Installation Instructions
PHOTOSWITCH® Bulletin 42FT Self-Teach Fiber Optic

IMPORTANT: SAVE THESE INSTRUCTIONS FOR FUTURE USE.

Description

The 42FT is a compact, DIN Rail Mount Fiber Optic Photoelectric sensor with sophisticated part detection, diagnostic, and self-teach capabilities.

Five LED indicators provide diagnostic and alignment information. A dynamic diagnostic output signals when margin levels are below a predetermined threshold for seven successive detections.

The self-teach capability allows the Bulletin 42FT to determine an optimum sensitivity and hysteresis setting for a specific application. The remote lockout feature can be used to help prevent unauthorized changes to these adjustments. A switch selectable 50ms off-delay ("pulse stretcher") is useful in high speed applications where the output pulse must be lengthened to allow time for the machine logic to respond.

42FT sensors are designed for DIN rail mounting. For installation convenience, a steel mounting bracket is supplied for separate mounting.

42FT sensors are designed for use with 2.2mm diameter plastic fiber optic cables. An adaptor is supplied with the sensor to use 1.25mm diameter plastic fiber optic cables. Fiber optic cables are held in place by a rotating collar. No tools are required to attach or remove fiber optic cables. Special glass fiber optic cables are also available. Over 40 compatible standard plastic and glass fiber optic cables are available, please refer to page 1–232 of the C112 *Sensor* catalog.

Features

- Pico quick-disconnect available
- (5) LED indicators: 0.8X to 1.6X margin and output
- Manual or Self-Teach sensitivity adjustment
- Manual or Self-Teach hysteresis adjustment
- Stability output
- Visible red, green, or blue light sources
- Selectable light or dark operate

Features (continued)

- Selectable 50ms off-delay output (pulse stretcher)
- Can be DIN rail mounted or separately mounted
- No tools required to attach or remove Fiber Optic cables

General Specifications

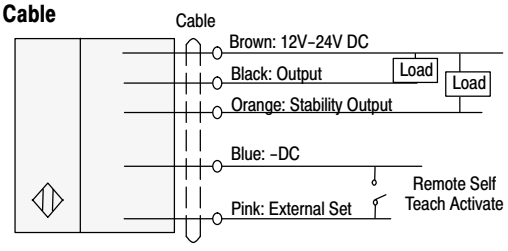
Output Protection	Short circuit, Reverse polarity, False pulse, Transient noise
Housing Materials	ABS resin, polycarbonate cover
Cable Construction	2m (6.5ft) 500V PVC jacketed 24AWG multi-conductor cable
Supplied Accessories	Adjustment screwdriver, 1.25mm diameter fiber optic cable adaptors
Operating Environment	NEMA 1, 4X, 12, 13 and IP66 (IEC 529) (Mounting bracket not NEMA 4X)
Vibration	10–55Hz, 1mm amplitude, Meets or exceeds IEC 947–5–2
Shock	30G, Meets or exceeds IEC 947–5–2
Ambient Temperature	–25°C to +55°C (–13°F to +131°F)
Relative Humidity	85%
Approvals	UL listed and CSA certified, and CE marked for applicable directives

Emitter LED	Visible red 660nm: 42FT–F2LNA–XX Visible green 565nm: 42FT–F3LNA–XX Visible blue 450nm: 42FT–F6LNA–XX	
Connections	Cable: 5-conductor PVC jacketed cable 2m (6.5ft)	3-pin pico quick-disconnect style
	42FT–F2LNA–A2 42FT–F2LPA–A2	42FT–F2LNA–Y3 42FT–F2LPA–Y3
	42FT–F3LNA–A2 42FT–F3LPA–A2	42FT–F3LNA–Y3 42FT–F3LPA–Y3
	42FT–F6LNA–A2 42FT–F6LPA–A2	42FT–F6LNA–Y3 42FT–F6LPA–Y3

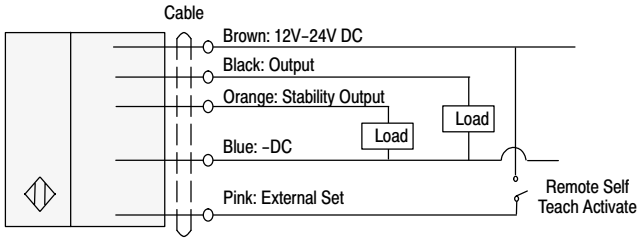
Wiring

NPN Output

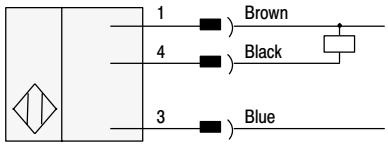
Cable

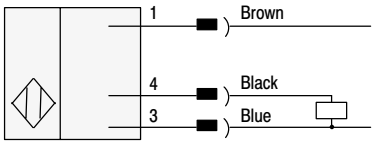


PNP Output

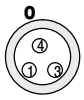


Quick-Disconnect



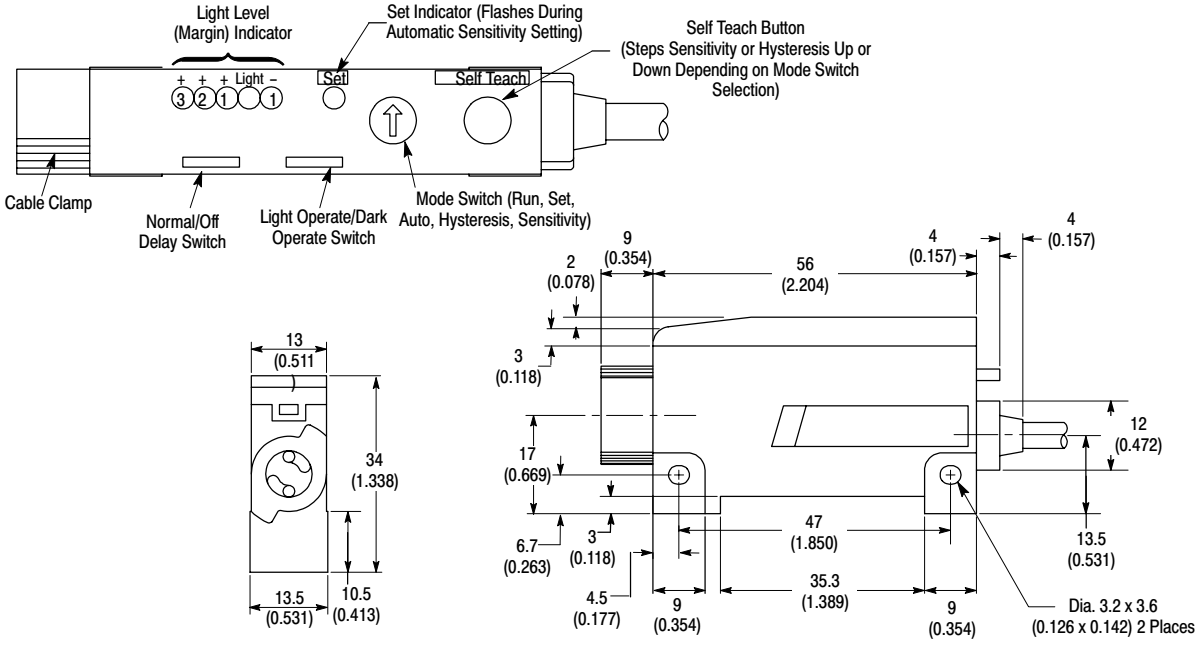


Pico



Note: Details regarding connection of Allen-Bradley Bulletin 42FT photoelectric sensors to Allen-Bradley Programmable Controllers can be found in publication 42-2.0.

Dimensions—mm (inches)



Visible Red, Green, or Blue Fiber Optic

Operating Voltage	Supply Current	Output Energized	Output Characteristics			Response Time	Emitter LED	Catalog Number
			Type	Max Load Current	Max Leakage Current			
12–24V DC ±10%	60mA	Light/Dark Selectable	PNP	Output: 100mA Stability: 50mA	0.5mA	500µs	Red	**42FT–F2LPA–A2**
							Red	**42FT–F2LPA–Y3**
							Green	**42FT–F3LPA–A2**
							Green	**42FT–F3LPA–Y3**
							Blue	**42FT–F6LPA–A2**
							Blue	**42FT–F6LPA–Y3**
	50mA		NPN				Red	**42FT–F2LNA–A2**
							Red	**42FT–F2LNA–Y3**
							Green	**42FT–F3LNA–A2**
							Green	**42FT–F3LNA–Y3**
							Blue	**42FT–F6LNA–A2**
							Blue	**42FT–F6LNA–Y3**

Typical Glass Fiber Optic Cable Selection—mm (in)

LED	Sensing Mode	Plastic Fiber Diameter	Typical Fiber Model	Maximum Range
Red	Diffuse (Bifurcated Fiber)	1 (0.040)	99–94	110 (4.3)
		0.5 (0.020)	99–808	30 (1.2)
	Transmitted Beam (Individual Fiber)	1 (0.040)	99–90	350 (13.2)
		0.5 (0.020)	99–822	95 (3.7)
Green	Diffuse (Bifurcated Fiber)	1 (0.040)	99–94	13 (0.5)
	Transmitted Beam (Individual Fiber)		99–90	35 (1.4)
Blue	Diffuse (Bifurcated Fiber)		99–94	18 (0.7)
	Transmitted Beam (Individual Fiber)		99–90	60 (24)

Mode Switch

AUTO (Factory Setting)

Allows Self-Teach to be initiated with the pushbutton on the sensor (Local) or through an external connection (Remote). Sensor indicators and outputs are active and function normally. Sensors may be operated in AUTO mode. Sensors must be operated in AUTO mode when Remote Self-Teach is required.

SET

Allows self-teach to be initiated with the pushbutton on the sensor (Local) only. The external Self-Teach connection (Remote) is ignored. Sensor indicators function normally. Both sensor and stability outputs are inhibited.

RUN

RUN mode is recommended for sensor operation in all applications where Remote Self-Teach will not be used. Sensor indicators and outputs are active and function normally. No adjustments, Local or Remote, are possible while the sensor is in RUN mode.

Two RUN switch positions are provided. For applications in close proximity, alternate sensors should be set to alternate RUN positions to reduce the possibility of crosstalk.

SENS

Allows Sensitivity to be increased (+) or decreased (–) manually. See Manual Adjustment section for information.

HYS

Allows Hysteresis to be increased (+) or decreased (–) manually. See Manual Adjustment section for information.

D.O./L.O. Switch

Selects Dark Operate or Light Operate sensor output.

OFF DLY/NORMAL Switch

OFF DLY position enables a 50ms off-delay on the sensor output ("pulse-stretcher"). NORMAL disables the off-delay.

Indicators

As more light is detected, more indicators will illuminate.

Green "–1"	0.8X margin
Red "LIGHT"	1.0X margin The Sensor Output changes state whenever this indicator turns ON or OFF
Green "+1"	1.2X margin
Green "+2"	1.4X margin
Green "+3"	1.6X margin
Green "SET"	Verifies adjustment inputs.

Alignment

All Sensing Modes—Mount the sensor securely. Attach the fiber optic cable(s) to the sensor and fasten the sensing end tip(s) loosely at the point where the target object is to be sensed. Apply power to the sensor. Set the mode switch to SET.

Diffuse Sensing—Place the target object in the position where it is to be sensed. Watch the margin indicators and pan the light source fiber optic cable up and down, left and right to center it on the target. Secure the sensing end tip at the point yielding the greatest margin.

Transmitted Beam Sensing—Secure the "receiver" firmly in position. Watch the margin indicators and pan the "light source" fiber optic cable up and down, left and right to center it on the "receiver" fiber optic cable. Secure the "light source" sensing end tip at the point yielding the greatest margin.

Retroreflective Sensing—Watch the margin indicators and pan the fiber optic cable end tip up and down, left and right to center it on the reflector. Mount the sensing end tip at the point yielding the greatest margin.

Alignment Aid

A special alignment assistance feature visibly increases the brightness of the sensor light source, as seen at the tip of the fiber optic cable, whenever the amount of light received by the sensor is sufficient for stable operation.

Reducing the Potential for Crosstalk

Crosstalk can occur when the fiber optic cables of two sensors are positioned to sense at points close to each other. Adjust each sensor independently while the other sensor is not powered. Once adjusted set each sensor to a different RUN position on the Mode Switch. (Note that two positions on the Mode Switch are labeled RUN.)

Self-Teach

Self-Teach can be initiated using the pushbutton on the sensor (Local) or through an external input (Remote) in the AUTO mode. Only Local Self-Teach is possible in the SET mode.

Refer to the Mode Switch section for a description of each Mode Switch setting.

Local Self-Teach

Moving Target Objects

1. Set Mode Switch to AUTO or SET.
2. Press and hold the SET button. The SET indicator flashes rapidly for three seconds while the sensor prepares to monitor the passing target objects then flashes more slowly as the sensor actually monitors the light received as the target objects pass. The sensor monitors the light received as long as the button remains pressed.
3. Allow at least one target object to pass completely while the SET indicator flashes slowly before releasing the button. Automatic Sensitivity adjustment is complete. (Note: Self-Teach will not occur if the button is released early.)
4. Set Mode Switch to AUTO or one of the RUN positions (see the description of operation in the Mode Switch section.)

Stationary Target Objects

1. Set Mode Switch to AUTO or SET.
2. Remove the target object and press and release the SET button. The SET indicator flashes continuously to confirm that the "no target" signal is stored.
3. With the target object in its sensing position press and release the SET button. The SET indicator stops flashing to confirm that Local Self-Teach is complete.
4. Set Mode Switch to AUTO or one of the RUN positions (see the description of operation in the Mode Switch section).

Remote Self-Teach

1. Set Mode Switch to AUTO. An external signal or switch closure can be used to automatically adjust sensitivity and hysteresis via the pink External Set wire (refer to wiring diagrams).
2. The adjustment procedure is the same as described in the Manual Self-Teach section except that the external signal or switch closure takes the place of manually pressing SET button. The duration of External Set signal or switch closure must be at least 100ms. The Stability Output pulses to provide a verification signal which duplicates the blinking of the SET indicator as described above.
3. Set Mode Switch to AUTO or one of the RUN positions (see the description of operation in the Mode Switch section.)

Manual Adjustment

Setting Maximum Sensitivity

1. Set Mode Switch to AUTO or SET.
2. **Diffuse Sensing**
   Remove the target object and press and release the SET button twice.

   Transmitted Beam or Retroreflective Sensing
   Completely block the beam from source to receiver or

from fiber optic cable to reflector. Press and release the SET button twice.

The SET indicator blinks OFF, briefly, after each press of the SET button to confirm the Sensor has been set to maximum sensitivity.

3. Set Mode Switch to AUTO or one of the RUN positions (see the description of operation in the Mode Switch section).

Adjusting Sensitivity

Increase—Set the Mode Switch to SENS +.

Decrease—Set the Mode Switch to SENS –.

1. Press and release the SET button. Sensitivity is increased (or decreased) each time the SET button is pressed and released. Press and release the SET button until the desired sensitivity is reached. The SET indicator turns off once, briefly, each time until the limit of the adjustment range is reached. The SET indicator no longer blinks when the upper or lower limit has been reached.
2. Set Mode Switch to AUTO or one of the RUN positions (see the description of operation in the Mode Switch section).

Adjusting Hysteresis

Increase—Set the Mode Switch to HYS +.

Decrease—Set the Mode Switch to HYS –.

1. Press and release the SET button. Hysteresis is increased (or decreased) each time the SET button is pressed and released. Press and release the SET button until the desired hysteresis is reached. The emitted light at the fiber tip and the SET indicator turn off once, briefly, each time until the limit of the adjustment range is reached. The emitted light at the fiber tip and the SET indicator no longer blink when the upper or lower limit has been reached.
2. Set Mode Switch to AUTO or one of the RUN positions (see the description of operation in the Mode Switch section).

Self Diagnostic/Stability Output

Self Diagnostic Upon Power Up

The sensor has a built-in self diagnostic program. Upon power up, this program verifies that sufficient input light is being detected.

Upon power up the light received by the sensor is measured for 3 seconds. If the light is below +1 (1.2X margin), the stability output signal is turned on.

Application Quality Verification

In diffuse applications, it is desirable to have a margin of less than 0.8X when the target is absent and a margin of greater than 1.2X when the target is present.

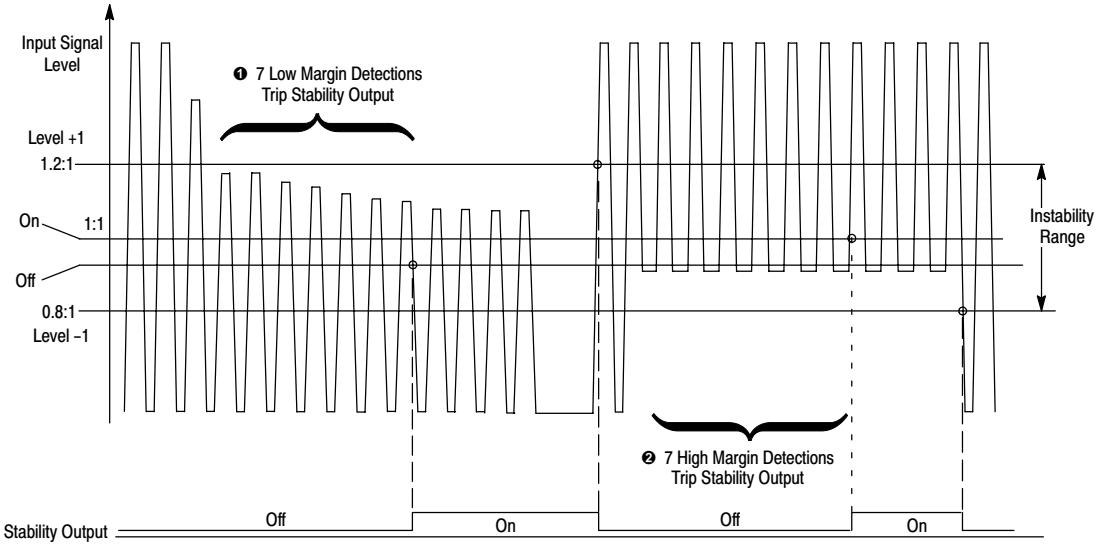
In transmitted beam and retroreflective applications, it is desirable to have a margin of greater than 1.2X when the target is absent and a margin of less than 0.8X when a target is present.

The diagnostic output of the 42FT will turn on when application margin levels are not less than 0.8X or greater than 1.2X for seven successive detections.

If seven consecutive input signals are below the +1 level (1.2X margin), the stability output signal turns on to indicate that the application is not stable (see ❶).

If seven consecutive input signals are above the –1 level (0.8X margin), the stability output signal turns on to indicate that the application is not stable (see ❷).

Stability Output



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