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.

The EZ-PRO™ AUTOSET ADJUSTMENT PROCEDURE is as simple as it gets...
1. Establish one of the following conditions:
   - Proximity . . . . . . . Reflect light off object.
   - Beam Break . . . . . . . Remove object from light beam path.
2. Depress either Yellow or Blue button for three (3) seconds.

NOTE: Yellow button AUTOSET provides light "ON" output.
Blue button AUTOSET provides dark "ON" output.

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®.
SET-UP AND OPERATION INSTRUCTIONS

OPAQUE OBJECT SENSING

OPTION 1

Preferred
Retroreflective and Beam Break sensing modes are the preferred choices for detecting opaque objects.

Sensing Range
Retroreflective
Fiber Optic: Fiber Tip to Reflector...Up to 2 ft.
Lens: R4 Lens to Reflector - Up to 12 ft.

Beam Break
Fiber Optic: Fiber Tip to Fiber Tip - Up to 3 ft.

AUTOSET INSTRUCTIONS
1. Remove opaque object from light beam path.
2. Depress the BLUE button for three seconds.

OPTION 2

Alternate
Reflective/Proximity beam make mode is an excellent alternative choice when the sensing site precludes using the retroreflective mode.

Sensing Range
Dependent on size, shape, color and surface reflectivity.
Fiber Optic: Fiber Tip to Object...Up to 6 in.
Lens: Lens to Object - Up to 3 ft.

AUTOSET INSTRUCTIONS
1. Place object in the light beam path at it's Maximum sensing range.
2. Position object with Darkest area facing light beam path.
3. Depress the YELLOW button for three seconds.
SET-UP AND OPERATION INSTRUCTIONS
TRANSLUCENT/TRANSPARENT

OPTION 1

*Full or Empty Containers*
Proximity beam make sensing mode is one method for detecting translucent or transparent objects.

**Sensing Range**
Dependent on size, shape, color, and surface reflectivity.

**Fiber Optic:** Fiber Tip to Object - Up to 6 in.
**Lens:** Lens to Object - Up to 3 ft.

**AUTOSET INSTRUCTIONS**
1. Place translucent/transparent object in the middle of the light beam path at its most distant location.
2. Depress the YELLOW button for three seconds.

OPTION 2

*Empty Containers*
Retroreflective, beam break sensing mode is the preferred choice for detecting empty translucent or transparent objects.

**Sensing Range**
**Fiber Optic:** Fiber Tip to Reflector - Up to 18 in.

**AUTOSET INSTRUCTIONS**
1. Remove opaque object from light beam path.
2. Depress the BLUE button for three seconds.

**IMPORTANT NOTE:**
The AUTOSET instructions as shown above, result in the triggering on the arrival of the leading edge of the object at the sensing site. To trigger on the departure of the trailing edge of the object from the sensing site, depress the opposite color AUTOSET button for three seconds.
DYNAMIC AUTOSET
Depressing the appropriate button for three seconds while input events are ongoing will oftentimes result in a perfect setting thanks to the Automatic Contrast Tracking system (ACT). If, after attempting a dynamic quickset routine a couple of times does not produce a satisfactory adjustment, it is recommended that you initiate a series of “up” or “down” manual commands while viewing the Contrast Indicator. When the signal level reaches the threshold of “3” on the indicator, the ACT digital tracking system will automatically complete the adjustment.

MANUAL-ADJUST
Please note that the Yellow “up” button, or the Blue “down” button are functional at all times, as long as the lock feature is disabled. Tap the Yellow button to move the adjustment (as indicated on the Contrast Indicator) toward the light state. Tap the Blue button to move the adjustment toward the dark state. Tapping the manual buttons advances the adjustment in small, incremental steps of about 0.5 bar per step as displayed on the Contrast Indicator. Manual adjustments are particularly useful when finite adjustments are required for very low contrast applications or when detecting highly reflective irregularly shaped objects.

DIAGNOSTICS
The SMARTEYE® EZ-PRO™ sensor is equipped with two important and useful diagnostic features. The first one is the 5 LED Contrast Indicator, which provides “at-a-glance” analysis of the sensor’s response to the light state vs. the dark state sensing conditions. This device is not only useful in static conditions for alignment purposes, but is also functional during dynamic conditions when input events are ongoing. The second important feature is the Action Alert bright Yellow indicator. This indicator will turn “on” whenever the highest “light state” reading, or the lowest “dark state” reading (as viewed on the contrast indicator) fails to exceed preset levels.

The “light state” reading must exceed 4”
The “dark state” reading must fall below 2”

Whenever the lightest or darkest light levels are unacceptable, the bright Yellow LED indicator will be turned “on” when the light level passes through the sensor’s switch point of 3 on the contrast indicator. Both the Contrast Indicator and the Action Alert indicator can be viewed simultaneously during dynamic conditions when input events are ongoing.

Note: • If the red Output Indicator flashes while the output transistor is in the “ON” state, one of the output leads is shortened (NPN to positive or PNP to negative/ shield).
• If the grey wire is shorted to ground, the Contrast Indicator cycles repeatedly.

OUTPUT INDICATOR
Red LED illuminates when output transistor is in the “ON” state.
ADVANCED OPTIONS

The SMARTEYE® EZ-PRO™ is equipped with the following 3 optional features that can help to adapt the sensor to specific application requirements:

- **Lock**  When this feature is enabled the sensor becomes tamper proof.
- **ACT**  (Automatic Contrast Tracking) - When this feature is enabled the sensor will automatically track with a variety of changing conditions by adjusting itself during normal operation.
- **Timer**  When this “off” delay timer is enabled, the output duration is extended by 10, 25, or 50 milliseconds. This timing function helps to prevent erratic triggering of the printer.

DISPLAY STATUS OF SELECTABLE OPTIONS

Press and hold both Blue and Yellow buttons simultaneously for 3 seconds. The 5-LED bargraph will go into a flashing routine. When completed, the 5-LED bargraph will switch from functioning as a contrast indicator to a status indicator. Now the status of the selectable options will be displayed and the amber LED option status indicator will be lit.

SELECT OPTION TO BE ALTERED

Step to the desired function to be toggled to the opposite state by “tapping” the Blue button. The first “tap” will step to the “lock” select function. To indicate the “lock” function has been selected, the #5 LED will blink. The next “tap” will step the blinking of the indicator to the #4 LED. Another “tap” of the Blue button will step the blinking of the indicator to the #3 LED. Another “tap” to the #2 LED and, finally, the fifth “tap” will select the #1 LED. Once the blinking LED is next to the option to be changed, depress the Yellow button to enter your choice into memory. The sensor will then display the choice briefly before returning to normal operation. This sequence must be repeated for each function to be altered. If there is no change in the status of any of the control functions, tap the Blue button a sixth time or wait 5 seconds and allow the sensor to automatically return to normal operation.

<table>
<thead>
<tr>
<th>LED</th>
<th>FEATURE</th>
<th>On/Off</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>#5</td>
<td>Lock</td>
<td>On</td>
<td>The manual up/down and AUTOSET adjustments are disabled.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>Manual adjustments are enabled.</td>
</tr>
<tr>
<td>#4</td>
<td>ACT</td>
<td>On</td>
<td>ACT is enabled.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>ACT is disabled.</td>
</tr>
<tr>
<td>#3</td>
<td>10ms Timer</td>
<td>On</td>
<td>10ms Timer/Pulse Stretcher is enabled.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>10ms Timer/Pulse Stretcher is disabled.</td>
</tr>
<tr>
<td>#2</td>
<td>25ms Timer</td>
<td>On</td>
<td>25ms Timer/Pulse Stretcher is enabled.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>25ms Timer/Pulse Stretcher is disabled.</td>
</tr>
<tr>
<td>#1</td>
<td>50ms Timer</td>
<td>On</td>
<td>50ms Timer/Pulse Stretcher is enabled.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>50ms Timer/Pulse Stretcher is disabled.</td>
</tr>
</tbody>
</table>

FACTORY PRESET OPTION MENU

<table>
<thead>
<tr>
<th>LED</th>
<th>FEATURE</th>
<th>On/Off</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>#5</td>
<td>Lock</td>
<td>Off</td>
<td>Lock disabled, Manual and AUTOSET adjustments are enabled.</td>
</tr>
<tr>
<td>#4</td>
<td>ACT</td>
<td>Off</td>
<td>ACT is disabled.</td>
</tr>
<tr>
<td>#3</td>
<td>10ms Timer</td>
<td>Off</td>
<td>10ms Timer/Pulse Stretcher is disabled.</td>
</tr>
<tr>
<td>#2</td>
<td>25ms Timer</td>
<td>Off</td>
<td>25ms Timer/Pulse Stretcher is disabled.</td>
</tr>
<tr>
<td>#1</td>
<td>50ms Timer</td>
<td>Off</td>
<td>50ms Timer/Pulse Stretcher is disabled.</td>
</tr>
</tbody>
</table>
LOCK FUNCTION
When enabled (#5 LED lit), the Blue (down) and Yellow (up), manual and AUTOSET commands will be disabled. This will provide tamper-proof operation. To toggle the lock function to the opposite state, hold in the both buttons for 3 seconds. Then, tap the Blue button once. The #5 LED should be blinking. Now, push and hold the Yellow button for one second.

ACT (AUTOMATIC CONTRAST TRACKING)
When enabled (#4 LED lit), the sensor will automatically track with a variety of changing conditions by adjusting itself during normal operation. For example, the sensor will continue to maintain the proper setting to compensate for changing detrimental conditions:

1. Lens or reflector contamination.
2. Scratched or damaged lens.
4. LED light source or thermal drift.
5. Target variations such as position, orientation or color.
6. Diminishing contrast deviation/shift caused by high speed events, particularly when input duty cycles are severely offset.

The dynamic adjustments of the sensor maintains excess gain and contrast deviation. As automatic adjustments occur, there will be an occasional flash of the bright yellow action alert indicator. **Note:** On rare occasions (usually associated with low contrast sensing or product inspection applications) the ACT self-adjusting may have to be disabled.

TIMER FUNCTION
The optional “Pulse Stretcher” timer can be activated to help prevent false triggering of the printer in difficult sensing applications. The timer will extend the sensors output duration by either 10, 25, or 50 milliseconds. (not additive) Therefore the time duration of the gap between objects must be less than the timers duration. There are 3 selectable time durations which can be enabled only one at a time. They can be activated by toggling LED #3, #4, or #5 (note selectable options as listed above). **Important:** When triggering off trailing edge of object, the timer must be disabled.

**Accessories**
**Micro Cable Selection Guide, 5-wire M12**

<table>
<thead>
<tr>
<th>Cable Code</th>
<th>Length</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSEC-6</td>
<td>6’ (1.8m) Shielded cable</td>
<td></td>
</tr>
<tr>
<td>GSEC-15</td>
<td>15’ (4.6m) Shielded cable</td>
<td></td>
</tr>
<tr>
<td>GSEC-25</td>
<td>25’ (7.62m) Shielded cable</td>
<td></td>
</tr>
<tr>
<td>GSEC-2MU</td>
<td>6.5’ (2.0m) Low-cost, unshielded</td>
<td></td>
</tr>
<tr>
<td>GSEC-5MU</td>
<td>16.4’ (5.0m) Low-cost, unshielded</td>
<td></td>
</tr>
<tr>
<td>GRSEC-6</td>
<td>6’ (1.8m) Right angle shielded cable</td>
<td></td>
</tr>
<tr>
<td>GRSEC-15</td>
<td>15’ (4.6m) Right angle shielded cable</td>
<td></td>
</tr>
<tr>
<td>GRSEC-25</td>
<td>25’ (7.62m) Right angle shielded cable</td>
<td></td>
</tr>
</tbody>
</table>

**Accessories:**

- **FMB-1** (8.4mm diam.)
  Standard Fiberoptic Mounting Bracket
- **FMB-2** (5.1mm diam.)
  Miniature Glass or Plastic Fiberoptic Mounting Brackets
- **FMB-3** (3.1mm diam.)
  Standard Fiberoptic Mounting Bracket
- **SEB-3**
  Stainless “L” Bracket
- **LK-4**
  Lens Kit
  (See Optical Blocks Accessories for contents)
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 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 O5 Proximity**
Narrow beam optics useful in long-range sensing of medium to large size objects.

**Type R4 Glass Fiberoptics**
Adapter for use with a wide variety of glass fiber optic light guides for both the proximity and opposed sensing modes.

**Type R5 Plastic Fiberoptics**
Adapter for use with a wide variety of plastic fiber optic 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 6 ft. (1.8m)
   - C = Connector

3. Select Optical Block based on mode of operation required.

Example: EZP R C F4

```
EZ-PRO
Light Emitter
Connector
Optical Block
```

### Sensing Range Guidelines

<table>
<thead>
<tr>
<th>Convergent / Proximity / Retroreflective</th>
<th>Glass Fiberoptics</th>
<th>Plastic Fiberoptics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OPTICAL-BLOCKS</strong></td>
<td><strong>OPTICAL-BLOCKS</strong></td>
<td><strong>OPTICAL-BLOCKS</strong></td>
</tr>
<tr>
<td>V4, V4A</td>
<td>F4 Opposed Mode</td>
<td>F5 Opposed Mode</td>
</tr>
<tr>
<td>V6</td>
<td>F4 16 in. 1 ft. 8 in. 5 in.</td>
<td>F5 9 in. 2 in.</td>
</tr>
<tr>
<td>V8</td>
<td>F4 20+ ft. 20+ ft. 12 ft. 9 ft.</td>
<td>F5 6 ft. 2 ft.</td>
</tr>
<tr>
<td>O4</td>
<td>F4 w/lens 7 in. 5 in. 1 in. 1 in.</td>
<td>F5 w/ right angle lens 3 ft. 1 ft.</td>
</tr>
<tr>
<td>O5</td>
<td>F4 1 ft. 1 ft. N/A 6 in.</td>
<td>Proximity Mode</td>
</tr>
<tr>
<td>R4</td>
<td>F4 w/lens 1 ft. 1 ft. N/A 6 in.</td>
<td>Proximity Mode</td>
</tr>
<tr>
<td>R5</td>
<td>F4 w/lens 7 in. 5 in. 1 in. 1 in.</td>
<td>Proximity Mode</td>
</tr>
</tbody>
</table>

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

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

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

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

Connections and Dimensions