X-tremely High Speed Photoelectric Registration Sensor

SMARTEYE® X-MARK™

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Photoelectric Registration Sensor

The *SMARTEYE® X-MARK™* is the fastest, most accurate registration mark sensor available on the market. The *X-MARK™* was designed to target the printing, packaging, and converting markets. By creating a specific sensor to exceed the current capability of the market leaders, and at a price that removes all barriers to change, the *X-MARK™* is sure to attract the attention of engineers and purchasing agents alike.

The *SMARTEYE® X-MARK™* uses a 2.2mm light spot that can detect a mark, edge, or product as it approaches the sensor in any direction. Some competitive models use a line to give the impression of accuracy, but through specific testing, we've discovered that these very expensive sensors are not as accurate as they appear. The *X-MARK™* sensors' 5µs repeatability provides reassurance of accuracy at the highest speeds in any direction. The only question is... "How fast can the machine run?"

The sensor was designed as a drop-in replacement to the existing market leaders. The bracket system provides the customer with a hole-for-hole configuration that aligns the focal point in the exact position of similar sensors currently on the market. Having this unique ability to be a drop-in replacement ensures the customer's requirements are met and exceeded without additional mechanical, electrical, or performance considerations.

Using the *X-MARK™*, High Speed Photoelectric Registration Sensor from Tri-Tronics® removes performance limitations and allows for full throughput capacity at the highest speeds in any direction.

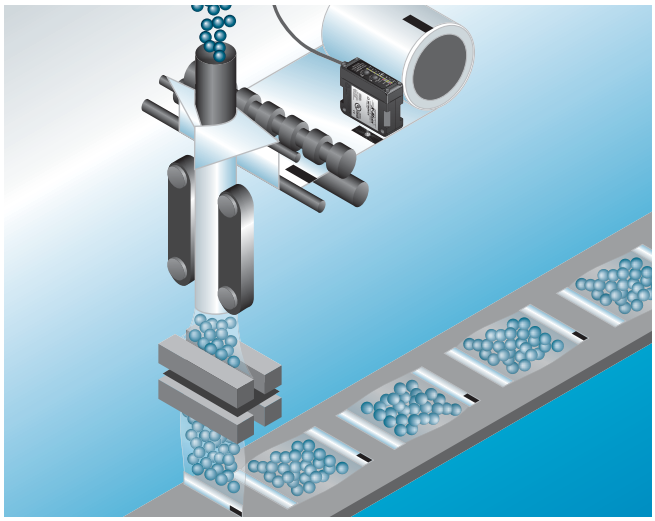
Features

- 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
- Full Spectrum, White LED
- AUTOSET – One-Touch Setup
- 8-LED Dual-Function Bar Graph
- Full Spectrum, White LED; or Tri-Color LED
- Vertical and Horizontal Line Optics

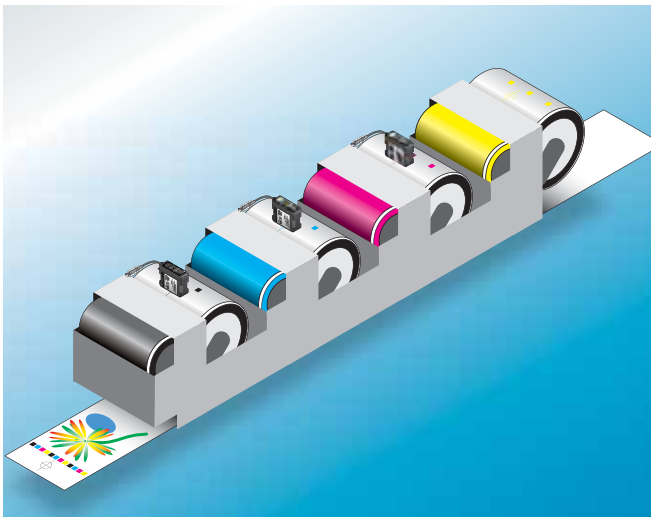
Benefits

- 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

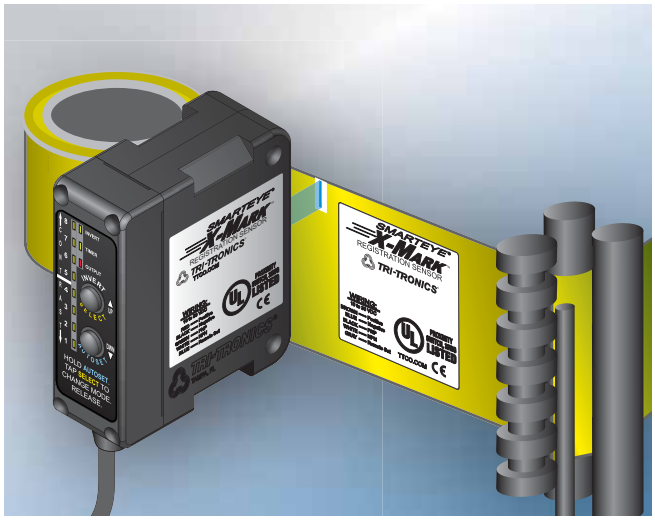
Applications



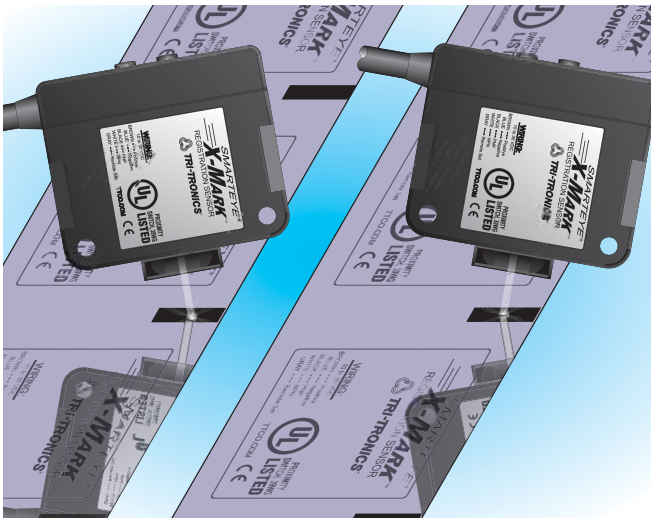
Form, Fill, & Seal



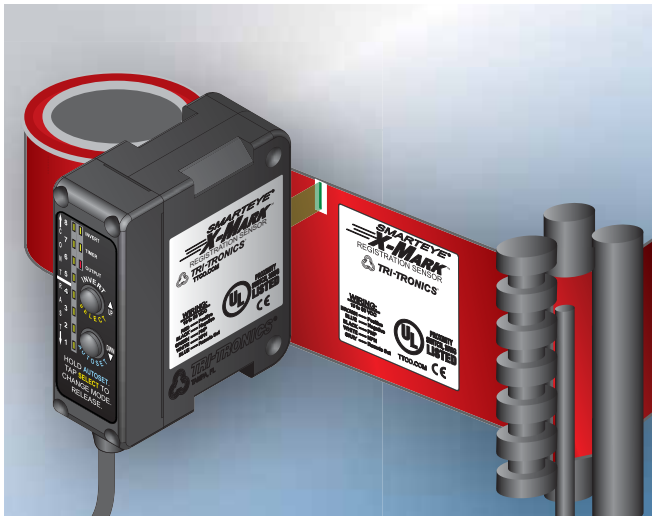
High Speed Offset Printing



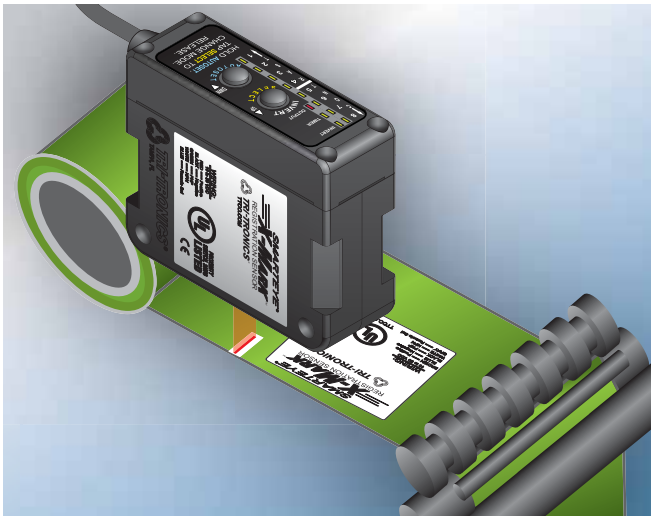
Registration Mark Sensing



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, one time. There are four AUTOSET Modes to choose from: Light State, Dark State, Two-Point, and Dynamic. 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)
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.

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 6 inch (152mm) pigtail with 5-pin connector *(accessory cable required) or 6 foot (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 pushbutton switch.

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

CONTRAST INDICATOR BAR 8
Remains on when signal strength is above Bar 8.

THRESHOLD POINT
Between Bars 4 & 5

CONTRAST INDICATOR BAR 1
Remains on when signal strength is below Bar 1.

CONTRAST INDICATORS (8X)
Green LED

Note: Insufficient contrast using Two-Point AUTOSET Mode is indicated by a triple-flash of all 8 contrast LEDs.

INVERT
Red LED
Illuminates when INVERT is enabled.

TIMER INDICATOR
Green LED
Illuminates when 10ms pulse stretch Timer is enabled.

OUTPUT INDICATOR
Red LED
Illuminates when output is On.
Flashes when output transistor is over current limit.

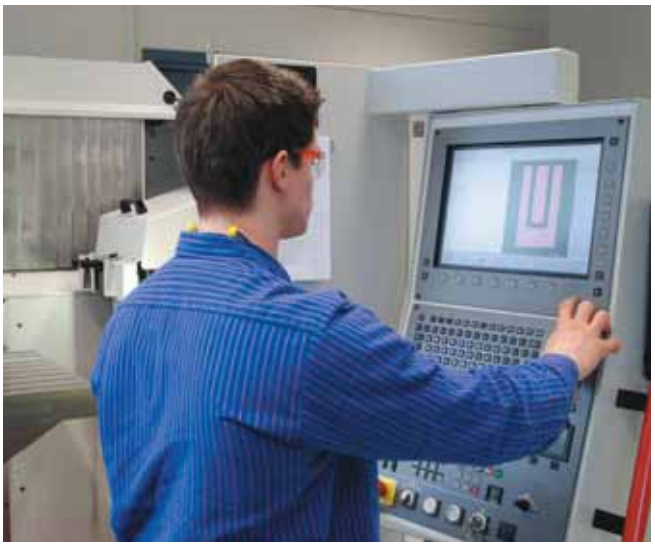
INVERT/SELECT
1. When holding the AUTOSET button, tap to select the AUTOSET mode.
2. Push for two seconds to INVERT output
3. Manual Up adjustment; tap UP to "Tweak" setting .

AUTOSET
1. Push and hold for AUTOSET, then release.
2. Manual Down adjust; tap DWN to "Tweak" setting.

Special Features

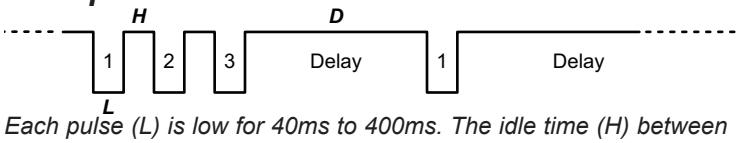
REMOTE PROGRAMMING (XM/XMC-1 Models Only)

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 pushbutton switch to 0VDC/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.



HMI - Human Machine Interface

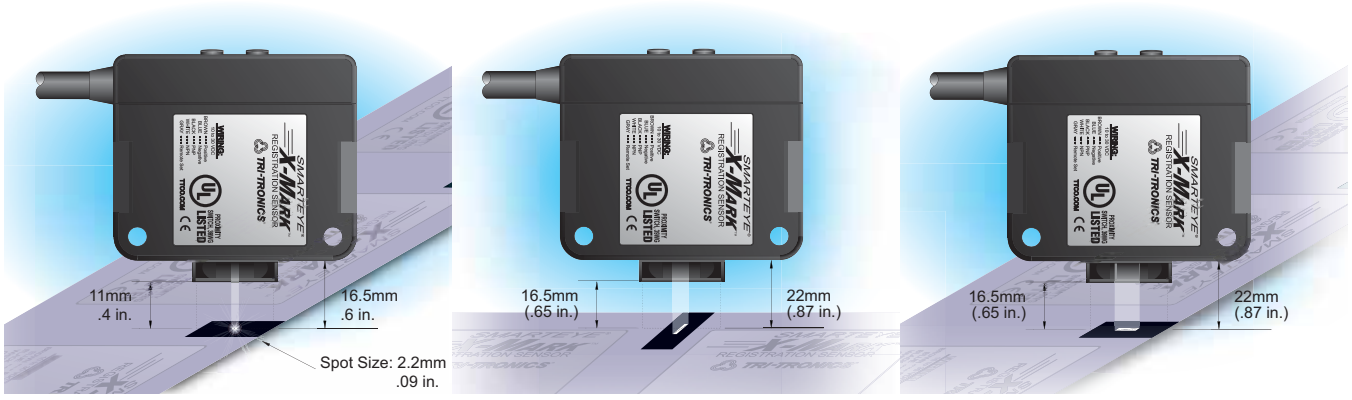
Example: Invert Mode - Normal



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 5 seconds.

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

Sensing Range



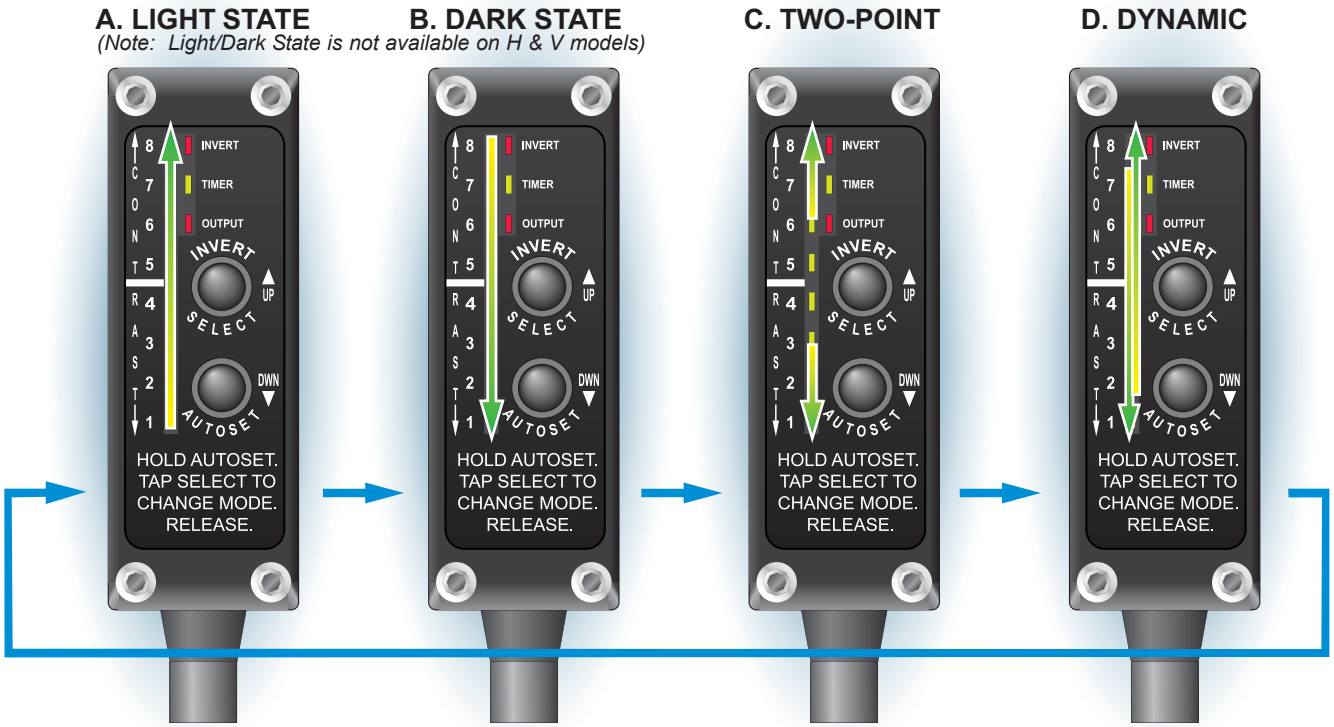
Standard Model | Horizontal Model | Vertical Model

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

(Mark Samples)

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 2 seconds.

TIMER: To select the 10ms pulse stretcher, press and hold both buttons for 2 seconds.

REMOTE AUTOSET:

1. When using the Remote AUTOSET line, the AUTOSET mode must first be selected manually via the pushbuttons, see Select AUTOSET Mode.

2. To initiate a Remote AUTOSET, pulse the AUTOSET line using the same sequence as specified in the pushbutton 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 Cable:
Blank = 6 ft. (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
NOTE: H & V models use tri-color LEDs, and are only available with Two-Point and Dynamic AUTOSET modes.

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

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

Example:

XM C -1 H P

SMARTEYE® X-MARK™ Registration Sensor

Blank = 6 ft. (1.8m) cable
C = 6in. (152mm) Pigtail, M12

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

Light Projection
Blank = Standard
H = Horizontal
V = Vertical

Lens Material
Blank = Glass
P = Acrylic

Hardware & Accessories

Micro Cable Selection Guide, 5-wire, M12

Cables

GSEC-6
6' (1.8m) Shielded cable

GSEC-15
15' (4.6m) Shielded cable

GSEC-25
25' (7.62m) Shielded cable

GRSEC-6
6' (1.8m) Right angle shielded cable

GRSEC-15
15' (4.6m) Right angle shielded cable

GRSEC-25
25' (7.62m) Right angle shielded cable

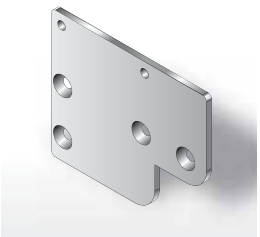
GX-25
25' (7.62m) Extension cable

GSEC-X

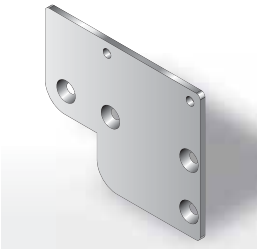
GRSEC-X

GX-X

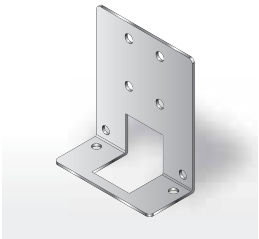
Universal Mounting Brackets



XMB-1L
Left



XMB-1R
Right



XMB-2
Front Mount

SEB-4
Stainless Stealth Mounting Bracket

Specifications

SMARTEYE® X-MARK™

SUPPLY VOLTAGE
- 10 to 30 VDC
- 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

PUSHBUTTON 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™