



## General Purpose Photoelectric Sensor





The **SMARTEYE® EZ-PRO™** is a high performance, automatic photoelectric sensor that can be adjusted by a single push of a button. As a result, there is no guess work on the part of the operator.

That's all there is to it! From that point on, the sensor will automatically maintain a perfect setting, thanks to the dynamic Automatic Contrast Tracking System (ACT). The EZ-PRO AUTOSET routine can also be implemented from a momentary remote switch (i.e. pushbutton or touch screen). The EZ-PRO is equipped with a Contrast Indicator as well as an Action Alert diagnostic indicator that allows the operator to visually substantiate performance. When the lock feature is enabled (see advanced features), the EZ-PRO sensor is tamperproof. Now, the sensor will provide you with the automatic, hassle-free performance that you expect from a **SMARTEYE®**.



## Features

- AUTOSET, one button push setup
- Remote AUTOSET
- ACT, Automatic Contrast Tracking
- Action Alert indicator
- Three pulse stretchers; 10ms, 25ms, and 50ms (not accumulative)
- 5-LED Contrast Indicator
- Cable or quick disconnect
- Interchangeable optical blocks
- Button lock out
- Light On/Dark On automatic select
- NPN and PNP output

## Benefits

- Easy to use
- Reduces downtime
- Robust design
- High reliability
- Lower inventory costs
- Tamperproof

## Applications

- Printing/Marking/Coding
- Pharmaceutical
- Registration mark sensing
- Product detector
- Labeling line sensor
- Packaging machine trigger
- Inspection sensor

# Features



## ACT AUTOMATIC CONTRAST TRACKING

ACT automatically adjusts the sensor as conditions change. This can include dirty or damaged lenses, reflectors, fiberoptics or LED light source, as well as thermal drift, and target variations such as position, orientation, or color. It can also compensate for signal shift or deterioration caused by highspeed input events. The **EZ-PRO** continues to operate requiring far less maintenance than other sensors, making it the choice in tough sensing applications.

## AGS AUTOMATIC GAIN SELECT

This unique feature provides automatic digital selection of the amplifier gain based upon your application requirements.

## AUTOSET ADJUSTMENT

The AUTOSET adjustment routine only requires one finger to push one button one time! Even in a dynamic operating condition, with ongoing input events, all you have to do is push a button for a perfect setting.

## EDR®

Another unique feature, the EDR (Enhanced Dynamic Range) circuit is digitally controlled. It prevents dark state saturation and expands the operating range without reducing amplifier gain.

## ACTION ALERT INDICATOR LED

This indicator provides an early warning to prevent marginal performance when the sensor can no longer provide full contrast deviation as displayed on the Contrast Indicator.

## REMOTE AUTOSET

Remotely adjust the sensor from a push button momentary switch or a touch screen to PLC instantaneously. The AUTOSET routine can occur during static or dynamic operating conditions.

## 5-LED DUAL FUNCTION INDICATOR AND CONTRAST INDICATOR

Provides "at-a-glance" performance data during both setup and operation.

## STATUS INDICATOR

Displays status of three selectable functions: Lock, Auto Trac, and Timer; 10ms, 25ms, and 50ms.

## VERSATILITY

Choice of ten "quick change" optical blocks allows one sensor to be used in proximity, convergent, retroreflective, polarized retroreflective, and fiberoptic applications.

## LED LIGHT SOURCES

Choice of four LED light sources — infrared, red, blue, and white light.

## CONNECTIONS

Built-in connector for use with quick disconnect cable or shielded 6' (1.80 m) cable.

## MOUNTING OPTIONS

Built-in DIN Rail "snap-on" design, thruhole, or bracket mount.

**DUAL-FUNCTION BAR GRAPH**  
Primary Function: **Contrast Indicator**  
Secondary Function: **Status Indicator** of Five Selectable Options

**FIVE SELECTABLE OPTIONS**

- #5 LOCK – for tamperproof operation.
- #4 AUTO TRAC – Automatic Contrast Tracking for perfect setting.
- #3 10 millisecond pulse stretcher / off delay.
- #2 25 millisecond pulse stretcher / off delay.
- #1 50 millisecond pulse stretcher / off delay.

**OPTION STATUS / MODE SELECT**  
Push both buttons for 3 seconds to switch bar graph display to status indicator of selectable options

**OPTION STATUS INDICATOR**  
Illuminates when in Option Status mode

**OUTPUT STATUS INDICATOR**  
Illuminates when output transistors are "ON."

**MARGINAL PERFORMANCE INDICATOR**  
Illuminates when sensor's performance falls below optimum contrast levels

**INTERCHANGEABLE OPTICAL BLOCKS**  
Choice of 10 Optical Blocks - O4, O5, R4, R5, F4, F5, V4, V4A, V6, V8

**OPTIONAL TIMER**  
10, 25, or 50 millisecond pulse stretcher / "OFF" delay

**YELLOW PUSHBUTTON - 3 Functions**

1. Manual "UP" adjustment
2. Light state AUTOSET with light "ON" output
3. Toggle selected option to opposite state and return to normal operation

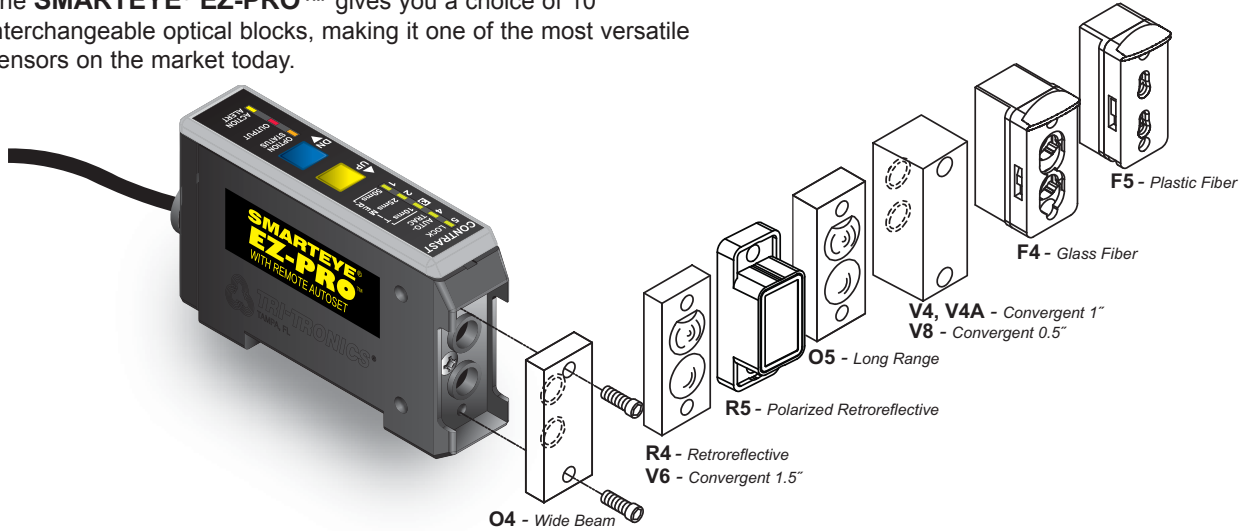
**BLUE PUSHBUTTON - 3 Functions**

1. Manual "DOWN" adjustment
2. Light state AUTOSET with dark "ON" output
3. Step to desired function to be altered when in option status mode

# Optical Block Selection



The SMARTEYE® EZ-PRO™ gives you a choice of 10 interchangeable optical blocks, making it one of the most versatile sensors on the market today.



### Type O4 Proximity

Wide beam optics useful for short-range sensing of transparent, translucent, opaque, or irregular shaped shiny objects.

### Type O5 Proximity

Narrow beam optics useful in long-range sensing of medium to large size objects.

### Type R4 Retroreflective

Very narrow beam optics designed to sense reflectors or reflective materials at long range. Designed for Beam Break sensing.

### Type R5 Polarized Anti-Glare Retroreflective

Polarized to reduce response to "hot spot" glare from shiny surface of detected object. Use with visible light source.

### Type F4 Glass Fiberoptics

Adapter for use with a wide variety of glass fiberoptic light guides for both the proximity and opposed sensing modes.

### Type F5 Plastic Fiberoptics

Adapter for use with a wide variety of plastic fiberoptic light guides for both the proximity and opposed sensing modes

### Type V4, V4A Convergent 1" "V" Axis

Useable range of 1" to 5".

### Type V6 Convergent 1.5" "V" Axis

Useable range of 1.5" to 8".

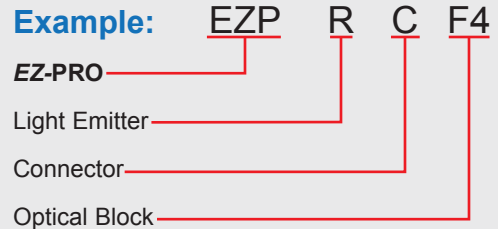
### Type V8 Convergent .5" "V" Axis

Useable range of .25" to 5"

Narrow beam optics useful for sensing small parts. Also useful for proximity sensing to minimize response to reflected light from background objects..

## How To Specify:

1. Select Sensor light source required:  
I = Infrared  
R = Red  
B = Blue  
WL = White
2. Select Connector required:  
Blank = Cable  
C = Connector
3. Select Optical Block based on mode of operation required.



## Sensing Range Guidelines

1 in. = 25.4mm / 1 ft. = 0.3048 meters

Convergent / Proximity / Retroreflective				
OPTICAL BLOCKS	IR	RED	BLUE	WHITE
V4, V4A	1 in.	1 in.	1 in.	1 in.
V6	1.5 in.	1.5 in.	1.5 in.	1.5 in.
V8	0.5 in.	0.5 in.	0.5 in.	0.5 in.
O4	18 in.	11 in.	4 in.	3 in.
O5	4 ft.	3 ft.	1.5 ft.	1 ft.
R4	20+ ft.	18+ ft.	6 ft.	5 ft.
R5	N/A	7 ft.	4 ft.	3 ft.

Note: Proximity tests utilized a 90% reflective white target. Retroreflective tests utilized a 3" diameter round reflector, Model AR3.

Glass Fiberoptics				
OPTICAL BLOCKS	IR	RED	BLUE	WHITE
<b>Opposed Mode</b>				
F4	3 ft.	3 ft.	8 in.	5 in.
F4 w/lens	20+ ft.	20+ ft.	12 ft.	9 ft.
<b>Proximity Mode</b>				
F4	7 in.	5 in.	1 in.	1 in.
F4 w/lens	1 ft.	1 ft.	N/A	6 in.

Note: Proximity tests utilized a .125" diameter fiber bundle.

Plastic Fiberoptics		
OPTICAL BLOCKS	RED	WHITE
<b>Opposed Mode</b>		
F4	9 in.	2 in.
F4 w/lens	6 ft.	2 ft.
F4 w/right angle lens	3 ft.	1 ft.
<b>Proximity Mode</b>		
F4	7 in.	5 in.
F4 w/lens	1 ft.	1 ft.

Note: Proximity tests utilized a .040" diameter fiber bundle.

# Light Source Guidelines



<p><b>INVISIBLE INFRARED LIGHT SOURCE (880nm)</b></p> <ul style="list-style-type: none"> <li>A. Best choice in most opaque object sensing tasks</li> <li>B. Provides longest possible sensing range in either Beam Make or Beam Break sensing modes</li> <li>C. Best choice in hostile environments; useful in penetrating lens contamination</li> <li>D. Preferred for use with small glass fiberoptic light guides Note: Do not use IR light with plastic fiberoptic light guides</li> <li>E. Preferred when sensing dark colored objects in the proximity (Beam Make) mode, i.e., black, blue, green, etc.</li> <li>F. Useful in penetrating containers for verification of contents; also useful in detecting overlapped splices in dense materials</li> <li>G. Color perception; tends to favor blue colored objects</li> </ul>	<p><b>RED LIGHT SOURCE (660nm)</b></p> <ul style="list-style-type: none"> <li>A. Best choice for use with plastic fiberoptic light guides</li> <li>B. Useful when sensing translucent objects in proximity (Beam Make) mode</li> <li>C. Useful when sensing transparent objects in fiberoptic retroreflective (Beam Break) mode</li> <li>D. Can be polarized for retroreflective (Beam Break) sensing to reduce proxing on shiny objects</li> <li>E. Opposed fiberoptic light guides can be polarized for sensing some translucent plastic containers; consult factory for details</li> <li>F. Used as red filter for color perception advantages</li> </ul>
<p><b>BLUE LIGHT SOURCE (480nm)</b></p> <ul style="list-style-type: none"> <li>A. Useful for detecting translucent, transparent, plastic, or glass objects in the retroreflective mode when using the R4 optical block</li> <li>B. Used as blue filter for color perception advantages, i.e. resolving yellow vs. white colored objects or printed registration marks</li> </ul>	<p><b>WHITE LIGHT SOURCE</b> (Broadband Color Spectrum)</p> <ul style="list-style-type: none"> <li>A. Best choice for detecting all printed registration marks on packaging material</li> <li>B. Recommended for detecting dark colored objects in the proximity (Beam Make) mode</li> <li>C. Best choice for sorting colored objects</li> </ul>

## Accessories

### Micro Cable Selection Guide, 5-wire M12

	<p><b>GSEC-6</b> 6' (1.8m) Shielded cable</p>
	<p><b>GSEC-15</b> 15' (4.6m) Shielded cable</p>
	<p><b>GSEC-25</b> 25' (7.62m) Shielded cable</p>
	<p><b>GSEC-2MU</b> 6.5' (2.0m) Low-cost, unshielded</p>
	<p><b>GSEC-5MU</b> 16.4' (5.0m) Low-cost, unshielded</p>
	<p><b>GRSEC-6</b> 6' (1.8m) Right angle shielded cable</p>
	<p><b>GRSEC-15</b> 15' (4.6m) Right angle shielded cable</p>
	<p><b>GRSEC-25</b> 25' (7.62m) Right angle shielded cable</p>



**FMB-1** (8.4mm diam.)  
Standard Fiberoptic Mounting Bracket



**SEB-3**  
Stainless "L" Bracket



**FMB-2** (5.1mm diam.)  
**FMB-3** (3.1mm diam.)  
Miniature Glass or Plastic Fiberoptic Mounting Brackets



**LK-4**  
Lens Kit  
(See Optical Blocks Accessories for contents)



# Specifications



## SUPPLY VOLTAGE

- 10 to 30 VDC
- Polarity Protected

## CURRENT REQUIREMENTS

- 45mA (exclusive of load)

## OUTPUT TRANSISTORS

- (1) NPN and (1) PNP sensor output transistor
- Sensor outputs can sink or source up to 150mA (current limited)
- All outputs are continuously short circuit protected

## REMOTE AUTOSET INPUT

- Opto isolated sinking input (10mA)

## RESPONSE TIME

- Light/Dark state response = 300 microseconds

## LED LIGHT SOURCE

- Infrared = 880nm, Red = 660nm, Blue = 480nm, White = Broadband Color Spectrum
- Pulse modulated

## PUSHBUTTON CONTROL

- Yellow/Blue – AUTOSET
- Manual Adjustments
- Set status of three options: 5) Lock, 4) Auto-Trac, 3) Timers: 10ms, 25ms, 50ms

## HYSTERESIS

- “Factory-set” for high resolution – less than one bar on the Contrast Indicator

## LIGHT IMMUNITY

- Responds to sensor’s pulsed modulated light source, resulting in high immunity to most ambient light, including indirect sunlight or strobes

## DIAGNOSTIC INDICATORS

- 5-LED bar graph functions in one of two modes:
  1. Contrast Indicator – displays scaled reading of sensor’s response to contrasting light levels (light to dark)
  2. Status Indicator – Displays status of 5 selectable options
- Red LED output indicator = Illuminates when the sensor’s output transistors are “on.” *NOTE: If Output LED flashes, a short circuit condition exists*
- Amber LED = Illuminates when in the options select mode
- Yellow LED = Illuminates when action alert is activated. Also indicates when ACT adjusts sensor



## AMBIENT TEMPERATURE

- -40°C to 70°C (-40°F to 158°F)

## RUGGED CONSTRUCTION

- Chemical resistant, high impact polycarbonate housing
- Waterproof ratings: NEMA 4X, 6P and IP67
- Conforms to heavy industry grade CE requirements

RoHS Compliant  
Product subject to change without notice

## Connections and Dimensions

## SMARTEYE® EZ-PRO® PHOTOELECTRIC SENSOR

