INSIZE

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Rz λ1 Test
5.45 μm

No. ISR-C003

ISR-C003
ROUGHNESS TESTER
OPERATION MANUAL

INSIZE

Introduction

This product is a new hand-held portable Surface Roughness Tester, features 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. Integrating pick up with the main unit, especially suitable for use in production area.

Features:
◆ Appearance using pull aluminum mould design, durable, anti-electromagnetism interference ability significant.
◆ Use high-speed DSP processors for the data processing and calculation, measuring and calculation speed is greatly improved.
◆ OLED module display, high brightness, no perspective, wide temperature. Suitable for various applications.
◆ Using lithium ion rechargeable batteries, it can work long hours with no memory effect. It also can work with charging .Charging time is short, while the battery life is long.
◆ Use the common USB interface to charge and communication. Charged by supplied AC/DC adapter or by computer USB port.
◆ Dot matrix OLED display, interface message is rich.
◆ Real-time monitoring of lithium battery power and display. Promptly remind the user to charge and have a charging progress tips.
◆ Automatic power off.
◆ The sensor probe has the protection door, which protect the probe effectively. Guarantee the accuracy of measurement.

Work Principle

When the pickup driven by a driver is making a linear uniform motion along the test surface, the contact stylus in perpendicular with the working surface is moving up and down on the working surface. Its motion is converted into electric signals, which are amplified, filtered and transformed into digital signals through A/D. The signals are then processed by the DSP into Ra and Rz values before displayed on the screen.

Name of Each Components
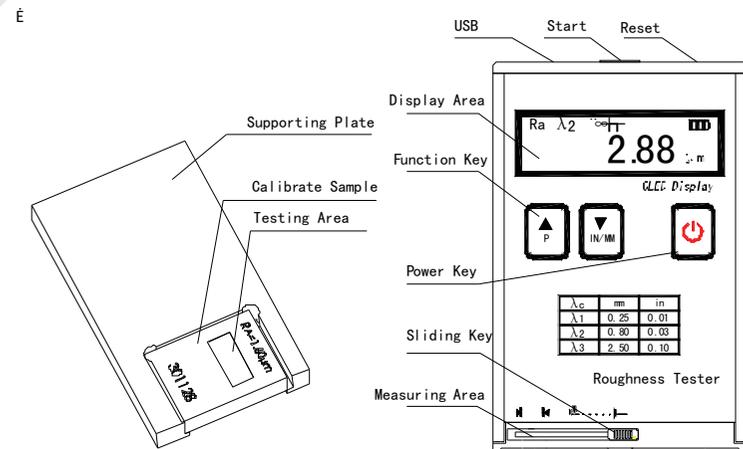
Specificaion

| Parameters		Ra, Rz, Rq, Rt
Range		Ra, Rq: 0.05 ~ 15µm Rz, Rt: 0.1 ~ 50µm
Accuracy		±10%
Resolution (Ra)		0.01µm
Probe	type	piezoelectric
	stylus radius/angle	10µm/90°
	stylus material	diamond
Measuring force		5mN
Measuring unit		µm/µin
Cut off		0.25/0.8/2.5mm
Evaluation length		1.25mm for cut off 0.25mm 4mm for cut off 0.8mm 5mm for cut off 2.5mm
Traverse speed		0.75mm/s
Power		built-in rechargeable battery
Dimension (L×W×H)		106×70×24mm
Weight		200g

Operataion

1.1 Measurement preparation

Take out instrument, the sensor probe protection door should be closed. (see below fig.)
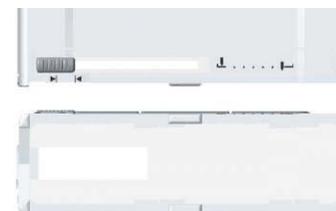
Push the probe protection door switch to the right, open the sensor probe protection door, reveal the sensor probe, ready to measure. (see below fig.)
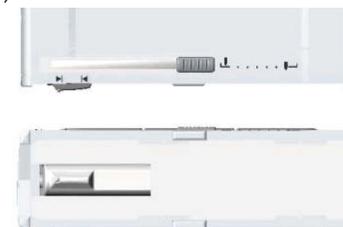
1.2 Power on/Power off

Power on: long press key ⏻ 2 seconds to power on. After a sound of "Di", enter into measurement state. Mearsuring parameters and sampling length will remain in the state before last shutdown.

Power off: In the boot state, long press key ⏻ 2 seconds to power off. The instrument will enter into the low consumption status. The instruments will automatically power off in 10 minutes if there's no any key operation.

1.3 Selecting Parameter

Please set up measurement parameters (Ra, Rz, Rq or Rt), appropriate sampling length and measuring unit before measurement.

Press ⬆ key to select sampling length 0.25mm, 0.8mm or 2.5mm.

Long press ⬆ key 2 seconds for metric/imperial conversion.

Press ⬇ key to select parameters Ra, Rz, Rq or Rt.

1.4 Measurement

When the parameters are set up and the cut-off sampling length is decided, it will come to measurement.
Point the Stylus marking ▶| |◀ to the measured area stably and then press the Start Key on the top to start measurement, "Waiting" will appear on display. At this time, it will be invalid to press the start key.
After the "Waiting" disappeared and a sound of "Di", the measurement is finished, the measured value will be showed on the dispaly.

```
Ra λ2 Test        ▭▭▮
       2.68 μm
```
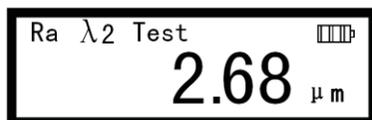
Notice:

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)   Before the pickup return to its previous position, the tester will not make any response to further operation.
3)   When the instrument crashes, press the reset key to turn it on again.

1.4 Calibration

Calibration should be done with standard calibration block before measurement.

calibration block and support (included)

For example, there is a standard cablibration block with value 1.60. In shutdown state, press the start key together with 🔘 to power on. Release the start key after below interface appears, the tester will enter into calibration.

```
w···   Cal        ▭▭▮
       3.20 μm
```

Press up key and down key to adjust the displaying value to 1.60.

```
Ra     /···        ▭▭▮
       1.60 μm
```
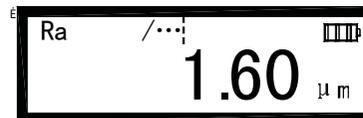
Put the instrument in the scribed line area. Sensor traveling direction is perpendicular to the scribed line of texture direction. Press the Start Key to measure. The precision can be evidently improved after multiple calibrations.

After measuring, the new standard cablibration block value will be stored instead of the old one. At this time, shutdown and restart the tester to work.

If you have multi-reticle calibration block that is close to the measured value, you can choose suitable calibration block to calibrate the tester against your measuring range in common use. By this way, the tester's precision can be greatly improved.

Battery Charge

Plug the adapter into the tester's recharge socket to charge. Battery symbol ▢▢▢ will appear and flash. Charging is finished after ▢▢▢ stop flashing. 3 hours charging time is enough.

The tester can also be charged in shutdown state.

Maintenance

◆ Protect the tester from collision, violent shock, heavy dust, dampness, oil stain, and strong magnetic field etc.

◆ Please turn off in time after each measurement to save the energy, and have the battery recharged promptly when necessary.

◆ Take care of the sensor. After each use, put on the protection door to avoid violent shock to the sensor.

◆ Standard calibration block provided with the tester should be given special protection to avoid scratch that may make the calibration inaccurate.

Terminology Definition

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

◆ **Sampling Length** is the benchmark's length used to be distinguished its surface roughness.

◆ **Evaluation Length** is the necessary length for evaluating the roughness profile. It may include one or more sampling lengths.

◆ **Ra:** Airthmetical 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 (Yi)from mean within sampling length.

◆ **Rt:** Total Peak-to-valley Height
Rt is the sum of the height of the highest peak and the depth of the deepest valley over the evaluation length.

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

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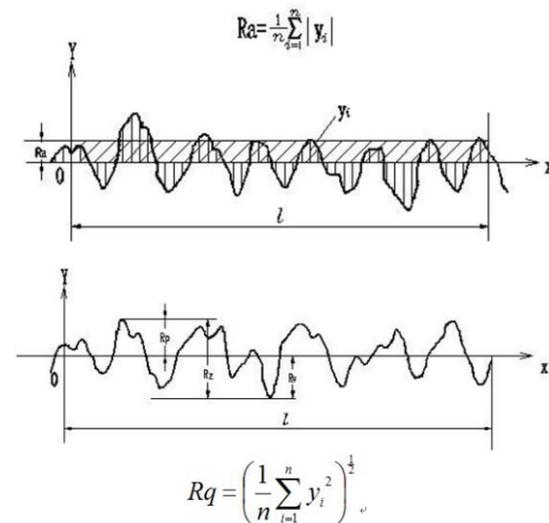
Cut off selection

Ra(μm)	Rz(μm)	Cut off λc(mm)
>5~10	>20~40	2.5
>2.5~5	>10~20	
>12.5~2.5	>6.3~10	0.8
>0.63~1.25	>3.2~6.3	
>0.32~0.63	>1.6~3.2	
>0.25~0.32	>1.25~1.6	0.25
>0.20~0.25	>1.0~1.25	
>0.16~0.20	>0.8~1.0	
>0.125~0.16	>0.63~0.8	
>0.1~0.125	>0.5~0.63	
>0.08~0.1	>0.4~0.5	
>0.063~0.08	>0.32~0.4	
>0.05~0.063	>0.25~0.32	
>0.04~0.05	>0.2~0.25	
>0.032~0.04	>0.16~0.2	
>0.025~0.032	>0.125~0.16	
>0.02~0.025	>0.1~0.125	

Standard Delivery

Main unit	1pc
Calibration block and support	1pc of each
AC/DC adapter	1pc