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# Manual

## Particle Counter PCE-PCO 1 / PCE-PCO 2



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## 1 Introduction

Thank you for purchasing a PCE-PCO 1 or PCE-PCO 2 from PCE Instruments.

This instrument is a universal particle counter for detecting the particles concentration in the air. The particle counter can measure six different particle sizes. Furthermore, the device has got sensors for temperature and relative humidity; this makes it a really versatile device. The integrated camera allows connecting the measurement data with image / video material. This particle counter is designed to accurately determine the degree of air contamination. The pollution is caused mainly by combustion, industrial manufacturing, power generation, vehicle engine emissions and the construction industry. With the help of this device the exact amount of dirt particles in the air is measured.

## 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.
- 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 should not make any technical changes to the device.
- The appliance should only be cleaned with a damp cloth / use only pH-neutral cleaner. Do not use abrasives or solvent based cleaners.
- If the device is not used for an extended period, please remove the batteries.
- This device may only be used in the way described in this manual. If the device is used otherwise, this may lead to dangerous situations.
- Do not expose the device to extreme temperatures, direct sunlight, extreme humidity or moisture.
- Never use the device with wet hands.
- The device may only be used with optional accessories offered by PCE Instruments or equivalent substitutes.
- Please check the housing for visual signs of damage before each use. If any visible damage occurs, the device must not be used.
- In addition, this device must not be used if the ambient conditions (temperature, humidity ...) are not within the limits stated in the specifications.
- The device must not be used in an explosive atmosphere.
- If the safety instructions are not followed, it may cause damage to the device and injury to the operator.

This user's handbook 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.

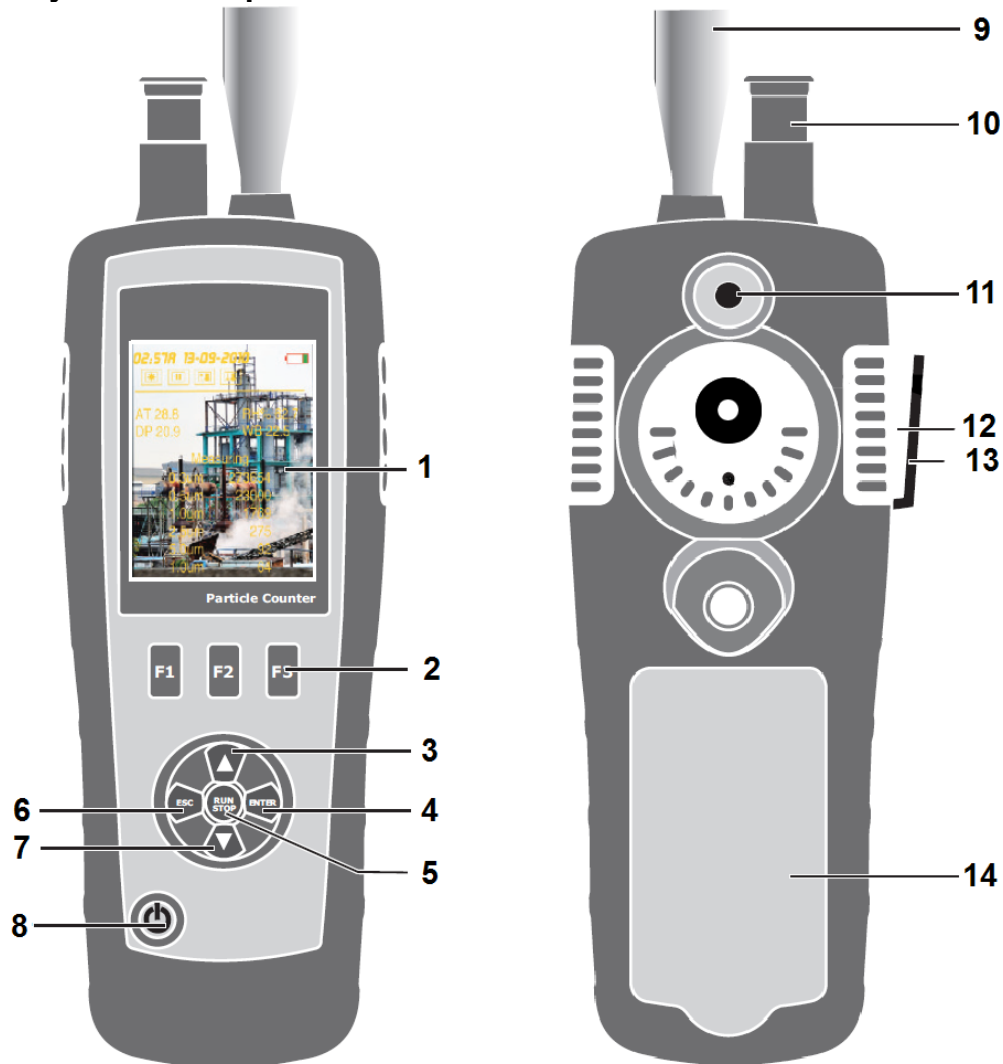
### 3 Specifications

|  |                 |  |
|--|-----------------|--|
| <b>General:</b>                            |                 |  |
| Ambient conditions                         |                 | 0 ... 50 °C, 10 ... 90 % RH (non-condensing)   |
| Display                                    |                 | 2.8" / 320 x 240 pixels / backlight / color  |
| Battery                                    |                 | rechargeable / life ~ 4 hours  |
| Memory                                     | Internal        | 80 MB  |
|  | Optional        | Micro SD-card up to 8 GB   |
| Dimensions                                 |                 | 240 x 75 x 55 mm   |
| Weight                                     |                 | 420 g  |
| <b>Particle counter:</b>                   |                 |  |
| Measurable particle sizes                  |                 | 0.3 / 0.5 / 1.0 / 2.5 / 5.0 and 10 µm  |
| Flow rate                                  |                 | 2.83 L / min   |
| Coincidence error                          |                 | <5 % at 2,000,000 particles per ft <sup>3</sup>  |
| Counting efficiency                        |                 | 50 % at 0.3 µm;<br>100 % with particle size >0.45 µm   |
| Data storage                               |                 | 5000 records   |
| Counting modes                             |                 | cumulative, differential, concentration  |
| <b>Air temperature and humidity</b>        |                 |  |
| Air temperature                            | Measuring range | 0 ... +50 °C   |
|  | Accuracy        | ±0.5 °C at +10 ... +40 °C; otherwise ±1.0 °C   |
| Dew point                                  | Measuring range | 0 ... +50 °C   |
|  | Accuracy        | ±0.5 °C at +10 ... +40 °C; otherwise ±1.0 °C   |
| Relative humidity                          | Measuring range | 0 % RH ... 100 % RH  |
|  | Accuracy        | ±3 % RH at 40 ... 60 %<br>±3.5 % RH at 20 ... 40 % and 60 ... 80 %<br>±5 % RH at 0 ... 20 % and 80 ... 100 % |
| <b>PM 2.5 &amp; PM 10 (PCE-PCO 2 only)</b> |                 |  |
| Channels                                   |                 | PM 2.5 & PM 10   |
| Measurement range                          |                 | 0 ... 2000 µg/m <sup>3</sup>   |
| Resolution                                 |                 | 1 µg/m <sup>3</sup>  |

#### 3.1 Delivery

- 1 x particle counter PCE-PCO 1 or PCE-PCO 2
- 1 x zero filter
- 1 x battery
- 1 x charger
- 1 x USB cable
- 1 x user manual
- 1 x tripod
- 1 x hard carrying case

## 4 System description




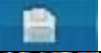


1. Display
2. Function buttons
3. Arrow up
4. Enter
5. Start / Stop button
6. ESC button
7. Arrow down
8. On / Off button

9. Particle sensor
10. Temp. / RH sensor
11. Camera sensor
12. USB Interface
13. AC / DC connection
14. Battery compartment









### 4.1 Switching on / off

- To turn the device on, hold the ON / OFF pressed till the start screen is visible.
- To turn the device off, hold the ON / OFF pressed till the screen darkens.

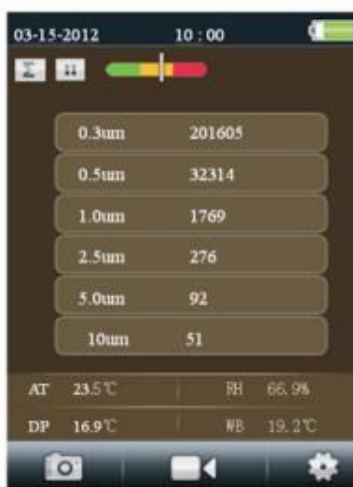
### 4.2 Menu structure

|   |                 |                       |
|---|-----------------|-----------------------|
|  | <b>PARTICLE</b> | Particle measurement  |
|  |                 | Memory set controller |
|  |                 | System settings       |
|  |                 | Help                  |

### 4.3 Symbols explanation

| Symbol  | Description        | Symbol  | Description       |
|---|--------------------|---|-------------------|
|  | Cumulative mode    |  | Differential mode |
|  | Concentration mode |  | Start measurement |
|  | Pause measurement  |  | Alarm active      |
|  | Camera mode        |  | Video mode        |

## 5 Instructions



PCE-PCO 1



PCE-PCO 2

- Select the menu item "particle measurement" and confirm with Enter. The following image (picture on the left side) appears on the display. The picture on the right-hand side appears depending on your settings (PCE-PCO 2 only). The device measures the air temperature, dew point and relative humidity continuously; these values are displayed in the lower part of the display.
- Press Start / Stop to start the particle measurement. The measurement ends automatically after the preset measurement duration, alternatively, you can stop the measurement with the Start / Stop button any time.
- After completion of the measurement process, the data are automatically saved.

### 5.1 Photo recording function

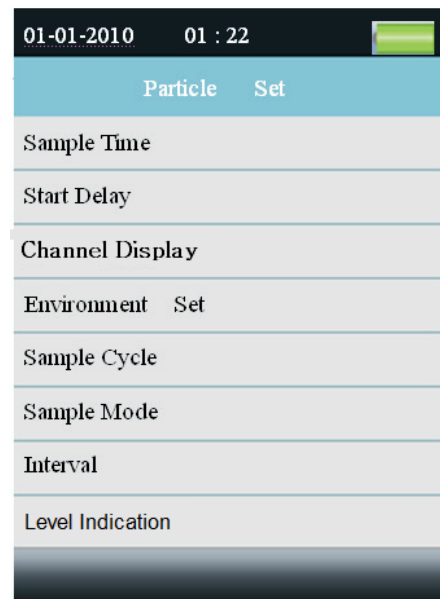
- Press the F1 key while you are in the menu item “particle counter” to start the photo recording function.
- Press F2 to take a picture.
- Press ESC to terminate the function.

### 5.2 Video recording function

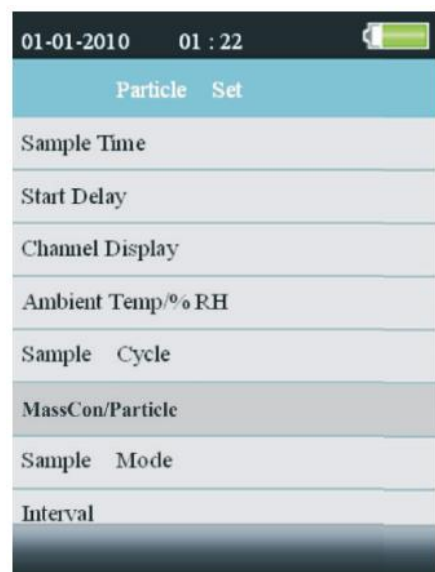
- Press the F2 key while you are in the menu item “particle counter” to start the video recording function.
- Press RUN/STOP to start the measurement simultaneously with the video recording. The file is automatically saved as soon as the measurement is completed.
- Press ESC to terminate the function.

### 5.3 Particle Set

- Press F3 while you are in the menu item „particle counters“ to enter the settings menu.
- Use the arrow button to navigate and confirm your choice by pressing Enter.
- Press ESC to terminate the function.



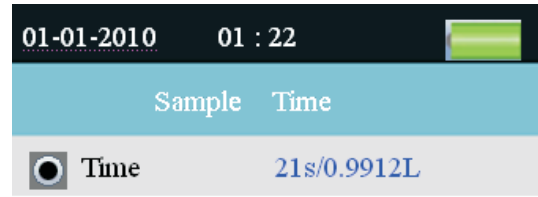
PCE-PCO 1



PCE-PCO 2

**5.3.1 Sample Time**

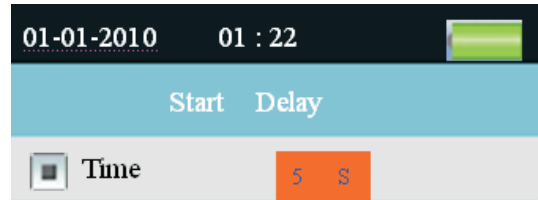
- Start the input with Enter.
- Use the arrow keys to adjust the measurement time.
- Confirm your entry with Enter



PCE-PCO 1 & PCE-PCO 2

**5.3.2 Start Delay**

- Start the input with Enter.
- Use the arrows to adjust the start delay.
- Confirm your entry with Enter.

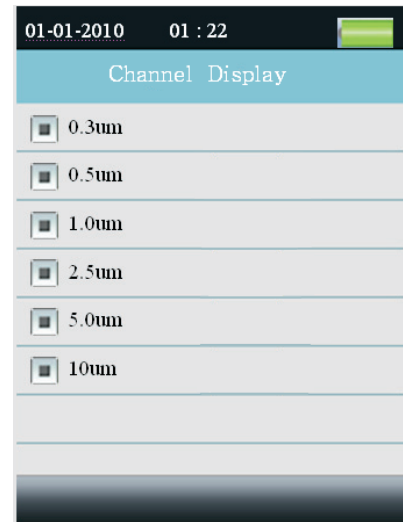


PCE-PCO 1 & PCE-PCO 2

**5.3.3 Channel Display**

In this menu you can set which particle sizes you want to be displayed.

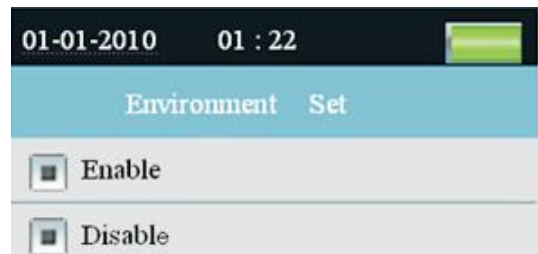
- Use the arrows to choose between the particle sizes.
- Use the Enter key to switch on / off the selected particle sizes.



PCE-PCO 1 & PCE-PCO 2

**5.3.4 Environment Set**

In this menu you can set whether or not the temperature and humidity are displayed. Select Enable to display the air temperature and humidity or Disable to switch this function off.

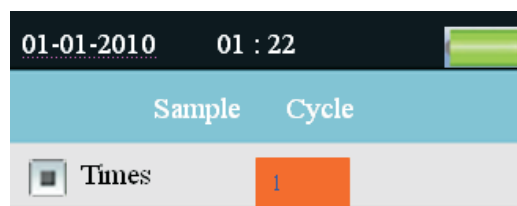


PCE-PCO 1 & PCE-PCO 2



### 5.3.5 Sample Cycle

In this menu you can set the number of measurements.

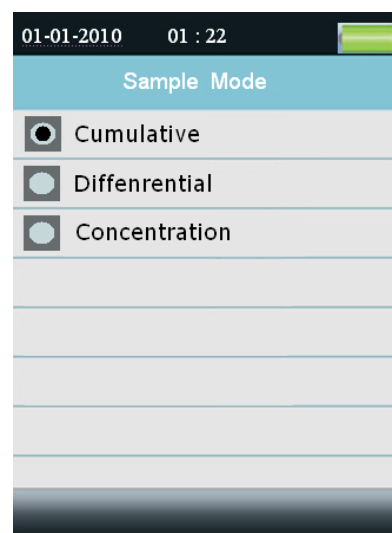


PCE-PCO 1 & PCE-PCO 2

### 5.3.6 Sample Mode

In this menu you can adjust the display mode of the particle counter.

- Cumulative -
- Differential -
- Concentration -



PCE-PCO 1 & PCE-PCO 2

#### 5.3.6.1 PM 2,5 & PM 10

Here you can switch between particle and mass concentration mode



PCE-PCO 2

#### 5.3.6.2 Sample modes explanation

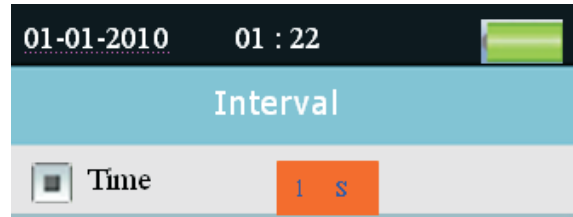
- Cumulative and differential:
  - ➔ The recorded numbers of particles are added up per channel (cumulative); starting with the largest channel
  - ➔ In differential mode there are the absolute particle numbers per channel
  - ➔ Example:

| Channel [µm] | Cumulative particle number [PC] | Differential particle number [PD] | Calculation                    |
|--------------|---------------------------------|-----------------------------------|--------------------------------|
| 0.3          | 1630                            | 1000                              | = [PC,630]+[PD,1000]=[PK,1630] |
| 0.5          | 630                             | 350                               | = [PC,280]+[PD,350]=[PK,630]   |
| 1.0          | 280                             | 200                               | = [PC,80]+[PD,200]=[PK,280]    |
| 2.5          | 80                              | 50                                | = [PC,30]+[PD,50]=[PK,80]      |
| 5.0          | 30                              | 20                                | = [PC,10]+[PD,20]=[PK,30]      |
| 10.0         | 10                              | 10                                | ---                            |

- Concentration:
  - ➔ Here, you can find the average numbers of the respective particles per channel; also called particle density.

### 5.3.7 Interval

In this menu you can set the pause between two measurement test runs.

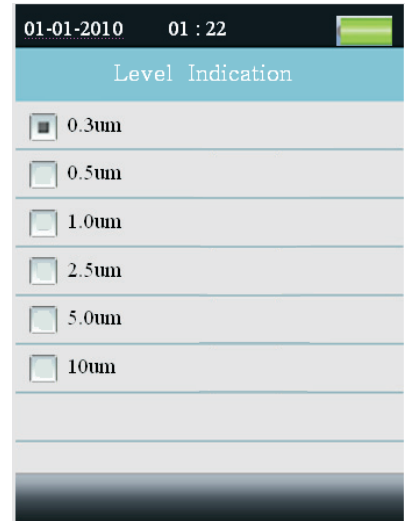


PCE-PCO 1 & PCE-PCO 2

### 5.3.8 Level Indication

In this menu you can set which particle sizes you wish to be displayed.

- Use the arrow buttons to choose between the particle sizes.
- Use the Enter button to switch on / off the selected particle sizes.



PCE-PCO 1 & PCE-PCO 2

| Channel | Green        | Yellow            | Red               |
|---------|--------------|-------------------|-------------------|
| 0.3 µm  | 0 ... 100000 | 100001 ... 250000 | 250001 ... 500000 |
| 0.5 µm  | 0 ... 35200  | 32501 ... 87500   | 87501 ... 175000  |
| 1.0 µm  | 0 ... 8320   | 8321 ... 20800    | 20801 ... 41600   |
| 2.5 µm  | 0 ... 545    | 546 ... 1362      | 1363 ... 2724     |
| 5.0 µm  | 0 ... 193    | 194 ... 483       | 484 ... 966       |
| 10.2 µm | 0 ... 68     | 69 ... 170        | 170 ... 340       |

### 5.4 File Browser

- Press F1 while you are in the home screen to open the file browser.
- There are the following subcategories "Picture", "Video" and "Particle Logs" in the file browser.
- Use the arrow button to navigate in the file browser and confirm your choice by pressing Enter.

## 5.5 System Set

- Press F2 while you are in the home screen to open the system settings menu.
- Use the arrow button to navigate in the system settings and confirm your choice by pressing Enter.

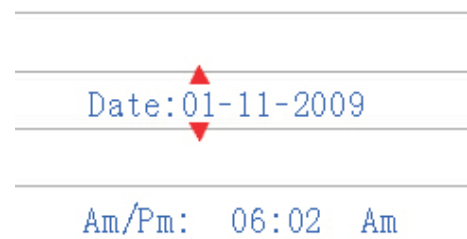


PCE-PCO 1 & PCE-PCO 2

| Menu item       | Description  |
|-----------------|--|
| Date / Time     | Set time and date                                    |
| Font Colour     | Set font colour                                      |
| Language        | Set language   |
| Brightness      | Set display brightness                               |
| Auto Power Off  | Set automatic power off                              |
| Display Timeout | Set automatic display timeout                        |
| Alarm Select    | Alarm on / off                                       |
| Memory Status   | Shows (remaining) memory capacity of the memory card |
| Factory Setting | Reset the device to factory defaults                 |
| Units (°C / °F) | Switch temperature units                             |

### 5.5.1 Date / Time

- Set the value with the help of the arrow.
- Press Enter to move to the next value.
- Press ESC to save the settings and exit the menu.



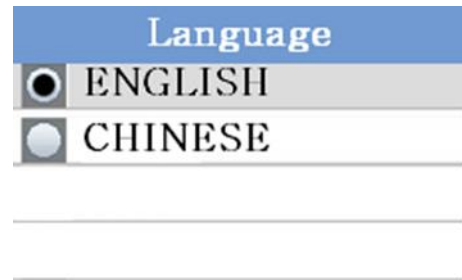
### 5.5.2 Font colour

- Use the arrow to select a color.
- Press ESC to save the settings and exit the menu.



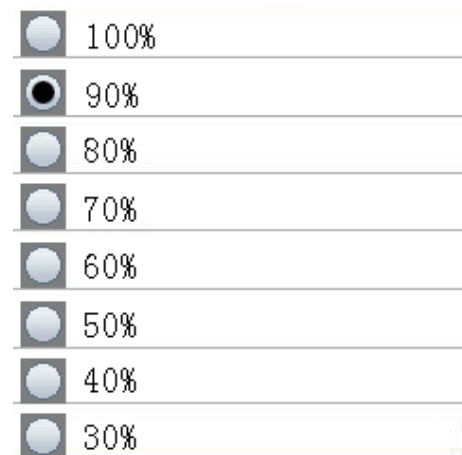
### 5.5.3 Language

- Use the arrow to select a language.
- Press ESC to save the settings and exit the menu.



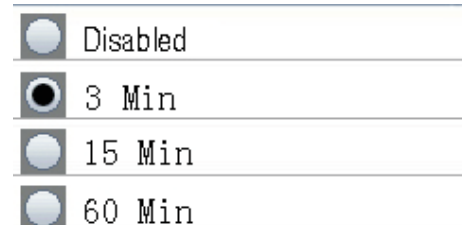
### 5.5.4 Brightness

- Use the arrow to set the required brightness.
- Press ESC to save the settings and exit the menu.



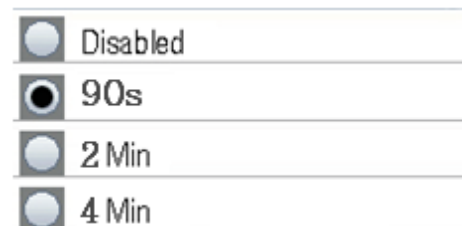
### 5.5.5 Auto Power Off

- Use the arrow to set the automatic power off time.
- Select „Disable“ to switch off the function.
- Press ESC to save the settings and exit the menu.



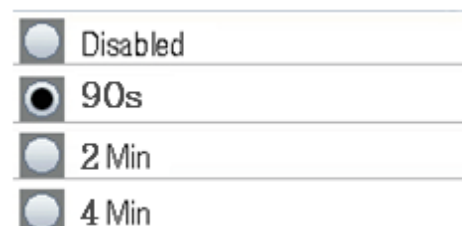
### 5.5.6 Display Timeout

- Use the arrow to set the automatic display timeout.
- Select „Disable“ to switch off the function.
- Press ESC to save the settings and exit the menu.



### 5.5.7 Alarm Select

- Use the arrow to switch the alarm function on / off.
- Select „Disable“ to switch the function off or „Enable“ to switch it on.
- Press ESC to save the settings and exit the menu.

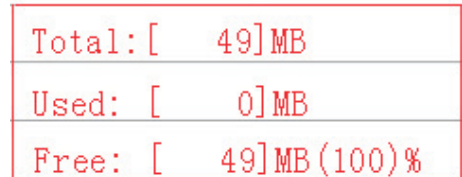
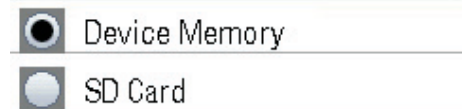


### 5.5.8 Memory Status

- Use the arrow to choose between the internal memory and the SD card.
- Press ESC to save the settings and exit the menu.

#### Formatting

- Press F1 to format the selected memory.
- Press F1 to confirm or F3 to discard.



### 5.5.9 Factory Settings

- Use the arrow to choose between „Yes“ and „NO“.
- Press ESC to save the settings and exit the menu.



### 5.5.10 Units (°C / °F)

- Use the arrow to choose between „°C“ and „°F“.
- Press ESC to save the settings and exit the menu.



## 6 Cleaning

In order to clean the device, unscrew the standard head.

Now attach the zero filter and carry out a cumulative measurement in measurement mode. If the measurement value is not 0 for one particle size, you must make measurements until all the values are zero. The system is cleaned by the pumping. You can now re-attach the standard head.

## 7 SD card

Open the battery compartment. If a rechargeable battery is inside, remove it. Loosen the holder and insert the SD card.

## 8 PC connection

Use the USB cable to connect the meter to your computer. You can find the connection on the right-hand side of the meter, below the rubber protector. You now have access to the meter as to a USB pen drive.

## 9 Disposal

For the disposal of batteries, 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.

If you have any questions, please contact PCE Instruments.

## 10 Contact

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

### 10.1 PCE Instruments UK

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