

USER MANUAL

ROUGHNESS-TESTER

PCE-RT 1200/1200BT/2000/2000BT/2200

ENGLISH



User manuals in various languages (français, italiano, español, português, niederlands, türk, polski) can be found via our product search on:
www.pce-instruments.com

SAFETY NOTES

Please read this manual carefully and completely before you use the device for the first time. The device may only be used by qualified personnel and repaired by PCE Instruments personnel. Damage or injuries caused by non-observance of the manual are excluded from our liability and not covered by our warranty.

- » The device must only be used as described in this instruction manual. If used otherwise, this can cause dangerous situations for the user and damage to the meter.
- » The instrument may only be used if the environmental conditions (temperature, relative humidity, ...) are within the ranges stated in the technical specifications. Do not expose the device to extreme temperatures, direct sunlight, extreme humidity or moisture.
- » Do not expose the device to shocks or strong vibrations.
- » The case should only be opened by qualified PCE Instruments personnel.
- » Never use the instrument when your hands are wet.
- » You must not make any technical changes to the device.
- » The appliance should only be cleaned with a damp cloth. Use only pH-neutral cleaner, no abrasives or solvents.
- » The device must only be used with accessories from PCE Instruments or equivalent.
- » Before each use, inspect the case for visible damage. If any damage is visible, do not use the device.
- » The sensor is a sensitive device which needs protection and extra care. Please put the sensor back into the box after using it.
- » The device may also not be used in heavy dusty and, oily areas and strong magnetic fields.
- » Do not use the instrument in explosive atmospheres.
- » The measurement range as stated in the specifications must not be exceeded under any circumstances.
- » Non-observance of the safety notes can cause damage to the device and injuries to the user.

We do not assume liability for printing errors or any other mistakes in this manual.

We expressly point to our general guarantee terms which can be found in our general terms of business. If you have any questions please contact PCE Instruments. The contact details can be found at the end of this manual.

SPECIFICATIONS

Technical specifications of the PCE-RT 1200

Sensor	
Testing principle	Inductance Type
Measurement Range	0,002 ... 200 µm
Stylus tip radius	5 µm
Stylus tip material	Diamond
Maximum recommended static measuring force	4 mN (0.4 gf)
Conical stylus with spherical tip angle	90 °
Longitudinal guide head radius	45 mm
Standards	ANSI B46.1/ASME B46.1 (DIN EN ISO 4287)
Driving parameters	
Maximum driving distance	15 mm
Driving speed during measurement	sampling length = 0.25mm: Vt=0.135mm/s sampling length = 0.8mm: Vt=0.5mm/s sampling length = 2.5mm: Vt=1mm/s
Driving speed during retraction	V=1mm/s
Indication error	< ±10%
Indication repeatability	< 6%
Measurement range	
Ra	0.005 µm ... 16 µm
Rq	0.005 µm ... 16 µm
Rz	0.02 µm ... 200 µm
Rt	0.02 µm ... 200 µm

The PC software for all devices can be downloaded here:
https://www.pce-instruments.com/english/download-win_4.htm

Technical specifications of the PCE-RT 2000 / 2000BT

Sensor	
Testing principle	Inductance Type
Measurement Range	0,002 ... 200 µm
Stylus tip radius	5 µm
Stylus tip material	Diamond
Maximum recommended static measuring force	4 mN (0.4 gf)
Conical stylus with spherical tip angle	90 °
Longitudinal guide head radius	45 mm
Standards	ANSIB46.1/ASMEB46.1 (DIN EN ISO 4287)
Driving parameters	
Maximum driving distance	15 mm
Driving speed during measurement	sampling length = 0.25mm: Vt=0.135mm/s sampling length = 0.8mm: Vt=0.5mm/s sampling length = 2.5mm: Vt=1mm/s
Driving speed during retraction	V=1mm/s
Indication error	< ±10%
Indication repeatability	< 6%
Measurement range	
Ra	0.005 µm ... 16 µm
Rq	0.005 µm ... 16 µm
Rsm	5 µm ... 1000 µm
Rsk	-1 ... +1
Rz	0.02 µm ... 200 µm
Rt	0.02 µm ... 200 µm
Rp	0.02 µm ... 200 µm
Rv	0.02 µm ... 200 µm
Rc	0.05 µm ... 16 µm

Technical specifications of the PCE-RT 2200

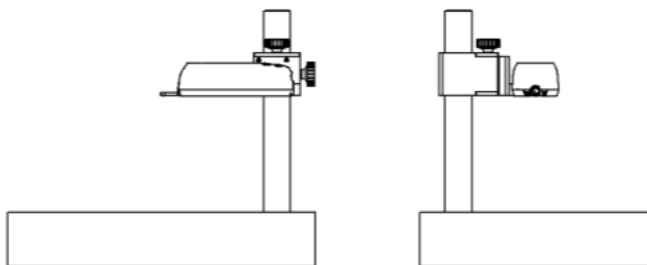
Sensor	
Testing principle	Inductance Type
Measurement Range	0,002 ... 200 µm
Stylus tip radius	5 µm
Stylus tip material	Diamond
Maximum recommended static measuring force	4 mN (0.4 gf)
Conical stylus with spherical tip angle	90 °
Longitudinal guide head radius	45 mm
Standards	ANSIB46.1/ASMEB46.1 (DIN EN ISO 4287)
Driving parameters	
Maximum driving distance	15 mm
Driving speed during measurement	sampling length = 0.25mm: Vt=0.135mm/s sampling length = 0.8mm: Vt=0.5mm/s sampling length = 2.5mm: Vt=1mm/s
Driving speed during retraction	V=1mm/s
Indication error	< ±10%
Indication repeatability	< 6%
Measurement range	
Ra	0.005 µm ... 16 µm
Rq	0.005 µm ... 16 µm
Rsm	5 µm ... 1000 µm
Rsk	-1 ... +1
Rz	0.02 µm ... 200 µm
Rt	0.02 µm ... 200 µm
Rp	0.02 µm ... 200 µm
Rv	0.02 µm ... 200 µm
Rc	0.05 µm ... 16 µm
Rmax	0.02 µm ... 200 µm
Ry(IIS)	0.02 µm ... 200 µm
Rz(IIS)	0.02 µm ... 200 µm

Measurement range	
Rp(ASME)	0.02 μm ... 200 μm
Rpm(ASME)	0.02 μm ... 200 μm
Rv(ASME)	0.02 μm ... 200 μm
R3z	0.02 μm ... 200 μm
R3zmax	0.02 μm ... 200 μm
Rz1max	0.02 μm ... 200 μm
Rmr(c)	0 ... 100 %
Rdc	0.02 μm ... 200 μm
Rmr	0 ... 100 %

Note: To view all measuring parameters, press the ENTER-key after making a measurement.

Measurement platform

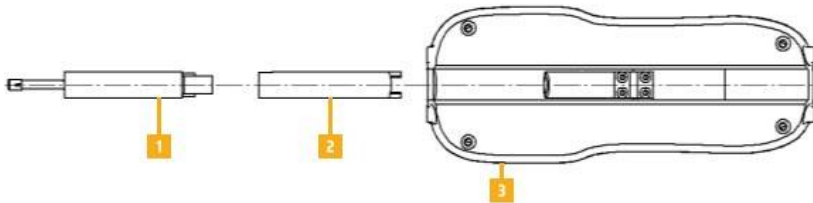
Use the measurement platform to easily adjust the position between the instrument and the workpiece to be measured. This ensures a more flexible and stable operation and creates a bigger use scope and measures the roughness on the surface of complex shape parts. When the platform is used the needle position can be adjusted more precisely and it measures more smoothly. It is suggested to use the platform when the Ra value is expected to be small.



Extension bar

Use the extension bar to increase the sensor depth of the workpiece inside. The length of the extension bar is 50 mm.

- 1 - Sensor
- 2 - Extension bar
- 3 - Host



SYSTEM DESCRIPTION

The roughness tester is suitable for laboratories and the production field. It is able to measure a variety of surface roughness of machined parts. Furthermore it can calculate the corresponding parameters according to the selected measurement conditions and in addition to that the measurement results are clearly shown on the OLED display as tables and graphics.

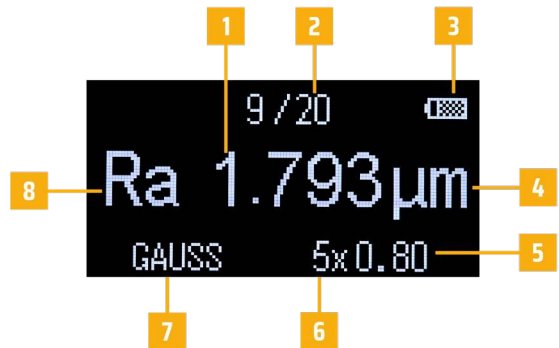


- | | |
|---------------|-------------------|
| 1 - Screen | 7 - USB Interface |
| 2 - Start key | 8 - Main switch |
| 3 - ESC key | 9 - Enter key |
| 4 - Up key | 10 - Left key |
| 5 - Power key | 11 - Up key |
| 6 - Right key | 12 - Menu key |

- 1 - Guide
- 2 - Stylus tip
- 3 - Main body
- 4 - Cover
- 5 - Plug



- 1 - Result
- 2 - Record number
- 3 - Battery condition
- 4 - Unit
- 5 - Sampling length
- 6 - Multiplied overall evaluation length
- 7 - GAUSS Filter
- 8 - Parameter



FUNCTION KEYS

Key	Name	Function
	Start key	Measurement will start
	Esc key	The menu will return to the upper level
	Up key	Cursor moves up
	Left key	Cursor moves to the left
	Power key	Device is switched on by entering boot mode, Device is switched off
	Right key	Cursor moves to the right
	Enter key	Confirm
	Down key	Cursor moves down
	Menu key	Menu is entered

GETTING STARTED

POWER SUPPLY

Power on

When the device is in standby mode, hit the POWER-key to start the instrument and enter the main menu.

Note: The battery switch has to be set to ON.

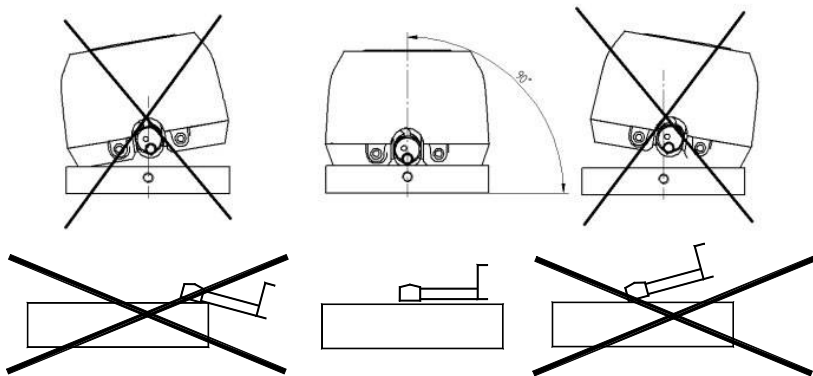
Power off

When the device is switched on, hit the POWER-key to put the device into standby mode.

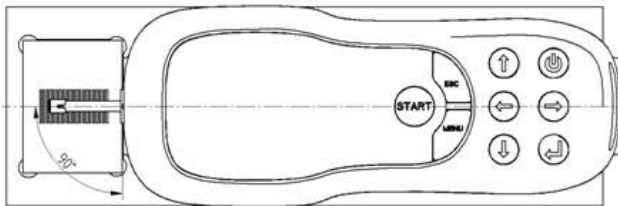
Note: If the instrument is not used for a longer period of time, please set the battery switch to OFF.

Preparation

- » Check the battery voltage
- » Clean the workpiece surface that needs to be tested
- » Connect the sensor to the host with reference to the graphic below
- » Make sure that the instrument correctly placed on the workpiece surface that needs to be tested



- » The sensor movement must be vertical to the tested surface



Attention! If measurements are not performed the correct way, the sensor and the device may suffer damage.

OPERATION

Measurement

By hitting the START-key the measurement will start in any menu item. The instrument will measure according to the current operation. After the measurement is finished, it will return to the main screen. If the measurement has to be cancelled, hit ESC-key

Data management

When the instrument shows the main screen, hit MENU-key to enter main menu. Choose the submenu Data. If this is done the display shows the data management. Use the UP or DOWN keys to either choose Test Data or Clear Data and confirm your choice by hitting the ENTER-key.

The point **Test Data** shows the gathered measurement data.

Clear Data will delete all measurement data.

Check measurement data

The measurement data can be observed in two different ways:

- » Main screen > Main menu > data management submenu > test data > press ENTER-key > single record all parameters submenu
- » Main screen > press ENTER-key > single record all parameters submenu

Original and filter curve

- » In order to select the measurements choose the desired set of data and hit ENTER.
- » Use the UP and DOWN key to change the curve magnification. Magnification can be set to: 1x, 2x, 3x, 4x, 5x, 10x, 20x, 30x, 40x and 50x. The user can view the curve which is demanded. By using the RIGHT or LEFT key the next graph can be selected. The magnification is default 1x.
- » Use UP or DOWN key to show the sampling lengths and the evaluation length.
- » Use ESC-key to return to the level above.

Stylus Position

Go to the main menu and then choose the submenu Function and select the point Stylus Position. Set the desired position. When this is done hit the ESC-key to return to the level above.

Bluetooth connection (PCE-RT 1200BT / 2000BT only)

To establish a Bluetooth connection with a mobile device, first go to the relevant menu.

» Main menu > Function > Bluetooth Config

Function	Description
Open Bluetooth for Print	Enables the Bluetooth connection and allows connection to a compatible Bluetooth printer.
Open Bluetooth for App	Enables the Bluetooth connection and allows connection to the free app.
Close Bluetooth	Disables the Bluetooth connection.

The free app for Android systems can be found directly at the Google Play Store:

PCE-RT xxxxBT series

<https://play.google.com/store/apps/details?id=com.pceinstruments.rtseries>

Note: This function is only available for PCE-RT 1200BT and PCE-RT 2000BT.

Automatic shutdown

- » Enter the main menu, select Function and go to the point **Time close**.
- » The automatic shutdown can be selected. The user can either deactivate the automatic shutdown or set the automatic shutdown to 1 minute, 3 minutes, 5 minutes, 10 minutes or 30 minutes.
- » Confirm your choice using the ENTER-key.
- » Use the ESC-key to return to the main menu.

Restore factory settings

- » In order to avoid wrong operation and deleting test data that shall not be deleted, the device double checks and asks for confirmation.
- » Enter the main menu, go to Function and go to the point **Reset default**
- » Hit the ESC-key to return to the higher level.
- » By hitting the LEFT-key you can choose the **YES** button. Confirm your choice by hitting the ENTER-key. Hit LEFT-key to choose the **NO** button and confirm your choice by pressing the ENTER-key. The memory will be cleared and no records will be left on the storage. The device will change to the main screen.

SETTINGS

Measurement settings

- » Enter the main menu and select **Config**
- » Use the UP or DOWN key to select the parameters that you want to change. You will be able to set the parameters, the sampling length and the evaluation length. The selected object will be highlighted black.
- » Use the ENTER-key to scroll through the configuration options.
- » Use the ESC-key to return to the main menu. The configuration options will automatically be saved.

Note: The following measurement parameters can be set:

- » PCE-RT 1200: Ra / Rq / Rz / Rt
- » PCE-RT 2000: Ra / Rq / Rsm / Rsk / Rz / Rt / Rp / Rv / Rc
- » PCE-RT 2200: Ra / Rq / Rsm / Rz / Rt / Rp / Rv / Rc

Note: To view all measuring parameters, press the ENTER-key after making a measurement.

- » The sampling length can be set to: 0,25 mm / 0,8 mm / 2,5 mm. 0,8 mm is set default.
- » The evaluation length can be set to: 1 / 2 / 3 / 4 / 5. 5 is set default.
- » The units can be set to: metric / inch. Metric is set default

Ways to modify measurement parameters

- » Go into the main menu, choose **Config** and use the ENTER-key to switch between the units.
- » Hit ESC-key to return to the main screen.
- » You can also change the settings when the main screen is shown. Simply use the LEFT and RIGHT keys to select the correct parameters and change them using the ENTER-key.

CALIBRATION

Result calibration

- » Enter the main menu, choose Function and choose **Result Correct**. Use the UP or DOWN key to set your desired value. Confirm your setting using the ENTER-key.
- » Hit ESC-key to return to the main menu.

Stylus correct

- » Enter the main menu and select Stylus Correct. Choose **YES** or **NO** in order to perform a correction of the stylus and confirm your choice using the ENTER-key. The correction is performed when **YES** is chosen and the device will then display the main screen again.

DISPOSAL

For the disposal of batteries in the EU, the (EU) 2023/1542 directive of the European Parliament applies. Due to the contained pollutants, batteries must not be disposed of as household waste. They must be given to collection points designed for that purpose. In order to comply with the EU directive 2012/19/EU we take our devices back. We either re-use them or give them to a recycling company which disposes of the devices in line with law. For countries outside the EU, batteries and devices should be disposed of in accordance with your local waste regulations. If you have any questions, please contact PCE Instruments.

PCE INSTRUMENTS CONTACT INFORMATION

Germany

PCE Deutschland GmbH
Im Langel 26
D-59872 Meschede
Deutschland
Tel.: +49 (0) 2903 976 99 0
Fax: +49 (0) 2903 976 99 29
info@pce-instruments.com
www.pce-instruments.com/deutsch

France

PCE Instruments France EURL
2, rue Georges Kuhnmmunch
67250 Soultz-sous-Forêts
France
Tel.: +33 (0) 972 35 37 17
Fax: +33 (0) 972 35 37 18
info@pce-france.fr
www.pce-instruments.com/french

Spain

PCE Ibérica S.L.
Calle Mula, 8
02500 Tobarra (Albacete)
España
Tel.: +34 967 543 548
info@pce-iberica.es
www.pce-instruments.com/espanol

United Kingdom

PCE Instruments UK Ltd
Trafford House
Chester Rd, Old Trafford
Manchester M32 0RS
United Kingdom
Tel: +44 (0) 161 464902 0
Fax: +44 (0) 161 464902 9
info@pce-instruments.co.uk
www.pce-instruments.com/english

Italy

PCE Italia s.r.l.
Via Pesciatina 878 / B-Interno 6
55010 Loc. Gragnano
Capannori (Lucca)
Italia
Telefono: +39 0583 975 114
Fax: +39 0583 974 824
info@pce-italia.it
www.pce-instruments.com/italiano

Turkey

PCE Teknik Cihazları Ltd.Şti.
Halkalı Merkez Mah.
Pehlivan Sok. No.6/C
34303 Küçükçekmece - İstanbul
Türkiye
Tel: 0212 471 11 47
Faks: 0212 705 53 93
info@pce-cihazlari.com.tr
www.pce-instruments.com/turkish

The Netherlands

PCE Brookhuis B.V.
Twentepoort West 17
7609 RD Almelo
Nederland
Telefoon: +31 (0)53 737 01 92
info@pcebenelux.nl
www.pce-instruments.com/dutch

United States of America

PCE Americas Inc.
1201 Jupiter Park Drive, Suite 8
Jupiter / Palm Beach
33458 FL
USA
Tel: +1 (561) 320-9162
Fax: +1 (561) 320-9176
info@pce-americas.com
www.pce-instruments.com/us

Denmark

PCE Instruments Denmark ApS
Birk Centerpark 40
7400 Herning
Denmark
Tel.: +45 70 30 53 08
kontakt@pce-instruments.com
www.pce-instruments.com/dansk



Subject to change without notice