XP10 – Extremely High Speed Sensor
Extremely High Speed (10µs) Photoelectric Sensor

The SMARTEYE® X-PRO XP10 is the highest speed (10µs) dual-function sensor in the world. This dual-function sensor is designed to be a precision registration mark sensor with 5µs repeatability, and a standard photoelectric sensor for any high speed application, in one package.

Mark Mode allows the user quick and easy set-up for detection of registration marks by performing an AUTOSET with the background in view. When in Mark Mode, the sensor will automatically configure to give an output on the mark.

Standard Mode allows the user independent control of the AUTOSET mode, (Light State or Dark State), and output, (Light ON or Dark ON). Standard Mode provides the greatest flexibility for general purpose applications.

Five Memory Locations are available to be used in either Mark Mode or Standard Mode when the Enable option is selected. These Memory locations can store all options and AUTOSET settings for up to five different application requirements. This Memory feature allows fast changeover when running several different types of materials on the same machine. Additionally, when the Enable option is selected, the sensor has the ability to be programmed by a PLC or other device via the Remote AUTOSET input wire. You can access any option, Memory location, or AUTOSET routine through this uniquely designed input feature.

No other sensor in the world gives you these high performance features packaged together in one compact design. The SMARTEYE® X-PRO XP10 photoelectric sensor from Tri-Tronics is the most comprehensive sensor available in its class.

Features
- 10µs Response Time
- 5µs Repeatability
- Dual-Function Sensor
  • Mark Mode – For Registration
  • Normal Mode – Object Sensing
- 5 Memory Locations
- PLC and External Programming Through the Remote Input Line
- Connector or Cabled Version
- Available in White, Red and Infrared LED
- Patents No. 5,621,205 and No. 6,950,778
- AUTOSET - One-Touch Setup
- 10-LED Dual-Function Bar Graph

Benefits
- Increase Edge Accuracy at All Speeds
- Virtually Eliminate Setup Time
- Save Registration Waste Cost
- Eliminate Compensation Software Requirement
- Repeatable Leading Edge or Trailing Edge Accuracy Consistently at 5µs
- Increase Throughput Capacity
- Eliminate Machine Speed Constraint
Applications

High Speed Offset Printing

High Speed Paper Converting

When Timing is Everything!

High Speed Edge Detecting

High Speed Label Rewinding
### Features

**AGS™ AUTOMATIC GAIN SELECT**
This unique feature provides automatic digital selection of amplifier gain based upon your sensing requirements.

**AUTOSET ADJUSTMENT**
The AUTOSET adjustment routine only requires the push of one button, one time! Oftentimes, in dynamic operating conditions, all you have to do is push the button for a perfect setting. This is dependent upon at least a 4:1 duty cycle ratio.

**AUTOSET/REMOTE PROGRAMMING (Patent No. 6,950,778)**
Remotely AUTOSET or program the sensor’s multiple options by applying a sequential momentary contact closure from the AUTOSET input wire to negative as shown in the wiring diagram. The remote AUTOSET command will duplicate the last manual AUTOSET.

**EDR® (Patent No. 5,621,205)**
Another unique feature is the digitally controlled EDR (Enhanced Dynamic Range) circuit. It prevents dark state saturation and expands the operating range without reducing amplifier gain.

**10 LED DUAL-FUNCTION BAR GRAPH**
- **Contrast Indicator™** – Provides “at-a-glance” performance data.
- **Status Indicator** – Displays status of selectable options:
  - **Lock** – When this option is enabled the sensor becomes tamperproof.
  - **Mark** – When this feature is enabled, the sensor buttons function like a MARK•EYE® PRO: Push and hold yellow button for light background and red button for dark background.

**Pulse Stretcher (PS)** – When the “OFF” delay pulse stretcher is enabled, the output duration is extended by 10 or 20 milliseconds (not additive). Enabling the Timer allows ample time for the controller to respond. The time durations of the gap between marks must be longer than the selected delay.

**HIGH SPEED**
10µs response time when responding to light or dark state.
5µs repeatability.

**DUAL FUNCTION BAR GRAPH**
Primary function: Contrast Indicator
Secondary function: Option Status Indicator of 10 selectable options

- **#10 LOCK**
  Tamperproof Operation

- **#9 MARK**
  When illuminated – “ON” = Mark Mode
  When not illuminated – “OFF” = Standard Mode

- **#8, 7 PULSE STRETCHER (PS)**
  10 or 20 Millisecond Pulse Stretcher
  “OFF” Delay

- **#6 ENABLE**
  Illuminates when advanced features are enabled…MEM 1 - MEM 5 and Remote Programming

- **#5 – #1 MEMORY (MEM)**
  Illuminates to Indicate Active Memory

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

**OUTPUT INDICATOR**
Illuminates when Output is “ON”

**MARK MODE INDICATOR**
Illuminates when Mark Mode is enabled

**LARGE HIGH VISIBILITY OUTPUT INDICATOR**
Illuminates when Output is “ON”

**10 INTERCHANGEABLE OPTICAL BLOCKS**
1. O4 (Wide Beam Proximity)
2. O5 (Long Range Proximity)
3. R4 (Retroreflective)
4. R5 (Polarized Retroreflective)
5. V4 (Convergent, 1” Axis)
6. V4A (Convergent, 1” Axis, Apertured)
7. V6 (Convergent, 1.5” Axis)
8. V8 (Convergent, 0.5” Axis)
9. F4 (Glass Fiberoptic Light Guides)
10. F5 (Plastic Fiberoptic Light Guides)

**YELLOW PUSHBUTTON – 4 Functions**
1. Manual “UP” Adjustment
2. Options Select & AUTOSET Programming
3. Toggle selected option to opposite state and return to normal operation
4. When holding red AUTOSET button, tap to alter AUTOSET mode… Light State/Dark State

**RED PUSHBUTTON – 4 Functions**
1. Manual “DOWN” adjustment
2. Options Select & AUTOSET Programming
3. When in Option Status Mode, tap to desired function to be altered
4. When holding yellow AUTOSET button, tap to alter AUTOSET mode… Light State/Dark State

Note: Press and hold both red and yellow buttons simultaneously for 3 seconds to enter Options mode.
Special Features

REMOTE PROGRAMMING

The Remote Programming feature of the SMARTEYE® X-PRO XP10 allows the customer to configure, AUTOSET, and tweak the sensor using a PLC pulse-train, HMI, MMI, NPN transistor output, or momentary pushbutton switch to 0 VDC/ground. This provides the customer with control over every aspect of the sensor configuration without having to physically touch the sensor. If you have several sensors on your machine; have sensors buried deep within the mechanical structure of the machine; or have your sensors in safe areas behind interlocks… you can easily access these sensors remotely to perform a "digital changeover" due to this unique, special feature.

Momentary Push Button

Ex. Selection of MEM 1

| L | 1 | 2 | 3 | Delay | 1 | Delay |

Each pulse (L) is low for 40ms to 400ms. The idle time (H) between pulses is 40ms to 400ms. The delay (D) between sets of pulses is .75 seconds to 5 seconds.

FIVE MEMORY LOCATIONS

There are Five Memory locations available to store various configurations of the sensor for particular applications. For instance, if you have 5 different web materials… the background colors are different, the mark colors are different, and the marks are different sizes… you would need to perform a different AUTOSET for each background, and you might need to add a Pulse Stretcher timer for the different sized marks. The SMARTEYE® X-PRO XP10 sensor allows you to store and recall that information so the setup time is eliminated completely, reducing down-time and change-over complications when running different materials. This feature is also a benefit for any other application with changing conditions; different sized bottles, different colored labels, varying background materials, varying product textures, etc.

Packaging Five Memory locations together with the unique Remote Programming feature above makes the SMARTEYE® X-PRO XP10 sensor the fastest sensor in the world for "rapid digital changeover", as well as for speed and accuracy.

NOTE: Any changes to the sensor will automatically be saved to current MEM # location.
How to Specify

1. Select Sensor Model based on LED Light Source required:
   - XP10W = White
   - XP10R = Red
   - XP10I = Infrared

2. Select Connection required:
   - Blank = Cable
   - C = Connector

   - GSEC-6 6' (1.8 m) Shielded cable
   - GSEC-15 15' (4.6 m) Shielded cable
   - GSEC-25 25' (7.62 m) Shielded cable
   - GSEC-2MU 6.5' (2.0 m) Low-cost, unshielded
   - GSEC-5MU 16.4' (5.0 m) Low-cost, unshielded
   - GRSEC-6 6' (1.8 m) Right angle shielded cable
   - GRSEC-15 15' (4.6 m) Right angle shielded cable
   - GRSEC-25 25' (7.62 m) Right angle shielded cable
   - GX-25 25' (7.62 m) extension cable
   - FMB-1 (5.1 mm diam.) Standard Fiberoptic Mounting Bracket
   - FMB-2 (5.1 mm diam.) Fiberoptic Mounting Bracket
   - SEB-3 Stainless “L” Bracket
   - LK-4 Lens Kit (See Optical Blocks Accessories for contents)

3. Select Optical Block:
   - F4 Glass Fiber Optic
   - F5 Plastic Fiber Optic
   - V4 Convergent Lens, 1.0" Focal Point
   - V4A Convergent Lens, 1.0" Focal Point
   - V6 Convergent Lens, 1.5" Focal Point
   - V8 Convergent Lens, 0.5" Focal Point
   - R4 Retroreflective Lens
   - R5 Polaredized Retroreflective Lens
   - O4 Wide Beam Proximity Lens
   - O5 Long Range Proximity Lens

Sensing Range Guidelines

Convergent / Proximity / Retroreflective

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No Prox on craft paper

F4 w/lens

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

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

**SUPPLY VOLTAGE**
- 12 to 24 VDC
- Polarity Protected
- Intended for use in Class 2 circuits

**CURRENT REQUIREMENTS**
- 45mA (exclusive of load)

**OUTPUT TRANSISTORS**
- (1) NPN and (1) PNP sensor output transistors
- Outputs sink or source up to 150mA (current limit)
- All outputs are continuously short circuit protected

**REMOTE AUTOSET INPUT**
- Opto-isolated momentary sinking input (10mA)

**RESPONSE TIME**
- Light/Dark = 10µs
- Repeatability = 5µs

**LED LIGHT SOURCE**
- Infrared = 880 nm, Red = 660 nm, White = Broadband Color Spectrum

**PUSHBUTTON CONTROL**
- AUTOSET
- Manual Adjustments
- Set status of 10 options: 10) Lock, 9) Mark, 8) PS 10ms, 7) PS 20ms, 6) Enable, 5–1) Five Memory Locations
- NOTE: Any changes to the sensor will automatically be saved to current MEM # location.

**HYSTERESIS**
- Set for high resolution – less than one bar on the contrast indicator

**LIGHT IMMUNITY**
- Responds to sensor’s pulsed modulated light source – immune to most ambient light including indirect sunlight

**DIAGNOSTIC INDICATORS**
- 10-LED dual-function bar graph operates 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 10 selectable options

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

**Ambient Temperature**
- -40°C to 70°C (-40°F to 158°F)

**Patents**
- No. 5,621,205 and No. 6,950,778

**RoHS Compliant**
Product subject to change without notice.

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Connections and Dimensions

**SMARTEYE® X-PRO XP10**

**Connections**

- NPN (Sink)
- Negative
- Positive
- PNP (Source)
- Remote AutoSet

**Dimensions**

- P/N: SEB-3
- Optional Mounting Bracket With Hardware

**Cables**

- Choice of Built-In 6’ Shielded Cable or 5-pin, M12 Connector for Use With Optional Cables

**Footnotes**

- *Sensors with connectors

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**Diagram**

- Diagram showing connections and dimensions of the SMARTEYE® X-PRO XP10 sensor.