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**The AR500** laser position sensors are compact devices for dimensional measurement. The unit uses laser triangulation principles to accurately measure at high speeds. The same compact enclosure houses models with ranges from 5 to 1000 mm. Sensor options include blue laser diodes, multiple analog output formats, and cooling jackets.

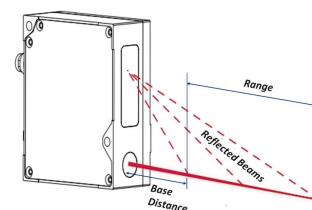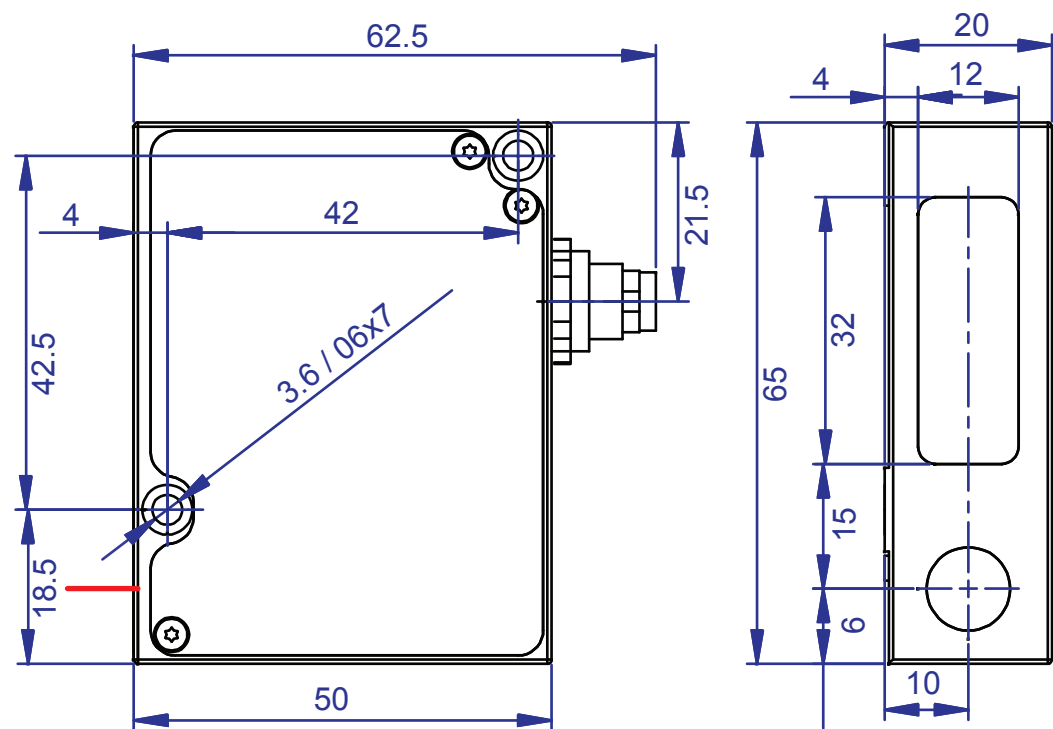## AR500 High Speed Laser Sensor

## 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 a +/- % 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
Specifications in metric units. [English units in brackets]

| AR500 Model | -5 | -10 | -25 | -50 | -100 | -250 | -500 | -750 | -1000 |
|---|---|---|---|---|---|---|---|---|---|
| Range mm [in.] | 5 [0.20] | 10 [0.39] | 25 [0.98] | 50 [1.97] | 100 [3.94] | 250 [9.84] | 500 [19.7] | 750 [29.5] | 1000 [39.4] |
| Base Distance mm [in.] | 10 [0.39] | 25 [0.98] | 45 [1.77] | 65 [2.55] | 90 [3.54] | 80 [3.15] | 125 [4.95] | 145 [5.75] | 245 [9.6] |
| Linearity (+/-) µm [$10^{-3}$ in.] | 0.10% of range | | | | | | | | 0.15% |
| | 5 [0.20] | 10 [0.39] | 25 [0.98] | 50 [1.97] | 100 [3.94] | 250 [9.84] | 500 [19.7] | 750 [29.5] | 1500 [59.1] |
| Resolution (+/-) µm [$10^{-3}$ in.] | 0.01% of range | | | | | | | | 0.02% |
| | 0.5 [0.02] | 1.0 [0.04] | 2.5 [0.10] | 5.0 [0.20] | 10 [0.39] | 25 [0.98] | 50 [1.97] | 75.0 [2.95] | 200 [7.87] |
| Laser Spot Size µm | 40 | 50 | 60 | 80 | 70 | 130 | 140 | 300 | 500 |
| Weight w/o Cable g [oz.] | 100 grams [3.5 ounces] | | | | | | | | |
| Available Laser Class | Class 2 (< 0.95 mW) | | | | | | | | |
| | Class 3R (< 5 mW) | | | | | | | | |
| | | | | | | | Class 3B (< 20 mW) | | |
| | Complies with 21 CFR 1040 with Laser Notice #50 and IEC/EN 60825-1:2014 | | | | | | | | |
| Laser Color | RED Laser: 660 nm wavelength OR BLUE Laser: 405/450 nm wavelength | | | | | | | | |
| Power | 9 - 36 Volts DC, 250 mA max. Voltage tolerance -5% to +10% | | | | | | | | |
| Sample Rates | Up to 9400 Hz, or sample trigger (serial command or input trigger wire) | | | | | | | | |
| 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 g / 6 ms; Vibration: 20 g / 10…1000Hz, 6 hours, for each of XYZ axes | | | | | | | | |
| Temp. Drift | 0.02% of range / °C | | | | | | | | |
| Interfaces — Serial | STANDARD: RS232 full duplex (460.8 Kbits/sec); OPTION: RS485 | | | | | | | | |
| Interfaces — Analog | STANDARD: 4-20 mA; OPTION: 0-10V | | | | | | | | |
| Interfaces — Ethernet | OPTION: Ethernet (minimum quantity order required) | | | | | | | | |
| Interfaces — Logic | STANDARD: Programmable (see manual), NPN: 100 mA max; 40 V max for output | | | | | | | | |
| Interfaces — Sync. Trig. | 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. | | | | | | | | |

## 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.

**Serial interface:** Optional RS485 interface for long-distance connections. Replaces RS232.

**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 windws.

## Laser Safety Labels

| LASER RADIATION | LASER RADIATION | LASER RADIATION |
|---|---|---|
| **AVOID EXPOSURE TO BEAM** | **AVOID EXPOSURE TO BEAM** | **AVOID EXPOSURE TO BEAM** |
| Maximum output 0.95mW | Maximum output 4.8mW | Maximum output 20mW |
| Wavelength 660nm | Wavelength 650nm | Wavelength 660nm |
| AVOID EXPOSURE Laser radiation is emitted from this aperture | AVOID EXPOSURE Laser radiation is emitted from this aperture | AVOID EXPOSURE Laser radiation is emitted from this aperture |
| **CLASS 2 LASER PRODUCT** **IEC/EN 60825-1 : 2007** | **CLASS 3R LASER PRODUCT** **IEC/EN 60825-1 : 2007** | **CLASS 3B LASER PRODUCT** **IEC/EN 60825-1 : 2007** |

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