



Instruction Manual

RLS and RLS24 Rugged Laser Sensors



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SAFEGUARDS AND PRECAUTIONS



Diode Laser

Max. Output Power: <1 milliwatt

Wavelength: **650 nanometers (visible light)**

Beam Divergence: <18 milliradian

Output: **Continuous (CW)**

Laser Hazard Classification: **Class 2**

Laser Hazards:

Eye injury from beam - Do not look into the direct or reflected beam; can cause eye injury up to 25 ft [7.5 m] away.

Visual interference (glare) with pilots and drivers - Interferes with vision up to 525 ft (160 m) away. Can be a distraction up to 1 mile [1.6 km] away. **NEVER point any laser towards aircraft or vehicles; it is unsafe and illegal.**

Safe Use Guidance:

Class 2 lasers are considered safe for accidental eye exposure. Do not look or stare into beam. Do not aim at aircraft. **This is not a toy.** Always supervise children.

Manufacturer:

Monarch Instrument

15 Columbia Drive

Amherst, NH 03031 USA

Country of Origin: USA

Contact info: www.monarchinstrument.com



Read and follow all instructions in this manual carefully, and retain this manual for future reference.

Do not use this instrument in any manner inconsistent with these operating instructions or under any conditions that exceed the environmental specifications stated.

This instrument is not user serviceable. For technical assistance, contact the sales organization from which you purchased the product.



In order to comply with EU Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE): This product may contain material

which could be hazardous to human health and the environment. DO NOT DISPOSE of this product as unsorted municipal waste. This product needs to be RECYCLED in accordance with local regulations; contact your local authorities for more information. This product may be returnable to your distributor for recycling; contact the distributor for details.

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Monarch Instrument's Limited Warranty applies.
See www.monarchinstrument.com for details.

Warranty Registration and Extended Warranty Coverage information is available online at www.monarchinstrument.com.

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1.0 OVERVIEW

The RLS and RLS24 Rugged Laser Sensors are optical reflective sensors with a visible red laser light source and green LED on-target indicator. The sensors are rated IP67 and are designed to survive accidental exposure to water, dirt, oil, and other contaminants.

The Class 2 laser source acts as the aiming device during setup and can accurately measure speeds from 1-250,000 RPM from a distance of up to 25 feet with a maximum offset angle of 60 degrees from the rotating object. The sensors are housed in an M20x1.5 threaded 316L stainless steel tube and have a watertight M12 4 pin socket on the backend. A 90-degree mounting bracket and 2 jam nuts are provided for mounting.

The RLS and RLS24 are supplied with a removable 3 m [9.8 ft.] cable with a watertight M12 4 Pole Female connector on one end and a 3.5 mm [1/8 inch] male stereo plug (RLS-P or RLS24-P) or 4 tinned wires (RLS-W or RLS24-W) on the other end. An optional 25 ft. [7.6 m] extension cable EC-25P is available with a female socket for the plug on one end and a 3.5 mm [1/8 inch] male stereo plug on the other (for RLS-P or RLS24-P).

The sensor can be powered by 4-15 V dc or 10-24 V dc and is available in the following configurations:

Model	Power Requirement	Removable 3 m Cable
RLS-P	4 – 15 V dc \pm 20% 0.5W	M12 4 Pole Female connector to 1/8 in. [3.5 mm] male stereo plug
RLS-W	4 – 15 V dc \pm 20% 0.5W	M12 4 Pole Female connector to tinned wires
RLS24-P	10 – 24 V dc \pm 20% 0.5W	M12 4 Pole Female connector to 1/8 in. [3.5 mm] male stereo plug
RLS24-W	10 – 24 V dc \pm 20% 0.5W	M12 4 Pole Female connector to tinned wires

2.0 CONNECTION DETAILS

Connection to the sensor is via the watertight M12 connector on the end of the sensor. The sensor may be ordered with one of two cables: the **-P** with a 3.5 mm stereo connector or the **-W** with tinned wires as shown below.

M12-PLUG



M12-PLUG

PLUG PIN OUT



M12-CONNECTOR



M12 PIN No.	Function	-W Wire Color	-P Stereo Conn.
1	+ Supply Voltage	Red	Ring
2	No Connection	White	-
3	Common	Yellow	Common
4	Pulse Out	Black	Tip
Sensor Housing	Sensor Housing	Shield	-



RLS-W with wires

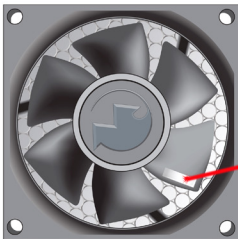


RLS-P with plug

3.0 OPERATING INSTRUCTIONS

Plug the sensor into an appropriate power source (RLS = 4-15 V dc, RLS24 = 10-24 V dc). The RLS-P will work directly with Monarch stroboscopes that accept pulse input through an input jack (e.g., dax, dbx, DBL, pbx, PBL, Nova-Pro® 300, Nova-Pro® 500). The RLS-W will work with all Monarch panel instruments in the ACT and Frequency to Analog Converter series that accept pulse inputs and have a sensor power option between 4 to 15 V dc. The RLS24-W will work with any panel instrument in the ACT series that accepts pulse inputs and has a sensor power option between 10 to 24 V dc. The RLS-W and RLS24-W can also be used with the DataChart™ 1250 and vibration data collectors.

The RLS Rugged Laser Sensor can detect a reflected pulse from a target consisting of T-5 Reflective Tape or high-contrast color differences (such as black and white) at distances up to 25 feet [7.6 m] from the rotating object and angles up to 60 degrees. For most applications, a ½" [12 mm] square piece of T-5 Reflective Tape should be applied to a clean area on the rotating object as a target. At slow speeds (<500 RPM) best results will be obtained by aiming the laser perpendicular (90°) to the target using a narrow piece of reflective tape – typically 0.2 inch [5 mm] wide.



The RLS should be optically aligned to illuminate the On-Target Indicator once per revolution. It is recommended that the optical sensor be placed at a slight angle (15 degrees) from perpendicular so that the sensor will receive only pulses from the reflective marker. Triggering from contrasting colors should be done perpendicular to the target. The RLS should be at least 1 inch from the reflective target to avoid false triggering. The green LED On-Target Indicator will blink at the input frequency rate when the RLS is properly aimed.

Note: The green LED On-Target Indicator will blink (on/off) at slow speeds and remain on steady at high speeds.

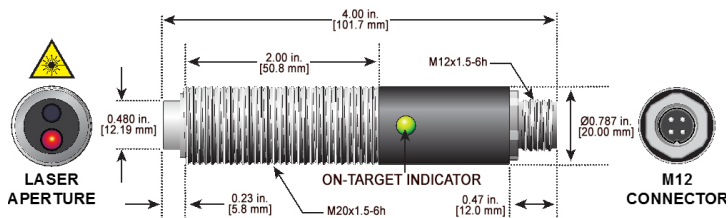
Note: Optical speed sensors require environments that are clean and free of mist, steam, dirt, oil, and other contaminants to function properly. The RLS can survive these conditions, but it will not function properly if the optics are contaminated. Carefully cleaning or drying the optics will restore normal operation.

4.0 SPECIFICATIONS

Specifications*	RLS Rugged Laser
Speed Range	1 - 250,000 RPM
Illumination	Visible red laser
Laser Specifications:	
Classification	Class 2 (per IEC 60825-1:2014) This product complies with IEC60825-1 Ed. 3 and 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50 of June 2007.
Laser Output	1 mW max
Laser Operation	Continuous
Laser Wavelength	650nm (visible red)
Beam Divergence	<18 mrad
Beam Diameter	4 x 7 mm typical at 2 m
Laser Diode Life	8,000 operating hours MTBF (1-year warranty)
On-Target Indicator	Green LED on tube body - active when pulse present
Operating Range	Up to 7.6 m [25 ft.] and 60° offset from target
Power Requirements	RLS-W and RLS-P: 4 - 15 V dc \pm 20% 0.5W RLS24-W and RLS24-P: 10 - 24 V dc \pm 20% 0.5W
Output	Standard: Open Collector with internal pull up resistor (5600 ohm) to supply voltage; positive pulse when target present Note: On 24 V unit output voltage = input voltage – 5 V. Optional: Negative pulse, true open collector, 3.3 V output (TTL); contact factory
Material	Tube: 316L stainless steel Nosepiece: ABS

*Specifications are subject to change without notice.

4.1 Dimensions



4.2 Environmental

This product is rated IP67 when used with supplied cables.

Operating Temperature: -10 °C to +50 °C (14 °F to 122 °F)

Storage Temperature: -40 °C to +80 °C (-40 °F to 170 °F)

4.3 Compliance

CE Compliant

Please visit our website, www.monarchinstrument.com, to download our Declaration of Conformity for this product.

5.0 ACCESSORIES

[See Accessories webpage for details.](#)

EC-25P: Extension Cable

PN: 6180-028



RLS-P Cable: 3 m cable

with M12 connector to 3.5 mm [1/8 in.]
male stereo plug

PN: 6180-085



RLS-w Cable: 3 m cable

with M12 connector to tinned leads

PN: 6180-084



RLS-Nut: Jam Nut M20 x 1.5 x 10 mm

Two required to secure to Mounting Bracket

PN: 1053-0189-001



RLS-Mount: Mounting Bracket

90° slotted

PN: 1052-4350-112

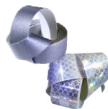
Reflective Tape

T-5 (single pack), 5 feet - PN: 6180-070

T-5 (2-pack), 5 feet each - PN: 6180-069

T-50, 50 feet - PN: 6180-072

T-5WP (waterproof), 5 feet - PN: 6180-079



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