

+ Type k Temp., Pt 1000 ohm Temp.
IR Temp .

AUTOMOTIVE TESTER

Model : **PCE-T 260**



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Your purchase of this
TACHOMETER/
STROBOSCOPE Meter
marks a step forward for you
into the field of
precision measurement.
Although this METER is
a complex and delicate
instrument, its durable
structure will allow
many years of use if
proper operating
techniques are
developed. Please read
the following
instructions carefully
and always keep this
manual within easy
reach.

OPERATION MANUAL

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1. FEATURES

- * Multi-functions, one instrument combine Photo Tachometer (RPM) & Contact Tachometer (RPM, m/min., ft/min.,in/min.). Stroboscope , Type K Thermometer, Pt 1000 Thermometer, IR Thermometer .
- * High intensity white light beam for photo tachometer, safety and save the power energy.
- * Wide measuring range from 0.5 to 99,999 RPM.
- * 0.5 RPM resolution for the measured value < 1000 RPM.
- * High precision with 0.05% accuracy.
- * The last value, max. value, min. value will be stored into the memory automatically & can be obtained by pressing REC Button.
- * Large LCD display
- * High visible LCD display gives RPM reading exactly with no guessing or errors & saves battery energy.
- * This tachometer used the exclusive one chip MICRO-COMPUTER LSI circuit & crystal time base, offer the high accurate measurement & fast sampling time.
- * The use of durable, long lasting components, including a strong, light weight ABS plastic housing, assures almost maintenance free performance for many years.
- * The housing cabinet has been carefully shaped to fit comfortable in either hand.

2. SPECIFICATIONS

2-1 General Specifications

Display	43 mm x 33 mm LCD, 5 digits. 5 digits with display unit.
Measurement	1. Photo Tachometer. 2. Contact Tachometer 3. Stroboscope Tachometer. 4. Type K thermometer 5. P t 1000 Ω thermometer. 6. IR thermometer
Operating Humidity	Max. 80% RH.
Operating Temperature	0 to 50 °C (32 to 122 °F)
Over Input Indicator.	Indication of "- - - - "
Power Supply	UM3-AA X 4 (DC 6 V battery),DC Adapter (adapter is optional)
Power Consumption	Approx. DC 42 mA
Weight	240g/0.53 LB (Meter only)
Dimension	HWD 207 x 67 x 45 mm (8.15 x 2.63 x 1.77 inch).
Time base	Quartz crystal.
Circuit	Exclusive one-chip of microcomputer LSI circuit.
Memory	Last/Max./Min. value.
Accessories Included	Hard carrying case 1 PC. Reflecting tape marks (600 mm)..... 1 PC. RPM adapter (CONE)..... 1 PC. RPM adapter (FUNNEL)..... 1 PC. Surface speed test wheel..... 1 PC. Operation manual..... 1 PC.

2-2 Electrical Specification (23 ±5°C)

Photo Tachometer

Measurement & Range	<i>Photo Tachometer :</i> 5 to 99,999 RPM.
Resolution	RPM: 0.5 RPM (< 1,000 RPM). 1 RPM (≥ 1,000 RPM).
Accuracy	±(0.05% reading+ 1 digit).
Photo Tachometer detecting distance	50 to 150 mm/2 to 6 inch. (typical max. 300 mm/12 inch, depending upon ambient light). <i>* Spec. of detecting distance are that under the size of reflecting tape is 10 mm square & the measuring RPM value is 1,800 RPM. The max. & min. detecting distance may change under different environment, different reflecting tape or the measuring RPM beyond 1800 RPM.</i>

Contact Tachometer

Measurement & Range	Contact Tachometer : 0.5 to 19,999 RPM.
Resolution	CONTACT (RPM): 0.5 RPM (< 1000 RPM). 1 RPM (≥ 1,000 RPM). SURFACE SPEED (m/min.): 0.05 m/min. (< 100 m/min.). 0.1 m/min. (≥ 100 m/min.). SURFACE SPEED (ft / min.): 0.1 ft / min. (< 1,000 ft/min.). 1 ft / min. (≥ 1,000 ft/min.). SURFACE SPEED (in./min.) : 0.1 in./ min. (< 1000 in./min.). 1 in. /min. (≥ 1,000 in./min.).
Accuracy	±(0.05% reading+ 1 digit).

NOTE: When using test wheel, accuracy can be affected as much as 0.5% of reading.

Stroboscope Tachometer

Flash adjust range	100 to 99990 RPM/FPM. * <i>RPM</i> : round per minute. * <i>FPM</i> : flash per minute.	
Resolution	0.1 RPM : < 1,000 RPM.	5 RPM : \geq 30,000 - 50,000 RPM
	1 RPM : \geq 1,000 - 30000 RPM	10 RPM : \geq 50,000 - 99,990 RPM
Function buttons	Digital rotate knob, x 2 button, \div 2 button, + button, - button,	
Accuracy	$\pm(0.1\% \text{ reading} + 2d)$ * <i>Spec. tested under the environment</i> <i>RF Field Strength less than 3 V/M &</i> <i>frequency less than the 30 MHz only.</i>	

Type K thermometer

Sensor Type	Resolution	Range	Accuracy
Type K	0.1 °C	-50.0 to 1300.0 °C -50.1 to -100.0 °C	± (0.4 % reading+ 0.5 °C) ± (0.4 % reading+ 1 °C)
	0.1 °F	-58.0 to 2372.0 °F -58.1 to -148.0 °F	± (0.4 % reading+ 1 °F) ± (0.4 % reading+ 1.8 °F)

P t 1000 Ω thermometer

Unit	Range	Resolution	Accuracy
°C	-10 to 70 °C	0.1 °C	± 1.2 °C reading
°F	14 to 158 °F	0.1 °F	± 2.2 °F reading

IR thermometer

Emissivity	0.95 fixed value
Spectral response	6 to 14 μm (wavelength)
Field of View D/S	D/S =Approx. 3 : 1 ratio (D = distance, S =spot)

Unit	Range	Resolution	Accuracy
°C	-30 to 305 °C	0.5 °C	± 3 % reading or ± 3 °C
°F	-22 to 581 °F	0.5 °F	± 3 % reading or ± 5.4 °F
Spec. is tested under the 20 cm dia. Black body, the measuring distance between the sensing head and the target is 30 cm.			

Spec. tested under the environment RF Field Strength less than 3 V/M & frequency less than the 30 MHz only.

3. FRONT PANEL DESCRIPTION

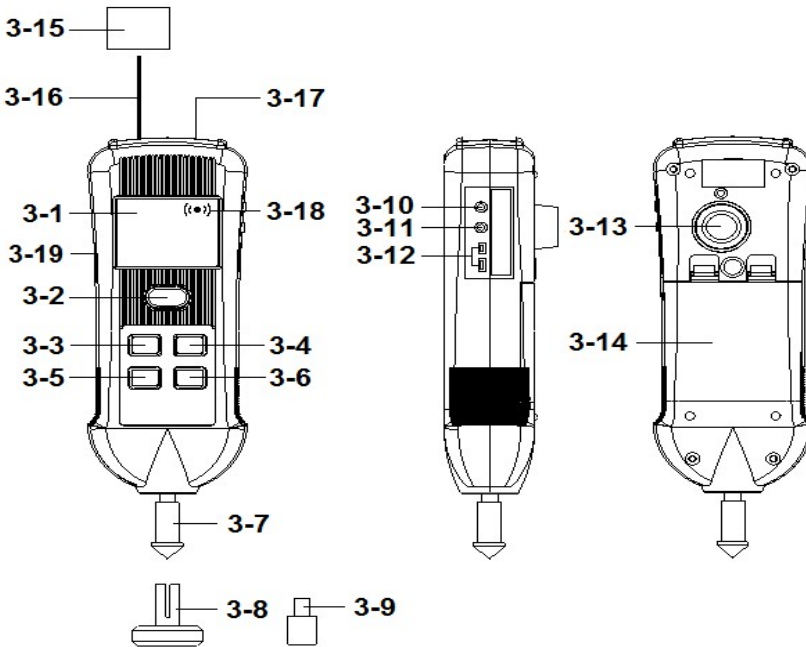


Fig. 1

- | | |
|--|--|
| 3-1 Display | 3-12 Thermocouple(type k) probe Terminal |
| 3-2 Power button | 3-13 IR Thermometer. |
| 3-3 HOLD/▲ button | 3-14 Battery Compartment/Cover |
| 3-4 REC/DOUBLE button | 3-15 Reflecting Mark |
| 3-5 UNIT/▼ button | 3-16 Photo led light beam |
| 3-6 Function button | 3-17 Stroboscope flash light (red) indicator |
| 3-7 RPM Adapter | 3-18 Monitor indicator |
| 3-8 Surface Speed Test Wheel | 3-19 DC 9V adapter socket |
| 3-9 Funnel type rubber for RPM adapter | |
| 3-10 RS-232 Output Terminal | |
| 3-11 Pt 1000Ω probe Terminal | |

4. PHOTO TACHOMETER MEASURING PROCEDURE

- 1) Power On the meter by short pressing the " Power button " (3-2, Fig. 1) >1.5 seconds , the LCD will light.
- 2) Press the " Function button " (3-6, Fig. 1) (short push) in sequence until to the " Photo RPM " function be selected, in the same time the " Photo light beam " (3-16, Fig. 1) will be generated.
- 3) Apply a " Reflecting mark " (3-15, Fig. 1) to the object being measured. and align the " Photo light beam " (3-16, Fig. 1) with the applied target. Verify that the " Monitor Indicator " (3-18, Fig. 1) lights when the target pass through the light beam.

Measuring consideration :

If the measured RPM values is very low (for example less than 50 RPM), recommend to attach more " Reflecting Marks " average to the object. It will get the real RPM with high resolution, precisely & fast sampling time when divided the reading values by the no. of the " Marks ".

5. CONTACT TACHOMETER MEASURING PROCEDURE

5-1 RPM measurement

- 1) Power On the meter by short pressing the " Power button " (3-2, Fig. 1) >1.5 seconds, the LCD will light.
- 2) Press the " Function button " (3-6, Fig. 1) (short push) in sequence until to the " Contact RPM " function be selected.
- 3) Lightly pressing the " RPM Adapter " (3-7, Fig. 1) against the center hole on the hole of the measured rotating axis.

Measuring consideration :

Making the contact RPM measurement due to different kind measured rotating axis, it may changed the rubber for RPM adapter from " CONE " type to " FUNNEL" type (3-9, Fig. 1)

5-2 Surface Speed Measurement

- 1) Power On the meter by short pressing the " Power button " (3-2, Fig. 1) >1.5 seconds , the LCD will light.
- 2) Short Press the " Function button " (3-6, Fig. 1) once again and again until lcd display show the " touch " text, then short press the " UNIT Button " to select the Surface Speed Measurement unit m/min , " ft/min " or " in./min.".
- 3) Change the " RPM Adapter " instead of the " Surface Speed Test Wheel " (3-8, Fig. 1)
- 4) Simply attaching the surface speed test wheel to the detector. approx. 2 sec. the display reading will be stabilizes.

6 STROBOSCOPE OPERATION PROCEDURES

6-1 STROBOSCOPE OPERATION

- 1) Power On the meter by short pressing the " Power button " (3-2, Fig. 1) >1.5 seconds , the LCD will light.
- 2) Press the " Function button " (3-6, Fig. 1) (short push) in sequence until to the " SCOPE RPM " function be selected, in the same time the " Stroboscope flash light (red) indicator " (3-17, Fig. 1) will be Light.
- 3) The display will show " last measurement value " RPM (FPM), last measurement value ,memo in the internal memory device. Use the " x 2 button(▲ button) " or " / 2 button(▼ button) " to adjust the display value near the estimate setting signal's RPM approximately.
 - * *Press and hold the " DOUBLE button " then Press " ▲ button " once will double the display value.
For example, the display is " 100.0 " , Press and hold the " DOUBLE button " then Press " ▲ button " once, the display will change to " 200.0 " . Operation again, the display will change to " 400.0 ".....*
 - * *Press and hold the " DOUBLE button " then Press " ▼ button " once will divide the display value by two.
For example, the display is " 400.0 " , Press and hold the " DOUBLE button " then Press " ▼ button " once , the display will change to " 200.0 " . Operation again, the display will change to " 100.0 ".....*

6-2 Checking Speed (RPM/FPM)

- 1) Use the " ▲+ button " (3-3, Fig. 1) , " ▼- button " (3-5, Fig. 1) to adjust the exact display value.
 - * Press the " ▲+ button " once will increase the display value.
 - * Press the " ▼- button " once will decrease the display value.
 - * Press and hold the " ▲+ button " or " ▼- button " will fast increase or fast decrease the display value.

- * If press the button once, the display value will change with high resolution (change just with 1 digit).
- * If press the button continuously, the display value will change with low resolution (change with more digits).

When checking the speed, care must be taken to ensure that the strobe is flashing in unison (one to one) with the object being monitored.

- 2) The Stroboscope will also stop motion at 2:1, 3:1, 4:1 et., this is normally referred to as harmonics. To ensure unison, turn the dial until two images appear - this will double the actual speed. Then lower the flashing rate until a single and stationary image appears - this is the actual true speed.

6-3 Checking Motion

For motion analysis, simply locate the actual speed as mentioned above and use the " ▲ button " or " ▼ button " to adjustment slowly up or down. This will give a slow motion effect allowing complete inspection.

7. Type K Thermometer MEASURING PROCEDURE

- 1) Power On the meter by short pressing the " Power button " (3-2, Fig. 1) >1.5 seconds, the LCD will light.
- 2) Press the " Function button " (3-6, Fig. 1) (short push) in sequence until to the " TYPE k " function be selected.
- 3) type k probe inserted into the thermocouple probe terminal " thermocouple probe terminal " (3-12, Fig. 1).
- 4) The display will show type k probe sensing temperature value.

8. RTD Temperature MEASURING PROCEDURE

- 1) Power On the meter by short pressing the " Power button " (3-2, Fig. 1) >1.5 seconds, the LCD will light.
- 2) Press the " Function button " (3-6, Fig. 1) (short push) , in sequence until to the " P t " function be selected.
- 3) TP-1000 probes are connected to the Pt 1000 Ω probe terminal " (3-11, Fig. 1) .
- 4) The display will show TP-1000 probe sensing temperature value.

9. Infrared Thermometer MEASURING PROCEDURE

NON-CONTACT TEMPERATURE MEASUREMENTS

- 1) Power On the meter by short pressing the "power button " (3-2, Fig. 1) >1.5 seconds, the LCD will light.
- 2) Use the " Function button " (3-6, Fig. 1)(short push), to select function , until to the " I r " function be selected.
- 3) Press and hold the IR thermometer test button " Power button " (3-2, Fig. 1
- 4) Use the led light pointer to identify the exact spot to be measured.
- 5) The area of the surface to be measured must be larger than the spot size as determined by the distance to spot size specification.
- 6) when test value stable then releass the IR thermometer test button " Power button " (3-2, Fig. 1) .
- 7) The display will show and hold the IR sensing temperture value.

10. RECORD OPERATION PROCEDURE

Data Record (Max., Min. reading)

- 1) The data record function records the maximum and minimum readings. Press the " REC Button " (3-4, Fig.1) once to start the Data Record function and there will be a " REC "Symbol indicator " will be light.
- 2) With the " REC " Symbol is light on the display :
 - a) Press the " REC Button " (3-4, Fig. 1) once, the " REC and MAX Symbol indicator will be light , and the maximum value will appear on the display.
 - b) Press the " REC Button " (3-4, Fig. 1) again, the " REC and MIN " Symbol indicator will be light , and the minimum value will appear on the display.
 - c) To exit the memory record function, just press the " REC " button for 1.5 seconds at least. The display will revert to the current reading, Symbol indicator will be quenched

Remark :

At Infrared Thermometer and stroboscope function, the RECORD Function is disabled.

11. ADVANCED SETTING

press the " FUNCTION (SET) Button " (3-6, Fig. 1) continuously at least Five seconds will enter the " Advanced Setting " mode. then press the " FUNCTION (SET) Button " (3-6, Fig. 1) once a while in sequence to select the two main function, the display will show :

POFF..... Auto power OFF management

t-CF..... Select the Temp. unit to °C or °F

Remark:

wait eight seconds or short press " power button " to back measurement.

11-1 Auto power OFF management

When the lower display show " POFF "

- 1) Use the " ▲ button " (3-3, Fig. 1) or " ▼ button " (3-5, Fig. 1) to select the upper text to " yES " or " no ".

yES - Auto Power Off management will enable.

no - Auto Power Off management will disable.

- 2) After select the text to " yES " or " no ", press the " REC(Enter) Button " (3-4, Fig.1) will save the setting function with default.

11-2 Select the Temp. unit to °C or °F

When the lower display show " t-CF "


- 1) Use the " ▲ button " (3-3, Fig. 1) or " ▼ button " (3-5, Fig. 1) to select the upper Display text to " C " or " F ".

C - Temperature unit is °C

F - Temperature unit is °F

- 2) After Display unit is selected to " C " or " F ", press the " REC(Enter) Button " (3-4, Fig.1) will save the setting function with default.

12. BATTERY REPLACEMENT

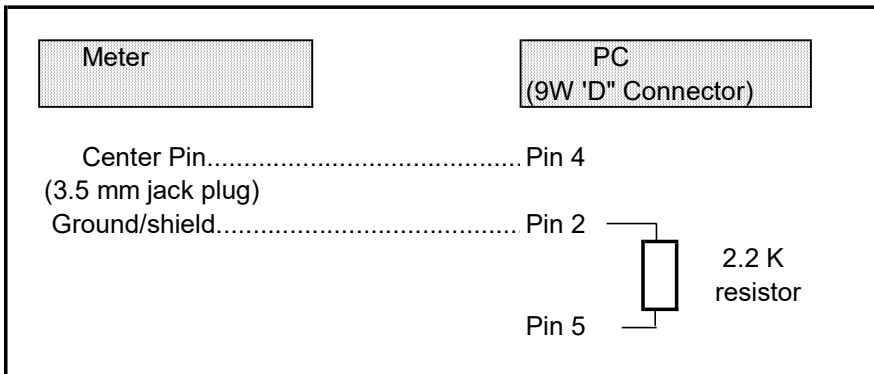
- 1) When the left corner of  "Low battery symbol" indicator is light, it is necessary to replace the battery. However, in-spec. measurement may still be made for several hours after low battery indicator appears before the instrument become inaccurate.
- 2) take away the " Battery Cover " (3-14, Fig. 1) from the instrument and remove the battery.
- 3) Replace with DC 1.5 V battery (UM3, AA, Alkaline/heavy duty) x 4 PCs, and reinstate the cover.
- 4) Make sure the battery cover is secured after changing the battery.

13. RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via a 3.5 mm terminal (3-10, Fig. 1).

The data output is a 16 digit stream which can be utilized for user's specific application.

A RS232 lead with the following connection will be required to link the instrument with the PC serial port.



The 16 digits data stream will be displayed in the following format :

D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0

Each digit indicates the following status :

D15	Start Word
D14	4
D13	1
D12, D11	Annunciator for Display
	ft/min = 11 inch/min = 28 m/min = 60
	RPM = 27 °C = 01 °F = 02
D10	Polarity 0 = Positive 1 = Negative
D9	Decimal Point(DP), position from right to the left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP
D8 to D1	Display reading, D1 = LSD, D8 = MSD For example : If the display reading is 1234, then D8 to D1 is : 00001234
D0	End Word

RS232 FORMAT : 9600, N, 8, 1

Baud rate	9600
Parity	No parity
Data bit no.	8 Data bits
Stop bit	1 Stop bit