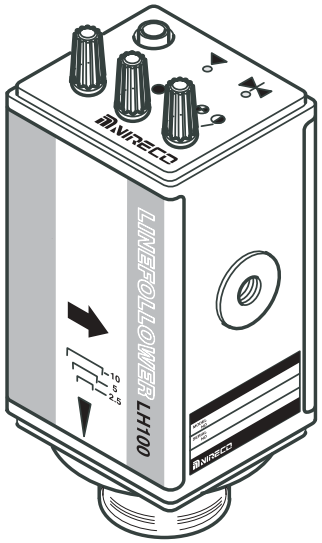
nexen

WEB CONTROL PRODUCTS

User Manual



LINE FOLLOWER SENSOR

LH100

FORM NO. L-20334-C-0404

In accordance with Nexen's established policy of constant product improvement, the specifications contained in this manual are subject to change without notice. Technical data listed in this manual are based on the latest information available at the time of printing and are also subject to change without notice.

Technical Support: 800-843-7445
(651) 484-5900

www.nexengroup.com

DANGER

Read this manual carefully before installation and operation.

Follow Nexen's instructions and integrate this unit into your system with care.

This unit should be installed, operated and maintained by qualified personnel ONLY.

Improper installation can damage your system or cause injury or death.

Comply with all applicable codes.

Nexen Group, Inc.
560 Oak Grove Parkway
Vadnais Heights, Minnesota 55127

ISO 9001 Certified

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INTRODUCTION

Nexen's LH100 Line Follower Sensor optically detects register lines, patterns, and edges. The LH100 offers improved detection capabilities, especially for yellow and light blue. Combining the LH100 with one of Nexen's Web Guide Controllers provides Line Follower Control (LFC) and Edge Position Control (EPC).

INSTALLATION

OUTPUT VOLTAGE SETTINGS

The LH100 has two output voltage ranges to meet the requirements of different controllers:
High (H): 0–5 VDC
Low (L): 0–600 mVDC

The LH100 selector switch comes factory set to "L". To ensure proper operation, set the LH100 sensor output selector switch "H" or "L" according to the requirements of the web guide controller you are using.

ADJUSTING THE OUTPUT VOLTAGE SETTING

1. Remove the selector switch cover to access the High/Low switch (See Figure 1).

2. Use a small, flat-blade screw driver to adjust the High/Low switch to the desired setting. Turn the switch until it comes to a stop on H or L.

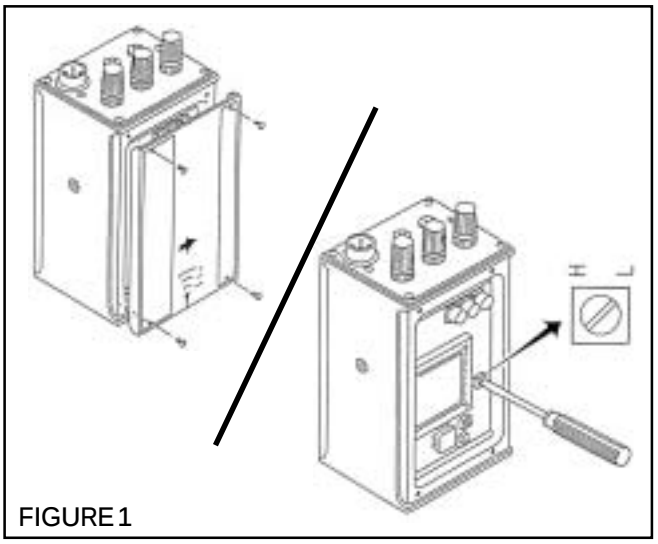

FIGURE 1

MOUNTING THE LH100

1. Secure the Mounting Bracket to a customer supplied mounting bar (See Figure 2).

NOTE: The centerline of the LH100 must be perpendicular (90°) to the web surface (See Figure 3).

2. Secure the LH100 to the threaded extension of the Screwguide mounted across the web path. Be sure it is in a location where the web is supported from beneath to prevent web flutter. (See Figure 3).

NOTE: Make sure the lock nut on the threaded extension is tight against the LH100.

3. Verify that the LH100 and Mounting Bracket are both securely mounted to the mounting bar.

NOTE: If the web material is paper-like, non-shiny, and/or rough, remove the Diffuser Cap by turning the cap counterclockwise. Leave in place for reflective materials.

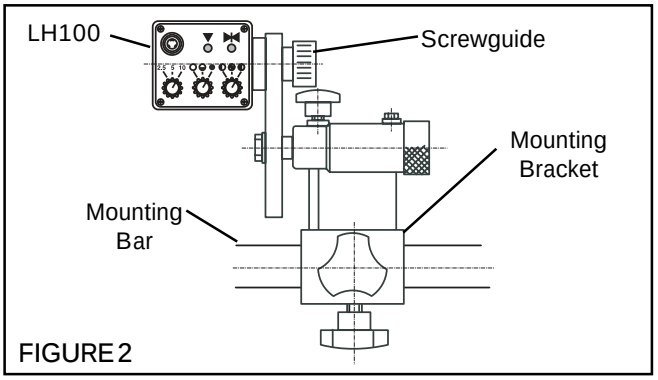

FIGURE 2

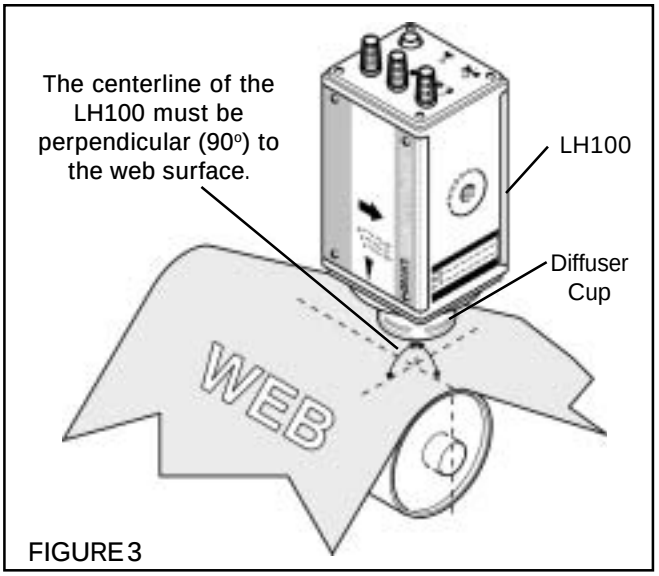

FIGURE 3

MOUNTING DIMENSIONS

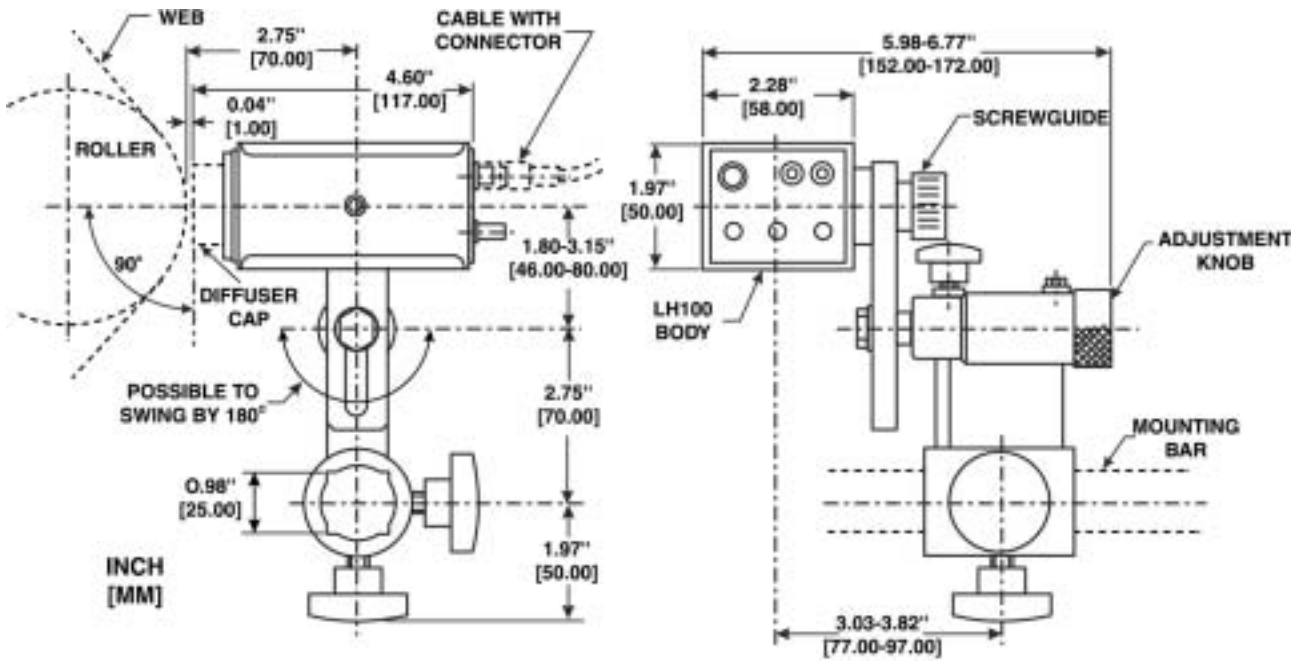

FIGURE 4
LH100 Mounting Dimensions

ELECTRICAL CONNECTIONS

Make the electrical connections between the LH100 and the controller as shown (See Figure 5).

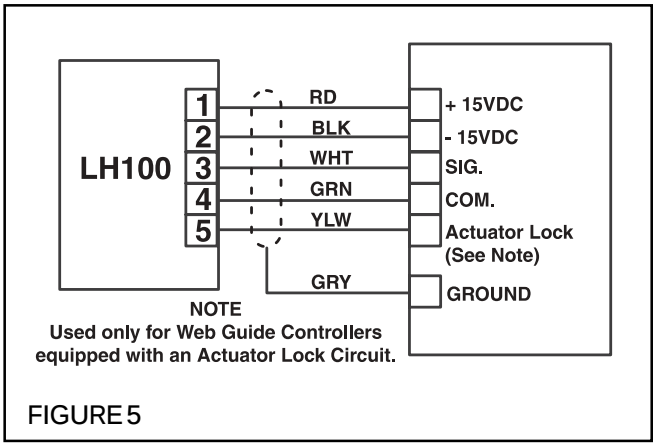

FIGURE 5

WIRING INSTALLATION GUIDELINES

This product is designed to minimize the effects of ElectroMagnetic Interference (EMI) on its operation, but as with any electronic device, proper installation and wiring methods are necessary to ensure proper operation. By doing so, the interference from external effects such as electrical line spikes, electrical noise, static electricity, etc. will be minimized. The following methods outline wiring installation guidelines to protect your system:

- All input and output signal and sensor cables must be shielded with the shields tied to earth ground at one end. In case of very high frequency (MHz range) electrical noise, both ends of the shield need to be tied to earth ground.
- Keep cable length as short as possible. Think of them as antennae for noise.
- Use power line filters to suppress interference on the AC voltage lines that power the unit.
- Place a resistor-capacitor network (snubber) across inductive coils such as relays and solenoids in order to stop electrical interference at the source (See Figure 6).
- Isolate signal and sensor cables from cables carrying AC voltages, power for high current loads or relays and solenoids. Either relocate the signal and sensor cables away from other cables or use grounded metal conduits to shield them. This will reduce the potential for noise interference between the signal and sensor cables and the other noisy cables.

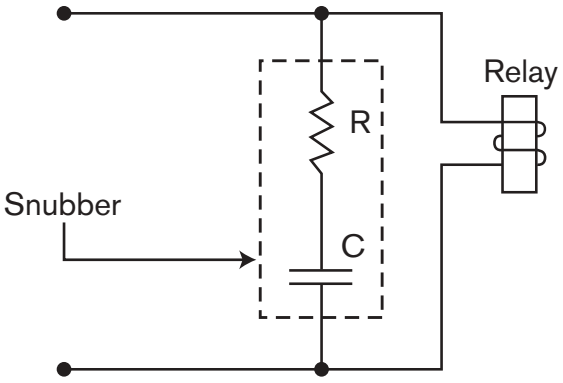

Figure 6 Snubber applied across relay coil

For environments that experience high levels of static electricity follow these additional guidelines:

- Remove the static charge from material carrying it. In the case of webs that carry static charges, there are static charge removal products available such as static bars and ionized blowers.
- Ensure that sensors and machine frames are grounded to earth through a low impedance path.
- Wrap grounding tinsel around sensors and cables that are close to the source of the static electricity and ground the tinsel to earth.
- Tie all signal and sensor cable shields directly to earth ground without passing through the electronic device. This will help prevent high voltage interference from coupling into other circuits within the device.

INDICATORS AND SWITCHES

NOTE: Refer to Figure 7 for LH100 alignment on a web. Use the Scanning Direction Indicator Arrow to determine the direction of the LH100 scan. In Figure 7 the arrow is pointed to the right, so the LH100 scans from left to right.

Refer to Figure 8 for the location of the indicator lights and switches listed below.

INDICATORS:

CENTER DISPLAY INDICATOR: illuminates when a web edge or line edge is at the center of the LH100 view field.

FOCAL DISPLAY INDICATOR: illuminates when the mounting distance and angle (90°) between the LH100 and the web is correct and the web/line edge is within the LH100 field-of-view.

SWITCHES:

COLOR SELECTOR SWITCH: used to select the color of the light source (Blue /Blue+Red /Red). Blue+Red is the most common.

NOTE: If an additional line or pattern of a different color is within the LH100's field of view (See Figure 9) the LH100 may not be able to lock onto the proper edge. In such a case, select the lamp color that most closely matches the intruding line/pattern. This will make it more difficult for the LH100 to see that color.

If the web or roller underneath a transparent web is less reflective than the line or edge to be followed, select a lamp color that is similar to the line or edge.

CONTRAST SELECTOR SWITCH: used to choose which edge of the line to follow. There are three different mode options:

NOTE: Look downstream of the web flow and use the Scanning Direction Indicator Arrow to determine the LH100 scanning direction. Select a mode based on the descriptions below:

With selected, the LH100 scans in the direction of the Arrow, looking for a change from dark to light and follows that edge. In Figure 7 the right edge of the line is detected as the control position.

With selected, the LH100 scans in the direction of the Arrow, looking for a change from light to dark and follows that edge. In Figure 7 the left edge of the line is detected as the control position.

With selected, the LH100 scans in the direction of the Arrow to detect the first contrast change. In Figure 7 the left edge of the line is detected as the control position. This is the most common setting.

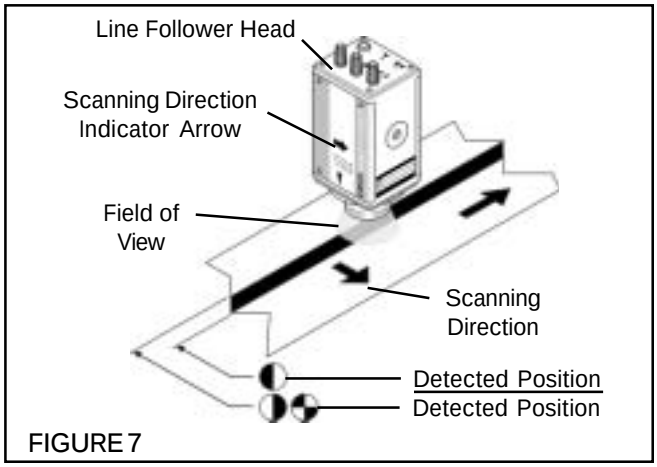

FIGURE 7

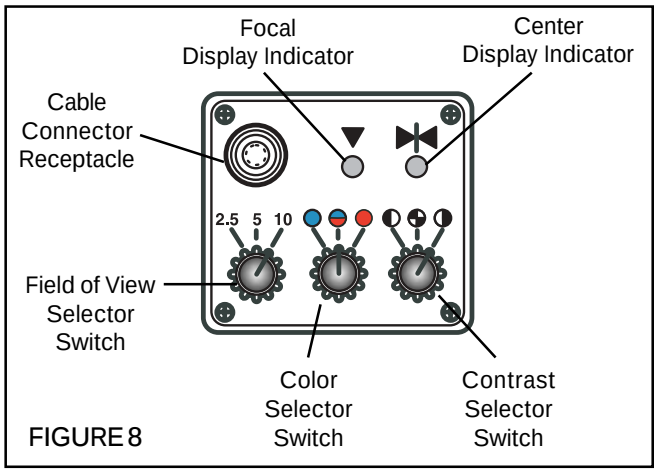

FIGURE 8

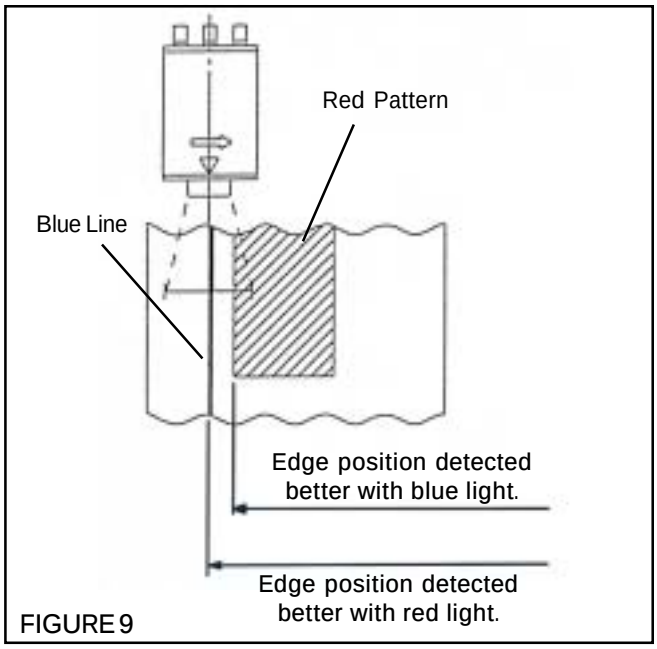

FIGURE 9

FIELD-OF-VIEW SELECTOR SWITCH: used to select the desired field of view width 2.5/5/10mm [.1/.2/.4 in]). 10mm is the most common setting, 2.5 and 5mm are used for restricted field-of-view area where patterns are close together.

DESCRIPTION

The LH100 scans in the direction of the arrow printed on its side (See Figure 11). The LH100 looks for a target edge within its field of view that matches the setting made with the Field-of-View Switch (See INDICATORS AND SWITCHES section). When the target edge is not centered within the field of view, the LH100 will output a control signal that will vary in proportion to how far the target edge is away from center. Each setting of the Field-of-View Switch has a different output voltage range. The center of the range corresponds to the target edge being centered within the field of view.

When a target edge moves from center, the output voltage will change until the edge leaves the field of view. This output voltage will remain constant until the target returns to the field of view. This will allow the web guide to continue steering the target edge back to center of the field of view. If the Actuator Lock function is used, then the web guide will maintain its position at the instant the target edge leaves the field of view until the target edge returns.

ACTUATOR LOCK FUNCTION

The Actuator Lock Function automatically turns on the Actuator Lock Output Transistor whenever the Focal Display Indicator turns off. The following situations will cause the Focal Display Indicator to turn off: web or line edge moving outside the field of view, a break in the line edge, or improper positioning of the LH100.

Use the Actuator Lock output signal for instances where there are breaks in the target line or edge that will reappear quickly. This function will prevent the web guide from moving out of position while waiting for the line or edge to reappear.

Do not use the Actuator Lock Function for instances when the edge moves out of the field of view in a direction perpendicular to web travel and it is desired to have the web guide controller steer the edge back.

SETUP

1. Set the Field Of View, Color, and Contrast Selector switches to appropriate positions.

2. Center the LH100 directly over the line or web edge and adjust the vertical distance of the LH100 to the web surface until the Focal Display indicator turns on (See Figures 10 and 11). For highly reflective webs, be sure the Diffuser Cap is installed and positioned about 1 mm [0.04 in] above the web for proper focus (See Figure 4).

3. Adjust the lateral position of the LH100 until the

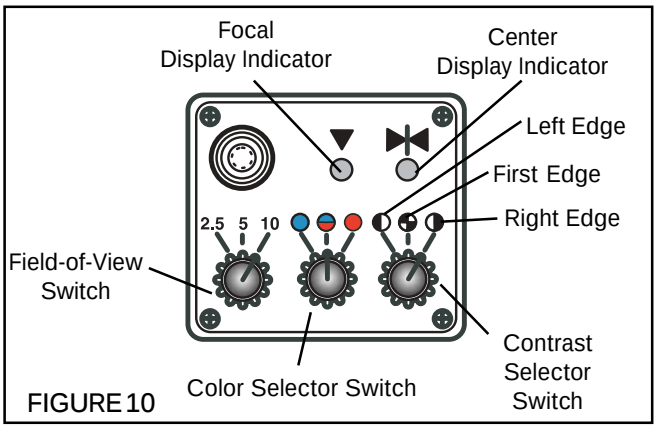

FIGURE 10

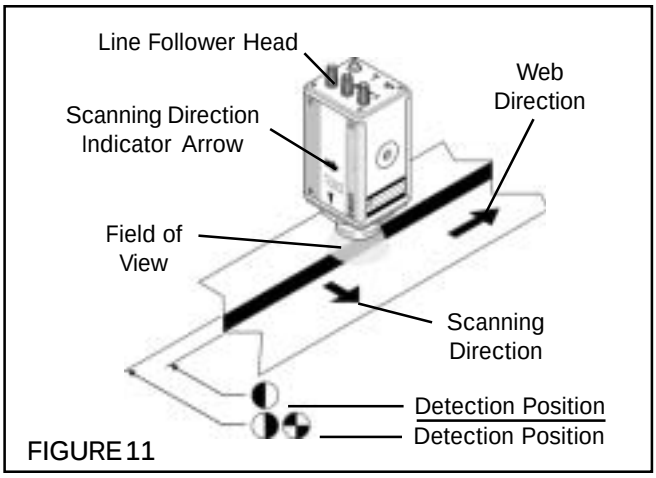

FIGURE 11

Center Display indicator turns on and indicates the center of the field of view is aligned with the appropriate line, pattern or web edge (See Figures 10 and 11).

4. Calibrate the LH100 to the web guide controller by referring to the controller's instruction manual.

5. Test the system setup by slowly pulling the web, causing the line or edge to move within LH100 field of view. The LH100 output should cause the web guide to move in the opposite direction of web movement. This will bring the line/edge back to center.

6. Disable the Actuator Lock Signal and pull the web edge or line slowly until it leaves the LH100's field of view (the focal display indicator turns off). The web guide should continue to steer, until it reaches an end-of-travel limit, in an attempt to move the edge or line back to the center of the field of view.

7. Enable the Actuator Lock Signal and slowly pull the web edge or line away from the LH100 until it leaves the LH100's field of view (the focal display indicator turns off). The web guide should stop moving once the line or edge moves beyond the field of view.

SPECIFICATIONS

Detection line width		0.2 mm [0.008 in] or greater (May differ depending on color or gradation of the line.)
Field of view		2.5 mm / 5 mm / 10 mm [0.1 in / 0.2 in / 0.4 in] diameter (selectable)
Resolution		14 µm [0.0005 in]
Light receiving element		CCD linear image sensor
Light source		High luminance LED (2 colors; blue and red)
Power supply		+15 VDC, 300 mA
		-15 VDC, 50 mA
Ouput	Position signal	Detection field view: 2.5 mm (0.3 V -- 0.5 V low) (2.4 VDC -- 3.7 V high)
		Detection field view: 5 mm (0.2 V -- 0.6 V low) (1.7 VDC -- 4.4 V high)
		Detection field view: 10 mm (0.1 V -- 0.7 V low) (0.3 mV -- 5.8 V high)
	Actuator/lock signal	Open collector 30 V, 0.1 A max, ON when the target is lost from the field of view
Mass		LH100: 0.6 kg [1.3 lb] (including cable)
		Mounting Bracket: 0.5 kg [1.0 lb]
Attached cable length		5 m [16 ft]
Ambient temperature		0° -- 50° C [32° -- 122° F]

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Warranties

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To make a claim under this warranty, the claimant must give written notice of the alleged defect to whom the Product was purchased from and deliver the Product to same within one year of the date on which the alleged defect first became apparent.

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560 Oak Grove Parkway
Vadnais Heights, MN 55127

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Fax: 651.286.1099
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