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Manual
Test Device for Peel Tests PCE-PST 1

Version 1.1
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Contents

1 Introduction

Thank you for purchasing a PCE-PST 1 test device for peel tests from PCE Instruments.
The PCE-PST 1 was designed for performing peel tests in a 90 ° angle and for measuring forces up to 500 N. To do so, the PCE-PST 1 comes with a PCE-FB 500 force gauge which is mounted on a motor-powered slide unit. A claw mechanism, which is attached to the force sensor, grabs and holds the sample when performing a peel test. To start the test, you just have to press the start button. The slide unit starts to move and the claw mechanism automatically grabs the end of sample, while two guiding pulleys hold the rest of the sample in place. The movement of the slide unit now exerts a force on the sample which is recorded by the force gauge.
The internal memory of the device can store up to 6,400 readings. Additionally, the force gauge also comes with a slot for micro SD cards and an USB interface for transferring the data to a PC.

2 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. There is no warranty of damages or injuries caused by non-observance of the manual.

- The device may only be used in the approved temperature range. Avoid severe fluctuations in temperature as well as poor ventilation.
- Do not expose the equipment to water or water vapour. Do not touch it when your hands are wet to avoid damage of the internal precision components as this item is not waterproof.
- Avoid direct sunlight.
- Do not place the instrument close to a heater or similar equipment.
- Excessive shock and vibration should be avoided.
- Make sure not to expose the device to chemical materials or explosive gases.
- The case should only be opened by qualified personnel of PCE Instruments.
- The instrument should never be placed with the user interface facing an object (e.g. keyboard side on a table).
- You must not make any technical changes to the device.
- The device should only be cleaned with a damp cloth / use only pH-neutral cleaner. However, some parts like the plug and interface cannot be cleaned with a damp cloth.
- Clean the LC display after each use to avoid drying of dirt which can affect the device's appearance (scratches etc.) and functionality negatively. Before cleaning, switch off the device.
- If the product emits smoke, sparks, strange noises or odours, please switch it off immediately and unplug it.
- The device may only be used with PCE accessories or equivalent.
- Make sure you use the proper mains adaptors for the force gauge and the test stand, as they differ in current. Using the wrong mains adaptor can cause damage to the devices.

This manual is published by PCE Instruments without any guarantee.

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.

3 Specification

3.1 Technical specifications

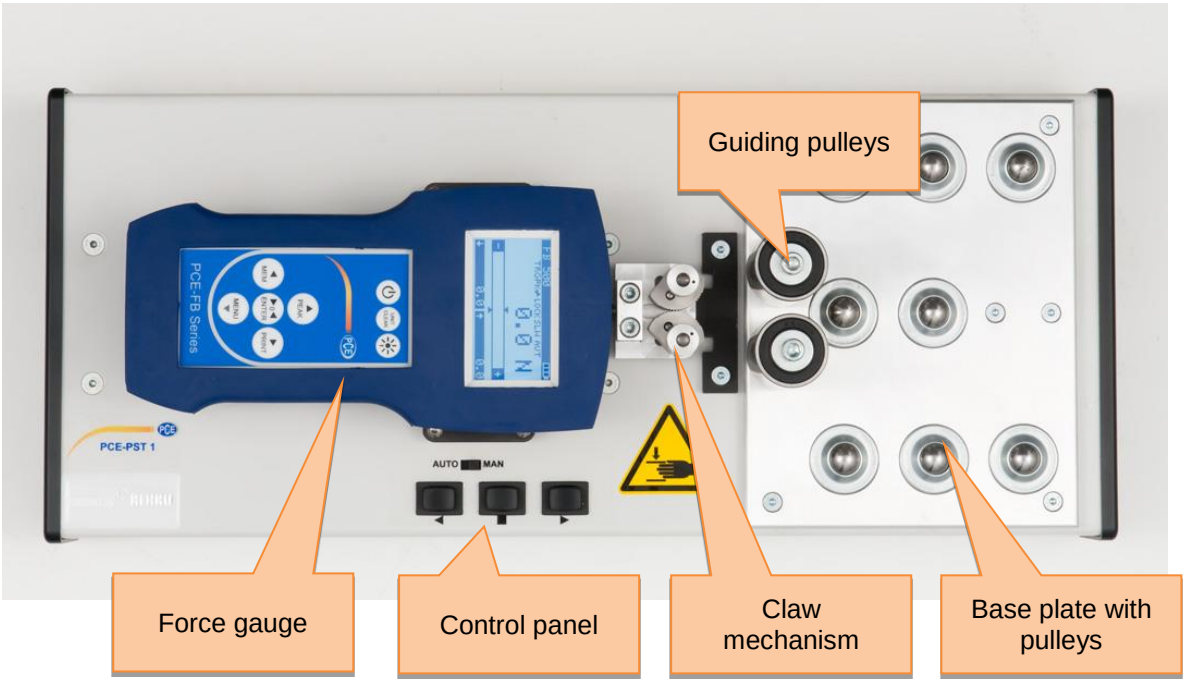
Test stand	
Measuring path	100 mm
Travelling distance	150 mm
Speed	0.3 m/min
Force gauge	
Measuring range	500 N
Resolution	0.1 N
Accuracy	±0.1 % of measuring range
Local gravity factor	manually adjustable or via GPS data
Trigger force for staring the measurement	20 N
Measuring units	N, g, lb, oz, kg, lbf, ozf
Sampling rate	10 samples / sec. Or 40 samples / sec.
Measuring functions	Peak (Min/Max) Threshold values Real-time measurements with PC software
Display	Graphic display 61 x 34 mm Automatic display orientation Backlight
Languages	German, English, Spanish
Memory	Internal memory: Up to 6,400 readings Micro SD card slot
Interfaces	RS-232C 9 pins USB
Software	PC Software included in the package
General specifications	
Operating conditions	-10 … +40 °C
Power supply	Test stand: mains adaptor 230V/12V, 5.0 A Force gauge: mains adaptor 230V/12V, 1.2 A 4 x NiMH batteries, 2700 mAh
Dimensions	490 x 210 x 150 mm
Weight	approx. 9.2 kg

3.2 Delivery contents

1 x test stand
1 x force gauge
1 x mains adaptor test stand
1 x mains adaptor force gauge
4 x NiMH batteries
1 x PC software
1 x carrying case
1 x instruction manual

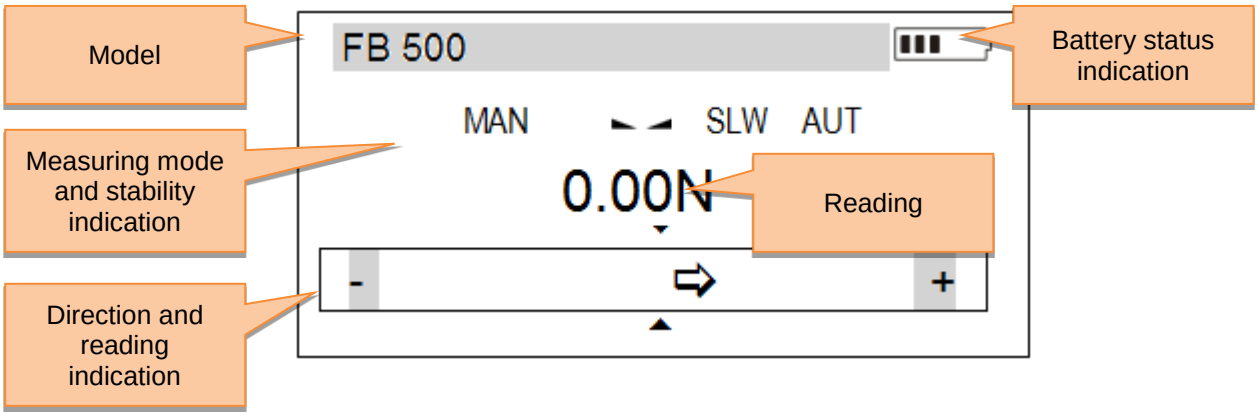
4 System description

4.1 Composition and components



4.2 Display

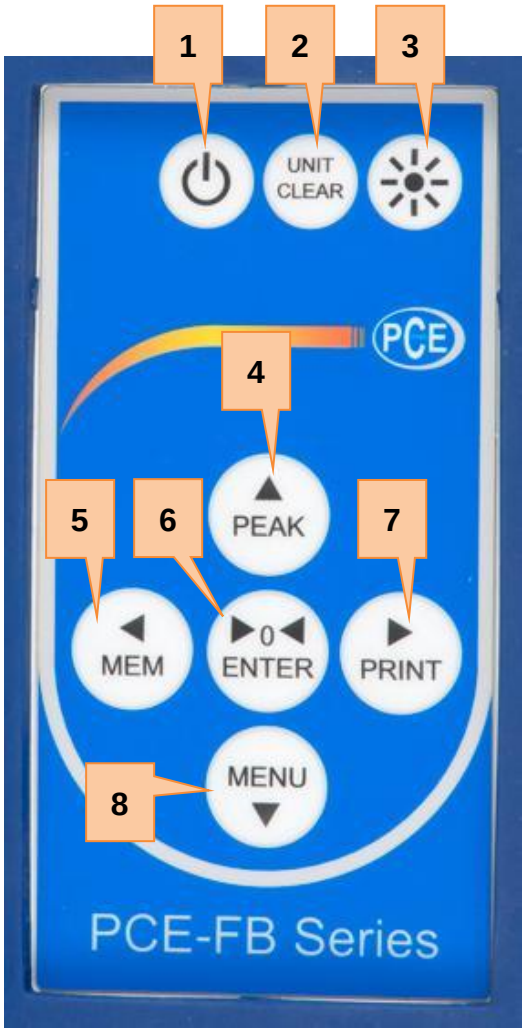
The display is located on the force gauge. The most important elements are described on the following image.



Indication	Meaning
MIN OK MAX	Reading is too low (MIN) Reading is alright (OK) Reading is too high (MAX)
TRG ACQ	Peel test mode Normal measuring mode
◣◢ LOCK	Reading is stable PEAK indication is active
PK↑/PK↓	Min or max value is displayed
SLW FST	Slow measuring mode Fast measuring mode
AUT	Auto-zero is active
SD	microSD card is installed

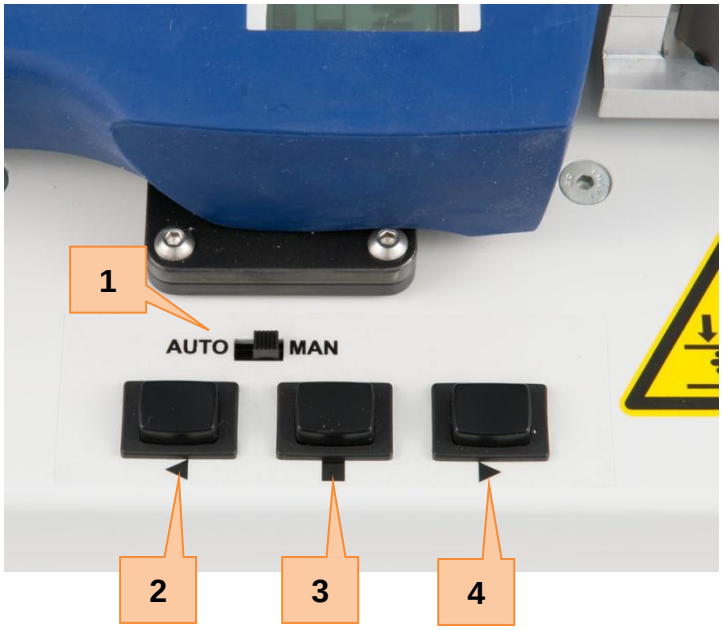
4.3 Controls

4.3.1 Force gauge



No.	Name	Function
1	ON/OFF	Turn the device on/off
2	UNIT/CLEAR	• **Main screen:** Change the measuring unit • **Menu:** cancel/back
3	BACKLIGHT	Turn the backlight on/off
4	PEAK ▲	• **Main screen:** Show peak values • **Menu:** Move cursor up • **Input field:** Increase current figure by 1
5	MEM ◄	• **Main screen:** Switch between peel test mode and the normal measuring mode • **Menu:** Move selection to the left or back/cancel • **Input field:** Move 1 figure to the left
6	ENTER ►0◄	• **Main screen:** Zeroing • **Menu:** Confirm selection/input
7	PRINT ►	• **Main screen:** Send reading to RS-232C interface • **Menu:** Move selection to the right or confirm selection • **Input field:** Move 1 figure to the right
8	MENU ▼	• **Main screen:** Open the menu screen • **Menu:** Move cursor down • **Input field:** Decrease current figure by 1

4.3.2 Test stand

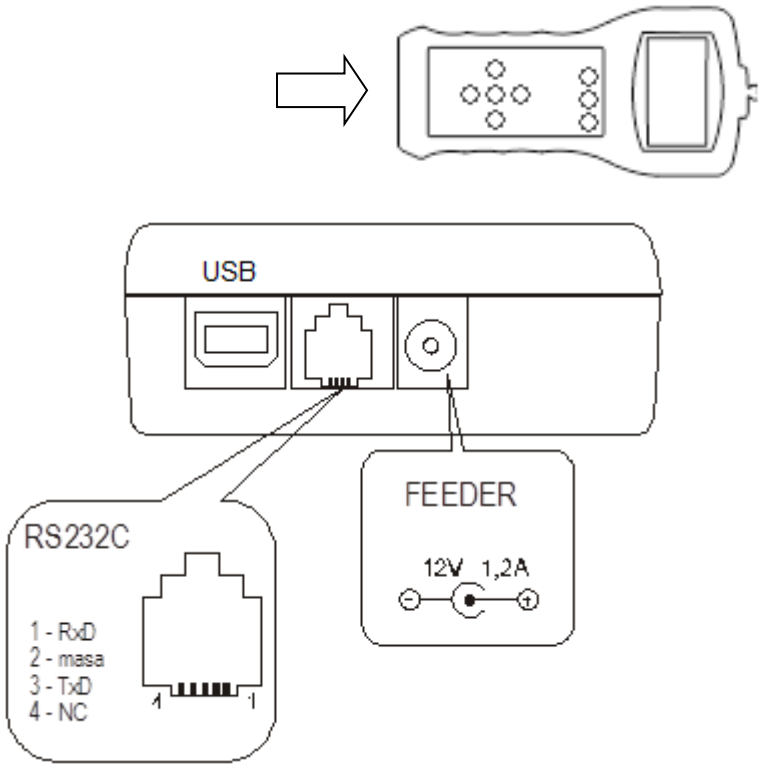


No.	Description	Function
1	Selector switch automatic/manual	Choose between manual and automatic control of the slide unit's movement (to the left)
2	Start button	• **Automatic:** Start the automatic movement of the slide unit to the left. The slide unit moves across the whole travelling distance. • **Manual:** The slide unit moves to the left as long as the button is pressed.
3	Stop button	Stop the movement of the slide unit when you have selected the automatic mode.
4	Back button	Move the slide unit to the right. The slide unit moves as long as the button is pressed.

4.4 Connectors

4.4.1 Force gauge

The connectors of the force gauge are located at the bottom side of the device (during normal use of the PCE-PST 1, this is on the left side).



On the bottom of the forge gauge you can find an USB and a RS-232C interface, as well as a connector for power supply.

Description of the data transmission protocol (USB, RS-232C) when working with a computer (LonG)

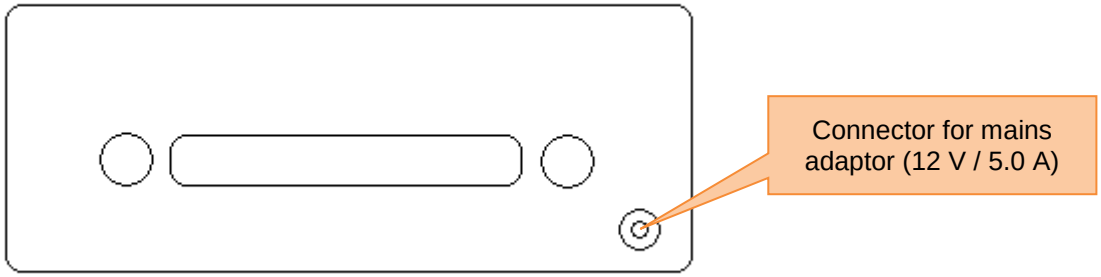
The force gauge transmits the data as follows (8 bits, 1 stop, no parity, 4,800 bps):
Computer→gauge: Initiating signal S I CR LF (53 h 49 h 0 Dh 0 Ah)
Gauge→computer: Gauge indication according to the following format (16 bytes):

Description of individual bytes:

Byte	1	- "-" or space
Byte	2	- space
Byte	3-4	- digit or space
Byte	5-9	- digit, comma or space
Byte	10	- digit
Byte	11	- space
Byte	12	- k, 1, c, p, or space
Byte	13	- g, b, t, c, or %
Byte	14	- space
Byte	15	- CR
Byte	16	- LF

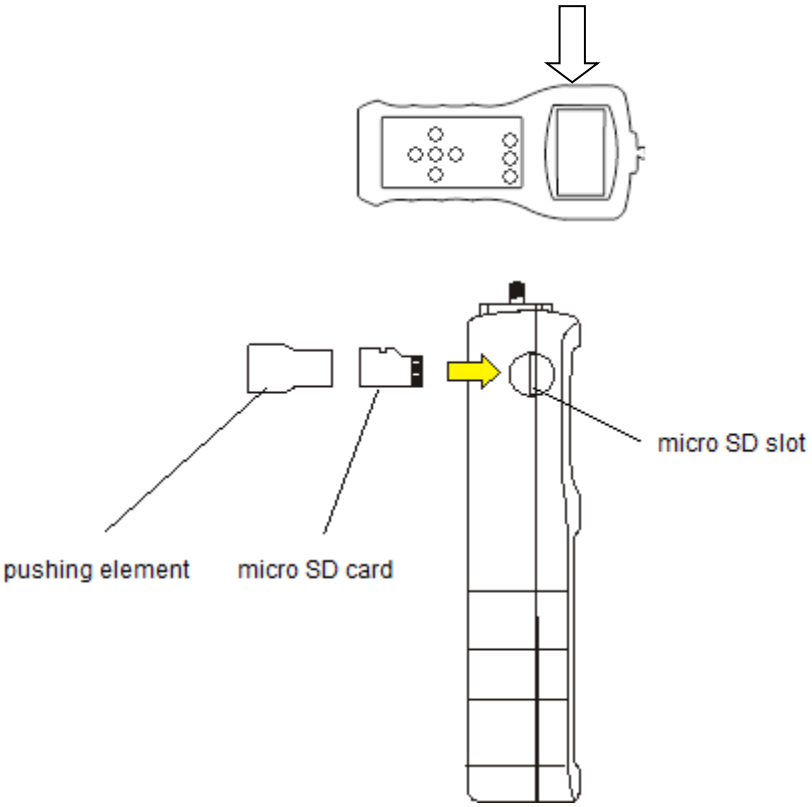
4.4.2 Test stand

The connector for the power supply is located on the left side of the device (when standing in front of the control panel).



4.5 Memory

The recorded data is stored automatically to the volatile memory (RAM) of the force gauge. When you turn off the device, the data are lost. The force gauge also has a non-volatile EEPROM memory, where the data can be stored as well, if desired. The data are preserved there, even after rebooting.
Another possibility is using a microSD card. For this purpose, the force gauge has a microSD card slot which is located at the left side of the device (during normal use of the PCE-PST 1, this is on the top side of the force gauge).



To insert a microSD card, turn off the device and put the card in the slot. Use the pushing element to push the SD card in, until it snaps into place. Now turn on the device. An SD symbol should appear in the display. To remove the SD card, turn off the device once again and use the pushing element to push the card further in, until the holding mechanism is released.

5 Operation

5.1 Getting started

To get started, follow these steps:

1. Charge the force gauge by using its mains adaptor (12 V / 1.2 A). Connect the mains adaptor of the test stand (12 V / 5.0 A) to the test stand.
   Note: It is recommended to operate the force gauge without the mains adaptor, when performing a measurement. This prevents the distortion of the readings and jamming of the cable.
2. Switch the test stand into manual mode and use the start button to move the slide unit in a position in which the claw mechanism is closed.
3. Now, turn on the force gauge. It will perform a zero calibration. If the calibration was successful, you should see the following screen:

Here you can set the material thickness and the unit in which it is displayed. Select the desired option by using the „PEAK ▲“ and „MENU ▼“ keys and press „ENTER ►0◄“. To change the unit, use the „MEM ◄“ and „PRINT ►“ keys. To change the thickness, select a digit by using „MEM ◄“ und „PRINT ►“ and increase or decrease it by using „PEAK ▲“ and „MENU ▼“. Press „ENTER ►0◄“ afterwards to confirm.

Once you have adjusted the settings to your needs, select “Exit” and press „ENTER ►0◄“. Now you get to the following screen:

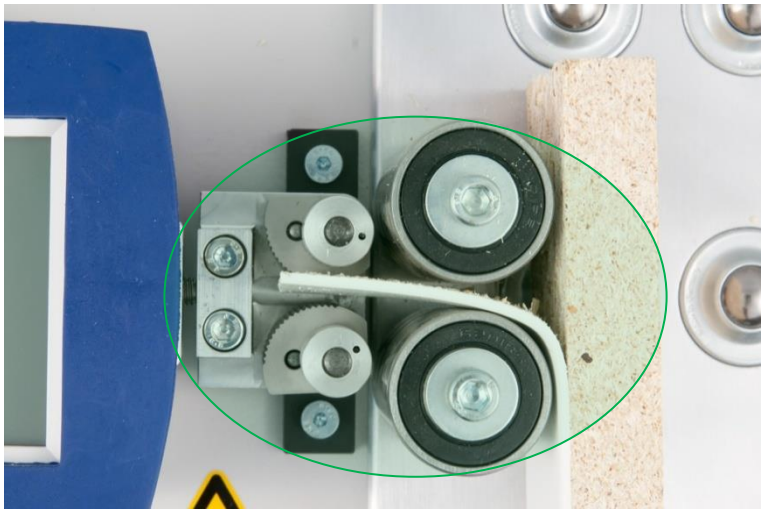
4. Next, move the slide unit back to its starting position (in which the claw mechanism is opened) by using the back button on the test stand. You can now perform a peel test.

5.2 Performing a test

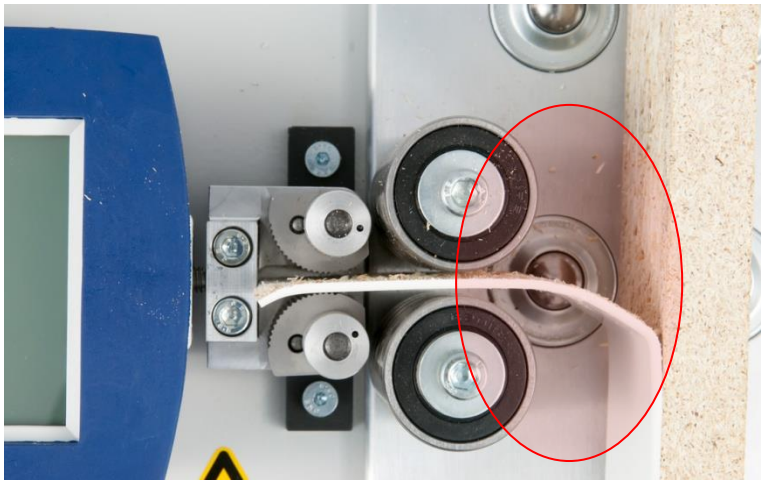
To perform a peel test, follow these steps:

1. Follow the steps in chapter 5.1.
2. Make sure that the slide unit is in its starting position and that the claw mechanism is opened.
3. Prepare the sample by peeling off an approx. 6 cm long stripe. Preferably bend the stripe in a 90 °C angle.

4. Insert the sample into the PCE-PST 1 as seen in the following image. Make sure the peeled-off stripe is not too short or too long.



The measurement can be started. The sample was inserted correctly.



The measurement cannot be started. The sample is too long.

When the sample is inserted correctly, you can start the measurement procedure.

5. Press the MEM button on the force gauge. A “TRG” indication should now appear in the display.
Note: the following settings are set by default for peel tests:

Mode:	*automatic*
Quantity:	*34*
Trigger:	*20 N*
Delay at	*trigg.*
Time delay	*0.0 s*
Record	*R/-*
Autosave	*off*

6. Switch the test stand into automatic or manual mode. In automatic mode, press the start button to start the peel test. In manual mode, press and hold the start button.
   Note: Make sure that the claw mechanism grabs the sample correctly. If all settings are correct and the measuring does not start, the trigger force has not been reached.

7. The slide unit automatically stops in the ending position. If forces of more than 500 N occur during the peel test, the slide unit will stop as well.

8. Now, you can read the measuring results in the display of the force gauge.

9. To move the slide unit back into its starting position, press and hold the back button on the test stand.
   Note: During this procedure, the claw mechanism opens. Hold the sample to prevent it from falling out.

To start another measurement, you first have to delete the readings from the volatile memory. This option (“MEM DELETE”) is selected by default in the statistics screen. Press “ENTER ►0◄” to clear the volatile memory.
If you want to save the data first, select “SAVE” to save the data to the EEPROM memory or to the SD card. Press “PRINT” to print the data via a printer.
Use the “MEM ◄” and “PRINT ►” for selection (respectively “PEAK ▲” and “MENU ▼” when choosing the memory location) and press ”ENTER ►0◄” to confirm.

6 Settings

Press the “MENU ▼” button to open the settings menu. Here you can choose between the following options:

1. **Measurement**
2. **Memory**
3. **Configuration**
4. **Exit**

To exit the menu, press the “UNIT/CLEAR” or “MEM ◄” button or select “Exit” and confirm by pressing ”ENTER ►0◄”.

6.1 Measurement

Select “Measurement” to open the measurement settings. Here you can choose between the following settings:

1. **Speed**
2. **Unit**
3. **Auto-zeroing**
4. **Threshold**
5. **Direction**
6. **Peak**
7. **Exit**

6.1.1 Speed

Here you can change the sampling rate. You can choose between the following settings:

- Slow / 10 Hz
- Fast / 40 Hz

Select the desired option and confirm by pressing ”ENTER ►0◄”.

6.1.2 Unit

Here you can select the measuring unit which is shown on the main screen and the statistics screen. You can choose between N, kgf, lbf, ozf, kg, lb and oz. Select the unit you want to use and confirm by pressing ”ENTER ►0◄”.

6.1.3 Auto-zeroing

Here you can change the settings of the auto-zeroing function.

1. **Status**: *ON/OFF* – turn on/off auto-zeroing
2. **Range**: Enter the range of auto-zeroing as a multiple of the readability d.
3. **Art. zero**: *SET/OFF*

6.1.4 Threshold

Here you can set threshold data and turn on/off the threshold function. You can change the following options:

1. **Status**: *ON/OFF* – Activate/deactivate the threshold function.
2. **MIN**: Set the minimum threshold value. Enter a force.
3. **MAX**: Set the maximum threshold level. Enter a force.
4. **ZERO**: Set the zero signalling threshold. Enter a force.
5. **Output**: *OFF/MODE1/MODE2* – Select if the force gauge emits a signal, once a threshold level is exceeded. MODE1 emits a short signal if the reading falls below the MIN threshold value and a long signal when the reading exceeds the MAX threshold value. MODE2 emits an interrupted signal as long as the reading is lower than the MIN threshold value and a continuous signal as long as the reading is higher than the MAX threshold value.
   Note: This option is only relevant in combination with an optional signal output.
6. **Alarm**: *OFF/MODE1/MODE2* – Select if the device emits an acoustic alarm signal, once a threshold value is exceeded. MODE1 emits a short signal if the reading falls below the MIN threshold value and a long signal when the reading exceeds the MAX threshold value. MODE2 emits an interrupted signal as long as the reading is lower than the MIN threshold value and a continuous signal as long as the reading is higher than the MAX threshold value.
7. **Exit**

If you have set and activated a threshold value, the display shows the current state (MIN/OK/MAX) in the top left side of the main screen.

6.1.5 Direction

Here you can select the direction of the force measurement. You can choose from normal (tensile forces) and reverse (compressive forces).
Note: To be able to perform peel tests, normal (tensile force) has to be selected.

6.1.6 PEAK

Here you can adjust settings of the peak function on/off. You can select the following options:

1. **AutoMEM**: *ON/OFF* – Turn on/off automatic saving of peak values.
2. **Minimum**: Determine from what value on a reading is recorded as a peak value.

6.2 Memory

Select “Memory” to open the memory settings. Here you have the following options:

1. **Statistics**
2. **Settings**
3. **Exit**

6.2.1 Statistics

Here you can view the stored readings and ratios, such as sum, average and standard deviation. In addition, you have the following options:

1. **Print**: Send the stored readings to a printer via the RS-232C interface.
2. **Histogram**: View the data in a histogram.
3. **Chart**: View the data in a chart.
4. **Save**: Save the readings to the EEPROM memory or to the SD card.
5. **Load**: Load readings from the EEPROM memory or from the SD card.
6. **Reset**: Delete all data from the volatile memory.
7. **Delete**: Delete all data from the EEPROM memory or from the SD card.
8. **Exit**

6.2.2 Settings

Here you can adjust the settings of the memory function. You have the following options:

1. **Mode**: *MANUAL/AUTO* – Automatic or manual measuring mode.
2. **Quantity**: Enter the quantity of readings to be saved in automatic measuring mode (max. 6,400).
3. **Smp. time**: Adjust the sampling rate.
4. **Trigger**: Enter the force (in N) which triggers data recording.
5. **Delay at**: *trigg./start* – Choose if the recording is delayed from the beginning on or when it is triggered.
6. **Time del.**: Enter the time delay.
7. **Record**: *R/- / R/D&T* – Choose if the readings are stored with the current date and time (R/D&T) or without Date and time (R/-).
8. **Autosave**: *OFF/EEPROM/SDCARD* – Choose if the readings are automatically stored to the EEPROM memory or to the SD card or turn off the auto save function.
9. **SD card**: Set the folder and file name for saving data to the SD card.

Note: The following settings are set by default for performing peel tests.

Mode:	*automatic*
Quantity:	*34*
Smp. time	*0.5 s*
Trigger:	*20 N*
Delay at:	*trigg.*
Time del.:	*0.0 s*
Record:	*R/-*
Autosave:	*off*

6.3 Configuration

Select “Configuration” to open the configuration settings. Here you have the following options:

1. **Interface**
2. **Calibration**
3. **Info**
4. **Time & date**
5. **LCD settings**
6. **Language**
7. **Printout**
8. **Keyboard**
9. **Auto-Off**
10. **Battery**
11. **External input**
12. **Firmware Update**
13. **Defaults**
14. **Exit**

6.3.1 Interface

Here you can configure the USB and RS-232 interfaces. You have the following options:

1. **RS-232C**: Here you can set the baud rate, bits, parity and the transmission method of the RS-232 interface.
2. **USB**: Here you can set the baud rate, bits, parity and the transmission method of the USB interface.
3. **Exit**

6.3.2 Calibration

If you have any questions, please contact our personnel.

6.3.3 Info

Here you can view information about the measuring device, such as type, measuring range, serial number or production date.

6.3.4 Time & date

Here you can adjust the date and time settings. You have the following options:

1. **Time**: Here you can adjust the internal clock.
2. **Date**: Here you can adjust the date settings.
3. **PIN**: Here you set a 4 figure PIN code.
4. **Format**: 12H/24H – Choose if the time is shown in 12 h or 24 h format.
5. **Exit**

6.3.5 LCD settings

Here you can adjust the LCD settings. You have the following options:

1. **Contrast**: Adjust the display contrast.
2. **Backlig.** *ON/OFF/ECO/BAT* – Turn on permanent backlight (ON). Turn off the backlight (OFF). Press the backlight key to activate backlight (ECO). The backlight is turned off after 30 seconds (BAT).
3. **Direct.**: *AUTO/UP/DOWN* – Choose the orientation of the display .
4. **LCD time**: *ON/OFF* – Choose if date and time are shown in the main screen.
5. **Exit**

6.3.6 Language

Here you can select the menu language. You have the following options:

1. **Language**: You can choose: Polish (PL), Spanish (ESP), German (DE) and English (ENG).
2. **Exit**

6.3.7 Printout

Here you can adjust the information which is transmitted to the printer. Select the desired information and press ”ENTER ►0◄” to activate it. Now press “PRINT ►” to get to the input filed. Here you can select letters and numbers by using “PEAK ▲” and “MENU ▼”. Press “PRINT ►” to get to the next digit. Pressing ”ENTER ►0◄” confirms the entry.
You have the following options:

1. **Heading**: Activate/deactivate the heading.
2. **Date**: Activate/deactivate the date.
3. **Time**: Activate/deactivate the time.
4. **ID1**: Text element 1 for up to 20 characters.
5. **ID2**: Text element 2 for up to 20 characters.
6. **ID3**: Text element 3 for up to 20 characters.
7. **Number**: Activate/deactivate the number-
8. **Signature**: Activate/deactivate the signature.

6.3.8 Keyboard

You have the following options:

1. **BEEP**: *ON/OFF* – Select if pressing a button triggers a sound.
2. **Exit**

6.3.9 Auto Power Off

Here you can configure the Automatic Power Off function. You have the following options:

1. **Status**: *ON/OFF/BAT* – Turn the function on/off or set it to Automatic Power Off after 5 min (BAT).
2. **Exit**

6.3.10 Battery

Here you have the following options:

1. **Charging**: *ON/OFF* – Select if the batteries are recharged when using the mains adaptor.
   Note: When using batteries which are not rechargeable, you have to deactivate this function.
2. **Level**: Here you can see an indication of the battery status.
3. **Exit**

6.3.11 External input

This is only relevant in combination with an optional external input. For more information, please contact our personnel.

6.3.12 Firmware update

The PCE-PST 1 has a special firmware for performing peel tests. Please DO NOT update the firmware. For more information, please contact our personnel.

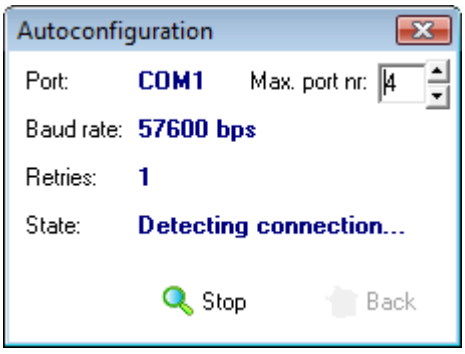
6.3.13 Defaults

Here you can reset the device to default settings. To do so, select “YES” and confirm by pressing ”ENTER ►0◄”.

7 Software

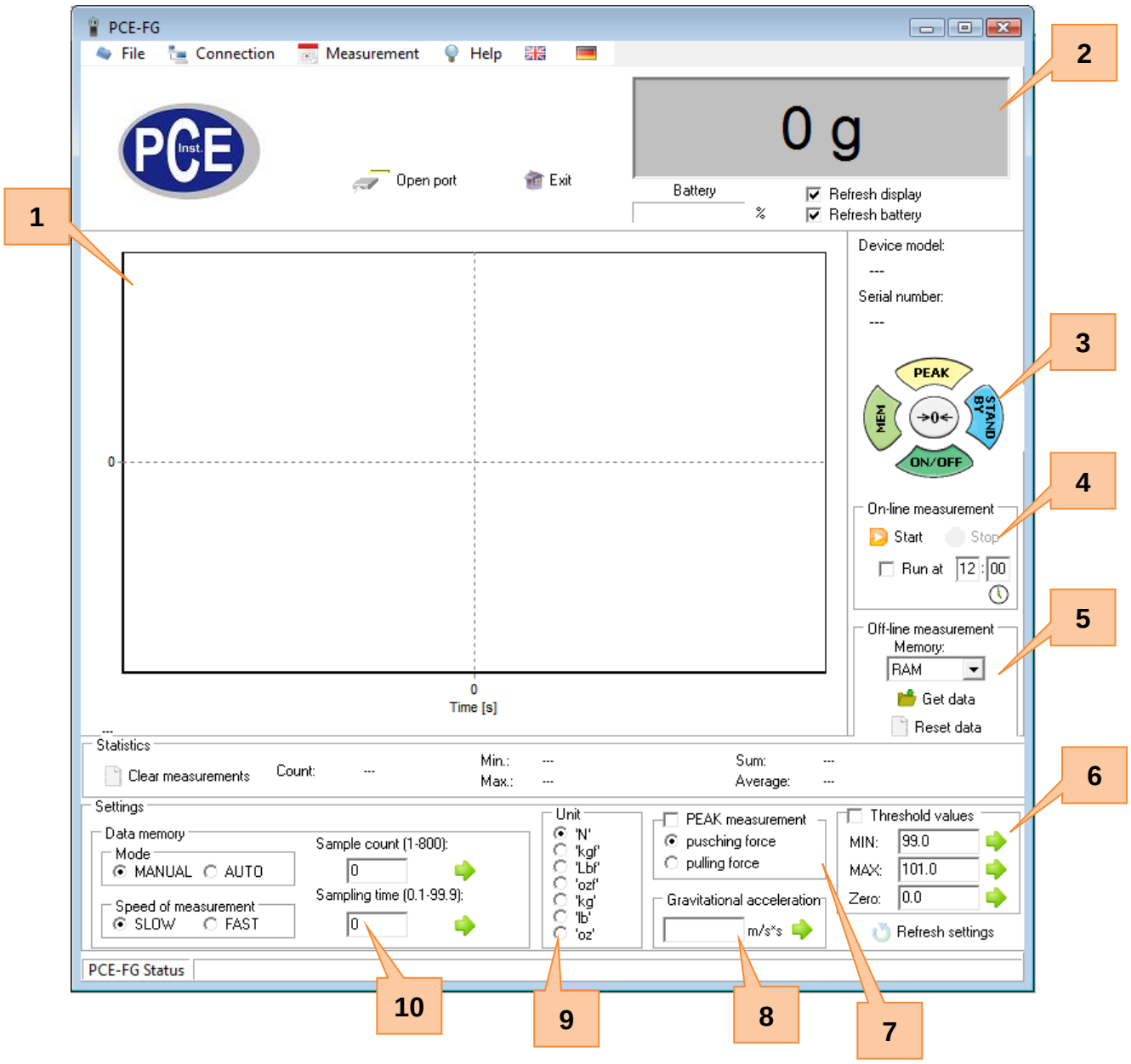
The PCE-PST 1 comes with the software “PCE-FG” which can be used to record and analyse the readings on a PC. To do so, follow these steps:

1. Install the software on your PC.
2. Connect the force gauge to the PC via the USB or RS-232 interface.
3. Start the software. The automatic detection should start shortly after:



Note: If the automatic detection does not start, select “Connection” in the menu bar and click on “detect”. You also can set up the COM port manually.

4. Now you get to the main screen of the software:



No.	Name	Function
1	Live graph	Here you can see the readings from the force gauge in real-time as a graph.
2	Current value	Here you can see the current reading.
3	Remote control	Here you can control some functions of the force gauge remotely.
4	On-line measurement	Here you can start a measurement with one click. Additionally, you can set up a time-based measurement.
5	Off-line measurement	Here you can choose from which memory the data are to be loaded.
6	Threshold values	Here you can set up threshold levels.
7	PEAK measurement	Here you can activate the PEAK function.
8	Gravitational acceleration	Here you can adjust the gravitational acceleration.
9	Unit	Here you can choose the measuring unit.
10	Data memory	Here you can adjust the memory settings and the sampling rate.

8 Contact

If you have any questions about our range of products or measuring instruments please contact PCE Instruments.

8.1 PCE Instruments UK

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