

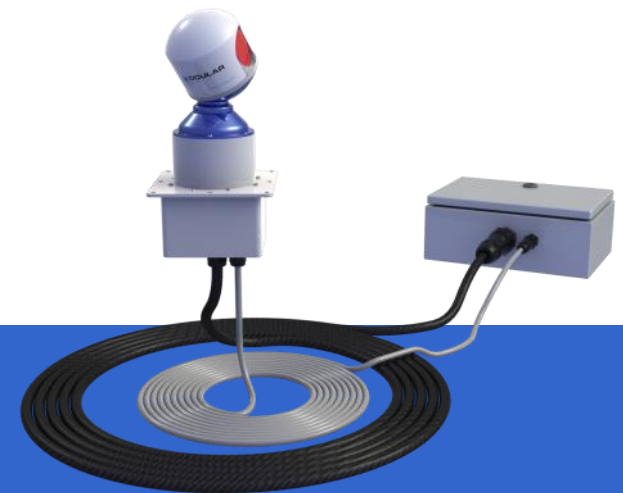


HIGH PERFORMANCE SENSOR POINTING TECHNOLOGIES

RobotEye RE03 3D Laser Scanning System

Product Datasheet

PROVISIONAL

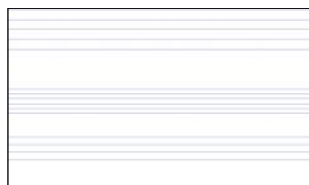
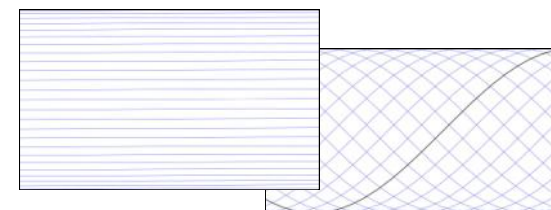


RobotEye RE03 3D Laser Scanning System

The RobotEye RE03 is a high performance long range 3D laser scanning system configured as a simple network appliance. Connect the RE03 to a suitable power supply and your Ethernet network, and the system is ready to go. The supplied software, *RE03 Tools*, and the RE03 C++ class library make it quick and easy to simply gather 3D range data, or integrate the system into your existing data gathering pipeline.

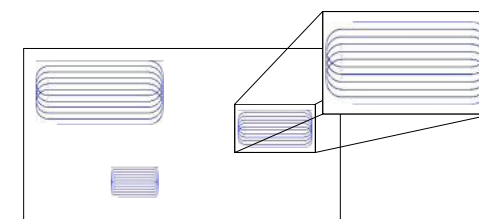
The embedded RobotEye technology brings to laser scanning previously unavailable control over scanning behaviour. Currently five scanning schemes are standard with the RobotEye RE03 System. Each scan pattern is fully parameterised, so that the behaviour of the system is entirely user defined.

- **Full Field Scanning** — When Full Field Scanning is used, the RobotEye scan parameters are the azimuth and elevation rates. Varying these parameters results in a wide variety of possible scan patterns, ranging from fast, coarse scans, to slower, more dense sampling patterns. The diagrams to the right show unwrapped examples of the scan patterns that can be achieved, firstly with a high relative azimuth rate to elevation rate and secondly with a lower azimuth rate relative to the elevation rate.



- **Bounded Elevation Scanning** — In bounded elevation scanning mode, the operator is able to define a scan that covers a full 360° in azimuth but is restricted to a region of the elevation range of the RE03. Again the azimuth rate is configurable as is the line density of the scan. This mode enables the operator to concentrate the focus of the RE03 Scanner to a desired region and at the same time have complete control over the density of the samples taken in that region. The diagram to the left shows some examples of different bounded elevation scans with varying location, extent and line density.

- **Region Scanning** — The region scanning mode allows the operator to define a region within the RE03's azimuth and elevation range in which to concentrate the range scanning. The region scan mode has settings for azimuth rate and line spacing as in the bounded elevation scan as well as the extent of the scan region relative to its top left hand corner where it will scan repeatedly until a different scan is commanded. Again, the diagram to the right shows an unwrapped example of some possible region scans.

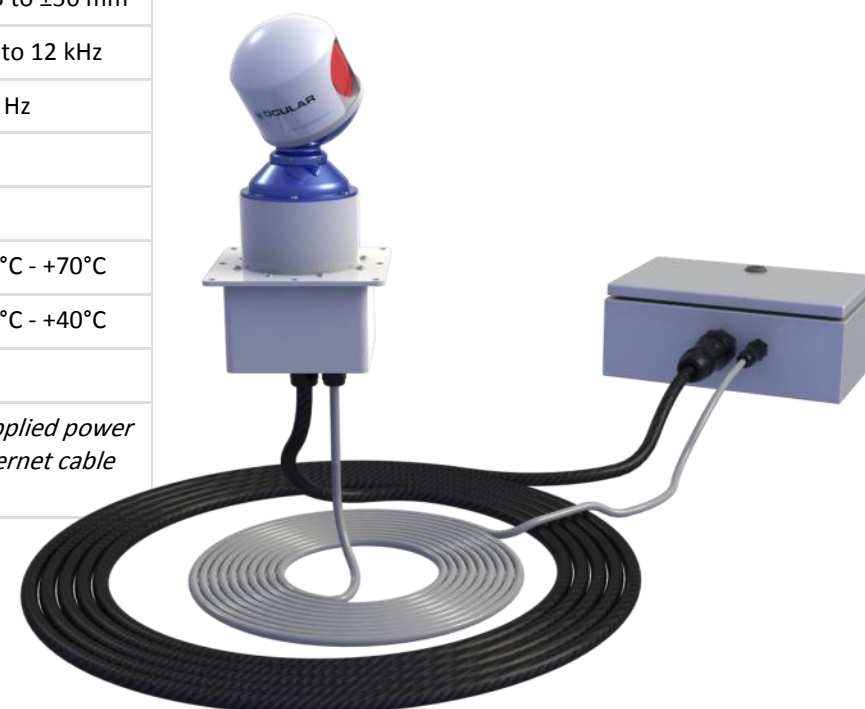


- **Point Measurement** — Point measurement mode gives the operator the ability to define any number of individual points within the RE03's azimuth and elevation range from which to take a measurement. Measurements at these points can then be taken once, a set number of times or repeatedly until a different scan is commanded.
- **Arbitrary Path Scanning** — In arbitrary path scanning mode by providing a list of aperture angles in azimuth and elevation the operator may define a path along which the RE03 will take measurements, as with Point Measurement mode the path may be traversed once, a set number of times or continuously until a different scan is commanded.

Additionally, with the RE03 3D Laser Scanning System you are able to reconfigure or swap between any of the scanning modes immediately, making dynamic control of the scanner behaviour easy.

RE03 Specifications

<i>Mechanical</i>		<i>Rangefinder</i>	
Maximum Azimuth Rate	20Hz	Laser Class	1
Maximum Elevation Rate	3Hz	Laser Wavelength	905 nm
Azimuth Axis Resolution	0.010°	Laser Divergence	1.6 - 3.0 mrad
Elevation Axis Resolution	0.004°	Range (Reflectorless)	Up to 200 m
Azimuth Range	360° Continuous	Range Resolution	1 - 50 mm
Elevation Range	70° (±35°)	Range Accuracy	±25 to ±50 mm
Weight	10.5kg	Maximum Sample Rate	Up to 12 kHz
		Minimum Sample Rate	0.5 Hz
<i>Electrical</i>		<i>Environmental</i>	
Communication (Ethernet)	100 Megabit	Operating Temp. - Scan Head	-20°C - +70°C
Supply Voltage	24VDC	Operating Temp. - Control Unit	-10°C - +40°C
Power Consumption — Typical (average)	<1.5 A	IP Class Rating	65
— Maximum (peak)	10.0 A	<i>Note: IP Rating valid only when both supplied power & optionally supplied weatherproof Ethernet cable connectors are fitted.</i>	
<i>Software</i>			
RE03 Class Library Support	Windows/Linux		
RE03 Tools Support	Windows/Linux		



Specifications are subject to change without notice

Software

RE03 Tools — The supplied *RE03 Tools* application allows control of all RE03 system settings including scan parameters, sample frequency, maximum range and connection settings. *RE03Tools* also gives full control over the logging of 3D data from the RE03 and the translation of the logged binary data to ASCII CSV format for export to point cloud display software. For more detailed information on *RE03Tools* see the RE03 User Manual downloadable from the Ocular Robotics website.

RE03 C++ Class Library — The RE03 ships with a fully documented C++ class library for both Windows and Linux that can be used to simply and quickly interface to the RE03 device. This enables rapid application development for users who wish to integrate the RE03 into their proprietary systems. The library provides access to the entire range of RE03 features. The RE03 Network Interface Class Library Reference Manual is available for download from the Ocular Robotics website.

Custom Application Development — Ocular Robotics Pty. Ltd. provides a full range of custom development services for users who have specific application requirements for the RE03. These services range from custom firmware development for the RE03 through to large scale software development for applications of the RE03, such as in volume estimation tasks. Please contact Ocular Robotics for more information if required.

Data Output

The RE03 system outputs 3D data points at up to 12kHz making it possible to quickly acquire dense point cloud data from the region specified by the current scan settings or alternatively rapidly update 3D range information over a wide area at ranges up to 200 metres.

Using RE03 Tools, the native 3D data format of the RE03 laser scanner is *range, azimuth, elevation, intensity*. The user can retain this native format when logging or choose to log data in *x, y, z, intensity* format. 3D data logged in native format can later be converted to *x, y, z, intensity* using *RE03 Tools* translation settings.

Environmental

The RE03 3D Laser Scanning System has been designed to operate in a wide variety of industrial environments. The RE03 system has an environmental rating of IP65 while the two system modules the RE03 scanning head and the control unit can operate in ambient temperatures of -20°C to $+70^{\circ}\text{C}$ and -10°C to 40°C respectively.

System Configuration

The RobotEye RE03 3D Laser Scanning System is configured as two modules, one is the RobotEye RE03 3D laser scanning head the other is the control and communication unit. The two modules are connected by an optical fiber link that carries the laser output and receive signals between the RE03 scanning head and the rangefinder system in the control and communications unit and a feedback and control cable that provides the signals necessary for control of the RE03 scanning head. The length of the link between the RE03 scanning head and the control and communications unit can be up to 20 metres allowing a great deal of freedom in the positioning of the scan head and its control and communications unit. The only other system connections are the power input and Ethernet communications port. The RE03 3D Laser Scanner can be configured with one of a number of different rangefinder units with differing range, accuracy and sample rate capabilities, when specifying a system we can provide advice on the most appropriate rangefinder unit for your application.

Communication

The bidirectional communication of data and control with the RobotEye RE03 is achieved via the system's Ethernet port. This enables the system to be operated and data processing to occur anywhere on the network to which the RE03 is connected, limited only by the allowable length of CAT6 Ethernet cable. A 100 Megabit Ethernet connection to the RE03 is sufficient to meet the demands of all possible data transmission rates.

Laser Class

All RobotEye RE03 3D Laser Scanning System configurations are eye safe Class 1 laser products.

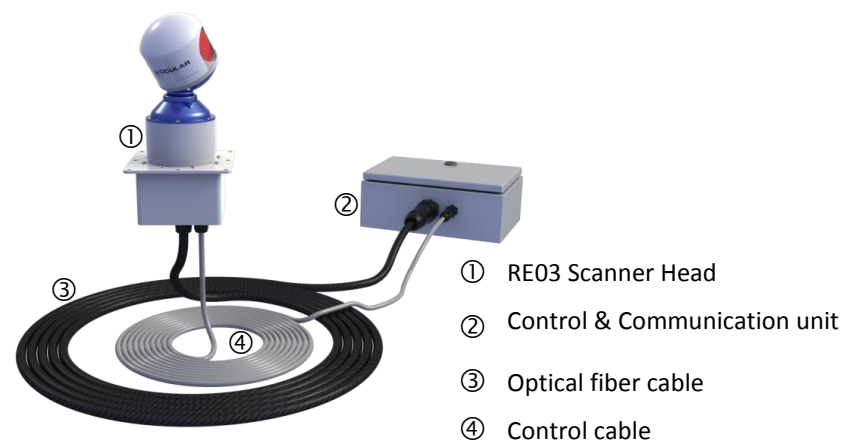


System components

The RE02 3D Laser Scanning System is supplied as standard with the following components:

- RobotEye RE03 3D Laser Scanning Head
- RobotEye RE03 3D Laser Scanning Control and Communications Unit
- 3 Metre RE03 Scan Head Optical Fiber Cable
- 3 Metre RE03 Scan Head Control Cable
- 5 Metre Power Cable
- RE03 Tools Operating, Logging and Translation Software
- RE03 Network Interface Class Library

Available system options include: a system case, extended optical fiber and control cables, and a weatherproof Ethernet cable assembly.



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