



## General Purpose Photoelectric Sensor

**SMARTEYE® PRO**

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The **SMARTEYE® PRO** is not a teach mode sensor; it is an automatic sensor. It is a high performance photoelectric sensor that, after the initial setup, can be adjusted by a single push of a button. As a result, there is no guesswork on the part of the operator. Now you can throw away the screwdriver!

After selecting the features of your application requirements, the **SMARTEYE® PRO** sensor is ready to be adjusted. Simply put the target in front of the sensor (proximity mode) and push the green AUTOSET button. From that point on, the sensor will automatically maintain a perfect setting, thanks to the dynamic ACT (Automatic Contrast Tracking) system. The **SMARTEYE® PRO** sensors are also equipped with a 5-LED Contrast Indicator as well as an Action Alert diagnostic tool that allows the operator to visually substantiate performance.

The Smarteye Pro sensors have the ability to perform a Light State AUTOSET as well as a Dark State AUTOSET (selectable in Option Status Mode). Dark State AUTOSET is useful for maximum range applications, or when the background is shiny or reflective.

The Lock feature ensures the **SMARTEYE® PRO** sensor is tamperproof. When the Lock feature is enabled in Options Status mode, the sensor's buttons will not allow an AUTOSET to be performed. This feature provides assurance of hassle-free operation operators have come to expect from a **SMARTEYE®**.



### Features

- n AUTOSET, one button push setup
- n ACT, Automatic Contrast Tracking
- n Action alert output
- n Pulse stretcher timer - 10ms non-adjustable
- n 5-LED Contrast Indicator
- n Cable or quick disconnect
- n Interchangeable optical blocks
- n Button lock out
- n NPN and PNP output
- n Selectable Light State or Dark State AUTOSET

### Benefits

- n Easy to use
- n Reduces downtime
- n Robust design
- n High reliability
- n Lower inventory costs
- n Tamper proof

### Applications

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

# Features



## ACT AUTOMATIC CONTRAST TRACKING

ACT automatically adjusts the sensor as conditions change. This can include dirty or damaged lenses or reflectors, damaged fiberoptics, LED light source or 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 SMARTEYE®-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.

## QUICKSET ADJUSTMENT

This two-step procedure is easy to perform and requires no expertise whatsoever.

1. Establish one of the following conditions: Proximity Mode – Reflect light off object.  
Beam Break – Remove object from light beam path.

2. Depress the red and green button simultaneously for three seconds.

## 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® (Pat. No. 5,621,205)

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.

## 5-LED DUAL FUNCTION INDICATOR CONTRAST INDICATOR

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

## STATUS INDICATOR

Displays status of five selectable functions: Lock, AUTOSET, and Light/Dark, Auto Trac and Timer.

## VERSATILITY

Choice of ten "quick change" optical blocks allows use in the proximity, convergent, retroreflective, polarized retroreflective, fiberoptic, or gap sensing modes.

## LED LIGHT SOURCES

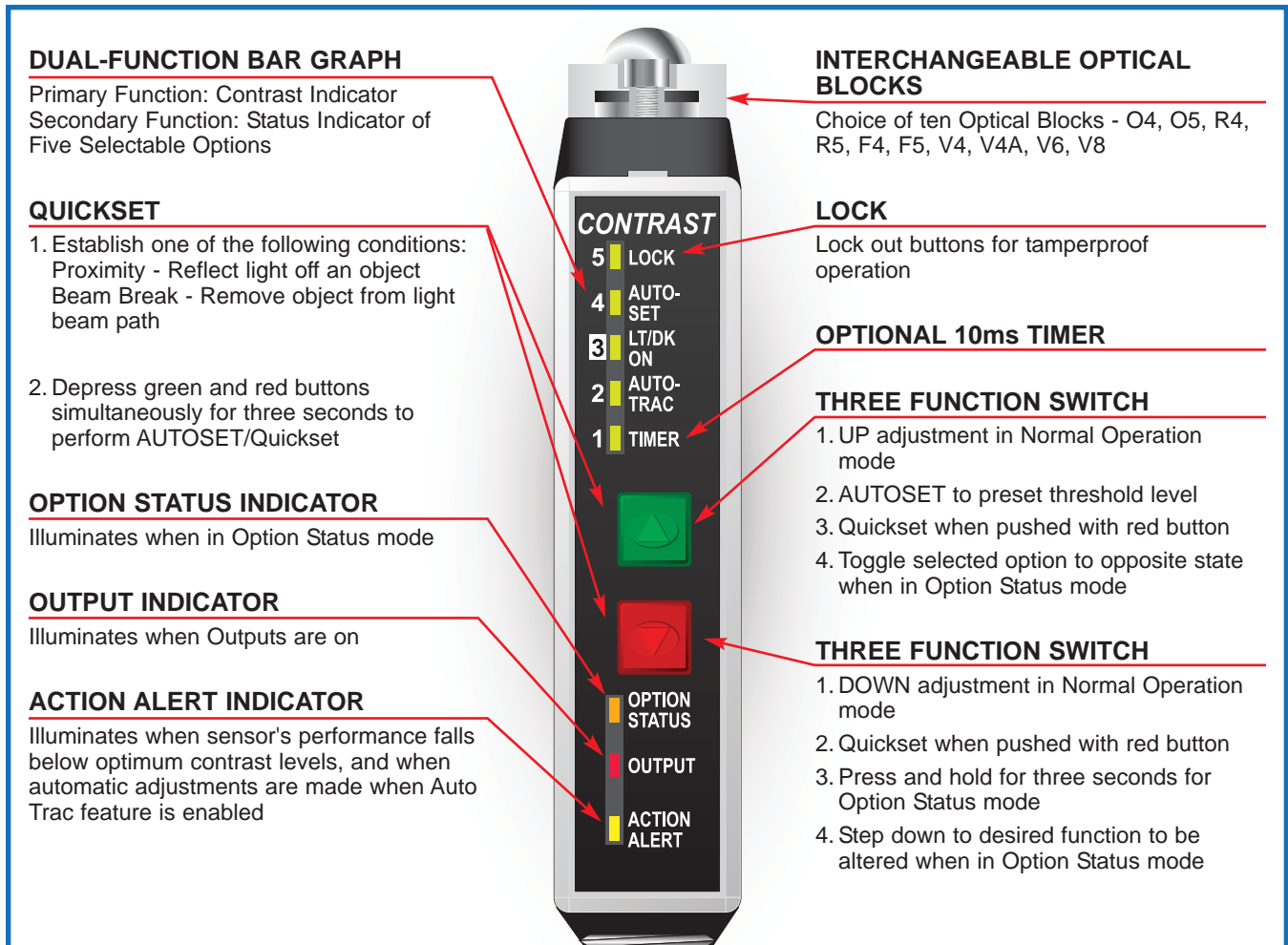
Choice of four LED light sources – invisible infrared, red, blue, and white light.

## CONNECTIONS

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

## TIMER

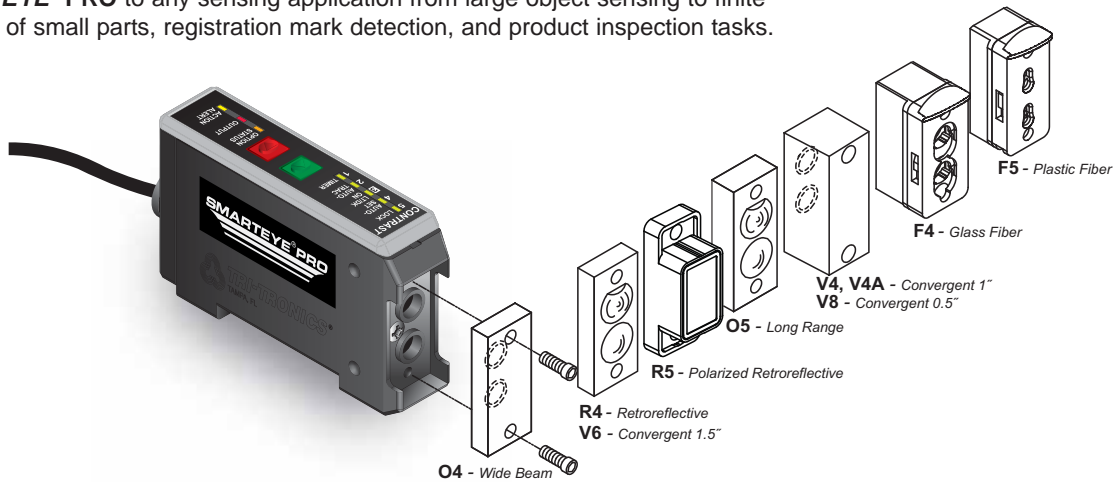
10ms pulse stretcher/off delay.



# Optical Block Selection



Interchangeable optical blocks provide for universal application of the **SMARTEYE® PRO** to any sensing application from large object sensing to finite sensing of small parts, registration mark detection, and product inspection tasks.



### 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".

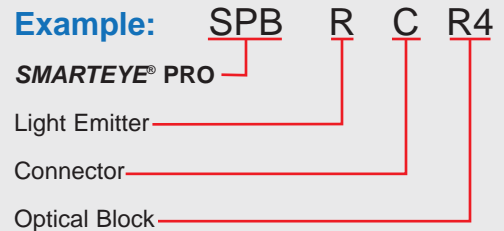
### Type V8 Convergent .5" "V" Axis

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:

- Select sensor type:  
SPB = Includes Action Alert
- Select sensor LED light source required: I = Infrared; R = Red; B = Blue; WL = White.
- Select connection required:  
Blank = Cable 6 ft. (1.8m)  
C = Connector
- Select Optical Block.



## 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	16 in.	1 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>		
F5	9 in.	2 in.
F5 w/lens	6 ft.	2 ft.
F5 w/right angle lens	3 ft.	1 ft.
<b>Proximity Mode</b>		
F5	7 in.	5 in.
F5 w/lens	1 ft.	1 ft.

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

<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

- (Current Limited)
- (1) NPN and (1) PNP sensor output transistor
- (1) PNP Action Alert output transistor
- Sensor outputs can sink or source up to 150mA
- All outputs are continuously short circuit protected
- Action Alert PNP transistor output source up to 75mA

## RESPONSE TIME

- Light/Dark state response = 300 microseconds

## LED LIGHT SOURCE

- Options:
  - A. Infrared = 880nm,
  - B. Red = 660nm,
  - C. Blue = 480nm,
  - D. White = Broadband spectrum
- Pulse modulated

## PUSHBUTTON CONTROL

- Automatic set-up routines, i.e., QuickSet/AUTOSET
- Manual Adjustments
- Set status of five options: LOCK, AUTOSET, LT/DK ON, Auto Trac, and 10ms TIMER

## 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



## LIGHT IMMUNITY

- Responds to sensor's pulse modulated light source, resulting in high immunity to most ambient light, including indirect sunlight

## AMBIENT TEMPERATURE

- -40°C to 70°C (-40°F to 158°F)

## RUGGED CONSTRUCTION

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

## HYSTERESIS

- Set for high resolution – less than one bar on the Contrast Indicator

RoHS Compliant  
Product subject to change without notice

## Connections and Dimensions

## SMARTEYE® PRO® PHOTOELECTRIC SENSOR

