OCULAR ROBOTICS

HIGH PERFORMANCE SENSOR POINTING TECHNOLOGIES

RobotEye NAKED REN25
Two-Axis Optical Pointing System

Product Datasheet

RobotEye NAKED REN25 Two-Axis Optical Pointing System

The RobotEye NAKED REN25 is an implementation of our RobotEye technology designed to provide a general purpose high performance two axis optical pointing capability for use in OEM and prototype systems. As with all RobotEye systems, the sensor or source is able to remain completely stationary while the signal is directed about two axes. The NAKED REN25 optical path components can be specified at build time to match your chosen sensor.

The unprecedented motion bandwidth of the RobotEye NAKED REN25 allows the following types of behaviours to be achieved with ease.

- *Pre-programmed Paths* - The NAKED REN25 can accurately follow predefined paths with extremely high accelerations up to $100,000°/s^2$ and velocities up to 10,000/s delivering unparalleled path following capabilities to a wide range of sensors and sources. Where precision repeated path following about two axes with your sensor or source is important to your application the NAKED REN25 provides an ideal solution.

- *Dynamically Generated Paths* - Just as with predefined paths the NAKED REN25 is able to follow dynamically generated paths with the same unparalleled accuracy, acceleration and velocity as in the pre-programmed case and with the same flexibility to use the sensor our source of your choice. The generated paths can be completely arbitrary within the field of regard of the NAKED REN25. These paths are realised simply by streaming desired aperture angles to the relevant function in our RobotEye RE Lib C++ library. A good example of this behaviour is our inertially slaved REN25 option which provides a ready made off the shelf implementation where the NAKED REN25 aperture is slaved to the inertial sensor connected to the system.

- *Dynamic or Structured Pointing* - The ability of the RobotEye NAKED REN25 to move rapidly and accurately between points with extremely high acceleration and slew speed provides unprecedented capability in acquiring sensor data from, or pointing a source at, points of interest within the field of regard of the NAKED REN25. Whether a structured grid of measurements is required or completely arbitrary points are being defined by some input to the system the NAKED REN25 can acquire each designated point dwell for the required amount of time and move to the next point with unparalleled speed.

- *Velocity Controlled Scanning* - By setting the NAKED REN25 to velocity mode the full field of the system can be scanned at a wide range of rates in both azimuth and elevation. Applications of this mode include: scanning the environment surrounding a system for a given signal; mapping the environment surrounding the system in terms of a given sensor's band of sensitivity; or even illuminating the surrounding environment in a controlled way. The NAKED REN25 velocity mode offers full control to be able to achieve these behaviours as required by the application.

Implementation of all of these behaviours is straightforward using the RobotEye RE Lib C++ library supplied standard with the RobotEye NAKED REN25 Optical Pointing System allowing quick and easy integration into the target system.

NAKED REN25 Specifications

Mechanical		Optical	
Maximum Aperture Rate	10,000°/s	Clear Aperture	22mm
Maximum Aperture Acceleration	100,000°/s	Mirror Options	Yes
Azimuth Axis Resolution	0.010°	Customizable Optical Path Elements	Yes
Elevation Axis Resolution	0.010°		
Azimuth Range	360° Continuous	Software	
Elevation Range	70° (±35°)	RobotEye Class Library Support	Windows/Linux
Accuracy	0.05°	Network Interface Protocol	
Weight	1.6kg		
		Environmental	
Electrical		Operating Temperature Range	-20°C - +70°C
Communication	Ethernet	IP Class Rating	65
Supply Voltage	24VDC		
Power Consumption — Typical (average)	<1.5 A	Note: IP Rating valid only when supplied in an enclosure, system window is factory fitted and both supplied power & optionally supplied weatherproof Ethernet cable connectors are fitted.	
— Maximum (peak)	10.0 A		

Specifications are subject to change without notice

Software

RobotEye C++ Class Library — The REN25 ships with a fully documented C++ class library for both Windows and Linux that can be used to simply and quickly interface to the REN25 device. This enables rapid application development for users of the REN25. The library provides access to the entire range of REN25 features. The RobotEye Class Library Reference Manual is available for download from the Downloads tab, and contains a full description of the library and its use.

RobotEye Inertial slaving application — The REN25 (inertially slaved variant) ships with an inertial Attitude Heading Reference System (AHRS) that enables inertially slaved operation of the REN25. This application, in conjunction with the RobotEye Class Library allows a wide variety of applications to be developed. See the Head Mounted Display on the REN25 Videos page of our website for a demonstration of the use of this application.

Stabilised RobotEye REN25 — The Stabilised REN25 closes an inertial feedback loop at the level of the RobotEye's custom control hardware to provide a high bandwidth stabilised aperture capable of stabilizing the view of a sensor in 3 axes on a wide range of mobile platforms

Optical Path Customization

The only required optical element in the NAKED REN25 System is the mirror at the centre of the system. When ordering a system a mirror can be chosen that suits the sensor used in your application or alternatively a customer specified mirror may be installed when the system is built. Other optical components may also be built into the optical path of the NAKED REN25, whether it is a system window with particular transmission properties, signal collimation optics or some other requirement. Please contact Ocular Robotics for more information if required.

Environmental

The RobotEye NAKED REN25 System has been designed to operate in the harshest environments with the ability to adopt an environmental protection rating of up to IP65 and an operating temperature range of –20°C up to 70°C. All system components have been designed or selected to meet the performance and operational requirements of the demanding environments in the defence, resources and homeland security sectors.

As with all of our systems, the REN25 system gains its robust nature from the fact that the sensor, all drive components and control electronics remain stationary and inside the system enclosure or within the housing of the platform to which the system is mounted leaving only the RobotEye head exposed. The low mechanical stress operation of the RobotEye technology ensures extended operation at high levels of performance. All of this results in a system that can be relied on to operate in harsh environments for long periods without attention.

Control & Communication

The NAKED REN25 system requires a 24VDC power connection and a 100 Megabit Ethernet connection. Communication and control of the RobotEye NAKED REN25 System is achieved via the system's Ethernet port, full control of the system aperture and system feedback including current aperture orientation is enabled through the RobotEye C++ Class Library. The connection to a sensor used with the system is normally made to the computer which is controlling the REN25 aperture so that application software can efficiently fuse sensor data and aperture positions to produce registered sensor data.

System Customisation

All RobotEye systems can be customised to meet the needs of an application or operating environment. Whether it is tailoring for operation in a particular service environment, component material changes, enhancing performance specifications, altering the optical path characteristics, custom software development or a range of other possible modifications, all of these things can be achieved while retaining the dynamic performance and other benefits of the RobotEye technology. Please contact Ocular Robotics for more information if required.

System components

The RobotEye NAKED REN25 System is supplied as standard with the following components:

- RobotEye NAKED REN25 Head optimized for efficiency in the selected band
- RobotEye NAKED REN25 Control Unit
- 3 Metre System Power Cable
- RobotEye C++ Class Library

Optional system components are:

- Inertially Slaved RobotEye System Upgrade
- Stabilized System Upgrade
- Optical Path Element Customisation (contact Ocular Robotics for more information)
- System Enclosure
- Weatherproof Ethernet Cable

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