TRI-TRONICS®

Smart Sensing Solutions Since 1954

SMARTEYE® PRO

Self-Adjusting
General Purpose Sensor

SMARTEYE®PRO

The ***SMARTEYE® PRO*** is a high performance, digital multi-mode sensor that can be adjusted by a single push of a button. From that point on, the sensor will automatically maintain a perfect setting, thanks to the dynamic Automatic Contrast Tracking System (ACT).

The PRO™ is equipped with a Contrast Indicator as well as an Action Alert diagnostic output signal and visual indicator that allows the operator to visually substantiate performance. When the lock feature is enabled, the PRO™ sensor is tamper-proof.

The PRO™ will provide with the automatic, hassle-free performance that is expected from a SMARTEYE®. It can either be side mounted or Din rail mounted and is epoxy encapsulated making it ultra rugged and vibration proof.

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

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

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

Features

SMARTEYE® PRO

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

AGS
AGS (Automatic Gain Select) provides automatic digital selection of the amplifier gain based upon application requirements.

QUICKSET ADJUSTMENT
This two-step procedure is easy to perform and requires no expertise.
1. Establish one of the following conditions:
   - Proximity Mode
   - Beam Break
2. Depress the red and green button simultaneously for three seconds.

AUTOSET
The AUTOSET adjustment routine only requires pushing one button once. Even in a dynamic operating conditions, with ongoing input events, just one push of one button to get a perfect setting.

EDR® (Pat. No. 5,621,205)
The EDR (Enhanced Dynamic Range) circuit is digitally controlled. EDR prevents dark state saturation and expands the operating range without reducing amplifier gain.

ACTION ALERT
Action Alert 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 AND CONTRAST INDICATOR
Provides at-a-glance performance data during both setup and operation.

STATUS INDICATOR
The 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 fiber optic 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 6ft (1.80 m) cable.

TIMER
10ms pulse stretcher/off delay.

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

QUICKSET
1. Establish one of the following conditions:
   Proximity - Reflect light off an object
   Beam Break - Remove object from light beam path
2. Depress green and red buttons simultaneously for three seconds to perform AUTOSET/Quickset

OPTION STATUS INDICATOR
Illuminates when in Option Status mode

OUTPUT INDICATOR
Illuminates when Outputs are on

ACTION ALERT INDICATOR
Illuminates when sensor's performance falls below optimum contrast levels, and when automatic adjustments are made when Auto Trac feature is enabled

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

LOCK
Lock out buttons for tamper-proof operation

OPTIONAL 10ms TIMER

THREE FUNCTION SWITCH
1. UP adjustment in Normal Operation mode
2. AUTOSET to preset threshold level
3. Quickset when pushed with red button
4. Toggle selected option to opposite state when in Option Status mode

THREE FUNCTION SWITCH
1. DOWN adjustment in Normal Operation mode
2. Quickset when pushed with red button
3. Press and hold for three seconds for Option Status mode
4. Step down to desired function to be altered when in Option Status mode

Optical Block Selection

SMARTEYE® PRO

Convergent V-Axis Blocks

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

V4
Convergent 1in V-Axis
Useable range of 1in to 5in.

V4A
Convergent 1in V-Axis, Apertured
Useable range of 1in to 5in.

V6
Convergent 1.5in V-Axis
Useable range of 1.5in to 8in.

V8
Convergent .5in V-Axis
Useable range of .25in to 5in

Proximity Blocks

O4
Proximity
Wide beam optics useful for short-range sensing of a variety of objects.

O5
Proximity
Narrow beam optics useful in long-range sensing of medium to large size objects.

Retroreflective Blocks

R4
Retroreflective
Narrow beam optics designed to sense reflectors or reflective materials at long range.

R5
Polarized Anti-Glare Retroreflective
Polarized to reduce response to hot-spot glare from shiny surfaces. Use with visible light source.

Fiber Optic Blocks

F4
Glass Fiber Optics
Adapter for use glass fiber optic light guides.

F5
Plastic Fiber Optics
Adapter for use plastic fiber optic light guides.

Sensing Range Guidelines

1 in = 25.4mm / 1ft = 0.3048 meters

Convergent / Proximity / Retroreflective

OPTICAL BLOCKS	IR	RED	BLUE	WHITE
V4, V4A	1in (25.4mm)	1in (25.4mm)	1in (25.4mm)	1in (25.4mm)
V6	1.5in (38.1mm)	1.5in (38.1mm)	1.5in (38.1mm)	1.5in (38.1mm)
V8	0.5in (12.7mm)	0.5in (12.7mm)	0.5in (12.7mm)	0.5in (12.7mm)
O4	18in (457.2mm)	11in (279.4mm)	4in (101.6mm)	3in (76.2mm)
O5	4ft (1.2m)	3ft (0.9m)	1.5ft (0.5m)	1ft (0.3m)
R4	20+ft (6.1m)	18+ft (5.5m)	6ft (1.8m)	5ft (1.5m)
R5	N/A	7ft (2.1m)	4ft (1.2m)	3ft (0.9m)

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

Glass Fiber Optics

OPTICAL BLOCKS	IR	RED	BLUE	WHITE
Opposed Mode				
F4	16in (406.4mm)	1ft (0.3m)	8in (203.2mm)	5in (127.0mm)
F4 w/lens	20+ft (6.1m)	20+ft (6.1m)	12ft (3.6m)	9ft (2.7m)
Proximity Mode				
F4	7in (177.8mm)	5in (127.0mm)	1in (25.4mm)	1in (25.4mm)
F4 w/lens	1ft (0.3m)	1ft (0.3m)	N/A	6in (152.4mm)

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

Plastic Fiber Optics

OPTICAL BLOCKS	RED	WHITE
Opposed Mode		
F5	9in (228.6mm)	2in (50.8mm)
F5 w/lens	6ft (1.8m)	2ft (0.6m)
F5 w/right angle lens	3ft (0.9m)	1ft (0.3m)
Proximity Mode		
F5	7in (177.8mm)	5in (127.0mm)
F5 w/lens	1ft (0.3m)	1ft (0.3m)

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

How To Specify:

SMARTEYE® PRO

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

Example: SPB R C R4

- ***SMARTEYE*® PRO** — SPB
- Light Emitter — R
- Connection — C
- Optical Block — R4

Light Source Guidelines

INVISIBLE INFRARED LIGHT SOURCE (880nm)

A. Best choice in most opaque object sensing tasks.
B. Provides longest possible sensing range.
C. Best choice in penetrating lens contamination.
D. Preferred for use with small glass fiber optic light guides
Note: Not recommended for plastic fiber optic light guides.
E. Best for sensing dark colored (black, blue, green, etc.) objects in the proximity mode.
F. Useful in penetrating containers for verification of contents, or detecting overlapped splices in dense materials.

BLUE LIGHT SOURCE (480nm)

A. Useful for detecting translucent/transparent plastic, or glass objects in the retroreflective mode when using the R4 optical block.
B. Used as blue filter for color perception advantages.

RED LIGHT SOURCE (660nm)

A. Best choice for use with plastic fiber optic light guides.
B. Useful when sensing translucent objects in proximity mode.
C. Useful when sensing transparent objects in fiber optic retroreflective mode.
D. Can be polarized for retroreflective sensing to reduce proxing on shiny objects.
E. Opposed fiber optic light guides can be polarized for sensing some translucent plastic containers.
F. Used as red filter for color perception advantages.

WHITE LIGHT SOURCE

(Broadband Color Spectrum)

A. Best choice for detecting all printed registration marks on packaging material.
B. Recommended for detecting dark colored objects in the proximity mode.
C. Best choice for sorting colored objects.

Hardware & Accessories

5-Wire Shielded MicroCable, M12

GSEC-6
6ft (1.8m) cable

GSEC-15
15ft (4.6m) cable

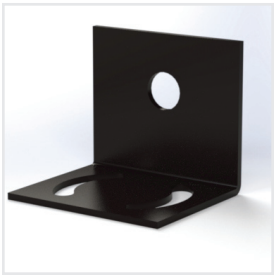
GSEC-25
25ft (7.62m) cable

GRSEC-6
6ft (1.8m) cable/right angle

GRSEC-15
15ft (4.6m) cable/right angle

GRSEC-25
25ft (7.6m) cable/right angle

Mounting Brackets



FMB-1 (8.4 mm diam.)
Standard Fiber Optic

SEB-3
Stainless L Bracket

FMB-2 (5.1 mm diam.)
Mini Glass Fiber Optic

FMB-3 (3.1 mm diam.)
Mini Plastic Fiber Optic

Specifications

SMARTEYE®PRO

SUPPLY VOLTAGE
- 10 to 30VDC
- 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

PUSH-BUTTON CONTROL
- Automatic set-up routines, 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

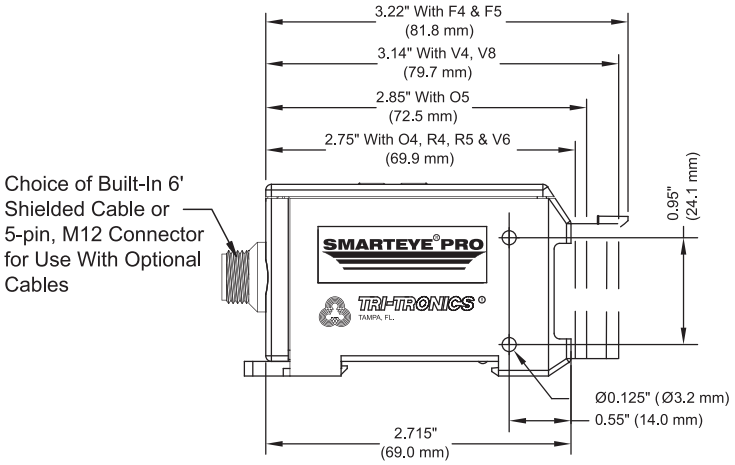
AMBIENT TEMPERATURE
- -40°C to 70°C (-40°F to158°F)

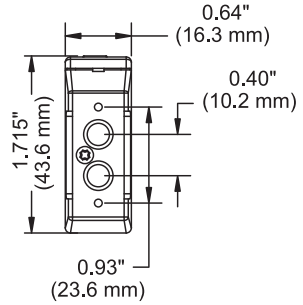
RUGGED CONSTRUCTION
- Chemical resistant, high-impact polycarbonate housing
- Waterproof ratings: NEMA 6 and IP67
- Conforms to heavy industry grade CE requirements

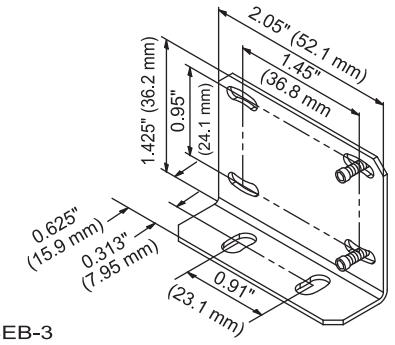
HYSTERESIS
- Set for high resolution – less than one bar on the Contrast Indicator

RoHS Compliant
Product subject to change without notice

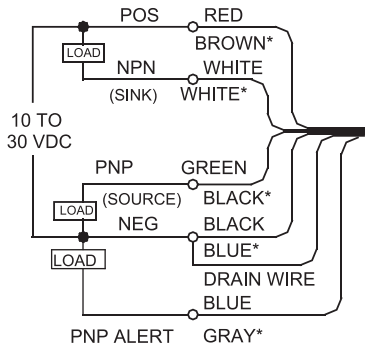
Connections and Dimensions — SMARTEYE®PRO® SENSOR







SEB-3
Optional Mounting Bracket with Hardware



*Sensors with connectors