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.

Contact info: www.dwyer-inst.com
Country of Origin: USA

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 OVERVIEW

The Model TAC3 is a 32 function tachometer/ratemeter, totalizer/counter, 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 Model TAC3 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

![Diagram of TAC3 features]

- Min / Scroll Down arrow
- Start / Reset button
- Max / Scroll Up arrow
- LCD display
- Menu / Select and Lock-on button
- Battery compartment
- AVIOD EXPOSURE - LASER BEAM IS EMMITED FROM THIS APERTURE
- Input socket
- Output socket
- Tripod mounting bushing (underside)
- Belt clip
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 TAC3 SPECIFICATIONS

Laser Specifications:

Classification: Class 2 (per IEC 60825-1:2014)
This product complies with IEC 60825-1 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 TAC-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:** $\pm 0.05\%$ 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:**

- **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:

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

#### 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.
5.0 INPUT / OUTPUT

**Input:** Accepts remote sensor or Remote Contact Assembly. 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.
6.0 PREPARATION FOR MEASUREMENT

6.1 Non-Contact Preparation

For Internal operation (Red laser) or External operation using optional Remote Optical Sensor (TAC2K-91).

1. Clean Shaft

2. Apply 1/2” square TAC-5 Reflective tape

For Small Shafts:

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

6.2 Direct Contact Preparation

For External operation ONLY using optional Remote Contact Assembly.

Select and install contact option:

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

Align flats
6.3 Connecting External Sensors

2. 10 cm Wheel

Tighten screw securely into flat on shaft.

3. 12 inch Wheel

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

OR

Plug sensor into Input socket

Remote Optical Sensor (TAC2K-91)

Remote Contact Assembly (shown with optional 12 inch wheel)
7.0 TAKING MEASUREMENTS

7.1 Non-Contact Measurements

Hand-held OR External Sensor (TAC2K-91 shown)

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.

7.2 Direct Contact Measurements

Rotational
(Use concave tip for small shafts)

Linear

ONLY USE MODERATE PRESSURE
8.0 TACHometer Mode

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

   Press and Hold

   Locked On

2. Enter Setup

3. Enter selection of Mode

   Last Mode selected is displayed

4. Select TACH Mode

   OR

   Repeat until TACH displayed

5. Save and advance
6. Enter selection of Units

7. Select Units

8. Save and advance

9. Enter selection of number of decimal places

10. Select decimal places

11. Save and advance

12. Exit Setup – Ready to measure

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

Measure \(\downarrow\ \text{Menu} \uparrow\) OR \(\downarrow\ \text{Menu} \uparrow\)

Press and hold Lock on

Recall Max \(\downarrow\ \text{Menu} \uparrow\)

Max Speed

Recall Min \(\text{Menu} \uparrow\)

Min Speed

If unit Locked on:

Resets Max/Min

Power OFF \(\text{Menu} \uparrow\)

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 (TAC3-K Only). 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 must be inserted into input socket.
9.1 RATE Setup

1. Turn Power ON

2. Enter Setup

3. Enter selection of Mode

4. Select RATE Mode

5. Save and advance

6. Enter selection of Units

1a. To toggle Lock On/Off

Press and Hold

EXTRN, then scrolling message, then last Units selected

Locked On

Last Mode selected is displayed

Toggles between RATE and TOTAL. Select RATE.

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

Only for Linear Units:
8a. Enter selection of Wheel

8b. Select Wheel

8c. Save and Advance

9. Enter selection of number of decimal places

10. Select decimal places Repeat until
desired decimal places displayed

11. Save and advance
12. Exit Setup – Ready to measure

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

### 9.2 RATE Operation

<table>
<thead>
<tr>
<th>Measure</th>
<th>OR</th>
<th>Recall Max</th>
<th>OR</th>
<th>Recall Min</th>
<th>Resets Max/Min</th>
<th>Power Off</th>
<th>OR</th>
<th>Automatic after 90 seconds if unit not Locked on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press and hold</td>
<td>Lock on</td>
<td>Press and hold</td>
<td>Max Speed</td>
<td>Press and hold</td>
<td>Min Speed</td>
<td>Press and hold</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DONE, USE CONTACT TIP or [wheel selected], then Units selected.
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 (TAC3-K only), 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 (TAC2K-91): 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

Last Mode selected is displayed

3. Enter selection of Mode

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:

External Remote Contact Assembly:

7. Select Units

Repeat until desired Units displayed

8. Save and advance

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 OR Repeat until desired decimal places displayed

11. Save and advance

12. Exit Setup – Ready to measure

Unit = 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.
10.2 TOTALizer Operation

Measure

Press and hold

OR

Press and hold

Recall Max or Min

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

OR

Press and hold

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

1a. To toggle Lock On/Off

2. Enter Setup Mode

3. Enter selection of Mode

4. Select TIMER Mode OR

5. Save and advance

Last Units selected are displayed

Locked On

Last Mode selected is displayed

Repeat until TIMER displayed
6. Enter selection of Timer function

7. Select Timer function

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.

**11.2 TIMER Operation**

Measure:

- **Manual**: Each press toggles Start and Stop
- **Auto**: Start and Stop triggered by external remote optical sensor (TAC2K-91) 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 1.5V "AA" alkaline batteries

**NOTE:** Both batteries face the same direction.
13.0 CLEANING
To clean the instrument, wipe with a damp cloth using mild soapy solution.

14.0 OPTIONS /ACCESSORIES

TAC2K-91 Remote Optical Sensor, includes mounting bracket and 8 foot [2.5 m] cable

TAC-5 Reflective Tape, 5 foot [1.5 m] roll, ½ inch [13 mm] wide

TAC3-1 Remote Contact Assembly, includes 6 foot [1.8 m] cable, convex and concave tips and 10 cm contact wheel