Tachometer

Model : PCE-T 238

PCE Americas Inc.
711 Commerce Way
Suite 8
Jupiter
FL-33458
USA
From outside US: +1
Tel: (561) 320-9162
Fax: (561) 320-9176
info@pce-americas.com

PCE Instruments UK Ltd.
Unit 11
Southpoint Business Park
Ensign way
Hampshire / Southampton
United Kingdom, SO31 4RF
From outside UK: +44
Tel: (0) 2380 98703 0
Fax: (0) 2380 98703 9
info@industrial-needs.com

Your purchase of this PHOTO/CONTACT TACHOMETER marks a step forward for you into the field of precision measurement. Although this TACHOMETER 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

TABLE OF CONTENTS

1. FEATURES

*   Compact and pocket tachometer.
*   The best Tachometer in the world. 2 in 1, one instrument combine Photo tachometer and Contact Tachometer.
*   Photo tachometer uses Laser light detecting source, long measuring range up to 1.5 meters, it is useful in the RPM measurement application where the machine would be a risk to the operator or close access is difficult or not possible.
*   Wide measuring range from 0.5 to 100,000 RPM, 0.1 RPM resolution for the measured value < 1000 RPM.
*   Microprocessor based circuit, crystal time base, high precision with 0.1% accuracy.
*   High visible LCD display gives RPM reading exactly with no guessing or errors & saves battery energy.
*   Memory with recall function, the last value, max., value, min. value will be stored into the memory automatically.
*   The use of durable, long lasting components, including a strong, light weight ABS plastic housing, assures almost maintenance free performance for many years.
*   RS232 PC serial interface.

2. SPECIFICATIONS

Measurement & Range	Photo Tachometer : 5 to 99,999 RPM.	
	Contact Tachometer : 0.5 to 19,999 RPM.	
	Surface Speed : m/min. - 0.05 to 1,999 m/min. ft/min. - 0.2 to 6,560 ft/min. in/min. - 2.0 to 78,740 in/min.	
Resolution	RPM	0.1 RPM (< 1,000 RPM). 1 RPM (≧1,000 RPM).
	m/min.	0.01 m/min. (< 100 m/min.). 0.1 m/min. (≧100 m/min.). 1 m/min. (≧1000 m/min.).
	ft/min.	0.1 ft/min. (< 1,000 ft/min.). 1 ft/min. (≧ 1,000 ft/min.).
	in/min.	0.1 in/min. (< 1,000 in/min.). 1 in/min. (≧ 1,000 in/min.).
Display	LCD, size 32 mm x 28 mm. 5 digits with display unit.	
Accuracy	±(0.1% + 1 digit). @ reading	
Photo Tachometer detecting distance	5 to 150 cm typically. * 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.	

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

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Time base Circuit	Quartz crystal. Exclusive one-chip of microcomputer LSI circuit.
Photo Tach. Laser light source	* Less than 1 mW. * Class 2 laser diode. Red Wave length is 645 nm approximately.
Operating Temperature	0 to 50 ℃ (32 to 122 ℉).
Operating Humidity	Less than 80% R.H.
Memory	Memorize Last/Max./Min. value with recall.
Data Output	RS232 PC serial interface.
Battery	4 x 1.5V AAA (UM4) batteries.

Power Consumption	Photo tachometer :
	  Approx. DC 20 mA.
	Contact tachometer :
	  Approx. DC 9.5 mA.

Size	165 x 50 x 33 mm. (6.5 x 2.0 x 1.3 inch).
Weight	149 g (0.33 LB). * W/O batteries.

Accessories Included	Tachometer PCE-T 238................ 1 PC.
	Rubberized measuring tip
	(cone shape)................................. 2 PC.
	  Rubberized measuring tip
	  (funnel shape)...............................1 PC.
	
	Reflective contact strip
	(about 60 cm/1.9 ft). ....1 PC.
	
	1.5 V batteries (type AAA)............4 PC.

3. FRONT PANEL DESCRIPTION
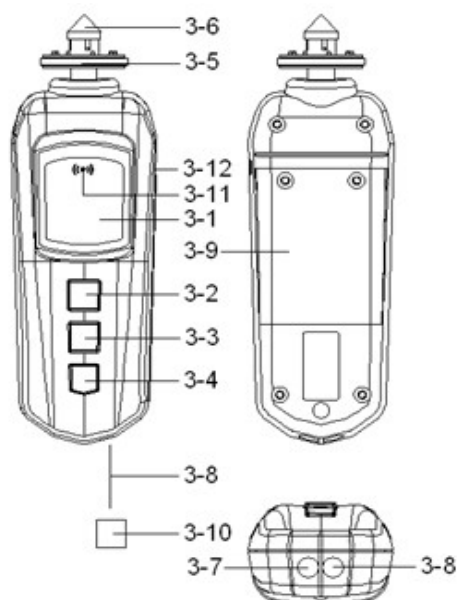
Fig. 1

3-1 Display
3-2 TEST(Power) Button
3-3 Function Button
3-4 Memory Button
3-5 Surface Speed Wheel
3-6 RPM Adapter (Contact Tach.)
3-7 Photo Tach. detect sensor
3-8 Laser Light Beam
3-9 Battery Cover/Compartment
3-10 Reflecting Mark
3-11 Monitor indicator
3-12 RS-232 Output Terminal

4. MEASURING PROCEDURE

4-1 Change the function

1) Short press the " TEST(Power) Button " (3-2, Fig. 1) once, the meter will power ON,
2) Short Press " Function Button " (3-3, Fig. 1) momentarily in sequence, the function will change to

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a. Contact RPM measurement, display shows " RPM " symbol.

b. Surface speed (m/min.) measurement, display shows " m/min " symbol.

c. Surface speed (ft/min.) measurement, display shows " ft/min " symbol.

d. Surface speed (in/min.) measurement, display shows " in/min " symbol.

e. Photo RPM measurement, display shows " RPM " symbol, at the same time the " Laser Light Beam " (3-8, Fig. 1) will be generated.

Note :
*** After the function be selected, the function will saved into the meter even turn off the meter.**
*** Turn on the meter again, the existing select function will present .**

Remark:
If want to power off ,please press and hold the" TEST(Power) " button > 2 sec. , the meter will be power off.

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4-2 Photo RPM measurement

1) Select (default) the function to " Photo RPM ", refer chapter 4-1, page 5.
2) Align the " Laser Light Beam " (3-8, Fig. 1) with the applied target. Verify that the " Monitor Indicator " (3-11, 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 ".*

4-3 Contact RPM measurement

1) Select (default) the function to " Contact RPM ", refer chapter 4-1, page 5.
2) Lightly pressing the " RPM Adapter " (3-6, Fig. 1) against the center hole on the hole of the measured rotating axis.

4-4 Surface Speed Measurement

1) Select (default) the function to surface speed " m/min "
   " ft/min " or " in/min " refer chapter 4-1, page 5.
2) Simply attaching the " Surface Speed Wheel " (3-5, Fig. 1)
   to the detector.reading stabilizes (approx. 2 sec.).

5. OPERATION PROCEDURE FOR
MEMORY RECALL

1) The readout of " last measuring value ", " max. measuring
   value " & " min. measuring value " can be obtained
   immediately & memorized into the circuit automatically after
   turning off the "TEST(Power) Button".
2) When have finished the measuring procedures
   , the memorized values can be displayed on the
   LCD display whenever :

   a. First press and hold the " Memory Button " (3-4, Fig. 1) -
      To display the last value (" LA " and " the last value "
      will be displayed alternately).
   b. Second, press and hold the " Memory Button " again -
      To display the maximum value (" UP " and " the
      max. value " will be displayed alternately).
   c. Third, press and hold the " Memory Button " again -
      To display the minimum value (" dn " and " the min.
       value " will be displayed alternately).
   Remark:
   Need in power off state,the "Memory Button" function
   can be use.

Display reading / Max value / Min value / Mesruing time
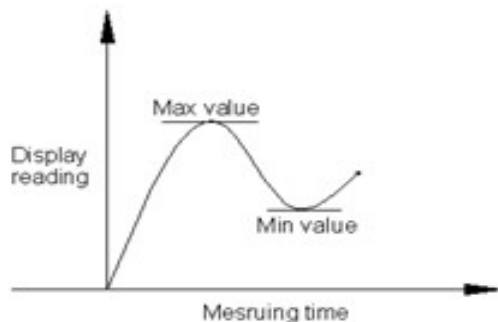
6. BATTERY REPLACEMENT

* Replace the batteries when the LCD displays the low battery icon " ⊠ ", using 4 fresh 1.5 V (UM4, AAA) batteries.
* To change the batteries, open the " Battery Cover " (3-9, Fig. 1).
* Make sure the " Battery cover " (3-9, Fig 1) is secured after changing the batteries.

7. RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via a 3.5 mm terminal (3-12, Fig. 1).

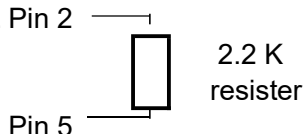The data output is a 16 digit stream which can be utilized for user's specific application.
A RS232 lead with the following connection will be required to link the instrument with the PC serial port.

| Meter (3.5 mm jack plug) | PC (9W 'D" Connector) |

Center Pin............................ Pin 4

Ground/shield...................... Pin 2

2.2 K resister

Pin 5

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 = 02		
D14	4		
D13	1		
D12 & D11	Annunciator for Display		
	RPM = 27	ft/min = 11	m/min = 60
	in/min = 28		
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, D8 = MSD, D1 = LSD
	For example :
	    If the display reading is 1234, then D8 to
	    D1 is : 00001234		

D0	End Word = 0D		

RS232 setting

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