MONARCH INSTRUMENT

Instruction Manual

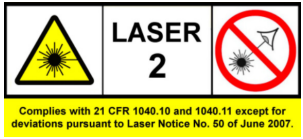
PLT200 - POCKET LASER TACH 200

Tachometer/Rate Meter/Totalizer/Timer

CE NIST CALIBRATION

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)**
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.

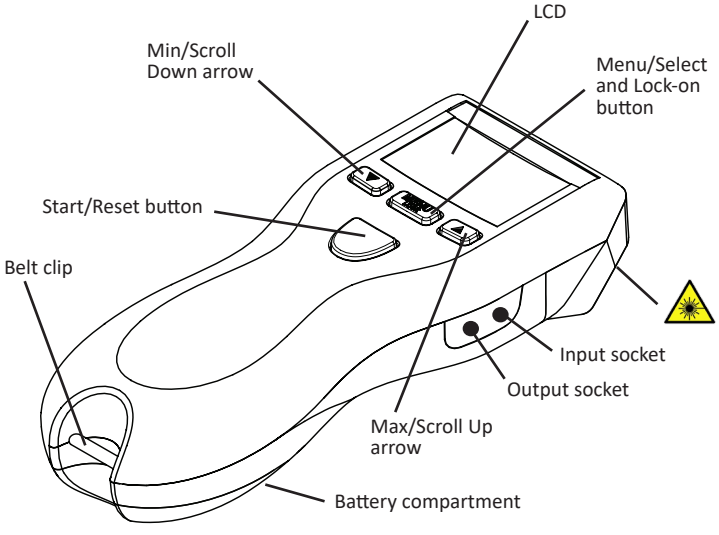
To comply with worldwide regulations such as the U.S. Environmental Protection Agency Resource Conservation and Recovery Act (RCRA) and EU Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE), you must not discard this electrical/electronic product in domestic household waste. The electronic components in this device may contain environmentally harmful substances. DO NOT DISPOSE of this product as unsorted municipal waste. This product needs to be RECYCLED and disposed of in accordance with environmental regulations in the country of use; 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:

1.0 DESCRIPTION

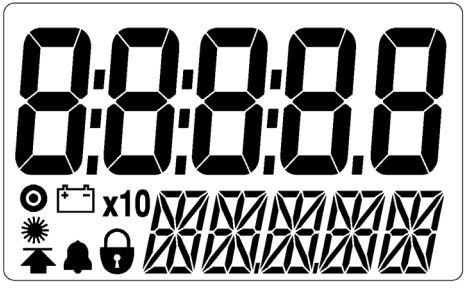
The Pocket Laser Tach 200 is a multifunction tachometer, rate meter, totalizer and timer. It is programmable to read in English or metric units. An input socket accepts remote sensing devices and an output socket allows for pulse output to external indicating devices. The PLT200 can be tripod mounted 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

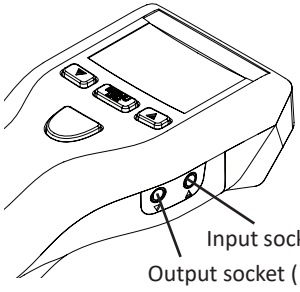
Low Battery icon — indicates that the batteries are low and need to be replaced

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**

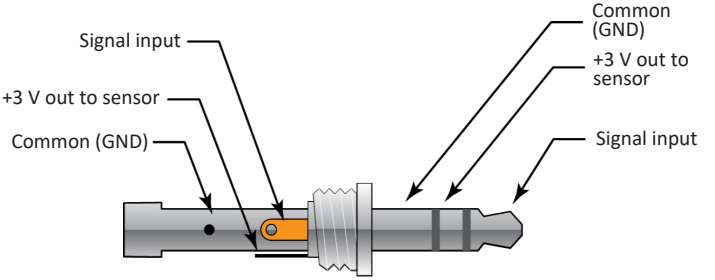
Lock icon — indicates that the unit is locked and making continuous measurements (Lock Mode)

4.0 INPUT/OUTPUT

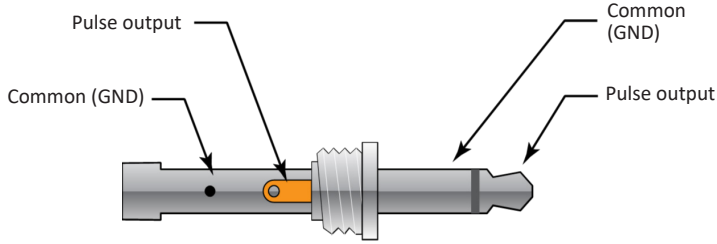


Input: Accepts remote sensor or Remote Contact Assembly (RCA)
1/8" [3.5 mm] stereo phone plug

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



Input Connector Detail (stereo plug)



Output Connector Detail (mono plug)

5.0 REMOTE CONTACT ASSEMBLY

The **Remote Contact Assembly (RCA)** is an accessory (sold separately) for measuring contact RPM, linear speeds or totalizing lengths. It needs to be plugged into a tachometer to be functional. It is supplied with two rubber contact tips (one concave and one convex) and a 10 cm linear wheel. An optional 12-inch linear wheel is available. When used with the Monarch Pocket Laser Tach 200, the unit outputs 12 pulses per revolution (PPR). The maximum operating range of the RCA is 20,000 RPM when used with a contact tip and 12,000 RPM when used with a linear wheel.

5.1 RCA Connection Detail

Connector pinouts are shown in Figure 1.

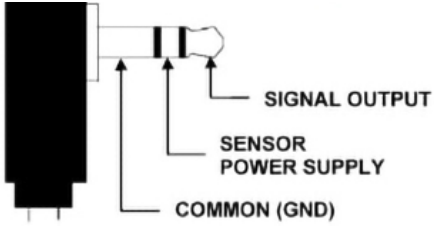
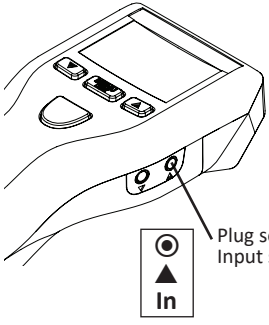


Figure 1 RCA Output Connector - Connection Detail

6.0 PREPARATION FOR MEASUREMENT

6.1 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)

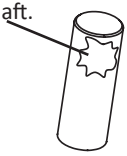
Magnetic Sensor with Amplifier (MT-190P)

Please visit www.monarchinstrument.com for additional sensor options.

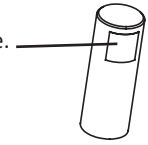
6.2 Noncontact Preparation

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

1. Clean shaft.

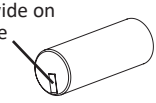


2. Apply 1/2" square of T-5 Reflective tape.



For small shafts:

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

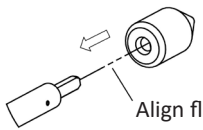


6.3 Direct Contact Preparation Using RCA

Plug the RCA into the 3.5 mm stereo input jack of the PLT200.

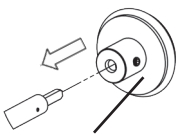
Select and install contact option:

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



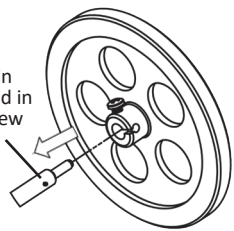
Align flats

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



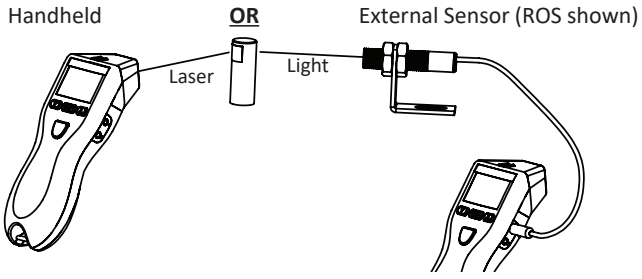
Tighten screw securely into flat on shaft

Install with pin in shaft fully seated in slot; tighten screw

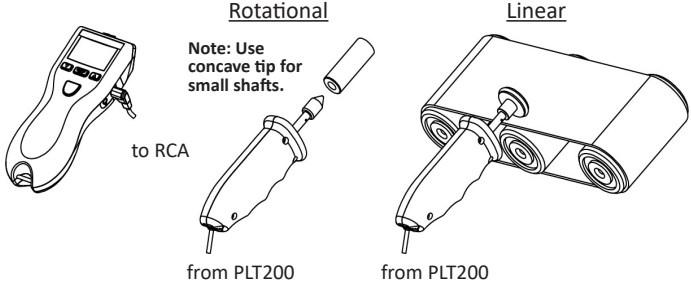


7.0 TAKING MEASUREMENTS

7.1 Noncontact Measurements



7.2 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.

8.0 TACHometer MODE

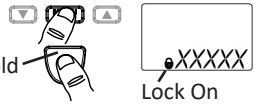
A tachometer measures speed or linear rate with respect to time; time intervals are seconds, minutes, or hours. Rotational speed can be measured in Revolutions (Revs) per second, per minute, or per hour. The most common measurement is RPM or Revs per minute using the optical Tachometer Mode.

8.1 TACHometer Setup

1. Turn Power ON

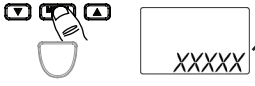
Last Units selected are displayed

1a. To toggle Lock On/Off



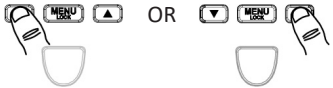
2. Enter Setup

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

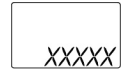
10. Select decimal places

OR

Repeat until desired decimal places displayed

11. Save and advance

12. Exit Setup – ready to measure



DONE, then Units selected

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

8.2 TACHometer Operation

Measure

Press and hold

OR

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

9.0 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.

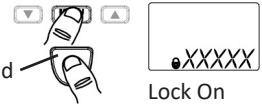
Note: External Remote Contact Assembly (RCA) must be inserted into input socket.

9.1 RATE Setup

1. Turn Power ON

EXTRN, then scrolling message, then last Units selected

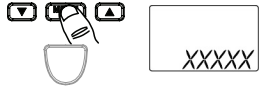
1a. To toggle Lock On/Off



Lock On

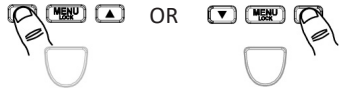
2. Enter Setup

3. Enter selection of Mode



Last mode selected is displayed

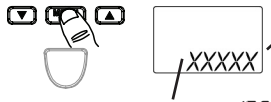
4. Select RATE Mode



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  OR  Repeat until desired Units displayed

8. Save and advance 

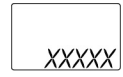
Rotational Units

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 

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.

9.2 RATE Operation

Measure

Press and hold

OR

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

10.0 TOTALIZER MODE

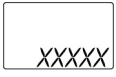
Totalizer accumulates input on an ongoing basis. In the simplest form the unit acts as an optical counter, incrementing the display each time an input pulse is sensed. Using the Remote Contact Assembly with various tips and wheels, the unit can totalize in revs, inches, feet, yards, centimeters, and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

10.1 TOTALizer Setup

1. Turn Power ON

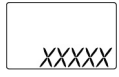
Different messages displayed for Internal or External operation

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



Last Units selected

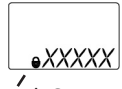
External Remote Contact Assembly:



EXTRN, then scrolling message, then last Units selected

1a. To toggle Lock On/Off

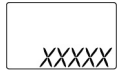
Press and hold



Lock On

2. Enter Setup

3. Enter selection of Mode



Last mode selected is displayed

4. Select TOTAL Mode

OR

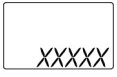
Repeat until TOTAL displayed

5. Save and advance

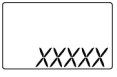
6. Enter selection of Units

Different options displayed for Internal or External operation

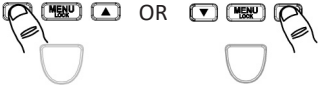
Internal or External ROS:



External Remote Contact Assembly:



7. Select Units



Repeat until desired Units displayed

8. Save and advance

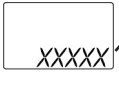
OR

COUNT or REV

Linear Units

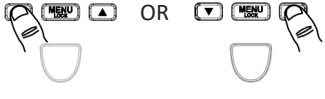
Only for Linear Units:

8a. Enter selection of Wheel



Last Wheel selected is displayed

8b. Select Wheel



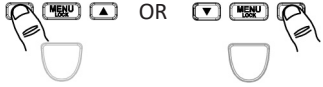
Toggles between 10CM and 12IN

8c. Save and Advance

TOTALizer Setup (continued):

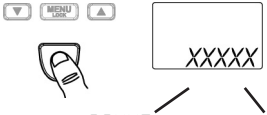
9. Enter selection of number of decimal places

10. Select decimal places



11. Save and advance

12. Exit Setup - ready to measure



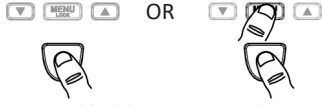
Units = COUNT:
DONE,
then COUNT

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.

10.2 TOTALizer Operation

Measure



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

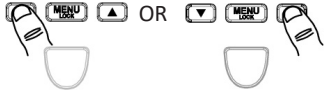
If unit is Locked On:

Resets Max/Min, Total and Measurement Time

Power Off

OR Automatic after 90 seconds if unit not Locked On

Note: Pressing



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

11.0 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.

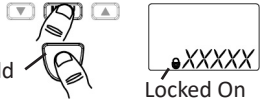
11.1 TIMER Setup

1. Turn Power ON

Last Units selected are displayed

1a. To toggle Lock On/Off

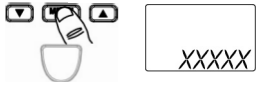
Press and hold



Locked On

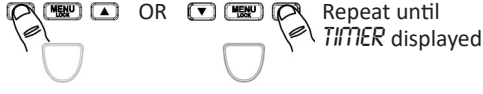
2. Enter Setup Mode

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*

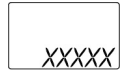
7. Select Timer function

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.

11.2 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

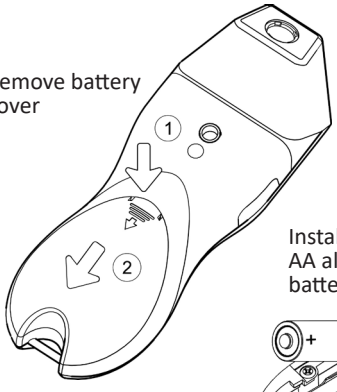
OR If Timer stopped - automatic after 90 seconds if unit not Locked On

OR Automatic after 99:59.9

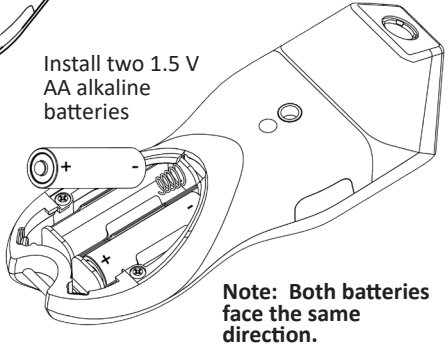
12.0 BATTERIES

When displayed, replace batteries

Remove battery cover



Install two 1.5 V AA alkaline batteries



Note: Both batteries face the same direction.

12.1 Battery Disposal

The PLT200 uses (2) 1.5V AA Alkaline batteries. Make sure you remove and dispose of used batteries in accordance with environmental regulations in the country of use.

To remove the (2) batteries, see section 12.0 Batteries.

13.0 SPECIFICATIONS

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

Specifications*	PLT200 Pocket Laser Tachometer
Contact Specifications (continued):	
Resolution - Fixed	1 (10 above 99,999)
Resolution - Autoranging	0.001 to 1.0 (10 above 99,999)
Accuracy - Revs	±0.05% of reading (RPM) or resolution limit (with no slippage)
Accuracy - Linear	±0.5% of reading or resolution limit (with no slippage)
Contact Measurement Ranges:	
Tachometer:	
RPM	0.5-20,000
RPS	0.0833-333.33
RPH	30-999,999
Rates:	**Wheel Circumferences**
Inches per Second	10 cm: 0.033 to 1,312.3 12 in.: 0.100 to 2,400.0
Inches per Minute	10 cm: 1.969 to 78,740 12 in.: 6.000 to 144,000
Inches per Hour	10 cm: 118.11 to 999,990 12 in.: 360.00 to 999,990
Feet per Second	10 cm: 0.003 to 109.36 12 in.: 0.009 to 200.00
Feet per Minute	10 cm: 0.164 to 6,561.7 12 in.: 0.500 to 12,000
Feet per Hour	10 cm: 9.843 to 393,700 12 in.: 30.000 to 720,000
Yards per Second	10 cm: 0.001 to 36.453 12 in.: 0.003 to 66.667

Specifications*	PLT200 Pocket Laser Tachometer
Rates (continued):	**Wheel Circumferences**
Yards per Minute	10 cm: 0.055 to 2,187.2 12 in.: 0.167 to 4,000.0
Yards per Hour	10 cm: 3.281 to 131,233 12 in.: 10.000 to 240,000
Miles per Hour	10 cm: 0.002 to 74.564 12 in.: 0.006 to 136.36
Centimeters per Second	10 cm: 0.084 to 3,333.3 12 in.: 0.21 to 3,048.0
Centimeters per Minute	10 cm: 5.000 to 200,000 12 in.: 15.240 to 365,760
Centimeters per Hour	10 cm: 300.00 to 999,990 12 in.: 914.40 to 999,990
Meters per Second	10 cm: 0.001 to 33.333 12 in.: 0.003 to 60.960
Meters per Minute	10 cm: 0.050 to 2,000.0 12 in.: 0.153 to 3,657.6
Meters per Hour	10 cm: 3.000 to 120,000 12 in.: 9.144 to 219,460
Totalizer:	
Counts	0 to 999,999
Scale Totals in Inches, Feet, Yards, Centimeters, or Meters	
Input	Internal or external optics or contact wheel
Timer Specifications:	
Minutes:Seconds, tenths to 99:59.9	
Accuracy	±0.2 second
Resolution	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 1.5V ⎓ (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) 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 ⎓ (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)
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	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.**

14.0 CLEANING

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

15.0 SENSORS

See webpage for the complete list of accessories.

ROS-P	PN: 6180-057	Remote Optical Sensor with 8 ft. [2.5 m] cable
ROS-P-25	PN: 6180-057-25	Remote Optical Sensor with 25 ft. [7.6 m] cable

The following sensors are compatible when used with the Self-Powered Sensor Interface Module (SPSR-IM, PN: 6150-021) and CA-4044-6 Input/ Output Cable (PN: 6280-037):

ROLS-P	PN: 6180-029	Remote Optical Laser Sensor with 8 ft. [2.5 m] cable
ROLS-P-25	PN: 6180-029-25	Remote Optical Laser Sensor with 25 ft. [7.6 m] cable
RLS-P	PN: 6180-081	Rugged Laser Sensor with removable 10 ft. [3 m] cable
MT-190P	PN: 6180-036	Amplified Magnetic Sensor
IRS-P	PN: 6180-020	Infrared Sensor with 8 foot [2.5 m] cable for use without reflective target at 0.5 inch [12 mm] gap
GE200 HP	PN: 6180-014	Gas Engine Inductive Sensor with 15-foot [4/ m] cable (requires magnetic amplifier PN: 4180-405)

16.0 ACCESSORIES

See webpage for the complete list of accessories.

Input/Output Cable CA-4044-6 PN: 6280-037

Extension Cable EC-25P PN: 6180-028
25 ft. extension cable with male/female
1/8" phone plug connectors

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

Contact Accessories:

Remote Control Assembly (RCA)
includes two contact tips (concave and convex) and a 10 cm linear contact wheel

PN: 6180-074

12 in. Linear Wheel
for use with RCA

PN: 6580-011

Contact Tip Pack and 10 cm Linear Wheel
replacement rubber concave and convex tips and wheel for use with RCA

PN: 6580-010

Replacement 10 cm Linear Wheel
for use with RCA

PN: 6180-077

Replacement Contact Tip Pack
rubber concave and convext tips (1 each) for use with RCA

PN: 6180-078

Measure • Monitor • Maintain

Monarch Instrument is committed to excellence and quality in manufacturing, sales, and service.

Portable Tachometers

Track-It™ Data Loggers

Panel Tachometers

Fixed Mounted Strobes

Portable Strobes

Frequency Converters

Speed Sensors

DataChart™ Paperless Recorders

MONARCH INSTRUMENT

15 Columbia Drive, Amherst NH 03031 USA
Tel.: (603) 883-3390 // (800) 999-3390
Email: support@monarchinstrument.com
Website: www.monarchinstrument.com