

Digital photo tachometer

Model: RM-1500/1501/1502

User Manual



Thank you very much for purchasing this new digital tachometer. In order to use the tachometer correctly in the long term, please read this instruction manual carefully. then you will understand its operation, appreciate all its features and obtain the most accurate results.

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1. Specification speed (non-contact):

Range resolution accuracy 10.00 -

	99999 0.01/0.1/1 0.04% ±2 dgts	0.200 - 2000.0 0.001/0.01/0.1	
Rotating speed	0.04% ±2 dgts		
rpm(Hz)			

speed (contact)

	Range resolution 20.00 - 29999	0.01/0.1/1	Accuracy
RPM / (/ symbol "Contact")			0.04% ±2 dgts
m/min	2.000 - 2999.9 0.001/0.01/0.1	0.04% ±2 dgts	6.00 - 10000 0.01/0.1/1 0.04% ±2
Zhong Ying	dgts 4.00 - 3000 0.01/0.		
feet/minute yards/minute			

Event counter:

Range 0	Maximum limit. The input frequency is 10KHz.
- 99999	Duty ratio is 5%

External TTL input

High > 4.5V (RM1501) 5 digits

Exhibition:

Word 99999 counts 0.7 seconds (> 60

Sampling rate:

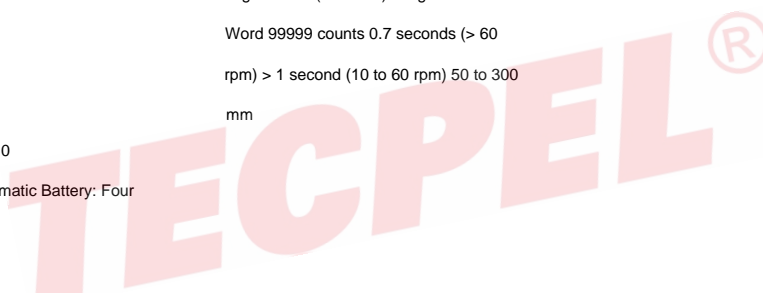
rpm) > 1 second (10 to 60 rpm) 50 to 300

mm

Measuring distance: Time base: 4.0

MHz Crystal range selection: Automatic Battery: Four

1.5V battery (AA, UM-3)



Power consumption: 1.5mA (idle) 5mA (1000.0 - 99999 rpm)

25mA (10.00 - 999.99 rpm)

25mA (max, min or average enabled)

25mA (event counter) for 30 minutes. 0 to 50°C

(32 to 122 °F) 172 mm x 63

mm x 36 mm

Automatic power off: operating temperature

Spend.

(6.8 in. x 2.5 in. x 1.5 in.) 190 g

ruler

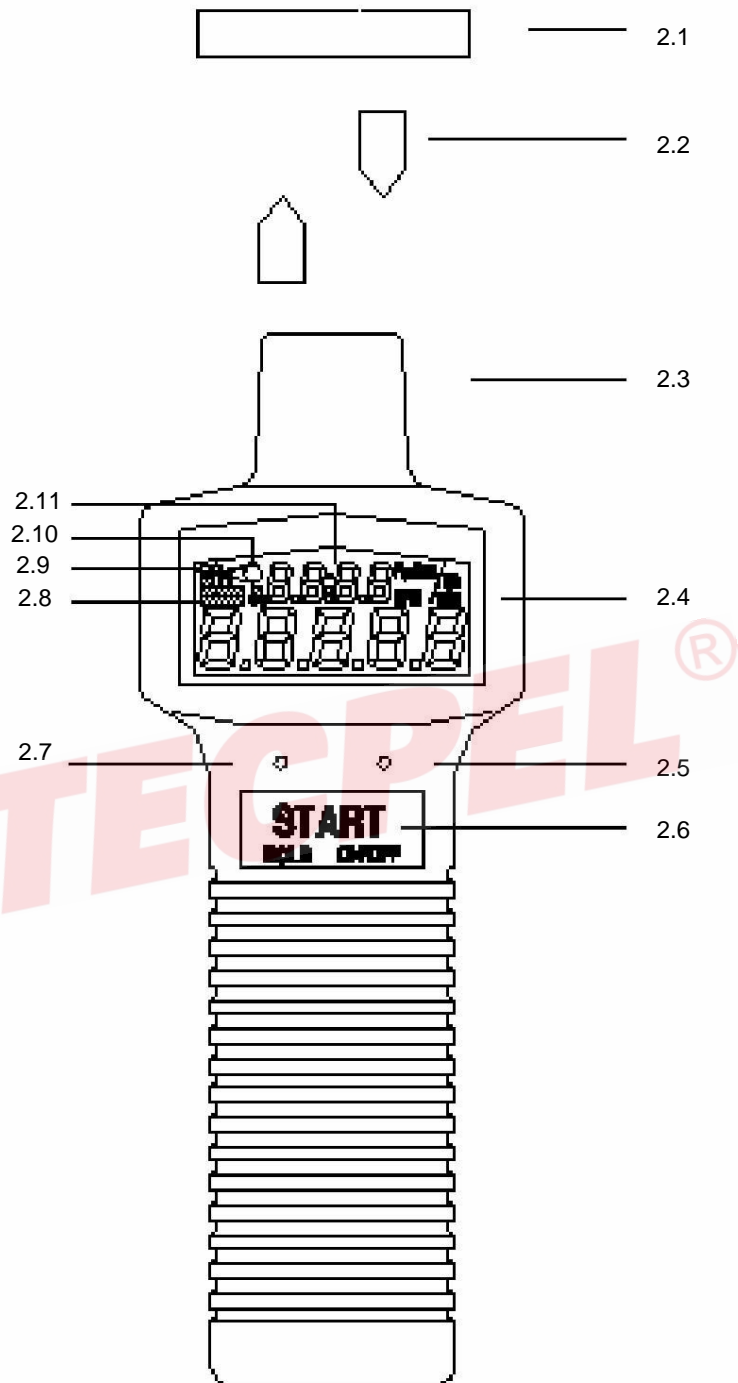
(6.7 oz.) (with battery)

ÿ: heavy

Quantity: Accessories:

Carrying bag x 1, reflective tape x 1, instruction manual x 1

2. Panel function



2.1. Reflective tape. Paste the reflective

tape on the surface of the unit under test 2.2. When the reflected signal beam restarts, the reflecting surface should be perpendicular to the transmitting/receiving unit to obtain the best measurement results.

2.3. The red light of the transmitting/receiving unit emits from the left side

of the tachometer. There is a receiving sensor installed on the right side, which is used to receive the light signal emitted by the reflected surface.

2.4. LCD

The lower row of the LCD is a 5-digit number used to display RPM, m/min, ft/min, yd/min or count.

The upper row of the LCD is the clock. If only minutes are displayed, the tachometer is in auto-off mode. The power will turn off after 30 minutes. To deactivate auto-off mode, press and hold the device button (left button) for 2 seconds. The hours will then be displayed.

2.5. Function button Press this button

to select MAX, MIN or AVE function. To return to normal mode, press and hold the button for 2 seconds.

2.6. Start/Hold/On/Off When the power is

off, press this button to turn the power on. If the power is on, press this button to start measurement. Press again to hold data and stop measurement. To turn off the power, press and hold the button until "OFF" appears on the LCD (about 2 seconds). Release the button and the power will turn off.

2.7. Unit button Use

this button to select different units, such as RPM, RPM / ( / symbolizes "contact"), m/min, ft/min, yd/min, rps (Hz) or counts. To measure speed in RPM/, m/min, ft/min or yd/min, the optional RM1502 mechanical adapter must be connected.

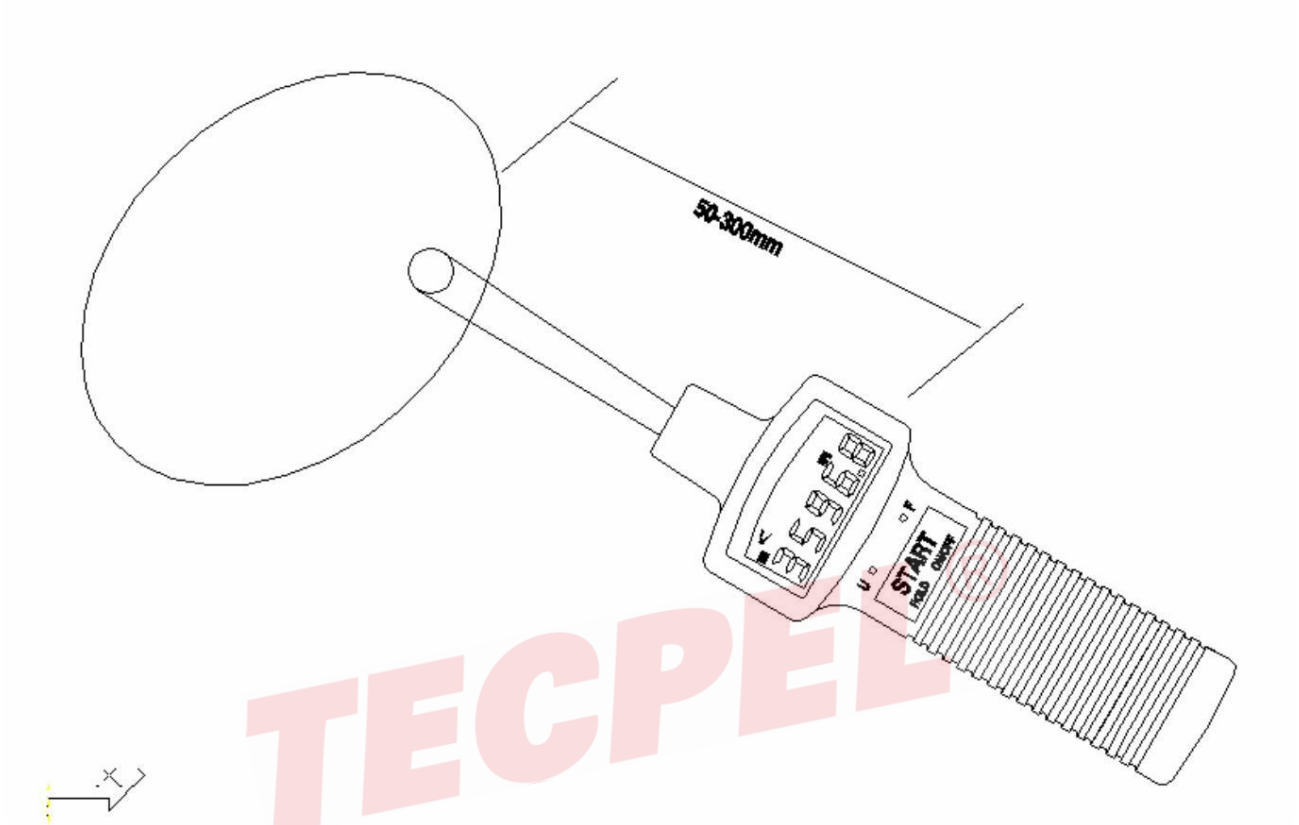
When the No. symbol is displayed on the LCD, the device becomes an event counter. The clock will reset to zero and start counting. To stop counting, press the HOLD (START) button once. To reset the count, press the function button (right button).

2.8. The MAX/MIN/AVE symbol indicates the

MAX, MIN or AVE function enabled symbol. 2.9. Low

battery warning 2.10. Start measuring symbol

2.11. Hour: minute clock



3.1. Normal operation A. Install four 1.5V AA batteries.

b. Cut a piece of reflective tape measuring 1.0 cm x 1.4 cm (optimal size)

c. Wipe off any oil or stains on the surface where the reflective tape will be applied.

d. Attach the self-adhesive reflective tape to the object where the rotation speed needs to be measured. The reflective tape should be as close as possible to the outer edge of the object being measured.

e. Press the "Start" button to turn on the tachometer.

f. Aim the photoelectric probe at the object, as shown in Figure 2. Press the START button once and confirm that the red LED light is on. Then read the rotation speed on the LCD display.

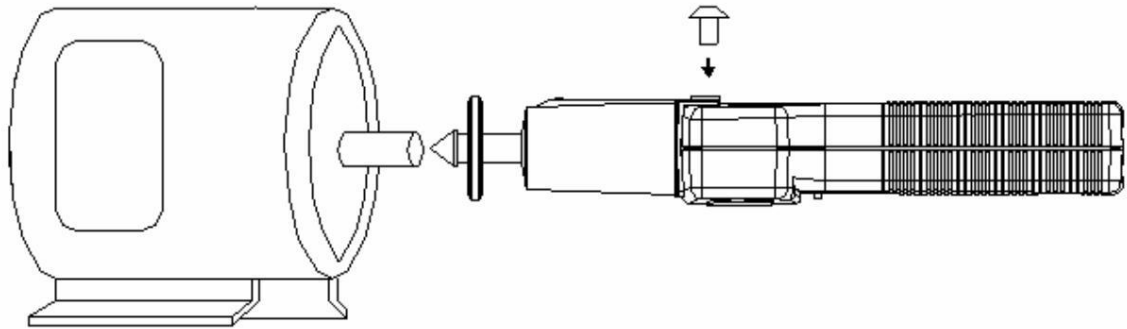
g. If the speed is less than 60 rpm, it may take approximately 1 to 6 seconds to measure (60 rpm takes 1 second, 10 rpm takes 6 seconds).

h. If you aim the photoelectric probe at a 0-speed object immediately after a measurement, the reading will remain for 6 seconds.

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Note: If the rotation speed is less than 999.99 rpm, the red LED is always on to detect the rotation speed. If the speed is greater than 999.99, the device will enter power saving mode. The LED will be on for a short time and then off most of the time to save power.

3.2. Using mechanical adapter (optional RM1502)

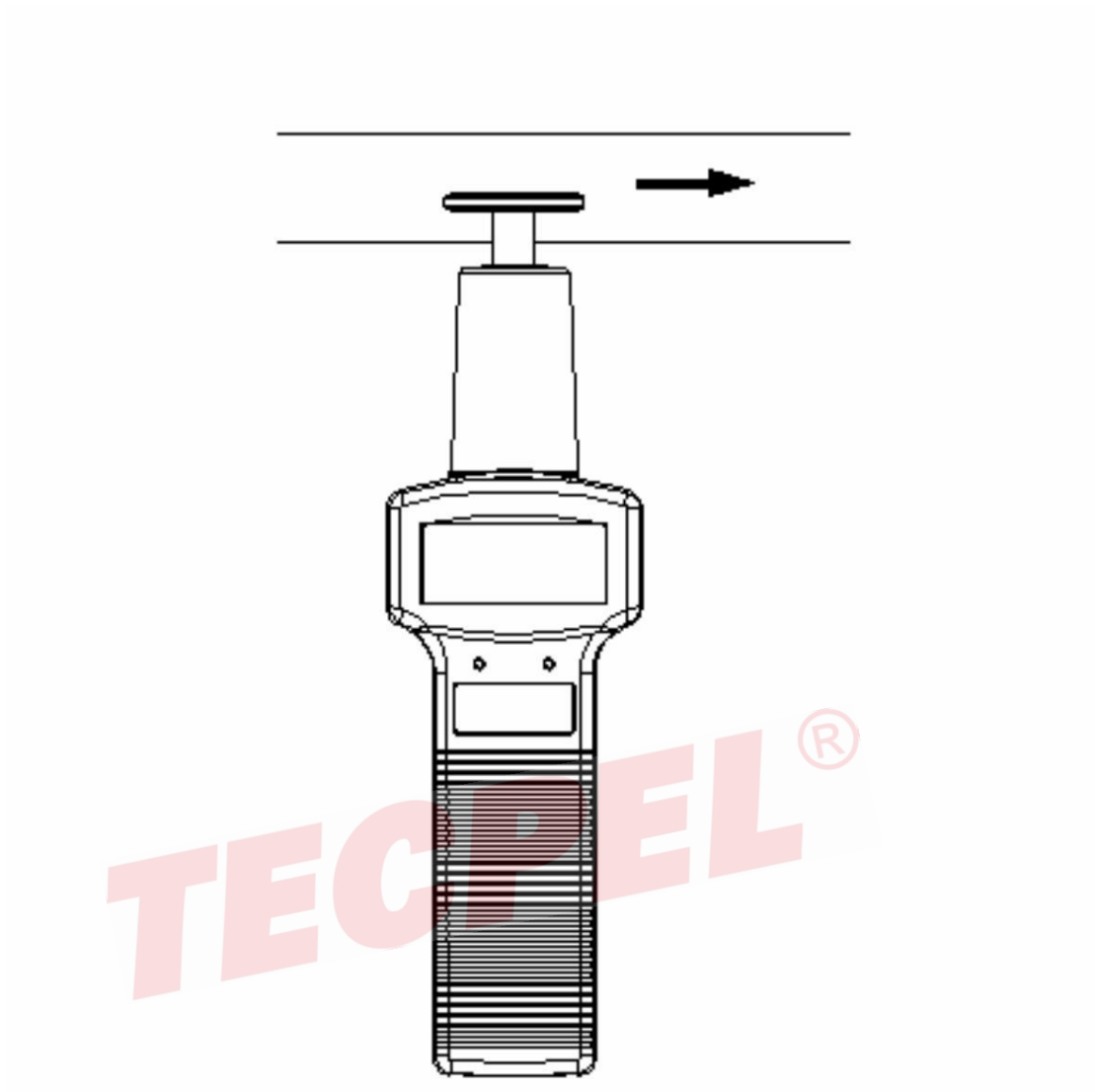


A. Choose the right rubber tip. b. Connect the mechanical adapter to the device and tighten the screws.

C. Press the unit button (left button) to select RPM / (not just RPM). The auxiliary LED will be on and the main LED will be off. d. Press on the axis of the object to be measured. e. Do not press the shaft with force to avoid danger.

WARNING: Do not exceed the speed limit of 29999 rpm when using a mechanical adapter.

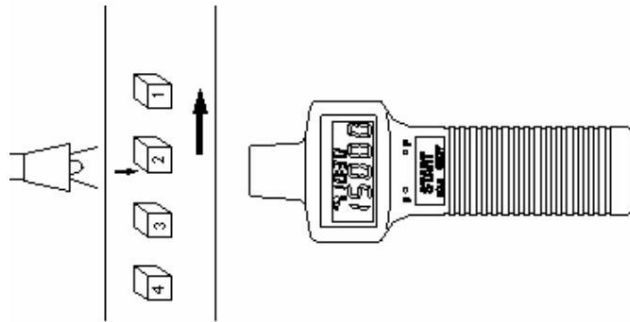
3.3. Surface speed measurement (meters/minute, feet/minute or yards/minute)



A. Connect the mechanical adapter (option RM-1502) to the device. b. Press the unit button to select the desired unit. The auxiliary LED will be on and the main LED will be off. C. Gently touch the surface to be tested.

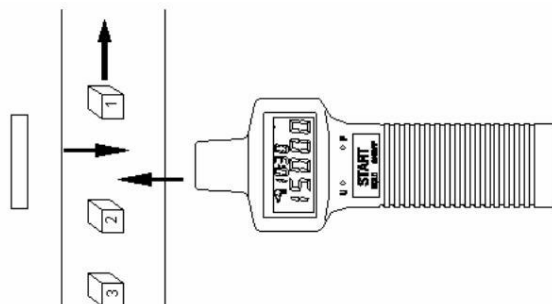
3.4. Use as an event counter with external light source Press the unit button several times to select the unit of "No.O" (count). The "O" symbol is used to indicate to the user that an external light source is required. b. When the symbol "No.O" appears, the tachometer resets the upper clock to 00:00 and starts counting the detected pulses. (Auto power off automatically deactivates) c.

To stop counting, press the Start button once. d. To reset the count to zero, press the Function (right) button.



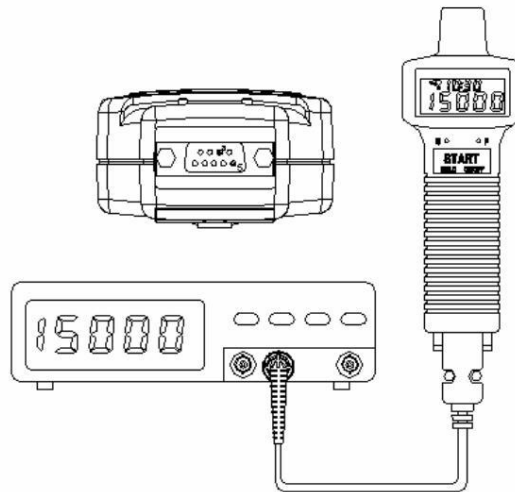
3.5. Use as an event counter with internal red LED Press the unit button several times to select

The unit of "No." (count). b. When the symbol is "no.". Once present, the tachometer resets the upper clock to 00:00 and begins counting detected pulses (auto power off will automatically deactivate). C. To stop counting, press the Start button once. d. To reset the count to zero, press the Function (right) button.



3.6. External signal (TTL) input (RM1501) Instead

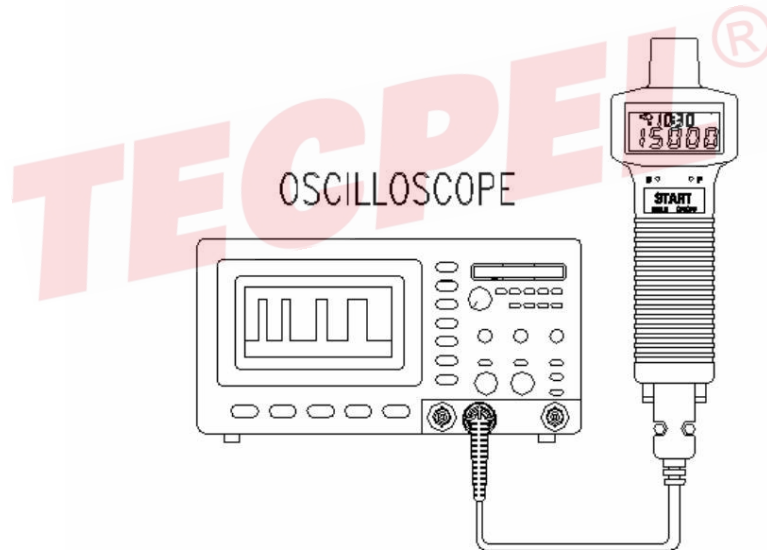
of receiving the signal from the light source, the user can input an external TTL signal (high: > 4.5V, low: 0V) through pin 8 of the RS232C connector. Pin 5 serves as signal ground.



NOTE: It is strongly recommended to cover the transmitter/receiver unit to avoid unwanted light signals from entering.

### 3.7. Digital pulse signal output (RM1501) Users can output

digital pulse signals through pin 8 of the RS232C connector, and pin 5 serves as the signal ground of the oscilloscope.



### 3.8. Measuring slow-rotating objects If the object you are measuring rotates

very slowly, it is recommended that you use a tripod to hold the tachometer in place and use multiple strips of tape to obtain more accurate results.

If using multiple strips of tape, each strip should be an equal distance from the object. Any amount of tape is acceptable. But you need to divide the reading by the number of pieces to get the correct result.

Correct rotation speed = read/(number of tapes)

Example: 4 tapes, reading 12 RPM. Correct speed =  $12 / 4 = 3$

rpm

3.9. Using the MAX/MIN/AVE function These functions allow the user to analyze the

stability of the rotational speed. These values

are actually the peak value (MAX), the value (MIN) and the true average value (AVE).

MAX: Press the function button to select the maximum function. The MAX function can be used to find the peak value of the measurement speed.

MIN: Press the function button to select the minimum function. The MIN function can be used to find the peak value of the measured speed.

AVE: Press the function key to select the average function. The average function is the true average.

mistake!

If the average sum overflows, or  $n > 65535$ , the last average speed will be used as the initial value for subsequent calculations, and  $n$  will be reset to 1. When

the

user presses the HOLD button

(same as the START button), the maximum/minimum/average values are still stored in the memory. The user can press the function button (right

button) to view the value. To return to normal mode, press and hold function (right button) for 2 seconds and the max/min/average symbols on the LCD will

disappear.

3.10. Turn on/off the tachometer. Pressing any button will turn on the

power of the tachometer. To power off the tachometer, press and hold the START button until "OFF" appears on the LCD. Then release the start button.

3.11. Deactivating the auto-off function If the tachometer is in auto-off mode, only the

minutes will be displayed. The tachometer will

switch off after 30 minutes. To deactivate the auto power off function, press and hold the UNIT button (left button) for 2 seconds until the hour is displayed.

3.12 . b.



Replace the battery It's time to replace the battery

Unscrew the screws of the battery cover and

A symbol (low battery) appears on the LCD to indicate

remove the battery cover. c Replace the old batteries with

4 new batteries. Do not mix different battery types together.

d. Replace the battery cover and tighten the screws.

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4. RS-232C serial interface protocol (RM-1501)

Ten bytes are transmitted to the PC through the RS-232C connector. Each byte is defined as follows: Byte 1: Leading byte 0x0D Byte 2: LCD display decimal point bit0:

dp1 (0000.0), if 1 bit1: dp2 (000.00),

if 1 bit2: dp3 (00.000), if 1

Previous status flag bit0: low battery, if it is 1 bit1: maximum. Value overflows,

if 1 bit2: counter overflows, if 1 bit3: self

Automatic power off is disabled, if 1 bit4: minimum value

Value overflow, if 1 bit5: average

Byte 3:

value overflow, if 1 Unit bit0: rpm, if 1

bit1: m/min, if 1 bit2: ft/min, if

1 bit3: yd/min, if 1 bit4: rps, if 1 bit5: Counter

of external light source, if 1 bit6:

Counter without external light source, if 1 function bit0: normal,

if 1 bit1: maximum value, if 1 bit2: minimum value, such as

If 1 bit3: average value, if 1 current status flag bit4:

Byte 4:

LCD

Reading overload

(OL) bit7: Keep binary format

The least significant bit of the reading

The second byte of the binary carry

format reading The third

byte of the binary carry format reading The most significant byte of the binary format reading

Byte 5:

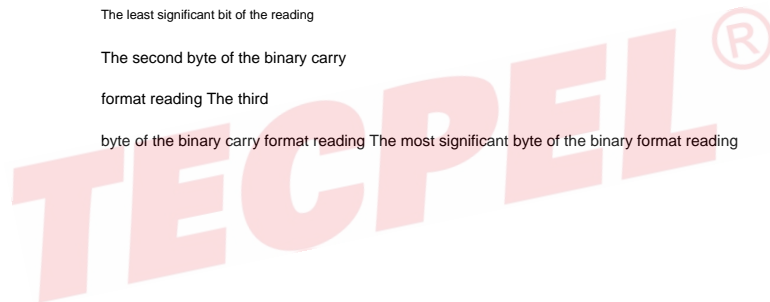
Byte 6:

Byte 7:

Byte 8:

Byte 9:

Byte 10:



5. Installation of WindowTM application software

(RM-1501) 5.1. For Windows

3.1 A. Start MicrosoftTM WindowsTM

B. Insert the disk into drive A (or B) C.

From the program manager, select the "File" menu and then select "Execute"

D. Enter a:\setup (or b:\setup) and press Enter key 5.2. For Windows

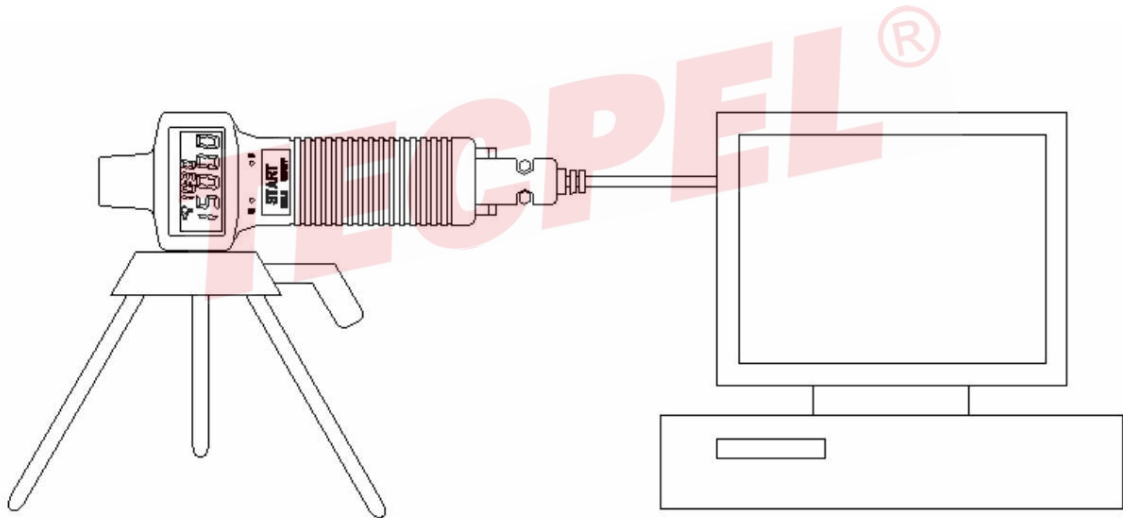
95

A. Start WindowsTM 95 B. Change

Insert the disk into drive A (or B)

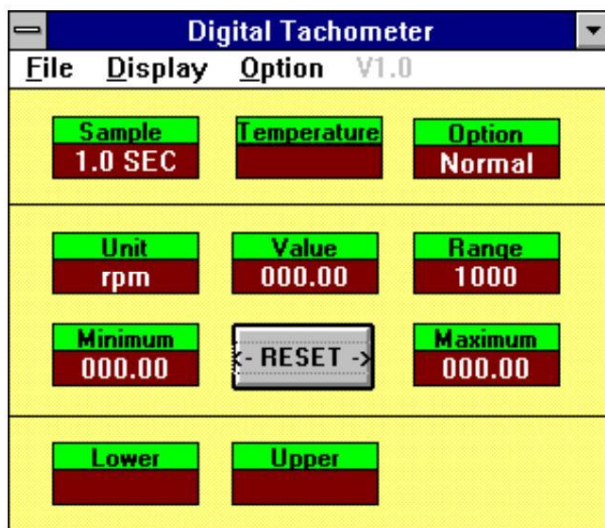
C. Press the "Start" button and select "Run"

D. Enter a:\setup (or b:\setup) and press Enter



6. Windows™ application instructions (RM-1501) Main window: When the program is executed, the program

will automatically search for a connected tachometer or an available serial port. If no serial port is available, a "No communication port" message will be displayed and the program will exit. After setting the communication port, the following main window will be displayed on the screen:



Sampling: sampling time. Options:

Speedometer display options. Normal, MAX, MIN, AVE units: rpm, m/min, ft/min, yard/min, counter 0, the value under counter VALUE is the reading value of the tachometer:

Range: under RANGE

The text displayed is the unit of the range selection

Tachometer minimum value: the

minimum value recorded by

the PC. Reset: Clear the recorded minimum and maximum values.

Maximum value: The maximum value recorded by the PC.

Lower: The minimum value of the specified range.

Above: Text The maximum value of the specified range. File: If you

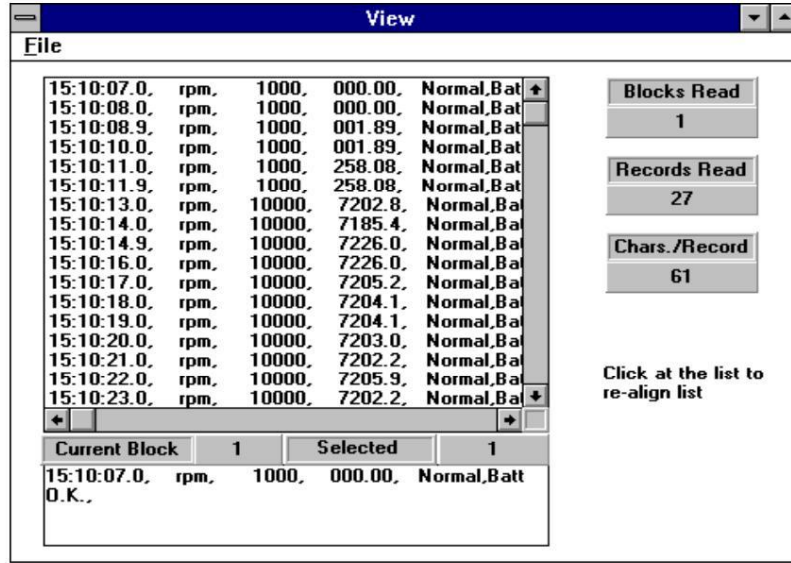
select File, the drop-down menu will display six options: Name,

Start recording, end recording, view, draw the data in the file, and exit.

Name: Enter a file name to store the data displayed on the LCD at specified intervals.

Start recording: Start recording when selected. End recording: End recording when selected.

View files:



If you select the view option under File in the main window, the view window shown above will be displayed, allowing users to view your ASCII data files. If the printer is connected to the PC, the user can selectively print content.

File: Select this menu to open the user profile. The user will be asked to enter a file name. After entering the name, the program will read a set of data. The number of records in a block depends on the memory size of the PC. The larger the memory, the more records there are in one block.

Block reading:

Indicates how many record blocks have been read. Read

record: indicates that the

The number of records read.

Character/Record: Express one stroke

How many characters are in the record.

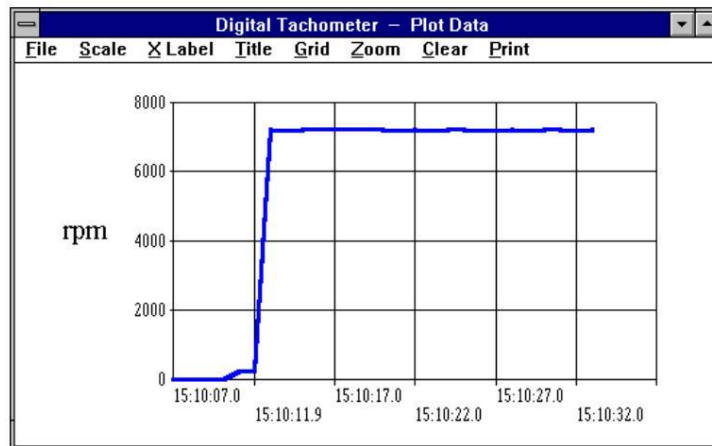
Current block:

Indicates the block number currently being reviewed.

Selected: Indicate

The currently selected record number.

Plot data in a file



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If you select the "Draw data from file" option under "File" in the main window, the drawing window will be displayed and the user can draw the curve of the data file. If a printer is connected, the user can print out the curve.

File: Open a file to draw data. Scale: Set the scale of Y axis.

X-axis label: Users can select serial number (1,2,3,4,...) or time (12:00:01, 12:00:05,...) as the X-axis label.

Title: Enter a title for the X-axis, Y-axis, or chart.

Grid: Draw a horizontal, vertical grid, or both.

Zoom: Enlarge the chart. Zoom size is limited to 3600 points.

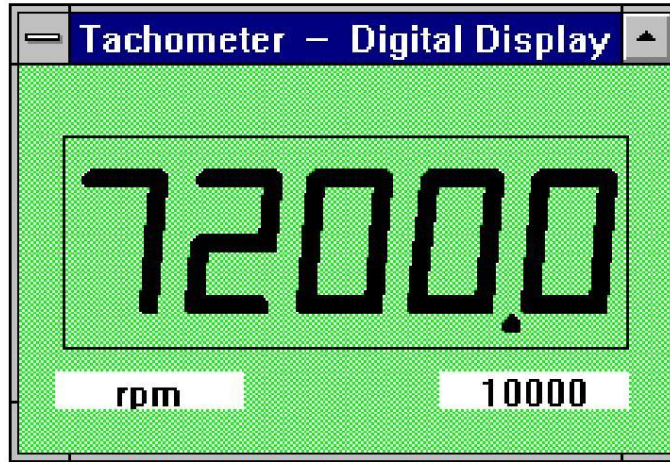
statistics: Statistical data. This function allows the user to plot the mean, standard deviation, and best fit on the curve. This function is only effective when the data is less than 3600. If there are more than 3600 pieces of data, STATIS will be disabled.

Clear: Clear the graphics

Print: screen. If a printer is connected to the PC, the curve is printed.

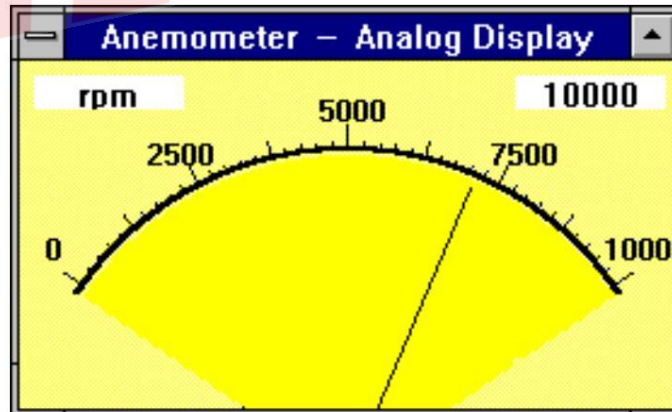
Display: The Display menu has four options: Number, Analogy, List, and Graph.

digital:



If you select this option or press CTRL+D, a window simulating the LCD display of a multimeter will appear on the screen.

simulation:



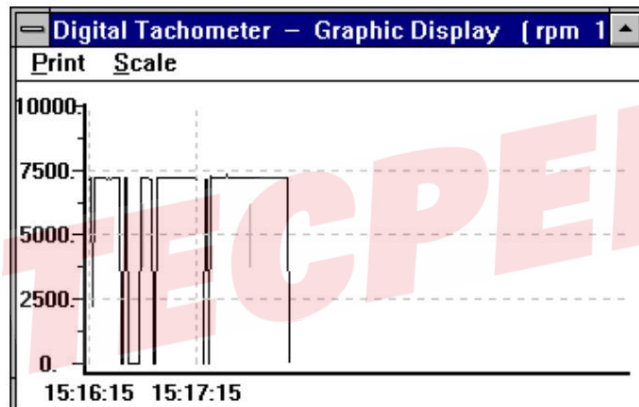
If you select this option or press CTRL+A, a window simulating the analog meter will appear on the screen.

List:

Digital Tachometer – List				
Time	Function	Range	Data	Area
15:26:01.9	rpm	10000:	7202.6	Normal
15:26:03.0	rpm	10000:	7202.6	Normal
15:26:04.0	rpm	10000:	0000.0	Normal
15:26:04.9	rpm	10000:	0000.0	Normal
15:26:06.0	rpm	10000:	7207.4	Normal
15:26:07.0	rpm	10000:	7229.3	Normal
15:26:07.9	rpm	10000:	7202.6	Normal
15:26:09.1	rpm	10000:	7205.0	Normal
15:26:10.0	rpm	10000:	7186.2	Normal
15:26:10.9	rpm	10000:	7201.8	Normal
15:26:12.0	rpm	10000:	7203.5	Normal
15:26:13.0	rpm	10000:	7199.4	Normal

If you select this option or press CTRL+L, a window will appear listing the date, function, range, and value for each sample.

figurative:



If you select this option or press CTRL+G, a window simulating a strip chart recorder will appear on the screen. The graphics window has two menus: Print and Zoom. Select the Print menu and the graphics will print via any printer connected to the PC. The SCALE menu allows the user to set the minimum and maximum values of the Y (vertical) axis.

Options: If you select Options, the drop-down menu will display three options: Sampling rate,

Baud rate. Upper limit: Enter the

upper limit. If the upper limit is exceeded, an OVER message will be displayed on the screen.

Lower limit: Enter the lower limit. If the displayed value is less than the lower limit, an UNDER message will be displayed on the screen.

Graphics mode: Select how the graphics window is displayed. Points or bars. Sampling

rate: Select this option to enter the PC sampling time, or click SAMPLE on the screen to enter the sampling time. 9600.

Baud rate:

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