Deutsch

English

Bedienungsanleitung
User Manual

PCE-VT 3700 Vibrationsmessgerät | Vibration Meter

User manuals in various languages (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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v1.2

English
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 ranges 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 System description

2.1 Device

The vibration meter PCE-VT 3700 is capable of measuring different vibration severity parameters and is thus suitable for machine condition monitoring. The measuring units include vibration acceleration, vibration velocity and vibration displacement. The vibration signal can be evaluated for RMS, peak, peak-peak and crest factor which is shown as the measurement value on the screen. These measurements can be used to detect and identify machine imbalances which can lead to e.g. bearing damage.

Apart from a Hold function which freezes the current measurement value, the device also includes a function to show the max value. During a session this function displays the highest measurement value acquired so far in addition to the current measurement value.

Another feature which consists of automatic evaluation of the measurement value with regards to the ISO standard 10816-3. When this feature is enabled the measurement value is compared against the three vibration thresholds described in the ISO standard and the current vibration severity zone is displayed through color coding of the value on the screen.

Fig. 1 Description PCE-VT 3700

1. Display
2. Function keys
3. Sensor connector
4. Vibration sensor
5. Magnet adapter

2.2 Function keys

Key	Description	Function
	ON/OFF	- Turn device on/off
	MENU	- Open main menu
	BACK	- Cancel, return, reset max. value
	OK	- Confirm
	HOLD	- Hold current measurement value
	UP	- Menu up
	DOWN	- Menu down
	RIGHT	- Menu right
	LEFT	- Menu left

2.3 Display (measurement screen)

1. Date & time
2. Battery charge
3. Measuring unit
4. Frequency range
5. Parameter
6. HOLD on/off
7. Measurement value
8. Max value
9. ISO group
10. Vibration severity zone

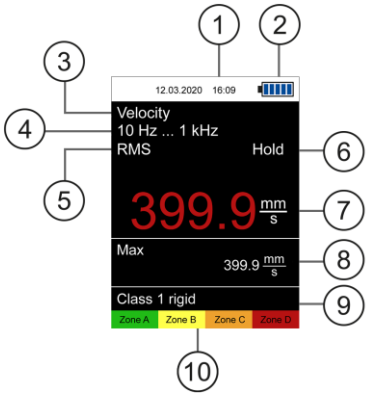

Fig. 2 Measurement screen

3 Specifications

3.1 Technical specifications

Vibration meter PCE-VT 3700		
Measurement range	Vibration acceleration Vibration velocity Vibration displacement	0,0 … 399,9 m/s² 0,0 … 399,9 mm/s 0,0 … 3,9 mm
Parameter	RMS, peak, peak-peak, crest factor	
Accuracy Reference frequency 160 Hz	± 2%	
Precision	Vibration acceleration Vibration velocity Vibration displacement	0,1 m/s² 0,1 mm/s 1,0 µm
Frequency range	Vibration acceleration Vibration acceleration Vibration velocity Vibration displacement	10 Hz … 10 kHz 1 kHz … 10 kHz 10 Hz … 1 kHz 10 Hz … 200 Hz
Menu language	English, German, French, Spanish, Italian, Dutch, Portuguese, Turkish, Polish, Russian, Chinese, Japanese	
Operating/storage conditions	Temperature: -20 °C … +65 °C Humidity: 10% RH … 95% RH non-condensing	
Power supply	3 x 1,5V AA batteries (DC)	
Dimensions	150 x 80 x 38 mm	
Weight (without batteries)	170 g	
Vibration sensor		
Resonance frequency	30 kHz	
Transverse sensitivity	≤ 5%	
Destruction limit	5000 g (peak)	
Operating/storage conditions	Temperature: -20 °C … +80 °C	
Housing material	Stainless steel	
Mounting thread	M5	
Dimensions	Ø 16 x 36 mm	
Weight (without cable)	35 g	

3.2 Delivery contents

- 1 x Vibration meter PCE-VT 3700
- 1 x Sensor with spiral cable
- 1 x Magnet adapter
- 3 x AA batteries
- 1 x Quick start guide
- 1 x Calibration certificate
- 1 x Service bag

3.3 Accessories

3.3.1 Magnet adapter PCE-VT-VMH

Instead of a stud bolt the magnet adapter PCE-VT-VMH can be used attach the sensor to magnetic surfaces.

3.3.2 Handle PCE-VT-HANDLE

The ergonomic handle which is attached to the sensor and spiral cable can be used in conjunction with the measuring tip to measure in inaccessible locations.

3.3.3 Measuring tip PCE-VT-NP

For inaccessible measurement locations or if only a quick, temporary measurement is sufficient, the measuring tip PCE-VT-NP can be used to perform these measurements. The measuring tip should be placed as vertical as possible on the measurement surface in order to receive accurate measurements.

3.3.4 Vibration calibrator PCE-VC20 / PCE-VC21

The vibration meter PCE-VT 3700 can be calibrated with the vibration calibrators PCE-VC20 or PCE-VC21.

3.3.5 Instrument case PCE-VT 3700 CASE

The instrument case PCE-VT 3700 CASE is used for safe storage and transport of the vibration meter and its accessories.

4 Getting started

4.1 Power supply

Three AA-batteries are used to power the vibration meter. The battery compartment is on the back of the device. The device should be turned off before the batteries are replaced. In order to replace the batteries, the two screws which hold the cover in place need to be removed. Afterwards the cover can be removed so the batteries can be inserted in the compartment. The compartment can then be closed by installing the cover and fastening the two screws.

The current battery level is displayed in the top right corner of the screen. If the battery charge is insufficient for proper operation of the device the device automatically powers off and the screen below is shown on the display.

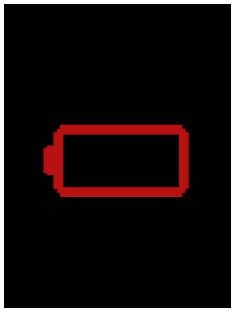

Fig. 3 Automatic power off

4.2 Preparation

Connect the sensor with the spiral cable to the vibration meter before turning it on. The knurled nuts should be tightened to ensure proper connection. In order to turn on the device, the *ON/OFF* button needs to be pressed until the screen backlight turns on and the start-up screen is shown. The start-up screen is shown for about 2 seconds and the device automatically switches to the measurement screen afterwards. The device is turned off by pressing the *ON/OFF* button until the screen backlight turns off. The following icon is displayed on the start-up screen if date and time need to be set:

Fig. 4 Set date & time

5 Menu

The main menu can be reached from any screen by pressing the *MENU* button. The arrow keys are used to navigate the menu items which can be activated with the *OK* button. The *BACK* button is used to return from sub menus. The main menu consists of the sub menus *Measurement*, *Calibration*, *Settings* and *Info* which are explained in detail below.

5.1 Measurement

The sub menu *Measurement* is used to configure the different options of the vibration measurement: *Measuring unit, parameter, ISO evaluation, display max value*.

5.1.1 Measuring unit

The measuring unit and the respective frequency range can be adjusted with this menu. The options include acceleration a (10 Hz … 10 kHz), acceleration a (1 kHz … 10 kHz), velocity v (10 Hz … 1 kHz) and displacement d (10 Hz … 200 Hz). This sub menu can also be directly accessed from the main screen by pressing the left arrow key .

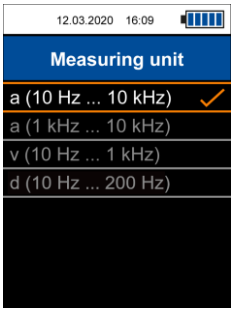

Fig. 5 Measuring unit

5.1.2 Parameter

This sub menu is used to adjust the metric of the measured vibration which is displayed as the measurement value on the main screen. It is possible to switch between RMS, peak, peak-peak and crest factor. This sub menu can also be directly accessed from the main screen by pressing the right arrow key .

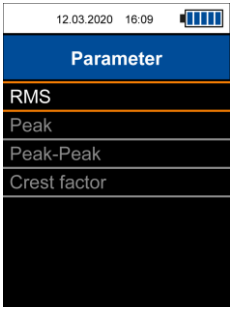

Fig. 6 Parameter

5.1.3 ISO evaluation

In order to enable the automatic evaluation of the current measurement value according to the ISO standard 10816-3, the measuring unit vibration acceleration or vibration velocity in conjunction with the parameter RMS need to be selected. This is necessary since the ISO standard only lists valid vibration severity thresholds for these two combinations. After the correct measurement options were set, the appropriate option for the machine to be measured (group 1 or 2, rigid or flexible mounting) can be selected in this sub menu.

When this function is enabled, the name of the enabled group is displayed at the bottom of the main screen together with four color coded items which represent the four vibration severity zones. The current measurement value shown on the screen is compared against the thresholds described in the ISO standard and is automatically color coded according to the thresholds. Additionally, the item which represents the current zone flashes periodically so the vibration severity can be quickly determined.

If the automatic evaluation is currently enabled and an incompatible measuring unit (acceleration) or parameter (peak, peak-peak, crest factor) is activated, the evaluation function is automatically disabled and a corresponding hint is displayed on the screen.

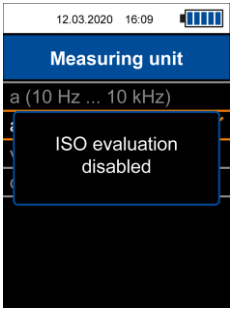

Fig. 7 Hint ISO evaluation disabled

As described previously the automatic evaluation function requires the measuring unit velocity or displacement in conjunction with the parameter RMS. Otherwise the menu to enable this function cannot be opened and the following hint is displayed on the screen.

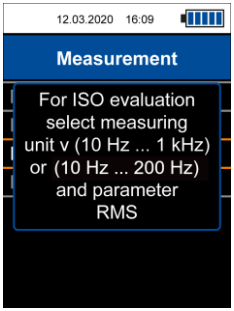

Fig. 8 Hint for activation of ISO evaluation

Machine groups:

- Group 1: Large machines with nominal power > 300 kW;
  Electrical machines with shaft height > 315 mm

  These machines generally have plain bearings and the rated/operating speeds range from 120 RPM to 15,000 RPM.

- Group 2: Machines with nominal power between 15 kW and 300 kW;
  Electrical machines with shaft height between 160 mm and 315 mm.

Vibration velocity		Group 1		Group 2	
mm/s	in/s	rigid	flexible	rigid	flexible
> 11.0	> 0.43	D	D	D	D
7.1 ... 11.0	0.28 ... 0.43		C		
4.5 ... 7.1	0.18 ... 0.28	C	B		C
3.5 ... 4.5	0.14 ... 0.18	B		C	B
2.8 ... 3.5	0.11 ... 0.14		A		
2.3 ... 2.8	0.09 ... 0.11			B	
1.4 ... 2.3	0.06 ... 0.09	A			A
< 1.4	< 0.06			A	

Vibration severity zones for vibration velocity according to ISO standard 10816-3

Vibration displacement		Group 1		Group 2	
µm	mil	rigid	flexible	rigid	flexible
> 140	> 5,51	D	D	D	D
113 ... 140	4,45 ... 5,51		C		C
90 ... 113	3,54 ... 4,45				
71 ... 90	2,80 ... 3,54	C	B	C	B
57 ... 71	2,24 ... 2,80				
45 ... 57	1,77 ... 2,24	B	A	B	A
37 ... 45	1,46 ... 1,77				
29 ... 37	1,14 ... 1,46				
22 ... 29	0,87 ... 1,14	A		A	
< 22	< 0,87				

Vibration severity zones for vibration displacement according to ISO standard 10816-3

5.1.4 Display max value

This sub menu is used to activate the display of the max value function. When enabled the max value during a measurement session is displayed under the current measurement value. The *BACK* button can be used to reset the max value.

5.2 Calibration

A vibration calibrator capable of generating a reference vibration of 10 mm/s RMS at 159,2 Hz (e.g. PCE-VC20 or PCE-VC21) is required for the calibration of the vibration meter. The calibration can be started with the sub menu *Calibration.* The first screen shows the hint regarding the required reference vibration and the sensor of the vibration meter needs to be mounted on the vibration calibrator.

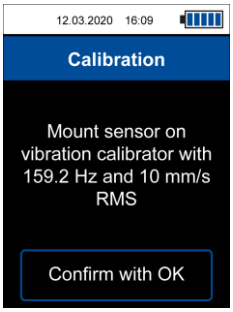

Fig. 9 Hint for required reference vibration

After the vibration calibrator was turned on, the calibration can be continued with the *OK* button. This leads to the calibration screen. This screen again shows the characteristics of the required reference vibration at the top, followed by the current measurement value of the device in a green font with the unit mm/s. It is not necessary to adjust the device measurement parameters specifically for the calibration as only the RMS value of the vibration velocity is evaluated during this procedure.

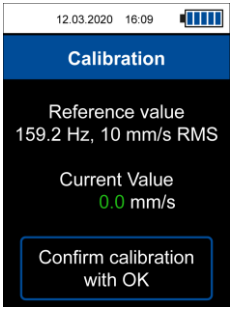

Fig. 10 Calibration screen

HINT: Verify that the required reference vibration is generated by the vibration calibrator before the calibration is performed!

If the current measurement value compared against the reference vibration exceeds the desired tolerance, the device can perform a calibration which can be started by pressing the *OK* button on the calibration screen and confirming the subsequent dialog.

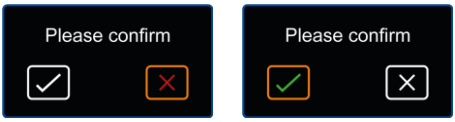

Fig. 11 Confirmation dialog

The calibration is performed autonomously by the device and should take less than 5 seconds. After the calibration was finished a pop-up is displayed on the screen with the hint that the calibration was successful as confirmation. Afterwards a short delay the device returns to the main measurement screen.

5.3 Settings

5.3.1 Units

The measurement unit can be switched between the metric system and imperial units.

5.3.2 Date & time

This menu is used to change the date and time which is displayed in the status bar at the top of the screen. The date format can also be changed.

5.3.3 Display brightness

The screen backlight intensity can be adjusted from 10% to 100%.

5.3.4 Language

This menu is used to switch between different menu languages. Available languages include English, German, French, Spanish, Italian, Dutch, Portuguese, Turkish, Polish, Russian, Chinese and Japanese.

5.3.5 Auto power off

This option enables the auto power off function. Available time periods include 1 minute, 5 minutes and 15 minutes. After the set time period has elapsed, the device will automatically turn off and any button press will reset the timer. It is also possible to disable the auto power off function.

5.3.6 Device reset

This menu is used to reset the device to factory settings. Device settings are separate from the calibration and each can be reset individually by selecting the corresponding menu item.

A reset of the device settings will load default measurement parameters and reset any remaining menu option to the factory default values. A calibration which may have been performed beforehand is retained.

HINT: If a reset of the calibration is performed, the previously performed calibration will be deleted and a default value for the sensor sensitivity will be selected. It is recommended to perform a calibration after the reset.

The reset must be confirmed via the subsequent confirmation dialog when one of the reset options is selected. The device will perform a restart after the reset has been performed.

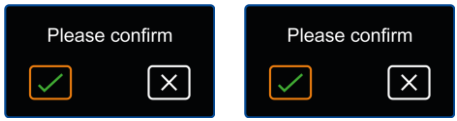

Fig. 12 Confirmation dialog

5.4 Manual

This sub menu leads to a screen with a QR code. This code can be decoded with a suitable scanner like e.g. a mobile phone and it contains a link which directly leads to the manual of the PCE-VT 3700 for easy access.

5.5 Info

This sub menu shows a screen with the device name and firmware version.

6 Operation

6.1 Measurement screen

After turning on the device, the main measurement screen is displayed. The mechanical vibration is converted by the sensor into an electrical signal which is subsequently evaluated according to the measurement settings. The result is displayed as the measurement value on the screen and is continually updated with the current value.

Default measurement settings (first start or after reset of device settings) consists of the RMS value of vibration velocity in mm/s. When measurement settings are adjusted via the menu, the changes are applied when the screen is returned to the measurement screen and the changes are reflected on the display accordingly.

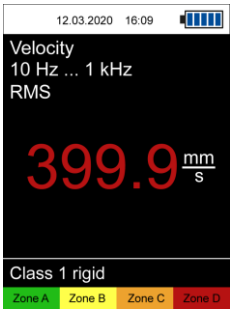

Fig. 13 Measurement screen

6.2 Preparation

Depending on the application and machine to be measured, the desired measurement settings need to be set with the menu. These settings include measuring unit, parameter, units and possibly ISO evaluation or max value.

6.3 Perform measurement

The sensor needs to be attached the desired position to perform a measurement. It can be mounted either with a stud bolt or the magnet adapter. If the measuring tip is used in conjunction with the sensor instead of either mounting option, the sensor should be placed as vertical as possible on the measurement surface in order to receive an accurate result.

The measurement is performed continuously by the device when on the main measurement screen and no further user input is required.

If the ISO evaluation function is enabled, the current measurement value is color coded with regards to the selected thresholds. Additionally, the corresponding vibration severity zone at the bottom of the display flashes periodically which allows for quick identification of the current vibration severity.

7 Warranty

You can read our warranty terms in our General Business Terms which you can find here: https://www.pce-instruments.com/english/terms.

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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Specifications are subject to change without notice.