

## AccuRange600™ laser displacement sensors with measurement capabilities from inches to feet



The **AR600** family of triangulating laser displacement sensors includes twelve models to satisfy your range requirements with excellent accuracy and sensitivity. These sensors employ CMOS line cameras for high sensitivity on wood, glowing steel, liquid surfaces and other targets. AR600 measuring sensors are self-contained and require no external controller or specialized PC card.

### AR600 Common Specifications

Laser class	AR600-0125 to -6	650 nm, Class II
	AR600-8 to -50	670 nm, Class IIIa
Sensor		CCD digital line scan camera
Power		12 - 24 V D.C. (75 mA at 15V), 20 mA added with current loop option
Weight		See Model Specification Chart
Resolution		0.03% of Full Scale Span
Operating Temperature		0 to 50°C, negligible accuracy drift
Enclosure		cast aluminum; meets NEMA-4 and IP-67 requirements
Sample Rates (configurable)		
maximum		
at Standard Resolution		1250 samples / sec
with Hi-Res option		200 samples / sec
minimum		0.2 samples / sec or sample on request
Cable Length		6 feet
Cable Configurations		Moulded serial with 9 pin connector and four-conductor power and analog cable
Regulatory		CE

### AR600 Outputs

The AR600 sensors are standard with serial RS-232 output. Sensor data cables are terminated with a DB-9 connector for direct connection to a PC and other equipment. AR600 sensors can be ordered with current loop or RS-422 outputs.

Serial Output		
ASCII		up to 11 bytes/sample, terminal readable
Binary		3 bytes/sample: 0-50000 over full scale span Hex FF terminated
RS-232 (standard)		300 - 56 K baud
RS-422 (optional)		300 - 56 K baud, 4000 ft. max line length
Analog signals (optional)		4-20 mA current loop, installed internally

## Principles of Operation

The AR600 sensors project a beam of visible laser light that creates a spot on a target surface. Reflected light from the surface is viewed from an angle by a line scan camera inside the AR600 sensor. The target's distance is computed from the image pixel data. The AR600 can not be overloaded and measures accurately even when a mirror reflects the entire light beam back to the detector.

## Definitions

**Target Standoff:** Distance from the face of the sensor to the middle of the span. Accuracy is greatest at the standoff distance for the AR600.

**Span:** Working distance between measurement range endpoints over which the sensor will reliably measure displacement.

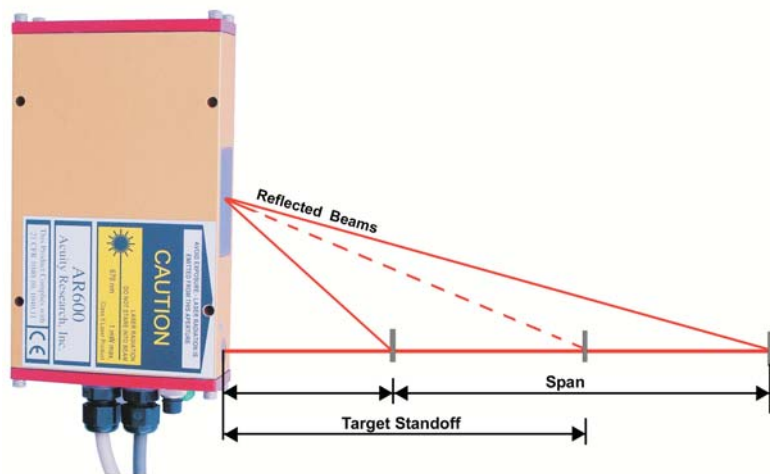
**Resolution:** Smallest change in distance that a sensor can detect. Stated as +/- % of the span.

**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 span.

**Sample Rate:** Rate that data samples are obtained from the sensor. The maximum attainable sample rate is determined by the selected operating mode and target reflectance.

**Background Light Elimination (BLE):** A user-selected operating mode that improves measurement in bright surroundings by capturing an image with the laser off and subtracts it from the image taken with the laser on. Sample rates are lowered as a result.

**Sensitivity:** A measure of the relative ability to detect small amounts of reflected light. The better the sensitivity, the higher the attainable sample rate on surfaces such as clear glass, gloss black paint or shiny plastic. See Sensitivity section of this data sheet.

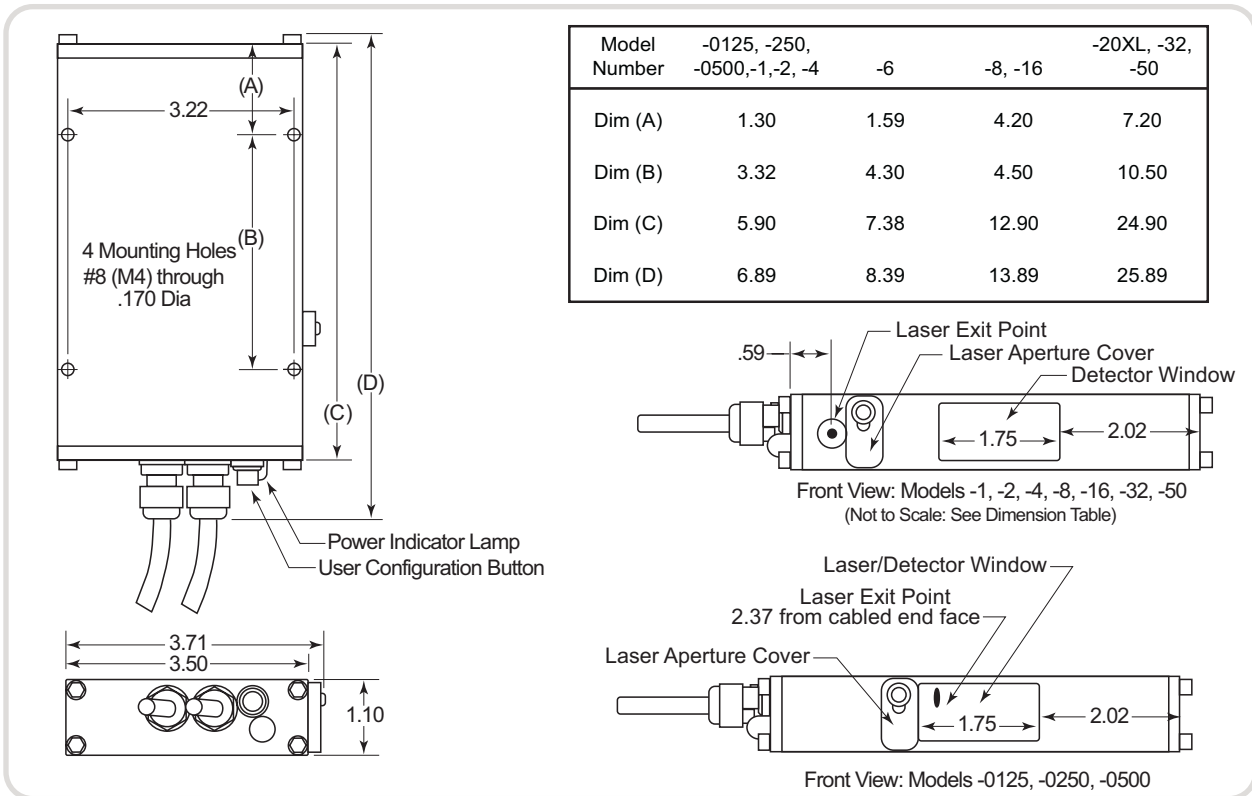


## AR600 Model Specifications

Length measurements are reported in inches unless noted differently.

AR600 Model #	-0125	-0250	-0500	-1	-2	-4	-6	-8	-16	-20XL	-32	-50
Span	0.125	0.25	0.5	1.0	2.0	4.0	6.0	8.0	16.0	20.0	32.0	50.0
mm	3.175	6.35	12.75	25.4	50.8	102	152	203	406	508	813	1270
Target Standoff	0.5625	0.725	1.15	3.0	3.25	5.5	10.0	17.0	19.5	48.0	42.0	55.0
mm	14.288	18.415	29.21	76.2	82.55	139.7	254	432	495	1220	1067	1397
Linearity	+/- 0.1%											
<b>Resolution</b> (10 <sup>-3</sup> in.)	.038	.075	.150	.30	0.60	1.20	1.80	2.40	4.80	6.0	9.60	15.0
microns	.953	1.905	3.825	7.620	15.24	30.60	45.60	60.90	121.8	152.4	243.9	381.0
Laser spot size												
@ span center (micron)	30	35	40	60	65	70	95	120	150	275	250	300
@ span endpoints	50	100	130	200	220	300	350	400	750	350	500	750
Weight less cable (oz.)	19	19	19	19	19	19	22.5	36	36	50	50	50
grams	539	539	539	539	539	539	638	1021	1021	1418	1418	1418
Laser Class	II	II	II	II	II	II	II	IIIa	IIIa	IIIa	IIIa	IIIa

## Mechanical Dimensions (inches)



### AR600 Sensitivity

for typical surfaces and relative amounts of diffuse light

Most surfaces reflect light in two ways. Some light is diffusely scattered over wide angles and some is reflected specularly, as from a mirror. Diffuse reflections are typically used for measurement, since they scatter widely and can be detected without precise alignment. The AR600 boasts great sensitivity to small amounts of the diffuse component from shiny surfaces. Versions of the AR600 sensor can measure many materials using either specular or diffuse reflections.

### Examples of diffuse scattered light from various materials

Material	Diffuse Reflectance (normalized)	Max sample rate (Hz)
White Paper	0.85	1250
Unpolished Metals (iron, steel)	0.2 - 0.5	1250
Wood (various)	0.1 - 0.7	1250
Flat Black Paint	0.03	1250
Gloss Black Paint or plastic	0.003	600
Polished Metals (Al, st. steel)	0.8 - 0.0005	1250 - 100
Clear glass (polished fused silica)	0.0004	100
Laser Mirror	0.0004	100

### AR600 Inputs

AR600 sensor command set through pushbutton or serial interface commands:

Set Sample Interval between 0.2 to 1250 Hz  
 Set Current Loop Span  
 Current Loop ON/OFF  
 Background Light Elimination ON/OFF  
 Sampling ON/OFF  
 Set Zero Point (to anywhere in measurement range)  
 Set Baud Rate between 300 and 57600 baud  
 Serial Flow Control ON/OFF

Write Configuration data to non-volatile memory  
 Read Configuration data from non-volatile memory  
 Serial Output Control between inches / mm  
 Initialize Configuration to factory defaults  
 Set Sample Priority between Quality/Rate  
 Set Serial Output between ASCII/Binary  
 Take Single Sample (serial only)

## AR600 Signal and Power Interface

The table below shows the wiring of AR600 sensors ordered without power supplies.

Red	Power, +15V (12-24 VDC)
Black	Ground
Orange	Optional Current Loop Range (out)
Brown	Current Loop Return (ground)
Shield	Ground at supply end

## AR600 Sensor Options

**Road Profiling Bundle:** Road Profiling package for AR600-1, -2, -4, -6, or -8. Includes optics, 20 mW laser, and signal processing firmware optimized for use in high-speed or low-speed road surface profiling.

**5 mW Laser Upgrade:** Upgrade laser power from 1 mW visible to 5 mW Visible. For high sample rates on dark or shiny targets.

**20 mW Laser Upgrade:** Upgrade laser power from 5 mW visible to 20 mW infrared. For high sample rates on dark or shiny targets at long distance or use on radiating surfaces. Includes 780 nm, Class IIIb infrared laser with safety interlocks.

**RS 422 Output:** Differential serial output for communication up to 4000 feet. 300 - 57600 baud. Replaces standard RS232 output.

**Current Loop Output:** 4-20 mA analog signal, installed internally.

**Optical Filter:** Optical Filter for brightly-lit or glowing targets, installed internally. to be used with 5 and 20 mW lasers only.

**Power Supply:** Universal AC power supply. 100-240 V, 50 - 60 Hz

**Software Library:** Software Library for AR600 using serial interface. Includes tested functions for C, C++, VBA and Microsoft® Excel.

**Display:** Encased display with bright green characters, 9 mm high for output from AR600 in mm or in. Dimensions: 246.4 x 71.1 x 116.8 mm (L x H x D)



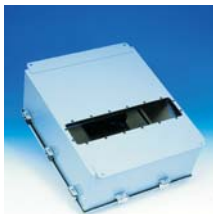
AccuRange™ 4000 sensor series with 0 - 54 foot range and 0.1 inch accuracy



AccuRange™ Line Scanner with spinning mirror and encoder assembly for measuring surface profiles



AccuRange™ 200 short range sensors with spans of 6, 12, 25 and 50 mm



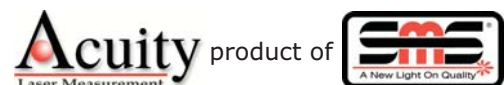
AccuRange™ Line Scanner Environmental Enclosure for industrial environments



AccuRange™ High Speed Interface for rapid sampling with AR4000 and Line Scanner



See chart for laser classification of each model. This product complies with 21CFR 1040.10 and 1040.11. Specifications subject to change without notice.



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