L-GAGE® LT3
Laser Distance-Gauging Sensors

- Uses advanced “time-of-flight” technology for precise, long-distance gauging at the speed of light
- Available in diffuse-mode models with ranges to 5 m and retroreflective models with a 50 m range
- Offered in dual-discrete or analog/discrete models
- Features push-button TEACH-mode programming for custom sensing windows
- Offers remote programming for added security and convenience
- Includes push-button programming for three output response speeds
- Simplifies alignment with a bright, visible laser spot
- Emits one million pulses per second
- Reliably detects angled targets
- Uses rugged construction to withstand demanding sensing environments—rated IEC IP67; NEMA 6

LT3 Sensing Ranges

- **Diffuse models with gray targets:** 0.3 - 3 m
- **Diffuse models with white targets:** 0.3 - 5 m
- **Retroreflective models with retroreflector:** 0.5 - 50 m

![Class 1 Label](image1)
![Class 2 Label](image2)

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
### L-GAGE® LT3, 12-24V dc

**Sensing Mode/LED** | **Laser Class** | **Sensing Distance** | **Connection** | **Analog Output** | **Models NPN** | **Models PNP**
--- | --- | --- | --- | --- | --- | ---
**DIFFUSE LASER** | Class 2 | 0.3 to 5 m for 90% reflectivity white card (see Performance Curve RRC-1 on page 299 for more information) | 2 m | None | LT3BD (Dual NPN or PNP selectable) | LT3BDQ (Dual NPN or PNP selectable)
 | | | 8-pin Euro QD | | | LT3NU | LT3PU
 | | | 2 m | 0 to 10V dc | LT3NUQ | LT3PUQ
 | | | 8-pin Euro QD | | | LT3NI | LT3PI
 | | | 2 m | 4 to 20 mA | LT3NIQ | LT3PIQ
 | | | 8-pin Euro QD | | | LT3BDLV (Dual NPN or PNP selectable) | LT3BDLVQ (Dual NPN or PNP selectable)
 | | | 2 m | None | LT3BDLVQ | LT3BDLVQ
 | | | 8-pin Euro QD | | | LT3NULV | LT3PULV
 | | | 2 m | 0 to 10V dc | LT3NULVQ | LT3PULVQ
 | | | 8-pin Euro QD | | | LT3NILV | LT3PILV
 | | | 2 m | 4 to 20 mA | LT3NILVQ | LT3PILVQ
 | | | 8-pin Euro QD | | | LT3BDLVQ | LT3BDLVQ

Connection options: A model with a QD requires a mating cordset (see page 299).

Connection options: A model with a QD requires a mating cordset (see page 299).

For 9 m cable, add suffix W/30 to the 2 m model number (example, LT3BD W/30).

† Retroreflective range is specified using a BRT-TVHG-8X10P high-grade target.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

### L-GAGE® LT3 Specifications

**Sensing Beam**
- Typical beam diameter: 6 mm @ 3 m
- Typical laser lifetime: 75,000 hours
  - Diffuse: 658 nm visible red IEC and CDRH Class 2 laser; 0.5 mW max. radiant output power
  - Retroreflective: 658 nm visible red IEC and CDRH Class 1 laser, 0.15 mW max. radiant output power

**Sensing Range**
- Diffuse:
  - 90% white card: 0.3 to 5 m
  - 18% gray card: 0.3 to 3 m
  - 6% black card: 0.3 to 2 m
- Retroreflective:
  - 0.5 to 50 m (using supplied target)

**Supply Voltage and Current**
- 12 to 24V dc (10% max. ripple); 108 mA max. @ 24V dc or [2600/V dc] mA

**Supply Protection CIRCUITY**
- Protected against reverse polarity and transient voltages

**Delay at Power-up**
- 1 second; outputs do not conduct during this time

**Output Rating**
- Discrete (switched) output: 100 mA max.
  - OFF-state leakage current: less than 5 µA
  - Output saturation NPN: less than 200 mV @ 10 mA; less than 600 mV @ 100 mA
  - Output saturation PNP: less than 1.2V at 10 mA; less than 1.6V at 100 mA
  - Analog voltage output: 2.5 kΩ min. load impedance (voltage sourcing)
  - Analog current output: 1 kΩ max. @ 24V; max. load resistance = [Vcc-4.5/0.02 Ω] (current sourcing)

**Output Configuration**
- Discrete (switched): Solid-state switch; NPN (current sinking) or PNP (current sourcing), depending on model. Dual-discrete models feature selectable NPN or PNP, depending on wiring hookup.
  - Analog output: 0 to 10V dc or 4 to 20 mA

**Output Protection**
- Protected against short circuit conditions
### L-GAGE® LT3 Specifications (cont’d)

<table>
<thead>
<tr>
<th>Output Response Time</th>
<th>Discrete output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast: 1 millisecond ON/OFF</td>
<td>Medium: 10 milliseconds ON/OFF</td>
</tr>
</tbody>
</table>

#### Diffuse Analog Voltage output (-3 dB)
- **Fast:** 450 Hz (1 millisecond average/1 millisecond update rate)
- **Medium:** 45 Hz (10 milliseconds average/2 milliseconds update rate)
- **Slow:** 4.5 Hz (100 milliseconds average/4 milliseconds update rate)

#### Retroreflective Analog Voltage output (-3 dB)
- **Fast:** 114 Hz (6 milliseconds average/1 millisecond update rate)
- **Medium:** 10 Hz (48 milliseconds average/1 millisecond update rate)
- **Slow:** 2.5 Hz (192 milliseconds average/1 millisecond update rate)

<table>
<thead>
<tr>
<th>Resolution/Repeatability</th>
<th>See charts RRC-1 and RRC-2 on page 299.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color Sensitivity (typical)</td>
<td>Diffuse: 90% white to 18% gray: less than 10 mm; 90% white to 6% black: less than 20 mm. See chart CSC-1 on page 299.</td>
</tr>
<tr>
<td>Analog Linearity</td>
<td>Retroreflective: ± 60 mm from 0.5 to 50 m (0.12% of full scale) (Specified @ 24V dc, 22° C using supplied BRT-TVHG-8X10P retroreflector)</td>
</tr>
<tr>
<td></td>
<td>Diffuse: ± 30 mm from 0.3 to 1.5 m; ± 20 mm from 1.5 to 5 m (Specified @ 24V dc, 22° C using a 90% reflectance white card)</td>
</tr>
</tbody>
</table>

#### Discrete Output Hysteresis
- **Diffuse**
  - Fast: 10 mm
  - Medium: 5 mm
  - Slow: 3 mm
- **Retroreflective**
  - Fast: 20 mm
  - Medium: 10 mm
  - Slow: 6 mm

#### Temperature Effect
- **Diffuse:** less than 2 mm/° C
- **Retroreflective:** less than 3 mm/° C

#### Minimum Window Size
- **Diffuse:** 20 mm
- **Retroreflective:** 40 mm

<table>
<thead>
<tr>
<th>Remote TEACH Input</th>
<th>18 kΩ min. (65 kΩ at 5V dc)</th>
</tr>
</thead>
</table>

| Remote TEACH | To teach: Connect yellow wire to +5 to 24V dc  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>To disable:</td>
<td>Connect yellow wire to 0 to +2V dc (or open connection)</td>
</tr>
</tbody>
</table>

#### Adjustments
- **Response speed:** Push button toggles between fast, medium and slow (see Output Response Time)
- **Window limits (analog or discrete):** TEACH-mode programming of near and far window limits. Limits may also be taught remotely using TEACH input.
- **Analog output slope:** The first limit taught is assigned to minimum output current or voltage (4 mA or 0V dc)

#### Laser Control
Connect red wire to +5 to 24V dc to enable laser beam; connect to 0 to +1.8V dc (or open connection) to disable. See data sheet for delay time on enable.

#### Indicators
- **Green Power ON LED:** Indicates when power is ON, overloaded output and laser status
- **Yellow Output LED:** Indicates when discrete load output is conducting
- **Red Signal LED:** Indicates target is within sensing range and the condition of the received light signal
- **Red/Yellow TEACH LEDs:** In programming mode; indicate active output(s)

#### Construction
- Housing: ABS/polycarbonate blend
- Window: Acrylic
- Quick-disconnect: ABS/polycarbonate blend

#### Environmental Rating
- IP67; NEMA 6

<table>
<thead>
<tr>
<th>Connections</th>
<th>2 m or 9 m shielded 7-conductor (with drain) PVC-jacketed attached cable, or 8-pin Euro-style quick-disconnect. QD cordsets are ordered separately. See page 299.</th>
</tr>
</thead>
</table>
| Operating Conditions | **Temperature:** 0° to +50° C  
| | **Relative humidity:** 90% at 50° C (non-condensing) |

#### Application Notes
- For best accuracy, allow 30-minute warm-up before programming or operating
- Retroreflective performance specifications are based on use with supplied BRT-TVHG-8X10P high-grade target. Results may vary with other retroreflective target materials.

#### Certifications
- CE
- UL

| Hookup Diagrams | Discrete/Analog Models: NPN: MI01 (p. 758)  
|-----------------|----------------------------------------------------------------------------------------|
| PN: MI02 (p. 758)  
| Dual-Discrete Models: NPN: MI03 (p. 758)  
| PN: MI04 (p. 758) |
Cordsets

<table>
<thead>
<tr>
<th>Euro QD (With Shield)</th>
<th>LT3</th>
</tr>
</thead>
<tbody>
<tr>
<td>See page 689</td>
<td></td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td><strong>LT3</strong></td>
</tr>
<tr>
<td>Threaded 8-Pin</td>
<td></td>
</tr>
<tr>
<td>2 m</td>
<td>SMBAMLT3IP pg. 650</td>
</tr>
<tr>
<td>5 m</td>
<td>SMBLT31 pg. 657</td>
</tr>
<tr>
<td>9 m</td>
<td>SMBLT32 pg. 657</td>
</tr>
<tr>
<td></td>
<td>SMBLT3IP pg. 658</td>
</tr>
</tbody>
</table>

More information online at bannerengineering.com 299

Brackets

| Additional brackets and information available. See page 620. |

Repeatability/Resolution Curves

*R*= Visible Red Laser

![Resolution/Repeatability vs. Distance for LT3](image)

- **RRC-1**
  - Range: 5 m
  - Mode: Diffuse
  - LED: *

- **RRC-2**
  - Range: 50 m
  - Mode: Retroreflective
  - LED: *

Color Sensitivity Curves

*R*= Visible Red Laser

![Color Sensitivity vs. Target Position for LT3](image)

- **CSC-1**
  - Range: 5 m
  - Mode: Diffuse
  - LED: *
Measurement and Inspection Hookups

### MI01 LT3 Analog and Current Sinking (NPN)
**Discrete Outputs**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brown</td>
</tr>
<tr>
<td>2</td>
<td>Green</td>
</tr>
<tr>
<td>3</td>
<td>Yellow</td>
</tr>
<tr>
<td>4</td>
<td>Gray</td>
</tr>
<tr>
<td>5</td>
<td>Pink</td>
</tr>
<tr>
<td>6</td>
<td>Blue</td>
</tr>
<tr>
<td>7</td>
<td>Shield*</td>
</tr>
<tr>
<td>8</td>
<td>Shield*</td>
</tr>
</tbody>
</table>

#### Key

- *1 = White*
- *2 = Brown*
- *3 = Green*
- *4 = Yellow*
- *5 = Gray*
- *6 = Pink*
- *7 = Blue*
- *8 = Shield*

#### Diagram

*It is recommended that the shield wire be connected to either earth ground or DC common.*

#### 8-Pin Euro

![8-Pin Euro Diagram](image)

### MI02 LT3 Analog and Current Sourcing (PNP)
**Discrete Outputs**

<table>
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<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>White</td>
</tr>
<tr>
<td>2</td>
<td>Brown</td>
</tr>
<tr>
<td>3</td>
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</tr>
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<td>Blue</td>
</tr>
<tr>
<td>8</td>
<td>Shield*</td>
</tr>
</tbody>
</table>

#### Key

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- *5 = Gray*
- *6 = Pink*
- *7 = Blue*
- *8 = Shield*

#### Diagram

*It is recommended that the shield wire be connected to either earth ground or DC common.*

#### 8-Pin Euro

![8-Pin Euro Diagram](image)

### MI03 LT3 with Two Discrete Outputs
**Current Sinking (NPN)**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Load 1</td>
</tr>
<tr>
<td>2</td>
<td>Output</td>
</tr>
<tr>
<td>3</td>
<td>Select</td>
</tr>
<tr>
<td>4</td>
<td>Laser Control</td>
</tr>
<tr>
<td>5</td>
<td>Teach</td>
</tr>
<tr>
<td>6</td>
<td>Shield*</td>
</tr>
</tbody>
</table>

#### Key

- *1 = White*
- *2 = Brown*
- *3 = Green*
- *4 = Yellow*
- *5 = Gray*
- *6 = Pink*
- *7 = Blue*
- *8 = Shield*

#### Diagram

*It is recommended that the shield wire be connected to either earth ground or DC common.*

#### 8-Pin Euro

![8-Pin Euro Diagram](image)

### MI04 LT3 with Two Discrete Outputs
**Current Sourcing (PNP)**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Load 1</td>
</tr>
<tr>
<td>2</td>
<td>Output</td>
</tr>
<tr>
<td>3</td>
<td>Select</td>
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<tr>
<td>4</td>
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#### Key

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- *2 = Brown*
- *3 = Green*
- *4 = Yellow*
- *5 = Gray*
- *6 = Pink*
- *7 = Blue*
- *8 = Shield*

#### Diagram

*It is recommended that the shield wire be connected to either earth ground or DC common.*

#### 8-Pin Euro

![8-Pin Euro Diagram](image)