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**1 YEAR
WARRANTY**

**MADE IN
USA**



NIST



User's Guide

It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to all the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification. The information contained in this document is believed to be correct but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice. **WARNING:** These products are not designed for use in, and should not be used for, human applications.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and traces.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or facility; or (2) in medical applications or used on humans. Should any purchaser or user with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.
PATENT NOTICE: U. S. Pat. Nos. 6,074,040; 5,465,838 / Canada 2,228,333; 2,116,055 / UK GB 2,321,712 / Holland 1008153 / Israel 123052 / France 2 762 908 / EPO 0614194. Other patents pending.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED.
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair.
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.



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ISO 9001
CERTIFIED
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STAMFORD, CT

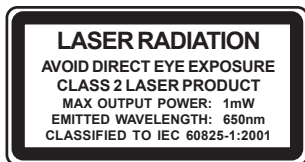
ISO 9002
CERTIFIED
CORPORATE QUALITY
MANCHESTER, UK

HHT13

Pocket Laser Tachometer with Remote Sensor Input

M4151/0507

SAFEGUARDS AND PRECAUTIONS



WARNING - This product emits a visible beam of laser light. Avoid exposure to the laser radiation. The use of optical viewing aids (binoculars, for example) may increase the ocular hazard.

CAUTION - The laser beam should not be intentionally aimed at people or animals.

CAUTION - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



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.



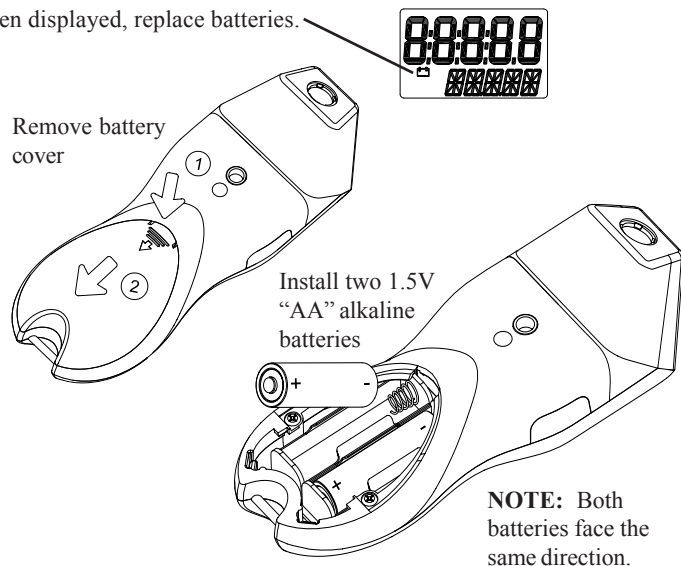
In order to comply with EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE): This product may contain material which could be hazardous to human health and the environment. DO NOT DISPOSE of this product as unsorted municipal waste. This product needs to be RECYCLED in accordance 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.

14.0 OPTIONS / ACCESSORIES

HHT-RT-5	Reflective Tape, 5 foot [1.5 m] roll, ½ inch [13 mm] wide
HHT13-RCA	Remote Contact Assembly with 10 cm wheel, concave and convex tips
HHT13-CTE	Concave/convex contact tips and 10 cm linear contact wheel
HHT13-LCW	12 inch circumference wheel for use with HHT13-RCA
HHT20-ROS	Remote Optical Sensor
HHT-ROS-CABLE	25 foot extension cable for all sensors
HHT13-CC10	Padded Nylon Carrying Case

12.0 BATTERIES

When displayed, replace batteries.



13.0 CLEANING

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

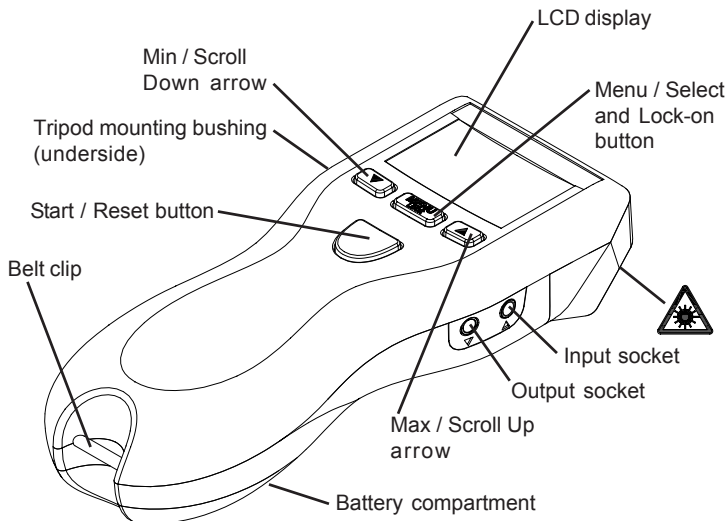
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1.0 OVERVIEW

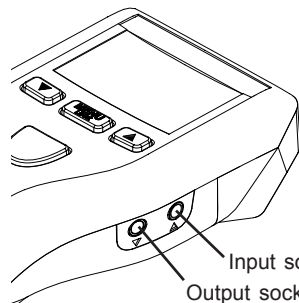
The HHT13 is a precision hand-held multifunction Tachometer, Ratemeter, Totalizer and Timer. It is programmable to display directly in Revs, Inches, Feet, Yards, Miles, Centimeters and Meters or function as a stopwatch or interval timer. Input / output sockets allow for remote sensing and pulse output to external indicating devices. For ease of use, the instrument can be “Locked-on” for continuous operation.

2.0 FEATURE LOCATIONS



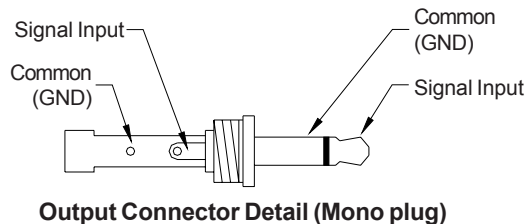
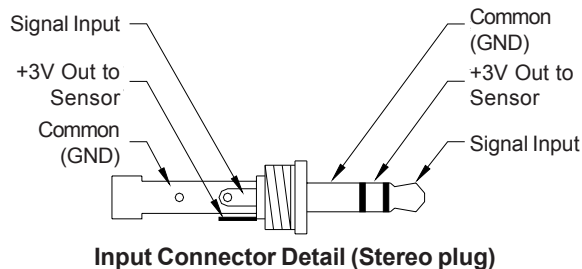
AVOID EXPOSURE - LASER RADIATION IS EMITTED FROM THIS APERTURE

11.0 INPUT / OUTPUT



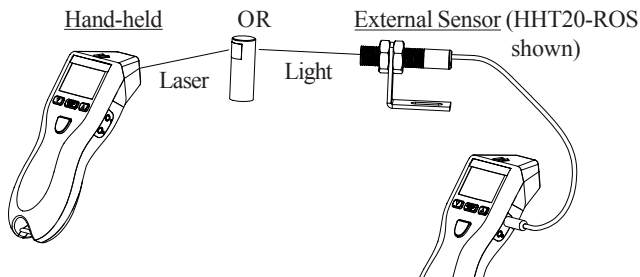
Input: Accepts remote sensor or Remote Contact Assembly (HHT13-RCA). 1/8" (3.5mm) stereo phone plug.

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

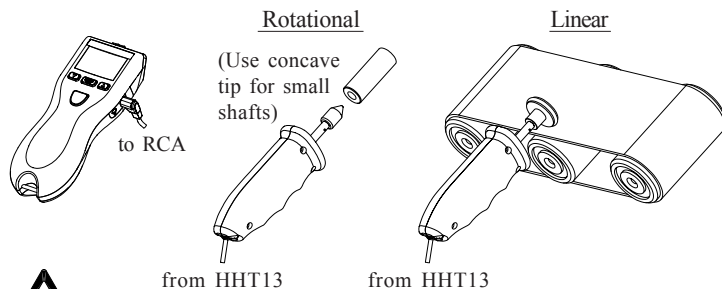


10.0 MAKING MEASUREMENTS

10.1 Non-Contact Measurements



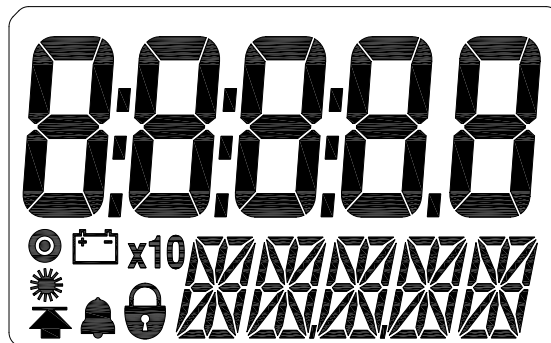
10.2 Direct Contact Measurements



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.

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.



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 HHT13 SPECIFICATIONS

Laser Specifications:

Classification: Class 2 (per IEC 60825-1 Ed 1.2 2001-8)
Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 50, dated July 26, 2001.

Maximum Laser Output: 1mW
Pulse Duration: Continuous
Laser Wavelength: 650 nm
Beam Divergence: < 1.5 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)

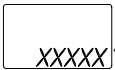
Accuracy: ±0.01% of reading or resolution limit

Operating Range: up to 25 feet (7.62 m) or up to 70 degrees off perpendicular to reflective 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)

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.

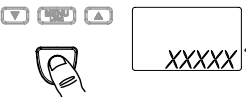
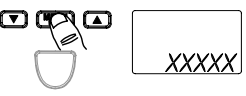
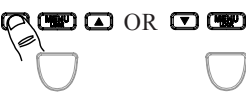
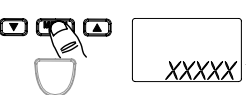
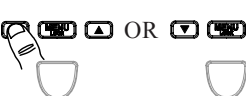
9.2 TIMER Operation

Measure:

- Manual   Each press toggles Start and Stop
- Auto   OR Start and Stop triggered by Remote Optical Sensor (HHT20-ROS)
- Reset   With Timer stopped - Resets time to 00:00.0
- Lap   With Timer running - Stops at elapsed time to date. To continue, press again.
- Power Off   OR Automatic after 90 seconds if unit not Locked on

9.0 TIMER Mode

9.1 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  *MAN or AUTO*
7. Select Timer function  OR  Toggles between Manual and Auto

Contact Specifications (continued):

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

8.2 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



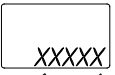
OR Automatic after 90 seconds if unit not Locked on

NOTE: Pressing



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

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 Units selected

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.

Display: 5 x 0.5" (12.7mm) numeric digits plus 5 Alpha-numeric LCD

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)

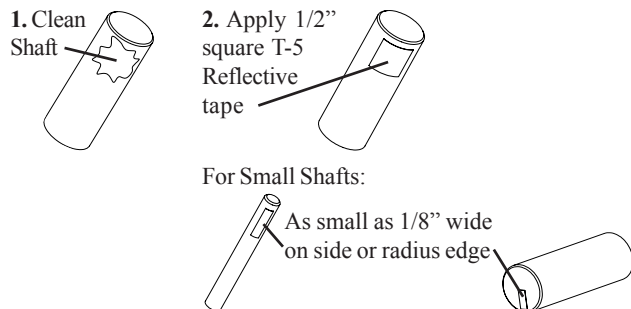
Humidity: Maximum relative humidity of 80% for temperatures up to 88 °F (31 °C) decreasing linearly to 50% relative humidity at 100 °F (40 °C). Humidity non-condensing.

Specifications subject to change without notice.

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).

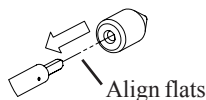


5.2 Direct Contact Preparation

For External operation ONLY using optional Remote Contact Assembly (HHT13-RCA).

Select and install contact option:

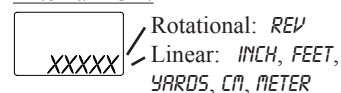
1. Contact Tip (Convex tip shown. Use Concave tip for small shafts.)



6. Enter selection of Units  Different options displayed for Internal or External operation.

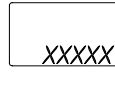
Internal or External ROS:

External RCA:



7. Select Units  OR  Repeat until desired Units displayed
8. Save and advance  OR  **SETUP** *DEPT* OR **SETUP** *WHEEL*
COUNT or REV Linear Units

Only for Linear Units:

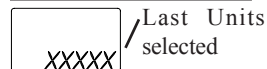
- 8a. Enter selection of Wheel   Last Wheel selected is displayed
- 8b. Select Wheel  OR  Toggles between 10CM and 12IN
- 8c. Save and Advance  **SETUP** *DEPT*

8.0 TOTALizer Mode

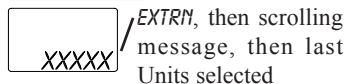
8.1 TOTALizer Setup

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

Internal or External ROS:



External RCA:



- 1a. To toggle Lock On/Off

Press and Hold



2. Enter Setup Mode



3. Enter selection of Mode



Last Mode selected is displayed

4. Select TOTAL Mode



OR  Repeat until TOTAL displayed.

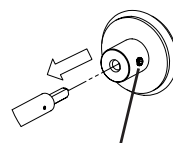
5. Save and advance



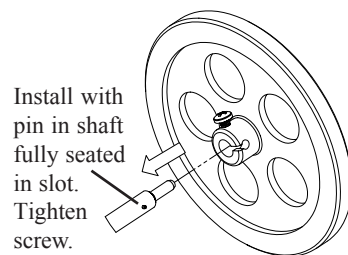
2. 10 cm Wheel

OR

3. 12 inch Wheel

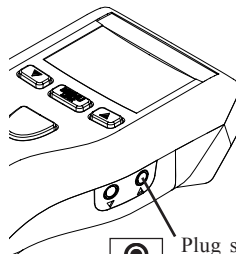


Tighten screw securely into flat on shaft.



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

5.3 Connecting External Sensors



Plug sensor into Input socket



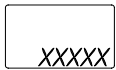
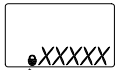
Remote Optical Sensor
(HHT20-ROS)



Remote Contact Assembly
(HHT13-RCA)
(shown with optional 12 inch wheel)

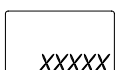
6.0 TACHometer Mode

6.1 TACHometer 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

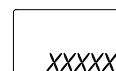
Last Mode selected is displayed
4. Select TACH Mode
 OR  Repeat until *TACH* displayed
5. Save and advance

6. Enter selection of Units

RPS, RPM or RPH

11. Save and advance



12. Exit Setup – Ready to measure

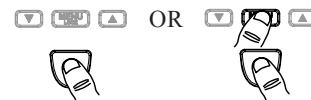


DONE, USE CONTACT TIP or [wheel selected], then Units selected

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

7.2 RATE Operation

Measure



Recall Max



Max Speed

Recall Min



Min Speed

If unit Locked on:



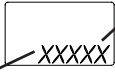
Resets Max/Min

Power Off



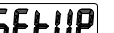
OR Automatic after 90 seconds if unit not Locked on

RATE Setup (continued):

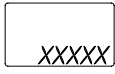
6. Enter selection of Units   Rotational: *CRPS, CRPM or CRPH*

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*

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

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.

6.2 TACHometer Operation

Measure    OR   

 Press and hold  Lock on

Recall Max      Max Speed

Recall Min      Min Speed

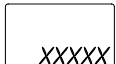
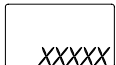
If unit Locked on:    Resets Max/Min

Power OFF     OR Automatic after 90 seconds if unit not Locked on

7.0 RATE Mode

NOTE: External Remote Contact Assembly (HHT13-RCA) must be inserted into input socket.

7.1 RATE Setup

- Turn Power ON      *EXTRN*, then scrolling message, then last Units selected
- To toggle Lock On/Off    Press and Hold   Locked On
- Enter Setup Mode    
- Enter selection of Mode     Last Mode selected is displayed
- Select RATE Mode    OR    Toggles between *RATE* and *TOTAL*. Select *RATE*.
- Save and advance    