



# PCE-RT 11

## Surface Roughness Tester



# Instruction Manual

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# 1 General Introduction

The product is a new portable Surface Roughness Tester developed by our company. Featuring high accuracy, wide range of application, simple operation and stable performance. It is widely applicable in testing surfaces of all kinds of metals and non-metals. Integrated pick up within the main unit, it is a hand-held set, especially suitable for use on production sites.

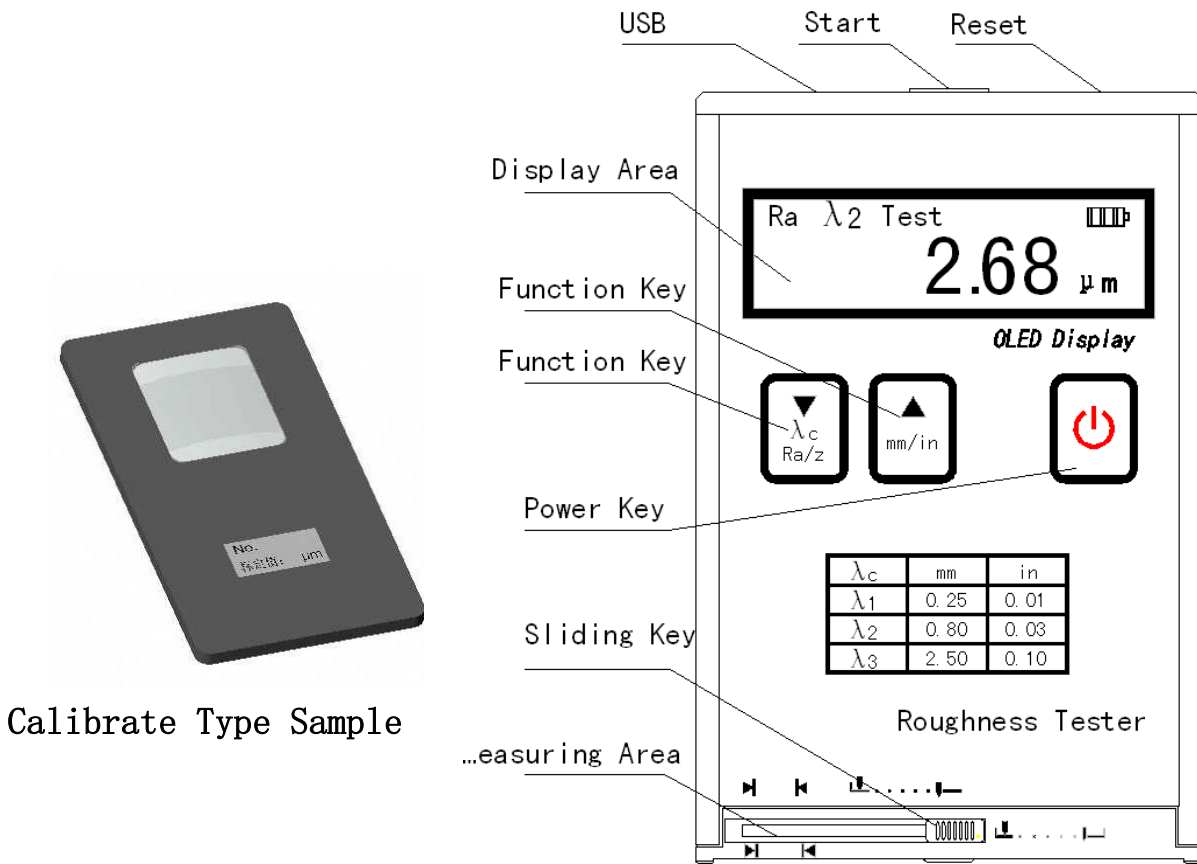
- Appearance using aluminum housing design is durable and helps eliminate electromagnetic interference.
- By using high-speed **DSP** processors for the data processing and calculation, measuring and calculation speed is greatly improved.
- Uses **OLED** display for high brightness and high quality fonts, wide temperature range and is suitable for various applications.
- Using lithium ion rechargeable batteries it can work many hours with no memory effect. The meter also can work while charging and charging time is short, while the battery life is long.
- Uses common **USB** interface to charge and communicate. Use special charger or the computer USB port to charge.

- Dot matrix LCD display making interface message clear.
- Real-time monitoring of lithium battery power and display, timely reminds users.
- Automatic shutdown function, low power consumption and hardware design make instrument working hours plentiful. It is suitable for all kinds of field use.
- The sensors head has a protection door, which protects the head of the sensor effectively further guaranteeing the accuracy of measurement.

## **2 Work Principle**

When the pickup is triggered, it is making a linear uniform motion along the test surface, the contact stylus is perpendicular to the work surface and is moving up and back. Its motion is converted into electric signals which are amplified, filtered and transformed into digital signals and processed by the DSP into Ra and Rz values before displayed on the screen.

### 3 Name of components



### 4. Technical Parameters

- ◆ Roughness Parameters(μm): Ra Rz Rq Rt
- ◆ Stroke Length (mm) : 6
- ◆ Sampling Length (mm) : 0.25 , 0.80 , 2.50
- ◆ Evaluation Length (mm) : 1.25 , 4.0 ,
- ◆ Measurement Range ( μm ) :
  - Ra, Rq: 0.05 ~ 10.0
  - Rz, Rt: 0.1 ~ 50
- ◆ Accuracy: ±15%

- ◆ Repeatability:  $< 12\%$
- ◆ Touch needle tip arc radius and angle of the sensor

Tip arc radius:  $10 \mu\text{m} \pm 1 \mu\text{m}$

Angle :  $90^{+5^\circ}_{-10^\circ}$

- ◆ The sensor touch needle static force measurement and its rate

Touch needle static force measurement:  $\leq 0.016\text{N}$

Force measurement rate:  $\leq 800\text{N/m}$

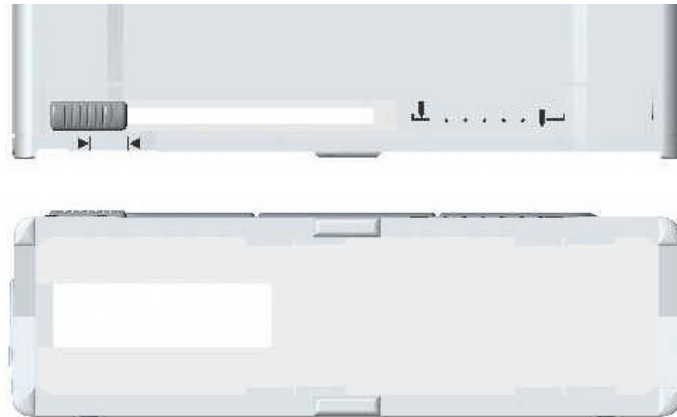
- ◆ Sensor guide head pressure:  $\leq 0.5\text{N}$
- ◆ Battery: 3.7V Lithium Ion battery
- ◆ Contour Dimension:  $106 \text{ mm} \times 70 \text{ mm} \times 24 \text{ mm}$
- ◆ Weight: 200g
- ◆ Working Environment Conditions
  - Temperature  $-20^\circ\text{C} \sim 40^\circ\text{C}$
  - Relative Humidity:  $< 90\%$

Avoid strong vibration and corrosive medium.

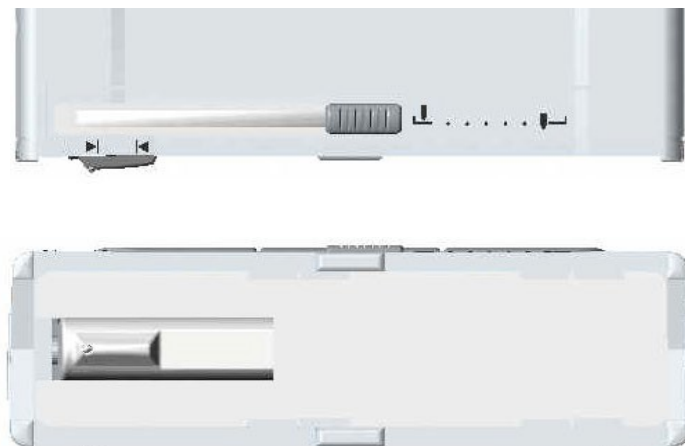
## 5. Operational Measure

### 5.1 Measurement preparation


Remove instrument, right now the sensors head door should be closed ( see illustration below).



Move to the right to trigger measuring head door switch. Open the sensors head protection door, to expose the sensor head and prepare to measure.




## 5.2 Switch on Switch off

Depress on/off button.  After sound indication (beep), place device on surface to be measured. Depress red button on top of device. This puts device in measurement state. Measuring parameters and sampling length will keep the last settings/readings before the shutdown of the meter.


Depress on/off button  a second time to shutdown. In 3 minutes of inactivity the instrument will be turned off.

## 5.3 Selecting Parameter

Before measuring the user should set up parameters such as Ra Rz Rq Rt, and the appropriate sampling length and units imperial if required.


Touch  keys, choosing sampling length 0.25mm, 0.8mm, or 2.5mm

Long press  key 2 seconds change metric/imperial conversion.

Touch  keys, chose the measurement parameters Ra Rz Rq Rt.



## 5.4 Measuring

When the parameters are set up and the cut-off samples length is decided, it will come to measurement. Point the Stylus mark  to the measured area stably and then press the Start Key on the top to start measurement, OLED will read “Testing”. At this time, it will be invalid to press the start button.

After the “Testing” has disappeared two audio indications will sound indicating the measurement has being finished, and the screen will show the measured value.



Note:

- 1) During the pickup's travel, do your best to make sure the tester is on the measured surface stably so as to avoid its influence to the precision.
- 2) During the pickup return to its previous position, the tester will not make any response to further operation.
- 3) If the tester battery is dying, you must press the Reset Key , and then you can use it again.

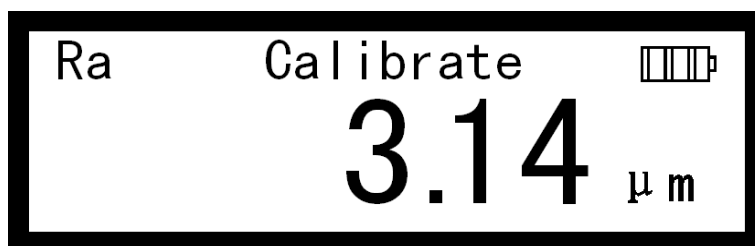
## 5.5 Calibration

Before use, calibration should be done with the standard sample plate. For example, there is a standard sample plate pointed to 3.14.

In shutdown condition, Press and hold the start button. Release the start button. The tester will enter the status of Calibration as shown below.



Press the Up Key and Down Key to adjust the displaying value to the value 3.14.




Put the instrument in the scribed line area. Sensor taxiing direction perpendicular to the scribed line of texture direction. Press the Start Key to exit the status of Calibration. Repeated calibration could improve precision.

After measuring, the new standard sample plate value will be stored to the memory instead of the old one.

If the user has multi-reticle sample plate, he can choose the suitable sample plate to calibrate the tester against his measuring range in common use. This way, the tester's precision can be improved greatly.

## 5.6 Battery Recharge

Plug the charger into the tester's recharge socket and have the tester  recharged together with the battery symbol lighting (if no lighting, plug it again). 3 hours recharging-time is enough. Filled animation end.

Even in shutdown condition charging interface will be displayed.

## 6. Daily Maintenance

### 6.1 Maintenance

- Protect the tester from collision, violent shock, heavy dust, dampness, oil stain, corrosive agents, and strong magnetic field etc.
- Please switch off in time after each measurement to

save the energy, and have the battery recharged promptly when necessary.

- The sensor is the precision part of the tester and particular care should be taken of it. After each use, put on the protective sheath gently to avoid violent shock to the sensor.
- Standard sample plate provided with the tester should be given special protection to avoid scratches that may make the calibration inaccurate.

## **6.2 Repair**

If any trouble occurs, user should not try to dismantle and repair it. The device should be returned to the manufacturer for checking and repair, together with the warranty card and the specimen provided and a statement about the trouble. Please keep in constant touch with the marketing department of our company or our sales agents.

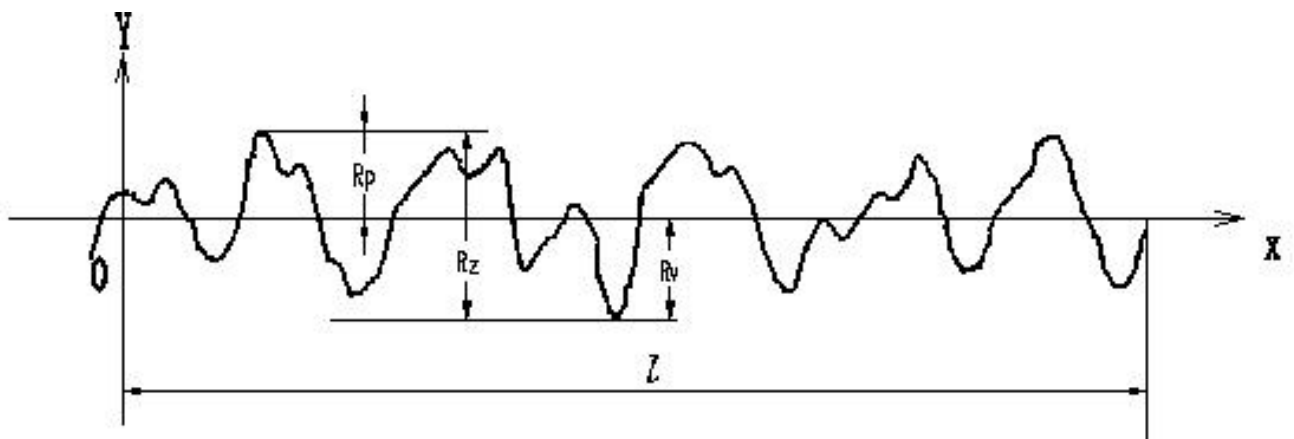
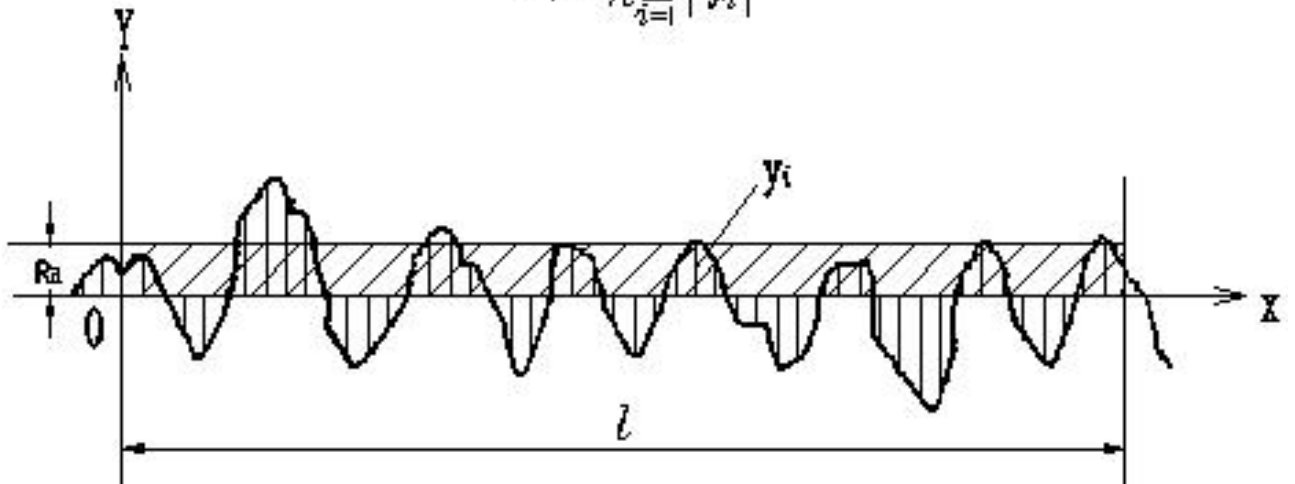
## **7. Terminology Definition**

- Surface Roughness is the microcosmic geometric form on the work-piece surface composed by peak and valley with small interspaces.

- Sample Length is the benchmark used to distinguish its surface roughness.
- Evaluation Length is the necessary length for evaluating the roughness profile. It may include one or more sampling lengths.
- Ra: Arithmetical Mean Deviation of the Profile is arithmetic mean value of the deviation of the profile within sampling length.
- Rz: The maximum Height of Irregularities is the distance between maximum depth of the profile peaks and maximum depth of the profile valley within the sampling length.
- Rq: Root-mean-square Deviation of Profile  
Rq is the square root of the arithmetic mean of the squares of profile deviation ( $Y_i$ ) from mean within sampling length.
- Rt: Total Peak-to-Valley Height

$R_t$  is the sum of the height of the highest peak and the depth of the deepest valley over the evaluation length.

$$R_a = \frac{1}{n} \sum_{i=1}^n |y_i|$$



$$Rq = \left( \frac{1}{n} \sum_{i=1}^n y_i^2 \right)^{\frac{1}{2}}$$

## **8. User Notes**

- ◆ During warranty, if the products have any trouble, we will fix or replace according to company rules.
- ◆ If the user disassemble this company product or practices improper safekeeping of transportation or use of products according to the instruction for use, correct operation damaged products, this company shall not be warranty.
- ◆ Non-warranty Parts  
Sheath, Pickup, Battery, Charger, communication cable



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