MONARCH INSTRUMENT
Instruction Manual

RLS and RLS24
Rugged Laser Sensors

CE ⚠ IP67

Safeguards and Precautions

CLASS 2 LASER PRODUCT
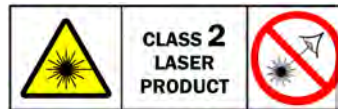
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50 of June 2007.

Diode Laser
Max. output power: **<1 milliwatts**
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.

⚠ 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.

TABLE OF CONTENTS:

OVERVIEW

The RLS Rugged Laser Sensor is an optical reflective sensor that has a visible red laser light source and green LED on-target indicator. The sensor is rated IP67 and is 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 sensor is housed in a M20x1.5 threaded 316L stainless steel tube and has a watertight M12-4 socket on the back end.

The sensor is supplied with a 90-degree mounting bracket, jam nuts, and a 3m [9.8 ft] shielded cable with a watertight M12 plug. The cable has either tinned wires (RLS-W or RLS24-W) or a molded 3.5mm [1/8 inch] male stereo plug (RLS-P or RLS24-P).
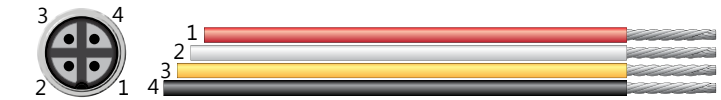

RLS-W with Wires   **RLS-P with Plug**

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 3.5mm stereo connector or the "-W" with tinned wires as shown below.

M12-PLUG

Stereo Connector
1/8 inch (3.5mm)

common ring tip

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	-

OPERATING INSTRUCTIONS

The RLS Rugged Laser Sensor is capable of detecting 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 Reflective Tape (T-5) 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.
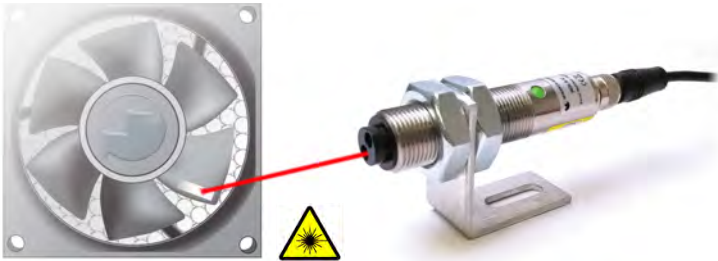
The RLS should be optically aligned to illuminate the on-target indicator once per revolution. It is recommended that the optical sensor be placed at a slight angle (15 degrees) from perpendicular, so that the sensor will receive only pulses from the reflective marker. Triggering from contrasting colors 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 and 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 in order 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.

The RLS is supplied with a 3m (9.8 ft.) cable with an 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 foot [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 RLS-P will work directly with all Monarch handheld tachometers and stroboscopes that accept pulse input through an input jack (e.g. PLT200, PLS, dax, dbx, DBL, pbx, PBL, Nova-Pro 300, Nova-Pro 500). The RLS-W and RLS24-W will work with all Monarch panel instruments that accept pulse inputs (e.g. ACT series, Frequency to Analog Converters, DataChart 1250, DataChart 6000) and vibration data collectors. A sensor power supply (SPSR-IM) with BNC output is available for those applications that require a separate power source for the sensor (RLS-P only).

SPECIFICATIONS

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: 1mW max
   Laser Operation: Continuous
   Laser Wavelength: 650 nm (Visible Red)
   Beam Divergence: <18 mrad
   Beam Diameter: 4 x 7 mm typical at 2 meters
   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 25 feet [7.6 m] and 60 degrees offset from target

Power Requirement: RLS-W and RLS-P: 4 – 15Vdc ±20% 0.5W
                                  RLS24-W and RLS24-P: 10 – 24Vdc ±20% 0.5W

Output: **Standard:** Open Collector with internal pull up resistor (5600 ohm) to supply voltage. Positive pulse when target present. Note: On 24V unit output voltage = input voltage – 5V)
      Optional: Negative pulse, true open collector, 3.3V output (TTL). Contact Factory.

Dimensions:

Material: Tube – 316L Stainless Steel
Nosepiece – ABS

Environmental: Rated IP67 when used with supplied cables
Temperature: Operating: -10°C to +50°C (14°F to 122°F)
Storage: -40°C to +80°C (-40°F to 170°F)

Compliance:
EMC: Directive 2014/30/EU – EN 61326-1:2013
Low Voltage: Directive 2014/35/EU
Electrical Safety: EN 61010-1:2010
Laser Safety: EN 60825-1:2014-3

ACCESSORIES

| P/N	Model	Description
6150-021	SPSR-IM	Self Powered Sensor—Interface Module
6180-028	EC-25P	25 foot [7.6 m] Extension Cable for RLS-P or RLS24-P
6180-070	T-5 Tape	Reflective Tape - 5 foot [1.5 m] roll, 0.5 inch wide
6180-079	T-5WP Tape	Waterproof Reflective Tape—5 foot [1.5 m] roll, 1 inch wide, adhesive back
1053-0189-001	RLS-NUT	M20 x 1.5 x 10mm Jam Nut—two required to secure to Mounting Bracket
1052-4350-112	RLS-Mount	90° Slotted Mounting Bracket
6180-085	RLS-P CABLE	3m Cable with M12 connector to 3.5 mm [1/8 inch] male stereo plug
6180-084	RLS-W CABLE	3m Cable with M12 connector to tinned leads

P/N: 6150-021

P/N: 6180-028

P/N: 6180-070
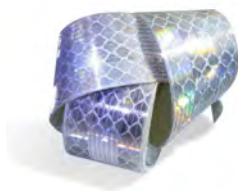
P/N: 6180-079

P/N: 6180-085

P/N: 6180-084

Check out our other product lines…

Handheld Tachometers

Panel Tachometers

Portable Stroboscopes

Machine Vision Stroboscopes

Speed Sensors

Temperature/ Humidity Sensors

Vibration Meters

Paperless Recorders

Track-It® Data Loggers

1071-4180-711– 0320