

Installation Instructions

45FPL Fiber Optic

Small Aperture Teachable Fiber Optic with Digital Display

IMPORTANT: SAVE THESE INSTRUCTIONS FOR FUTURE USE.

Description

DIN rail mountable fiber optic sensors with easy-to-read LED display and teach-in functionality.

The 45FPL photoelectric sensors are designed for use with fiber optic cables up to 2.2 mm in diameter. An adaptor is supplied for use with either 1.0 mm or 1.25 mm fiber optic cables. No tools are required to attach or remove the fiber optic cables.

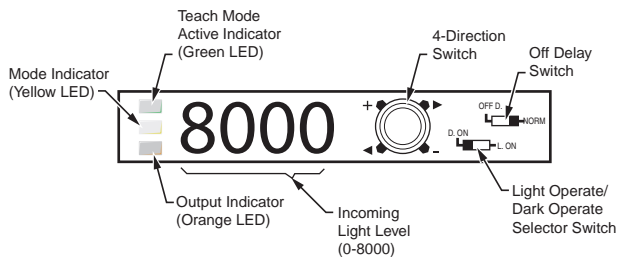
Features

- Two-step static or dynamic teach functionality (determine an optimum sensitivity setting for applications)
- Large, easy-to-read back lit display
- Clearly indicates detected light level, operating modes, functions and diagnostic information
- High speed and long range modes (maximum application flexibility)
- Selectable 45 ms OFF Delay output timer (for interfacing to slower systems)
- DIN rail mountable (for ease of installation, a steel bracket is supplied for applications requiring side mounting)
- Selectable Light or Dark Operate mode
- Manual override of switching threshold

User Interface

The user interface contains a large, easy-to-read LED display, a four-position thumb switch, two operation mode selection switches, and LED indicators for configuring and viewing the sensor's operation and status. A more complete description of each item is described below:

LED	State	Condition
Green	Flashing	Teach mode active
Yellow	ON	Long range mode
	OFF	High speed mode
Orange	ON	Output ON
	OFF	Output OFF



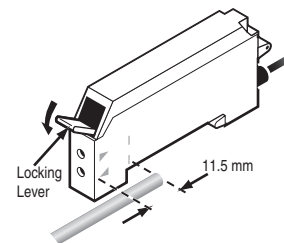
Specifications

Certifications	UL listed and CE Marked for all applicable directives
Light Source	Visible red LED (660 nm)
Power Supply	12...24V DC $\pm 10\%$
Current Consumption	NPN type 25 mA, PNP type 32 mA
Output	NPN or PNP by cat. no.
Output Type	Light/dark operate selectable
Output Rating	100 mA @ 30V DC
Leakage Current	0.3 mA
Response Time	190 μ s max. (high speed); 1.8 ms max. (long range)
Power-On Delay	1.5 seconds (outputs for conducting)
Housing Material	Polycarbonate
LED Indicators	See User Interface table
Connection Type	2 m (6.5 ft) cable or 3-pin pico on 300 mm (11.8 ft) pigtail
Enclosure Type Rating	NEMA 1, IP40
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Shock	50 g, 3 directions, 3 times, meets or exceeds IEC 60947-5-2
Operating Temperature—C (F)	1...5 units: -25...55° (-13...131°) 5 or more units: -25...50° (-13...122°)
Relative Humidity	35...85% (noncondensing)
Supplied Accessory	Mounting bracket (60-2638): Qty. 1 Fiber adaptor (61-6731): Qty. 2

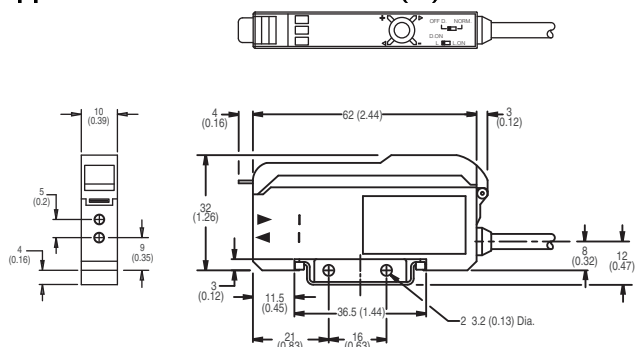
Installing the Fiber Optic Cables

- Push down the locking lever
- Insert fiber all the way
- Lift locking lever to lock fiber in place

Maximum fiber insertion length is 13 mm (0.51 in).



Approximate Dimensions—mm (in)



Aligning Fiber Optic Cables

Transmitted Beam Mode

- Using a soft cloth, gently clean the tips of the fiber optic cables.
- Securely mount the transmitter (light source) fiber end.
- Aim the receiving fiber end at the transmitter end until the sensor output turns ON (light operate) or OFF (dark operate).

Note: You may have to move the fiber ends either towards (light operate) or away (dark operate) from each other in order to toggle the output.

- Sweep the receiving fiber from the right in the horizontal axis and make a note of the light intensity levels that are indicated on the sensor's digital display.
- Position the receiving end of the fiber at the location where the maximum light level intensity was indicated.
- Repeat steps 4 and 5 but in the vertical plane, i.e., sweep the receiving fiber up and down and position it where the maximum light intensity was observed.

Separate the transmitting and receiving fiber ends so that they are mounted at the desired distance from each other, taking care to not upset the vertical or horizontal alignment.

Diffuse Mode (bifurcated fiber optic cables)

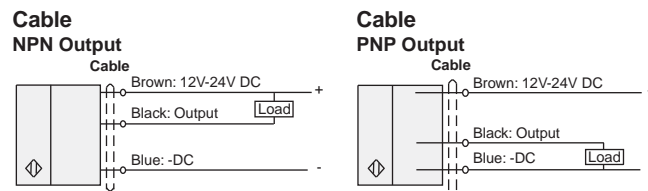
- Using the soft cloth, clean the tips of the fiber.
- Aim the fiber optic at the object to be detected until the sensor output turns ON (light operate) or OFF (dark operate).
- Sweep the fiber in the horizontal axis from left to right and make a note of the light intensity levels indicated on the sensor's digital display.
- Position the fiber optic to achieve the maximum received light level intensity.
- Repeat steps 3 and 4 but in the vertical axis, i.e., sweep the receiving fiber optic up and down to achieve the maximum light intensity.

Wiring the Sensor

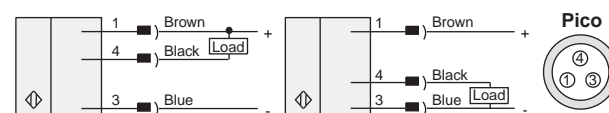
The 45FPL is available with either a 2 m cable or a 3-pin pico QD connector on a 300 mm pigtail. With the pico QD models, Rockwell Automation recommends the use of their 889 series patchcords, cordsets and distribution boxes (e.g., 889P-F3ABPM-2, 889P-F3AB-2 and 889P-P38PT-A5) for simplified field wiring and

reduced installation time. Furthermore, pico QD models can also be used with ArmorBlock™ or ArmorPoint™ distributed I/O digital input modules (e.g., 8-port I732D-IB8M8) to maximize convenience and minimize field wiring. (The correct input type must be used, e.g., PNP output sensors should connect to sinking inputs.) Refer to the table below for a list of compatible cordsets and accessories.

Compatible Patchcords and Accessories



Quick-Disconnect

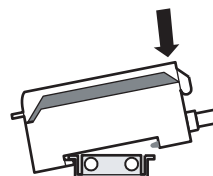


Description	Cat. No.
3-pin pico 2 m cordset, straight female	889P-F3AB-2
3-pin pico 2 m patchcord, straight male/female	889P-F3ABPM-2
ArmorBlock DeviceNet™ 8-port sinking input module (for use with PNP sensors only)	I732D-IB8M8
ArmorBlock EtherNet/IP 8-port sinking input module (for use with PNP sensors only)	I732E-IB16M12
3-pin pico to 4-pin DC micro, 2 m patchcord	889P-F3ABDM4-2
4-port, 3-pin pico distribution box	898P-P34PT-B5
8-port, 3-pin pico distribution box	898P-P38PT-B5

Mounting the Sensor

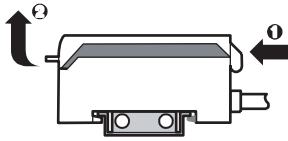
How to Attach Sensor to DIN Rail

Attach front hook of the photoelectric sensor onto rail (or mounting bracket) and press rear end of sensor down until unit snaps into place.



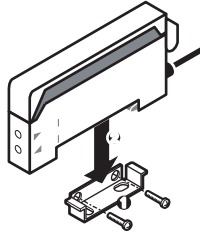
How to Detach Sensor from DIN Rail

Pushing the sensor unit forward, pull up on the front of the sensor until the front hook is detached. Remove sensor.



Side Mounting Sensor with Bracket

Fasten mounting bracket assembly using M3 screws. Tightening torque is 0.8 Nm max. Attach front hook of the photoelectric sensor onto mounting bracket and press rear end of sensor down until unit snaps into place.



Configuring and Using the Sensor

After connecting power, output, fiber optic cables, and then mounting the sensor, the next step is to configure the sensor for use with your application. The instructions below provide detailed step-by-step instructions for accomplishing this task.

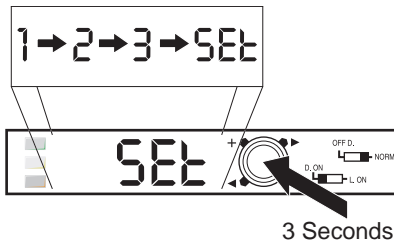
Teaching the Sensor

Static Teach—Stationary Target

Static teach is a two-stage process whereby the sensor is taught the target (object to be detected) present condition and the target not present (no object to be detected) condition.

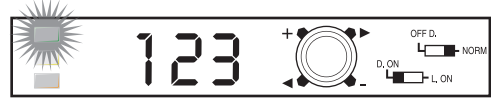
Note: Either the target present/target not present condition may be presented initially, providing that the other condition is presented subsequently.

1. Present the target to be detected in front of the sensor sensing area and then press and hold the green pushbutton three seconds. The LED display will indicate 1, followed by 2, 3, and then SEt as you hold the button.



2. Release the green button once Set is shown. The green LED will start to flash after you release the button and the LED display will show a numerical value.

Green LED Flashes



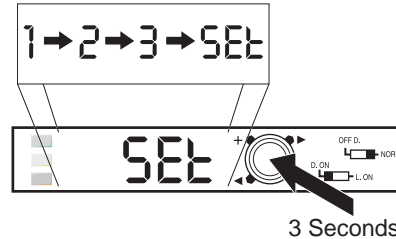
3. Remove the target and then press and release the green button.
4. The LED display will show one of the following values to indicate that the teach process is completed.

good	Sensitivity has been set to optimum level
high	Sensitivity has been set to maximum level
HArd	Insufficient contrast detected between output ON and output OFF conditions. Adjust switching threshold manually for more reliable sensor operation.
SAtu	Sensor light detection (or detector) is saturated—select a smaller diameter fiber optic and/or set sensor in high speed mode.

Dynamic Teach—Moving Target

Dynamic teach is used in applications where the sensor has to be used with machines and/or processes that can not be stopped or where it is not possible to easily present a target present/not present condition as required for the static teach process.

1. Press and hold the green pushbutton for three seconds. The LED display will indicate 1->2->3->Set as you hold the button.



2. Release the green button once Set is shown. The green LED will start to flash after you release the button and the LED display will show a numerical value.

Green LED Flashes



3. Press and hold the green button for three seconds again. The LED screen displays Set while the button is pressed.
4. Release the green pushbutton once the LED display indicates Auto. The green TEACH LED and orange OPERATION LED will flash alternately and the LED will display the detected light level while the sensor is in dynamic teach mode.



Received light level is shown.

Ensure that the sensor observes at least one cycle of target present/target not present while the LEDs are flashing alternately. There is no time limit for showing these conditions.

- Press and hold the green button until the LEDs stop flashing.
- The LED display will show one of the following values to indicate that the teach process is complete.

5 Seconds

good	Sensitivity has been set to optimum level
high	Sensitivity has been set to maximum level
HArd	Insufficient contrast detected between output ON and output OFF conditions. Adjust switching threshold manually for more reliable sensor operation.
SAtu	Sensor light detection is saturated—select a smaller diameter fiber optic and/or set sensor in high speed mode.

Yellow LED Lights



Long Range Mode



High-Speed Mode

Note: Teach settings are reset when switching between long range and high speed modes.

Checking and Adjusting Switching Threshold

The sensor switching threshold can be displayed and adjusted manually during normal operation by using the green four position toggle switch.

- While in run mode, press the green toggle switch once to display the current switching threshold. One of the digits on the LED display will start flashing.



Press Once

- Press the green button again if you do not wish to change the threshold setting. To change the threshold, toggle the four-position switch as follows:

To increase the value of the flashing digit:	Push the toggle switch towards +
To decrease the value of the flashing digit:	Push the toggle switch towards -
To change the flashing digit:	Push the toggle switch towards either the Right ➡ or Left ⬅ arrows.

Note: Push and hold the toggle switch towards either + or - to increase or decrease the rate of change in the flashing digit.

Setting Long Range and High Speed Mode

High speed mode offers fast response time (max 190 μs) but shorter sensing distance whereas the long range mode offers longer sensing range but longer response time (1.8 ms max).

- Press and hold the green push button for five seconds. Note that the 1->2->3->Set will still be displayed. Release the button when either long or H-SP is shown. The central yellow LED indicates when the long range mode is active.

Note: You will need to press and hold the toggle button for five seconds each time you wish to change the mode.

Typical Sensing Range

Sensing range varies depending on reflectivity of target, type of fiber optic cable used, switching threshold, as well as ambient lighting conditions.