MONARCH INSTRUMENT

Instruction Manual

Pocket Laser Tach 200 (PLT200)

Tachometer / Rate Meter / Totalizer / Timer

Para la traducción en español: www.monarchinstrument.com
Pour la traduction en français : www.monarchinstrument.com

15 Columbia Drive
Amherst, NH 03031 USA
Phone: (603) 883-3390
Fax: (603) 886-3300
E-mail: support@monarchinstrument.com
Website: www.monarchinstrument.com

SAFEGUARDS AND PRECAUTIONS

Diode Laser
Max. output power: **<1 milliwatt**
Wavelength: **650 nanometers (visible light)**
Min. divergence: **1.0 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 2002/96/EC 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.

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

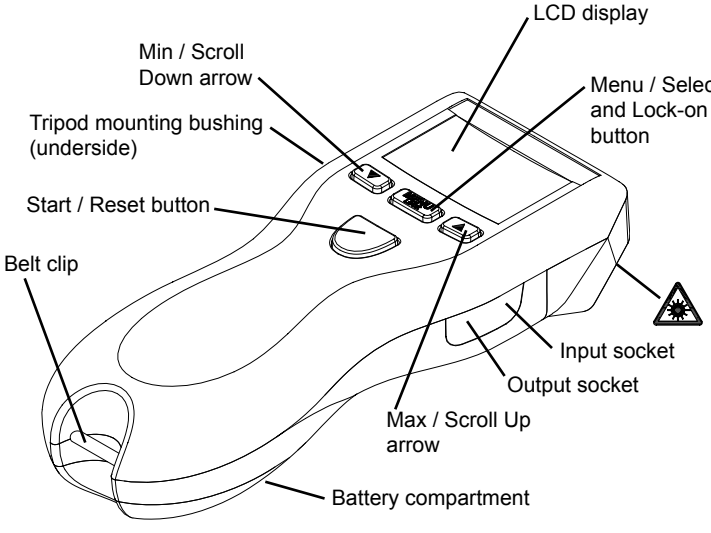
Warranty Registration and Extended Warranty coverage available online at www.monarchinstrument.com.

TABLE OF CONTENTS

1.0 OVERVIEW

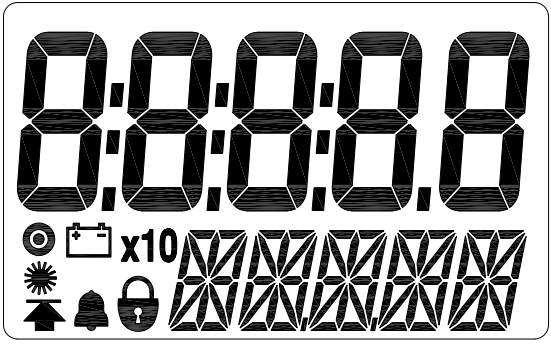
The Pocket Laser Tach 200 is a multifunction Tachometer, Ratemeter, Totalizer and Timer. It is programmable to read in English or Metric units. An input socket accepts remote sensing devices and an output socket allows for pulse output to external indicating devices. The PLT200 can be tripod mounted 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 DISPLAY SYMBOLS



On Target Indicator. Blinks on whenever there is an input signal. Will appear to be solid on at higher frequencies.

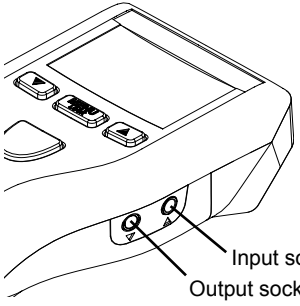
Low Battery icon. Indicates that the batteries are low and need to be replaced.

x10 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.

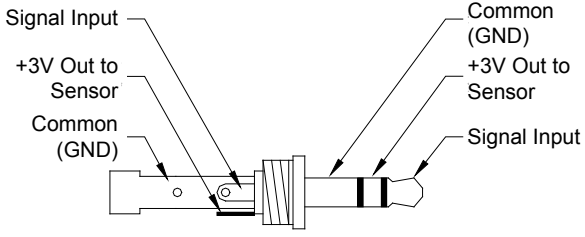
Lock icon. Indicates that the unit is “Locked” on and making continuous measurements (Lock mode).

4.0 INPUT / OUTPUT

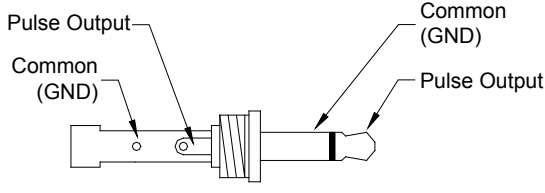


Input: Accepts remote sensor or Remote Contact Assembly (RCA). 1/8" (3.5mm) stereo phone plug.

Output: 1 pulse per revolution TTL output on internal operation. Pulse repeater with external sensors. 1/8" (3.5mm) mono phone plug.



Input Connector Detail (Stereo plug)

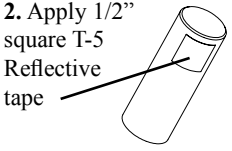


Output Connector Detail (Mono plug)

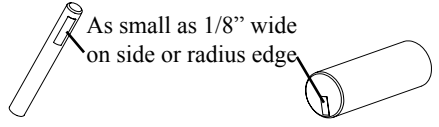
5.0 PREPARATION FOR MEASUREMENT

5.1 Non-Contact Preparation

For Internal operation (Red laser) or External operation using optional Remote Optical Sensor (ROS-Red LED).



For Small Shafts:



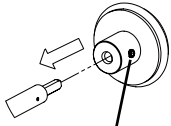
5.2 Direct Contact Preparation

For External operation ONLY using optional Remote Contact Assembly (RCA).

Select and install contact option:

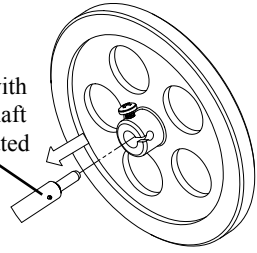
1. Contact Tip (Convex tip shown. Use Concave tip for small shafts.)

2. 10 cm Wheel **OR** **3.** 12 inch Wheel

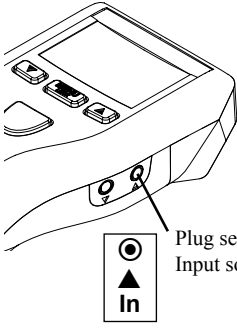


Tighten screw securely into flat on shaft.

Install with pin in shaft fully seated in slot. Tighten screw.



5.3 Connecting External Sensors



Plug sensor into Input socket

Remote Contact Assembly (RCA)
(shown with optional 12 inch wheel)

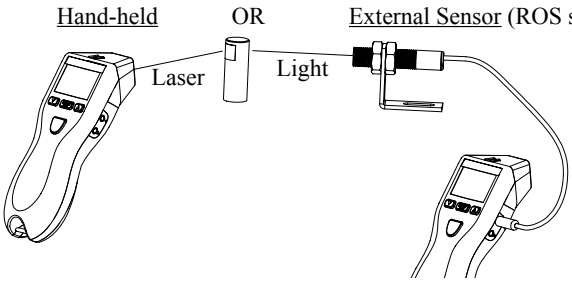
Remote Optical Sensor (ROS-P)

Infrared Sensor (IRS-P)

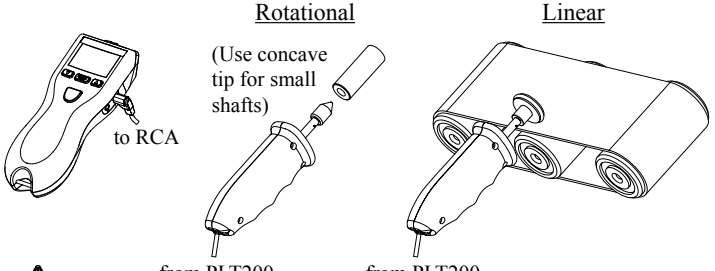
Magnetic Sensor with Amplifier (MT-190P)

6.0 TAKING MEASUREMENTS

6.1 Non-Contact 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

Tachometer measures speed or linear rate with respect to time. Time intervals are sceonds, 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

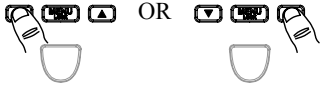
1a. To toggle Lock On/Off

2. Enter Setup

3. Enter selection of Mode

Last Mode selected is displayed

4. Select TACH Mode



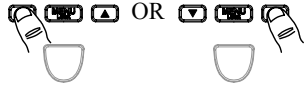
Repeat until *TACH* displayed

5. Save and advance

6. Enter selection of Units

RPS, *RPM* or *RPH*

7. Select Units



OR

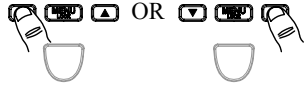
Repeat until desired Units displayed

8. 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

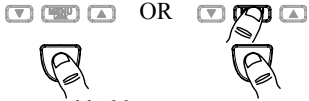
11. Save and advance

12. Exit Setup – Ready to measure

DONE, then Units selected

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

7.2 TACHometer 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

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

EXTRN, then scrolling message, then last Units selected

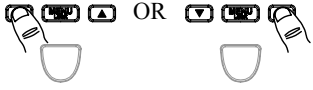
1a. To toggle Lock On/Off

2. Enter Setup

3. Enter selection of Mode

Last Mode selected is displayed

4. Select RATE Mode



OR

Toggles between *RATE* and *TOTAL*. Select *RATE*.

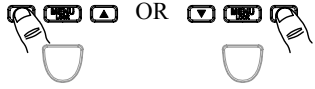
5. Save and advance

6. Enter selection of Units

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/MIN*, *M/H*

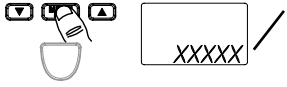
RATE Setup (continued):

7. Select Units  Repeat until desired Units displayed

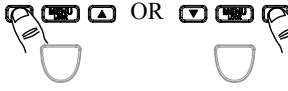
8. Save and advance 

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  Repeat until desired decimal places displayed

11. Save and advance 

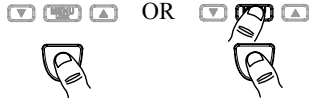
12. Exit Setup – Ready to measure

DONE, USE CONTACT TIP or [wheel selected], then Units selected

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

8.2 RATE Operation

Measure



OR Press and hold Lock on

Recall Max

Max Speed

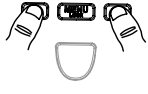
Recall Min

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

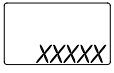
Totalizer accumulates input on an ongoing basis. In the simplest form the unit acts as an optical counter, incrementing the display each time an input pulse is sensed. Using the Remote Contact Assembly with various tips and wheels, the unit can totalize in revs, inches, feet, yards, centimeters, and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

9.1 TOTALizer Setup

1. Turn Power ON

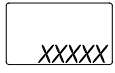
Different messages displayed for Internal or External operation.

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



Last Units selected

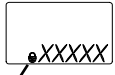
External Remote Contact Assembly:



EXTRN, then scrolling message, then last Units selected

1a. To toggle Lock On/Off

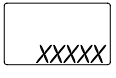
Press and Hold



Locked On

2. Enter Setup

3. Enter selection of Mode



Last Mode selected is displayed

4. Select TOTAL Mode

OR

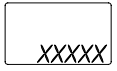
Repeat until *TOTAL* displayed.

5. Save and advance

6. Enter selection of Units

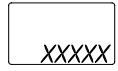
Different options displayed for Internal or External operation.

Internal or External ROS:



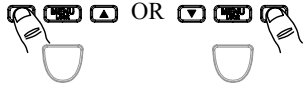
COUNT Only

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

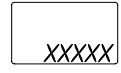
OR

COUNT or REV

Linear Units

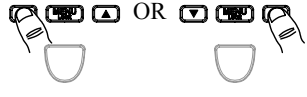
Only for Linear Units:

8a. Enter selection of Wheel



Last Wheel selected is displayed

8b. Select Wheel



OR

Toggles between 10CM and 12IN

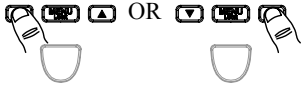
8c. Save and Advance

TOTALizer Setup (continued):

9. Enter selection of number of decimal places

NONE, *1*, *2* or *3*

10. Select decimal places



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

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

9.2 TOTALizer Operation

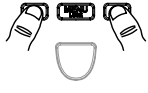
Measure  OR 

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

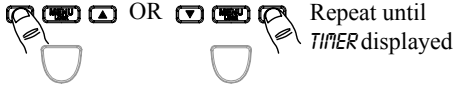
1a. To toggle Lock On/Off

2. Enter Setup Mode

3. Enter selection of Mode

Last Mode selected is displayed

4. Select TIMER Mode



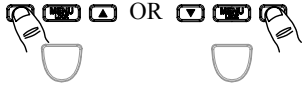
Repeat until *TIMER* displayed

5. Save and advance

6. Enter selection of Timer function

MAN or *AUTO*

7. Select Timer function



OR

Toggles between Manual and Auto

8. Save and advance

9. Exit Setup – Ready to measure

DONE, then Units selected

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

10.2 TIMER Operation

Measure:

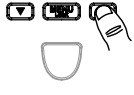
Manual

Each press toggles Start and Stop

Auto

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

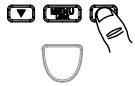
Reset



With Timer stopped - Resets time to 00:00.0

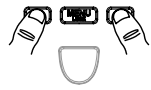
TIMER Operation (continued):

Lap



With Timer running -
Stops at elapsed time to date.
To continue, press again.

Power Off

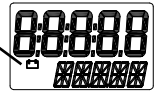


OR If Timer stopped -
Automatic after 90 seconds
(if unit not Locked on)

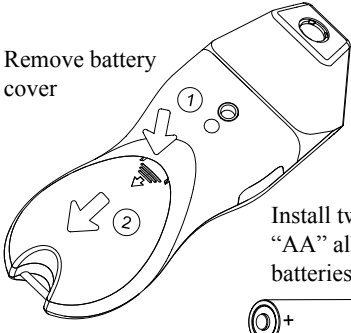
OR Automatic after 99:59.9

11.0 BATTERIES

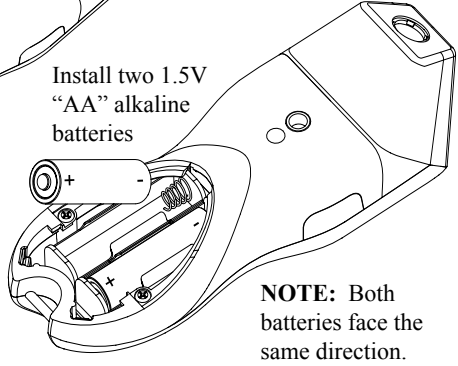
When displayed, replace batteries.



Remove battery cover



Install two 1.5V "AA" alkaline batteries



NOTE: Both batteries face the same direction.

12.0 PLT200 SPECIFICATIONS

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.

Maximum Laser Output:	<1mW
Pulse Duration:	Continuous
Laser Wavelength:	650 nm
Beam Divergence:	> 1.0 mrad
Beam Diameter:	4 x 7 mm typical at 2 meters
Laser Diode Life:	8,000 operating hours MTBF (1 year warranty)

Non-Contact Specifications:

Ranges:	RPM	5 – 200,000
	RPS	0.084 – 3,333.3
	RPH	300-999,990
Resolution:	Fixed:	1 (10 above 99,999)
	Auto-ranging:	0.001 to 1.0 (10 above 99,999)

Accuracy: ±0.01% of reading or resolution limit

Operating Range: up to 25 feet (7.62 m) or up to 70 degrees off perpendicular to T-5 tape target

Contact Specifications using optional Remote Contact Assembly:

Range:	Contact Tips:	0.5 to 20,000 RPM
	10 cm / 12-inch Wheel:	0.5 to 12,000 RPM
Resolution:	Fixed:	1 (10 above 99,999)
	Auto-ranging:	0.001 to 1.0 (10 above 99,999)

Contact Specifications (continued):

Accuracy: Revs: ±0.05% of reading (RPM) or resolution limit (with no slippage)
Linear: ±0.5% of reading or resolution limit (with no slippage)

Contact Measurements Ranges:

TACHOMETER:

Revolutions per Minute (RPM)	0.5 to 20,000 RPM
Revolutions per Second (RPS)	0.0833 to 333.33 RPS
Revolution per Hour (RPH)	30 to 999,990 RPH

RATES:	**Wheel Circumference:**	
Inches per Second	**10 cm:**	0.033 to 1312.3 IPS
	12 in:	0.100 to 2,400.0 IPS
Inches per Minute	**10 cm:**	1.969 to 78,740 IPM
	12 in:	6.000 to 144,000 IPM
Inches per Hour	**10 cm:**	118.11 to 999,990 IPH
	12 in:	360.00 to 999,990 IPH
Feet per Second	**10 cm:**	0.003 to 109.36 FT/S
	12 in:	0.009 to 200.00 FT/S
Feet per Minute	**10 cm:**	0.164 to 6,561.7 FT/M
	12 in:	0.500 to 12,000 FT/M
Feet per Hour	**10 cm:**	9.843 to 393,700 FT/H
	12 in:	30.000 to 720,000 FT/H
Yards per Second	**10 cm:**	0.001 to 36.453 YPS
	12 in:	0.003 to 66.667 YPS
Yards per Minute	**10 cm:**	0.055 to 2,187.2 YPM
	12 in:	0.167 to 4,000.0 YPM

Contact Measurements Ranges (continued):

RATES:	Wheel Circumference:	
Yards per Hour	**10cm:**	3.281 to 131,233 YPH
	12 in:	10.000 to 240,000 YPH
Miles per Hour	**10 cm:**	0.002 to 74.564 MPH
	12 in:	0.006 to 136.36 MPH
Centimeters per Second	**10 cm:**	0.084 to 3,333.3 CM/S
	12 in:	0.21 to 3,048.0 CM/S
Centimeters per Minute	**10 cm:**	5.000 to 200,000 CM/M
	12 in:	15.240 to 365,760 CM/M
Centimeters per Hour	**10 cm:**	300.00 to 999,990 CM/H
	12 in:	914.40 to 999,990 CM/H
Meters per Second	**10 cm:**	0.001 to 33.333 M/SEC
	12 in:	0.003 to 60.960 M/SEC
Meters per Minute	**10 cm:**	0.050 to 2,000.0 M/MIN
	12 in:	0.153 to 3,657.6 M/MIN
Meters per Hour	**10 cm:**	3.000 to 120,000 M/H
	12 in:	9.144 to 219,460 M/H

TOTALIZER:

Counts: 0 to 999,999

Scale Totals in Inches, Feet, Yards, Centimeters or Meters

Input: Internal or External optics or linear contact wheel

Timer Specifications:

Minutes:Seconds.Tenths to 99:59.9

Accuracy: ±0.2 second

Resolution: 0.1 second

Display: Dual LCD Display (5-digit upper/scrolling, 5-digit alphanumeric lower display)

Batteries: 2 “AA” 1.5 V ⎓ (DC) alkaline included
(Note: Batteries are NOT rechargeable.)

Battery Life: 30 hours continuous typical with batteries provided

External Input:

Absolute max: -0.3 V to 5 V ⎓ (DC)

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 @ 20 mA max

Pulse Output: 0 V to 3.3 V ⎓ (DC) pulse
Same shape as External Input signal or high when internal optics sees a reflection

Dimensions: 6.92” (17.58 cm) H x 2.4” (6.10 cm) W x 1.6” (4.06 cm) D

Weight: Approx. 7 oz. (210 g)

This product is designed to be safe for indoor use under the following conditions (per IEC61010-1).

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: Maximum 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 subject to change without notice.

13.0 CLEANING

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

14.0 OPTIONS / ACCESSORIES

T-5	Reflective Tape, 5 foot [1.5 m] roll, ½ inch [13 mm] wide
RCA	Remote Contact Assembly with 10 cm wheel, concave and convex tips
CTE	Concave/convex contact tips and 10 cm linear contact wheel
12 inch Wheel	12 inch circumference wheel for use with RCA
CA-4044-6	6 foot Input/Output cable, 1/8" mono phone plug to BNC connector
ROS-P	Remote Optical Sensor
ROS-P-25	Remote Optical Sensor with 25 foot cable
ROSM-5P	Remote Optical Sensor, modulated
MT-190-P	Amplified Magnetic Sensor
IRS-P	Infrared Sensor
EC-25P	25 foot extension cable for all sensors
CC-10	Padded Nylon Carrying Case
CC-11	Latching Carrying Case for Pocket Tach and accessories
CAL-N.I.S.T.	N.I.S.T. Traceable Certificate of Calibration

Check out some of our other product lines…

Panel Tachometers

Frequency Converters

Portable Stroboscopes

Machine Vision Stroboscopes

Speed Sensors

Temperature/ Humidity Sensors

Vibration Meters

Paperless Recorders

Track-It™ Data Loggers

1071-4838-117

0916