

AR1000 Laser Distance Sensor

Principles of Operation

The AR1000 is a time-of-flight sensor that measures distance by a rapidly-modulated and collimated laser beam that creates a spot on a target surface. Components of the reflected light signal are collected by a lens and focused onto a photodiode within the sensor unit. The reflected light returns with a shift in phase compared with the reference signal. From the amount of phase shift, a required distance is calculated with millimeter accuracy. The distance is transmitted through serial communications or analog outputs. Maximum ranges exceed 100 feet (30 m) with the optional usage of reflectors. The *AR1000H* model has an automatic internal heater for sensor operation to -40°C.



Definitions

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

Accuracy: The sum of all measurement errors when compared to a known standard

Resolution: Smallest increment of change in distance that a sensor can detect.

Reproducibility: Similarity between duplicate measurements

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

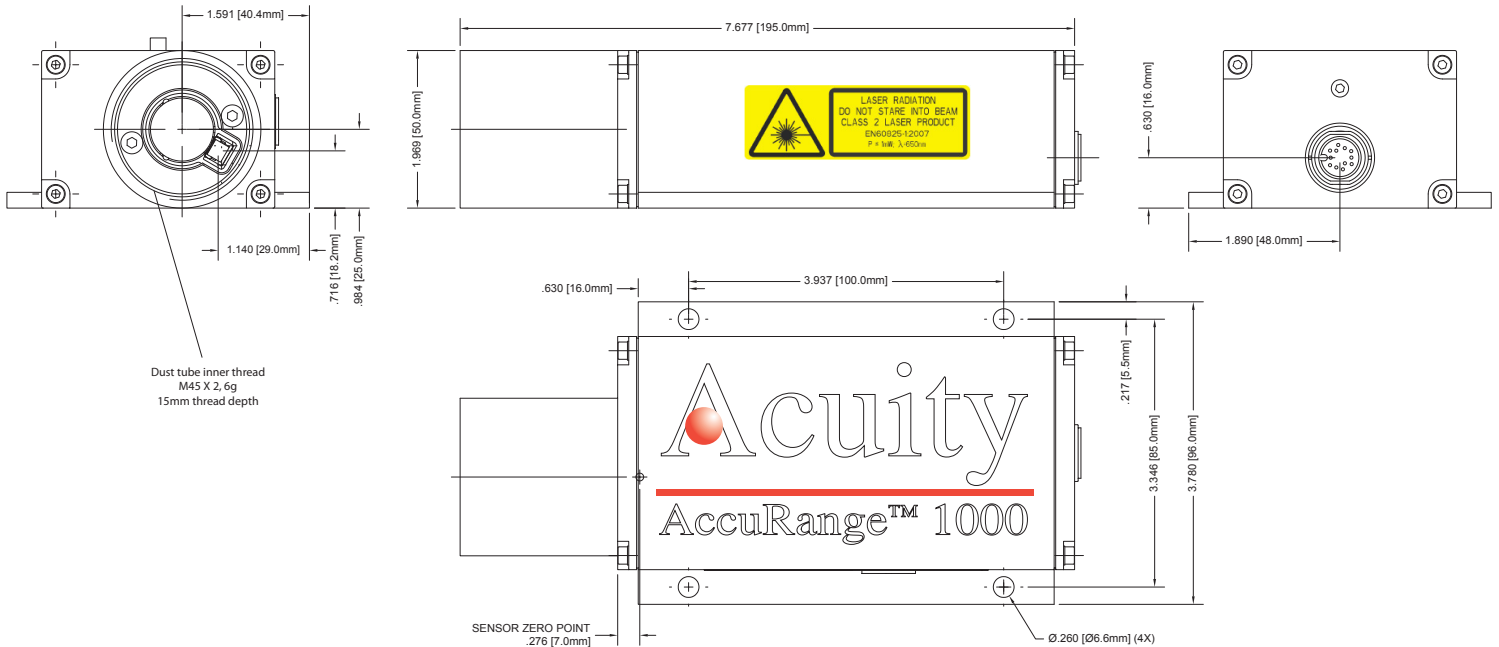
AR1000 Standard Model Specifications units in inches unless noted metric

	English units	Metric units
Span	4 in. min. to 100 ft. max (targets of 85% diffuse reflectance) 500 ft. max (retroreflective targets*)	0.1 to 30 m (targets of 85% diffuse reflectance) 150 m max (retroreflective targets*)
Accuracy	+/- 0.12 in.	+/- 3 mm
Resolution	0.004 in.	0.1 mm
Laser spot	0.2 in., 0.6 mrad divergence	5.1 mm, 0.6 mrad divergence
Reproducibility	≥ 0.02 in.	≥ 0.5 mm
Weight (less cable)	1.7 lbs.	760 grams
Laser class	Class 2, Complies with 21 CFR 1040.10 with Laser Notice 50, IEC/EN60825-1:2001	
Laser type	650 nm, 1 mW visible RED	
Power	10 - 30 Volts DC, 50 – 150 mA draw . (<i>AR1000H</i> 24W at 24VDC with heater)	
Sample rates	50 Hz maximum, or sample trigger (serial command and analog)	
Operating Temp	14 to 122 °F	-10 to 50 °C
	-40 to 122°F (<i>AR1000H</i> with internal heater)	-40 to 50 °C (<i>AR1000H</i> with internal heater)
Environmental	NEMA – 4, IP65. Keep optical windows clean for best performance. Aluminum case.	
Shock & Vibration	Shock (single): 500g / 1ms, DIN ISO-9022-30-08-1 Shock (continuous): 10g / 6ms / 1000x in all 6 directions, DIN ISO-9022-31-01-1 Vibration: 10 Hz ... 2000 Hz ... 10 Hz / 0,075mm / 1g / 2 cycles in 3 directions, DIN ISO-9022-36-02-1	
Outputs serial	RS232 full duplex, RS422 (optional) unterminated and terminated	
analog	4-20 mA, limit switch (NPN, 100 mA sinking)	
Profibus®	Optional output: Profibus® RS485, Profibus-DP-V0	
SSI Option	Optional output: Simple Sensor Interface protocol	
Cable	6.6 ft. (2 m) length, 12 conductor, Binder series 723 flange-mount connector, soldertail wire termination	
	Red – current loop out	Pink - unassigned
	Black – Tx - (RS422)	Grey – Ground
	White – Alarm, digital switching output	Orange – supply voltage
	Clear – Shield	Brown – external trigger
		Yellow – RxD(RS232), RX- (RS422)
		Green – TxD (RS232), RX+ (RS422)
		Blue – Ground
		Violet – Tx+ (RS422)

* Contact Acuity for these targets

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Mechanical Dimensions units in inches [mm] (RS232/RS422 version shown)



AR1000 Sensor Options

RS422 Output: Differential serial output in both terminated and unterminated formats. RS422 replaces RS232.

Touch Panel Display: Smart controller displays distance readings and differential measurements with two sensors.

Cables: Optional cable lengths. Contact us for custom cabling needs.

Internal Heater: AR1000H operates to -40°C using internal heating stabilization

Profibus: 

SSI: Synchronous Serial Interface communication

Laser Safety Labels



Contact Acuity

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

