



Instruction Manual

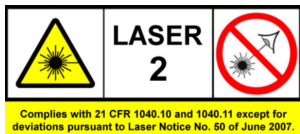
PLT200 - POCKET LASER TACH 200
Tachometer/Rate Meter/Totalizer/Timer



15 Columbia Drive
Amherst, NH 03031 USA



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: <http://www.fzyq.cn>



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.

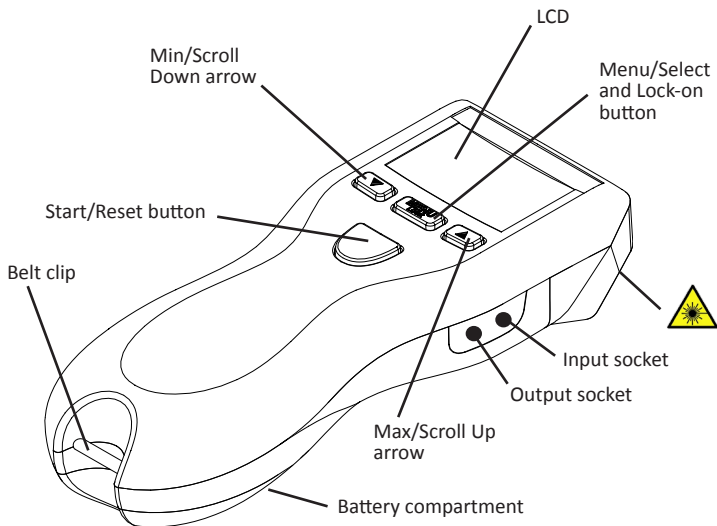
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1.0 DESCRIPTION

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.

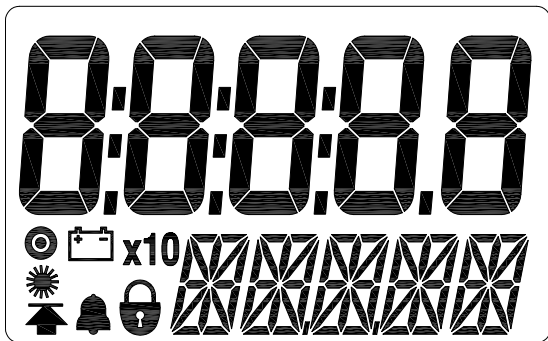
2.0 FEATURE LOCATIONS



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.

x10

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

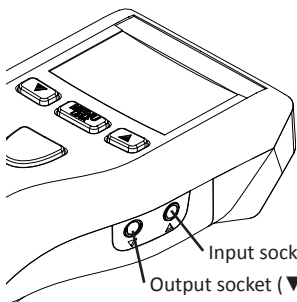


Laser Indicator — red laser is on when this indicator is illuminated



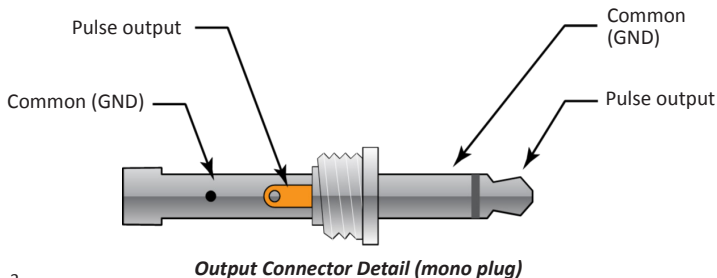
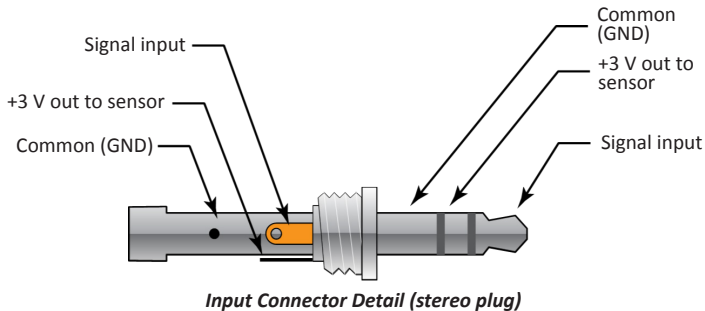
Lock icon — indicates that the unit is locked and making continuous measurements (Lock Mode)

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



5.0 PREPARATION FOR MEASUREMENT

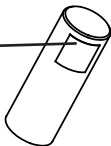
5.1 Noncontact Preparation

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

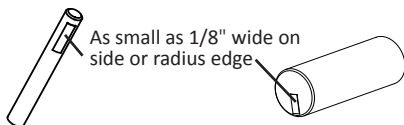
1. Clean shaft.



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



For small shafts:

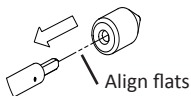


5.2 Direct Contact Preparation

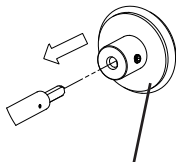
Follow external operation **ONLY** using optional Remote Contact Assembly (RCA):

Select and install contact option:

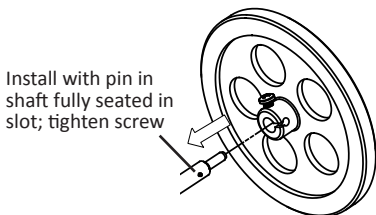
1. Contact Tip (convex tip shown)
Use concave tip for small shafts



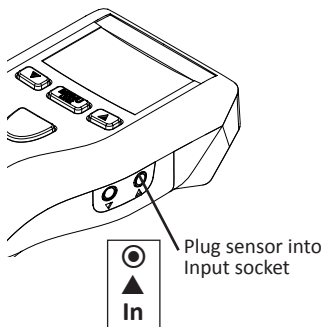
2. 10 cm Wheel **OR** 3. 12 in. Wheel



Tighten screw securely into flat on shaft



5.3 Connecting External Sensors



Remote Optical Sensor (ROS-P)



Infrared Sensor (IRS-P)



Magnetic Sensor with Amplifier (MT-190P)

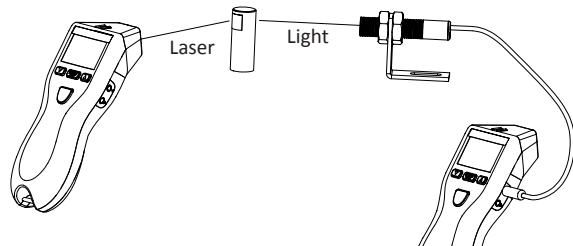
6.0 TAKING MEASUREMENTS

6.1 Noncontact Measurements

Handheld

OR

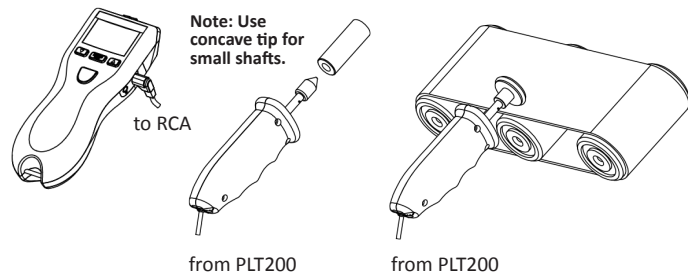
External Sensor (ROS shown)



6.2 Direct Contact Measurements

Rotational

Linear



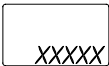

ONLY USE MODERATE PRESSURE



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.



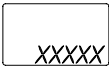

7.0 TACHometer MODE


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

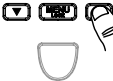
1. Turn Power ON




Last Units selected are displayed
- 1a. To toggle Lock On/Off
Press and hold



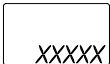











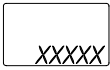
Lock On
2. Enter Setup

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   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.

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




●XXXXX

Press and hold


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  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.

8.2 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

9.0 TOTALIZER MODE

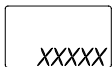
Totalizer accumulates input on an ongoing basis. In the simplest form the unit acts as an optical counter, incrementing the display each time an input pulse is sensed. Using the Remote Contact Assembly with various tips and wheels, the unit can totalize in revs, inches, feet, yards, centimeters, and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

9.1 TOTALizer Setup

1. Turn Power ON  Different messages displayed for Internal or External operation

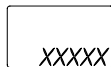


Internal optics or External optical sensor (i.e. ROS):



Last Units selected

External Remote Contact Assembly:



EXTRN, then scrolling message, then last Units selected

- 1a. To toggle Lock On/Off

Press and hold

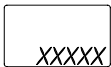


Lock On

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



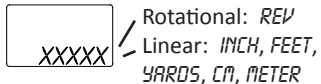
Different options displayed for Internal or External operation

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



SETUP
COUNT

COUNT or REV

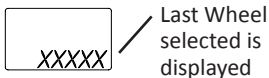
OR



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
RECP

NONE, 1, 2 or 3

10. Select decimal places



OR



Repeat until desired decimal places displayed

11. Save and advance



SETUP
MOVE

12. Exit Setup - ready to measure



XXXXX

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



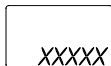
Once before 90 seconds will keep measurements in memory and the display turned on longer

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



Press and hold

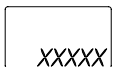


Locked On

2. Enter Setup Mode



3. Enter selection of Mode



Last mode selected is displayed

4. Select TIMER Mode


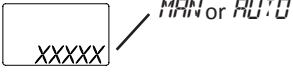

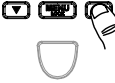






OR    Repeat until *TIMER* displayed



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

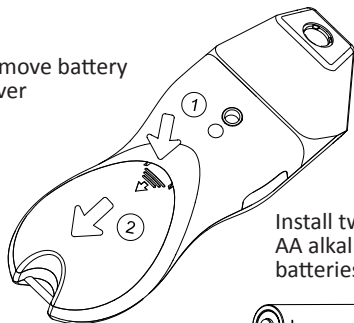
OR Automatic after 99:59.9

11.0 BATTERIES

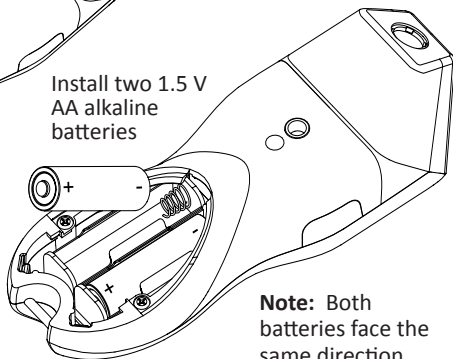
When displayed, replace batteries



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
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 1312.3 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 M/MIN 12 in.: 0.153 to 3,657.6 M/MIN
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 1.5 V \approx (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 \approx (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 \approx (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.

13.0 CLEANING

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

14.0 SENSORS AND ACCESSORIES

Sensors:

RLS-P	PN: 6180-081	Rugged Laser Sensor with removable 3 m cable, M12 connector to 1/8" phone plug connector
ROLS-P	PN: 6180-029	Remote Optical Laser Sensor with 8 ft. [2.5 m] cable
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
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
ROSM-P	PN: 6180-902	Modulated Remote Optical LED Sensor with 8 ft. [2.5 m] cable
MT-190P	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

