User Manual

Force Gauge PCE-FM 200

Last change: 26 July 2018 v1. 0

Contents

1   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.
- 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.

2   Specifications

Measuring range	0 ... 200 N
Calibration	0.1 N
Pressure calibration	1 Mpa
Load cell	integrated load cell with M6 connection
Measuring range	1 ... 100 % of the full scale
Measurement accuracy	±0.5 %
Units	n, kg, lb
Display	LCD
Operating temperature	+10 ... +30 °C / +50 ... +86 °F
Relative humidity	15 ... 80 %
Working conditions	the device must not be located near sources of vibration or corrosive substances
Weight	1 kg / 2.2 lb

3   Important information before use

- Before the impact test, wear mask and gloves; avoiding personal injury in case of object splash.
- Do not use damaged or bent fixture; avoiding personal injury in case of fixture fall or break.
- If "Err-1" appears on the LCD, it indicates that the test load the sensor measures is 110 % larger than the rated load. Decrease the load immediately. Make sure the load applied is smaller than 105 % the rated load after the force gauge is restarted.
- Make sure the force gauge is not overloaded. Overload, excessive impact force and forces other than pull force and push force may damage the sensor.
- Do not use sharp tools to press buttons.
- Keep the force gauge away from water, oil, and other liquids. Put it in a cool, dry, and vibration-free place.
- Use the charger delivered with the force gauge for charging; otherwise, circuit failure or even fire may be caused.
- Follow this document to wire ports; otherwise, circuit failure or even PC fault may be caused.
- Make sure the AC charger is securely inserted into a socket if the product needs to be charged. Looseness may cause short circuit, resulting in electric shock or fire.
- Remove the power adaptor after charging to avoid accidents.
- Do not touch the power adaptor with wet hands; otherwise, electric shock may occur.
- This product is for measuring pull and push forces only. Do not bend or twist the test head. See the following figure for correct operation method.
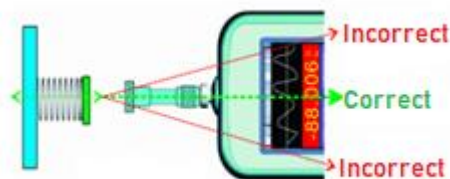
4   Function

This force gauge is used to measure tensile and compressive force. It is compact, lightweight, versatile and precise. Therefore, it can be used to test lots of different products. It can be easily used with a test stand.

5   Main Features

Display	LCD / 180 ° ratatable / backlight
Interface	USB
Alarm	Fracture alarm, upper / lower offset, limit alarm
Open Collector Transistor	12 V / 50 mA
Memory	10 measurements
Peak value measurement	yes

6   Delivery contents

1 x Force Gauge PCE-FM 200
1 x Flathead adapter
1 x Hook adapter
1 x Ball head adapter
1 x Chisel head adapter
1 x Notch head adapter
1 x Adapter for extension rod
1 x Extension rod (65 mm / 2.55")
1 x USB cable
1 x Charging adapter (240 V)
1 x Equipment case
1 x Operation manual

The evaluation software can be downloaded here:
https://www.pce-instruments.com/english/download-win_4.htm

7 Device description
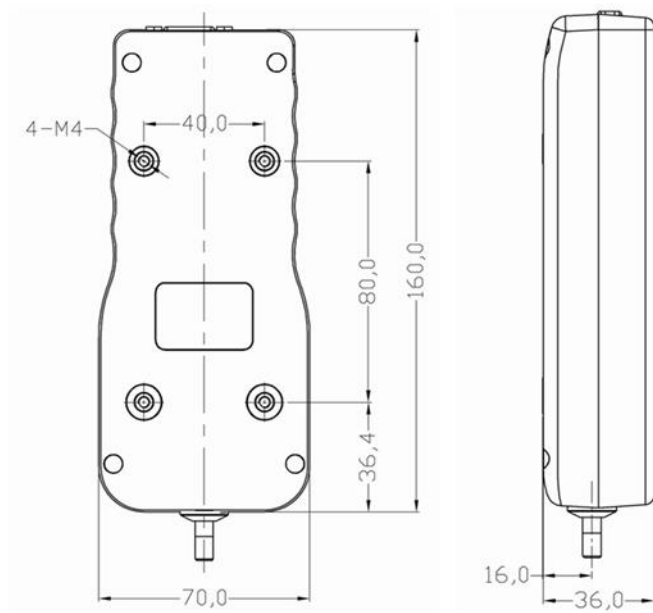
7.1 Keys and adaptor

1. Measuring adaptor
2. Clamping nut
3. LCD

4. LED
5. Control panel
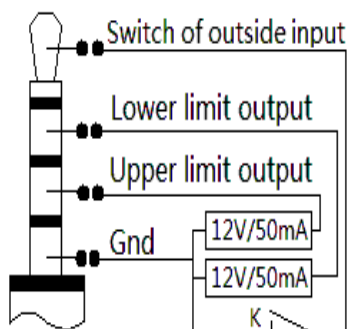

1. Switched output
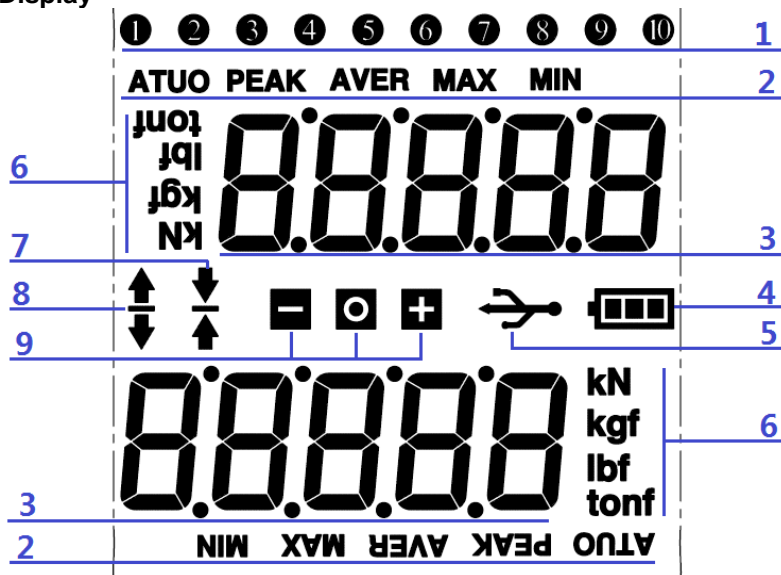2. USB interface
3. Power connection

7.2   Dimensions

All dimensions in mm

7.3   Circuit diagram of 3.5 mm jack

Here you can find the circuit diagram for connecting a 3.5 mm jack in order to establish a connection to the switched outputs.

8   Display

1. Number of values saved (these do not turn when the display does)
2. ATUO: Automatic peak clearing
   PEAK：Manual peak clearing
   AVER: Average of saved peak values
   MAX：highest value measured
   MIN：lowest measured value
3. Displays current the peak value or current measurement value in real time, depending on display orientation
4. Battery level indication
5. PC connection
6. Measuring unit
7. Push (compression) icon
8. Pull (tension) icon
9. "—" the displayed value is smaller than the set limit
   "○" Measurement successful or interrupted
   "＋" the displayed value exceeds the set limit

8.1 Keys

Key	Test mode	Online test mode (USB connected)	Storage mode	Menu
On / off	On / off	On / off	x	x
Unit	Unit	x	Exit mode	Leave option
→0←	Zeroing	Zeroing	Memory is cleared	x
Up	Reading and unit are sent	x	Data are sent	Up
Down	Saved readings are qeried	x	Switch between AVER, MAX and MIN	Down
OK	Menu is opened	Invalid	Back to measurement mode	Selected option is opened
Left	Displayed value is saved	Displayed value is saved	Left	x
Right	Peak value is deleted	Peak value is deleted	Right	x

9   Operation

Power on and off:

- Press ⏻ to power on/off.

Open menu and select an option:

- In test mode, press `OK` to open the settings menu and to select individual options.

Zero and delete a saved value:

- In test mode, press `→0←` to reset the measured value to zero.
- In storage mode, press `→0←` to delete individual memory items. These individual memory items flash and can be selected by means of the arrow keys ◀ and ▶ and deleted individually.

Change unit and leave a mode:

- In test mode, press ↺ to change the unit.
- In the menu, you can use ↺ to leave a selected option or menu.
- In storage mode, you can use ↺ to leave this mode and return to test mode.

Navigate through the options:

- In the menu, you can use the arrow keys ◀ and ▶ to navigate through the options.

Save:

- In test mode, you can reset the peak value by using the ▶ key.
- Also in test mode, you can save the peak value by using the ◀ key.
- In storage mode, you can navigate to the right through the memory items by using the ▶ key.
- Also in storage mode, you can navigate to the left through the memory items by using the ◀ key.

10   Options

Option	Name	Options	Meaning	Default setting
F-0	code	code	Analogue code	x
F-1	ast	close/1d/2d/3d	Auto zero from 1/2/3 digits	1 d
F-2	speed	6~200Hz	Measuring frequency	50 Hz
F-3	cal	Two- or three-point	Calibration	x
F-4	old_g	9. 7000～9. 9000	Gravity value at calibration location	9. 7833
F-5	new_g	9. 7000～9. 9000	Gravity value at user location	9. 7833
F6	j-out	inter/outer/cut/ off	Alarm settings Inter (within the alarm limit) Outer (outside the alarm limit) Cut (material fracture alarm) Off (alarm deactivated)	outer: outside alarm limit
F-7	lo		Lower alarm limit	0
F-8	hi		Upper alarm limit	Maximum
F-9	cut	10～90 %	Overload alarm	50 %
F-10	peak	key/3~60 sec	Display time of peak value	Remove by pressing key
F-11	bps	4800~57600	Bandwidth	38400 bps
F-12	print	key/stabl/chang/conti	Key: data transfer when key is pressed Stabl: data transfer when value is stable Chang: data transfer when value changes Conti: permanent data transfer	Key: data transfer when key is pressed
F-13	angle	0 °/180 °	Display orientation	0 °
F-14	off_t	no/3~60 min	Auto Power Off	Off: Auto power Off deactivated
F-15	Led	on/off/auto	Backlight On (always on) Off (always off) Auto: automatic (5 seconds)	Auto: automatic
F-16	reset	no/yes	Factory settings	No

11 Alarm

- **Inter:** This option triggers an audible signal when the measured value is between the lower and the upper alarm limit. „+" and „-" will flash in the display.

- **Outer:** This option triggers an audible signal when:

  A: the measured value is below the lower limit („-" will flash in the display)

  B: the measured value is above the upper limit („+" will flash in the display)

- **Off:** This option deactivates the alarm.

12 Calibration by using weights

You can select either „cal=2" (2-point calibration) or „cal=3" (3-point calibration).

Go to the menu F-3 and either select „cal=2" or „cal=3" by means of the arrow keys. Confirm your selection with OK. Remove all attachments from the device that affect the measuring cell. Confirm the zero calibration by pressing the OK key. To calibrate the second point, you can use the pre-set weight or select the desired weight by using the arrow keys. Confirm with the OK key. Attach the chosen weight to the device and confirm with OK. The indication in the display will start flashing. When the calibration is finished, the display will "CAL".

The procedure for the 3-point calibration is the same as for the 2-point calibration, just with one more calibration point.

13 Rechargeable battery

This product is configured with a 1600 mAh 6 V Ni-Hi rechargeable battery. If it is fully charged, the product can be running uninterruptedly for 10 hours. When shut down, the battery will discharge in 3 months. Make sure the battery level is always sufficient. In case of power shortage, use the delivered DC 12 V/1000 mA power adaptor to charge the product. It will be fully charged within 8 ~ 10 hours. Remove the power adapter immediately after the product prompts full charge. Otherwise, longtime charging may cause the battery to overheat. Only charge the battery when it is completely flat. Frequent charging shortens the battery life.

14   Contact

If you have any questions, suggestions or technical problems, please do not hesitate to contact us. You will find the relevant contact information at the end of this user manual.

15   Disposal

For the disposal of batteries in the EU, the 2006/66/EC 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.

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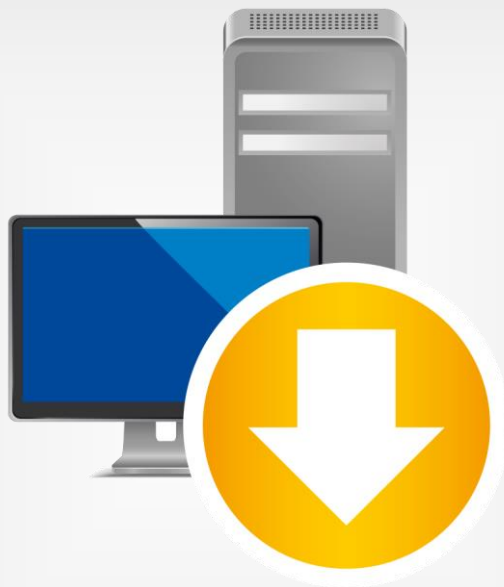www. pce-instruments. com/chile

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User Manual

PC Software PCE-FM 200

User manuals in various languages (deutsch, français, italiano, español, português, nederlands, türk, polski, русский, 中文) can be found by using our product search on: www.pce-instruments.com

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Contents

1   Safety notes

Acquaint yourself with the operation of the measuring device before using it in combination with the PC software. For this purpose, use the instruction manual, which comes with your PCE product. All safety notes from the device's manual have to be observed as well when the device is used with this software.

The device and the software may only be used by qualified personnel. Damage or injuries caused by non-observance of the manuals are excluded from our liability and not covered by our Contact.

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

We expressly point to our general warranty 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.

2   System requirements

- Operating system Windows XP SP3 or higher
- USB port (2.0 or higher)
- installed .NET framework 4.0
- minimum resolution of 800 x 600 pixels
- optional: printer
- processor with 1 GHz
- 4 GB RAM recommended
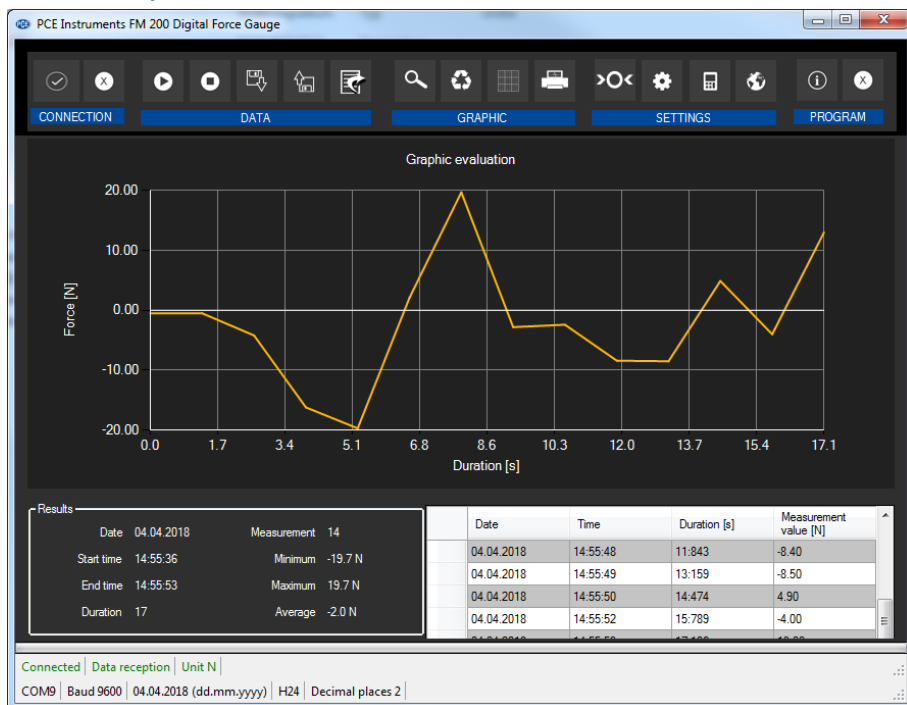- CD-ROM drive

3   Installation

The software can be downloaded here:
https://www.pce-instruments.com/english/download-win_4.htm.
Please run the "Setup-PCE-FM-200.exe" and follow the instructions of the setup.

4   Operation

4.1   Description of the user interface

The main screen consists of several sections:

Below the title bar, there is a tool bar with icons that can be selected by a mouse click. These icons are grouped according to their functions.

Below this bar, you can find an area where the measuring points are displayed graphically ("Graphical evaluation").

The next section below the graphic shows a chart with the measuring points determined on the right and an area with statistical data on the left-hand side.

The lower edge of the main window shows two status bars containing important information, directly above each other.
The lower bar shows the statistical settings of the program that can be defined in the settings screen.
The upper status bar shows the dynamic settings or data of the PCE-FM 200 which are directly taken from the connected device. These include the selected unit.

5 Meaning of the individual icons on the toolbar

		Group "Connection"	
	✓		Connect to the PCE-FM 200
	⊗		Disconnect from the PCE-FM 200
		Group "Data"	
	▶		Start a measurement
	■		Stop a measurement
	▣		Export a series of measurements
	▣		Load a series of measurements from a file
	▣		Save a series of measurements in a file
		Group "Graphics"	
	🔍 ✋		Enlarge the graphics area ("Zooming") or move the enlarged graphics
	♻		Restore the orginal graphics
	▦		Change the background and representation of the graphics
	🖶		Print the currently visible graphics

Group "Settings"			
	⚙		Open settings dialog
	🌐		Select one of the languages supported by the program
Group "Program"			
	ⓘ		Display an information dialog
	⊗		Exit the program

6   Operation

6.1   First use of the software

Before the PCE-FM 200 can work with the software, the assigned COM port must be set in the software once. It can be set via the "settings dialog" ⚙
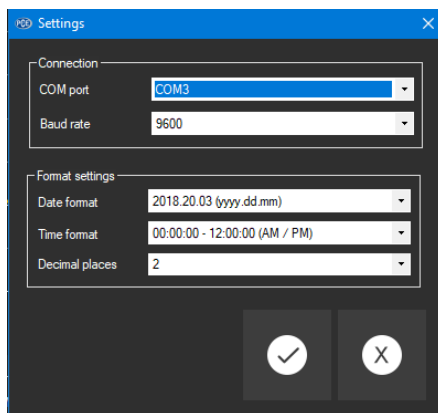
In addition to entering the connection data, the settings for the date and time format and for the decimal format can be made here.

6.2   Connect to the PCE-FM 200

After the desired settings have been made and the settings dialog has been closed with a click on the "Apply" button, the connection to the PCE-FM 200 can be established by clicking on the

✅ icon.

If the connection has been successfully established, the term "Connected" is displayed in green on the status bar for the dynamic data.
If, however, no connection has been established, the term "Disconnected" is displayed in red.

6.3   Disconnect from the PCE-FM 200

By clicking on the ⊗ icon, an active connection to the PCE-FM 200 can be terminated.

If you exit the software while the connection is active, the connection will also be terminated.

6.4 Numerical display

Date	Time	Duration [s]	Measurement value [N]
2018.20.03	04:44:02 PM	06:373	-2.90
2018.20.03	04:44:02 PM	06:399	0.00
2018.20.03	04:44:02 PM	06:423	0.10
2018.20.03	04:44:02 PM	06:448	0.20
2018.20.03	04:44:02 PM	06:472	0.20
2018.20.03	04:44:02 PM	06:496	0.20

In the lower part of the main window, all the measured values are tabulated.
The chart can be sorted by columns by clicking on the respective column heading
("Date", "Time", "Duration" and "Measurement value").

Note:
These data come directly from the PCE- FM 200; the time can thus deviate from the PC time.

6.5 Statistical data

| Results			
Date	2018.20.03	Measurement	267
Start time	04:43:55 PM	Minimum	-7.9 N
End time	04:44:02 PM	Maximum	19.8 N
Duration	06	Average	4.4 N

The statistics include the number of measured points, the smallest and largest measured force levels and the average value. Also, they include the date, start time, end time and duration of measurement.

6.6   Graphical representation

In the area for the graphical evaluation, the selected unit ("N","kgf","lbf") is shown on the y axis and the duration (in seconds) is shown on the x axis.
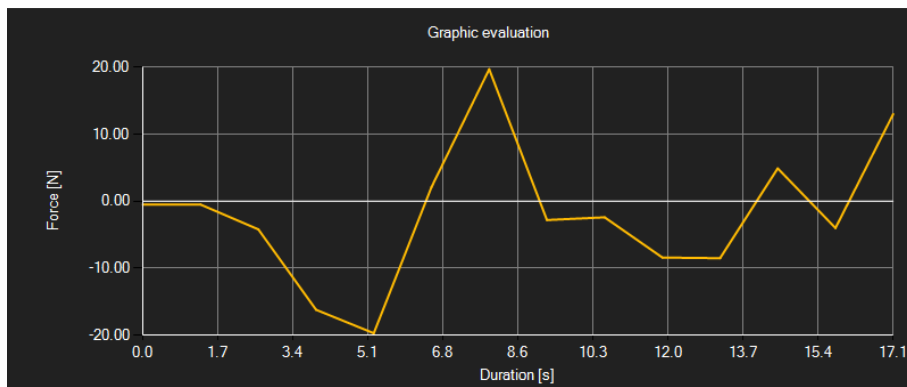
Moving the mouse cursor to a point on the displayed line makes a small information window with the data (time and unit) of the currently selected measurement value pop up after a short time.
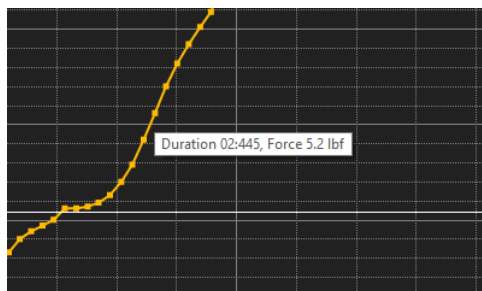
A freely selectable part of the displayed graphics can be enlarged.
For this purpose, the corresponding icon in the toolbar ("Enlarge the graphics area ("Zooming")

or move the enlarged graphics) must be a magnifying glass .
Then, a rectangle can be drawn over a part of the graphics by holding the mouse button down. When the mouse is released, the selected area appears as a new graphic.

As soon as at least one enlargement has been made, it is possible to switch from enlargement mode to shift mode by clicking on the icon ("Enlarge the graphics area ("Zooming") or move the enlarged graphics) with the magnifying glass icon.

Shift mode is represented by the icon.

If the mouse is now placed over the graphics area and then the left mouse button is pressed, the depicted section can be moved by holding the mouse button down.

Another click on the icon changes back to enlargement mode, which is recognizable by the icon.

The original graphics can be restored at any time by clicking on the icon next to the magnifying glass or hand.

The background of the graphics and its representation can be changed via the icon to the right. A click on the icon works like a switch:
A single click makes the division of the background finer and adds some more dots to the graphics. A further click on the icon changes back to standard view.

The currently displayed graphics can also be printed.

A click on the icon opens the "Print" dialog.

6.7   Performing the measurement

If an connection to the PCE-FM 200 is active, a new measurement can be started.

After clicking on the corresponding icon in the toolbar ("Start a measurement"), a new dialog is displayed, with the help of which additional options, relevant for the upcoming measurement, can be determined.
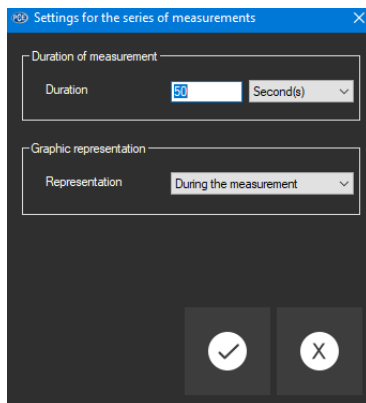
An ongoing measurement can be terminated by clicking on the icon in the toolbar.

6.8   Export of series of measurements

Measurement series can also be exported. The entire content of one series of measurements can be exported in CSV format by using the icon of the toolbar.

6.9   Loading and saving series of measurements

A series of measurements can be loaded and saved via the and the icon in the toolbar.

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