



The AR700 laser displacement sensors are Acuity's fastest and most accurate series of triangulation sensors. Designed for industrial and scientific applications, these sensors measure distances to within fractions of a micron at speeds near ten kilohertz. All models include digital and analog outputs.

## AR700 Laser Displacement Sensors

### Principles of Operation

The AR700 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 AR700 sensor. The target's distance is calculated from the image pixel data using the sensor's microprocessor. The distance is transmitted through serial communications or analog outputs. A variety of models are specified, each to allow a different measurement range.



### Definitions

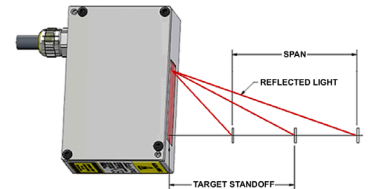
**Span:** Working distance between measurement endpoints over which the sensor will reliably measure displacement

**Standoff:** Offset distance from the face of the sensor to the middle of the span. Accuracy is greatest at the standoff distance and the laser spot size is smallest at this focal point. AR700 standoff location tolerance is +/-0.25mm.

**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.

**Resolution:** Smallest increment of change in distance that a sensor can detect. Stated as % of the Span.

**Sample Rate:** Speed that data samples are obtained from the sensor.



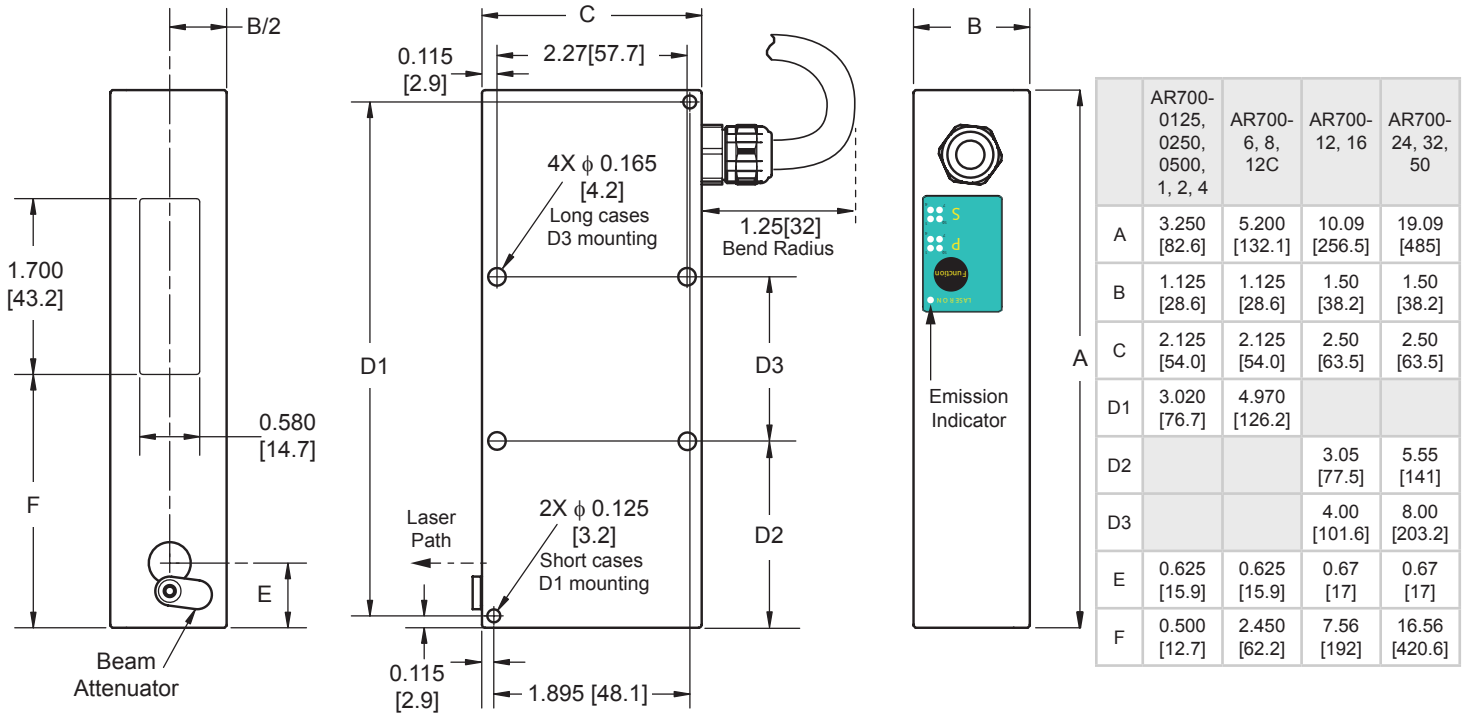
### AR700 Standard Model Specifications units in inches unless noted metric

AR700 model	- 0125	- 0250	- 0500	- 1	- 2	- 4	- 6	- 8	-12c	- 12	- 16	- 24	- 32	- 50
Span	0.125	0.250	0.500	1.0	2.0	4.0	6.0	8.0	12.0	12.0	16.0	24.0	32.0	50.0
Span (mm)	3.175	6.35	12.7	25.4	50.8	101.6	152.4	203.2	304.8	304.8	406.4	609.6	812.8	1270
Standoff	0.50	0.75	1.25	2.00	3.38	5.06	10.0	12.0	15.0	17.0	21.0	43.0	42.0	56.0
Standoff (mm)	12.7	19.1	31.8	50.8	85.7	129	254	305	381	432	533	1092	1067	1422
Linearity (+/-)	0.03% of Span, 500 Hz, to white target (85% diffuse reflectance)											0.03% *	0.05% *	0.1% *
Linearity x10 <sup>-3</sup> (+/-)	0.04	0.08	0.15	0.3	0.6	1.2	1.8	2.4	4.8	3.6	4.8	7.2	16.0	50.0
Linearity μm (+/-)	0.95	1.9	3.8	7.6	15	31	46	61	122	91	122	183	406	1270
Resolution	0.005% of Span													
Resolution x10 <sup>-3</sup>	0.006	0.013	0.025	0.05	0.1	0.2	0.3	0.4	0.6	0.6	0.8	1.2	1.6	2.5
Resolution μm	0.16	0.32	0.64	1.3	2.6	5.1	7.6	10.2	15.2	15.2	20.5	30.5	41.0	63.5
Laser spot size μm	30	35	40	60	65	70	95	120	130	135	150	200	250	300
Weight w/cable, (oz.)	13.1 oz.						15.0 oz.			43.2 oz.		75.7 oz.		
Weight w/cable, (g)	370 g						425 g			1225 g		2146 g		
Laser class	2	2	2	2	2	2	3R	3R	3R	3R	3R	3R	3R	3R
	Complies with 21 CFR 1040 with Laser Notice #50 and IEC/EN 60825-1:2001													
Laser type	650 nm, 1 mW visible RED						670 nm, 5 mW visible RED							
							OPTIONAL 660 nm, 20 mW visible RED (Class 3B)							
Power	15 - 24 Volts DC, 120 – 200 mA draw with 350 mA surge at power-up, Voltage tolerance -5% to +10%													
Sample rates	0.2 – 9400 Hz, or sample trigger (serial command or analog)													
Operating Temp	0 – 50 °C (32 – 122 °F)											0 – 40 °C (32 – 104 °F)		
Storage Temp	0 - 75°C (32 - 167 °F)													
Environmental	NEMA – 4, 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.													
Outputs serial	RS232 full duplex, RS422 unterminated and terminated													
analog	4-20 mA or 0–10 V; two limit switches (NPN, 100 mA sinking)													
Cable	length: 6 ft. (1.8 m), diamter: 0.26" (6.6 mm), weight: 5.8 oz. (165 g), 12 conductor, Polyurethane sheathing													
	Red – power 15-24 VDC				Pink - Limit 1, NPN				Yellow – RxD(RS232), RX- (RS422)					
	Black – Ground				Grey – Limit 2, NPN				Green – TxD (RS232), TX- (RS422)					
	White – laser disable				Orange – current loop / voltage out				Blue – RTS (RS232), TX+ (RS422)					
	Clear – Shield				Brown – current loop / voltage return				Violet – CTX (RS232), RX+ (RS422)					

\* with optional 660 nm, 20 mW visible red laser diode (Class 3B). Standard 5 mW diode results in higher linearities

# AR700 Laser Displacement Sensors

## Mechanical Dimensions units in inches [mm]. Tolerances: .XXX = +/- 0.010 [0.3]; .XX = +/- 0.020 [0.5]



## AR700 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 20 mW (660 nm, Class 3B) for high sample rates on dark surfaces or in high ambient light.

**Bandpass Filter:** Internally-installed. Suggested for outdoor applications and when measuring to bright or radiating targets.

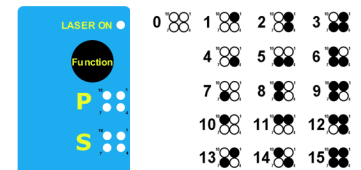
**Road profiling option:** Package for AR700-6 or -8. Includes specialized optics, upgraded diode, bandpass filter and signal processing firmware optimized for use in high-speed longitudinal road surface profiling.

**Touch Panel Display:** Controller and display for Acuity laser sensors. Includes TFT touch display for simple configuration. Calculates material thicknesses using dual laser sensors. Eliminate the need for a PC and costly software development!

**Cables:** Optional 7m cable. Contact us for custom cabling needs.

## Interface Selection

The AR700 has many configurations that can be set directly using the sensor's built-in Function button and corresponding LED's. External controllers are not required to change settings! Manipulation of the PARAMETER and SETTING functions allow users to configure sampling rates, output formats, zero and span points, baud rates, optional exposure limits and limit switches. See the User's Manual for more information.



## Laser Safety Labels



**Acuity AR700**  
Schmitt Measurement Systems  
2765 NW Nicolai St.  
Portland OR, 97210  
COMPLIES WITH 21 CFR  
1040.10 WITH LASER  
NOTICE 59 AND  
IEC/EN60825-1:2001



## Contact Acuity

Schmitt Industries, Inc.  
2765 NW Nicolai Street, Portland, Oregon, 97210, USA  
Tel: 503-227-5178 Fax: 503-227-5040  
www.acuitylaser.com

**Acuity®**