seconds to show that the push button is now unlocked.

Permanent Lock: The push button can be permanently locked by connecting the white wire (pin 2) to –V.

Remote Teach (RT)

The sensor can be taught remotely via the white wire (pin 2). Connection to +V acts the same as the button being pressed and no connection is the same as the button not being pressed. The sensor can be taught by following the same teach/timing sequence as used in the push button teach. For example, connect to the +V for more than three seconds to teach the “target.” Disconnect from the +V, remove the target, and connect to the +V for less than one second to teach the “no target” condition. All push button functions can also be conducted via RT.

Fixed Range Background Suppression—Visible Red Emitter Models

Understanding How the Sensor Operates

Familiarize yourself with the status indicators. This sensor does not have a teach button since it is a fixed range sensor.

The sensor is available in 15 mm (0.59 in.), 30 mm (1.18 in.), and 50 mm (1.97 in.) dependent on the catalog number.

Select L.O/D.O.

Connect white wire (pin 2) to “-” for light operate.

Connect white wire (pin 2 to “+” for dark operate.

Rockwell Automation Support

For technical support, visit http://www.rockwellautomation.com/support/overview.page.

Rockwell Automation maintains current product environmental information on its website at http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page.

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