AR500 Laser Position Sensors

Principles of Operation

The AR500 is a triangulation sensor that measures distance by projecting a beam of laser light that creates a spot on a target surface. Reflected light from the surface is viewed from an angle by a CMOS detector array inside the AR500 sensor. The target’s distance is calculated from the image pixel data using the sensor’s microprocessor. The distance is transmitted through serial communications, analog outputs or optionally, via Ethernet. A variety of models are specified, each to allow a different measurement range and standoff.

Definitions

Range: Working distance between measurement endpoints over which the sensor will reliably measure displacement.
Base Distance: Offset distance from the face of the sensor to the beginning of the measurement range. Accuracy is greatest at the middle of the range, and the laser spot size is the smallest at the middle of the measurement range.
Resolution: Smallest change in distance that a sensor can detect. Stated as % of the full-scale range.
Linearity: The largest deviation from a best-fit straight line over the measurement range, created by data from the sensor with reference taken from a true distance scale. Stated as +/- % of the range.
Sample Rate: Speed that data samples are obtained from the sensor. The maximum attainable sample rate is determined by the selected operating mode and target reflectance.

AR500 Standard Model Specifications

<table>
<thead>
<tr>
<th>AR500 Model</th>
<th>-5</th>
<th>-10</th>
<th>-25</th>
<th>-50</th>
<th>-100</th>
<th>-250</th>
<th>-500</th>
<th>-750</th>
<th>-1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range [in.]</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>50</td>
<td>100</td>
<td>250</td>
<td>500</td>
<td>750</td>
<td>1000</td>
</tr>
<tr>
<td>Base Distance [in.]</td>
<td>0.2</td>
<td>0.39</td>
<td>0.98</td>
<td>1.97</td>
<td>3.94</td>
<td>9.84</td>
<td>19.7</td>
<td>29.5</td>
<td>39.4</td>
</tr>
<tr>
<td>Linearity (+/-) μm [10¹ in.]</td>
<td>0.1% of range</td>
<td>0.15%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution (+/-) μm [10¹ in.]</td>
<td>0.01% of range</td>
<td>0.02%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Laser spot size μm</td>
<td>0.5</td>
<td>1.0</td>
<td>2.5</td>
<td>5.0</td>
<td>10</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>200</td>
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<tr>
<td>Weight no cable [oz]</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>80</td>
<td>100</td>
<td>140</td>
<td>150</td>
<td>300</td>
<td>500</td>
</tr>
<tr>
<td>Laser class</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3R</td>
<td>3R</td>
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<td>3R</td>
</tr>
</tbody>
</table>

Complies with 21 CFR 1040 with Laser Notice #50 and IEC/EN 60825-1:2001

- Laser type
  - STANDARD: 660 nm, ≤ 0.95 mw, visible RED
  - OPTIONAL: 405 nm, ≤ 0.95 mw, visible BLUE

- Laser type
  - STANDARD: 660 nm, ≤ 3 mW RED
  - OPTIONAL: 660 nm, 20 mW visible RED (Class 3B) 405 nm, ≤ 3 mW BLUE 405 nm, 20 mW BLUE (Class 3B)

- Power
  - 9 - 36 Volts DC, 250 mA max. Voltage tolerance -5% to +10%

- Sample rates
  - STANDARD: to 9400 Hz, or sample trigger (serial command or Hardware)

- Operating Temp
  - -10 - 60°C [14 - 140°F]; to -30°C with optional heater; to 120°C with optional air-cooling; 95% Humidity (non-condensing)

- Environmental
  - NEMA – 4X, IP67. Keep optical windows clean for best performance. Aluminum case. Compliant with the RoHS directive regarding the reduction of the use of lead and other hazardous substances

- Shock / Vibration
  - Shock: 30 grams / 6 ms; Vibration: 20 g / 10...1000Hz, 6 hours, for each of XYZ axes

- Temperature Drift
  - 0.02% of range / °C

- Interfaces Serial
  - STANDARD: RS232 full duplex (460.8 Kbits/sec); OPTION: RS48

- Analog
  - STANDARD: 4-20 mA; OPTION: 0-10V

- Ethernet
  - OPTION: Ethernet (minimum quantity required)

- Logic
  - STANDARD: Programmable (see manual), NPN: 100 mA max; 40 V max for output

- Sync Trigger
  - STANDARD: 2.4 – 5 V (CMOS, TTL)

- Cable
  - length: 6 ft. (1.8 m), weight: 5.8 oz. (165 g), 12 conductor, Polyurethane sheathing. Binder 712 connector.
AR500 Laser Position Sensors

Mechanical Dimensions units in mm.

AR500 Sensor Options

Connectivity kit: Includes terminal blocks, serial cable with molded DB9 connector, AC power supply with 110 VAC or 240 VAC

High power lasers: Diode upgrades to visible red or blue for high sample rates on dark surfaces or in high ambient light.

Cables: Optional, longer cables. Contact us for custom cabling needs.


Analog interface: Optional 0-10 V analog interface signal. Replaces 4-20mA signal

Internal heater: Permits sensor use to -30°C

Air-cooled jacket: Enclosure with forced air to cool sensor for use up to 120°C. Sensor must be calibrated inside jacket at factory.

Spray guard: Open-sided enclosure which helps to keep debris off optical windows.

Laser Safety Labels