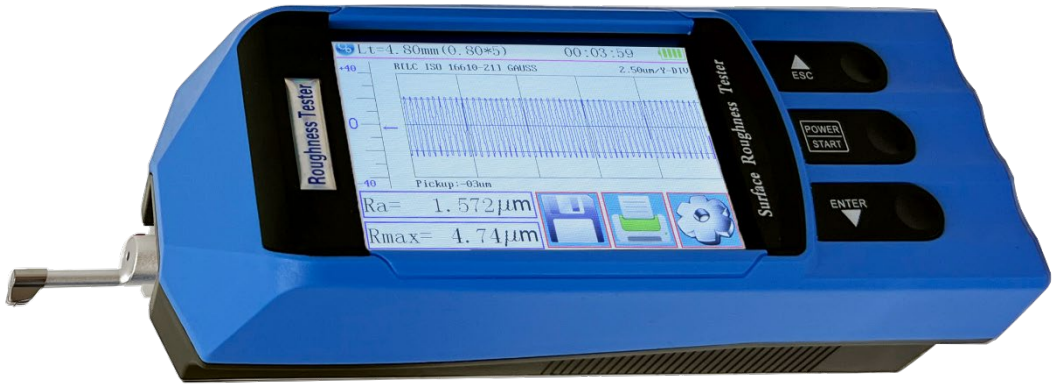


SaluTron SRTPro Plus Surface Roughness Tester

Operating Instructions

Table of Contents

1 Overview of the Roughness Tester

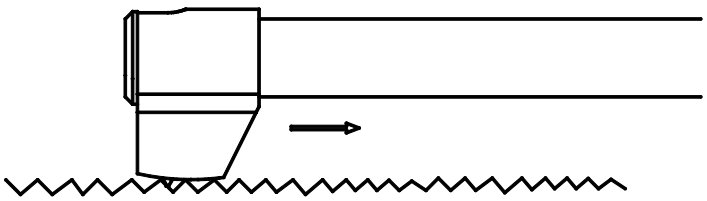
The SRTPro Plus roughness tester is a compact handheld instrument for use in workshops and for mobile measurements. It is characterised by simple operation, comprehensive functions, fast measurements as well as precise and stably reproducible results. The instrument is suitable for use in production facilities and allows the surface roughness of various machined components to be determined. It can analyse surface textures using numerous parameters in accordance with international standards. The measurement results are displayed digitally and graphically on the colour graphic LCD and can additionally be output to a printer.

1.1 Instrument Features

- Modular design: composite structure consisting of main display unit, drive unit and sensor. Electromechanical integration design, compact, lightweight and user-friendly.
- Flexible operation: supports Bluetooth printing as well as wireless control via a mobile app.
- Extensive measurement parameters: Ra, Rz, Rq, Rt, Rp, Rv, R3z, R3y, Rz (JIS), Rs, Rsk, Rsm, Rku, Rc, Ry, Rmax, Rmr, RPc, Rk, Rpk, Rvk, Mr1, Mr2.
- Versatile display options: in addition to the calculation results, primary profile lines, filtered roughness profiles and bearing ratio curves can be displayed.
- Large measuring range: 320 µm.
- Display: 3.5-inch colour LCD with 480 × 320 dot matrix, adjustable backlight for optimal visibility in poor lighting conditions and a wide viewing angle.
- Powerful control: DSP chip control for fast data processing at low power consumption.
- Graphical presentation: complete display of all information in clear graphics.
- Standards compliance: complies with ISO 4287, ANSI B46.1, DIN 4768 as well as JIS B601.
- Four profile filters: Gauss, RC, PC-RC as well as D-P.
- Battery technology: integrated 3000 mAh lithium-ion battery with control circuit, high capacity and no memory effect.
- Battery indicator: graphical display of the charge state as well as an animated display of the charging process for easy recognition.
- Long runtime: more than 50 hours of operation with sufficient power supply.
- Large data memory: stores up to 100 sets of raw data and measured profiles.
- Time settings: real-time clock for easy documentation and storage of measurement data.
- Power management: automatic sleep mode and automatic shut-off to save power.
- Reliability: robust circuit and software design to prevent motor stalling.
- Information display: displays measurement results, menu prompts and error messages.
- Robust housing: metal housing of the drive unit – compact, portable and particularly reliable.
- Interfaces: connection options for computer and printer.

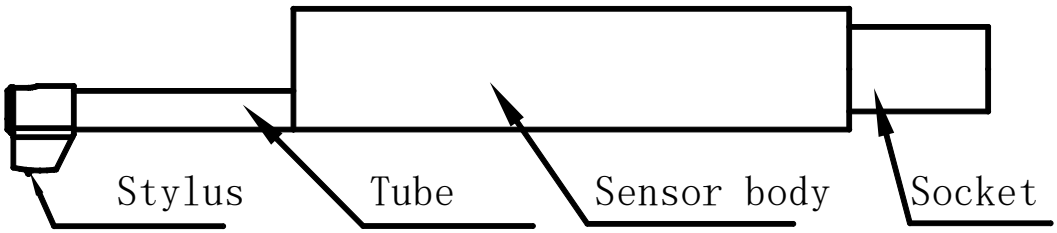
- Flexible printing options: output of all parameters or user-defined individual parameters.
- Optional accessories: probes for curved surfaces, bore holes and micro holes, measuring stand, protective sleeve for sensors, extension rod, printer and analysis software.

1.2 Measuring Principle

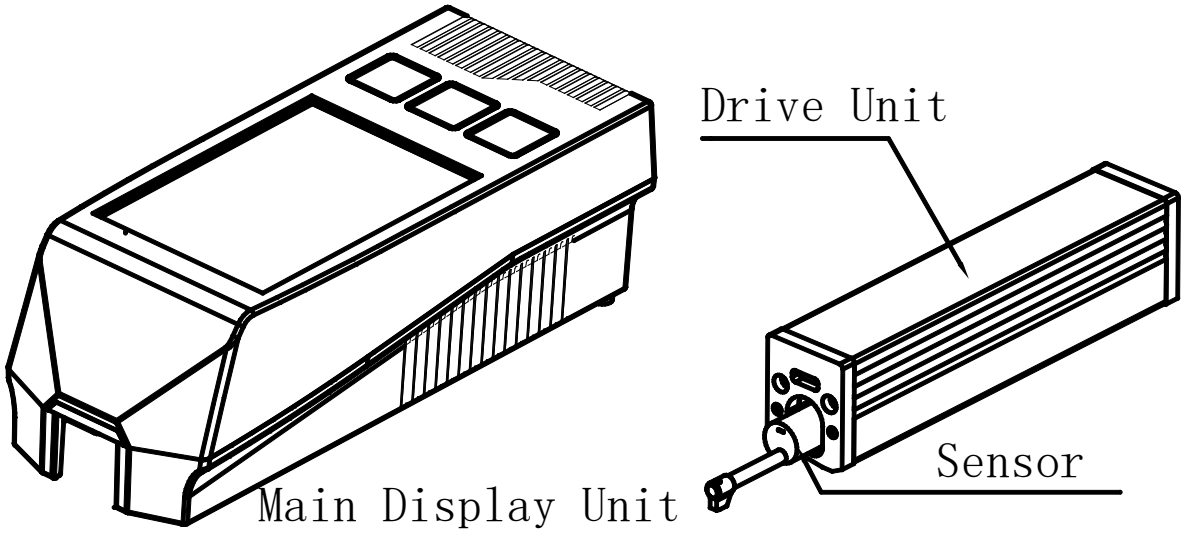


During roughness measurement of the workpiece surface, the probe is placed on the surface and then traversed across the surface at a constant speed. The fine stylus of the probe registers the surface roughness. This roughness causes a displacement of the stylus, which changes the inductance value of the induction coils. This generates an analogue signal at the output of the phase-sensitive rectifier that is proportional to the surface roughness. After amplification and level adjustment, this signal is fed into the data acquisition system. The acquired data is then digitally filtered by a DSP chip and the relevant parameters are calculated. The measurement result can be shown on the LCD, output via a printer or transferred to a PC.

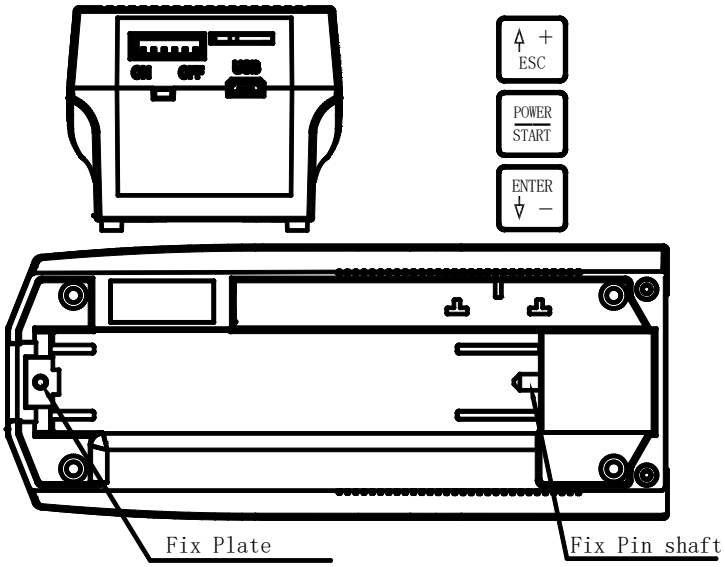
1.3 Components of the SRTPro Plus Instrument

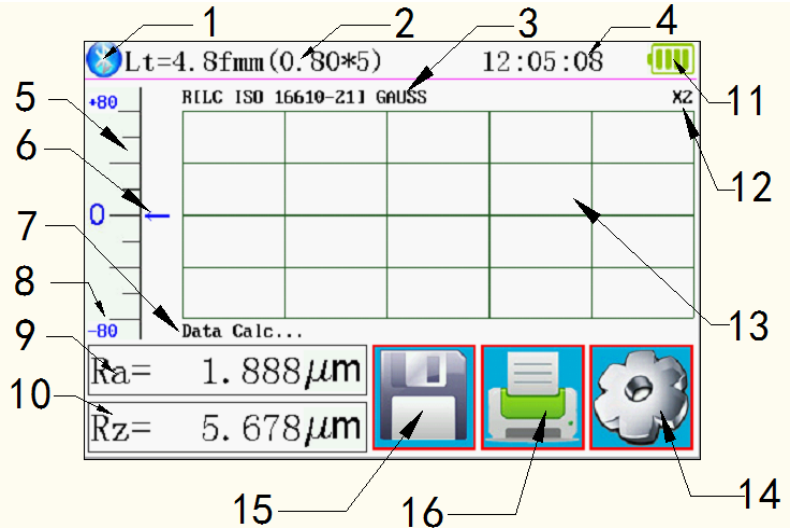


PROBE



HANDHELD UNIT WITH DRIVE UNIT





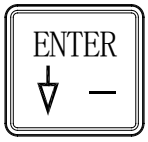
1 Bluetooth indicator
2 Traversing length
3 Filter
4 Time
5 Start touch area
6 Stylus position
7 Information area
8 Measuring range
9,10 Measurement result
11 Battery level
12 Profile scale
13 Profile display
14 Menu touch button
15 Save touch button
16 Print touch button

MAIN DISPLAY

1.4 Buttons

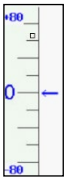
Power button: Press and hold for 2 seconds to switch the instrument on or off.
Measurement start button: A short press starts the measuring process

Up/plus button: Increases the value.
Cancel/exit button: allows you to leave the menu and reset.

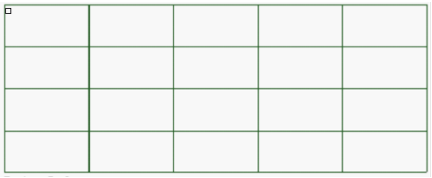


Enter button: Confirmation of the setting.
Down/minus button: Decreases the value.

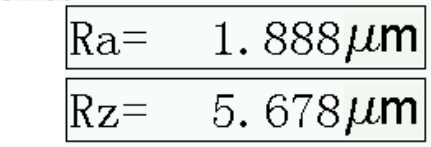
TOUCH AREAS OF THE DISPLAY



starts the measuring process



switches to the next profile display



Switches to the display of the further roughness units

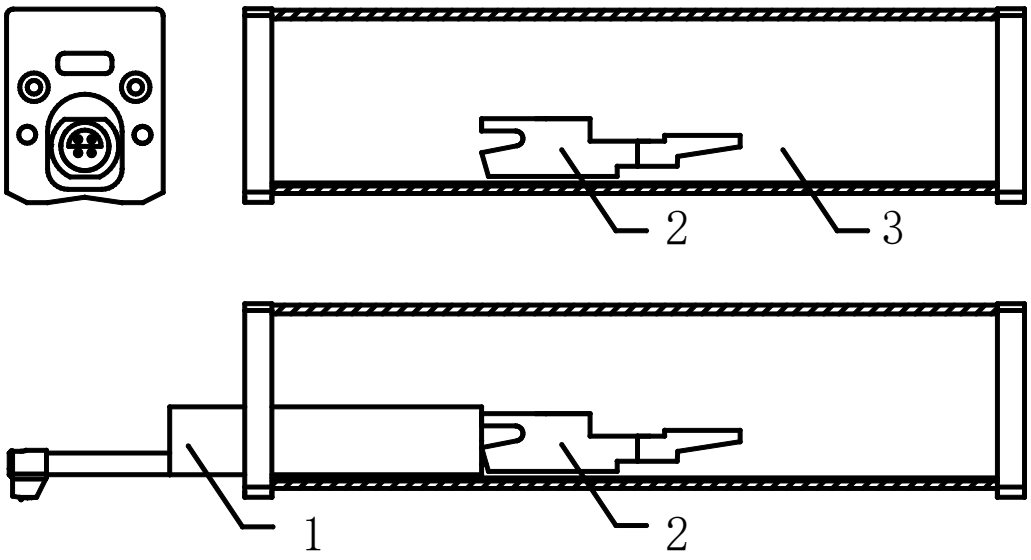
1.5 Battery Charging

When the battery voltage is too low (the corresponding battery symbol appears on the screen), the instrument should be charged as soon as possible. The USB port of the instrument is used for charging. You can use either the supplied power adapter or the USB port of a computer. If you use a different power adapter, the output voltage should be 5 V DC and the current greater than 1000 mA. During charging the instrument displays a charging animation; once complete, the display shows the battery indicator at full capacity. The full charging time is approximately 5 hours. The instrument is equipped with a rechargeable lithium-ion battery without memory effect, so charging is possible at any time without impairing normal operation.

Note: The main switch on the instrument must be switched on during charging.

1.6 Installing the Probe in the Drive Unit

Always switch off the instrument before installing or removing the probe.

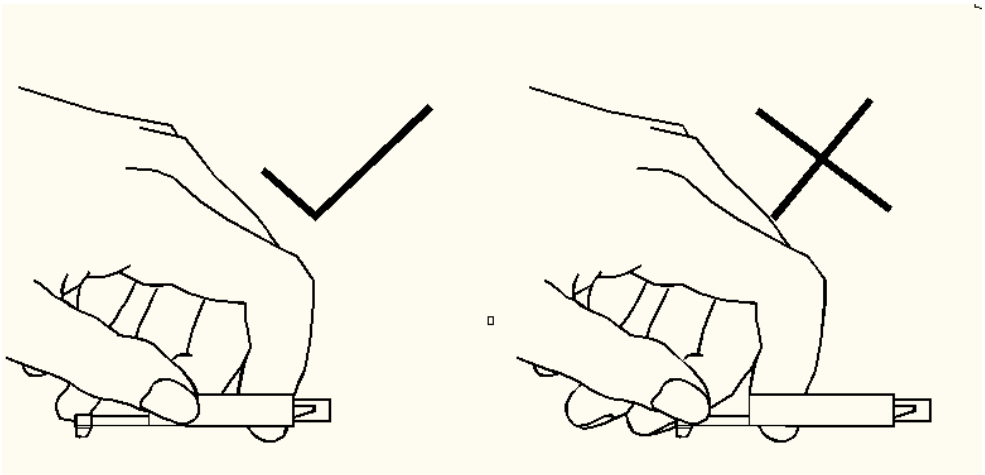


1 – Probe 2 – Connector/socket of the drive unit 3 – Drive unit

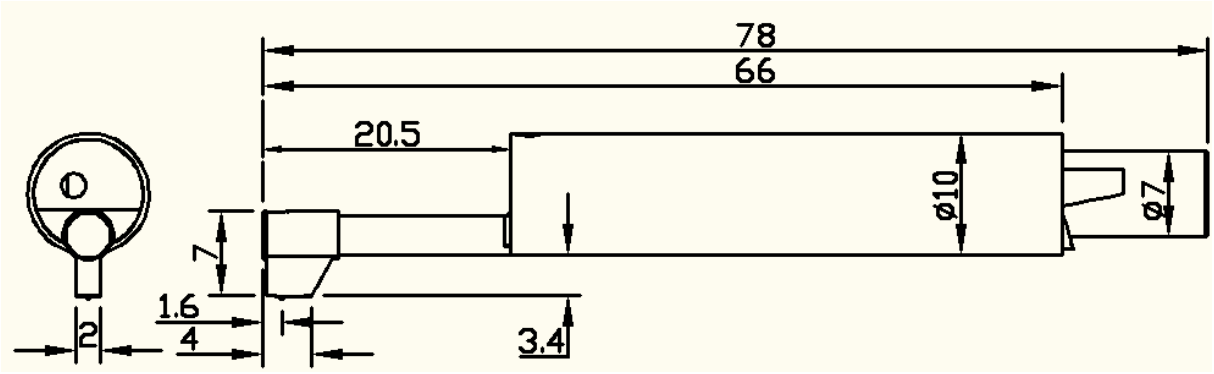
When installing, hold the probe body in your hand, insert it into the socket on the drive (see figure) and gently push it in until it reaches the end of the protective sleeve. To remove it, hold the probe body or the shoulder of the protective sleeve in your hand and slowly pull it out.

Notes:

- The probe is an essential component of this instrument and therefore requires particular attention.
- During installation and removal, the stylus of the sensor must not be touched in order to avoid damage and not to impair the measuring accuracy.
- During installation, the connection to the probe must be made reliably.
- The probe does not need to be removed as long as it is not in use.
- After installing a new sensor, calibration is recommended.

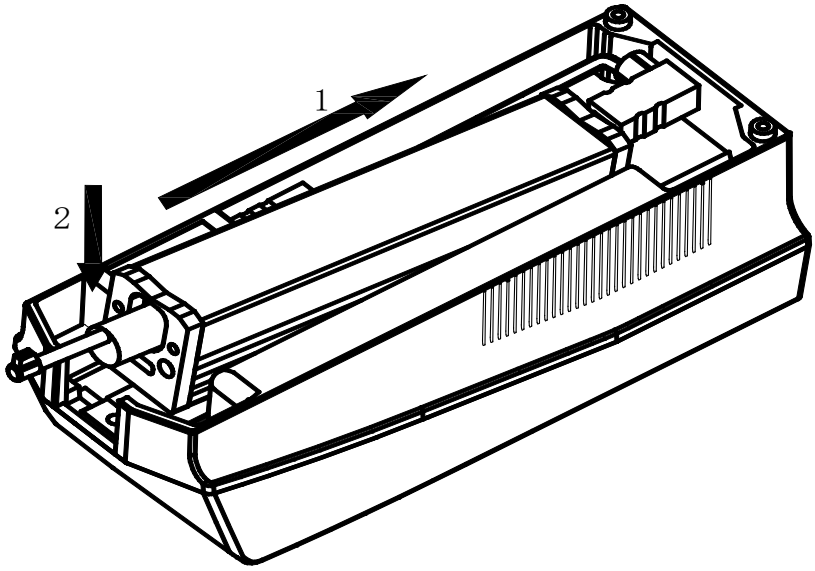


DIMENSIONS OF THE PROBE



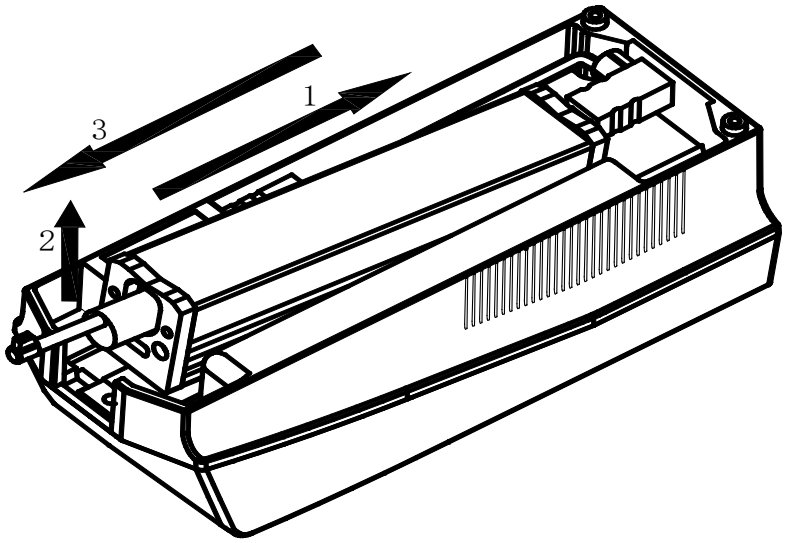
1.7 Installing the Drive Unit in the Handheld Unit

INSTALLATION



1. Slide the drive unit into the handheld unit in the direction of arrow 1 until it sits on the fixed pivot axis.
2. Press the drive unit down in the direction of arrow 1 and arrow 2 to fix it onto the fixed plate.

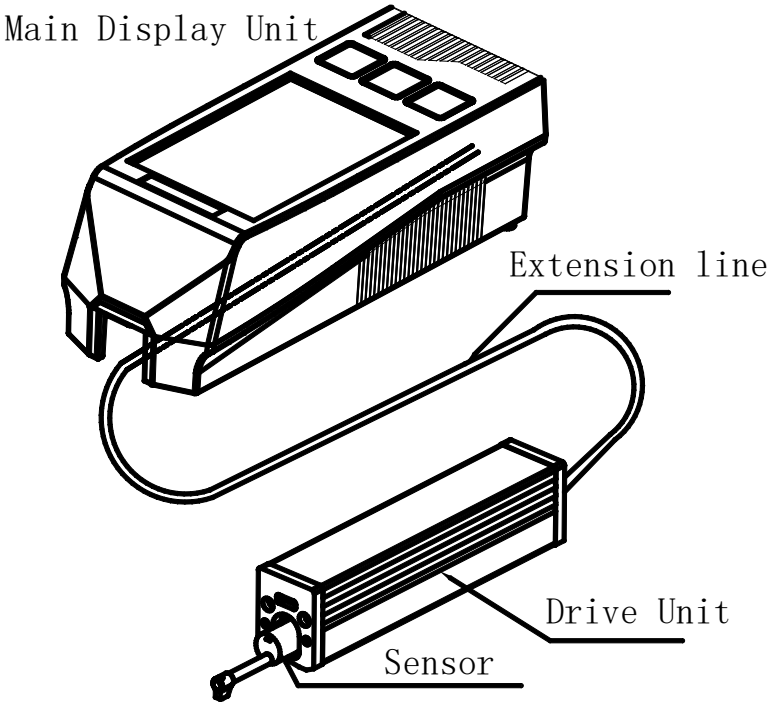
REMOVAL



1. Press the drive unit in the direction of arrow 1 and then lift it in the direction of arrow 2. Remove the unit from the fixed carrier plate.
2. Pull the drive unit out in the direction of arrow 3 and remove it.

1.8 Using the Drive Unit via the Extension Cable

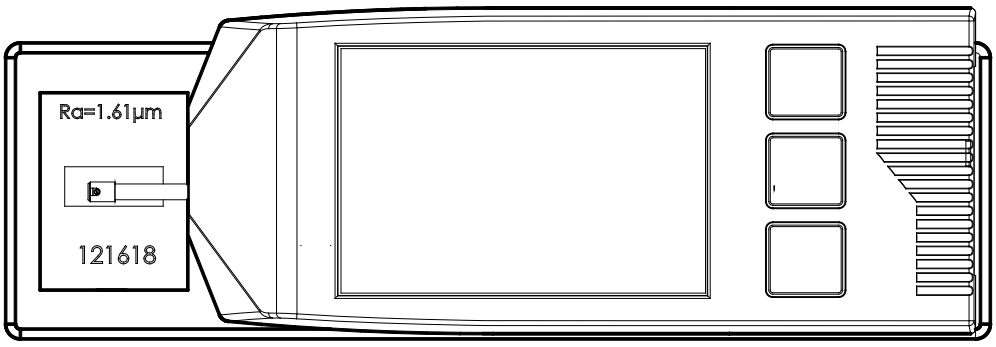
If you want to use the drive unit externally, connect the handheld unit to the drive unit via the extension cable, as shown in the figure below.



2 Measuring with the SRTPro Plus Roughness Tester

2.1 Preparation for Measurement

- Switch on the instrument and check whether the battery voltage is in the normal range.
- Clean the surface of the object to be measured.
- Place the measuring instrument correctly, stably and securely on the surface to be measured.
- The stylus trace must run perpendicular to the lay direction of the surface.



Note: Correct operation is the prerequisite for accurate measurement results. Please make sure that you follow it.

2.2 Switching On and Off

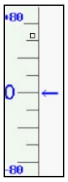
SWITCHING ON: Set the main switch of the instrument to the "ON" position. Then press and hold the POWER button for 2 seconds so that the instrument starts automatically. During start-up, type, name and manufacturer information are displayed; afterwards you reach the main screen in basic measuring mode.

SWITCHING OFF: Press and hold the POWER button for 2 seconds in any state to switch off the instrument.

Note: If the instrument is not used for a longer period, the main switch on the side should be switched off.

2.3 Stylus Position

First, the position of the stylus should be checked. The ideal position is in the middle of the measuring range. If the arrow indicates that the position is not at the zero point, the measurement can still be carried out as long as the entire measuring process does not exceed the specified range.



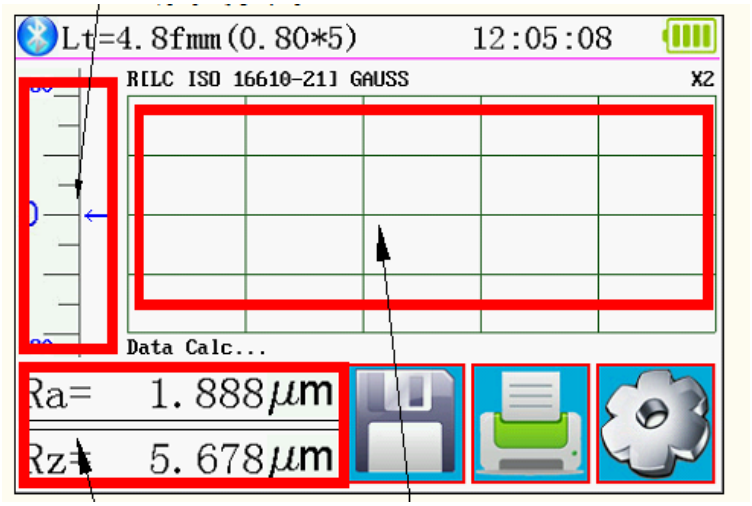
2.4 Starting the Measurement

In the main display mode you can start the measurement either by pressing the start button or by touching the touch start area on the display (at the position of the stylus). To stop the measurement, press the ESC button.

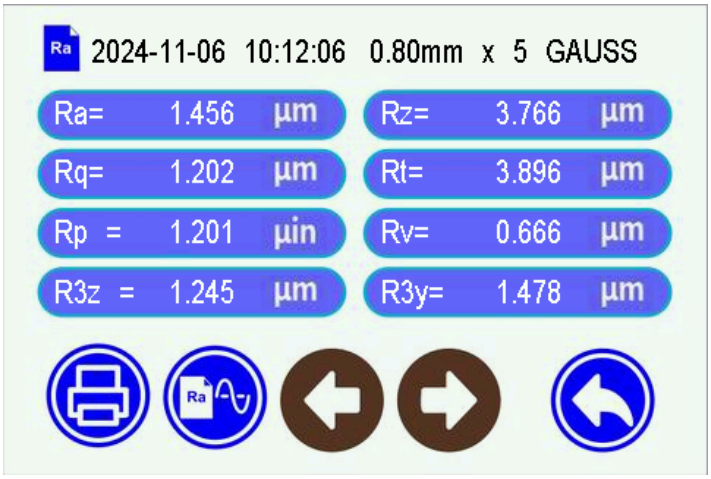
2.5 Displaying the Measurement Results

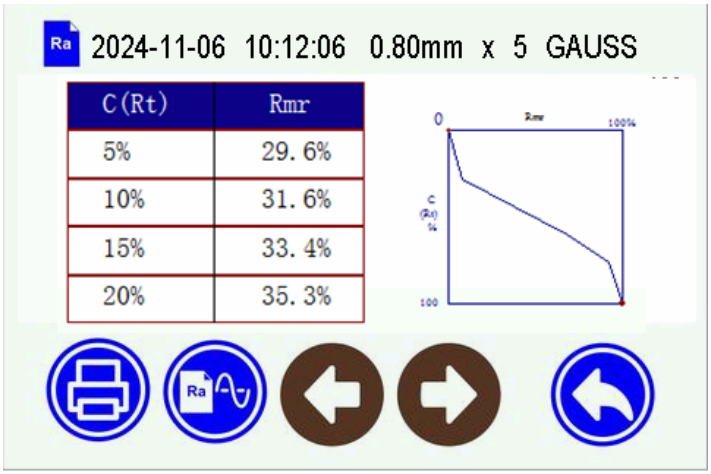
After the measurement, if you want to view the measured value in all possible units, touch the “touch results area”. The “touch profile area” enlarges the profile.

Touch start area



Touch results area Touch profile area





2.6 Printing Measurement Results

The instrument can be connected to a printer to print out the measurement results. After completing the measurement, you can press the button to output the measured data to a serial printer. It is possible to adjust the print output of the instrument as required by either selecting certain parameters for printing or printing all parameters. Information on setting the parameters can be found in the “Print settings” chapter.

2.7 Saving the Measurement Results

In the main display mode, press the button to save the measurement results in the instrument's memory. The instrument has a data memory that can store up to 100 sets of raw data and profile data.

When saving data, date and time are logged, and the file name is generated automatically according to the last record, which always stores the most recent recording time. The last saved record is given the record number 001.

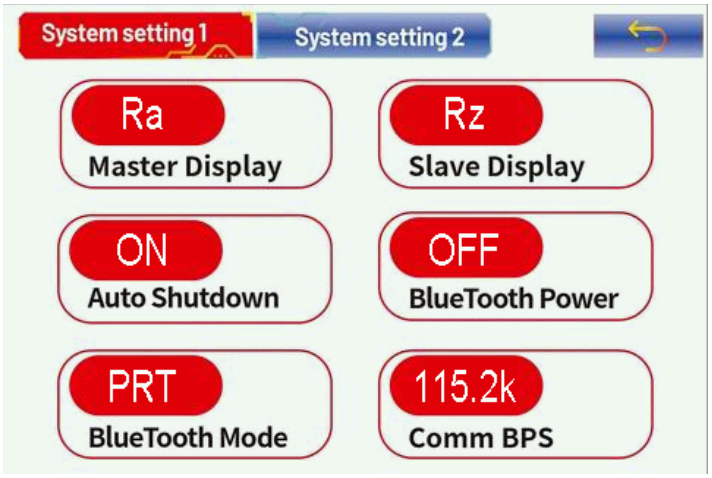
2.8 Calibrating the Touchscreen

The touchscreen of the instrument was already calibrated during manufacture. As a rule, recalibration is not necessary. However, the physical parameters can change over time. Should you find that the touchscreen does not respond correctly, please carry out a recalibration. To do so, follow the instructions on the screen.

2.9 Main Menu

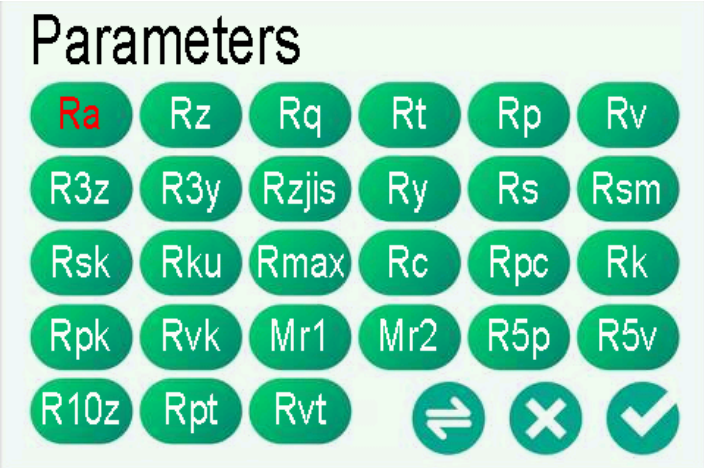
In the main display mode, press the button to call up the main menu.

2.10 System Settings



Please tap the corresponding area to access the settings.

2.10.1 Setting the Roughness Units in the Main Display Mode



2.10.2 Setting the Baud Rate

The baud rate of communication between the instrument and the printer or the mobile phone app. The default setting is 115.2K.

2.10.3 Automatic Shut-off

The instrument switches off automatically if it is not used within 10 minutes. With the “OFF” setting, the instrument stays switched on permanently.

2.10.4 Bluetooth Mode

There are two operating modes for the Bluetooth module: print mode and data transfer mode. Select print mode if you want to operate the instrument together with the optional Bluetooth printer, and data transfer mode if you want to communicate with the mobile app.

The Bluetooth switch can only be operated when the Bluetooth power supply is switched off.

2.10.5 Bluetooth Power Supply

Please first activate Bluetooth mode before switching on the Bluetooth power supply. The instrument configures the Bluetooth module automatically according to the requirements.

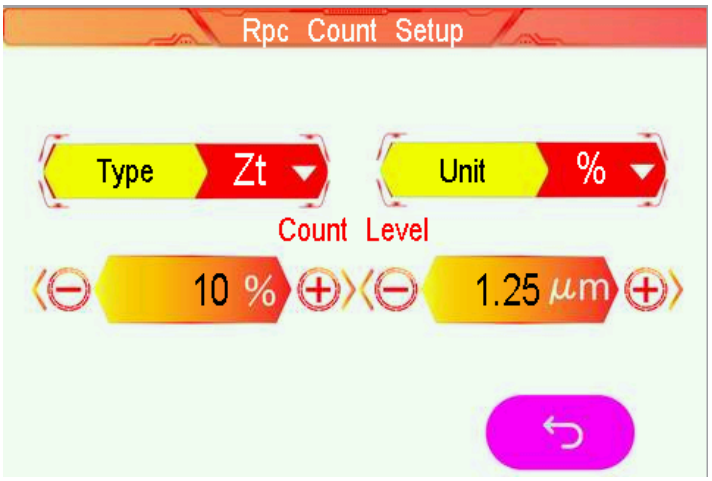
To avoid unnecessary battery consumption, the Bluetooth power supply is deactivated automatically after each restart of the instrument. If you want to use the Bluetooth function, please switch it on manually.

2.10.6 Settings for Rmc

The Rmc parameter refers to the percentage of the measuring length that consists of material when the roughness profile is “cut off” at a certain section level c.

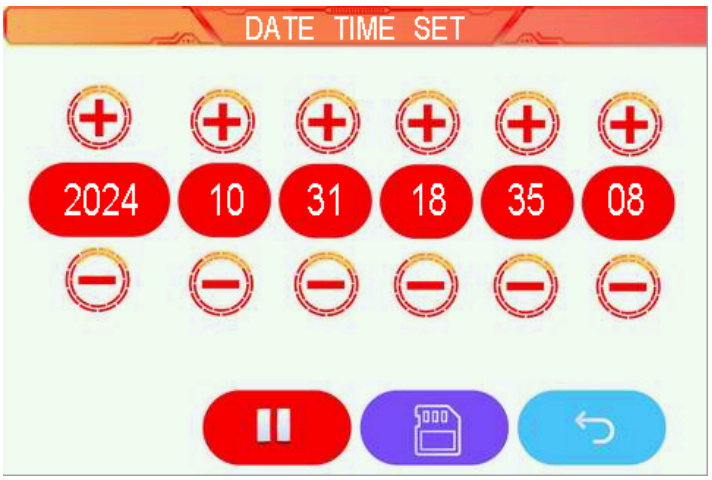
2.10.7 Settings for Rpc

The Rpc parameter refers to the number of roughness peaks per unit length that exceed a defined section level.



Depending on user requirements, the section level for calculating the Rpc parameter can be specified either in “µm” or in “%”.

2.10.8 Date and Time Settings



If you want to change the date and time, please first press STOP. After the change is complete, press START.

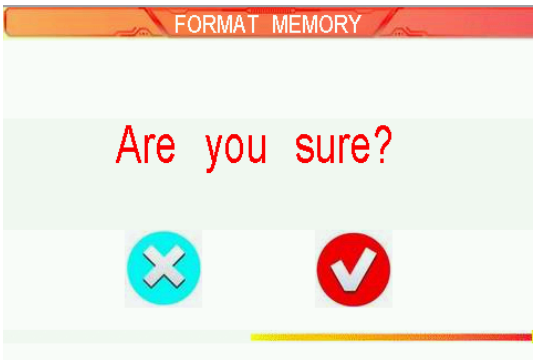
2.10.9 Display Brightness Settings

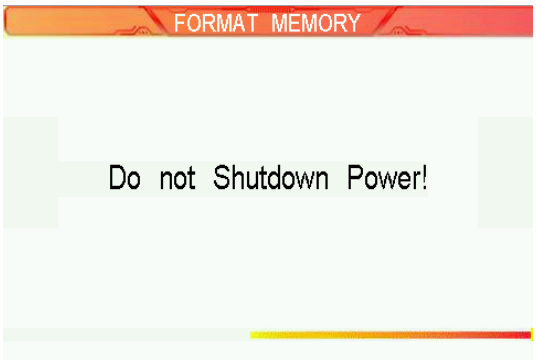
2.10.10 Reset to Factory Settings

2.10.11 Memory Formatting

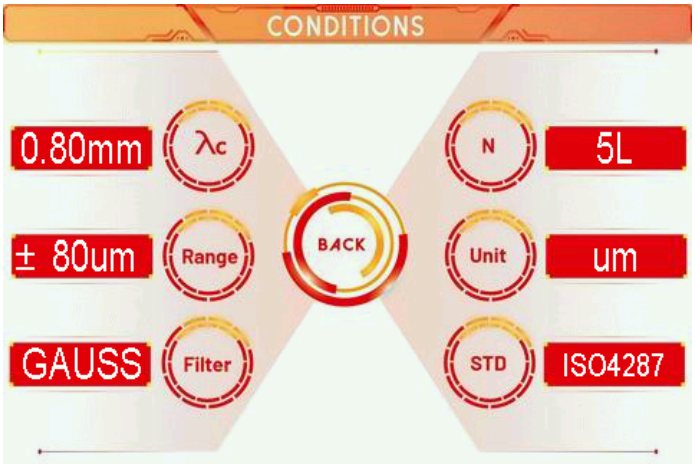
Memory formatting irrevocably deletes all existing data. Before the process begins, a confirmation prompt appears on the instrument. Once the user confirms the formatting, recovery of the data is no longer possible. Please be careful.

The formatting process takes approximately one minute. Do not switch off the instrument during this time.





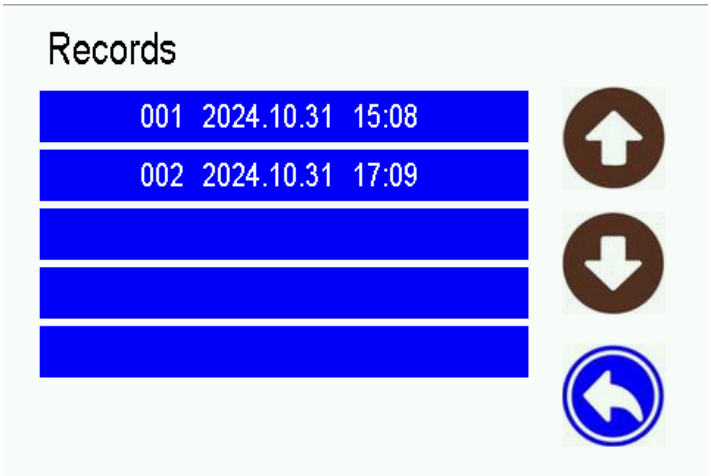
2.11 Measurement Condition Settings



The following measurement conditions can be set:

- **Sampling length: 0.25 mm / 0.8 mm / 2.5 mm**
- **Number of sampling lengths: 1 to 5**
- **Measuring range: ±20 µm / ±40 µm / ±80 µm / ±160 µm**
- **Unit: inch / mm**
- **Filter: RC / PC-RC / Gauss / D-P**
- **Standard: ALL / ISO4287 / DIN4768 / JIS-B601 / ANSI-B46 / ISO21920**

2.12 Managing Records



Select the desired record to display the details.

2.13 Software and Hardware Information

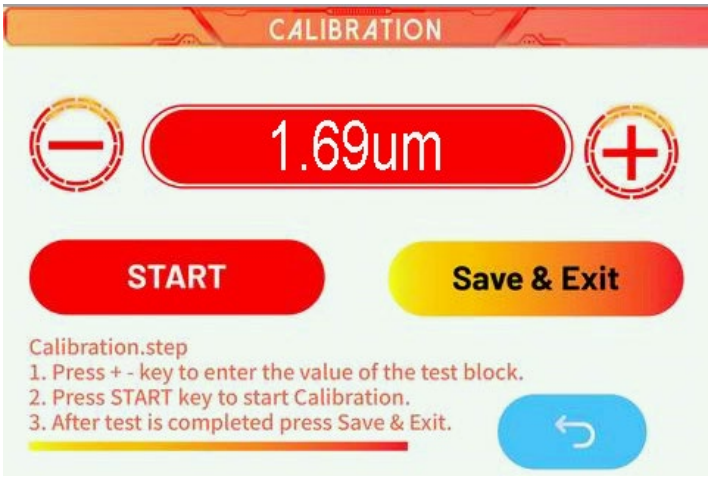
The software and hardware information helps to uniquely identify the instrument. The serial number and the version of the software and hardware are displayed.

2.14 Calibration

Before carrying out measurements, the instrument should as a rule be checked using a standardised calibration block. Under normal conditions, the measured value is considered valid if the deviation between the measured value and the block value is within the acceptable range. In this case, you can proceed directly with the measurements.

However, should the deviation be greater than the permissible accuracy error of the instrument, or if higher accuracy is required, the calibration function can be used to improve the measuring accuracy. The calibration procedure is described below.

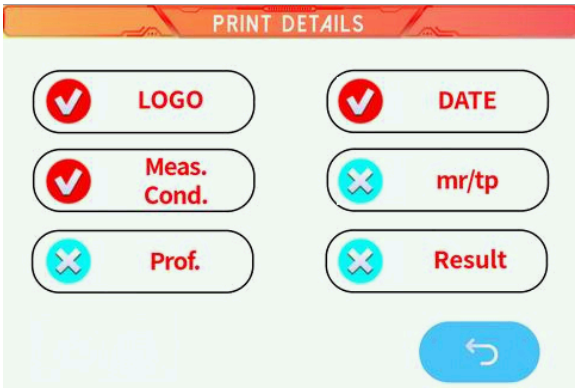
The figure shows the calibration of an Ra value using a test block with a nominal value of 1.69 µm.

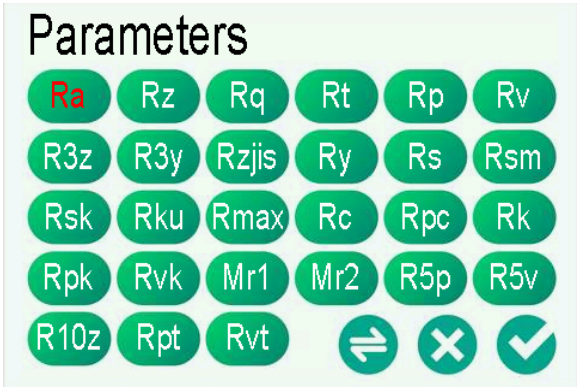


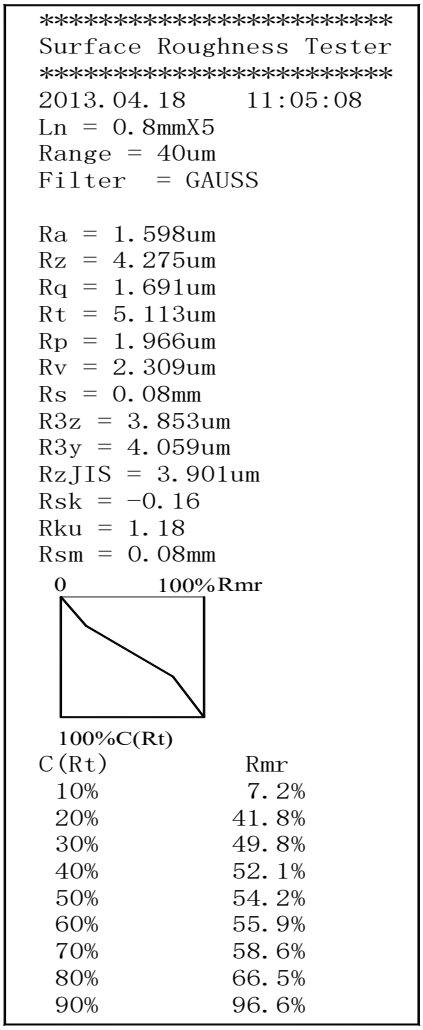
- Use the + and – buttons to set the nominal value of the calibration block.
- After the calibration value has been set, press the START button to carry out a complete measurement.
- Then press “Save & Exit” to store the correction parameter and end the calibration procedure.
- Press the “Exit” button to return to the menu without saving the calibration results.

2.15 Setting Up the Print Function

This menu item allows a print report to be designed in which the corresponding parameters are added to the printout by activating them.







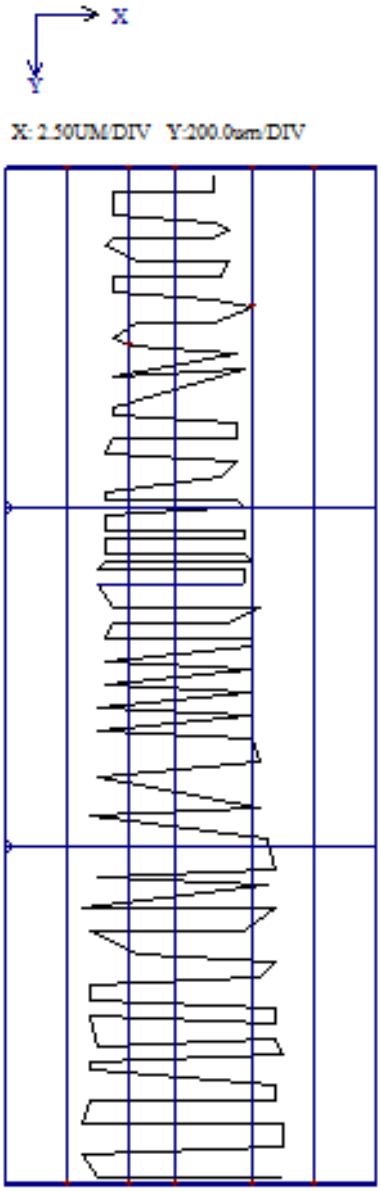
```
**************************
Surface Roughness Tester
**************************
2013.04.18      11:05:08
Ln = 0.8mmX5
Range = 40um
Filter  = GAUSS

Ra = 1.598um
Rz = 4.275um
Rq = 1.691um
Rt = 5.113um
Rp = 1.966um
Rv = 2.309um
Rs = 0.08mm
R3z = 3.853um
R3y = 4.059um
RzJIS = 3.901um
Rsk = -0.16
Rku = 1.18
Rsm = 0.08mm
```

0 100%Rmr

100%C(Rt)

C(Rt)	Rmr
10%	7.2%
20%	41.8%
30%	49.8%
40%	52.1%
50%	54.2%
60%	55.9%
70%	58.6%
80%	66.5%
90%	96.6%

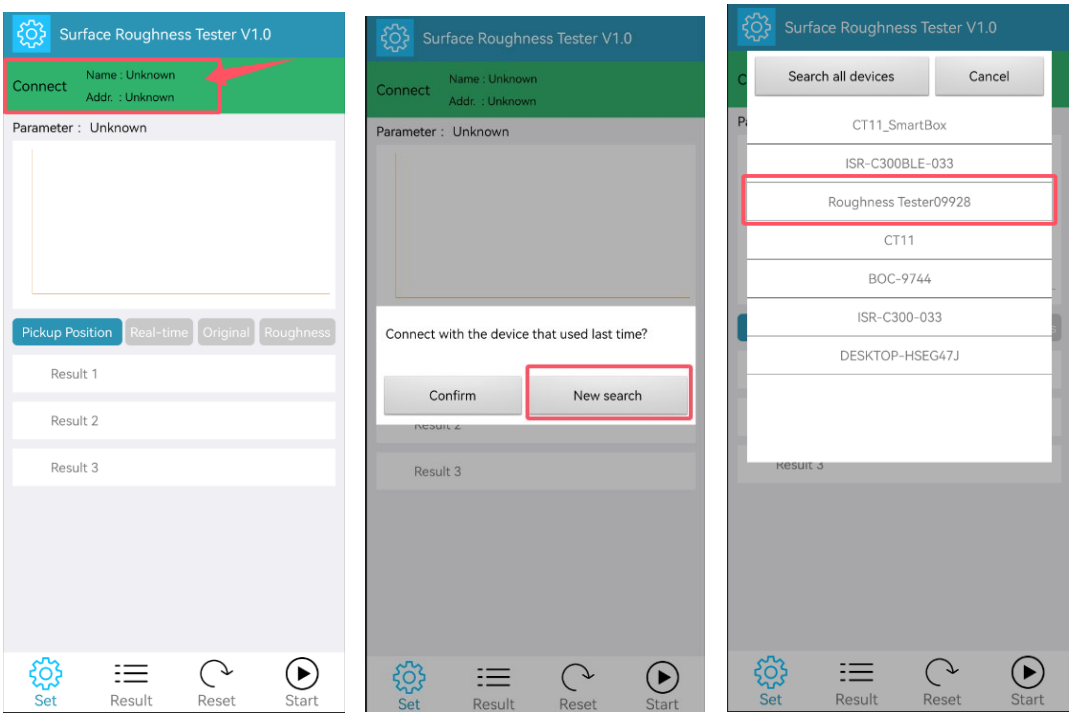


2.16 Mobile App

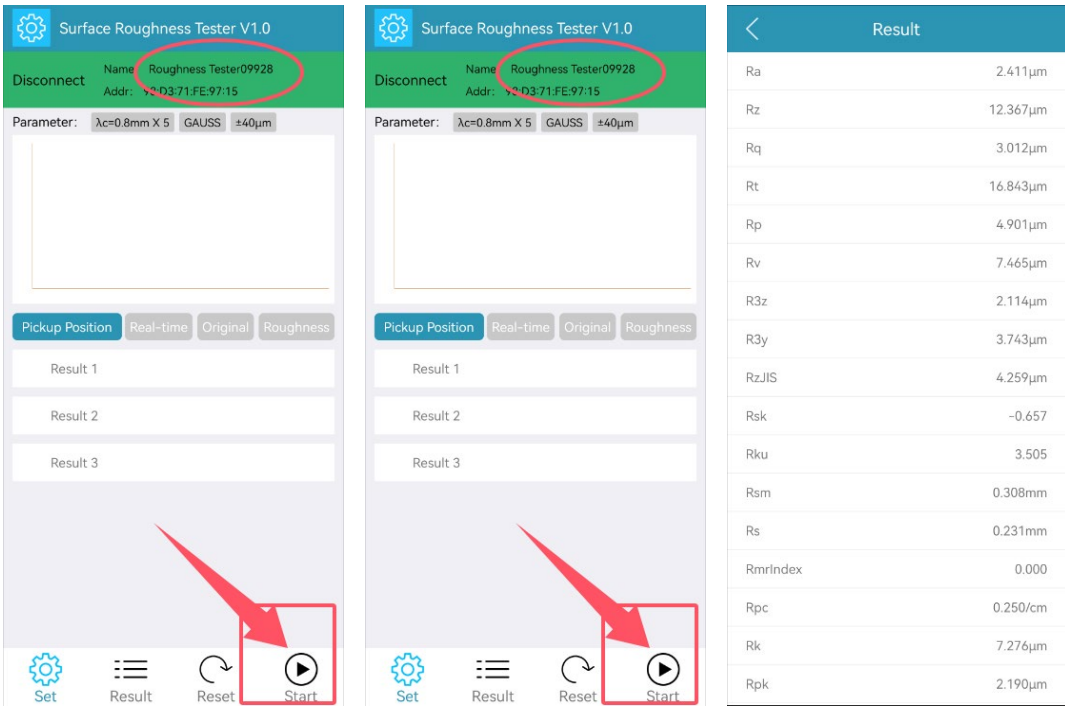
The instrument has a wireless Bluetooth function, which is particularly useful when working at height or in hard-to-reach places where direct operation is difficult. In such cases, the

remote control function of the mobile app can be used. The app is compatible with Android 6.0 or newer.

To control the instrument via the app, set the Bluetooth mode to “APP” and activate the Bluetooth power supply as well as the transfer speed BPS 115.2 kbit/s (115200 baud).



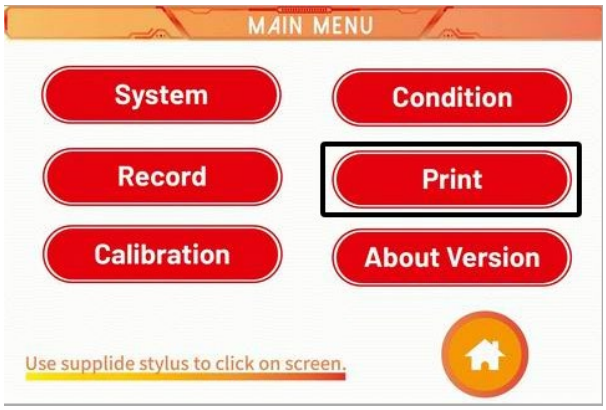
Tap the upper green area of the app to search for the roughness tester or to establish a connection to a device that has already been found.

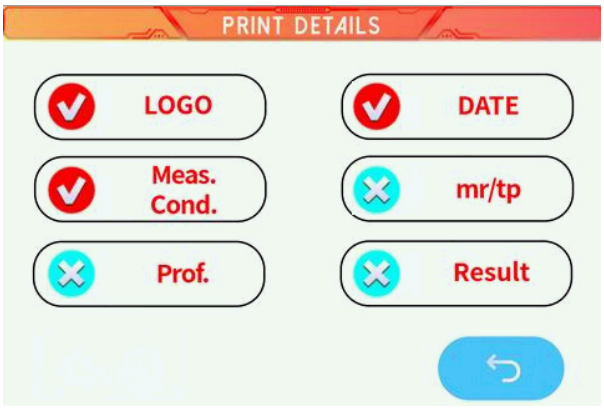


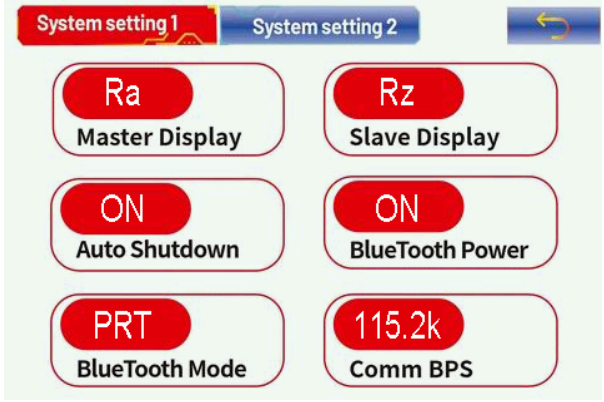
Start the measurement with the “Start” icon.

2.17 Outputting the Measurements to the Mobile Bluetooth Printer

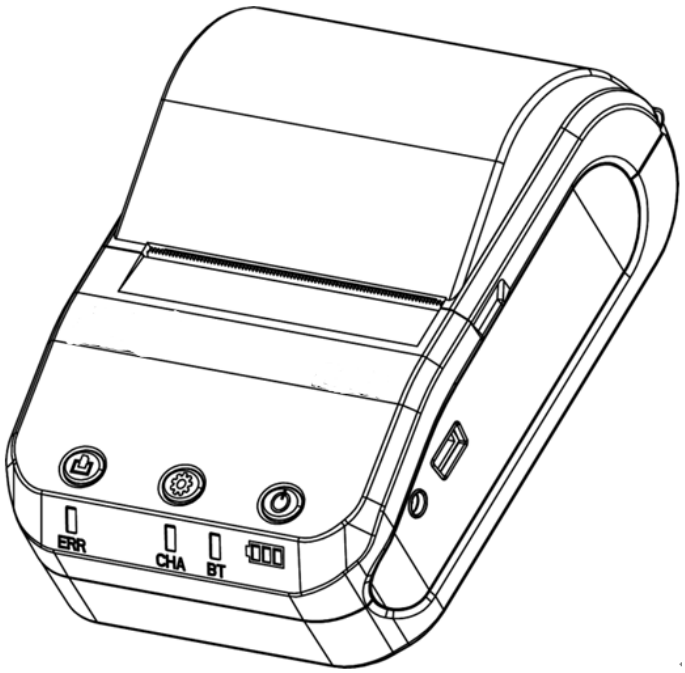
Tap the button to call up the main menu and then select the “Print” option. Set the Bluetooth mode to “PRT”, activate the Bluetooth power supply and set the data transfer rate to 115.2 kbit/s (115200 baud). 

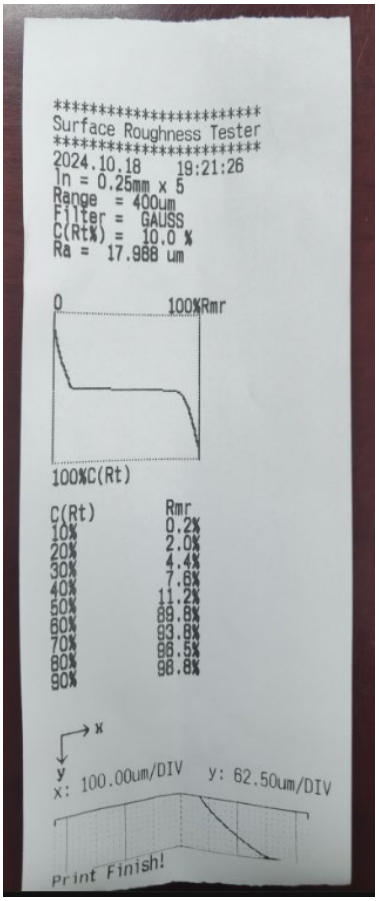

MAIN MENU
System
Condition
Record
Print
Calibration
About Version
Use supplide stylus to click on screen.


PRINT DETAILS
LOGO
DATE
Meas. Cond.
mr/tp
Prof.
Result


System setting 1
System setting 2
Ra
Master Display
Rz
Slave Display
ON
Auto Shutdown
ON
BlueTooth Power
PRT
BlueTooth Mode
115.2k
Comm BPS


BlueTooth Set
Press waiting!

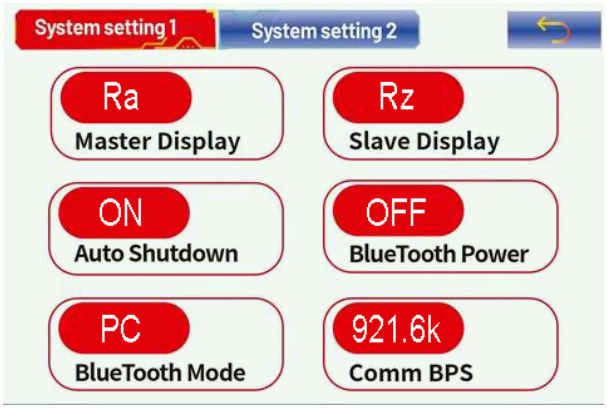

ERR
CHA
BT


****
Surface Roughness Tester
****
2024.10.18 19:21:26
In = 0.25mm x 5
Range = 400um
Filter = GAUSS
C(Rt%) = 10.0 %
Ra = 17.988 um
0
100%Rmr
100%C(Rt)
C(Rt) Rmr
10% 0.2%
20% 2.0%
30% 4.4%
40% 7.6%
50% 11.2%
60% 89.6%
70% 93.8%
80% 96.5%
90% 98.8%
x
y
x: 100.00um/DIV y: 62.50um/DIV
Print Finish!

2.18 DataView Software

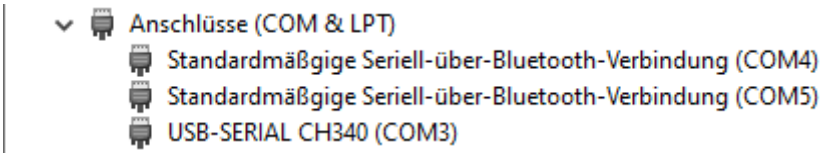
The DataView software enables waveform analysis and convenient editing of measurement results on a PC.

In the instrument, set the Bluetooth mode to PC, switch off the Bluetooth power supply and set the baud rate to 921.6 kbit/s.

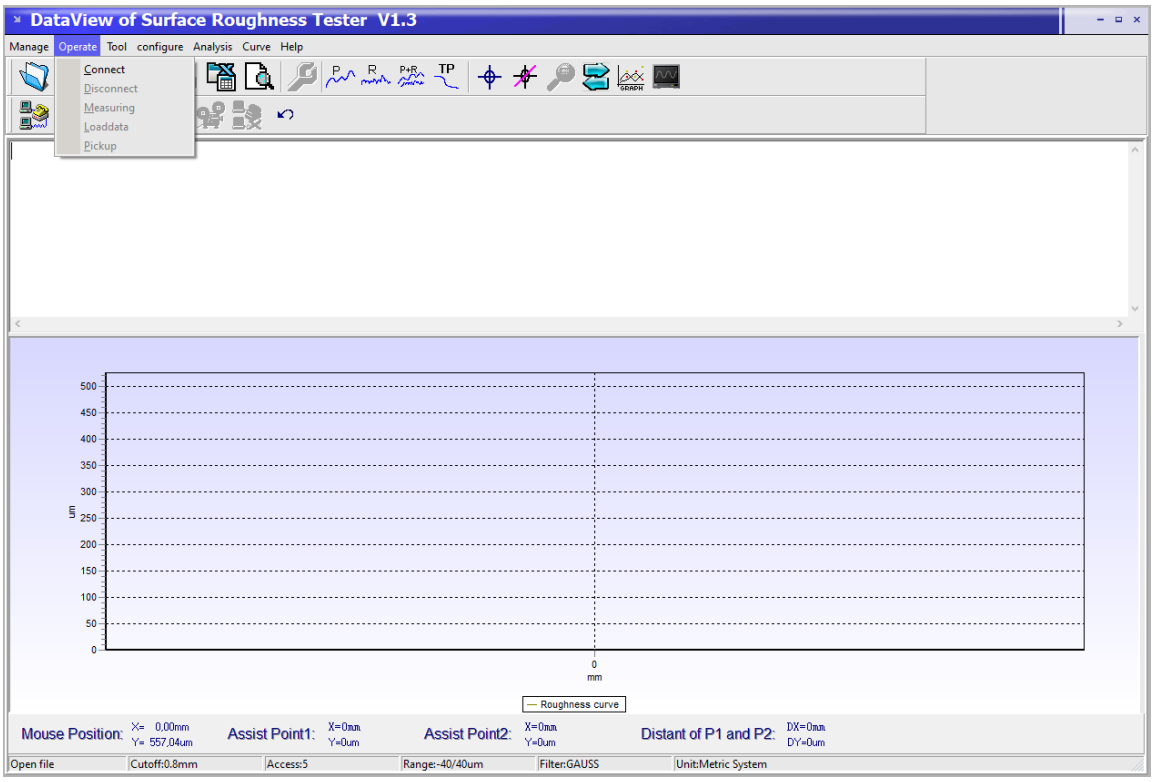


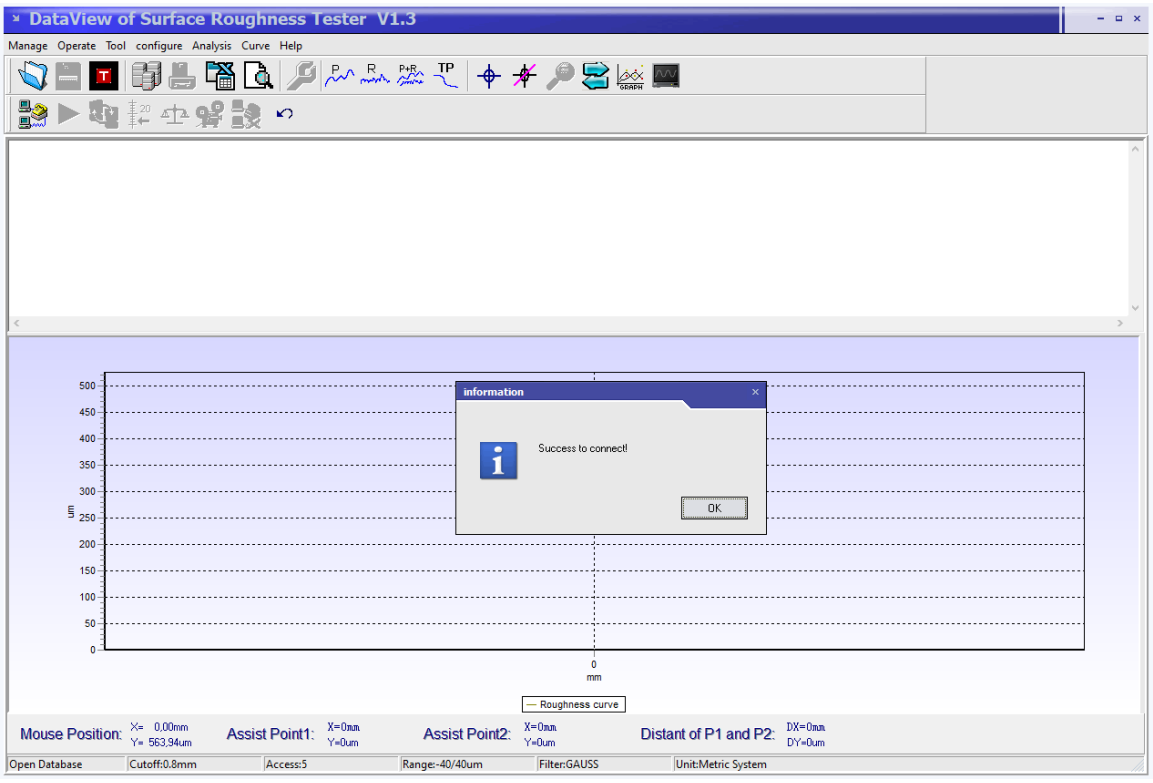
Install the DataView software and the USB-SERIAL CH340 driver from the supplied USB stick on your computer. Connect the instrument to your PC using the supplied USB cable.

In your PC's Device Manager, check whether the device “USB-SERIAL CH340” is recognised. Under “Ports (COM & LPT)” it should appear with a COM port assigned by the system.

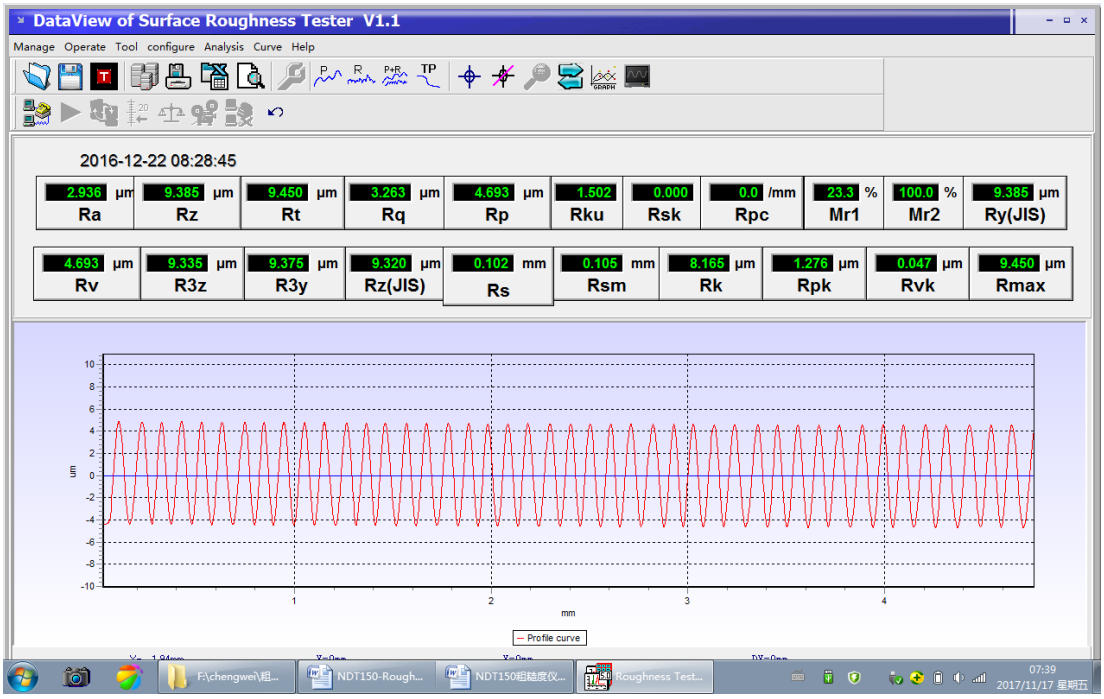


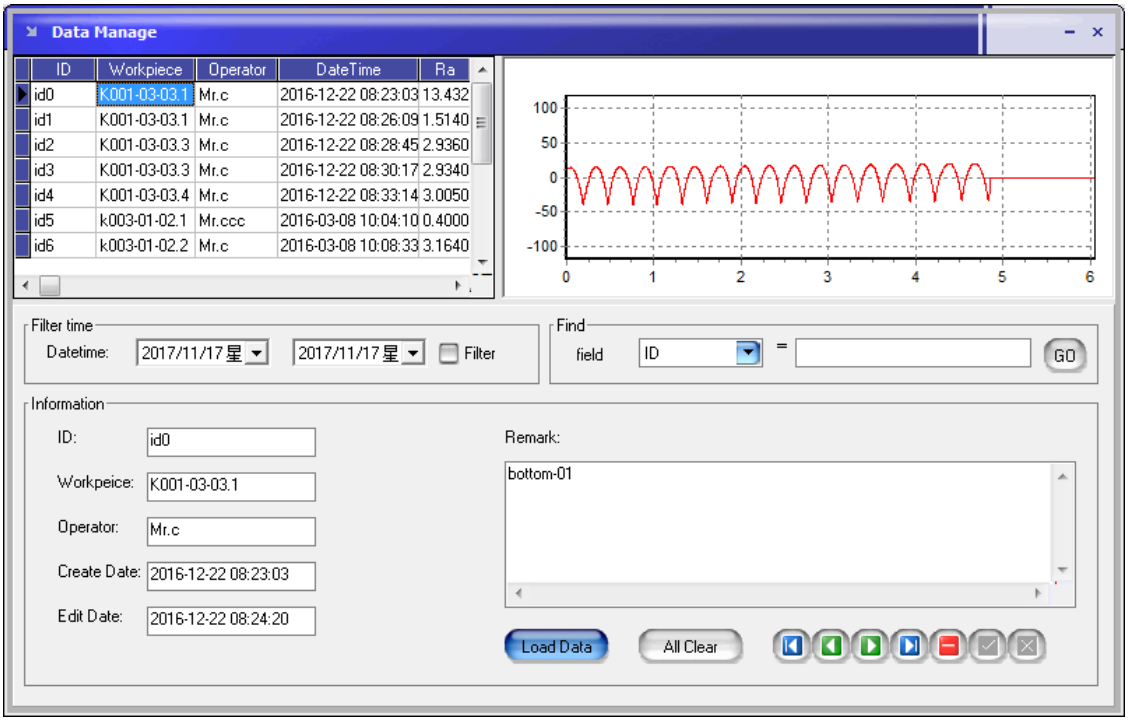
Start the DataView software and establish a connection to the instrument via Operate > Connect.

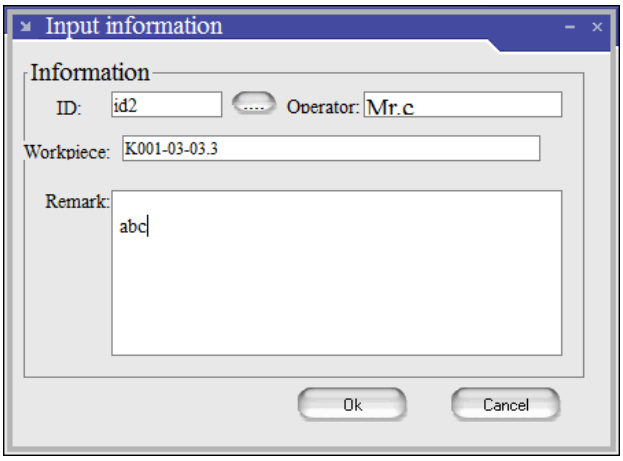


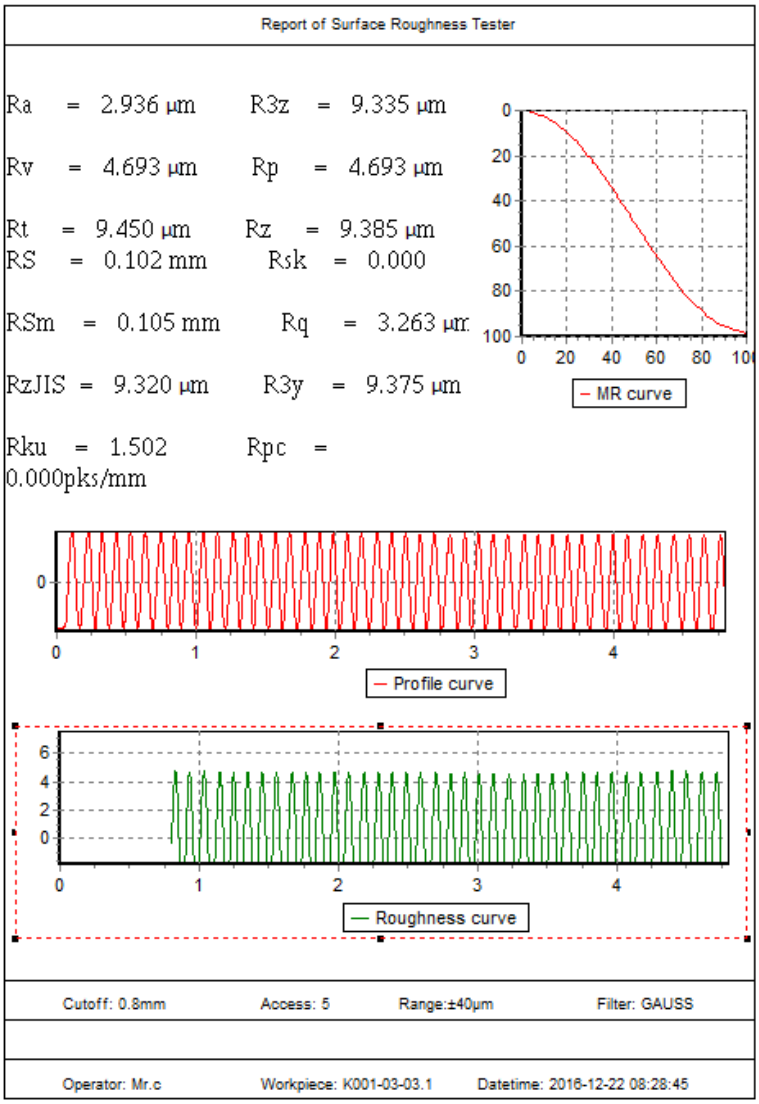


After that, all functions of the DataView software are available to you.


DataView of Surface Roughness Tester V1.1
Manage Operate Tool configure Analysis Curve Help
2016-12-22 08:28:45
2.936 µm Ra
9.385 µm Rz
9.450 µm Rt
3.263 µm Rq
4.693 µm Rp
1.502 Rku
0.000 Rsk
0.0 /mm Rpc
23.3 % Mr1
100.0 % Mr2
9.385 µm Ry(JIS)
4.693 µm Rv
9.335 µm R3z
9.375 µm R3y
9.320 µm Rz(JIS)
0.102 mm Rs
0.105 mm Rsm
8.165 µm Rk
1.276 µm Rpk
0.047 µm Rvk
9.450 µm Rmax
mm
Profile curve


Data Manage
ID Workpiece Operator DateTime Ra
id0 K001-03-03.1 Mr.c 2016-12-22 08:23:03 13.432
id1 K001-03-03.1 Mr.c 2016-12-22 08:26:09 1.5140
id2 K001-03-03.3 Mr.c 2016-12-22 08:28:45 2.9360
id3 K001-03-03.3 Mr.c 2016-12-22 08:30:17 2.9340
id4 K001-03-03.4 Mr.c 2016-12-22 08:33:14 3.0050
id5 k003-01-02.1 Mr.ccc 2016-03-08 10:04:10 0.4000
id6 k003-01-02.2 Mr.c 2016-03-08 10:08:33 3.1640
Filter time
Datetime: 2017/11/17 星 2017/11/17 星 Filter
Find
field ID = GO
Information
ID: id0
Workpeice: K001-03-03.1
Operator: Mr.c
Create Date: 2016-12-22 08:23:03
Edit Date: 2016-12-22 08:24:20
Remark:
bottom-01
Load Data
All Clear

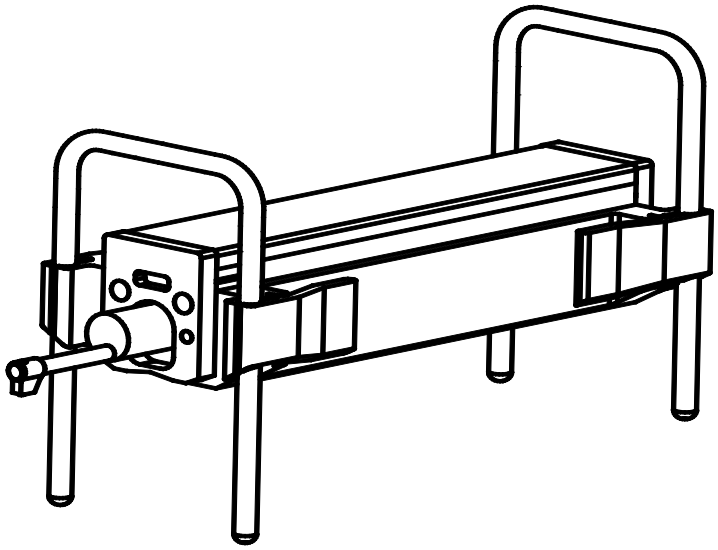

Input information
Information
ID:
id2
Operator:
Mr.c
Workpiece:
K001-03-03.3
Remark:
abc
Ok
Cancel


Report of Surface Roughness Tester
Ra = 2.936 µm
R3z = 9.335 µm
Rv = 4.693 µm
Rp = 4.693 µm
Rt = 9.450 µm
Rz = 9.385 µm
RS = 0.102 mm
Rsk = 0.000
RSm = 0.105 mm
Rq = 3.263 µm
RzJIS = 9.320 µm
R3y = 9.375 µm
Rku = 1.502
Rpc = 0.000pks/mm
MR curve
Profile curve
Roughness curve
Cutoff: 0.8mm
Access: 5
Range:±40µm
Filter: GAUSS
Operator: Mr.c
Workpiece: K001-03-03.1
Datetime: 2016-12-22 08:28:45

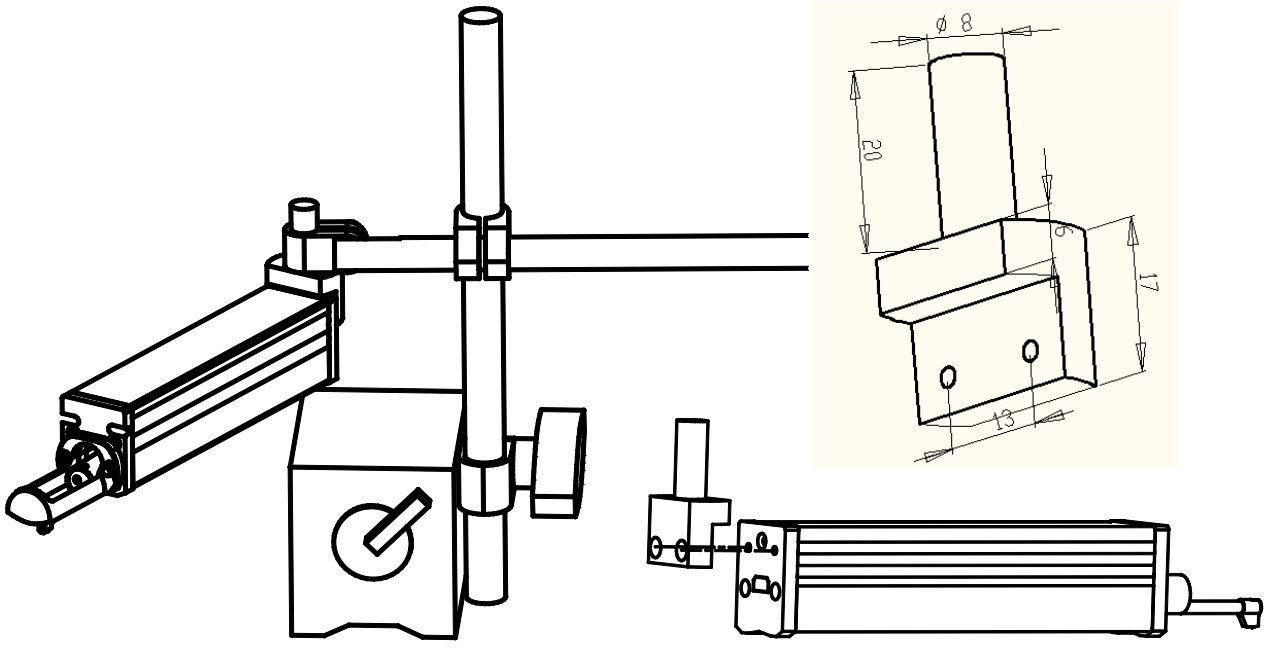
3 Optional Accessories for the Drive Unit

3.1 Height-adjustable Support Feet

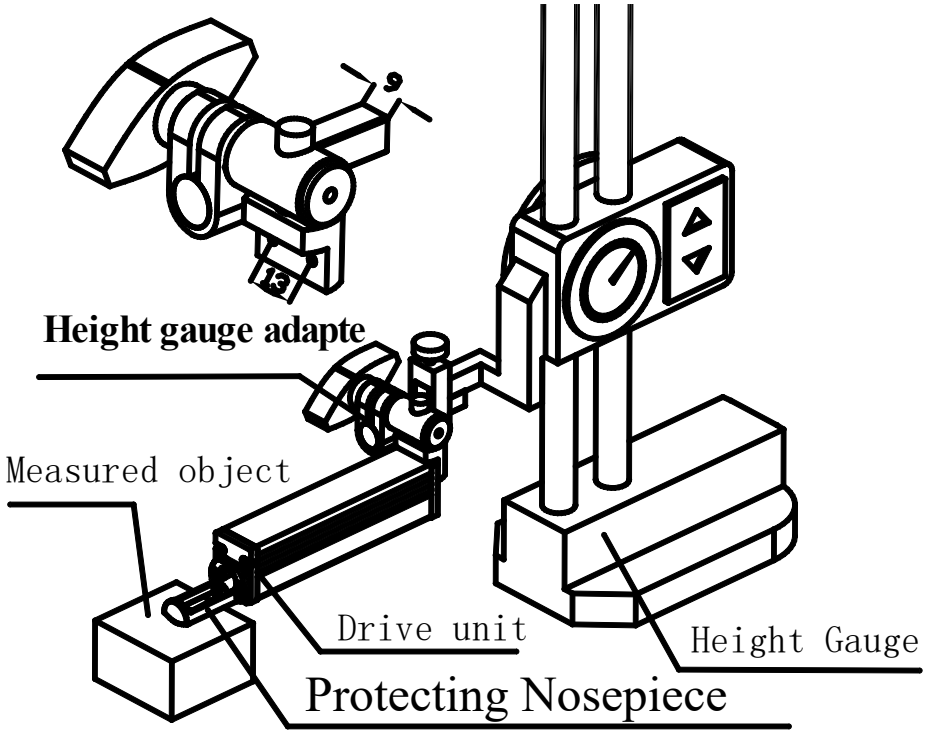
If the surface of the workpiece to be measured is smaller than the bearing surfaces of the instrument, the height-adjustable support feet can be used as an auxiliary support to carry out the measurement.



3.2 Magnetic Stand Adapter

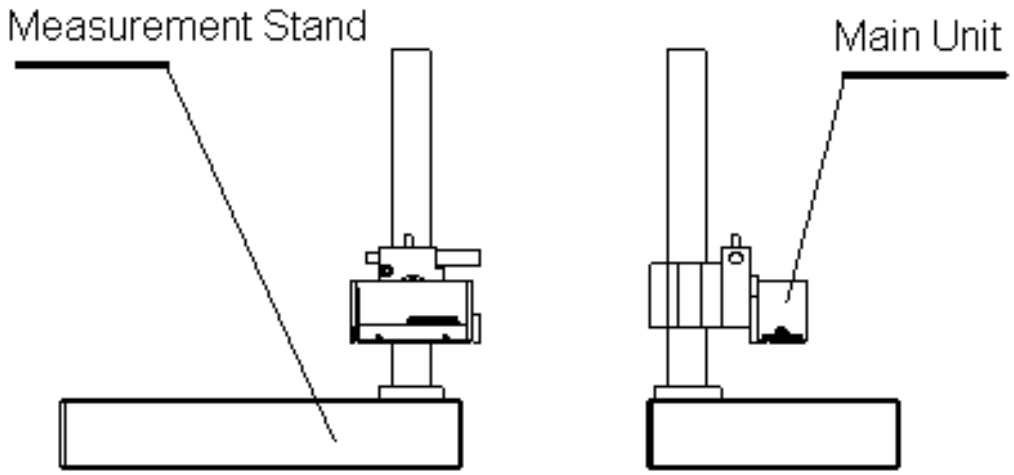


3.3 Height Adapter



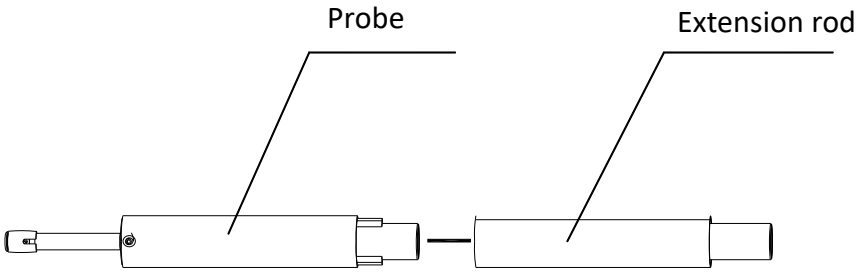
3.4 Measuring Stand

The measuring stand allows convenient position adjustment between the instrument and the test part through flexible and stable operation, thereby extending the field of application. The roughness of complex shapes can also be measured with the help of this measuring stand. The measuring stand allows more precise positioning of the stylus tip and ensures more stable measurements. The use of the measuring stand is also recommended for small Ra values of the measuring surface.



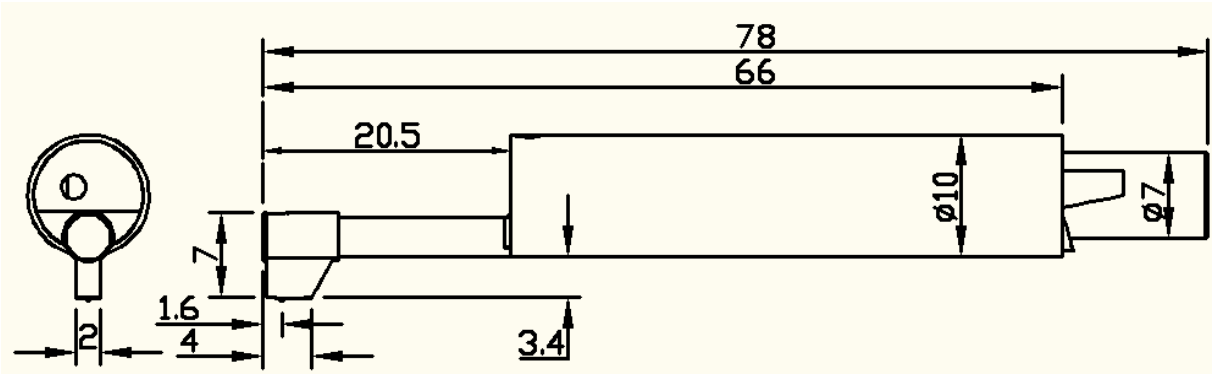
3.5 Extension Rod

The extension rod increases the penetration depth so that the pickup can reach the component. Its length is 50 mm.



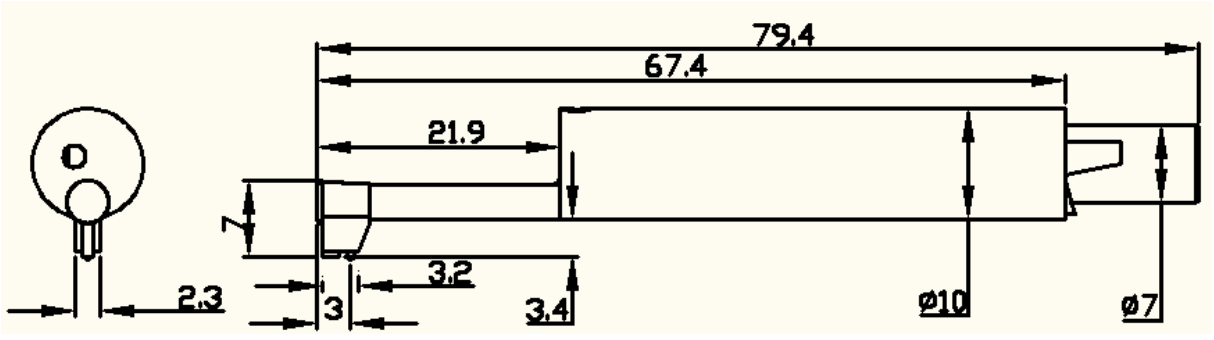
3.6 Standard Axe-type Probe

With the standard axe-type probe it is possible to measure grooves with a width greater than 3 mm and a depth of at most 3.2 mm. The distance from the measuring point to the top edge is 1.6 mm.



3.7 Groove Probe

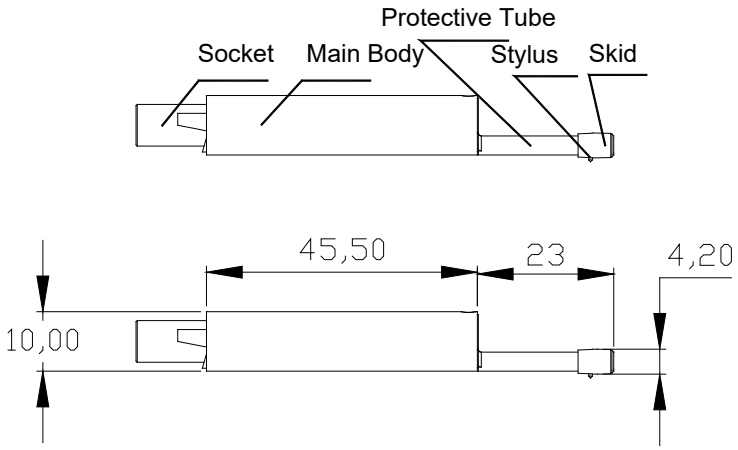
With the groove probe it is possible to measure grooves with a width of more than 3 mm and a depth of at most 3.2 mm. The distance from the measuring point to the top edge is 3 mm.



3.8 Probe for Small Bores

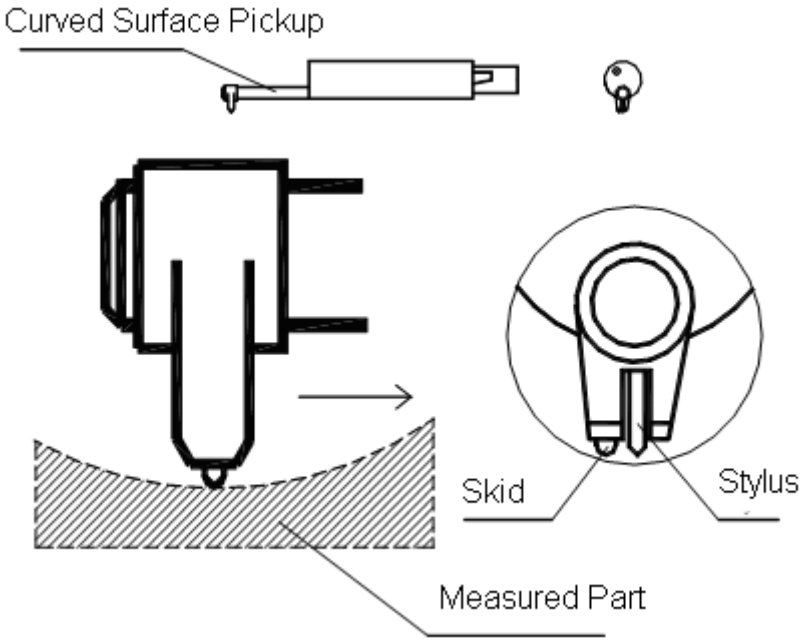
The probe for small bores measures the roughness of flat surfaces, inclined surfaces, conical surfaces, internal bores and other geometries. The minimum measurable hole diameter is Ø

4.5 mm. For measurements, the sensor with drive unit must be mounted on the measuring stand.



3.9 Probe for Curved Surfaces

The probe for curved surfaces is used mainly to measure radii greater than 3 mm and to determine the roughness of smooth cylindrical surfaces. With larger radii, smooth spherical surfaces and other surfaces, a good approximation can likewise be achieved. The smoother the surface and the larger the radius of curvature, the better the measurement result.



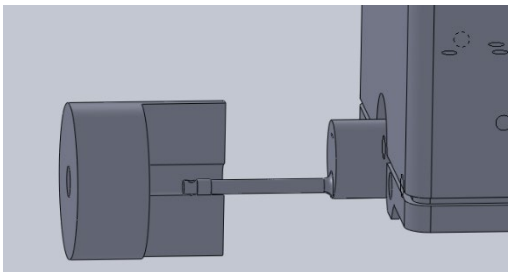
3.9.1 Operating Method of the Probe for Curved Surfaces

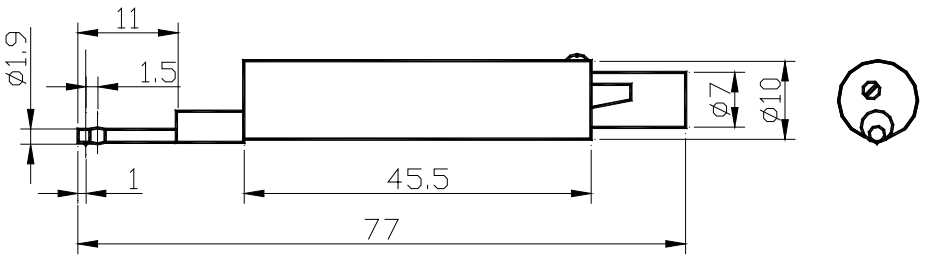
The main difference between the probe for curved surfaces and other probes is that the skid and stylus tip are arranged parallel to one another, whereas in the other probes they are arranged front and back respectively. For measurement, the probe for curved surfaces must be mounted on the measuring stand with

the drive unit.

3.10 Probe for Very Small Bores

With this probe, internal surfaces of bores with a radius of more than 2 mm can be measured. For exact dimensions see the following figure.



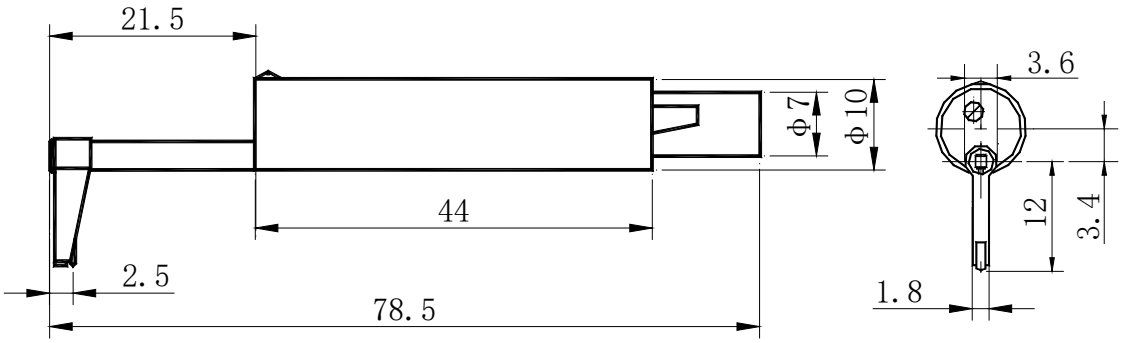


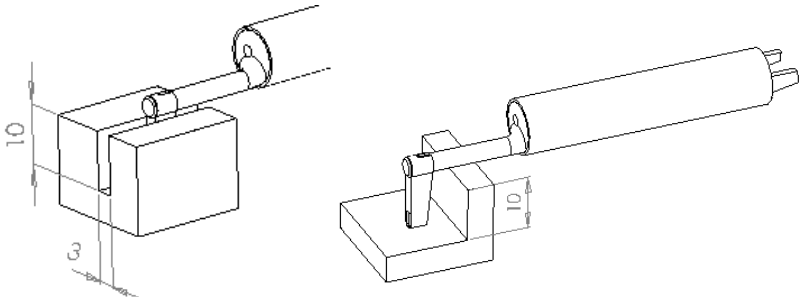
3.10.1 Operating Method of the Probe for Very Small Bores

The skid of the probe for very small bores is located behind the stylus pin. On contact with the workpiece, the trigger position is first in the upper and then in the lower position. Probes for very small bores must be mounted together with the drive unit on the measuring stand for measurement.

3.11 Deep-groove Probe

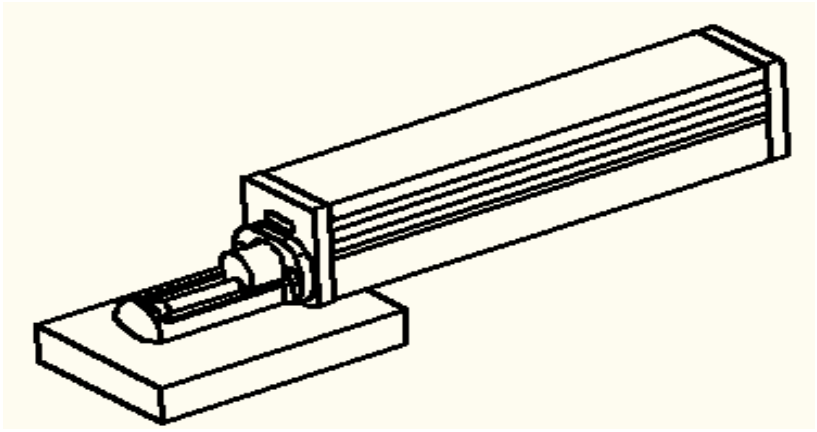
The deep-groove probe enables the measurement of grooves (width over 3 mm, depth over 10 mm) as well as the determination of the surface roughness of step shoulders with a height below 10 mm. In combination with a platform it is also suitable for measuring flat and cylindrical surfaces. See the figure for detailed dimensions.

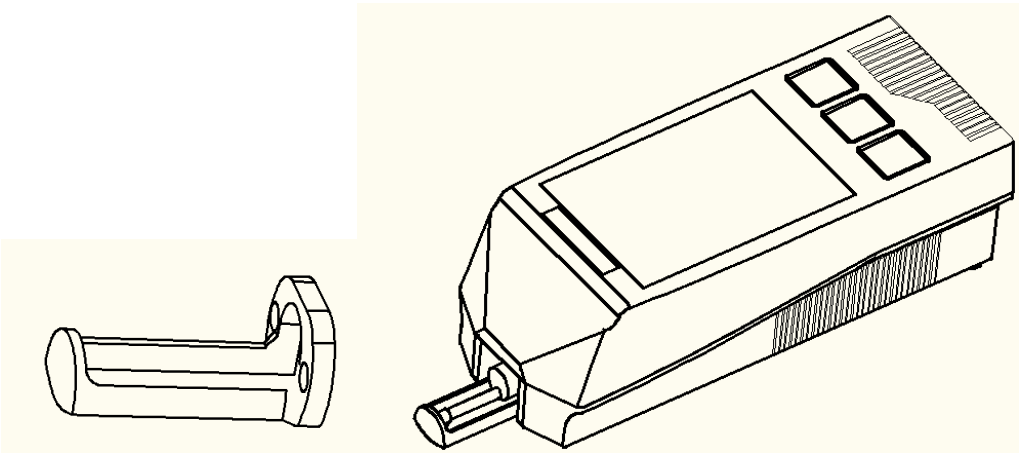




3.12 Measuring Attachment for Flat Surfaces

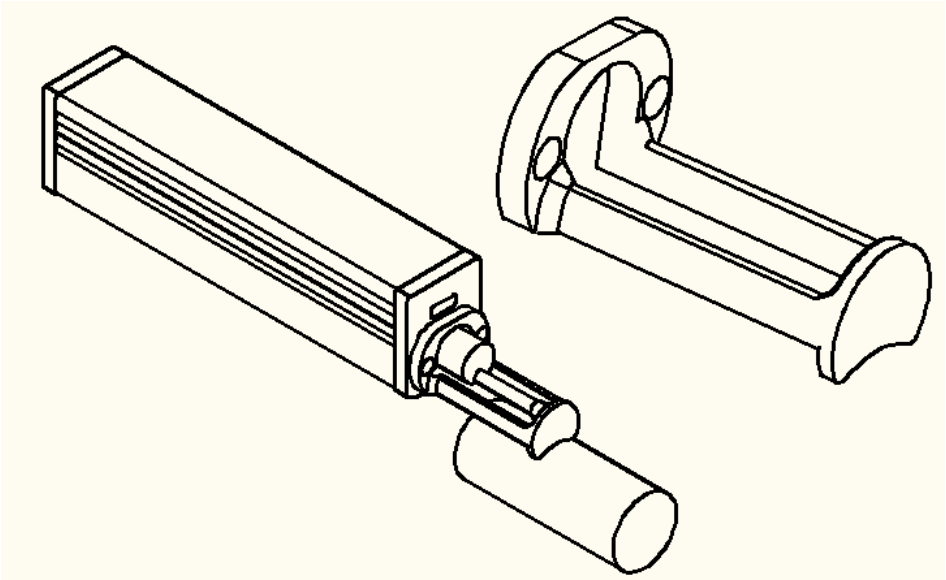
It is suitable for measuring the roughness of measurement objects that are smaller than the roughness tester and whose measuring surface is flat. The measuring attachment can effectively protect the probe.





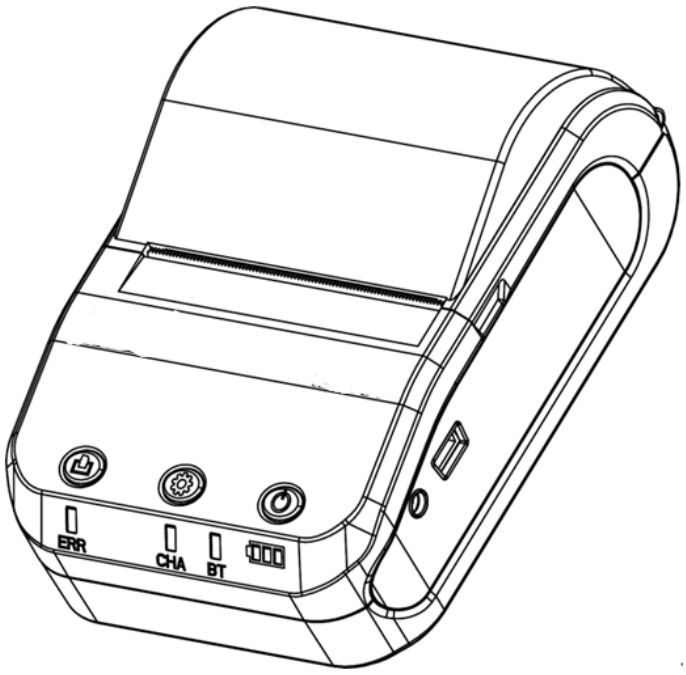
3.13 Attachment for Cylindrical Surfaces

It is suitable for measuring the roughness of cylindrical objects that cannot be measured directly. The attachment can effectively protect the sensor.



3.14 Miniature Thermal Printer

The printer has a Bluetooth interface. The BT LED indicates a successful connection to the roughness tester.



4 Technical Data and Features

4.1 Technical Data

Measuring range	Z axis (vertical)	320 µm (-160 µm ~ 160 µm) / 12600 µin (-6300 µin ~ +6300 µin)	
	X-Achse (horizontal)	17.5 mm / 0.69"	
Resolution		0.002 µm / ±20 µm	0.004 µm / ±40 µm

	Z axis (vertical)	0.008 µm / ±80 µm	0.02 µm / ±160 µm
Measurement data	Units	Ra, Rz, Rq, Rt, Rc, Rp, Rv, R3z, R3y, Rz(JIS), Ry, Rs, Rsk, Rku, Rmax, Rsm, Rmr, RPc, Rk, Rpk, Rvk, M1, Mr2	
	Standard	ISO4287, ANSI B46.1, DIN4768, JISB601	
	Graphics	Primary profile, roughness profile, material ratio curves	
Display dimensions		3.5-inch / 480*320	
Filter		RC, PC-RC, Gauss, D-P	
Sampling lengths (lr)		0.25, 0.8, 2.5mm	
Number of sampling lengths (ln)		*Ln = lr × n n = 1~5*	
Probe	Measuring principle	Inductive differential displacement	
	Stylus	Natural diamond, cone angle 90°, tip radius 5 µm	
	Contact force	4mN	
	Skid force	< 400 mN	
	Skid	Ruby, longitudinal radius 40 mm	
	Measuring speed	*lr = 0.25, Vt = 0.135 mm/s*	
		lr = 0.8, Vt = 0.5 mm/s	
		lr = 2.5, Vt = 1 mm/s	
		Return, Vt = 1 mm/s	
Accuracy		±(5 nm + 0.1A) / A: Ra value of the calibration block	
Repeatability		< 3%	
Residual profile		< 0.010 µm	
Power supply		Permanently installed 3.7 V lithium battery Charging time: 5 hours / DC 5 V, 800 mA	
Operating time		> 50 hours	
Dimensions L×W×H	Handheld unit	158×55×52mm	
	Drive unit	115×23×27mm	
Weight		approx. 500 g (handheld unit + drive unit + probe)	
Operating environment		Temperature: -20 ℃ ~ 40 ℃ Humidity: < 90% RH	
Storage and transport		Temperature: -40 ℃ ~ 60 ℃ Humidity: < 90% RH	

4.2 Measuring Range

Ra Rq	0.005 µm ~ 32 µm
Rz R3z Ry Rt Rp Rm	0.02 µm ~ 320 µm
RSk	0 ~ 100%
Rs Rsm	0.02 ~ 1000 µm
Rmr	0 ~ 100%

5 General Maintenance

5.1 Sensor

- Proceed with particular care when changing the probe. Do not touch either the guide or lead tube or the stylus, as these are sensitive key components. If possible, grip the probe by the holder of the guide tube at the front of the housing.
- Place the probe in the storage box immediately after completing the measurements.
- In particular, protect the stylus area of the probe from contamination and damage.
- Avoid impacts, unintentional contact and drops, as these can damage the precision components of the probe.
- The probe is a sensitive sensor and, due to wear, is not covered by the warranty. Keep a spare probe ready to avoid measurement downtime.

5.2 Main Display Unit

- Always keep the surface of the main display clean. Clean it regularly with a soft, dry cloth.
- The instrument is a precision measuring device. Handle it with care and avoid impacts.

5.3 Battery

- Always pay attention to the battery status indicator. Charge the instrument when the charge level is low.
- The full charging time is approximately 3–4 hours. Avoid prolonged charging beyond the recommended time and disconnect the charger after the charging process is complete.

5.4 Roughness Standard Specimen

- The surface of the standard specimen plate is to be kept clean and protected from scratches.

5.5 Troubleshooting

If a failure of the tester occurs, carry out the measures described in the error notes. If the problems persist, send the instrument to the manufacturer for repair. Users must not open or repair the instrument themselves. The symptoms that have occurred must be described precisely when the instrument is sent in.

Fault	Cause	Solution
After start-up the display remains visible for about 1 minute and then switches off.	The cable between the display unit and the drive unit is not connected	Remove the probe and plug it in again

After switching on the test instrument, no motor noise can be heard.		
Touchscreen failure	Loss of the touch parameters	Recalibrate the touchscreen. In the main display mode, press the ESC button for 6 seconds.
Motor fault	Motor stalled	Restart the instrument
Out of measuring range	• The measured surface signal exceeds the measuring range • Stylus not placed in the centre	• Increase the measuring range • Adjust the stylus position
Measuring accuracy out of range	• Incorrect parameters set for the measurement. • Incorrect calibration.	• Reset the parameters for the measurement • Recalibrate the instrument

6 References

6.1 Terms

The instrument calculates parameters on the filtered profile and on the direct profile. All calculations are carried out in accordance with ISO 4287 “Geometrical Product Specification (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters.”

6.1.1 Terms

- **Filtered profile: profile signal after the primary profile has been filtered to remove waviness.**
- **D-P (direct profile): use of the mean line, calculated using the least-squares algorithm.**
- **RC filter: analogue 2RC filter with phase difference.**
- **PC-RC filter: RC filter with phase correction.**
- **Gauss filter: ISO 11562.**

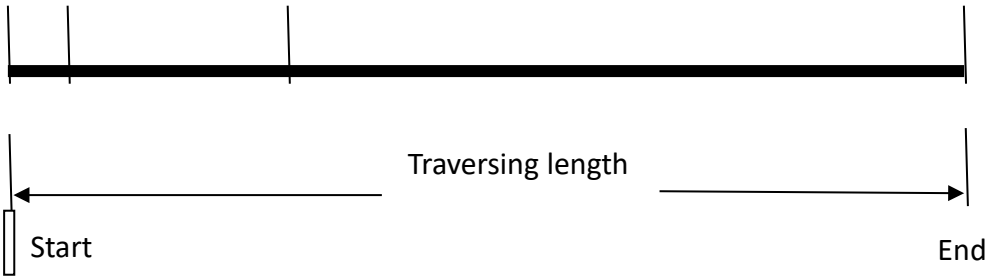
6.1.2 Sampling Length

- **RC filter**

Pre-travel
0.5mm

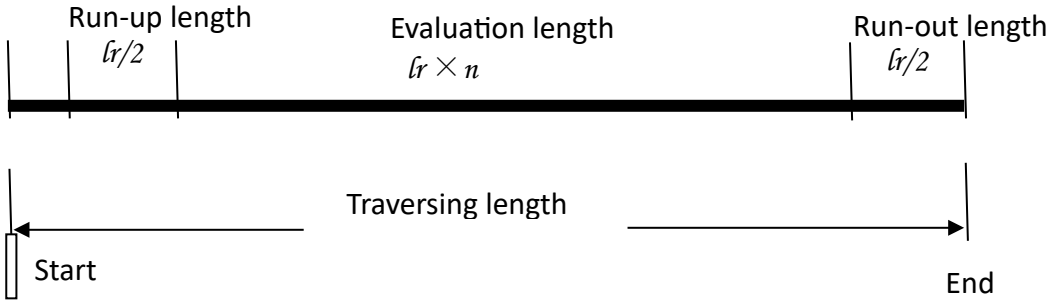
Run-up length
$2l_r$

Evaluation length
$l_n = 8$



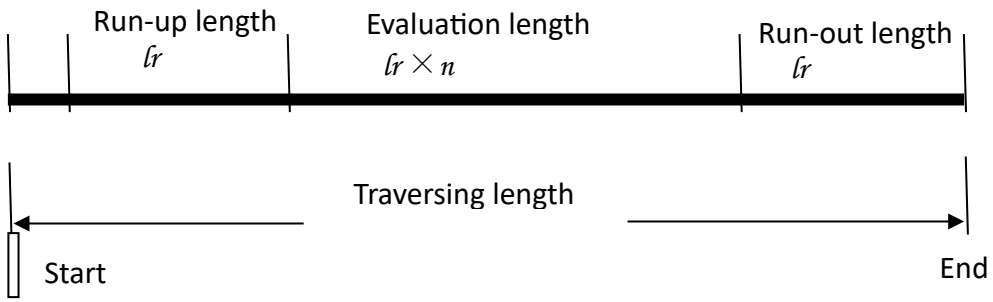
- **GAUSS filter**

Pre-travel
0.5mm



- **PC-RC filter**

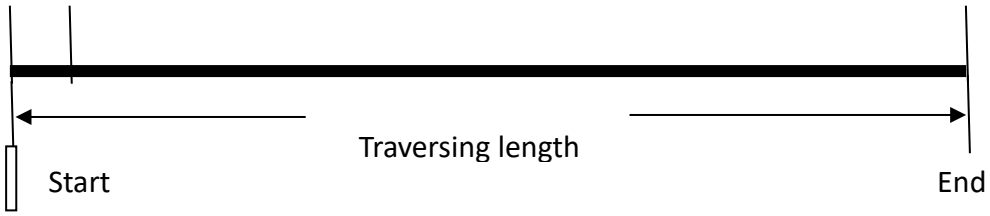
Pre-travel
0.5mm



- **D-P direct profile**

Pre-travel
0.5mm

Evaluation length
$\ell r \times n$

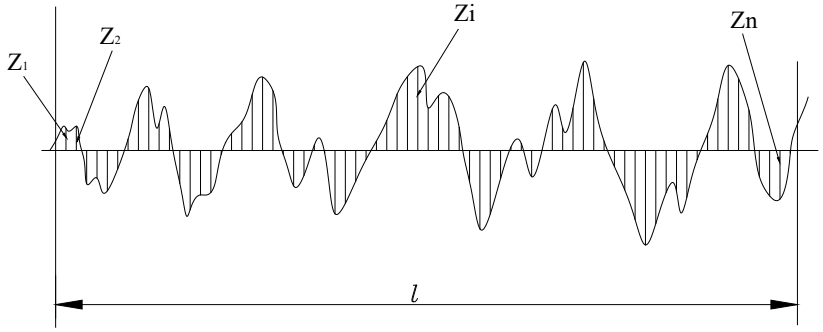


6.2 Parameter Definitions

6.2.1 Arithmetic Mean Deviation of the Profile Ra

Ra is the arithmetic mean of the absolute values of the profile deviation Z(x) from the mean line within the sampling length.

$$Ra = \frac{1}{l}\int_0^l |Z(x)|dx$$



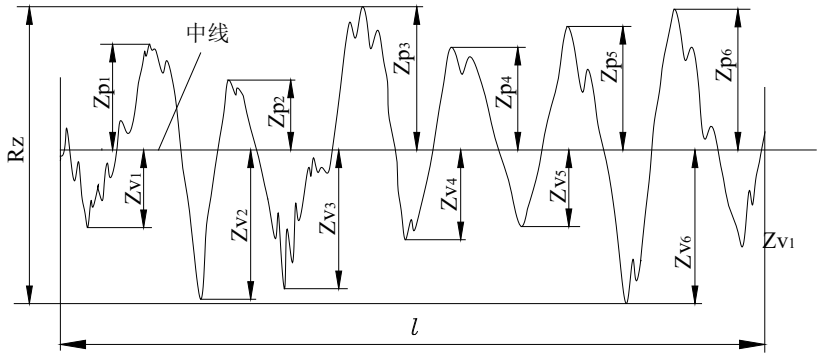
6.2.2 Root Mean Square Deviation of the Profile Rq

Rq is the square root of the arithmetic mean of the squares of the profile deviation Z(x) from its mean line within the sampling length.

$$Rq = \sqrt{\frac{1}{l}\int_0^l Z^2(x)dx}$$

6.2.3 Maximum Height of the Profile Rz

Rz is the sum of the height Zp of the highest profile peak above the mean line and the depth Zv of the deepest profile valley below the mean line within the sampling length.

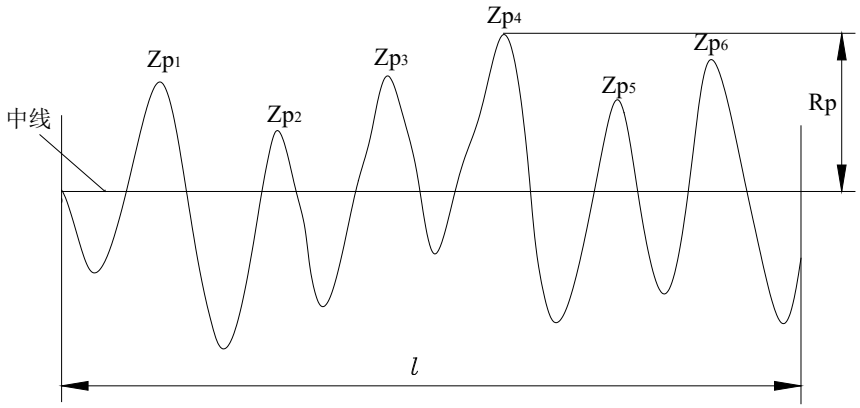


6.2.4 Total Peak-to-Valley Height Rt

Rt is the sum of the height of the highest peak Zp and the depth of the deepest valley Zv over the evaluation length.

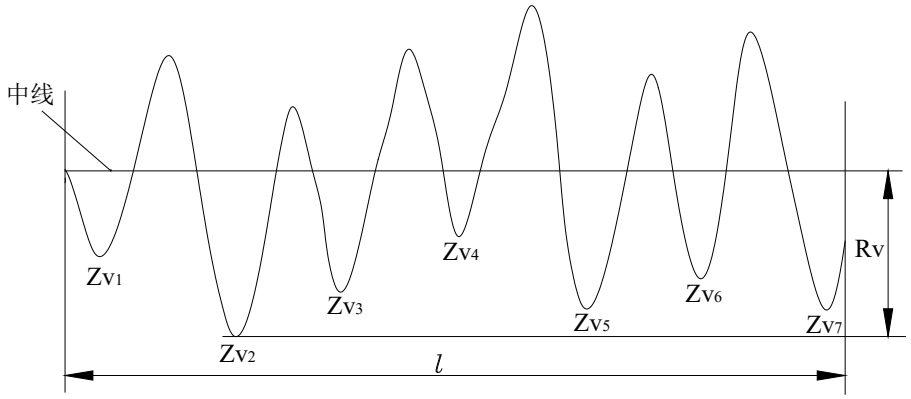
6.2.5 Maximum Profile Peak Height Rp

Rp is the height from the highest profile peak line to the mean line within the sampling length.



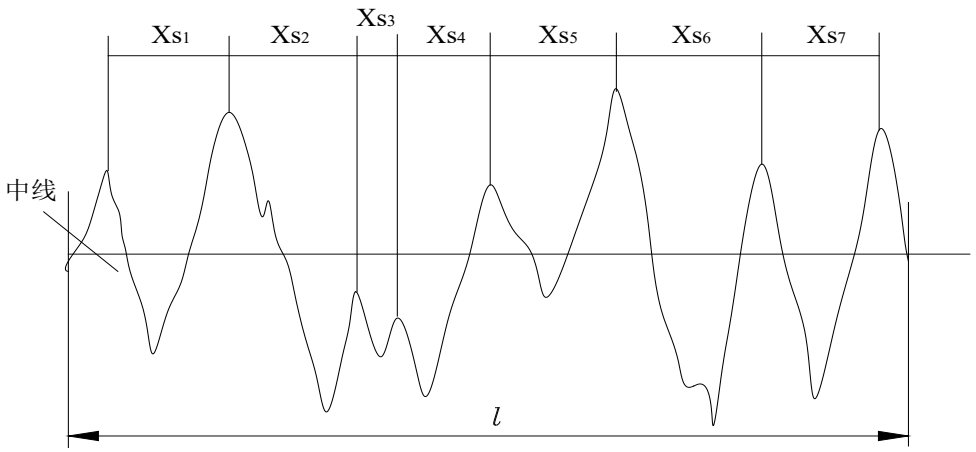
6.2.6 Maximum Profile Valley Depth Rv

Rv is the depth from the lowest profile valley line to the mean line within the sampling length.



6.2.7 Mean Spacing of Local Profile Peaks RS

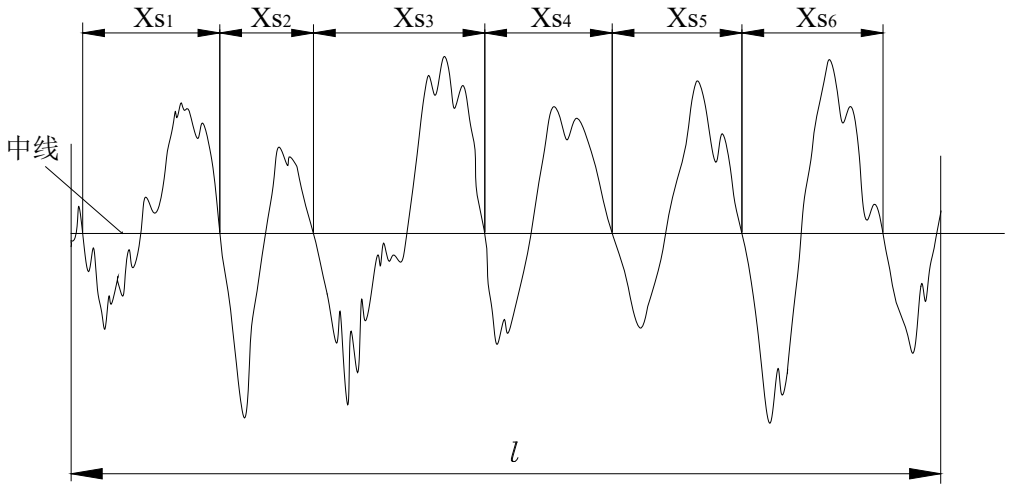
RS is the mean spacing of adjacent local profile peaks within the sampling length.



6.2.8 Mean Width of the Profile Elements RSm

RSm is the mean spacing between profile peaks at the mean line within the sampling length.

$$RSm = \frac{1}{n}\sum_{i=1}^{m} XSi$$



6.2.9 Ten-Point Height of Irregularities RzJIS

The sum of the mean height of the five highest profile peaks and the mean depth of the five deepest profile valleys, referred to the mean line within the sampling length.

$$RzJIS = \frac{1}{5}\sum_{i=1}^{5} Yp_i + \frac{1}{5}\sum_{i=1}^{5} Yv_i$$

6.2.10 Maximum Height of the Profile RyJIS

Corresponds to the Rz parameter (6.2.3).

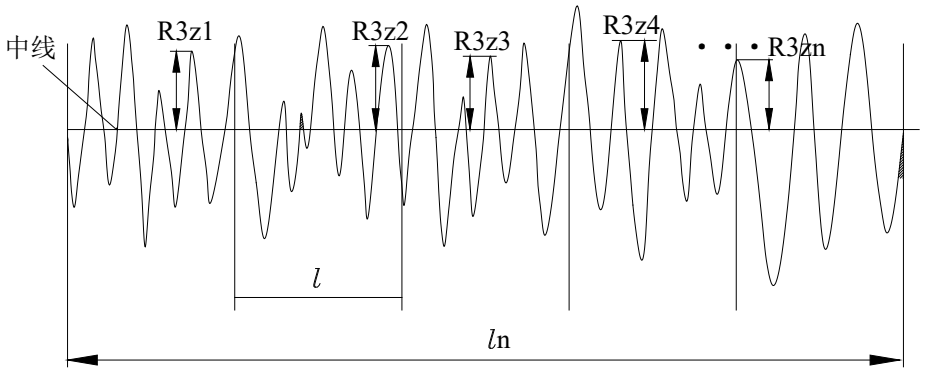
6.2.11 Skewness of the Profile RSk

RSk is the quotient of the mean value of the third power of the profile deviation (Yi) and the third power of Rq within the sampling length.

$$Rsk = \frac{1}{Rq^3}\left[\frac{1}{lr}\int_0^{lr} Z^3(x)dx\right]$$

6.2.12 Third Maximum Peak-to-Valley Height R3z

R3z is the mean value of the sum of the height of the third profile peak and the depth of the third profile valley of each sampling length over the evaluation length.

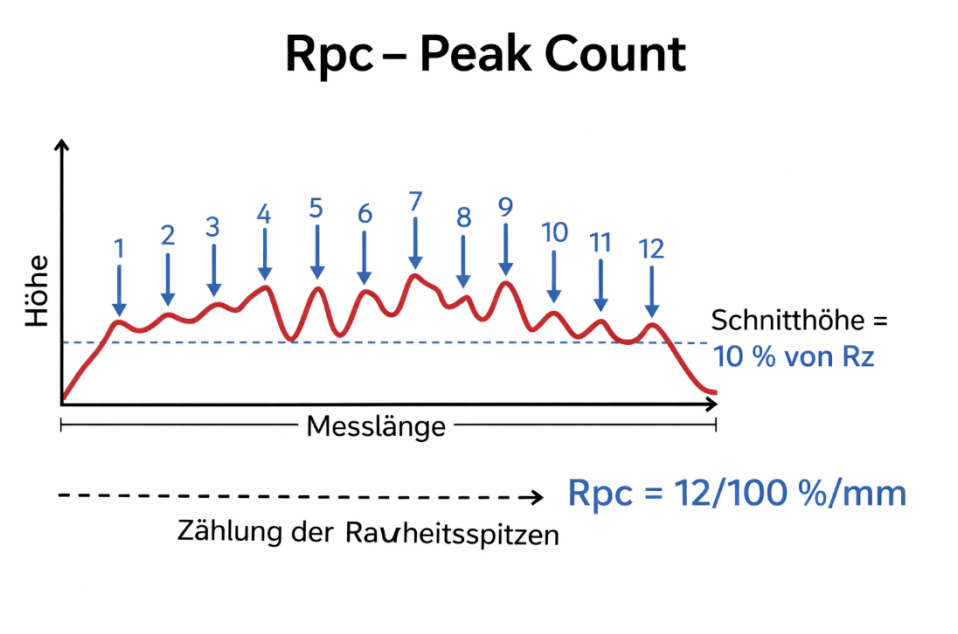


6.2.13 Rmax

Corresponds to the Rt parameter (6.2.4).

6.2.14 Peak Count Rpc

The number of roughness peaks per unit length that exceed a defined section level.

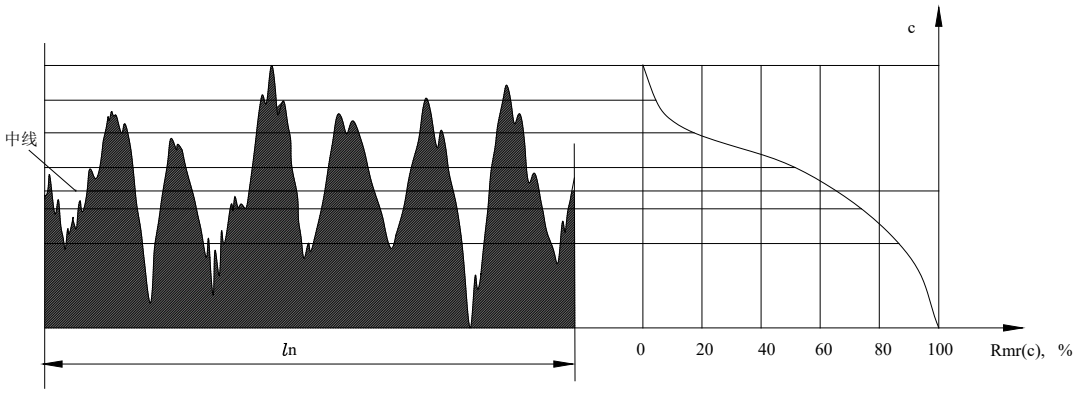


6.2.15 Material Ratio Curve of the Profile Rmr

The change in the material ratio as a function of the horizontal position and the relationship between the curves.

6.2.16 Material Ratio of the Profile Rmr(c)

Percentage of the measuring length that consists of material when the roughness profile is “cut off” at a certain section level c.



6.3 Recommended Sampling Lengths

Ra (μm)	Rz (μm)	Sampling length λc (mm)
＞5~10	＞20~40	2.5
＞2.5~5	＞10~20	
＞1.25~2.5	＞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

7 Standards

The SRTPro Plus roughness tester complies with national (DIN) and international (ISO, ASTM) standards and bears the CE mark.

- ISO 4287
- ANSI B46.1
- DIN 4768
- JIS B601

8 Environmental Protection and Disposal

In the interest of environmental protection, dispose of the instrument properly. Do not throw the instrument into household waste; instead, hand it in at a collection point for electronic waste or return it to your supplier.

Remove the battery beforehand and dispose of it properly at a collection container for batteries.

Packaging materials are raw materials too! Therefore return them to the material cycle.

Salu*Tron* Messtechnik GmbH
Dr.-Gottfried-Cremer-Allee 30/7 · D-50226 Frechen
Tel. +49 (0) 2234 9999960 · Fax. +49 (0) 2234 9999962
Email: info@salutron.de · www.salutron.de