

## Product Description

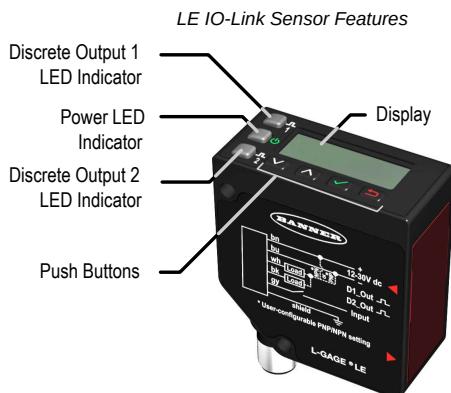
This guide is designed to help you set up and install the L-GAGE® LE Laser Gauging Sensor. For complete information on programming, performance, troubleshooting, dimensions, and accessories, please refer to the Instruction Manual at [www.bannerengineering.com](http://www.bannerengineering.com). Search for p/n 194205 to view the manual. Use of this document assumes familiarity with pertinent industry standards and practices.

**WARNING:**



- Do not use this device for personnel protection
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

## Features and Indicators



Three LED indicators provide ongoing indication of the sensing status.  
**Power LED Indicator**

Solid Green = Normal operation, power On and laser On  
Flashing Green (1 Hz) = Power On and laser Off (laser enable mode)

**Discrete Output LED Indicators**

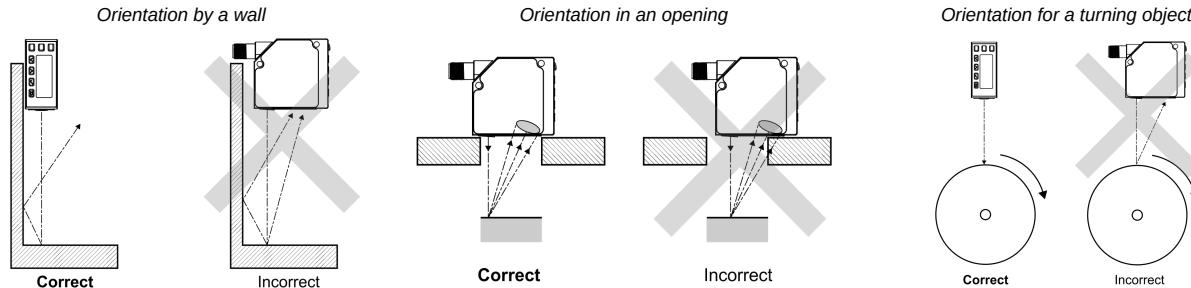
Solid Amber = Discrete Output is On  
Off = Discrete Output is Off

## Sensor Installation

**NOTE:** Handle the sensor with care during installation and operation. Sensor windows soiled by fingerprints, dust, water, oil, etc. may create stray light that may degrade the peak performance of the sensor. Blow the window clear using filtered, compressed air, then clean as necessary using 70% isopropyl alcohol and cotton swabs or water and a soft cloth.

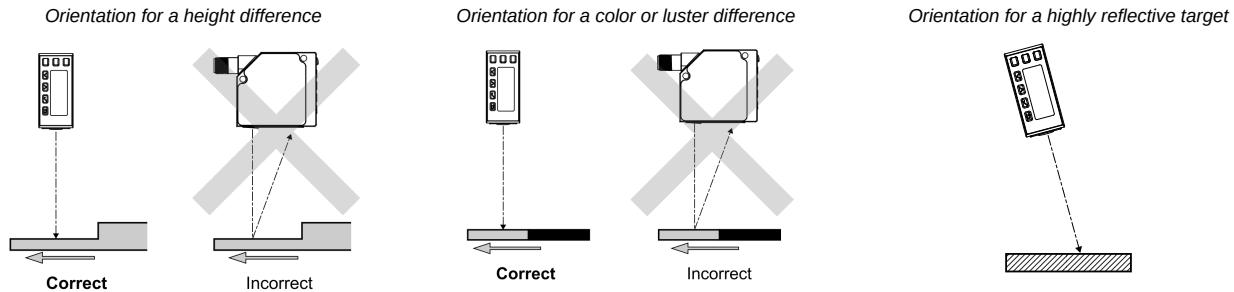
## Sensor Orientation

Correct sensor-to-object orientation is important to ensure proper sensing. See the following figures for examples of correct and incorrect sensor-to-object orientation as certain placements may pose problems for sensing distances.



Continued on page 2

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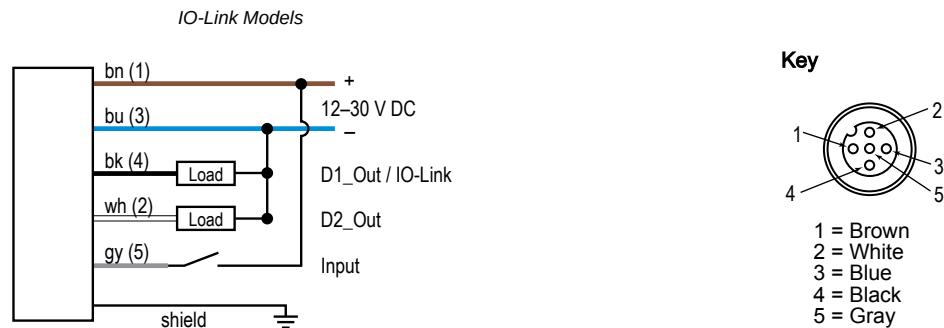


Applying tilt to sensor may improve performance on reflective targets. The direction and magnitude of the tilt depends on the application, but a 15° tilt is often sufficient.

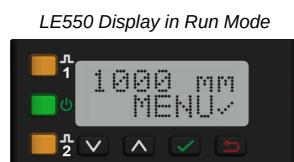
## Mount the Device

1. If a bracket is needed, mount the device onto the bracket.
2. Mount the device (or the device and the bracket) to the machine or equipment at the desired location. Do not tighten the mounting screws at this time.
3. Check the device alignment.
4. Tighten the mounting screws to secure the device (or the device and the bracket) in the aligned position.

## Wiring Diagrams



## LE Laser Display



The display is a 2-line, 8-character LCD. The main screen is the Run mode screen, which shows the real-time distance measurement.

## Buttons

Use the sensor buttons **Down**, **Up**, **Enter**, and **Escape** to program the sensor and to access sensor information.



### Down and Up Buttons

Press **Down** and **Up** to:

- Access the Quick Menu from Run mode
- Navigate the menu systems
- Change programming settings

When navigating the menu systems, the menu items loop.

Press **Down** and **Up** to change setting values. Press and hold the buttons to cycle through numeric values. After changing a setting value, it slowly flashes until the change is saved using the **Enter** button.



### Enter Button

Press **Enter** to:

- Access the Sensor Menu from Run mode
- Access the submenus
- Save changes

In the Sensor Menu, a checkmark in the lower right corner of the display indicates that pressing **Enter** accesses a submenu.

Press **Enter** to save changes. New values flash rapidly and the sensor returns to the parent menu.



### Escape Button

Press **Escape** to:

- Leave the current menu and return to the parent menu
- Return to Run mode from the Quick Menu

**IMPORTANT:** Pressing **Escape** discards any unsaved programming changes.

In the Sensor Menu, a return arrow in the upper left corner of the display indicates that pressing **Escape** returns to the parent menu.

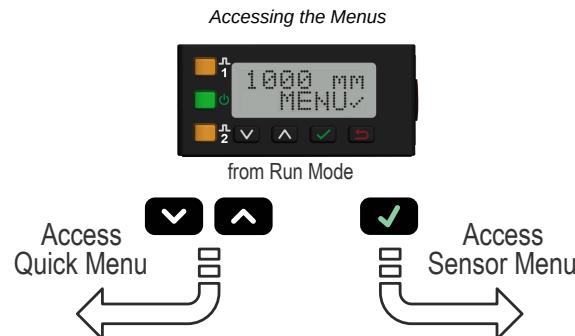
Press and hold **Escape** for 2 seconds to return to Run mode from any menu or remote teach.

## LE Laser Sensor Programming

Program the sensor using the buttons on the sensor or the remote input (limited programming options).

From Run mode, use the buttons to access the Quick Menu and the Sensor Menu. See "Quick Menu" on page 3, "Sensor Menu (MENU)" on page 4, and the instruction manual (p/n 194205) for more information on the options available from each menu. For TEACH options, follow the TEACH instructions in the instruction manual.

In addition to programming the sensor, use the remote input to disable the buttons for security, preventing unauthorized or accidental programming changes. See the instruction manual for more information.



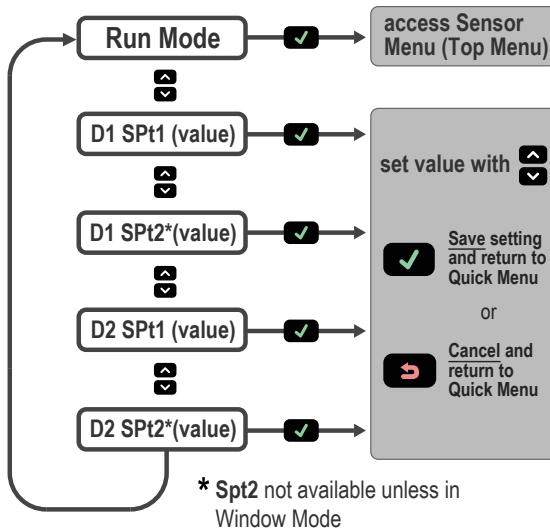
## Quick Menu

The sensor includes a Quick Menu with easy access to view and change the discrete output switch points. Access the Quick Menu by pressing **Down** or **Up** from Run mode. When in the Quick Menu, the current distance measurement displays on the first line and the menu name and the discrete output switch points alternate on the second line of the display. Press **Enter** to access the switch

points. Press **Down**  or **Up**  to change the switch point to the desired value. Press **Enter**  to save the new value and return to the Quick Menu.

Quick Menu Map (Window Mode)

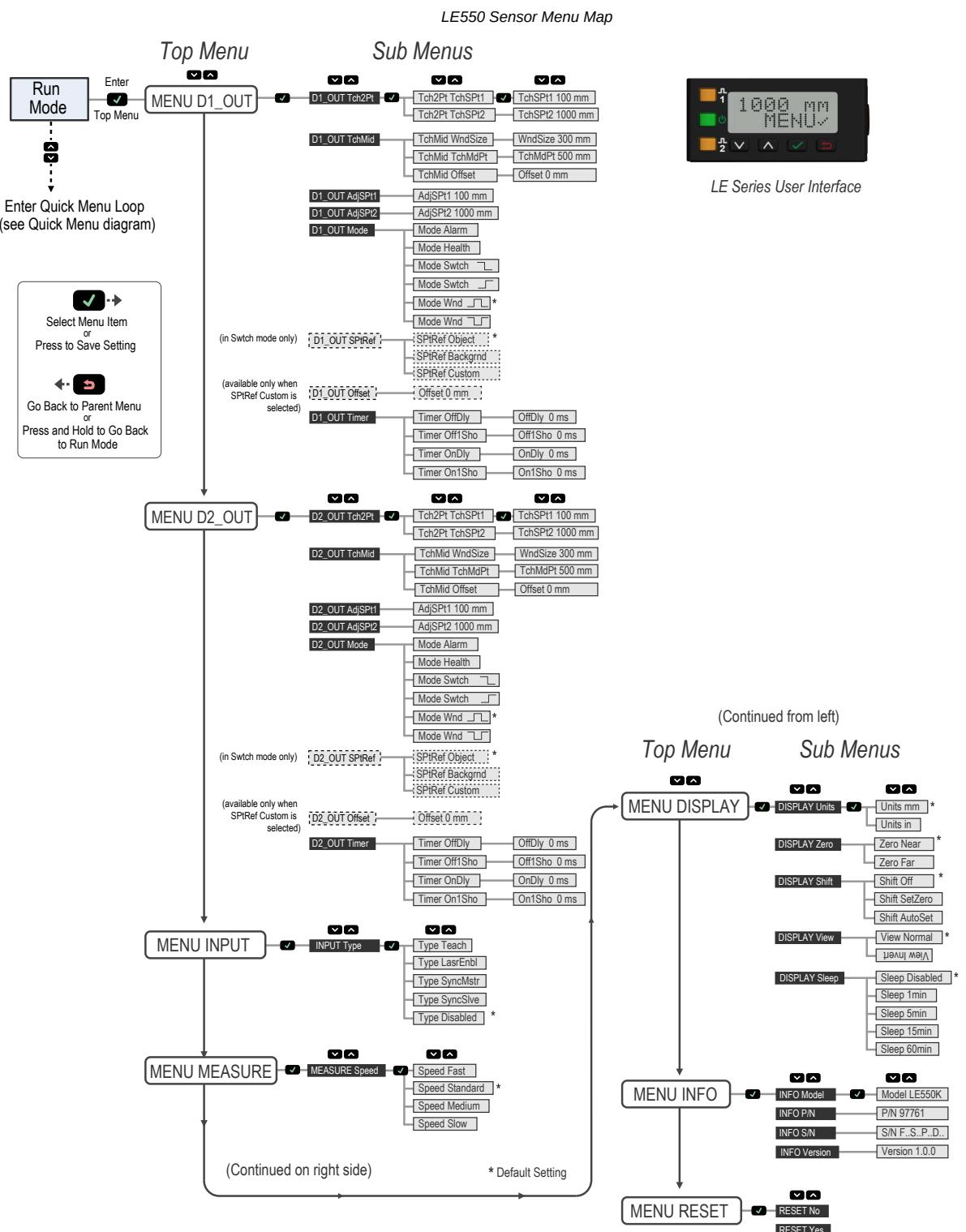
## Quick Menu



\* Spt2 not available unless in Window Mode

## Sensor Menu (MENU)

Access the Sensor Menu by pressing **Enter**  from Run mode, when MENU is displayed. The Sensor Menu includes several submenus that provide access to view and change sensor settings and to view sensor information.



## Class 1 Laser Description and Safety Information



**Laser light. Do not stare into the beam.**

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 56, dated May 8, 2019.

**CLASS 1  
LASER PRODUCT**

**CAUTION:**

- **Never stare directly into the sensor lens.**
- Laser light can damage your eyes.
- Avoid placing any mirror-like object in the beam. Never use a mirror as a retroreflective target.

**CAUTION:**

- **Return defective units to the manufacturer.**
- Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Do not attempt to disassemble this sensor for repair. A defective unit must be returned to the manufacturer.

**CAUTION:**

- **Ne regardez jamais directement la lentille du capteur.**
- La lumière laser peut endommager la vision.
- Évitez de placer un objet réfléchissant (de type miroir) dans la trajectoire du faisceau. N'utilisez jamais de miroir comme cible rétro-réfléchissante.

**CAUTION:**

- **Tout dispositif défectueux doit être renvoyé au fabricant.**
- L'utilisation de commandes, de réglages ou de procédures autres que celles décrites dans le présent document peut entraîner une exposition dangereuse aux radiations.
- N'essayez pas de démonter ce capteur pour le réparer. Tout dispositif défectueux doit être renvoyé au fabricant.

Class 1 lasers are lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing.

Complies with IEC 60825-1:2014 and EN 60825-1:2014+A11:2021.

**For safe laser use:**

- Do not stare at the laser.
- Do not point the laser at a person's eye.
- Mount open laser beam paths either above or below eye level, where practical.
- Terminate the beam emitted by the laser product at the end of its useful path.

**Class 1 Laser Characteristics**

Output power: <0.22 mW

Laser wavelength: 650 nm

Pulse duration: 150-900  $\mu$ s

## Class 2 Laser Description and Safety Information



**Laser light. Do not stare into the beam.**

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 56, dated May 8, 2019.

**CLASS 2  
LASER PRODUCT**

**CAUTION:**

- **Never stare directly into the sensor lens.**
- Laser light can damage your eyes.
- Avoid placing any mirror-like object in the beam. Never use a mirror as a retroreflective target.

**CAUTION:**

- **Return defective units to the manufacturer.**
- Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Do not attempt to disassemble this sensor for repair. A defective unit must be returned to the manufacturer.

**CAUTION:**

- Ne regardez jamais directement la lentille du capteur.
- La lumière laser peut endommager la vision.
- Évitez de placer un objet réfléchissant (de type miroir) dans la trajectoire du faisceau. N'utilisez jamais de miroir comme cible rétro-réfléchissante.

**CAUTION:**

- Tout dispositif défectueux doit être renvoyé au fabricant.
- L'utilisation de commandes, de réglages ou de procédures autres que celles décrites dans le présent document peut entraîner une exposition dangereuse aux radiations.
- N'essayez pas de démonter ce capteur pour le réparer. Tout dispositif défectueux doit être renvoyé au fabricant.

Class 2 lasers are lasers that emit visible radiation in the wavelength range from 400 nm to 700 nm, where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing.

Complies with IEC 60825-1:2014 and EN 60825-1:2014+A11:2021.

**Class 2 Laser Safety Notes.** Low-power lasers are, by definition, incapable of causing eye injury within the duration of a blink (aversion response) of 0.25 seconds. They also must emit only visible wavelengths (400 nm to 700 nm). Therefore, an ocular hazard may exist only if individuals overcome their natural aversion to bright light and stare directly into the laser beam.

**For safe laser use:**

- Do not stare at the laser.
- Do not point the laser at a person's eye.
- Mount open laser beam paths either above or below eye level, where practical.
- Terminate the beam emitted by the laser product at the end of its useful path.

**IMPORTANT:** This laser device is not bore-sighted.

**Class 2 Laser Characteristics**

Output power: <1 mW  
Laser wavelength: 650 nm  
Pulse duration: 150-400  $\mu$ s

## Specifications

**Supply Voltage (Vcc)**

12 V DC to 30 V DC

**Power and Current Consumption, exclusive of load**

**Normal Run Mode:** 1.7 W, Current consumption < 70 mA at 24 V DC

**Supply Protection Circuitry**

Protected against reverse polarity and transient overvoltages

**Output Configuration**

D1\_Out: IO-Link, Push/pull

D2\_Out: PNP

**Output Ratings**

100 mA maximum capability each output

Saturation: Less than 2 V

Off-State Leakage Current: Less than 50  $\mu$ A PNP at 30 V (N.A. push/pull)

**Remote Input**

Allowable Input Voltage Range: 0 to Vcc

Active High (internal weak pulldown—sourcing current):

High State > Vcc – 1.5 V DC  
Low State < Vcc – 5 V DC

Input Impedance > 10 kOhm

**Measurement/Output Rate**

Class 2 Laser Models: < 1 ms

Class 1 Laser Models (Fast): < 1 ms

Class 1 Laser Models (Std/Medium/Slow): < 2 ms

**IO-Link Interface**

Supports Smart Sensor Profile: Yes

Baud Rate: 38400 bps

Process Data Widths: 32 bits

IODD files: Provides all programming options of the display, plus additional functionality

**Environmental Rating**

IP67, NEMA 6

**Operating Conditions**

–20 °C to +55 °C (–4 °F to +131°F)

90% at +55 °C maximum relative humidity (non-condensing)

**Storage Temperature**

–30 °C to +65 °C (–22 °F to +149 °F)

**Sensing Beam**

Class 2 laser models: visible red, 650 nm

Class 1 laser models: visible red, 650 nm

**Sensing Range**

LE250: 100 mm to 400 mm (3.94 to 15.75 inches)

LE550: 100 mm to 1000 mm (3.94 to 39.37 inches)

**Minimum Window Size**

LE250: 1 mm (0.039 inches)  
 LE550: 10 mm (0.39 inches)

**Boresighting**

LE250: 4 mm radius at 400 mm  
 LE550: 1 cm radius at 1 m

**Maximum Torque**

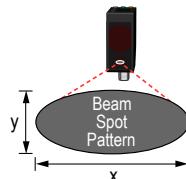
2 N·m (17.7 in-lbs)

**Indicators****Power LED Indicator**

Solid Green = Normal operation, power On and laser On  
 Flashing Green (1 Hz) = Power On and laser Off (laser enable mode)

**Discrete Output LED Indicator**

Solid Amber = Discrete Output is On  
 Off = Discrete Output is Off

**Typical Beam Spot Size<sup>(1)</sup>**

	Distance (mm)					
	LE250 Models			LE550 Models		
	100	250	400	100	550	1000
x	3.2	2.1	1.2	8.4	10.5	12.1
y	2.2	1.5	0.9	3.5	4.2	4.9

**Response Time**

	Class 1 Laser Models	Class 2 Laser Models
Fast <sup>(2)</sup>	2 ms	2 ms
Standard	10 ms	5 ms
Medium	30 ms	15 ms
Slow	100 ms	50 ms

<sup>(1)</sup> Beam spot size is calculated as 1.6 times the D4σ measured value  
<sup>(2)</sup> Response time for lateral entry of object into measurement range < 5 ms

**Construction**

Housing: die-cast zinc  
 Window: acrylic

**Ambient Light Immunity**

Class 2 laser models: > 10,000 lux  
 Class 1 laser models: > 5,000 lux

**Delay at Power Up**

3 s

**Repeatability**

See *Performance Curves*

**Temperature Effect**

See *Performance Curves*

**Vibration/Mechanical Shock**

All models meet Mil. Std. 202 G requirements method 201A.  
 Also meets IEC 60947-5-2.

**Application Note**

For optimum performance, allow 10 minutes for the sensor to warm up

**Certifications**

Banner Engineering BV  
 Park Lane, Culliganlaan 2F bus 3  
 1831 Diegem, BELGIUM



Turck Banner LTD Blenheim House  
 Blenheim Court  
 Wickford, Essex SS11 8YT  
 GREAT BRITAIN



Industrial  
 Control  
 Equipment  
 3TJJ

UL Environmental Rating: Type 1

**Required Overcurrent Protection**

**WARNING:** Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

Overcurrent protection is required to be provided by end product application per the supplied table.

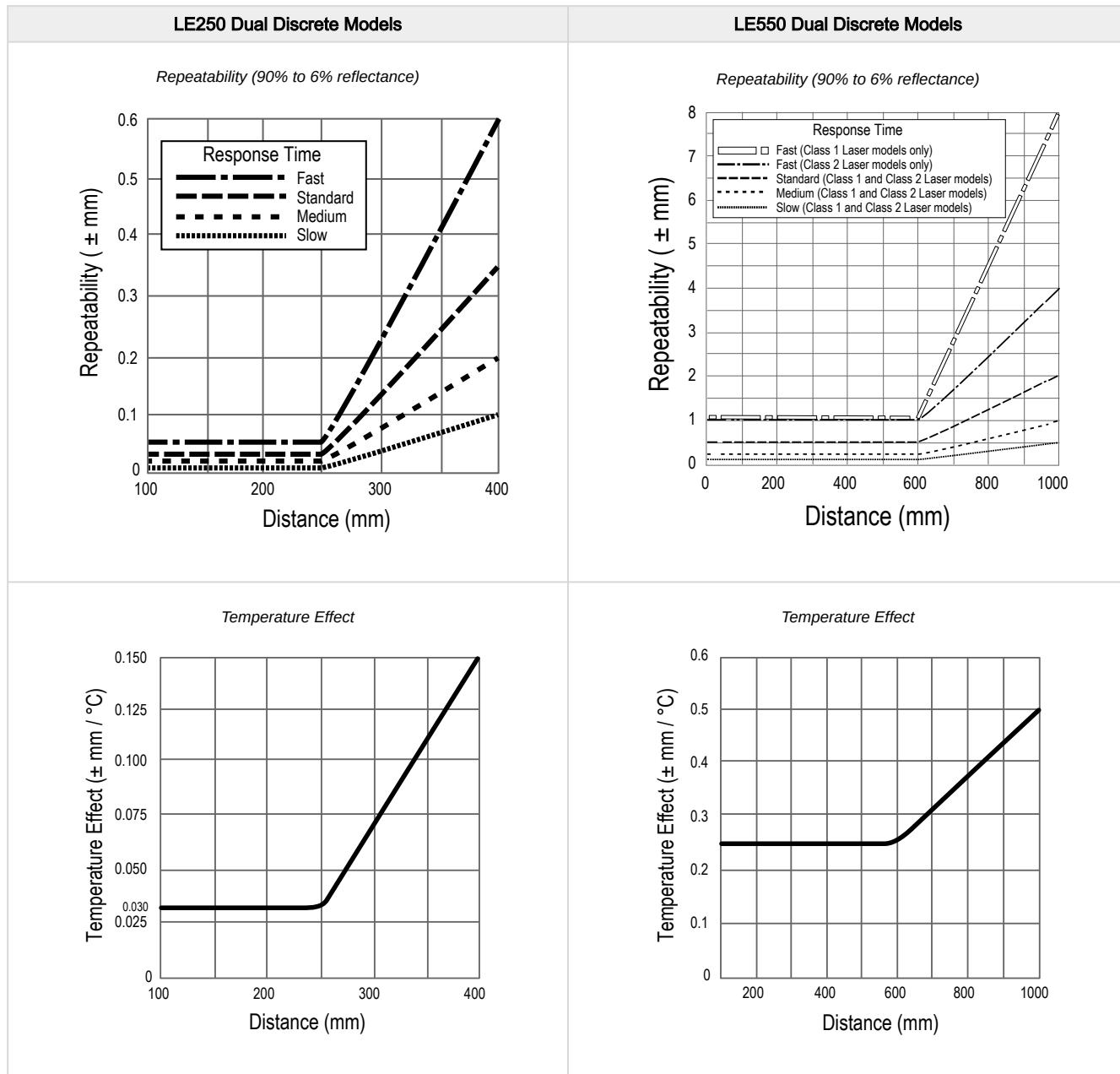
Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

Supply wiring leads < 24 AWG shall not be spliced.

For additional product support, go to [www.bannerengineering.com](http://www.bannerengineering.com).

Supply Wiring (AWG)	Required Overcurrent Protection (A)	Supply Wiring (AWG)	Required Overcurrent Protection (A)
20	5.0	26	1.0
22	3.0	28	0.8
24	1.0	30	0.5

## Performance Curves



## Banner Engineering Corp Limited Warranty

Banner Engineering Corp. warrants its products to be free from defects in material and workmanship for one year following the date of shipment. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture which, at the time it is returned to the factory, is found to have been defective during the warranty period. This warranty does not cover damage or liability for misuse, abuse, or the improper application or installation of the Banner product.

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For patent information, see [www.bannerengineering.com/patents](http://www.bannerengineering.com/patents).