PCE-PDA

Differential Pressure Meter

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1. GENERAL

These instructions for use describes the functions of the digital pressure gauge PCE-PDA and provide the user directions for its use.

1.1. SAFETY WARNING

Incorrect use of the digital pressure gauge PCE-PDA or non-performance of these instructions can result in damage of the instrument or an injury of the operator. All personnel responsible for the operation of the instrument must be properly trained and informed about the dangers and must carefully follow these instructions for use and safety directions, see further in this document.

In case you find out that you do not understand any part of these instructions for use, please contact the producer.

The producer retains the right to continue with the development of this instrument without recording any single change.

1.2. PRESSURE MEASURING AND OPERATING WARNING

1.2.1. PRESSURE MEASURING

Pressure measuring by means of the digital pressure gauge PCE-PDA starts immediately after connecting pressure on the positive pressure input (2) = measuring of the relative overpressure or the negative pressure input (1) = measuring the relative underpressure. If both the relative and negative outputs are connected at the same time to different pressures, the PCE-PDA gauge measures the pressure difference. This data is displayed on the main display (6). If the nominal pressure range is exceeded 2.4 times, the main display will show OL = overload. Overload is indicated on the secondary display by means of signs - - - -.

If the gauge cannot display the measured pressure in the chosen unit, it will display OL and - - - -. Thus pay attention to a proper setting of the unit in accordance to the nominal pressure of the gauge.

1.2.2. PERMITTED MEASURED MEDIA

The PCE-PDA gauge is constructed only for measuring non-aggressive gases and non-aggressive liquids. In case of connecting to an unsuitable media, the gauge can be unretrievably damaged. If you are not sure about the character of the measured medium, please contact your distributor.

1.2.3. SYMBOLS

The below mentioned symbols are used in these instructions for use to indicate the cases when incorrect activity might result in the following difficulties:

PROHIBITIONS – non-observance of them could result in bodily harm or to irretrievable damage of the PCE-PDA gauge.

RECOMMENDATIONS – they warn about different difficulties of the operation. Non-observance of them can result in the gauge dysfunction or wrong measurement.

TIPS – help and advise the user to use the gauge correctly.

1.3. INSTRUMENT DESCRIPTION

The digital pressure gauge series PCE-PDA is a battery portable service and workshop device, intended for a wide use in industry, energetics, medical technology, air-conditioning, laboratories, etc. It is also suitable for the 4Pa test. Its advantages are especially measuring accuracy, a wide pressure range, possibility of a ten times increase of sensibility, simple operation, small dimensions, low consumption, a big amount of additional functions, USB communication through a standard microUSB cable. The manual multifunctional pressure gauge PCE-PDA is fitted into an ergonomically shaped casing from quality ABS plastic, rubberized on the sides. The front side of the gauge is dominated by a big graphic display with white backlights, covered with a foil keyboard with nine control buttons. For measuring pressure ranges higher than 100 Pa, it is allowed to measure both gas and liquid non-aggressive media, but gauges for ranges lower than 100 Pa allow to measure only non-aggressive gases.

1	negative pressure input
2	positive pressure input
3	battery state indicator
4	time
5	date
6	main display
7	datalogger state indicator
8	pressure unit
9	10 x increase of sensitivity
10	secondary display
11	help line
12	offset zeroing button
13	menu button
14	on / off button
15	OK button
16	navigating buttons
17	backlight on / off button
18	microUSB connector
19	ABS casing
20	anti-slip rubber

Picture 1

1.4. TECHNICAL PARAMETERS

Model	**PCE-PDA 1L**	**PCE-PDA 01L**	**PCE-PDA A100L**	**PCE-PDA 100L**	**PCE-PDA 10L**	**PCE-PDA 1000L**
Nominal pressure range	2 kPa	200 Pa	200 kPa	200 kPa	20 kPa	2000 kPa
Pressure measurement range	±2 kPa	±200 Pa	0 ... 200 kPa absolute	-100 ... 200 kPa	±20 kPa	-100 ... 2000 kPa
Max. overpressure	10 kPa	1 kPa	200 kPa	300 kPa	40 kPa	2000 kPa
Burst pressure	100 kPa	20 kPa	300 kPa	400 kPa	100 kPa	3000 kPa
Accuracy	±0,5 % f.s.	±1 % f.s.	±0.5 % f.s.	±0.5 % f.s.	±0.5 % f.s.	± 0.5 % f.s.
Way of pressure measuring	Differential	Differential	Absolute	Differential	Differential	Relative
Pressure connection	inlet for a quick coupler 5mm					
Operating temperature range	0 ... +50 °C					
Storage temperature	10 ... 55 °C					
Protection (case)	IP 41					
Power supply	2 x 1.5 V AA battery / 1.2 V rechargeable NiMh battery					
Current consumption	50 mA with backlight, 10 mA without backlight					
External dimensions	145 x 85 x 35 mm					
Weight (with battery)	Approx. 285 g					

A differential pressure gauge with a disconnected negative pressure input measures relative pressure.

2. CONTROL

PCE-PDA is controlled by means of a 9-button foil keyboard, situated on the front side of the gauge.

- **On/Off** (14) – serves for switching on and off of the gauge. For switching it on/off, it is necessary to hold the button for 0.25s.
- **Zero** (12) – serves for resetting the offset, or rather modification of the initial measuring level. When the inlets are disconnected from the measured pressure or the positive inlets (2) and the **zero** (12) button. A successful reset is confirmed by a sound signal. But if the pressure is connected and the **zero** (12) button is pressed, the gauge will be reset to the currently connected pressure level, so called taring. When the pressure is disconnected, the gauge will display the value of the tare pressure, but with the opposite sign.
  The **zero** (12) button also resets the numeric values of the adjustable items in the menu. After the cursor is clicked on the numeric value and the **zero** (12) button is held, the value will be adjusted to zero(s).

But zero does not necessarily have to be the default value!

- **Menu** (13) – serves as entry/return to the basic menu
- **Light** (17) – serves for switching on/off of the display backlights. Its adjustment is described in the chapter 3.6.
- **OK** (15) – serves for the choice confirmation in the menu or for confirmation of the adjusted values
- **<^v>** (16) – navigating buttons serve for the movement of the cursor in the menu and adjusting the requested values. They can also have different uses according to the chosen function. See the help line (11).

3. MENU

The menu is entered by means of the **menu** (13) button. This way are displayed the actual possible adjustments and accessible functions of the given version of PCE-PDA. Cursor is moved by means of the **<^v>** (16) buttons and the values are confirmed by the **OK** (15) button. For an example of a menu look, see picture 2.

Picture 2

3.1. SENSITIVITY

The sensitivity function enables the user a ten times increase of the gauge sensitivity and also definition on the main display (6) by 1 digit. But the accuracy of the gauge remains unchanged, e.g. 0.5% of the nominal range. Switching on/off, see picture 3, of the function is indicated by an icon on the main display (9).

Picture 3

3.2. DAMPING

Damping in the PCE-PDA gauge is realized by means of an adjustable time constant, in the range 0.1 – 9.9 second. It is possible to switch it on/off directly from the menu or whenever during the measuring by means of the **< DAMP** button, see the help line (11). Switching it on/off is confirmed by a sound signal.

Picture 4

3.3. UNIT

The user can choose from 17 pressure units. They are units of the SI and Pascal systems and their multiples, but also units used in other different branches. The choice is executed by the **^v** arrows and the confirmation by the **OK**(15) button. The chosen unit is related to the pressure values on the main display (6), to the values on the secondary display (10) and also to the ± limit of the pressure difference in the leakage test, see **3.4.3**.

Picture 5

3.4. FUNCTIONS

3.4.1. TEMPERATURE

It is possible to display the temperature on the pressure sensor bridge on the secondary display (10). While measuring the medium pressure with the same temperature as the environment, we can say that it is the orienteering temperature of the environment. The temperature is given in degrees of Celsius. Calibration and the declared gauge accuracy are not related to the temperature data.

Picture 6

3.4.2. MIN / MAX

The max/min function is designed for detection of both positive and negative pressure peaks and impacts with the time constant >100ms. The gauge measures with a period of 1/10s, faster events might not be detected. The result of this measuring is again displayed on the secondary display (10). The actual maximum and also minimum can be reset by means of the **INIT>**(16) button.

Picture 7

3.4.3. LEAKAGE TEST

This enables the user measuring of a pressure change in the adjusted time period (test time). The test is started by the **^START** button. If the test time is adjusted to 00:00:00, the test runs to pressing the **vSTOP** button, otherwise it is stopped automatically according to the adjusted time. It is also possible to adjust the ± limit of the pressure difference, if it is exceeded, it is announced by a sound signal and the value of the pressure difference flashes on the secondary display. If the test is not switched on, it is possible to initialize the pre-adjusted values by the **INIT>** button.

If the data function is activated, the record is started together with the leakage test by the **^START** button and is stopped by the **vSTOP** button.

Picture 8

3.4.4. SPEED/FLOW (Root function)

The PCE-PDA gauge carries out the calculation of the flow speed on the basis of measuring the differential pressure on the plate. These plates can for example be Pitot´s tube, Prandtl´s tube or another throttling organ. The plate properties are represented by the **K** constant and a power constant **x**. The **K** constant has the default value 1 and can gain values 0 – 9.999. The **x** constant has the default value ½ (0.5000 – square root) and can be adjusted to the value 0,0001 to 0.9999. It is also necessary to set the density of the measured medium **ρ(ró)** (default air 1.29 kg/m^3) and the section of the measured pipe **S**.

Picture 9

This relation is valid for the speed calculation:

$$v = k \times \left(\frac{2dP}{\rho} \right)^x [m/s]$$

Where: v=flow speed, k=plate constant, dP= measured differential pressure, ρ=measured medium density in kg/m^3, x=power constant

For the flow calculation:

$$Q = v \times S[m^3/s]$$

Where: Q=flow, v= measured flow speed, S=section in m^2

3.4.5. NONE

With the choice None function, the secondary display (10) remains blank.

3.4.6. HOLD FUNCTION

The HOLD function “holds” the actual measured pressure value on the main display (6). It is active after pressing the navigating button (16) **HOLD >**. After it is released, the main display shows values according to the actual adjustment of the PCE-PDA.

3.5. DATALOGGER

- Number of records in one or up to 1000 sets.
- Measuring time 1s to 256 hours. If the measuring time is 000:00:00, the record runs till pressing the **REC OFFv** or **STOPv** button (leakage test, datalogger) or filling up the memory.
- Record period 1s to 24 hours.

Recording to the datalogger must be allowed in the menu by pressing **data recording**, which is displayed on the display by **datalogger state indicator** (7). The figure to the right of it displays % of filling up the datalogger memory. If the record is allowed, the **^REC ON** button is displayed at all functions, after its pressing the record to the memory is started. The record is indicated by a rotating arrow in the icon **datalogger state indicator** (7). The **REC OFFv** button serves for stopping the record.

The record format in the datalogger memory:

Characteristic	Date & time	Temperature	**Pressure**	Unit	Sec. value 1	Unit 1	Sec. value 2	Unit2

Record into the datalogger in the "Sleep mode". This record mode is used for long-term measuring with a longer record period with respect to the battery life. For the activation of the "sleep mode", it is necessary to start the record into the datalogger by means of the **^REC ON** or **^START** button and then it is enough to "switch off" the gauge by pressing the **Gauge on/ off** button. The gauge is then switched on automatically only for the record of values to the datalogger memory. If the sleep mode is active, the datalogger state indicator (7) is displayed with a 5s period.

3.6. BACKLIGHTS

The PCE-PDA gauge display backlights are switched on and off by means of the **light** (17) button. It can also be adjusted in the menu\backlights. The user can change:

- **Brightness** (0=without backlights, 5=maximum brightness).
- **Contrast** (0=minimum contrast, 5=maximum contrast).
- Time before automatic switching off of the backlights stated in minutes (0=without backlights time limit, 5=5minutes).

THE TIME OF BATTERY OPERATION DEPENDS ON THE BRIGHTNESS OF THE DISPLAY BACKLIGHTS AND THE TIME IT IS SWITCHED ON.

3.7. CALENDAR/HOURS

The time is stated in the format **hh:mm:ss**
The date in the format **dd:mm:yyyy**

The information about the date and the time remain in the gauge's display for approx. 5 minutes when the power supply is disconnected.

3.8. INFO ABOUT THE INSTRUMENT

A part of the **Info** about the instrument is the type of the instrument, the pressure range of the instrument, the serial number of the instrument and the version of the firmware and also the language option. The option **Factory setting** returns by the confirmation **YES** all settings to the values saved at the construction.

4. POWER SUPPLY AND CHARGING

4.1. POWER SUPPLY

PCE-PDA can be power supplied from two pieces of AA batteries or two pieces of AA rechargeable accumulators. When inserting the batteries, it is necessary to observe the right polarity, see the label placed at the bottom of the battery space. It is also possible to power supply the gauge by means of a USB supply (5V and 500mA). Always only after the first switch on of the gauge after changing batteries, the display with the choice of batteries appears.

PAY ATTENTION TO THE PROPER CHOICE OF BATTERIES/ACCUMULATORS. AN INCORRECT CHOICE COULD DAMAGE THE GAUGE.

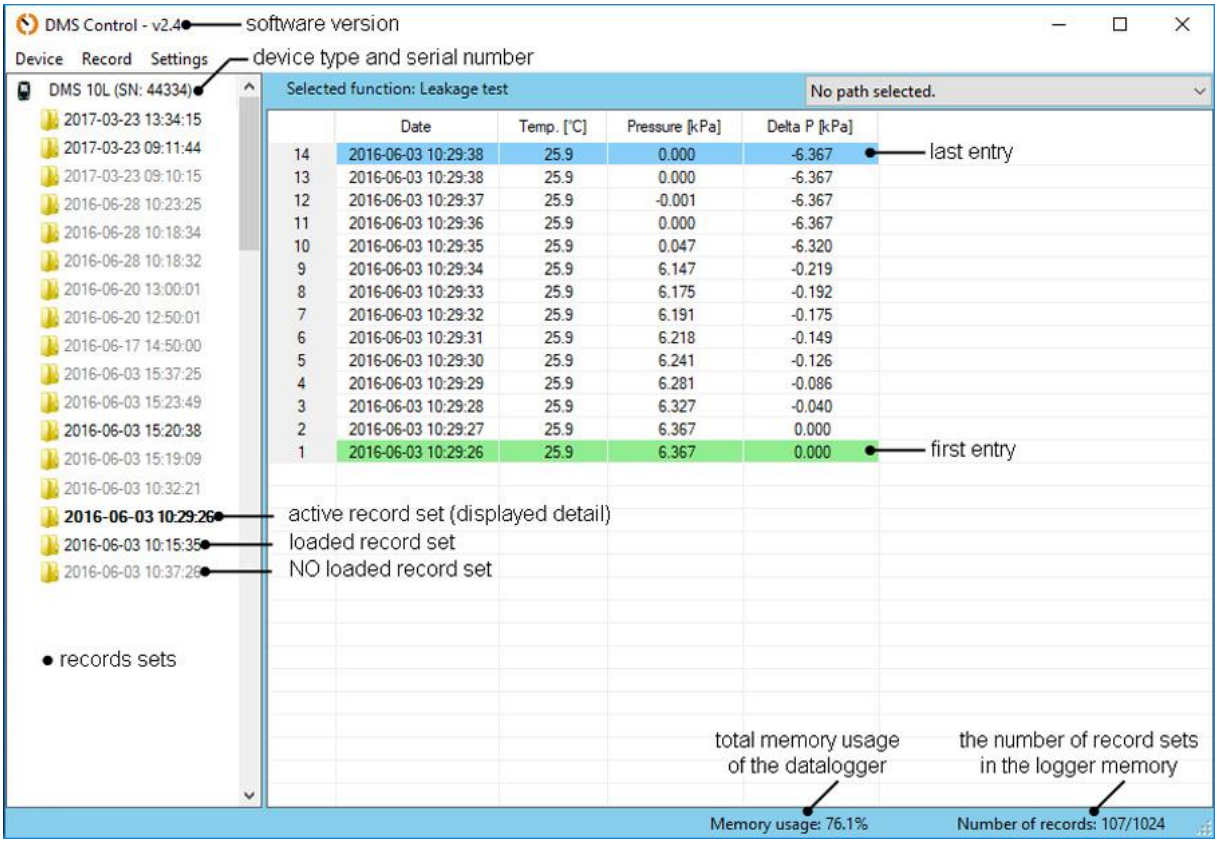
4.2. CHARGING

Charging is done through the USB connector (18) on the bottom side of the gauge. The supply voltage is 5V and the supply current max. 500mA. The battery state indicator (3) situated in the upper part of the display indicates the power supply. In a proper feeding cycle, the battery state indicator changes from "zero" to the full charge of the accumulators. As soon as the accumulators are fully charged, the feeding current is switched to the keeping current. Indication of this state is again displayed on the battery state indicator by flashing of the last division of the battery icon. The battery state indicator (3) is active during charging also after switching the PCE-PDA gauge off.

IT IS RECOMMENDED TO CHARGE ALWAYS BY THE WHOLE CHARGING CYCLE (ca. 6 hours at the room temperature). THIS WILL PREVENT EARLY DISCHARGE OF THE ACCUMULATORS.

6. DMS CONTROL – SOFTWARE

Software DMS Control is a freeware (compatible with Win XP and newer) determined to control handheld pressure gauge PCE-PDA, but primarily serves for downloading and saving data from PCE-PDA datalogger memory to PC.



Picture 10

6.1. CONNECTION

Before connecting PCE-PDA to PC, shows the DMS-control green progress bar in the left bottom corner. Connection of the device to PC realizes by microUSB cable. After plugin the cable into the connector (18), basic data are downloaded within 4s from the device.

6.2. DESCRIPTION

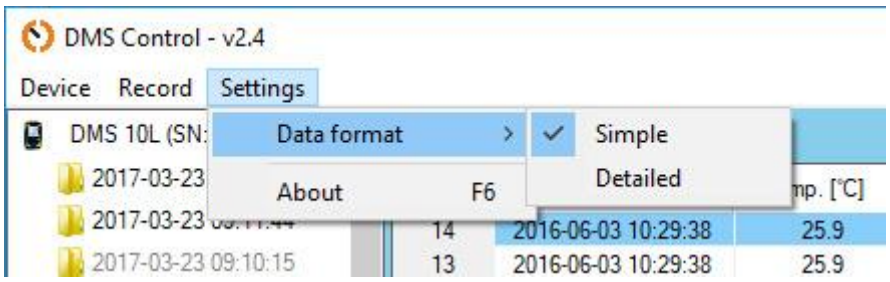
The DMS-control window is divided into two logical ones sections. In left column is displayed the type of connected device and below it, are displayed record sets. (Picture 10).

- **NO Loaded record set** (gray) – displays only record set name (date and time)
- **Loaded record set** (black) – data can be displayed in PC.

FILE IS UPLOADED (USER CAN SEE THEM), BUT DATA ARE NOT SAVED.

- **Active record set** (black, bold) – applies the same as for a loaded record set, except the fact, that the values of the active record set are displayed in the right section of the DMS Control window.

In the right section of the window are displayed concrete data from actual record set.
The individual data from datalogger are clearly displayed in table (Picture 10).



Picture 11

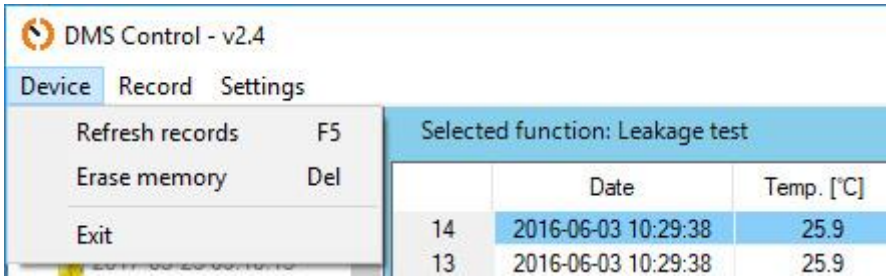
Format of displaying data, can be changed in menu (Picture 11) Settings \ Data format \ Simple or Detailed.

- **Record order** - sorted from oldest to latest
- **Sign** – information about selected function
  - First record is marked by green color and sign 128+number of selected function
  - Last record is marked by blue color and sign 64+ number of selected function
  - Error record is marked by red color and sign 0 (Zero)
- **Date** – in format YYYY-MM-DD hh:mm:ss
- **Temperature** – mentioned in degree Celsius
- **Pressure** – main measured value
- **Unit** – of main measured value
- Other columns concern to the selected function

In right bottom corner of DMS control window is situated information about actual datalogger memory usage a number of record sets (max. 1024)

6.3. FUNCTION

- **Refresh records** – key F5 reload record sets
- **Erase memory** – or key Delete deletes data from PCE-PDA datlogger. Erasing is blocked by popup window with question, whether user really wants to delete data.
- **Exit** – ends DMS Control.



Picture 12

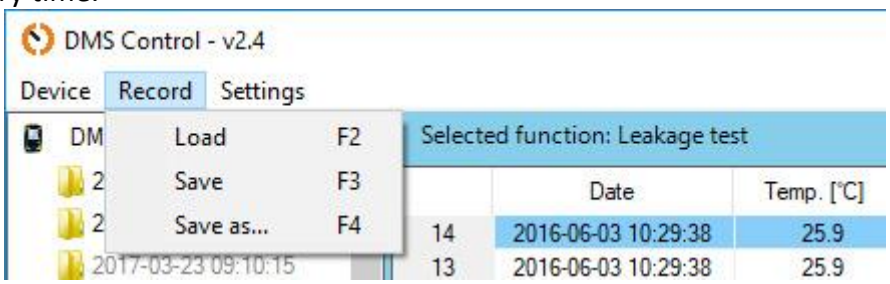
6.3.1. DATA UPLOADING

- Record sets can be uploaded individually or in bulk.
- Click on left mouse button choses the record set.
- Double click by left mouse button on PCE-PDA type are all records chosen.
- Uploading record sets is realized by right mouse button or key F2.

6.3.2. SAVING DATA

Data are saved in *.CSV format with values detached by semicolons. Record sets can be saved individually or in bulk. Click on record set by the right mouse button chose **save** (key F3) or **save as** (key F4).

- **Save** – saves data file(s) automatically to preset folder. This folder is displayed and its select is made in top right corner of DMS-control window. (Picture 10)
- **Save as** – data files cannot be saved in bulk and DMS-control asks on target path every time.



Picture 13

7. 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.

8. 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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