1 Brief Introduction

The portable roughness tester is a new generation of portable surface roughness tester introduced by our company. It has the characteristics of high measurement accuracy, wide measurement range, simple operation, easy portability and stable operation. It can be widely used in the detection of various metal and non-metal processing surfaces. It is a pocket instrument integrated with a host and a sensor. It has the characteristics of hand-held, and is more suitable for use in the production site.

Features:

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- Monitor and display the power of battery in real time, timely remind users to charge and with charging progress prompt.
- The automatic shutdown function and low-power software and hardware design make the instrument work for a long time, which is suitable for all kinds of field use.
- The sensor probe has a protective door, which effectively protects the sensor probe and ensures the accuracy of measurement.

2 Working Theory

When the sensor moves along the measured surface at a uniform speed and straight line driven by the driving mechanism, the internal stylus to the working surface displaces vertically with

- The exterior is designed by drawing aluminium die, which is durable and has remarkable anti-electromagnetic interference ability, and conforms to the new trend of design today.
- Low-power consumption ARM processor is used for data processing and calculation, which improves the speed of measurement and calculation greatly.
- The display LCD adopts 1.14 inches IPS TFT, with high brightness and no dead visual angle, which is suitable for various occasions
- With a AA battery, it can work for a long time
- Equipped with Bluetooth adapter, it can communicate with Bluetooth devices such as smart phones
- 500 groups of measurement data can be stored

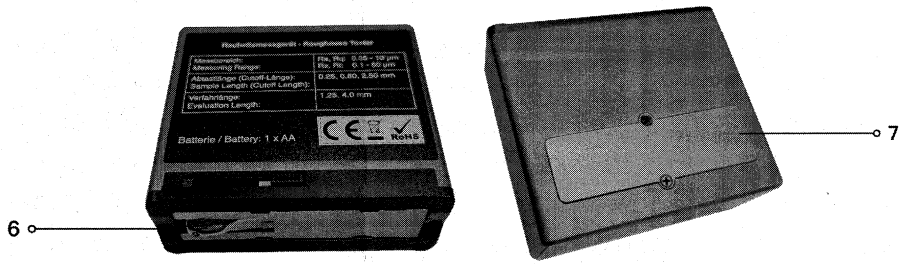
3 Spare Parts Drawings



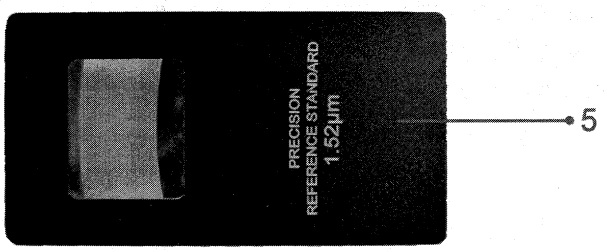
1) Power/Start Test Button *2) Cut-Off length Selection/Up*

3) Parameter Selection/Down *4) Stylus Protector Shield*

the micro-uneven contour of the working surface, and then transforms the displacement change into the change of the electric quantity through the sensor. The electric signal is amplified, filtered and acquired by A/D converter. Analog signal is replaced by digital signal, processed by embedded DSP, and then Ra, Rz, Rq, Rt values are calculated and displayed.



6) Stylus *7) Battery Compartment(1 AA battery)*



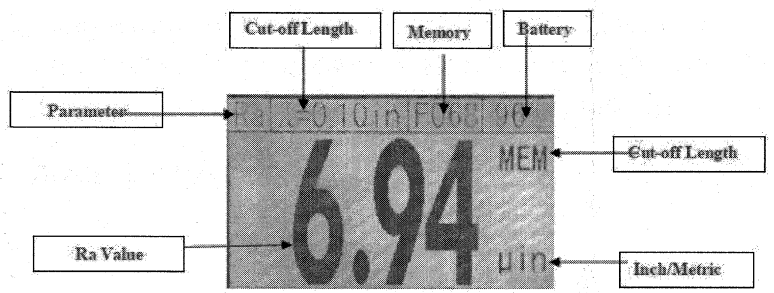
5) Reference Standard

4 Specifications

- ◆ Parameter（μm）：Ra, Rz, Rq, Rt
- ◆ Travel Length（mm）：5.6
- ◆ Sample Length（mm）：0.25 ,0.80 ,2.50
- ◆ Evaluation Length（mm）：1.25, 4.0
- ◆Measuring Range（μm）：

  Ra, Rq：0.05 ~ 10.0

  Rz, Rt：0.1 ~ 50
- ◆ Display Error：±10%
- ◆ Display Variability：＜12%



No Vibration and Corrosive Medium around

5 Operation

5.1 Measuring preparation

Take out the instrument, at which time the guard door of the sensor probe should be closed (see figure below).

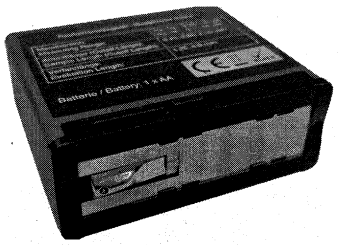
- ◆ Stylus Radius and Angle：

  Stylus Radius：10 μm±1 μm

  Angle：$90^{\circ}{}^{+5^{\circ}}_{-10^{\circ}}$
- ◆ Measuring force of Stylus：≤ 0.016N
- ◆ Sensor Guide Pressure：≤ 0.5N
- ◆ Battery：One 1.5V AA dry battery
- ◆ Size：73 mm×28mm×62 mm
- ◆ Weight：220g
- ◆ Working Condition:

Temperature：0℃～40℃

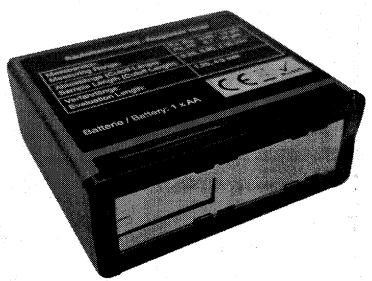
Relative Humidity：< 90%



5.2 Switch ON/OFF

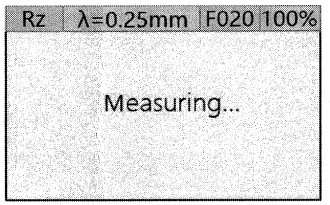
Start up: Press ▶ key to start up, and then enter the state to be measured. The measurement parameters and sampling length will remain in the state before the last shutdown.

Shutdown: In the startup state, press ▶ key for 2 seconds to shut down the instrument, and the instrument will enter the



At this time, the warehouse door switch should be pushed right , and the sensor probe protection door should be opened to reveal the sensor probe ready for measurement (as shown in the following figure).

measurement. At this time, other keys can be operated according to the actual needs （as shown in the following figure）



NOTE：

(1) In the process of sensor movement, the instrument should be placed as smoothly as possible to avoid affecting the measuring accuracy of the instrument.

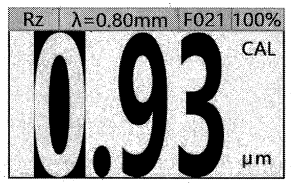
(2) Before the sensor is positioned, the instrument will no

shutdown state, or the instrument will automatically shut down if there is no key operation within 2 minutes

5.3 Measurement

After selecting the measurement parameters and sampling length, align the sensor of the instrument with the measured area. After it is placed stably, press the ▶ key on the top of the instrument, the sensor will move and start measurement. The LCD will display “ Measuring ” . At this time, pressing other keys is invalid;When "Measuring" disappears, the measured value will appear on the screen, but the sensor has not been reset. Pressing other keys is invalid at this time. After the measured value blinks twice, it marks the end of the

side of the screen, and select the first digit of the measured value)



When the machine enters the calibration state, press the button to adjust the display value to the position that needs to be modified,press the R or λ button to adjust the value. After adjusting the number, the nominal value of the sample is

longer respond to the measurement operation.

(3) When the instrument crashes, long press the measuring key to shut down and restart it to operate.

5.4 Calibration

Before use, the instrument should be calibrated with random standard samples. The nominal value of the standard sample is 1.0 as an example.

Place the instrument in the positioning window of the sample block. After startup and measurement,press and hold R key until the screen displays as follows("CAL" will appear on the right

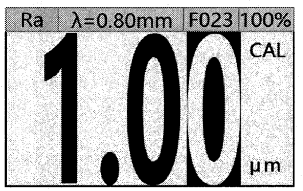
measured value, according to needed testing range to choose the sample block, which will improve the accuracy of measurement significantly.

5.5 Selection of parameters

When the user needs to select the required measurement parameters Ra, Rz, Rq and Rt before measurement, the user can press R key to switch (see Section 7 of the manual for parameter value definition)

5.6 Selection of sampling length

1.00, as shown in the following figure.

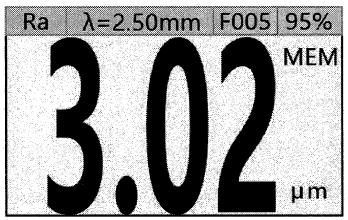


After calibrating the measured values, press the R key for 3 seconds to save the calibration and exit calibration interface.At this time, the "CAL" in the interface disappears

If the user has a multi-notched sample block close to the

This instrument can store 500 groups of measurement data.

To view the stored measurement data, press λ and R key at the same time until "MEM" is displayed on the right side of the screen. At this time, press λ and R key to view the stored measurement values（As shown in the following figure）



When the user selects the required sampling length of 0.25mm, 0.8mm and 2.5mm before measurement, the user can press λ key to switch

5.7 Selection of measurement units

When the user selects the required measurement unit before or after measurement μm (Metric) or μin (British system), press and hold λ key to switch

5.8 Storage data viewing

5.9 Replacement of battery

When the power display is too low or the machine cannot be started, please replace the battery in time. You can unscrew the screws of the battery cover and replace it. If the instrument is not used for a long time, it is better to take out the battery.

If long press ▶ key under the view stored data interface,all data can be deleted.

After viewing, press λ and R key to exit this memory interface, and the "MEM" on the right side of the screen will disappear

severe vibration to the sensor

◆Random standard samples(calibration block) should be carefully protected from scratches resulting in inaccuracy of calibration instruments.

6.2 Repair

If the instrument fails, the manufacturer is responsible for the maintenance. Users are not allowed to disassemble or repair themselves. The instrument sent back to the manufacturer for repair should be accompanied by a calibration sample randomly equipped with the warranty card, and the phenomenon of failure should be explained.

6 Daily Maintenance

6.1 Maintenance

◆ Avoid the situation of collision, violent vibration, heavy dust, humidity, oil pollution, strong magnetic field, etc.

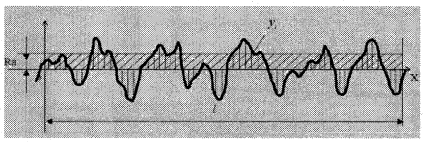
◆ After each measurement, the power supply should be switched off in time to maintain the battery energy.

◆ Sensors are the precise parts of the instrument. Keep in mind that they should be carefully maintained. After each use, gently cover the protective cover of the instrument to avoid

assessing contours, which may include one or more sampling lengths.

◆ Arithmetic mean deviation of contour Ra: Arithmetic mean of contour offset in sampling length.

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



◆ RMS deviation Rq of contour: RMS value of ordinate

7 Data Definition

The parameter calculation of this instrument conforms to GB/T 3505 "Terminology, Definition and Parameters of Surface Structure Profile Method of Product Geometry Technical Specification".

◆ Surface roughness: refers to the micro-geometric characteristics of the machined surface with small spacing and valleys.

◆ Sampling length: The length of a reference line used to distinguish the surface roughness characteristics.

◆Evaluation length: The length of a section necessary for

◆ Total height of contour peak and valley Rt: The sum of maximum contour peak height and maximum contour Valley depth in the evaluation length.

◆ Maximum contour peak height Rp: The distance from the top line of contour peak to the middle line within the sampling length.

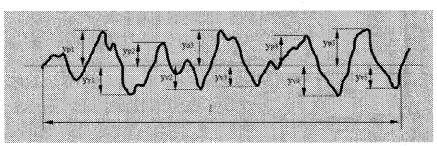
◆ Contour maximum Valley depth Rv: The distance from the bottom to the middle of the contour valley within the sampling length.

values within a sampling length

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

◆ Contour maximum height Rz (ISO): The height of the sum of maximum contour peak height Rp and maximum contour Valley depth Rv within a sampling length.

$$Rz = \frac{\sum_{i=1}^{5} y_{pi} - \sum_{i=1}^{5} y_{vi}}{5}$$



During the warranty period, the warranty card or copy of purchase invoice can not be produced. Our company calculates the warranty period according to the date of leaving the factory for one year.

● If the product fails beyond the warranty period, the fee of maintenance shall be checked according to the company's regulations:

● Any damage to the product caused by the user's disassembly of the company's product, improper transportation, improper storage, or failure to follow the "Product Instruction Manual", or unauthorized alteration of the warranty card, without a purchase certificate, the company cannot provide warranty.

● List of non-guaranteed parts:

8 Sales-after service

● After purchasing our products, please fill in the warranty registration card carefully, stamp the official seal of the user unit and send the copy of the purchase invoice back to our company, or consign the vendor to bring it with you when purchasing the machines. If the procedures are incomplete, the maintenance will be refused properly.

● The product of our company has quality failure within one year (except for non-warranty parts) from the date of purchase. Please contact our company with the warranty card or copy of purchase invoice. The product can be repaired free of charge.

9 Sample Length Chart

Ra(μm)	Rz(μm)	Sample Length（mm）
＞40-80	＞160-320	8
＞20-40	＞80-160	
＞10-20	＞40-80	
＞5-10	＞20-40	2.5
＞2.5-5	＞10-20	
＞1.25-2.5	＞6.3-10	

Casing, Sensor, Battery and Standard calibration block

＞0.032-0.04	＞0.16-0.2	
＞0.025-0.032	＞0.125-0.16	
＞0.02-0.025	＞0.1-0.125	
＞0.016-0.02	＞0.08-0.1	0.08
＞0.0125-0.016	＞0.063-0.08	
＞0.01-0.0125	＞0.05-0.063	
＞0.008-0.01	＞0.04-0.05	
＞0.0063-0.008	＞0.032-0.04	
≤0。063	≤0.032	

＞0.63-1.25	＞3.2-6.3	0.8
＞0.32-0.63	＞1.6-3.2	
＞0.25-0.32	＞1.25-1.6	0.25
＞0.2-0.25	＞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	0.25
＞0.0063-0.08	＞0.32-0.4	
＞0.05-0.063	＞0.25-0.32	
＞0.04-0.05	＞0.2-0.25	

Packing List

NO.	Items	Qty.
1	Main unit	1
2	Calibration Block	1
3	Instruction Manual	1
4	QC certificate	1
5	Guarantee Card	1
6	Suitcase	1
7	Screwdriver	1