TRI-TRONICS®

Smart Sensing Solutions Since 1954

SMARTEYE®
X-MARK™

Extremely High Speed Photoelectric Registration Sensor

SMARTEYE® X-MARK™

Photoelectric Registration Sensor

The ***SMARTEYE® X-MARK***™ reliably detects the position of registration marks on various webs of material running at very high speed for applications in the printing, packaging and converting industries. The switching frequency of the sensor is 50Khz with a repeatability of 5µs. This provides unprecedented stability of the mark position. It is ideal in processes where timing is critical.

The sensor uses a 2.2mm white light spot to detect a mark, product edge, or product feature as it approaches the sensor in any direction. Vertical and horizontal line versions us a tri-color emitter to enhance performance. 5µs repeatability provides high accuracy at high speed. The only question is: "How fast can the machine run?"

When using our conversion brackets, the sensor is a drop-in replacement for existing registration mark sensors. The conversion bracket provides the user with a hole-for-hole bolt pattern of the removed sensor and when installed aligns the focal point in the exact same position as the removed sensor eliminating the need for any modification.

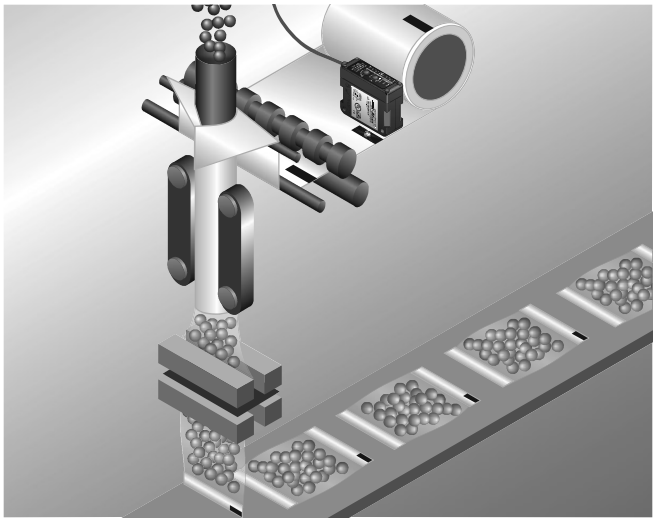
Features

- 10µs response time
- 5µs repeatability
  H & V Models
  - *12µs response time*
  - *6µs repeatability*
- Four AUTOSET Modes:
  - Light State
  - Dark State
  - Two-Point
  - Dynamic
- Remote AUTOSET
- Connector or cabled version
- AUTOSET – One-Touch setup
- 8-LED Dual-Function bargraph
- Full spectrum White LED; or Tri-Color LED
- Vertical and Horizontal line optics

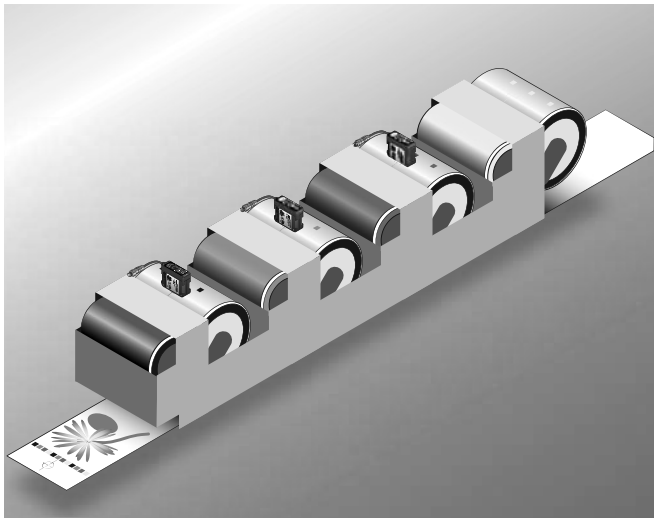
Benefits

- Increase edge accuracy at the highest speeds
- Virtually eliminate setup time
- Reduce material waste
- Eliminate compensation software
- Increase throughput capacity
- Eliminate machine speed constraint
- Quick digital changeover
- Drop-in replacement of existing sensors

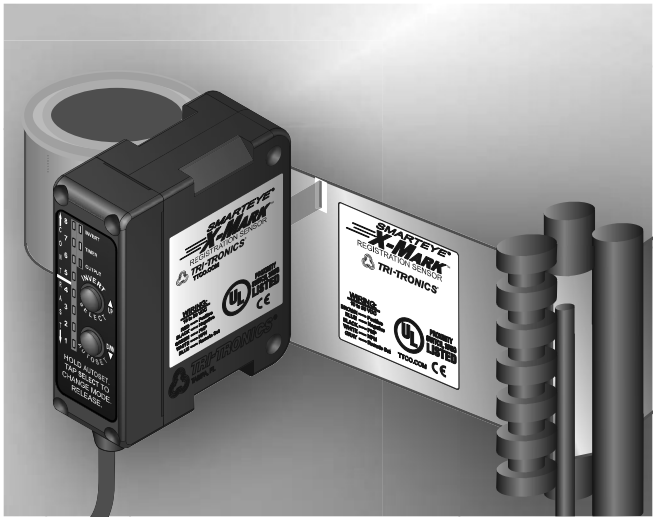
Applications



Form, Fill, & Seal



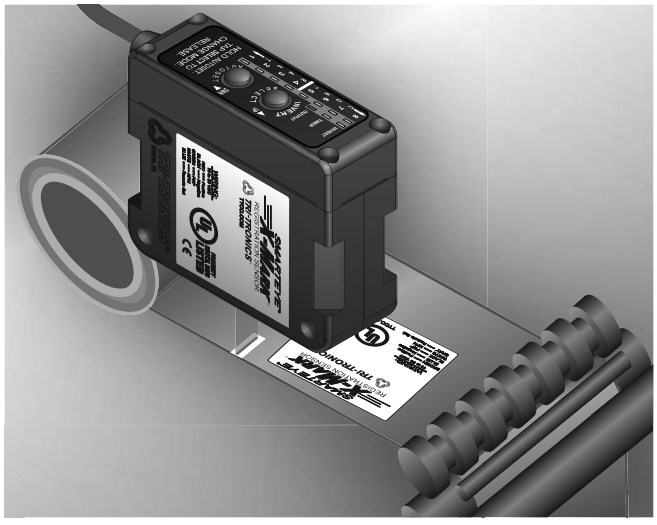
High Speed Offset Printing



Registration Mark Sensing

Angle for Glare and Shiny Webs

Vertical Line Tri-Color Optics



Horizontal Line Tri-Color Optics

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, once. Four AUTOSET Modes to choose from:
Light State AUTOSET is used when there is a light background with a dark mark;
Dark State AUTOSET is used when there is a dark background with a light mark;
Two-Point AUTOSET is used when the background and mark are very similar in color or contrast;
Dynamic AUTOSET is used when there is a requirement to jog the mark past the sensor on-the-fly, or when there isn't an opportunity to stop the system for setup.

CONTRAST INDICATOR
Provides at-a-glance performance data.

REMOTE AUTOSET
Remotely AUTOSET the sensor by applying a contact closure from the Remote AUTOSET input wire to negative (0VDC) or positive (10-30VDC), depending on model, as shown in the wiring diagram. The Remote AUTOSET command will duplicate the last manual AUTOSET performed.

EDR® (Patent 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.

TIMER
When the OFF delay pulse stretcher is enabled, the output duration is extended by 10 milliseconds. 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.

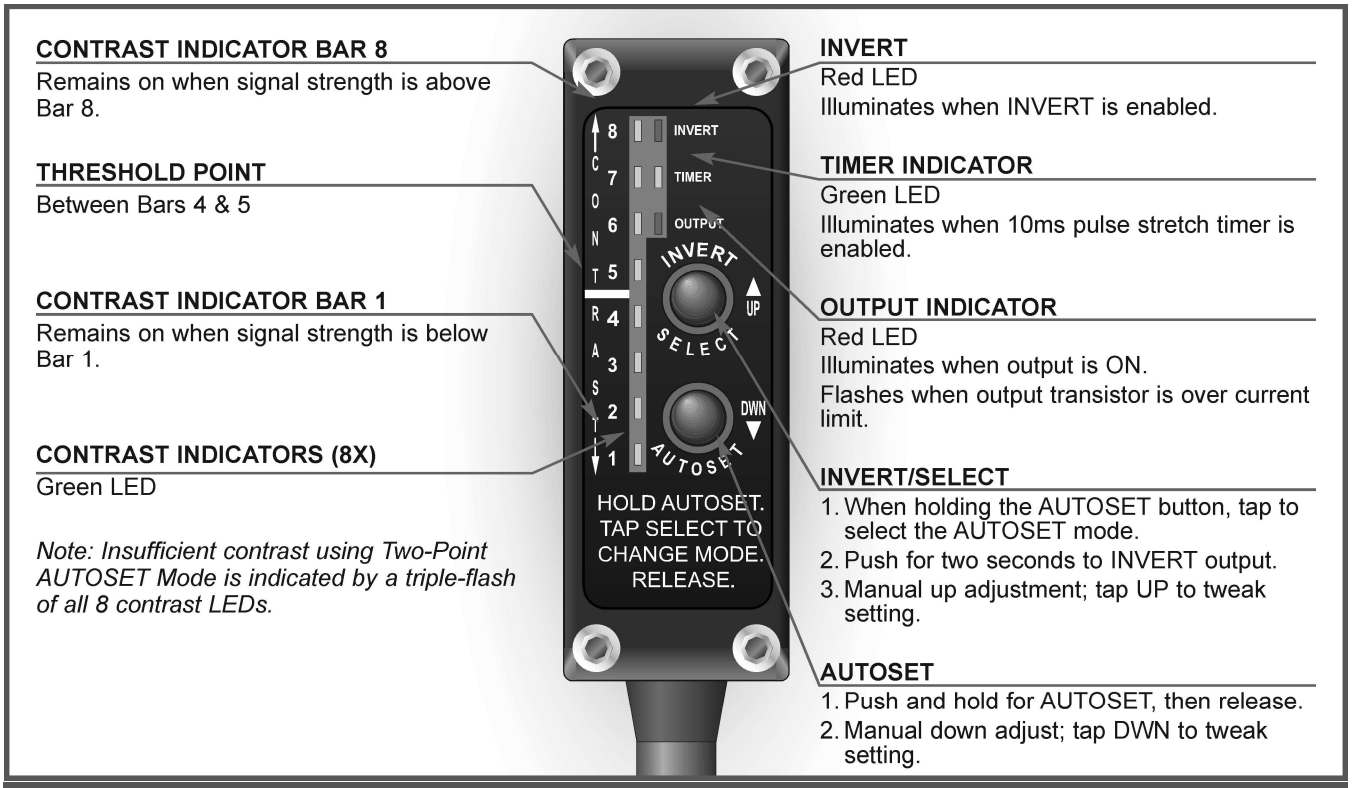
HIGH SPEED
10µs response time when responding to Light or Dark State.
5µs repeatability.
H & V Models: 12µs Response Time, 6µs Repeatability

CONNECTIONS
Built-In 6in (152mm) pigtail with 5-pin connector *(accessory cable required)* or 6ft (1.8m) cable.

MOUNTING OPTIONS
Through-hole or Bracket Mount.

REMOTE PROGRAMMING (XM/XMC-1 Models Only)
Remotely program the sensor's four AUTOSET Modes, change the Timer, invert the output, make minor adjustments, and repeat the last AUTOSET performed by applying a contact closure to negative (0VDC) in a simple sequence of pulses. This can be accomplished using a PLC pulse train, an HMI, or a momentary push-button switch.

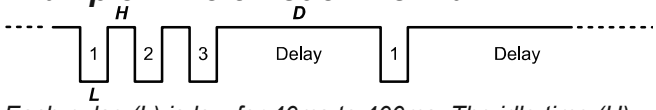
NOTE: H & V models use tri-color LEDs and are only available with Two-Point and Dynamic AUTOSET modes.



Special Features

REMOTE PROGRAMMING (XM/XMC-1 Models Only)
The Remote Programming feature of the SMARTEYE® *X-MARK*™ allows the customer to configure AUTOSET and tweak the sensor using a PLC pulse-train, HMI, NPN transistor output, or momentary PUSH-BUTTON switch to
0VDC/ground. This provides the customer with control over every aspect of the sensor configuration without having to physically touch the sensor.
Having several sensors on the machine; have sensors buried deep within the mechanical structure of the machine; or have sensors in safe areas behind interlocks, sensors are easily accessible remotely to perform a digital changeover due to this unique, special feature.

Example: Invert Mode - Normal



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 five seconds.

HMI - Human Machine Interface

NOTE: H & V models use tri-color LEDs, and are only available with Two-Point and Dynamic AUTOSET modes.

Sensing Range

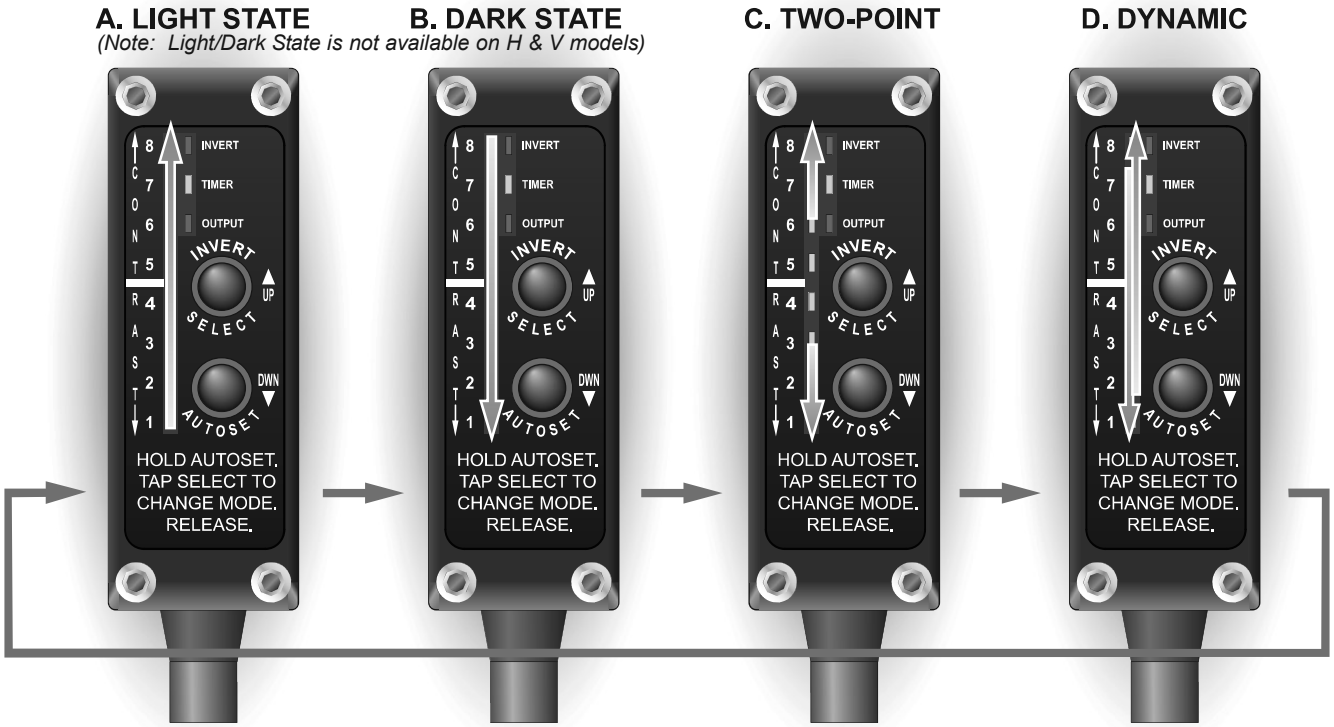
Standard Model | Horizontal Model | Vertical Model

***NOTE: H & V models use tri-color LEDs, and are only available with Two-Point and Dynamic AUTOSET modes.*

(Mark Samples)

Detailed Features

SELECT AUTOSET MODE:
While holding down the AUTOSET button, tap the SELECT button to advance through the four AUTOSET modes. The direction of the LED's indicates the current AUTOSET mode illustrated below. When desired AUTOSET mode is selected, release the AUTOSET button (see below for details).



INITIATE AUTOSET: First, select the appropriate AUTOSET Mode.

A. LIGHT STATE AUTOSET MODE - Place the light background in view, press and release the AUTOSET button *(Note: Not available on H & V models).*

B. DARK STATE AUTOSET MODE - Place the dark background in view, press and release the AUTOSET button *(Note: Not available on H & V models).*

C. TWO-POINT (Span Adjustment) - Place the background in view, press and release the AUTOSET button. Then place the mark in view, press and release the AUTOSET button.

D. DYNAMIC - With the background in view, press and hold the AUTOSET button, move the mark in view, or past the sensor, then release the AUTOSET button.

INVERT: To invert the output, press and hold the INVERT button for two seconds.

TIMER: To select the 10ms pulse stretcher, press and hold both buttons for two seconds.

REMOTE AUTOSET:
1. When using the Remote AUTOSET line, the AUTOSET mode must first be selected manually via the push-buttons, see Select AUTOSET Mode.

2. To initiate a Remote AUTOSET, pulse the AUTOSET line using the same sequence as specified in the push-button instructions for that AUTOSET mode. The pulse must have a minimum duration of .75 seconds and is active low for XM/XMC-1 and -2 models and active high for XM/XMC-3 models. See Connections and Dimensions.

NOTE: AUTOSET automatically selects Output ON for mark. LT/DK line on XM/XMC-2 and -3 models will override automatic output selection.

How To Specify

1. Select Sensor:
SMARTEYE® X-MARK™
Registration Sensor

2. Select Connection:
Blank = 6ft (1.8m) cable
C = 6in (152mm) Pigtail, M12 Connector

3. Select Output Configuration:
-1 = NPN/PNP
-2 = NPN w/ Remote LT/DK
-3 = PNP w/ Remote LT/DK

4. Select Light Projection:
Blank = Standard Round Spot
V = Vertical
H = Horizontal

5. Select Lens Material:
Blank = Glass
P = Acrylic

Example: XM C -1 H P

- XM — *X-MARK™*
- C — Connection
- -1 — Output Configuration
- H — Light Projection
- P — Lens Material

NOTE: H & V models use tri-color LEDs, and are only available with Two-Point and Dynamic AUTOSET modes.

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) right angle

GRSEC-15
15ft (4.6m) right angle

GRSEC-25
25ft (7.6m) right angle

5-Wire Extension Cable, M12

GX-25
25ft (7.6m) extension cable

Mounting Brackets

XMB-1L
Left

XMB-1R
Right

XMB-2
Front Mount

SEB-4
Stainless Steel Mounting Bracket

Specifications

SUPPLY VOLTAGE
- 10 to 30VDC
- Polarity protected
- Intended for use in Class 2 circuits

CURRENT REQUIREMENTS
- 30mA (exclusive of load; standard model)
- 50mA (exclusive of load; H & V models)

OUTPUT TRANSISTORS
- (1) NPN and/or (1) PNP output transistor. *Note: Dependent on Model; see "How to Specify, #3".*
- Outputs sink or source up to 150mA (current limit)
- All outputs are continuously short circuit protected.

REMOTE AUTOSET INPUT
- XM/XMC-1 & 2 Models – Momentary sinking input (1mA)
- XM/XMC-3 Models – Momentary sourcing input (1mA)
  Note: Remote programming available in XM/XMC-1 Models only.

REMOTE LT/DK INPUT
- XM/XMC-2 Models - Connect to Negative/0VDC
- XM/XMC-3 Models - Connector to Positive/10-30VDC

RESPONSE TIME
- 10µs (standard model)
- 12µs (H & V models)

REPEATABILITY
- 5µs (standard model)
- 6µs (H & V models)

LED LIGHT SOURCE
- White = Broadband Color Spectrum (standard model)
- Tri-Color LED = Red (635nm), Green (520nm) Blue (470nm) - (H & V models)

DIAGNOSTIC INDICATORS
- Contrast Indicator – Display scaled reading of sensor's response to contrasting light levels (light vs. dark) on an 8 bar LED display.
  Note: All 8 LEDs will flash three times if contrast insufficient or too low in Two-Point AUTOSET mode.
- Red LED Output Indicator – Illuminates when the sensor's output transistors are ON.
  Note: If Output LED flashes, a short circuit condition exists.
- Green LED Timer Indicator – Illuminates when the 10ms pulse stretch timer is enabled.
- Red LED INVERT Indicator – Illuminates when INVERT is enabled.

PUSH-BUTTON CONTROL
- AUTOSET
- INVERT outputs
- Manual Adjustments
- Timer – 10ms Pulse Stretcher

HYSTERESIS
- Dynamic – adjusted by AUTOSET

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

AMBIENT TEMPERATURE
- 10°C to 60°C (50°F to 140°F)

RUGGED CONSTRUCTION
- Chemical resistant, high impact polycarbonate housing
- Waterproof ratings: NEMA 4X, 6P and IP67
- Conforms to heavy industry grade CE requirements.
- Standard Light Projection Models are UL Listed. Horizontal and Vertical Beam Models are UL Pending.

RoHS Compliant
Product subject to change without notice

Connections and Dimensions

SMARTEYE® X-MARK™