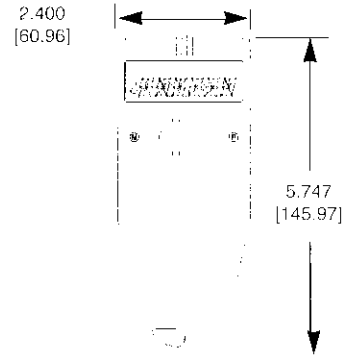
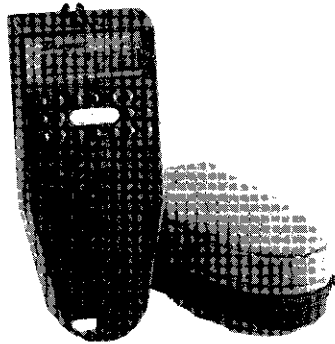




Series TAC Pocket Tachometer

Specifications – Installation and Operating Instructions



GENERAL

MODEL TAC1

Model TAC1 Pocket Tachometer is designed to make non-contact measurements of rotational speeds from 5 RPM to 100,000 RPM, at a distance of up to 30 inches (0.75 m) from the reflective target and at an angle of up to 30° from perpendicular. When equipped with the optional TAC1-1 Contact Tip Assembly, the pocket tachometer can make contact measurements of rotational speeds in the range of 5 RPM to 20,000 RPM. Both convex and concave tips are provided with TAC1-1 for measuring various size shafts. The concave tip is one inch in circumference and may also be used for measurement of linear surface speeds directly in inches per minute.

MODEL TAC2K

Model TAC2K Pocket Tachometer Plus Kit consists of a hand-held Tachometer, a removable Contact Tip Assembly with two rubber tips, one concave, the other with a point, a linear speed wheel, a roll of Reflective Tape and a battery, all in a rugged plastic carrying case.

Model TAC2K is a versatile instrument with advanced features and options. In order to get acquainted with and know all the features of the TAC2K it is recommended that you **READ THIS MANUAL IN ITS ENTIRETY BEFORE ATTEMPTING TO USE THE INSTRUMENT.**

The TAC2K is a multifunction tachometer, ratemeter, totalizer and timer. It has programmable options to allow it to measure in revs, inches, feet, yards, miles, centimeters and meters using the included contact tip assembly. It has an external input socket allowing an optional remote optical sensor (Model TAC2K-9) to be used. The timer function operates as a simple stopwatch, or can be triggered by reflective targets. The unit can also totalize in various units to a maximum of 999,999.

Model TAC2K has a six digit alphanumeric display capable of displaying words and numbers. There are three control buttons. The **middle** button is the main control button and is the primary button used to operate the unit. The two smaller buttons are for programming and auxiliary functions. To the left, the button marked **M** is for the Menu functions, while the button to the right marked **R** is for the Recall and Reset functions.

Once programmed, the unit is fairly straightforward to operate. The function of the buttons is dependent upon the current operating mode of the unit. There are three primary modes of operation—

Tachometer measures speed or linear rate with respect to time. Time

PHYSICAL DATA

Temperature Range: 41°F to 104°F (5°C to 40°C).

Humidity: Maximum relative humidity 80% for temperature up to 87.8°F (31°C) decreasing linearly to 50% relative humidity at 104°F (40°C).

Pollution Degree: 2 per IEC 664.

Power: 9 VDC @ 70 mA max. Battery Type IEC-6LR61.

Accuracy: Non Contact: ±0.01%; Contact: ±0.5% typ.

Display: 6-digit Alphanumeric LCD Display, 0.3"H digits.

Resolution: Model TAC1: 1 RPM; Model TAC2K: User Selectable between fixed format 1 RPM resolution or floating format resolution to 0.0001.

Weight: 6 oz. (170 g).

Update Rate: TAC2K: 2 times/sec.

MEASUREMENT RANGES

Model TAC1

Non-Contact: 5 to 100,000 RPM.

Contact (optional) : 5 to 20,000 RPM.

Model TAC2K

RPM: 2.5 to 100,000 RPM, 0.042 to 1666.67 RPS, 150 to 999,999 RPH.

Linear Rates: 0.165 to 750 IPS, 10 to 40,000 IPM, 360 to 999,999 IPH, 0.015 to 65 FPS, 0.825 to 3,900 FPM, 50 to 235,000 FPH, 0.005 to 20 YPS, 0.275 to 1200 YPM, 16.5 to 72,000 YPH, 0 to 44 MPH, 0.43 to 2,000 cm/s, 25 to 120,000 cm/m, 1,500 to 999,999 cm/hr, 0.0042 to 20 m/s, 0.25 to 1,200 m/m, 15 to 72,000 m/hr.

Totalizer: 0 to 999,999 counts. Scale in inches, feet, yards, centimeters or meters.

Timer (Stopwatch):

Minutes: Seconds: hundredths to 59:59:99 - Resolution 0.01 sec. Hours:Minutes:Seconds to 99:59:59 - Resolution 1 sec. Accuracy: 0.01 second.

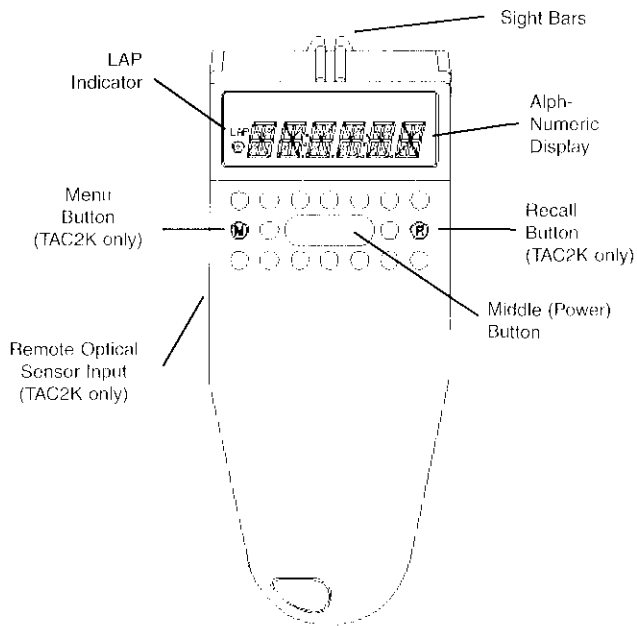


Figure 1

intervals are seconds, minutes or hours. Rotational speed can be measured as Revolutions (Revs) per second, per minute or per hour. The most common measurement being RPM or Revs per minute using the optical tachometer mode. Measurement of units other than Revs requires the attachment of the Linear Contact Wheel and Contact Tip Assembly. With this easily attached wheel, the unit can measure RATE inputs - inches, feet, yards, centimeters and meters either per second, per minute or per hour, as well as miles per hour. The user can recall the maximum and minimum values with the **R** button.

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 Contact Wheel attachment the unit can totalize in inches, feet, yards, centimeters and meters. The user can freeze the display at any time without affecting the count by pressing the **R** button. Press the **middle** button to reset total to 0 (zero).

Timer accumulates time in hours, minutes, seconds and hundredths 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 **middle** button. The Auto mode can be stopped and started by the user or by a piece of reflective tape on the objects. A LAP time can be saved in either mode by pressing the **R** button.

NON-CONTACT MEASUREMENTS For TAC1 & TAC2K

To prepare a shaft for non-contact measurement of speed, carefully clean an area of the shaft of all grease and dirt and apply a piece of reflective tape to the cleaned surface. Typically, a half inch square of reflective tape is convenient. For smaller shafts, smaller pieces of tape down to approximately 1/8 inch (3 mm) in length may be used. Always use reflective tape supplied. Additional tape is available in five foot rolls, part number TAC-5.

The ergonomic design of tachometer makes the non-contact measurement of speed extremely simple. Aim the tachometer at the reflective marker using the sight bars on the top surface of the instrument as an aid in locating the target. A light emanates from the underside of the tachometer parallel to the top surface and in line with the sight bars. This design allows you to view the target on the rotating shaft and display on the instrument simultaneously. To measure, press

and hold the **middle** button (TAC2K) or **power** button (TAC1) on the front panel and aim the instrument until a steady illumination of the on-target indicator or "bull's eye" indicates you are receiving valid data. Above 200 RPM wait for three updates of the display for the instrument to stabilize. At lower speeds, a few additional updates may be required for the instrument to initially "lock on". Once a measurement is complete, release the **middle** button (TAC2K) or **power** button (TAC1) while still viewing the target. The last reading will be held on the display for approximately 90 seconds and then the instrument automatically times out and shuts off. The operative speed range is from 5 to 100,000 RPM when using a reflective tape target.

CONTACT MEASUREMENTS For TAC1 & TAC2K

To measure rotational speed by directly contacting a shaft, the pocket tachometer must be equipped with the Contact Tip Assembly. speed ranges of 5 to 20,000 rpm (TAC1) or 2.5 to 20,000 RPM (TAC2K). **Model TAC1 requires the purchase of the optional TAC1-1 while TAC2K comes complete with the appropriate Contact Tip Assembly.** This accessory is attached to the bottom of the instrument with two Nylatch® fasteners which install in the holes provided for attachment. To assemble, first pull back on the grips on the two Nylatch® fasteners to insure they are in the released (pulled out) position. **DO NOT ATTEMPT TO PULL THEM BEYOND THE UNLOCKED POSITION** (loose feel). Install the Contact Tip Assembly onto the tachometer by sliding the sight bars on tachometer into the corresponding notch in the top of the Contact Tip Assembly (above the window exposing the shaft). Push the Contact Tip Assembly flush against the tachometer so that the fasteners fit into the two locating holes on the underside of the unit. Secure the tip assembly by pushing firmly on both the Nylatch® fasteners until they snap securely in place. Select either a convex or concave tip appropriate for the measurement to be made and install it firmly on the shaft extension of the Contact Tip Assembly. Note that the shaft has a flat surface on it which must align with the flat in the rubber tips. The convex (conical) tip is used for moderate to larger diameter shafts that are equipped with a turned center, while the concave (inverted conical) tip is used on smaller diameter shafts. To make a measurement, start the equipment and carefully move the contact tip against the end of the rotating shaft. **KEEP THE HAND HOLDING THE INSTRUMENT WELL BEHIND THE BACK EDGE OF THE CONTACT TIP ASSEMBLY.** Only a moderate amount of pressure is required to keep the rubber tip in contact with the rotating shaft. Depress the **middle** button (Model TAC2K) or **power** button (Model TAC1) and hold the instrument in position until the reading is complete. Once again, the on target indicator or "bull's eye" symbol will be your indication of reliable data being received. When the measurement is complete, release the **middle** button (Model TAC2K) or **power** button (Model TAC1) while still in contact with the shaft.

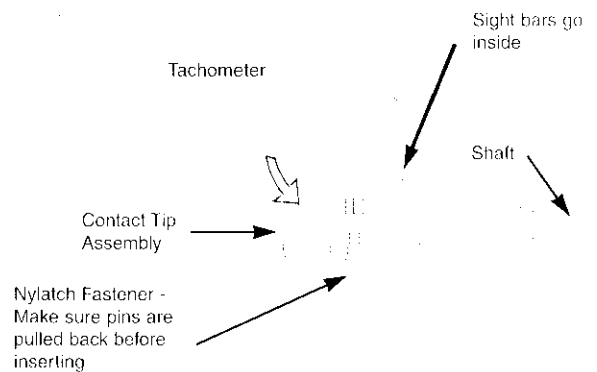


Figure 2

remove the instrument from contact with the shaft, and the tachometer will retain the last reading for approximately 90 seconds then automatically shut off. To disassemble the Contact Tip Assembly, pull the grip of each of the Nylatch® fasteners to release them from the back of Pocket-Tach, and remove the Contact Tip Assembly by gently pulling it from the back of the instrument.

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 CONTACT TIP ASSEMBLY. PROPERLY REPLACE ALL MACHINERY GUARDS AFTER COMPLETING MEASUREMENT. DO NOT USE FOR ROTATION GREATER THAN 20,000 RPM.

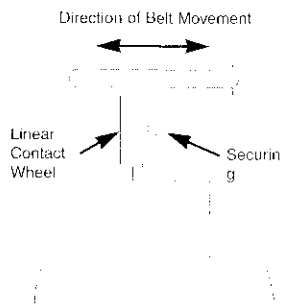
SURFACE SPEED MEASUREMENTS

Model TAC2K

Surface speed measurements are made with the Contact Tip Assembly and the Linear Speed Wheel. Install the Contact Tip Assembly on the tachometer as described previously. The Linear Speed Wheel must be pushed right back onto the shaft, aligning the flats. Secure the Linear Speed Wheel in position by tightening the small machine screw on the neck of the wheel.

DO NOT ATTEMPT TO USE THE LINEAR SPEED WHEEL IF THE SECURING SCREW IS NOT TIGHT.

To measure a linear surface speed such as a moving belt or web, hold the tachometer at a right angle (90 degrees) to the direction of movement and gently contact the side of the rubber tip against the top surface of the object to be measured. For accurate results, be sure that the tip is held flat against the moving object. Only a very moderate amount of pressure is required. Excess pressure can load the shaft and distort the rubber tip causing an erroneous reading and eventual wear in the bearings of the Contact Tip Assembly. Linear speeds are read out directly based on the operating mode previously selected in the menu modes. The "Per Minute" measurement ranges are: Inches, 10 to 40,000 Inch/M; Feet, .84 to 3,900 Feet/M; Yards, .28 to 1,200 Yard/M; Centimeters, 25.0 to 120,000 Cm/Min; Meters, .250 to 1,200 M/Min; Miles per Hour, 0 to 44 Mile/H.



NOTE: PLEASE READ AND HEED WARNINGS FOR CONTACT MEASUREMENTS ABOVE.

Model TAC1

Surface speed measurements are made with the TAC1-1 Contact Tip Assembly (sold separately) and the side of the concave tip. Install the TAC1-1 and concave tip on tachometer as described in the Contact Measurement Section. To measure a linear surface speed such as a moving belt or web, gently contact the side of the rubber tip against the top surface of the object to be measured. For accurate results, be sure that the tip is held flat against the moving object. Only a very moderate amount of pressure is required. Excess pressure can load the TAC1-1 shaft and distort the rubber tip causing an erroneous reading and eventual wear in the bearings of the Contact Tip Assembly. Linear speeds are read out directly in inches per minute over the range of 5 to 20,000 IPM (inches per minute). Feet per minute equals inches per minute divided by 12.

NOTE: PLEASE READ AND HEED WARNINGS FOR CONTACT MEASUREMENTS ABOVE.

OPERATION (Model TAC2K only)

The unit is started by pressing the **middle** button. The display will turn on with all segments lit, the unit will then indicate what operating mode has been preset. The display will then show *READY* and the display will go to 0 (zero). The unit will automatically shut off after 90 seconds of inactivity.

TO SHUT THE UNIT OFF AT ANY TIME, PRESS THE **R** AND **MIDDLE** BUTTONS SIMULTANEOUSLY.

SELECTING OPERATING MODES (Model TAC2K only)

To change the operating mode press the **M** button so that the display shows *MENU*. There are a number of Main Menu choices that can be selected by pressing the **M** button. These are:

TYPE Selects the primary operating mode—RPM, RATE, TOTAL, TIMER.

DEC PT Decimal point—select SET for a resolution of one, or AUTO for auto ranging with moving decimal point (fractional resolution to 0.0001).

TEST All segments will be illuminated, then press the **middle** button, aim it at a fluorescent lamp and observe 7200 ± two counts. (Note: In countries with a 50 Hz, power line frequency, the Tachometer will read 6000 ± 2).

When setting modes the **M** button acts as the primary select button and the **R** button acts as the secondary select button. The **middle** button is the enter/save button and will return the user to the new operating mode. The unit will remember all menu settings when turned off.

RPM MODE (CONTACT TIP CAN NOT BE USED IN THIS MODE)

Note: The instrument is factory preset in optical RPM mode of operation.

To select RPM mode, press the **middle** button until the display shows *READY* then *O*. Press and hold the **middle** button, aim the Tachometer at a reflective target up to 30 inches away and an angle not exceeding 30 degrees to take readings. Notice the on-target indicator "bull eye" must be steadily indicating the target is being hit correctly.

To measure RPM you can use the internal optics or a remote sensor, TAC2K-9.

In the **INTERNAL** mode it is necessary to press and hold the **middle** button to take a reading. The unit will shut itself off after 90 seconds of inactivity in all modes. It will also hold the last reading on the display for 90 seconds.

In the **EXTERNAL** mode the Remote Sensor is powered on continuously, taking readings all the time until it is shut off by pressing the **middle** and **R** buttons simultaneously or shuts off after 90 seconds of inactivity.

When measuring RPM the user can recall the maximum and minimum by pressing the **R** (Recall) button. Press once for MAX and again for MIN. Each time the **middle** button is pressed to begin readings, the MAX and MIN values are cleared.

RATE MODE (USE THE CONTACT TIP FOR RPM, FPM, MPM AND OTHER RATE MODE MEASUREMENTS)

The RATE mode is an extension of the RPM mode and, with the exception of Revs, all work with the 0.1 meter Linear Speed Wheel and

Contact Tip Assembly attachment. This mode is used to measure linear rate, such as conveyor belt speed.

To select RATE mode turn the unit on and press **M** twice so the display shows *TYPE*. Press **R** once to enter the TYPE menu then press **M** until the display shows *RATE*. Now press **R** until the operating mode you wish to measure is displayed. Press the **middle** button to save/enter your mode selection.

OT RPS, OT RPM and OT RPH are Optical Tachometer or non-contact measurements. CT RPS, CT RPM and CT RPH are contact Tachometer measurements, and are used with the Contact Tip Assembly. The rest are linear measurements and must be used with the contact wheel. The contact tip and wheel use 2 pulses per Rev. Carefully place the Linear Contact Wheel or contact tip on the surface to be measured.

Note: /S is per second, /M is per minute, /H is per hour. CM/ is centimeters and M/ is meters.

TIMER MODE

To select the TIMER mode, turn the unit on and press the **M** button twice so the display shows *TYPE* then press the **R** button to access the TYPE menu. Press the **M** button until the display shows *TIMER*. Press the **R** button to select MANUAL or AUTO then press the **middle** button to enter the timer mode.

MANUAL mode acts like a stopwatch. Timing is started and stopped using the **middle** button. A LAP time can be held by pressing the **R** button while timing. The display will show the LAP value and will blink *LAP* in the top left corner of the display. To return to the timing mode press **R** button again. To reset to 00:00:00 press **R** button when timer is stopped.

The AUTO mode is similar to the MANUAL mode except that the timing can be started and stopped from the internal optics or external sensor TAC2K-9 as well as the **middle** button.

The unit will time in hundredths of a second to 1 hour and will then change to seconds. NOTE: Once timing is initiated, the unit needs to be TURNED OFF MANUALLY or the battery will go dead.

TOTALIZE MODE

To select TOTALIZE mode, turn the unit on and press the **M** button twice so the display shows *TYPE* then press the **R** button to access the TYPE menu. Press the **M** button until the display shows *TOTAL*. Press the **R** button to select the desired mode. The COUNT scale simply increments the display by one for each reflective optical pulse received.

The unit can totalize in units by selecting COUNT or REV or in distance by selecting INCHes, FEET, YARDs, CentiMeters or METERS.

Press the **middle** button to save/enter your selection.

In the TOTALIZE mode the lamp or external sensor TAC2K-9 is powered continuously. The reading on the display can be held without affecting the count by pressing the **R** button while totalizing. The display will hold the reading and will blink *LAP* in the top left corner indicating that the display is on hold. To revert back to the count display press **R** one more time. The display will be RESET to zero by pressing the **middle** button. To shut the unit off manually, press the **middle** and **R** buttons simultaneously.

Note that the total may have an uncertainty of ± 0.5 revolution of the contact wheel circumference (0.05 m or 1.8") depending on where the wheel starts or stops.

In TOTALIZER mode, the unit will shut off if no inputs are received or no buttons are pressed in 90 seconds.

DECIMAL POINT (DEC PT)

The instrument can display measurements in a "set" range format - 1234 with a resolution of 1 digit, or in an "auto" floating point format - 1234.56 for maximum resolution. It is not applicable to the TIMING mode.

The decimal point operation is selected by pressing the **M** (menu) button until the display shows *DEC PT*. Press the **R** button to select either *SET* or *AUTO* modes then press the **middle** button to return to the measurement.

TEST

The TEST mode is used to check the instrument calibration against a known standard, the AC mains frequency. The Contact Wheel Assembly or Remote Sensors must not be attached to the instrument. To enter the TEST mode turn the unit on and press the **M** button until the unit shows *TEST*. Press the **R** button. The display will show all segments on and then enter the RPM mode. To test the unit, aim it at a fluorescent light. The display should show 7200 ± 2 counts for countries with 60 cycle AC mains and 6000 ± 2 counts for countries with 50 cycle AC mains. To exit the TEST mode press the **M** button then the **middle** button. The unit will remember the previous mode of operation. Note that this test does not check the internal lamp. This can be accomplished during the RPM mode by looking into the lens hole on the underside of the unit and pressing the middle button. Check to see that the lamp comes on and is bright white not yellow in color.

USING THE REMOTE SENSOR - TAC2K-9

The Optional Remote Optical Sensor, part number TAC2K-9, can be plugged (3.5 mm phone plug) into the side of the instrument housing. The user can hold or mount the TAC2K-9 at the end of the 5 foot cable. The green LED on the TAC2K-9 is the on-target indicator while utilizing this sensor.

Operation in all modes is the same as using the internal optics of the instrument. The TAC2K-9 should be plugged into the tachometer while the power is off.

BATTERY (Models TAC2K and TAC1)

The tachometer is powered from a single NEDA type 1604 (PM9) (Model TAC2K) or IEC Type 6LR61 (Model TAC1) nine volt dc alkaline battery. The battery is installed by removing the sliding cover from the back of the instrument, connecting the battery to the battery snap, and installing the battery into the compartment with leads arranged so that they will not be damaged when replacing the battery compartment cover.

When the battery voltage in tachometer is getting low, the display will blink on and off to indicate this condition. At the time the low battery indication comes on, the tachometer should operate another fifteen minutes.

CALIBRATION

The tachometer is a microprocessor -controlled digital instrument which requires no calibration. However, the accuracy of the tachometer can be checked at any time by aiming it at a fluorescent light and observe $7200 \pm \text{two}$ counts. (NOTE: In countries with a 50 Hz. power line frequency, the tachometer will read 6000 ± 2).