TRI-TRONICS®

Smart Sensing Solutions Since 1954

SMARTEYE® SMARTDOT® LASER SENSOR

Precision Laser Sensor

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Precision Laser Sensor

The *SMARTEYE®* **SmartDot Laser** Sensor uses a laser beam to maintain a focused visible light spot on the object or feature to be sensed. The SmartDot is easily aligned, easily setup, and designed for repeatability of performance from sensor to sensor.

The intuitive graphic OLED display provides all necessary information and visual confirmation of sensing stability giving the user confidence as to the long-term performance of the sensor. The consistently small laser beam is used to detect such things as a tab on a battery, a misaligned or missing bottle cap, or a cross-threaded can lid.

The SmartDot is useful not only in general purpose applications such as a product detector for vision systems, and simple inspection applications but also for high precision applications for small parts detection, critical identifying feature inspection, and detection of micro electronic packages.

Features
- OLED graphic display
- 180° rotating connector
- NPN and PNP outputs
- M12, 5 pin connector, or cable
- 240μs response time
- Threshold and set-point numeric graphic
- Timers; on-delay, off-delay, one-shot
- Sensor scope diagnostics
- Built-in digital instructions

Benefits
- Easily align replacement sensors
- See through tight spaces at long distances
- Easy setup
- Low maintenance
- Confident setup
- Robust and durable
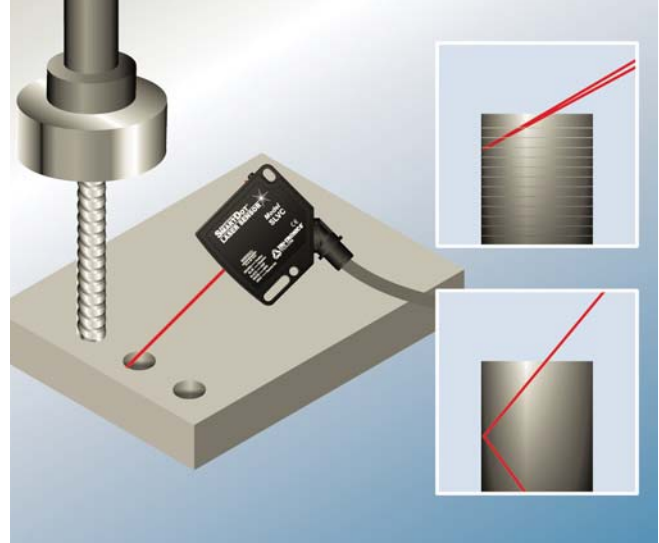- High-Speed
- Accurate
- Repeatable

Applications
- Edge Detection - Packaging, Wafers, etc.
- Shaft Key Orientation
- Small Parts Detection
- Container Cap Alignment
- Vision System Trigger
- Metal Thread Detection on Machined Parts
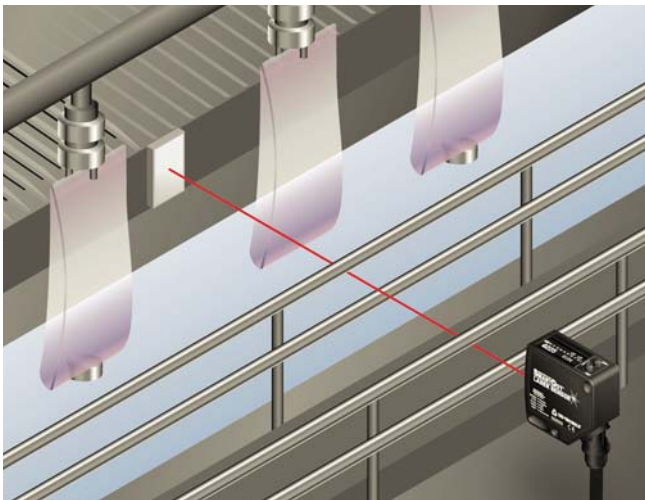- Small Hole Detection at up to 18 Inches

Applications

SMARTEYE® SMARTDOT® LASER SENSOR
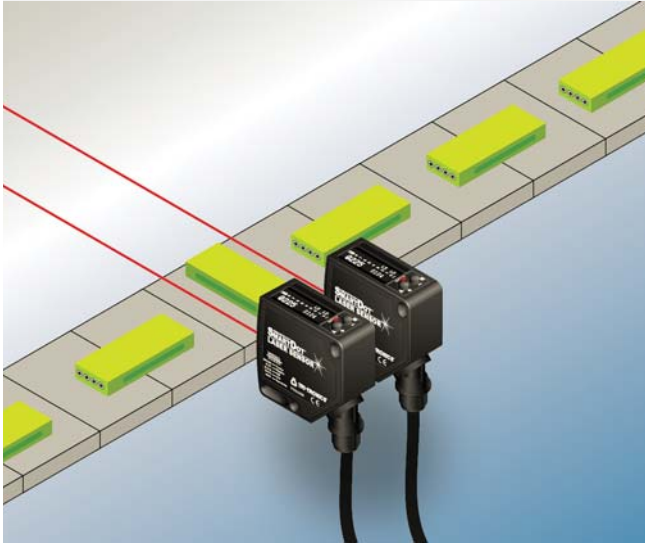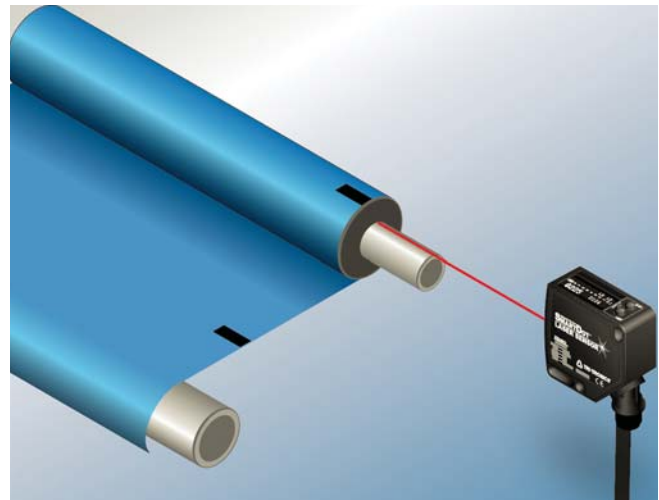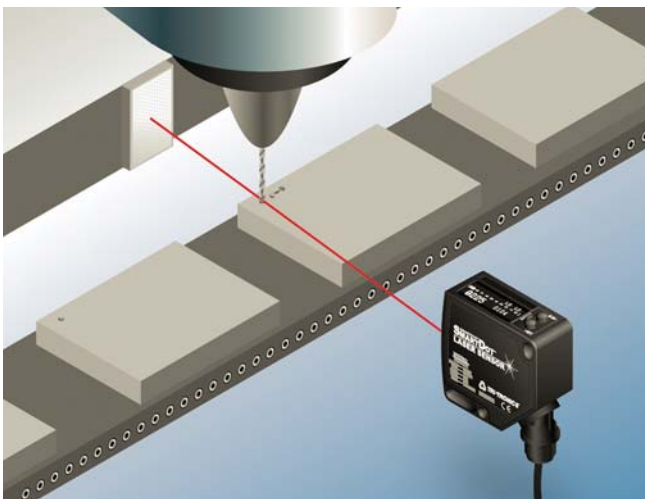

Product Orientation

Thread Verification/Inspection

Missing Cap Inspection

End of Roll Sensing

Broken Drill Bit

Small Part Orientation Verification/Inspection

Menu Options

AUTOSET

| Autoset Mode:
Light State (LS) | The Light State AUTOSET **(LS)** is normally used in Proximity, through-beam, and retrorelfective sensing modes. In Proximity mode, the AUTOSET is initiated when the target is in view. In Through-beam or Retroreflective mode, the AUTOSET is initiated with the target out of view. |

| Autoset Mode:
Dark State (DS) | The Dark State AUTOSET **(DS)** is normally used for long range sensing in Proximity mode. Helpful for suppressing the background when shiny objects or structures are in view behind the target. |

| Autoset Mode:
Two Point (2P) | Two-Point AUTOSET **(2P)** is used when there is a smaller amount of contrast between the target and background, and determining which mode to set up on is difficult to discern. This mode is also helpful if spanning equally beyond the threshold is required. |

| Autoset Mode:
Dynamic (DN) | Dynamic AUTOSET **(DN)** is used when the target is not easily accessible during setup, and jogging the part past the sensor is required. Only one or two passes is sufficient for a robust and repeatable setup. |

Output

| Oupput Mode:
Light On(Lo) | The **Light On** selection provides a leading edge output for Proximity sensing, and a trailing edge output for through-beam and retroreflective sensing. |

| Oupput Mode:
Dark On(DO) | The **Dark On** output option provides for a trailing edge on proximity sensing and a leading edge on through-beam and retroreflective sensing. |

Timer Mode

| Timer Mode:
Enabled | Timers allow for many different output conditioning considerations: ensuring outputs are on long enough; ignoring blips, or small optical disturbances; or stabilizing the output signal when input signals are erratic. |

| Timer Mode:
Off Delay(o) | Timer Mode:
On Delay | Timer Mode:
One Shot | Timer Mode:
Debounce |
|---|---|---|---|
| **Off Delay** timers are most useful as a pulse stretcher. adding the selected time to the duration of the input signal. | **On Delay** timers are most useful in ignoring shorter inputs between targets. | **One Shots** are useful for ignoring different sizes and shapes of targets, and keeps the output timing consistent. | **Debounce** is useful for targets that may vibrate on the leading or trailing edge of the beam. |

Display Orientation

| Toggle Display
Orientation | Helps the user view the display more easily. |

Toggle Display
Orientation

Advanced Options:

| Advanced
Options... | The ability to change the output to either NPN or PNP provides for flexibility in input devices. |

Input Mode:

| Input Mode
NPN / Sink | Input Mode provides flexibility for interfacing with different types of controllers. |

Input Mode
PNP / Source

Button Lockout 🔒

| Button Lockout:
Off | The button lockout feature provides a way for production engineers and maintenance personnel to ensure the sensor maintains proper setup, and prevents tampering or improper adjustment. |

Button Lockout:
On (🔒)

Quick Reference

| Quick Reference
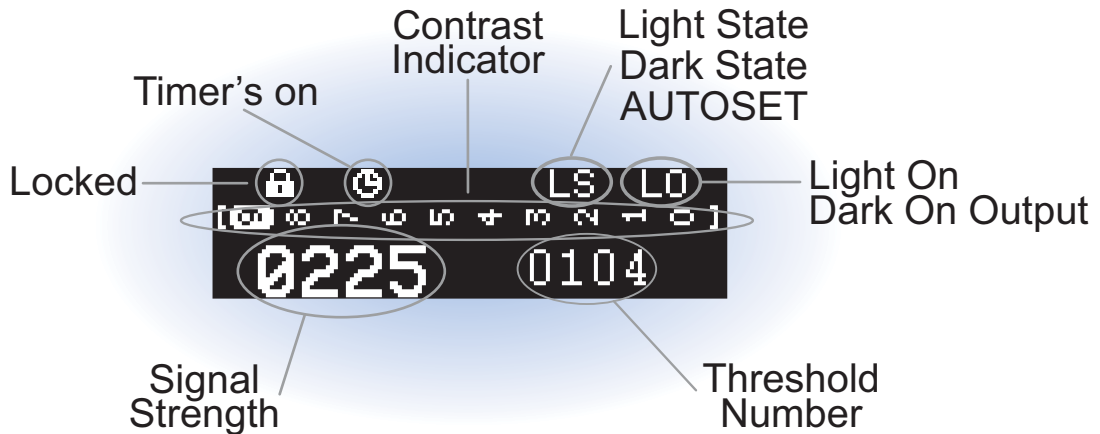Tap A: Scroll Text | Reference for ajustments quickly. |

Sensor Scope

Allows the operator to visually inspect the current setup for repeatability.

OLED Alpha/Numeric Display

SMARTEYE® SMARTDOT®
LASER SENSOR

The **OLED Alpha/Numeric** display provides all the information a line operator needs for maximum up time. There is a 10 segment Contrast Indicator for viewing dynamic signal strength and sensor performance; a set-point number and signal strength number for static viewing of the long-term contrast attributes; symbols to indicate the sensing mode, output mode, timer status, and button lockout status. This display also provides visual aid when configuring the sensor specifically for any application requirement. With this unique OLED display, the user may also view the Sensor Scope in order to confirm the long-term robustness of the application contrast. This feature ensures that the production line will not have to be constantly monitored for consistent production throughput.

Remote Programming

The SmartDot sensor can be configured and adjusted from the Remote AUTOSET line. This is accomplished by sending a simple sequence of 0VDC pulses. For example: Output Mode: Light On
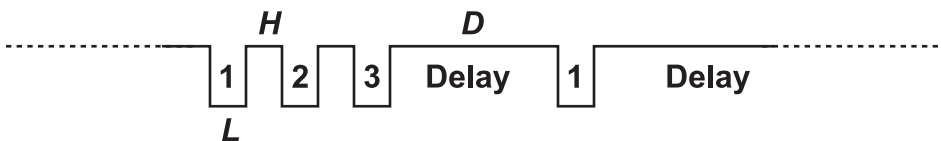
Each pulse (L) is low for 40ms to 400ms. The idle time (H) between pulses is 40ms to 400ms. The delay (D) between sets of pulses is .75 seconds to 5 seconds.
NOTE: Default remote input is NPN. See Advanced Options for change to PNP input.

Standard AUTOSET
Hold the Remote AUTOSET line low for at least .75 seconds.

Option/Command	Setting	Pulse Sequence	Notes
Threshold Adjust	Tap UP	1 - 1 - #	# is the number of adjustments from 1 to 8
	Tap DOWN	1 - 2 - #	
AUTOSET Mode	Light State	2 - 1	*Note:* Changes the AUTOSET mode used by the next AUTOSET
	Dark State	2 - 2	
	Two-Point	2 - 3	
	Dynamic	2 - 4	
Output Mode	Light On	3 - 1	Leading Edge/Trailing Edge Detection
	Dark On	3 - 2	

Press Menu for Detailed Setup

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LASER SENSOR

1 AUTOSET
Tap **A** to move through screens; tap **M** for next option.

`Autoset Mode:`
`Light State (LS)`

Light State (LS): push and hold A button for light state AUTOSET. Light state is most useful for leading edge triggering, and fastest ON time in proximity sensing.

`Autoset Mode:`
`Dark State (DS)`

Dark State (DS): push and hold A button for dark state AUTOSET. Dark state is most useful for trailing edge triggering, and maximum range settings in proximity sensing modes.

`Autoset Mode:`
`Two Point (2P)`

Two-Point (2P): Push and hold A button for two-point AUTOSET. Release A button for first point AUTOSET. Push and release A button for second point AUTOSET. Two-Point is most useful for spanning between two contrast levels that may not have a great amount of difference. Low contrast applications work best using this AUTOSET mode.

`Autoset Mode:`
`Dynamic (DN)`

Dynamic (DN): Push and hold A button while passing target in and out of beam, then release A button. Dynamic is most useful when automatic set up is necessary due to mechanical constraints.

2 Output
Tap **A** to toggle; tap **M** for next option.

`Oupput Mode:`
`Light On(Lo)`

LIght On - Output turns on when received light level exceeds threshold.

`Oupput Mode:`
`Dark On(DO)`

Dark On - Output turns on when received light level drops below threshold.

3 Timer Mode
Tap **A** to move through screens; tap **M** for next option.

`Timer Mode:`
`Enabled`

To set timer duration, tap **A** button to scroll through 1-9, tap **M** button to move through 1000, 100, 10, 1 place holders. Then tap **M** button to complete selection.
Note: Timer must be enabled to have available options displayed.

`Timer Mode:` `Off Delay(o)`	`Timer Mode:` `On Delay`	`Timer Mode:` `One Shot`	`Timer Mode:` `Debounce`
Off Delay: outputs stay on for set time after duration of input.	**On Delay**: outputs turn on when input exceeds set time.	**One Shot**: outputs turn on for set time when triggered by input.	**Debounce**: outputs are stabilized and held in current state for duration of time setting.

4 Display Orientation
Tap **A** to toggle; tap **M** for next option.

`Toggle Display`
`Orientation`

Tap **A** button to Toggle Orientation. Useful for left or right hand visibility.

`Toggle Display`
`Orientation` (inverted)

5 Advanced Options:

`Advanced`
`Options...`

Tap **A** button to select Advanced Options. Provides for NPN or PNP remote AUTOSET input.

6 Input Mode:

`Input Mode`
`NPN / Sink`

Tap **A** button to change from NPN to PNP Input. Choose NPN if output device in sinking (0VDC); Choose PNP if output device is Sourcing (10-30VDC).

`Input Mode`
`PNP / Source`

7 Button Lockout 🔒

`Button Lockout:`
`Off`

Tap **A** button to select Button Lockout. The Button Lockout prevents tampering with AUTOSET and displays sensor locked should AUTOSET be attempted.

`Button Lockout:`
`On (🔒)`

To UNLOCK, press and hold M for two seconds to enter new options mode. Tap M to scroll through to Button Lockout and tap A to unlock.

8 Quick Reference

`Quick Reference`
`Tap A: Scroll Text`

Tap **A** to scroll through Quick Reference.

9 Sensor Scope

The sensor scope will reveal any nominal setup issues or sensitivities to changes in background or target. Momentarily press the **minus (–)** button to shorten the time between signals. Momentarily press the **plus (+)** button to lengthen the time between signals.
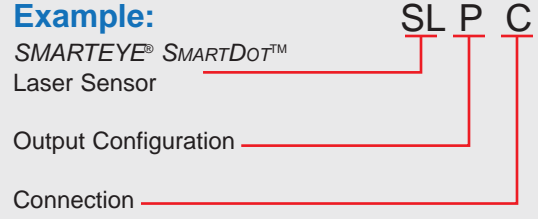
How to Specify

SMARTEYE® SMARTDOT® LASER SENSOR

1. Select Sensor:
SMARTEYE® SMARTDOT™
Laser Sensor

2. Select Output Configuration:
V = Short Range
P = Long Range
R = Retroreflective
(Includes AR51 Reflector)

3. Select Cable:
Blank = 6 foot Cable (1.8m)
C = 6 inch (152mm)
  M12 5-Pin Connector

Example: SL P C
SMARTEYE® SMARTDOT™
Laser Sensor

Output Configuration

Connection

OLED Alpha/Numeric Display Visual Confirmation of Proper Sensor Performance

OUTPUT INDICATOR
Red LED illuminates when outputs are ON; flashes when short circuit or overload detected.

AUTOSET
1. Press and hold for two seconds to initiate AUTOSET.
2. When in menu, momentarily tap to make changes to menu options.
3. When in normal operation, momentarily tap to adjust threshold up **(+)**.

OLED NUMERICAL DISPLAY
1. 1 to 10 bar contrast indicator.
2. Numerical display provides visual feedback of threshold settings and signal strength feedback.
3. Displays button lockout, AUTOSET mode, timers on/off, and output mode.

MENU BUTTON
1. Push and hold for two seconds to enter menu options mode.
2. When in menu options mode, tap to scroll through available options.
3. When in normal operation, momentarily tap to adjust threshold down **(-)**.
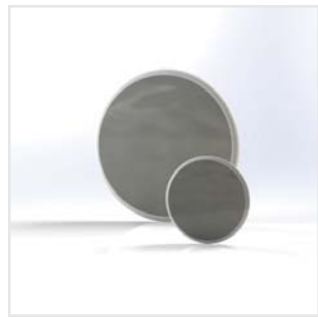

Accessories

GSEC-6
6ft (1.83m) shielded cable
GSEC-15
15ft (4.57m) shielded cable
GSEC-25
25ft (7.62m) shielded cable

AR51
Laser reflector 51mm

PRD1
Round press-on reflector Ø1in (Ø 25mm)

PRD2
Ø2in (50mm)

SLB-1
Stainless steel mounting bracket

Specifications

SUPPLY VOLTAGE:
• 10 to 30VDC
• Polarity protected
  Note: For use in Class 2 circuits

CURRENT REQUIREMENTS:
• 35 milliamps max. at 24VD

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

REMOTE AUTOSET INPUT:
Selectable: Advanced Options
• NPN Input, connect to 0VDC
• PNP Input, connect to 10-30VDC

RESPONSE TIME:
• Light state response = 240
  microseconds
• Dark state response = 240
  microseconds

LASER LIGHT EXPECTANCY:
• 50,000 hours @ 25ºC

LIGHT SOURCE:
• Red laser: class 1 or II
• EN 60825-1 (2003)

SPOT SIZE:
• Short range: .05in X .03in @ 6in
• Long range: .07in X .05in @ 18in
• Retroreflective: .1in X .1in @ 5ft

PUSH-BUTTON CONTROL:
• Two push-buttons

AMBIENT TEMPERATURE:
• -40ºC to 70ºC (-40ºF to 158ºF)

RUGGED CONSTRUCTION:
• Chemical resistant high impact
  ABS plastic housing
• Waterproof rating: IP68
• Conforms to heavy industry
  grade CE requirements.
• RoHS Compliant

DIMENSIONS:
• Width: 2.037in (51.73mm)
• Height: 2.005in (50.9mm)
• Depth: .812in (20.6mm)

FOCAL DISTANCE:
• Short range proximity: 6in (152mm)
• Long range proximity: 18in(456mm)
• Retroreflective: 5ft (1.520m)

*Note: Ranges are determined by
optimal beam spot focus. Increased
ranges are possible, but are application
specific and can not be adequately
specified herein.*

RoHS Compliant
Product subject to change without notice.

Connections and Dimensions

SMARTEYE® SMARTDOT™

SLB-1

Slot Width:
.173"
(4.4mm)

0.625"
(15.9 mm)

2.621"
(66.6 mm)

10°

1.575"
(40 mm)

2.362"
(60 mm)

7.87"
(20 mm)

Accessory:
AR51   High Performance Laser Reflector 51mm

WIRING

Red
Brown* (1) — Pos

White
White* (2) — NPN (Sink) — LOAD

Green
Black* (4) — PNP (Source)

Black
Blue* (3) — Neg — LOAD

Blue
Gray* (5) — Remote Autoset — (1)

10 To 30 VDC

(1) - NPN (SINKING) INPUT ACTIVATED BY CONNECTING TO NEGATIVE
      PNP (SOURCING) INPUT ACTIVATED BY CONNECTING TO POSITIVE

M12 Male Connector

1 - Positive
2 - NPN
3 - Negative
4 - PNP
5 - Remote Autoset

* - Sensors with connectors

CONNECTOR MODEL
5-PIN, M12, MALE
180° SWIVEL FOR
BOTTOM OR REAR
CONNECTOR
EXIT

CABLED MODEL
6' (1.83m), 5-CONDUCTOR,
26 AWG, SHIELDED

Model SLVC