

ELECTRICAL COMPONENTS

LABEL SENSOR INFORMATION

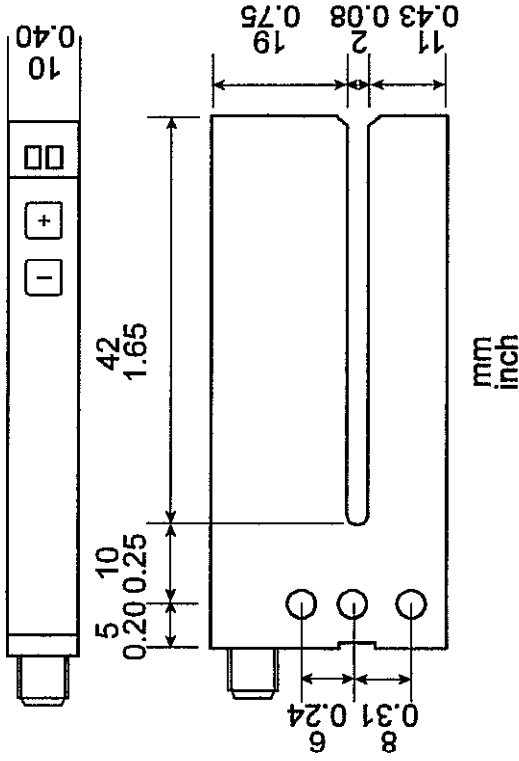
As a standard, we offer three types of label sensors.

- In most cases, the Lions Eye works fine to sense opaque labels. The sensor includes a teach feature that allows it to learn most labels. In some cases, manual sensitivity adjustment may be required.
- For the sensing of most clear labels we offer the optional Lions LRD2100 Clear Label Sensor. As this sensor is an analog type the set-up is done through adjustment pots. Normally used with a clear label on a clear liner.
- For sensing clear labels we also use the Banner SLC1 Clear Label Sensor. However, as it is a self-teach sensor, there are some clear labels it does not work well with. Normally used for sensing clear labels on an opaque liner.

Due to different label types some of our machines are supplied with both an opaque label sensor and a clear label sensor. Both the Lions Clear Label Sensor and the Banner Clear Label Sensor are larger than the Lions Eye Opaque Label Sensor. Also, the sensing area of the Lions Eye Opaque Label Sensor is near the end of the sensor. The sensing area on the two clear label sensors is closer to the center of the sensor. This requires the mount of the sensor to be moved left to right (across the web) when changing sensor types. All sensors are marked showing the location of their sensing element.

Please find cut sheets and set-up information on all three (3) sensors mentioned above attached. This allows us to offer one (1) standard manual regardless of label sensor type used.

Mechanical Detail



User Guide
for the
LionEye₂ Label Sensor
from
Lion Precision

TWO YEAR WARRANTY

AUTOMATED QUALITY TECHNOLOGIES INC., and its division LION PRECISION warrants to the Purchaser that the LRD Product will be free from defects in material and workmanship and will be in conformance with the Purchaser's specifications when such specifications are accepted by specific contract. The foregoing warranty is exclusive and in lieu of all other warranties whether written, oral, or implied (including any warranty of fitness for purpose). If it appears within two years from the date of shipment by the Corporation that the equipment as delivered does not meet the warranties specified above and the Purchaser so notifies the Corporation promptly, the Corporation shall correct any defect, including non-conformance with the specifications, at its option, either by repairing any defective part(s), or by making available at the Corporation's plant, a replacement or required part.

The above warranty is null and void if the equipment is used or serviced in a manner that does not conform to the ratings and specifications as defined by the Corporation or if the equipment has been damaged or altered. The foregoing shall constitute the sole remedy of the Purchaser and the sole liability of AUTOMATED QUALITY TECHNOLOGIES, INC.

LION
PRECISION

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Document Number: M015-3775.001

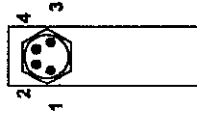
Description

The Lion Precision LionEye2 is an inexpensive optical sensor for the detection and registration of label edges and splices. The sensor output signal indicates the leading or trailing edge of the label as it passes through the sensor.

Connecting to the Sensor

Pin	Color	Connection
1	Brown	10-30VDC
2	White	NPN Output (Current Sinking), 100mA, 0.2µf max load
3	Blue	Ground (0VDC)
4	Black	PNP Output (Current Sourcing) 100mA, 0.2µf max load

MB Connector Pins



Specifications

Power supply	Voltage	10 - 30 VDC
	Residual Ripple	10% (must remain within 10-30 VDC)
Response time	Current	40mA
	on or off	50µs max
	Switching Frequency	10kHz max
Output	Output Current (sinking or sourcing)	100mA max
	Switching output	NPN (white), PNP (black)
	Output voltage drop at 100 mA	2 V
	Output voltage drop at 10 mA	1 V
Emitter	LED (continuous)	Infrared
Temperature	Operating Range	-4°F to +140°F (-20°C to 60°C)
External Light Immunity	Artificial Light	5,000 Lux
	Daylight	10,000 Lux
Protections	Supply	Inverse Polarity Protection
	Switching output	Short Circuit and Overload Protection
	Degree of Protection	IP 65

Important Indications:

Red LED on steady: Sensor Setup Locked

Yellow LED is on when outputs are activated/on

Teach Mode Setup Procedure:

- Place web only in sensor (remove a label, or carefully center a gap in the sensor).
Press [+] and [-] at the same time for less than one second.
The red LED will begin to flash.
- Place a label in the sensor.
Press [-] for less than one second.
The red LED stops flashing.
- Automatic setup is complete (steps 1 and 2 can be reversed).

Manual Adjustments of Sensitivity:

The "Teach" mode setup should always be successful. However, the sensitivity of the sensor can be adjusted manually by pressing the [+] or [-] buttons. The red LED will flash with each button press.

Locking/Unlocking the Setup

Press and hold the [+] and [-] for three seconds (but less than six seconds). The red LED will change state. When the buttons are released, the red LED will then indicate locked (red LED on) or unlocked (red LED off).

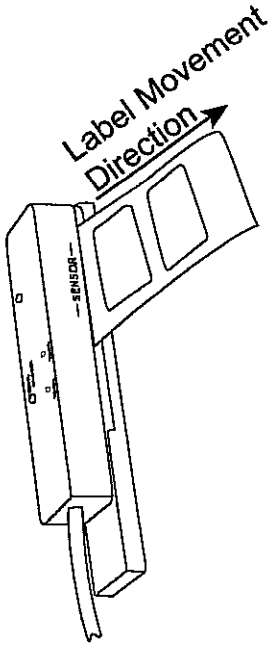
Light/Dark Switching

Press and hold the [+] and [-] for six seconds. When the mode is changed, the red LED will begin to flash slowly until the buttons are released.

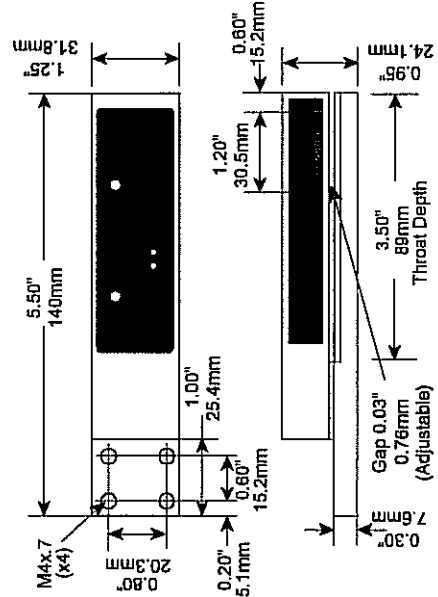
**SET-UP SHEET
FOR
CLEAR LABEL SENSOR**

Output and Mechanical Detail

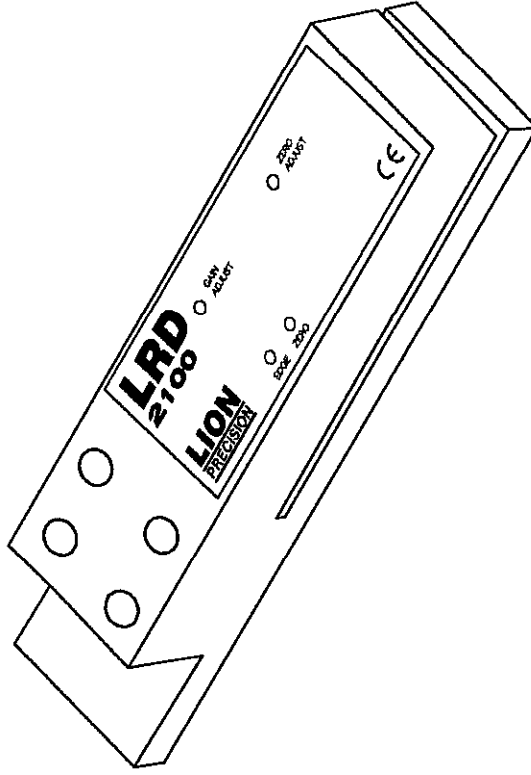
Output polarity is affected by the direction of label movement. Waveforms below are for direction indicated in the drawing below. Waveforms invert if direction is reversed.



Output	Brown Wire
NPN	Ground
NPN	+Vin
PNP	Ground
PNP	+Vin



User's Guide
for the
LRD2100 Label Sensor
from
Lion Precision



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Document Number: M014-4660.022



Description

The LION PRECISION LRD2100 is an electronic, capacitive sensor used to monitor label registration and/or count labels. The sensor's NPN and PNP outputs indicate the leading or trailing edge of the label as it passes through the sensor.

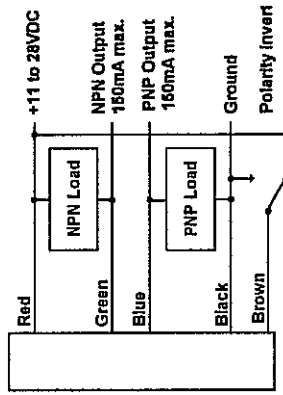
Use LRD6110 or UltraLRD V2 for metallic labels, metallic inks, or hot stamp.

Connecting to the Sensor

Warnings:

- Sensor body is connected to Ground.
- Unused wires must be insulated from contact with other objects.
- All power must be off when installing the sensor.
- Brown wire must be connected to +V or Ground for reliable operation.

Wire Color	Connection	Notes
Red	+Vin (11-28VDC)	50mA max.
Black	Ground	Connected to sensor body
Green	NPN Output	150mA max.
Blue	PNP Output	150mA max.
Brown	Output Polarity (light/dark switching)	+V or Ground See detail on back



Warning: Brown wire must be connected to +V or Ground for reliable operation.

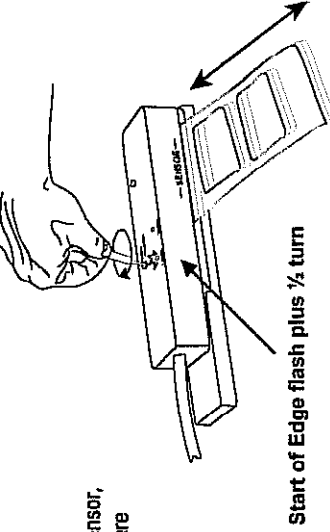
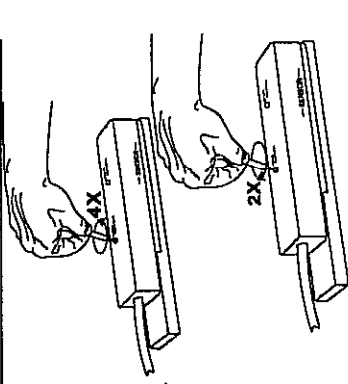
Specifications

Power supply	Voltage	11-28 VDC (reverse polarity protected)
	Current	50mA
Response time	on or off	20µs max
	Switching Frequency	10kHz max
Output	Output Current (sinking or sourcing)	150mA max (overload protected)
	Switching output	PNP (sourcing) or NPN (sinking), Dark or light switching
Temperature	Operating Flange	40°F to 140°F (4°C to 60°C)
Protections	Supply	Inverse Polarity Protection
	Switching output	Short Circuit and Overload Protection

Setup Procedure

These sensors are extremely stable and should not require re-adjustment after the initial setup. Re-adjustment will only be required for significant changes in label shape or thickness, or changes in power supply voltage.

- Remove all material from sensor.
- Center GAIN ADJUST**
Turn GAIN ADJUST four (4) turns counter clockwise.
Turn GAIN ADJUST two (2) turns clockwise.
- Set ZERO ADJUST**
Set ZERO ADJUST to the point where the ZERO light just begins to come on. It is not important whether the light is on or off. What is important is that the light is very near the point where it changes from off to on.



- Set GAIN ADJUST**
Insert material into sensor.
While moving labels through the sensor, Set GAIN ADJUST to the point where the EDGE light starts to flash. Then continue turning 1/2 turn clockwise.
- Sensor is now ready.

Lights During Operation:

The Edge light indicates the sensor output. It will be in one state (on or off) during the label and the other state during the gap. Whether it is on or off during a label depends on the direction of the label movement and the connection of the Polarity Invert wire.

The Zero light is for setup only and is meaningless during operation.

Notes:

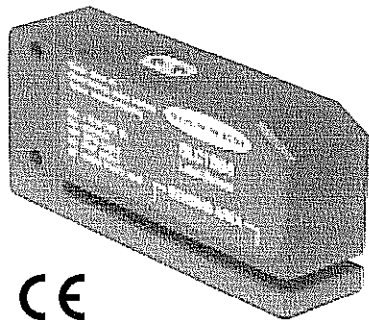
- For best results, web should ride against sensor baseplate, not "float" in the gap.
- Some inks, usually black, have a high carbon content. These inks behave like metal and may not work reliably with the LRD2100. Use the LRD6110 instead.



C-GAGE™ SLC1 Series Label Sensor

Featuring Adaptive Digital Logic (ADL™)

SLC1 Series Features



- No user adjustments – Adaptive Digital Logic (ADL™)[†] provides revolutionary self-learning capability.
- Continuous automatic internal adjustment of sensing threshold and drift compensation.
- Registration accuracy of ± 0.3 mm (0.012") typical at web speeds up to 1.5 m per second (5' per second)
- Reliably detects the presence of most types of labels on web backing
 - Clear labels on an opaque backing
 - Clear labels on a clear backing
 - Opaque labels on an opaque backing
 - Opaque labels on a clear backing
- Perfect for label-registering applications, and also for label-counting tasks in slitting or rewinding applications.
- Heavy-duty metal housing, 1 mm (0.04") slot

[†] Patent Pending



SLC1 Series Models

Model Number	Supply Voltage	Cable	Output Type	User Adjustments
SLC1BB6	10 to 30V dc	5-wire 2 m (6.5')	Bipolar (NPN and PNP)	None Required
SLC1BB6Q		5-pin Euro-style (QD)		

* 9 m (30') cables are available by adding suffix "W/30" to the model number of the cabled version (e.g., **SLC1BB6 W/30**). A model with a QD connector requires an accessory mating cable; see page 6.

SLC1 Series Description

The SLC1 Series Label Sensor was developed to provide trouble-free detection of labels on web backing material. It reliably senses the difference between materials of extremely low visual contrast, including clear labels on clear or opaque backing. The SLC1 uses Banner's exclusive Adaptive Digital Logic (ADL™) to automatically make all sensor settings; no user adjustments are necessary.

NOTE: Labels with metallic inks, foil embossing or metal substrates are not recommended for use with SLC1 Series sensors.

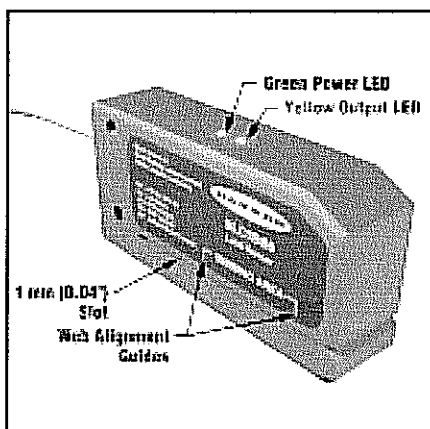


Figure 1. SLC1 Label Sensor features

SLC1 Series Label Sensor

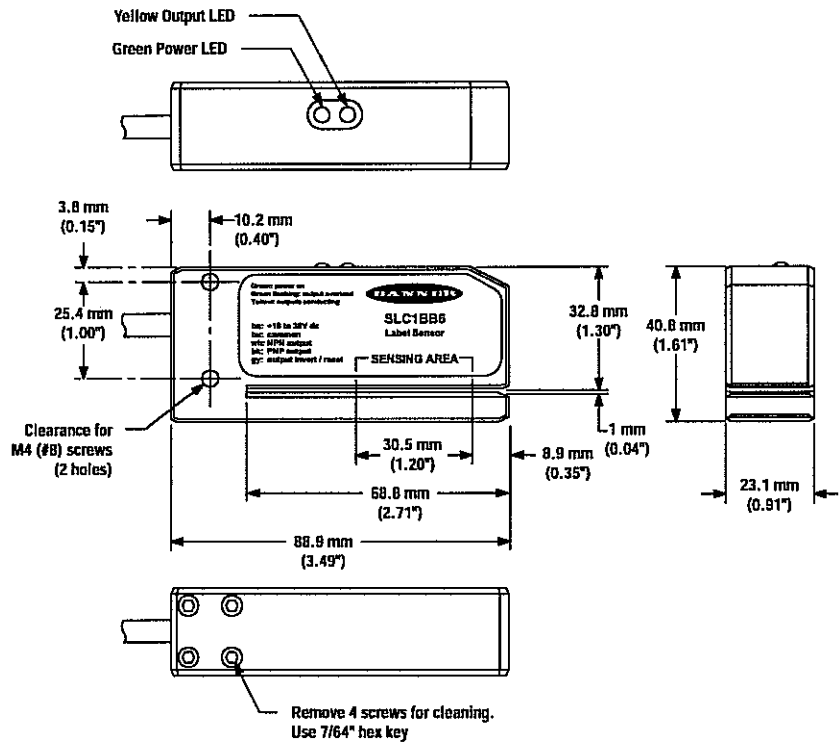
SLC1 Series Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple) @ less than 60 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Power-Up or Reset Delay	1 second typical (outputs are non-conducting during this time)
Output Configuration	Bipolar: one current-sourcing (PNP) and one current-sinking (NPN) open-collector transistor
Output Rating	150 mA max. (each output) OFF-state leakage current: < 5 microamps @ 30V dc Output saturation voltage: < 1V @ 10 milliamps dc; < 1.6V @ 150 milliamps dc
Output Protection	Protected against continuous overload and short-circuit of outputs Overload trip point: > 200 milliamps, typical, at 20°C
Output Invert Control/Reset	Gray wire has dual functionality, and may be controlled by a PLC Input impedance: 10 K Ω Outputs ON during gap (turn OFF at leading edge of label): leave open, or connect to 0 to +1V dc Outputs ON during label (turn ON at leading edge of label): connect to +5 to 30V dc Microprocessor reset: toggle gray wire to opposite polarity for > 100 milliseconds (see Hookups, page 3)
Registration Accuracy*	± 0.3 mm (0.012") typical, at web speeds up to 1.5 m per second (5' per second)
Maximum Counting Speed*	Web speed of 10 m per second (33' per second).
Minimum Sensing Speed*	Web speed of 100 mm per minute (4" per minute)
Response Time*	100 μ s
Maximum Switching Speed*	1 kHz
Minimum Gap or Label Size	2 mm (0.080")
Adjustments	No user adjustments; automatic continuous adjustment of sensing threshold and drift compensation under internal microprocessor control Adjustment interval: every 250 milliseconds or 4 labels, whichever is greater
Indicators	Two LEDs, green and yellow: Green ON steadily: power to sensor is ON Green flashing @ 4 Hz: output is overloaded Yellow ON steadily: NPN and PNP outputs are ON Green and Yellow flashing alternately @ 1 Hz: internal error; reset sensor
Construction	Housings are machined aluminum with black anodized finish
Environmental Rating	IP67, NEMA 6
Connections	2 m (6.5') or 9 m (30") 5-wire attached cable, or 5-pin Euro-style quick-disconnect fitting; cables for QD models are purchased separately, see page 6.
Operating Conditions	Temperature: +5° to 50°C (+41° to 122°F) Maximum relative humidity: 90% at 50°C, non-condensing
Certifications	CE Approval Expected: UL

*Based on 3.2 mm (0.125") gap between labels. Instantaneous web speed, not average web speed, must be used to determine actual operating speeds in stepped-advance label systems.

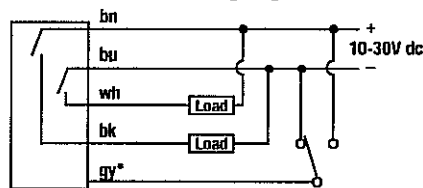
SLC1 Series Label Sensor

SLC1 Series Dimensions

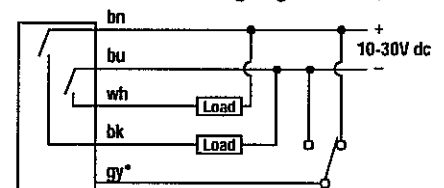


SLC1 Series Hookups

Outputs ON during gap
(Turn OFF at leading edge of label)



Outputs ON during label
(Turn ON at leading edge of label)



*Toggle to opposite polarity for > 100 milliseconds to reset microprocessor

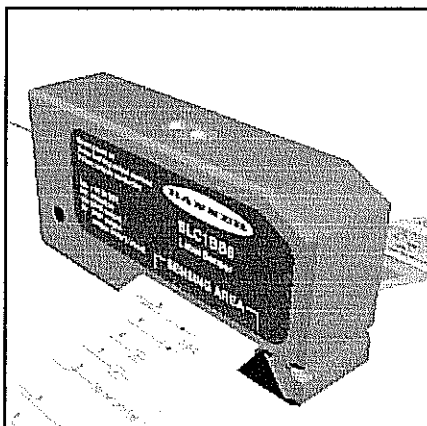


Figure 2. Allowing the web to glide over the bottom fork with slight tension lessens the effects of web flutter

SLC1 Series Installation

Mount directly and securely to a firm surface using M4 (#8) hardware (bolts not included). See dimensions for mounting hole locations. To lessen the effects of web flutter, position the bottom fork of the sensor slightly above the web's path so that the web can glide over the bottom fork with slight tension (see Figure 2).

For the most reliable operation, take steps to eliminate static electricity near the SLC1 Label Sensor.

SLC1 Series Label Sensor

SLC1 Series Operation

The SLC1 Series is completely self-teaching and needs no programming; there are no adjustments to set. Simply align the label web in the slot, between the guides, and allow the labels to run through the sensor. After the passing of four successive labels or 250 milliseconds (whichever is greater), the SLC1 will learn the characteristics of the labels, and adjust for the proper sensing threshold and drift compensation.

For best self-programming results, turn power to the sensor ON or perform a reset after the web has been positioned in the slot. Align the labels within the web alignment guides on the side of the sensor slot, as completely as possible.

For best repeatability, position the label to cover the entire sensing area (between the sensor's web alignment guides, as shown in Figure 2). Some label configurations are sensed with greater repeatability than others; the sensor performs best when there is an abrupt change between labels (see Figure 3). For example, labels with sharply defined edges that are perpendicular to the web direction and that have larger gaps between labels are sensed most easily. Tiny gaps between labels and labels whose shape tapers at the leading and trailing edges are more difficult to sense.

If sensing a label with a shape like that shown in Figure 4, best repeatability will result if the most perpendicular edge of the label is aligned fully within the sensing area.

Reset Procedure

Resets are performed at startup, when changing label types, or in response to an internal error indication.

To reset, simply turn the power to the SLC1 ON or cycle the power OFF for 1 second or longer and ON again.

The SLC1 may also be reset using the sensor's gray wire. To do so, toggle the gray wire to the opposite polarity for >100 ms. Again, the sensor will automatically adjust to the current sensing conditions after the passing of four labels or 250 ms, whichever is greater.

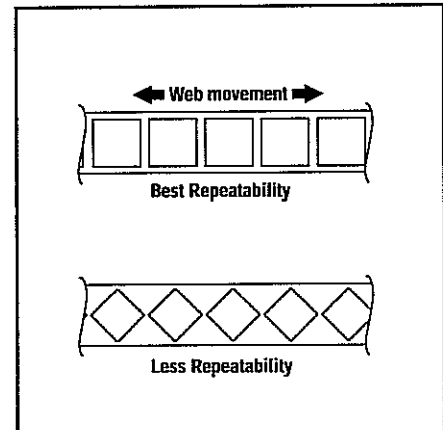


Figure 3. SLC1 Label Sensor preferred sensing configurations

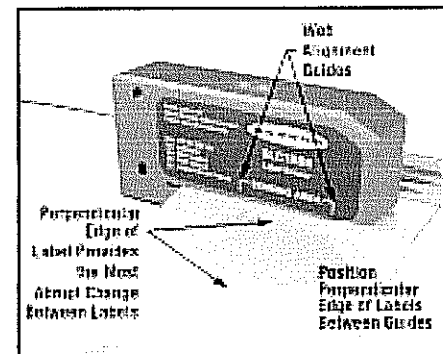


Figure 4. For best repeatability, align the labels' flat sides between the sensor's web alignment guides

SLC1 Series Label Sensor

Troubleshooting

The SLC1 Series sensor has two LEDs, green and yellow:

Green ON steadily:	Power to sensor is ON
Green flashing @ 4 Hz:	Output is overloaded
Yellow ON steadily:	NPN and PNP outputs are ON
Green and Yellow flashing alternately @ 1 Hz:	Internal error; reset sensor

Internal errors are caused by several factors:

- Moisture in the sensing slot
- Extreme and prolonged web flutter
- Label jams (labels touching both the top and the bottom sensor forks)

If an internal error occurs, correct its cause and perform a reset (cycle the sensor power OFF for at least 1 second and ON again or toggle the gray wire to the opposite polarity for >100 milliseconds).

Maintenance

The SLC1 Series sensor may be disassembled for periodic cleaning, as needed. Use a 7/64" hex key to remove the four screws at the bottom and remove the bottom fork for cleaning. Clean the fork surfaces with a mild solvent, such as isopropyl alcohol, taking care to avoid the clear indicator light window.

Repairs

NOTE: Do not attempt any repairs to the SLC1 Series sensor. It contains no field-replaceable components. Return the sensor to the factory for warranty repair or replacement, as described below.

If it ever becomes necessary to return an SLC1 Series to the factory, please do the following:

- 1) Contact the Banner Factory Application Engineering Group at the address or at the numbers listed at the bottom of the back page. They will attempt to troubleshoot the problem from your description. If they conclude that your sensor is defective, they will issue an RMA (Return Merchandise Authorization) number for your paperwork, and give you the proper shipping address.
- 2) Pack the SLC1 Series sensor carefully. Damage which occurs in return shipping is not covered by warranty.