



# MONARCH INSTRUMENT

*Instruction Manual*

## **PLT200 - POCKET LASER TACH 200** **Tachometer/Rate Meter/Totalizer/Timer**



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Amherst, NH 03031 USA

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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](http://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](http://www.monarchinstrument.com) for details.

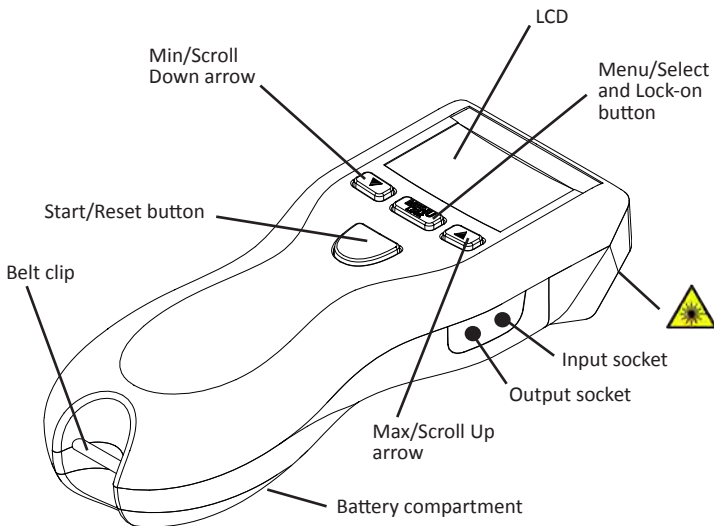
Warranty Registration and Extended Warranty Coverage information is available  
online at [www.monarchinstrument.com](http://www.monarchinstrument.com).

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## 1.0 DESCRIPTION

The Pocket Laser Tach 200 is a multifunction tachometer, ratemeter, totalizer and timer. It is programmable to read in English or metric units. An input socket accepts remote sensing devices and an output socket allows for pulse output to external indicating devices. The PLT200 can be tripod mounted and locked-on for accurate and continuous operation. This tachometer also stores minimum, maximum and last measurement in memory.

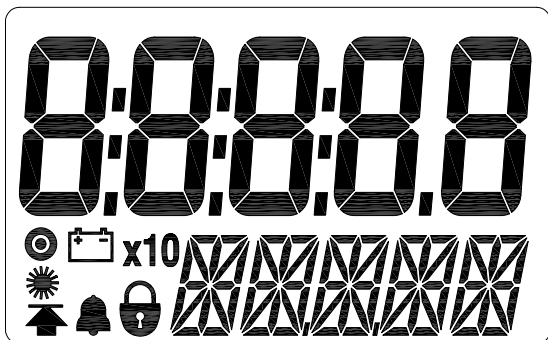
## 2.0 FEATURE LOCATIONS



**AVOID EXPOSURE**

**LASER BEAM IS EMITTED FROM THIS APERTURE**

### 3.0 LCD SYMBOLS



On-Target Indicator — blinks whenever there is an input signal and will appear to be solid on at higher frequencies



Low Battery icon — indicates that the batteries are low and need to be replaced.



Times Ten icon — indicates that the value shown is ten times that which is displayed

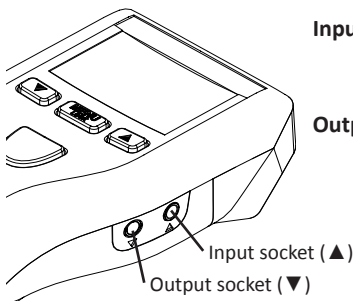


**Laser Indicator — red laser is on when this indicator is illuminated**



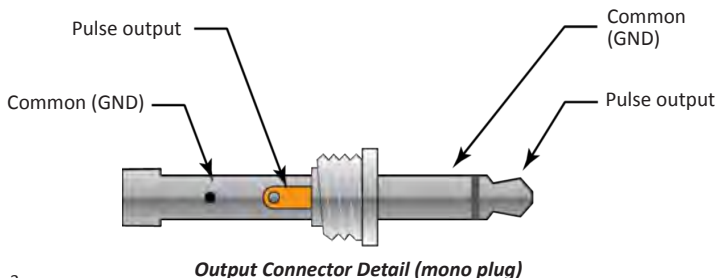
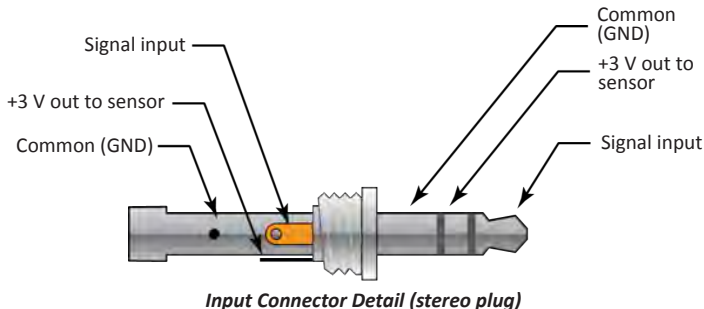
Lock icon — indicates that the unit is locked and making continuous measurements (Lock Mode)

## 4.0 INPUT/OUTPUT



**Input:** Accepts remote sensor or Remote Contact Assembly (RCA)  
*1/8" [3.5 mm] stereo phone plug*

**Output:** 1 pulse per revolution TTL output on internal operation;  
pulse repeater with external sensors  
*1/8" [3.5 mm] mono phone plug*



## 5.0 PREPARATION FOR MEASUREMENT

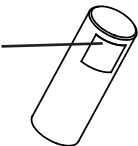
### 5.1 Noncontact Preparation

Follow the steps below for internal operation (red laser) or external operation using optional Remote Optical Sensor (ROS-Red LED):

1. Clean shaft.



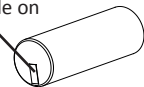
2. Apply 1/2" square of T-5 Reflective tape.



For small shafts:



As small as 1/8" wide on side or radius edge

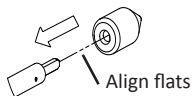


### 5.2 Direct Contact Preparation

Follow external operation **ONLY** using optional Remote Contact Assembly (RCA):

**Select and install contact option:**

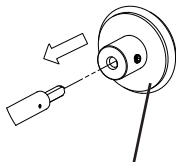
1. Contact Tip (convex tip shown)  
*Use concave tip for small shafts*



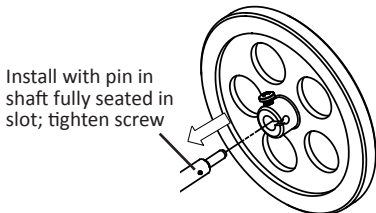
2. 10 cm Wheel

**OR**

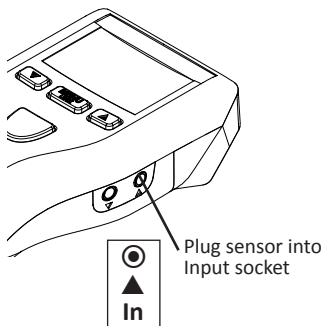
3. 12 in. Wheel



Tighten screw securely into flat on shaft



## 5.3 Connecting External Sensors



Remote Contact Assembly (RCA)  
(shown with optional 12-inch Wheel)



Remote Optical Sensor (ROS-P)



Infrared Sensor (IRS-P)



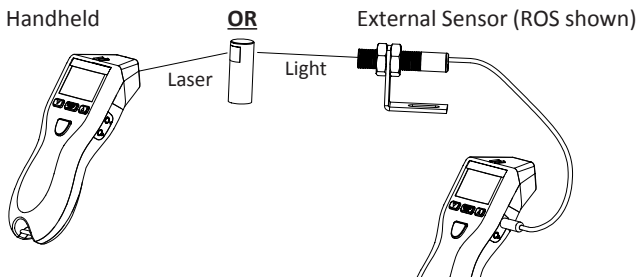
Magnetic Sensor with Amplifier (MT-190P)

Please visit [www.monarchinstrument.com](http://www.monarchinstrument.com) for additional sensor options.

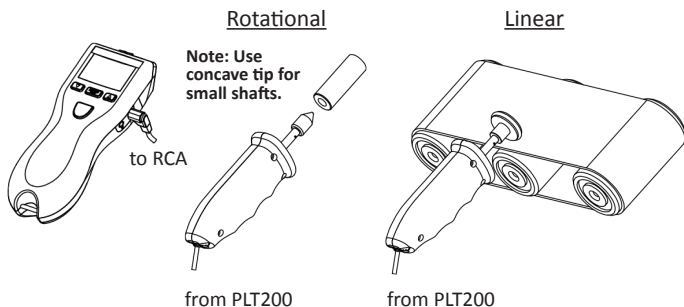


## 6.0 TAKING MEASUREMENTS

### 6.1 Noncontact Measurements



### 6.2 Direct Contact Measurements



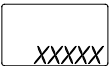








#### ONLY USE MODERATE PRESSURE

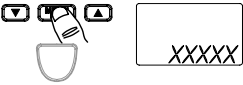



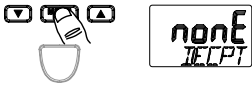




**WARNING:** Making measurements in direct contact with rotating equipment can be dangerous. Keep all loose clothing and hair away from exposed moving machinery. Keep the hand holding the instrument well behind the back end of the Remote Contact Assembly. Properly replace all machinery guards after completing measurement. Do not use for rotation greater than 20,000 RPM.

## 7.0 TACHometer MODE

A tachometer measures speed or linear rate with respect to time; time intervals are seconds, minutes, or hours. Rotational speed can be measured in Revolutions (Revs) per second, per minute, or per hour. The most common measurement is RPM or Revs per minute using the optical Tachometer Mode.

### 7.1 TACHometer Setup

1. Turn Power ON  
 Last Units selected are displayed
- 1a. To toggle Lock On/Off  
Press and hold  
 Lock On
2. Enter Setup  

3. Enter selection of Mode  
 Last mode selected is displayed
4. Select TACH Mode  
 OR  Repeat until *TACH* displayed
5. Save and advance  


6. Enter selection of Units  

7. Select Units  

 OR 
 Repeat until desired Units displayed
8. Save and advance  

9. Enter selection of number of decimal places  

10. Select decimal places  

 OR 
 Repeat until desired decimal places displayed
11. Save and advance  

12. Exit Setup – ready to measure  


The unit will remember these settings (including Lock On/Off) even if turned off then back on.

## 7.2 TACHometer Operation

Measure



OR



Press and hold



Lock On

Recall Max



Max speed

Recall Min



Min speed

If unit Lock On



Resets Max/Min



Power OFF



OR Automatic after 90 seconds  
if unit not Locked On


## 8.0 RATE MODE

Measurement of units in addition to Revs requires the attachment of the Remote Contact Assembly and tips/wheels. With this attachment, the unit can measure RATE inputs-revs, inches, feet, yards, centimeters and meters either per second, per minute or per hour, as well as miles per hour.

**Note:** External Remote Contact Assembly (RCA) must be inserted into input socket.

## 8.1 RATE Setup


1. Turn Power ON
 




XXXXXX


*EXTN*, then scrolling message, then last Units selected
  
- 1a. To toggle Lock On/Off
 

Press and hold




 XXXXX

Lock On
  
2. Enter Setup
 




**SETUP**  
MODE
  
3. Enter selection of Mode
 




XXXXXX


Last mode selected is displayed
  
4. Select RATE Mode
 




OR



Toggles between *RATE* and *TOTAL*; select *RATE*
  
5. Save and advance
 



**SETUP**  
UNITS
  
6. Enter selection of Units
 



XXXXXX

Rotational: *CRPS*,  
*CRPM* or *CRPH*

Linear: *IPS*, *IPM*, *IPH*, *FT/S*, *FT/M*,  
*FT/H*, *YPS*, *YPM*, *YPH*, *MPH*, *CM/S*,  
*CM/M*, *CM/H*, *M/SEC*,  
*M/M IN*, *M/H*

## RATE Setup (continued):

7. Select Units



OR



Repeat until  
desired Units  
displayed

8. Save and  
advance



OR



Rotational Units

Linear Units

### Only for Linear Units:

- 8a. Enter selection  
of Wheel



Last wheel  
selected is  
displayed

- 8b. Select  
Wheel



Toggles  
between  
10CM and  
12IN

- 8c. Save and  
Advance



9. Enter selection  
of number of  
decimal places



NONE, 1, 2 or 3

10. Select decimal  
places



OR



Repeat until  
desired decimal  
places displayed

11. Save and  
advance



12. Exit Setup –  
ready to  
measure



*DONE,  
USE CONTACT TIP*  
or [Wheel selected],  
then Units selected

The unit will remember these settings (including Lock On/Off) even if turned off then back on.

## 8.2 RATE Operation

Measure



OR



Press and hold



Lock On

Recall Max



Max Speed

Recall Min



Min Speed

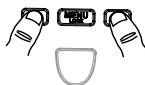
If unit Locked On:



Resets Max/Min



Power Off



OR

Automatic after 90 seconds  
if unit not Locked On

## 9.0 TOTALIZER MODE

Totalizer accumulates input on an ongoing basis. In the simplest form the unit acts as an optical counter, incrementing the display each time an input pulse is sensed. Using the Remote Contact Assembly with various tips and wheels, the unit can totalize in revs, inches, feet, yards, centimeters, and meters.

### 9.1 TOTALizer Setup

1. Turn Power ON



Different messages displayed for Internal or External operation



Internal optics or External optical sensor (i.e. ROS):



Last Units selected

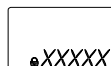
External Remote Contact Assembly:



*EXTRN*, then scrolling message, then last Units selected

- 1a. To toggle Lock On/Off

Press and hold



Lock On

2. Enter Setup



3. Enter selection of Mode



Last mode selected is displayed

4. Select TOTAL Mode



OR



Repeat until *TOTAL* displayed



5. Save and advance

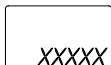


6. Enter selection of Units



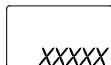
Different options displayed for Internal or External operation

Internal or External ROS:



COUNT  
Only

External Remote Contact Assembly:



Rotational: REV  
Linear: INCH, FEET,  
YARDS, CM, METER

7. Select Units



OR



Repeat until  
desired Units  
displayed

8. Save and advance



COUNT or REV

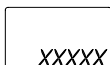
OR



Linear Units

Only for Linear Units:

- 8a. Enter selection of Wheel



Last Wheel  
selected is  
displayed

- 8b. Select Wheel



OR



Toggles  
between  
10CM and  
12IN

- 8c. Save and Advance



## TOTALizer Setup (continued):

9. Enter selection of number of decimal places



— NONE, 1, 2 or 3

10. Select decimal places



OR



Repeat until desired decimal places displayed

11. Save and advance



12. Exit Setup - ready to measure



Units = COUNT:  
DONE,  
then COUNT

Rotational/Linear Units:  
DONE,  
USE CONTACT TIP or  
[wheel selected],  
then Units selected

The unit will remember these settings (including Lock On/Off) even if turned off then back on.

## 9.2 TOTALizer Operation

Measure



OR



Press and hold



Lock On

Recall Max  
or Min



Max or Min Speed (in last selected Tach or Rate mode units)

Recall Time  
in seconds



Shows time in seconds from when the Start/Reset button is pressed until the last input signal measured

If unit is  
Locked On:



Resets Max/Min, Total and Measurement Time

Power Off



OR Automatic after 90 seconds if unit not Locked On

**Note:** Pressing



OR


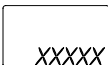

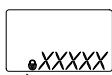




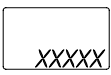







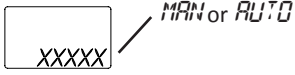

Once before 90 seconds will keep measurements in memory and the display turned on longer

## 10.0 TIMER MODE

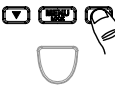
Accumulates time in minutes, seconds, and tenths of a second. There are two modes of operation. The Manual mode operates like a stopwatch, the timing period being started and stopped by the user. The Auto mode can be stopped and started by the user or a piece of reflective tape on objects. The user can freeze the display and view/record a LAP time-at any time without affecting the count.





### 10.1 TIMER Setup

1. Turn Power ON   Last Units selected are displayed
- 1a. To toggle Lock On/Off   Locked On  
Press and hold 
2. Enter Setup Mode  
3. Enter selection of Mode   Last mode selected is displayed
4. Select TIMER Mode  OR  Repeat until *TIMER* displayed
5. Save and advance  

6. Enter selection of Timer function  


7. Select Timer function  


OR



Toggles between Manual and Auto
8. Save and advance  


9. Exit Setup – ready to measure  



Unit will remember these settings (including lock on/off) even if turned off and back on.

## 10.2 TIMER Operation

Measure:

Manual



Each press toggles Start and Stop



Auto



OR Start and Stop triggered by external remote optical sensor (ROS) or internal optics



Reset



With Timer stopped - resets time to 00:00.0

## TIMER Operation (continued):

Lap



With Timer running - stops at elapsed time to date; to continue, press again

Power Off



OR If Timer stopped - automatic after 90 seconds if unit not Locked On

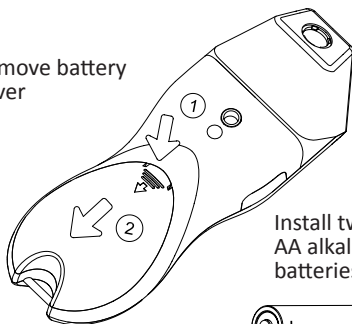
OR Automatic after 99:59.9

## 11.0 BATTERIES

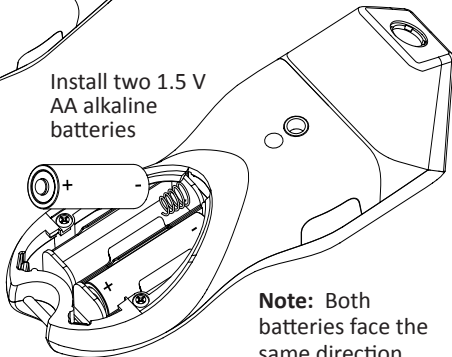
When displayed, replace batteries



Remove battery cover



Install two 1.5 V  
AA alkaline  
batteries



**Note:** Both batteries face the same direction.

## 12.0 SPECIFICATIONS

Specifications*	PLT200 Pocket Laser Tachometer
<b>Laser Specifications:</b>	
<b>Classification</b>	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
<b>Max Laser Output</b>	<b>&lt; 1 mW</b>
<b>Pulse Duration</b>	Continuous
<b>Laser Wavelength</b>	650 nm
<b>Beam Divergence</b>	18 mrad
<b>Beam Diameter</b>	4 mm x 7 mm typical @ 2 meters
<b>Laser Diode Life</b>	8,000 operating hours MTBF (1 year warranty)
<b>Noncontact Specifications:</b>	
<b>RPM Range</b>	5-200,000
<b>RPS Range</b>	0.084-3,333.3
<b>RPH Range</b>	300-999,999
<b>Resolution - Fixed</b>	1 (10 above 99,999)
<b>Resolution - Autoranging</b>	0.001 to 1.0 (10 above 99,999)
<b>Accuracy</b>	±0.01% of reading or resolution limit
<b>Operating Range</b>	Up to 25 ft. [7.62 m] or up to 70 degrees off perpendicular to T-5 Reflective Tape target
<b>Contact Specifications using optional Remote Contact Assembly:</b>	
<b>Range - Contact Tips</b>	0.5-20,000 RPM
<b>Range - Wheels</b>	0.5-12,000 RPM

Specifications*	PLT200 Pocket Laser Tachometer
<b>Contact Specifications (continued):</b>	
<b>Resolution - Fixed</b>	1 (10 above 99,999)
<b>Resolution - Autoranging</b>	0.001 to 1.0 (10 above 99,999)
<b>Accuracy - Revs</b>	±0.05% of reading (RPM) or resolution limit (with no slippage)
<b>Accuracy - Linear</b>	±0.5% of reading or resolution limit (with no slippage)
<b>Contact Measurement Ranges:</b>	
<b>Tachometer:</b>	
<b>RPM</b>	0.5-20,000
<b>RPS</b>	0.0833-333.33
<b>RPH</b>	30-999,999
<b>Rates:</b>	<b>Wheel Circumferences</b>
<b>Inches per Second</b>	10 cm: 0.033 to 1312.3 12 in.: 0.100 to 2,400.0
<b>Inches per Minute</b>	10 cm: 1.969 to 78,740 12 in.: 6.000 to 144,000
<b>Inches per Hour</b>	10 cm: 118.11 to 999,990 12 in.: 360.00 to 999,990
<b>Feet per Second</b>	10 cm: 0.003 to 109.36 12 in.: 0.009 to 200.00
<b>Feet per Minute</b>	10 cm: 0.164 to 6,561.7 12 in.: 0.500 to 12,000
<b>Feet per Hour</b>	10 cm: 9.843 to 393,700 12 in.: 30.000 to 720,000
<b>Yards per Second</b>	10 cm: 0.001 to 36.453 12 in.: 0.003 to 66.667



<b>Specifications*</b>	<b>PLT200 Pocket Laser Tachometer</b>
<b>Rates (continued):</b>	<b>Wheel Circumferences</b>
<b>Yards per Minute</b>	10 cm: 0.055 to 2,187.2 12 in.: 0.167 to 4,000.0
<b>Yards per Hour</b>	10 cm: 3.281 to 131,233 12 in.: 10.000 to 240,000
<b>Miles per Hour</b>	10 cm: 0.002 to 74.564 12 in.: 0.006 to 136.36
<b>Centimeters per Second</b>	10 cm: 0.084 to 3,333.3 12 in.: 0.21 to 3,048.0
<b>Centimeters per Minute</b>	10 cm: 5.000 to 200,000 12 in.: 15.240 to 365,760
<b>Centimeters per Hour</b>	10 cm: 300.00 to 999,990 12 in.: 914.40 to 999,990
<b>Meters per Second</b>	10 cm: 0.001 to 33.333 12 in.: 0.003 to 60.960
<b>Meters per Minute</b>	10 cm: 0.050 to 2,000.0 M/MIN 12 in.: 0.153 to 3,657.6 M/MIN
<b>Meters per Hour</b>	10 cm: 3.000 to 120,000 12 in.: 9.144 to 219,460
<b>Totalizer:</b>	
<b>Counts</b>	0 to 999,999
<b>Scale Totals in Inches, Feet, Yards, Centimeters, or Meters</b>	
<b>Input</b>	Internal or external optics or contact wheel
<b>Timer Specifications:</b>	
<b>Minutes:Seconds, tenths to 99:59.9</b>	
<b>Accuracy</b>	±0.2 second
<b>Resolution</b>	0.1 second

Specifications*	PLT200 Pocket Laser Tachometer
Display	Dual LCD: 5-digit upper/scrolling and 5-digit alphanumeric lower display
Batteries	Two (2) AA 1.5 V $\pm$ (DC) alkaline included (Note: Batteries are NOT rechargeable.)
Battery Life	30 hours continuous typical with batteries provided
<b>External Input:</b>	
Absolute Max	-0.3 V to 5 V $\pm$ (DC) pulse
Minimum	Low below 1.2 V and high above 2 V (TTL compatible)
Edge	Triggers on Positive edge
Power Out	3.0 V nominal, approx. 2.8 V @ mA max
Pulse Output	0 V to 3.3 V $\pm$ (DC) pulse Same shape as External Input signal or high when internal optics sees a reflection
Dimensions (HxWxD)	6.92 in. x 2.4 in. x 1.6 in. [17.58 cm x 6.10 cm x 4.06 cm]
Weight	Approx. 7 oz. (210 g)
<b>This product is designed to be safe for indoor use under the following conditions (per IEC61010-1):</b>	
Installation Category II	per IEC 664
Pollution Degree Level II	per IEC 664
Temperature	40 °F to 105 °F (5 °C to 40 °C)
Humidity	Max relative humidity of 80% for temperatures up to 88 °F (31 °C) decreasing linearly to 50% relative humidity at 100 °F (40 °C) Humidity non-condensing

\*Specifications are subject to change without notice.

## 13.0 CLEANING

To clean the instrument, wipe with a damp cloth using mild, soapy water.

## 14.0 SENSORS AND ACCESSORIES

[See webpage for the complete list of accessories.](#)

### Sensors:

<b>RLS-P</b>	PN: 6180-081	Rugged Laser Sensor with removable 3 m cable, M12 connector to 1/8" phone plug connector
<b>ROLS-P</b>	PN: 6180-029	Remote Optical Laser Sensor with 8 ft. [2.5 m] cable
<b>ROS-P</b>	PN: 6180-057	Remote Optical Sensor with 8 ft. [2.5 m] cable
<b>ROS-P-25</b>	PN: 6180-057-25	Remote Optical Sensor with 25 ft. [7.6 m] cable
<b>IRS-P</b>	PN: 6180-020	Infrared Sensor with 8 foot [2.5 m] cable for use without reflective target at 0.5 inch [12 mm] gap
<b>ROSM-P</b>	PN: 6180-902	Modulated Remote Optical LED Sensor with 8 ft. [2.5 m] cable
<b>MT-190P</b>	PN: 6150-036	Amplified Magnetic Sensor

### Accessories:

**Remote Contact Assembly (RCA)** PN: 6180-074  
includes two contact tips and 10 cm wheel

**Input/Output Cable CA-4044-6** PN: 6180-028  
mono phone plug to BNC connector

**Padded Pouch (with belt loop)** PN: 6180-047

**Latching Plastic Carry Case CC-11** PN: 6180-048

### **Reflective Tape:**

T-5 (single pack), 5 feet PN: 6180-070  
T-50, 50 feet PN: 6180-072  
T-5WP (waterproof), 5 feet PN: 6180-079

