TRI-TRONICS®

Smart Sensing Solutions Since 1954

COLOR SMARTEYE® MARK II

Contrast Sensor for Registration Marks

Registration Mark Sensor

The *SMARTEYE*® COLORMARK™ II

Registration Mark Sensor combines unique color perception ability with very high speed response. Many important features have been incorporated into the design to meet the increasing demand for precision registration control on today's higher speed packaging machinery. It provides extended operating ranges, enhanced background suppression and the elimination of saturation problems.

The specific task of a photoelectric registration mark detector is to respond to printed registration marks on packaging material as they pass through the sensor's light beam. The output of the sensor must switch when the mark arrives precisely in position for the control function to occur. The resolution of the exact location of each passing registration mark is keynote to ensure that the initiation of the electromechanical response triggered by the sensor is in synchronization with the arrival of the mark.

Features

- Built-in Connectors
- Waterproof Housings
- Clutch Knob Adjustment (Offset/EDR®)
- Unique 10 LED Contrast Indicator
- Addition of EDR® (Enhanced Dynamic Range) eliminates hot spot glare effects. Works on the shiniest materials, including foils.
- Optional Pulse Stretcher guarantees a minimum of 10 milliseconds output – ample time for visual LED verification and for the control to respond.
- Choice of light source – green, red, blue, or white.

Benefits

- Minimizes downtime
- Flexible and accommodating for a variety of registration materials and marks
- Easily adjusted for optimum performance
- Very accurate and repeatable with unnoticeable migration from start up to full speed
- High Quality and High Reliability

Application Setup Guide

Registration Mark Sensing Using Fiber Optic Light Guides

Opaque Material (Non-Foil)

1. Position the fiber optic light guide to view material looking straight down (see Fig.1).
2. Place background in view of fiber optic light guide.
3. Adjust OFFSET as follows:

   A. For dark mark on light background, adjust for a reading of 10 on the contrast indicator with the background in view.

   B. For light mark on dark background, adjust for a reading of 1 on the contrast indicator with the background in view.
4. Set light/dark switch in the position that turns the MARK indicator off.
5. Move mark into view. If the new contrast reading has deviated from the initial reading by 4 to 5 bars or more, enough contrast exists for proper detection.

Foil Material

1. Position fiber optic light guide as follows:
   A – For a black or dark mark on shiny foil, position light guide to view material looking straight down (see Fig. 1).
   B – For white or light mark on shiny foil, position light guide to view material looking on a 45° angle (see Fig. 2).
2. Place mark in view of fiber optic light guide.
3. Adjust OFFSET as follows:
   A – For black or dark mark on shiny foil, adjust for a reading of 1 when the black mark is in view.
   B – For white or light mark on shiny foil, adjust for a reading of 10 when the white mark is in view.
4. Set light/dark switch in the position that turns the mark indicator ON when the mark is in view.
5. Move mark out of view. With the background in view, if the new contrast reading has deviated from the initial reading by 4 to 5 bars or more, enough contrast exists for proper detection.

Transparent Material

1. Position fiber optic light guide to view material looking straight down.
2. Place background (transparent area) in view of fiber optic light guide.
3. Adjust OFFSET or a reading of 9 or 10 on the contrast indicator.
4. Set light/dark switch in the position that turns the MARK indicator off.
5. Move the mark into view. If the new contrast reading has decreased or deviated from the initial reading by 6 to 8 bars or more, enough contrast exists for proper detection.

Hints and Tips:

1. False tripping or erratic operation is usually caused by excessive web flutter, wrinkles or variations in material back ground color or marks. Minor adjustments of the OFFSET can help to eliminate erratic operation.
2. If the surface of opaque (non-foil) material is extremely shiny, consider placing fiber optic light guide into the 45° angle position (see Fig. 2). The position that results in the maximum contrast deviation as displayed on the contrast indicator will give the most reliable performance.
3. A metal guide plate for the material to flow across provides several necessary advantages:
   A – Helps to iron out wrinkles.
   B – Helps to eliminate web flutter.
   C – Provides shiny background when sensing marks on transparent material.

Fig. 1 Straight Position

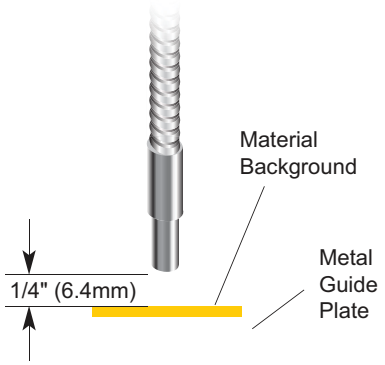
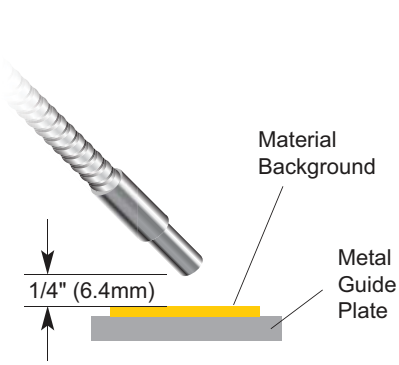


Fig. 2 45º Angle Position



Selection Guidelines

Preferred Mode: Fiber Optic Reflective (Proximity)

Based upon the characteristics of the web material, the printed mark and the sensing site conditions, the following guidelines will help to select the proper **SMARTEYE® COLORMARK™ II** to fit your sensing needs.
Sensor: Model CMSGL-1BF1 (with Pulse Stretcher) or Model CMSGL-2BF1 (w/o Pulse Stretcher). White Light Source.
Cable: Shielded cable w/connector. Right angle or straight mating connectors available.
Fiber Optic Light Guide: Model BF-A-36T (straight) or Model BF-A-36RT (right angle) as shown above. See Fiber Optic Light Guides section for availability in a wide variety of bundle sizes and shapes.
Sensing Range: From 1/4 to 3/8in. Optional lenses can be used to extend sensing ranges.
Accessories: Mounting Bracket: Model SEB-1

Alternate Mode (A): Convergent Beam V-Axis

Optional choice to detect printed registration marks on opaque or translucent packaging materials.
Sensor: Model CMSWL-1BV1G (with Pulse Stretcher) or Model CMSWL-2BV1G (w/o Pulse Stretcher). White light source.
Cable: Shielded cable w/connector. Right angle or straight mating connector available.
Sensing Range: 1in.
Accessories: Mounting Bracket: Model SEB-1

Alternate Mode (B): Fiber Optic Thru-Beam

Good choice to detect printed registration marks on transparent packaging material.
Sensor: Model CMSRL-1BF1 (with Pulse Stretcher) or Model CMSRL-2BF1 (w/o Pulse Stretcher). White light source.
Cable: Shielded cable w/connector. Right angle or straight mating connectors available.
Fiber Optic Light Guide: Model (2) F-A-36T (straight) or Model (2) F-A-36RT (right angle). See Fiber Optic Light Guides section for availability in a wide variety of bundle sizes and shapes.
Sensing Range: Recommended 2 to 3in.
Accessories: Mounting Bracket: Model SEB-1

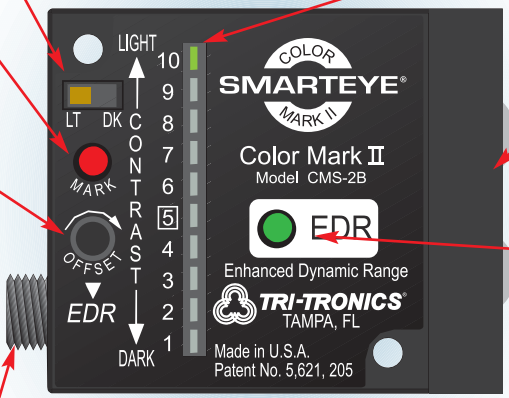
Features

LIGHT/DARK SWITCH
Light ON/Dark ON selector switch

OUTPUT INDICATOR
Illuminates when outputs are ON.

OFFSET/EDR KNOB ADJUSTMENT
Sets initial level in relation to switch point of 5 on CONTRAST INDICATOR – also functions as a sensitivity adjustment
Controls EDR® which functions to avoid glare effect

CONNECTION
M12 4-pin connector



10 LED CONTRAST INDICATOR
Provides at-a-glance analysis of the sensor's response to Light State vs Dark State sensing conditions.

INTERCHANGEABLE OPTICAL BLOCKS
Choice of two Optical Blocks: F1, V1G.

EDR INDICATOR
Intensity of GREEN LED provides indication of where in the dynamic operating range the offset, EDR® adjustment has been set.
- FULLY LIT: Operating near saturation
- OFF: Operating near maximum sensing range

How To Specify

1. Select sensor: **CMS**

2. Select light source required:
Blank = Green
R = Red
B = Blue
WL = White

2. Select Pulse Stretcher required:
-1B = 10ms Pulse Stretcher
-2B = No Pulse Stretcher
-2BT = with toggle switch

3. Select Optical Block based on mode of sensing required:

F1 = Fiber Optic
Range Proximity Mode:
1/4in to 3/8in (6.4mm - 9.5mm)

Range Opposed Mode:
1/2in to 3in (12.7mm - 76.2mm)

VIG= 1in V-Axis Glass Lens
Range: 1in (25.4mm)

Example: CMS WL -1B F1

COLORMARK™ II
Light Emitter
Pulse Stretcher
Optical Block

Hardware & Accessories

4-Wire Shielded MicroCable, M12

SEC-6
6ft (1.8m) cable

SEC-15
15ft (4.6m) cable

SEC-25
25ft (7.62m) cable

RSEC-6
6ft (1.8m) cable/right angle connector

RSEC-15
15ft (4.6m) cable/right angle connector

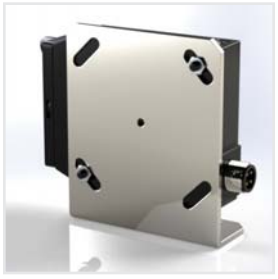
RSEC-25
25ft (7.6m) cable/right angle connector

4-Wire Extension Cable, M12

BX-10
10ft (3.1m) extension cable

BX-25
25ft (7.62m) extension cable

Mounting Brackets



SEB-1
Stainless L Bracket

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

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

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

Specifications

SUPPLY VOLTAGE
- 12 T0 24VDC
- Polarity Protected

CURRENT REQUIREMENTS
- 85mA (exclusive of load)

OUTPUT TRANSISTOR
- (1) NPN and (1) PNP output transistor
- NPN: Sink up to 150mA
- PNP: Source up to 150mA
- Momentary short circuit protected
- Output transistors turn ON when mark is in view.
- Anti-pulsing on power-up

RESPONSE TIME
- Minimum duration of input event:
- Light state response: 50 microseconds
- Dark state response: 140 microseconds
- Leading edge variation: less than 20 microseconds

HYSTERESIS
- Less than 400 millivolts for maximum sensitivity and resolution.

LED LIGHT SOURCE
- Choice of color:
  A. White - Broadband Spectrum (CMSWL)
  B. Green - 550nm (CMS)
  C. Blue - 480nm (CMSB)
  D. Red - 660nm (CMSR)

LIGHT IMMUNITY
- Pulse modulated to provide extremely high immunity to ambient light.

PULSE STRETCHER TIMER (Optional)
- Provides minimum of 10 milliseconds output duration.

OFFSET/EDR® CLUTCH KNOB ADJUSTMENT
- Sets initial level on Contrast Indicator in relation to mid-scale switch point of 5 – functions as sensitivity adjustment.
- Controls Enhanced Dynamic Range circuit (EDR®) which functions to avoid glare effect.

LIGHT/DARK SWITCH
- Dark position for dark mark; Light position for light mark.

INDICATORS
- OUTPUT INDICATOR - Red LED illuminates when output transistors are ON.
- EDR INDICATOR – Intensity of Green LED provides indication of where in the dynamic operating range the offset / EDR adjustment has been set.
  FULLY LIT: Operating near saturation
  OFF: Operating near maximum sensing range
- CONTRAST INDICATOR –Displays returned contrasting light levels (background vs. mark).

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
- Epoxy encapsulated for mechanical strength

RoHS Compliant
Product subject to change without notice

Connections and Dimensions — SMARTEYE® COLORMARK™II