# D12DAB6 Series DIN Rail AC-coupled Fiber Optic Sensor

## Features

Special-purpose glass and plastic fiber optic sensor for low-contrast applications

- Highly sensitive to very small signal changes; fast response
- Automatic gain control circuit continually adjusts the emitter output to maintain system gain
- Ideal for low contrast applications such as web flaw, thread break, and falling parts detection
- Sensors operate from 10 V DC to 30 V DC
- One NPN and one PNP output; 150 mA maximum (continuous) load
- LED indicators for power on, output conducting, and AGC lock conditions
- Selectable light- or dark-operate; no false pulse on power-up
- Models available for use with glass fibers or plastic fibers




**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.

**IMPORTANT:**

- **Electrostatic discharge (ESD) sensitive device**
- ESD can damage the device. Damage from inappropriate handling is not covered by warranty.
- Use proper handling procedures to prevent ESD damage. Proper handling procedures include leaving devices in their anti-static packaging until ready for use; wearing anti-static wrist straps; and assembling units on a grounded, static-dissipative surface.

## Models

| Model | Fiber Optic | Output | Connection | Range |
|---|---|---|---|---|
| **D12DAB6FV** | Glass | One NPN and one PNP | 2 m (6.5 ft) attached cable | Range varies by sensing mode and the fiber optics used |
| **D12DAB6FVQ** | | | 150 mm (6-in) with M8 QD | |
| **D12DAB6FP** | Plastic | | 2 m (6.5 ft) attached cable | |
| **D12DAB6FPQ** | | | 150 mm (6-in) with M8 QD | |

The following models are no longer available for order but are still covered by the information in this document.

| Model | Fiber Optic | Output | Connection | Range |
|---|---|---|---|---|
| **D12DAB6FV W/30** | Glass | One NPN and one PNP | 9 m (30 ft) attached cable | Range varies by sensing mode and the fiber optics used |
| **D12DAB6FP W/30** | Plastic | | | |

Original Instructions
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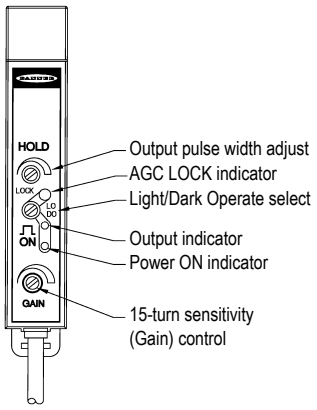
38384
p/n: 38384 Rev D

ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

# Overview

D12DAB6 Series sensors are compact, ac-coupled sensors designed for use with Banner glass or plastic fiber optics. They are intended for applications in which the light signal change is so small that sensitivity adjustment of ordinary DC-coupled sensors is difficult or impossible. D12DAB6 Series sensors can respond to even smaller signal changes than the standard D12 fiber optic sensors, and are less affected by gradual signal changes because of dirt buildup, etc. Typical applications include thread break detection, web flaw detection, and detection of small parts falling randomly from vibratory feeders or small presses.

*Sensor Features (Top Panel Shown)*




D12DAB6 Series sensors reliably amplify the small signal changes found in many low-contrast sensing applications. An automatic gain control (AGC) feedback system locks onto the light signal and continually adjusts the light intensity of the emitter so that the system is always maintained at the desired reference level regardless of the sensing range or the degree of environmental contamination. A multi-turn control enables setting of the amplifier sensitivity.

Model D12DAB6FV models are for use with Banner glass fiber optic assemblies. The D12DAB6FP plastic fiber models may be used with either the small diameter (0.508 mm or 0.020-inch) or large diameter (1.016 mm or 0.040-inch) Banner cut-to-length plastic fiber optics.

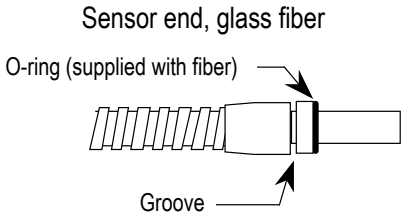
D12DAB6 Series sensors have a POWER ON indicator, a LOCK indicator that lights when the AGC circuit has locked onto the signal, and an output indicator that lights whenever the sensor's outputs are energized.

A switch on the sensor's top panel selects either light- or dark-operate. When light-operate is selected, output occurs on a dark-to-light transition. When dark-operate is selected, output occurs on a light-to-dark transition.

# Installation

## Installing Glass Fibers

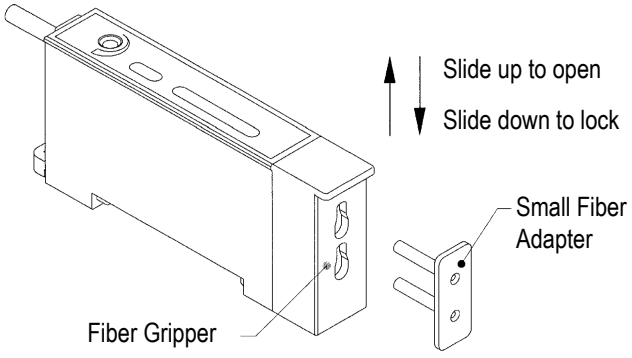
1. Gently seat an o-ring onto each sensor end of the fiber.




2. Slide the sensor ends into the fiber ports as far as they will go.
3. Push firmly on the fiber ends to compress the o-ring, and while holding the sensor ends snugly in place, slide the fiber retaining clip into the slot.
4. Press the retaining clip in until it snaps into the groove.

## Installing Plastic Fibers in a D11 or D12 Sensor

Follow these steps to install plastic fibers.




1. Cut the fiber ends according to the instructions included with the fibers.
2. Slide the fiber gripper up (open).


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3. If you are using 0.254 mm (0.01 in) or 0.508 mm (0.02 inch) diameter fibers: Insert the adaptor into the ports as far as it will go.
4. For all fiber diameters: Insert the prepared plastic fiber sensor ends gently into the ports as far as they will go.
5. Slide the fiber gripper back down to lock it.

## Alignment

1. Attach two individual fiber optic assemblies (or one bifurcated fiber optic assembly) to the D12DAB6 Series sensor using the instructions packed with the fiber.
2. Mount and align the sensing end(s) of the fiber(s) at the sensing location in a position that will optimize the differential between the light and dark conditions.

   Do not connect the load at this time: the LOAD (amber) LED will simulate the action of the load.
3. Connect the brown and blue wires from the sensor to a +10 V DC to 30 V DC source (see wiring diagram).
4. Apply DC power and verify that the POWER ON LED (green) is on.
5. Set the LO/DO switch to DO (dark operate).
6. Present the light condition to the sensor.
7. Make sure that the LOCK LED (red) stays on. If necessary, adjust the fiber ends so that the red LOCK LED stays on reliably.

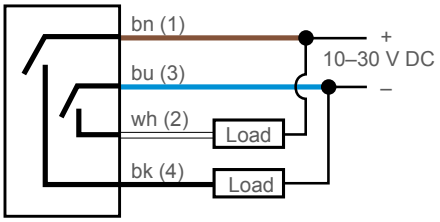
> **NOTE:** If the light condition is a quick transition that cannot be simulated as a static condition and the dark condition is the normal condition, set the LO/DO switch to LO (light operate). Adjust the fiber ends so that, when the light condition occurs, the amber LOAD indicator LED turns on reliably.

8. Simulate the sensing event to the sensor while observing the amber LOAD LED.
9. If necessary, adjust the GAIN control (clockwise to increase) so that the LOAD LED changes state positively and reliably to all desired variations of the sensing event.

   Note that too much gain may result in unwanted response to conditions such as vibration of the sensing ends, etc.
10. While observing the LOAD LED, adjust the output pulse length using the sensor's 3/4-turn HOLD control.

    Minimum on time is 1 millisecond; maximum on time is 70 milliseconds.
11. Connect the load to the sensor and check the system.

## Wiring




**Key**
1 = Brown
2 = White
3 = Blue
4 = Black

The sensor operates normally if the supply voltage polarity is reversed; however, the white and black wires must always be wired as shown.

# Specifications

**Sensing Beam**
Visible red, 680 nm

**Supply voltage**
+10 V DC to 30 V DC at 60 mA max, exclusive of load

**Supply Protection Circuitry**
Protected against reverse polarity and transient overvoltages

**Output configuration**
One NPN (current sinking) and one PNP (current sourcing) open-collector transistor

**Output rating**
150 mA maximum each output
No false pulse on power-up. False pulse protection circuit causes a 0.1 second delay on power-up
Short-circuit protected
Off-state leakage current: < 10 microamps at 30 V DC
On-state saturation voltage: < 1 V at 10 mA DC; < 1.5 V at 150 mA DC
The total load may not exceed 150 mA
Output pulse: time adjustable, 1 to 70 milliseconds

**Response time**
50 microseconds on

**Repeatability**
15 microseconds


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### Indicators

Three top-mounted LED indicators, one amber, one green, and one red

Green on: DC power on

Amber on: output conducting

Red on: whenever the AGC system is locked onto the signal

### Adjustments (three top-panel controls)

Sensitivity control is a 15-turn slotted brass screw, clutched at both ends of adjustment

Light- or Dark-operate select switch

Output Pulse adjustment is a 3/4-turn potentiometer

### Construction

Black ABS housing with acrylic cover

Acetal fiber clamping element

Stainless steel M3 × 0.5 hardware for use with the mounting bracket (supplied)

### Environmental Rating

NEMA 4, IP66

### Cable

2 m (6.5 ft) or 9 m (30 ft) attached PVC-covered cable, or 150 mm (6-in) with Pico-style 4-pin QD connector

### Mounting bracket

D12 Series sensors mount directly to a standard DIN rail, or may be through-hole mounted using the supplied mounting bracket and M3 × 0.5 hardware. Bracket material is black PBT polyester.

### Operating Conditions

–40 °C to +70 °C (–40 °F to +158 °F)

90% at +50 °C maximum relative humidity (non-condensing)

### D12DAB6FV—Sensing modes and minimum guaranteed ranges (3-foot fibers)

| Mode | Glass Fiber and Lens | Guaranteed Range (3-ft fibers) |
|---|---|---|
| Opposed | 1.588 mm (1/16-in) fibers, no lenses | 75 mm (3 in) |
| Opposed | 1.588 mm (1/16-in) fibers, L9 lenses | > 150 cm (60 in)[1] [1] |
| Opposed | 1.588 mm (1/16-in) fibers, L16F lenses | > 150 cm (60 in)[1] |
| Diffuse | 1.588 mm (1/16-in) fibers, no lenses | 25 mm (1 in); distance to 90% reflectance white test card |
| Opposed | 3.175 mm (1/8-in) fibers, no lenses | 20 cm (8 in) |
| Opposed | 3.175 mm (1/8-in) fibers, L9 lenses | > 150 cm (60 in)[1] |
| Opposed | 3.175 mm (1/8-in) fibers, L16F lenses | > 150 cm (60 in)[1] |
| Diffuse | 3.175 mm (1/8-in) fibers, no lenses | 60 mm (2.5 in); distance to 90% reflectance white test card |

### D12DAB6FP—Sensing modes and minimum guaranteed ranges (6-foot fibers)

| Mode | Plastic Fiber and Lens | Guaranteed Range (6-ft fibers) |
|---|---|---|
| Opposed | 0.508 mm (0.020-in) fibers, no lenses | 13 mm (0.5 in) |
| Diffuse | 0.508 mm (0.020-in) fibers, no lenses | 5 mm (0.2 in); distance to 90% reflectance white test card |
| Opposed | 1.016 mm (0.040-in) fibers, no lenses | 76 mm (3 in) |
| Opposed | 1.016 mm (0.040-in) fibers, L2 lenses | 76 cm (30 in) |
| Opposed | 1.016 mm (0.040-in) fibers, L08 lenses | > 3 m (10 ft)[2] |
| Diffuse | 1.016 mm (0.040-in) fibers, no lenses | 25 mm (1 in); distance to 90% reflectance white test card |

[1] Exceeds maximum practical separation of sensing ends for a pair of 3-foot individual fibers.

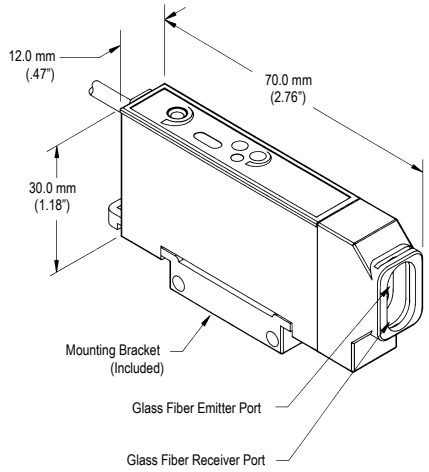
[2] Exceeds maximum practical separation of sensing ends for a pair of 6-foot individual fibers.

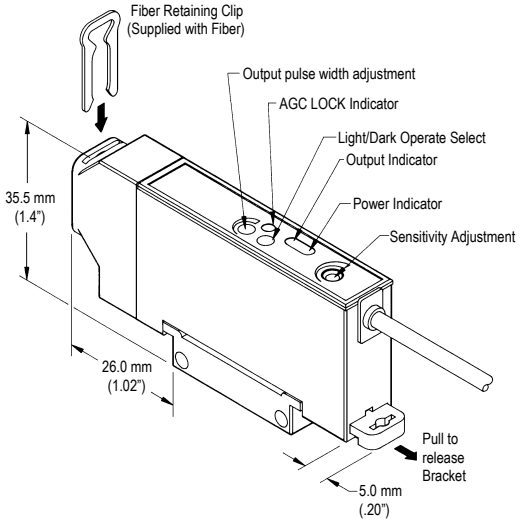
## Dimensions

All measurements are listed in millimeters [inches], unless noted otherwise. The measurements provided are subject to change.

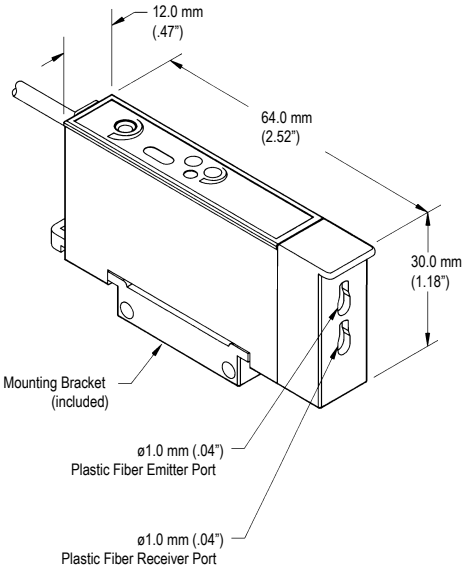

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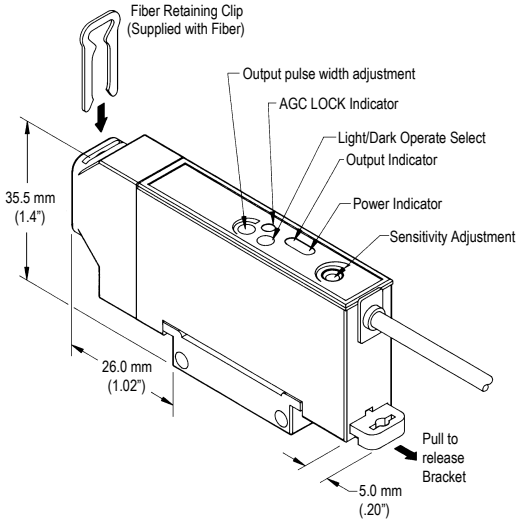
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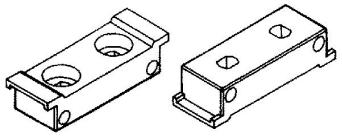

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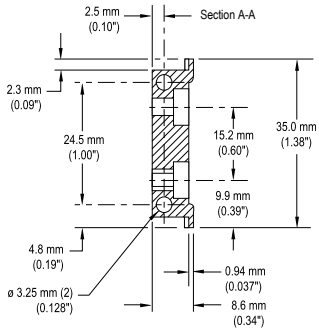


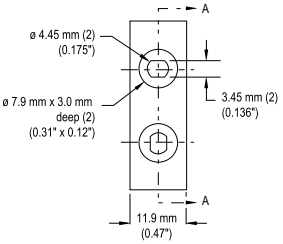




# D12 Bracket Dimensions

D12 Sensors mount directly to a standard 35 mm DIN rail, or may be through-hole mounted using the supplied mounting bracket and stainless steel M3 × 0.5 hardware.





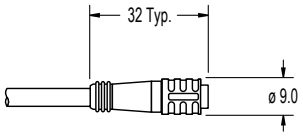
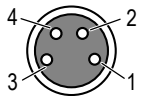
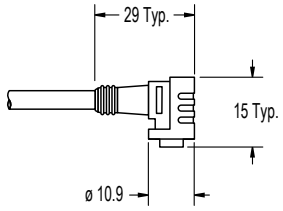
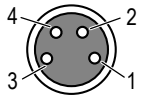





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# Accessories

D12 models with a quick-disconnect require a mating cable.

| 4-Pin Single-Ended Snap-on M8 Female Cordsets | | | | | |
|---|---|---|---|---|---|
| **Model** | **Length** | **Style** | **Dimensions** | **Pinout (Female)** | |
| **PKG4-2** | 2.03 m (6.66 ft) | Straight |  |  | 1 = Brown<br>2 = White<br>3 = Blue<br>4 = Black |
| **PKW4Z-2** | 2 m (6.56 ft) | Right-Angle |  |  | |

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