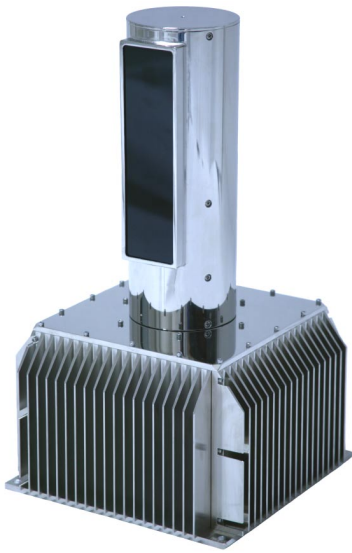


## SRI-500

### Scanning Laser Rangefinder with Inertial Image Stabilization



The SRI-500 Laser Rangefinder is an omnidirectional scanning range image acquisition system for obtaining range images from stationary or mobile platforms at distances up to 500 feet and 800,000 points per second. Scanning is a combination of fast vertical scans at 500 lines/s combined with an azimuth sweep rate of up to 1000<sup>o</sup>/s.

3D point datasets are acquired by setting vertical and horizontal sweep rates, and commanding acquisition of a sequence of vertical scan lines through a specified elevation and azimuth range. The SRI-500 can be programmed to auto-cycle through an azimuth region repeatedly, automatically reversing direction.

The SRI-500 communicates with a host via a TCP-IP connection. The host may issue Laser Enable, Motor Speed, and Take Scan commands through software based on sample source code provided with the scanner. Each scan consists of a sequence of nearly vertical scan lines taken between start and stop platform azimuth and elevation angles. Elevation coverage may be programmed from +65<sup>o</sup> to -65<sup>o</sup> and azimuth from +300<sup>o</sup> to -300<sup>o</sup>. The scan head is capable of two complete rotations in azimuth, lock to lock, to maximize programming flexibility.

#### Optional Inertial Measurement Unit

In mobile applications, the optional internal inertial measurement unit captures platform vibration and rotation at 200 Hz and is used to correct the 3D coordinates of each sample point to create a stabilized world referenced dataset. Data for each scan is corrected to the initial platform inertial orientation during acquisition. Platform orientation and velocity changes between and during scans are reported with each scan, so multiple scans may be registered in a world map and vehicle motion may be derived.



In static applications the internal IMU may be used to register earth vertical which provides absolute orientation information for structures captured.

## Specifications

Scan Angles  
 Azimuth:  $\pm 300^{\circ}$   
 Elevation:  $\pm 65^{\circ}$

Scan Speed:  
 Vertical: 500 lines/s max  
 Horizontal:  $1000^{\circ}$ /s max

Measurement Acquisition Rate: Approx. 800,000 points/sec peak during vertical scan

Range Accuracy, $1\sigma$	1.5 inches
Maximum Range, 85% Reflectance Lambertian Surface	500 feet
Minimum Range	5 feet
Laser Wavelength	905 nm
Eye Safety	Eye safe
Average Laser Power	< 1 mW
Laser Interlock	Vertical scan mirror encoder
Laser Spot Divergence	2 millirad H $\times$ 0.5 millirad V
Optical Aperture	2" $\times$ 8.5"
Scan Motors	Long life brushless DC
Azimuth Accuracy, Platform Relative	1.5 arc-min
Elevation Accuracy, Platform Relative	1 arc-min

Range Gating  
 Minimum and maximum range limits in increments of 12.5 feet from 5 to 500 feet.

Weight: 35 lb.  
 Power: 50-500 W, scan pattern dependent, 12-28 VDC

## Environmental

Enclosure	IP65 / NEMA-4 waterproof
Operating Temperature	-20 to 70 C shade, -20 to 50 C direct sun
Storage Temperature	-40 to 85 C
Shock and Vibration	5G operating, 10G survival
Connectors	Waterproof, UV resistant power and ethernet
Optical Head	Sealed, dry nitrogen filled

## Inertial Measurement Unit Option

6-Axis quartz accelerometer/gyro AHRS system  
 Image Stabilization

Azimuth drift	$0.05^{\circ}$ /sec
Pitch/roll drift	$0.02^{\circ}$ /sec
Pitch/Roll Earth Vertical Attitude Accuracy	
Stationary	$0.1^{\circ}$
Maneuvering Vehicle	$0.5^{\circ}$ typical

## Output Data

Physical Data Interface: 100 Base-T Ethernet  
Application data rate: 25.6 Mbit/s at max scan rate  
Data Output: Streaming scan packet data  
Latency: 100 milliseconds maximum

### Scan Packet

#### Packet Header

Timestamp  
Inertial Velocity Change from Previous Scan End  
Inertial Azimuth Change From Previous Scan End

#### Point Sample Data

Range: 0.1 inch resolution, 0 to 6500 inches  
Azimuth: 0.02° resolution  
Elevation: 0.01° resolution  
Relative Return Signal Strength  
Time From Previous Sample

#### Packet Trailer

Timestamp  
Inertial Velocity Change from Scan Start  
Inertial Azimuth Change From Scan Start

## Reference Coordinate Systems for Output Data

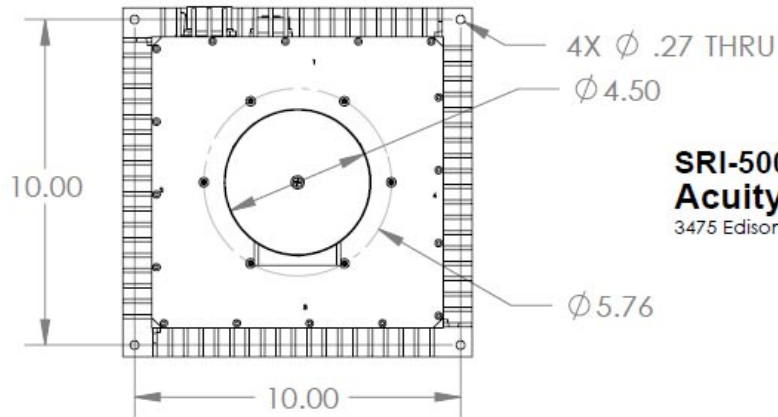
With Inertial Option      Elevation angle relative to Earth Vertical  
Azimuth relative to platform orientation at start of scan  
OR relative to instantaneous platform orientation

Without Inertial Option      Elevation and azimuth relative to instantaneous platform orientation

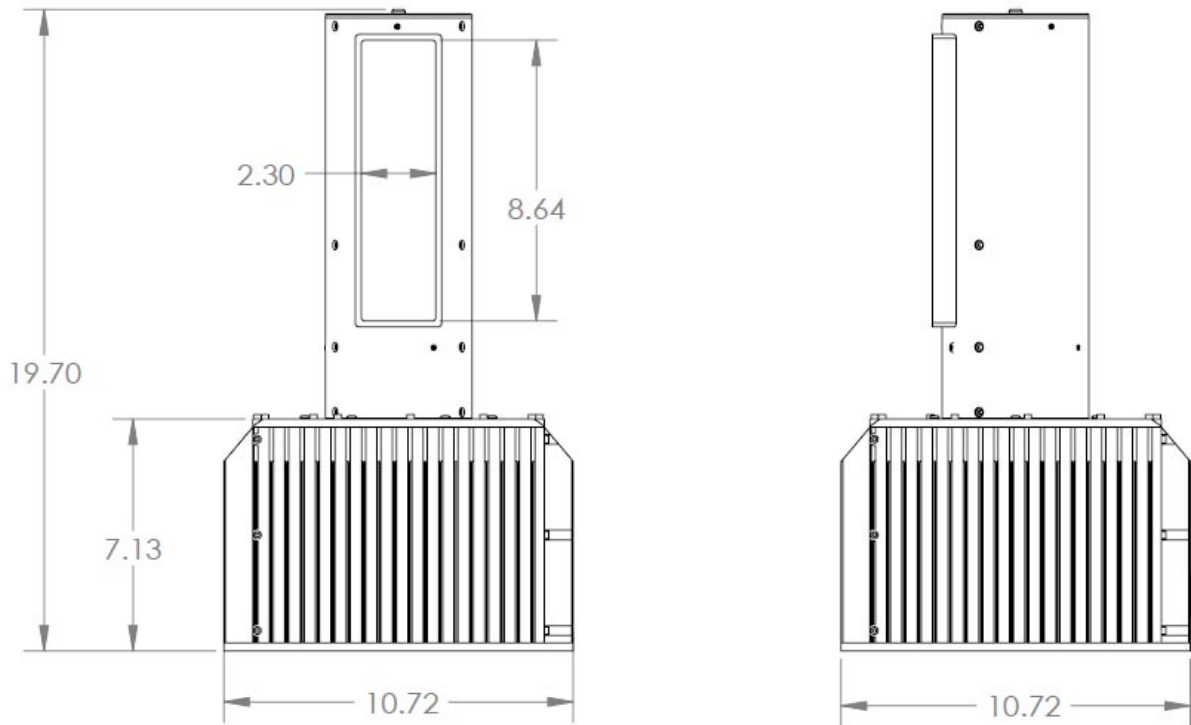
## Command Set

Set Azimuth Scan Speed  
Set Elevation Scan Speed  
Take Single Scan  
Take Repeating Scans (Auto-reverse in azimuth)  
Laser Enable  
Halt Scan

Maximum Scan Duration: 10,000 vertical lines (20 seconds), up to 600° azimuth  
Minimum Scan: 1 vertical line (2 milliseconds)



**SRI-500**  
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