USER MANUAL

THICKNESS GAUGE

PCE-TG 75A / 150A

ENGLISH



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

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.

TECHNICAL SPECIFICATIONS

Model	PCE-TG 75A	PCE-TG 150A
Measurement range	1,00 ... 225,0 mm	1,00 ... 300,0 mm
Operating memory	500 readings	1500 readings
Probe selection	no	yes
Operating frequency	5 MHz	5 MHz / 2,5 MHz
Accuracy	±(0,5 % H*+0,05) mm	
Sound velocity setting range	1000 ... 9999 m/s	
Operating temperature	0 ... 40 °C	
Power supply	3 x 1,5 V AA Battery	
Dimensions	163 x 82 x 38 mm	
Weight	320 g	

*H refers to the material thickness of the sample

MODELS

Models	Included probe
PCE-TG 75A	PCE-TG 5M10d
PCE-TG 150A	PCE-TG 5M10d PCE-TG 5M6d
PCE-TG 150A F25	PCE-TG 2.5M
PCE-TG 150A HT	PCE-TG HT

PROBES

Probes	Specifications	
PCE-TG 5M10d	Application	Standard probe for flat materials, pipes with a radius >10 mm
	Frequency	5 MHz
	Diameter	10 mm
	Temperature range	-10 ... 60 °C
PCE-TG 5M6d	Application	Standard probe for flat materials, pipes with a radius >6 mm
	Frequency	5 MHz
	Diameter	6 mm
	Temperature range	-10 ... 60 °C
PCE-TG 2.5M	Application	Thickness measurement of cast materials
	Frequency	2,5 MHz
	Diameter	12 mm
	Temperature range	-10 ... 60 °C
PCE-TG HT	Application	Measurement of the material thickness of hot components
	Frequency	5 MHz
	Diameter	10 mm
	Temperature range	-10 ... 350 °C

OPTIONAL ACCESSORIES

Item number	Description
TT-GEL	Ultrasonic coupling gel
K-GEL	Coupling gel for temperatures of up to 350 °C / 662 °F (100 ml)
PCE-TG 5M10d	Standard probe for PCE TG 75A and PCE-TG 150A series, 5 MHz, Ø10 mm / 0.29“, 1 ... 225 mm (PCE-TG 75A), 1 ... 300 mm (PCE-TG 150A), -10 ... 60 °C / 14 ... 140 °F
PCE-TG 5M6d	Miniature probe for PCE-TG 150A, 5 MHz, Ø6 mm / 0.24“, 1 ... 50 mm, -10 ... 60 °C / 14 ... 140 °F
PCE-TG 2.5M	2.5 MHz probe for PCE-TG 150A, Ø12 mm / 0.47“, 1.2 ... 300 mm, -10 ... 60 °C / 14 ... 140 °F
PCE-TG HT	High-temperature probe for PCE-TG 150A, Ø10 mm / 0.29“, 1.2 ... 300 mm, -10 ... 350 °C / 14 ... 662 °F
PCE-BAG M	Universal bag for meters: inside size M (190 x 120 x 70 mm / 7.48 x 4.72 x 2.76”) black/blue

SYSTEM DESCRIPTION

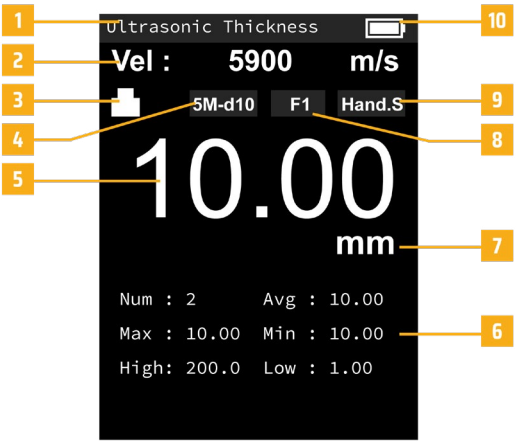
The PCE-TG 75A / PCE-TG 150A is a thickness gauge that measures the speed of ultrasonic waves and can thus determine the thickness of materials accurately and non-destructively. The meter can also be used to detect corrosion damage to piping and pressure vessels of production equipment. It can also be used in manufacturing, metal processing and cargo inspection. The meter is suitable for the thickness measurement of any homogeneous material that transmits ultrasonic waves at a constant rate and reflects them off the back of the material.

Applications
This meter can be used to measure the thickness of any good ultrasonic conductor with parallel top and bottom, such as metal, plastics, ceramics and glass. Materials such as aluminium, copper, gold, resin, etc. are not suitable for this measuring instrument!

Measuring device
1 - Display
2 - Function keys
3 - Calibration block
4 - Battery compartment
5 - Sensor socket



Display
1 - Title bar
2 - Sound velocity
3 - Coupling symbol
4 - Selected probe
5 - Measured value
6 - Measurement information
7 - Unit
8 - Selected file
9 - Selected storage method
10 - Battery level



Function keys

Key	Designation	Function
	On/Off & Menu	Press and release to turn on the meter Press and hold to turn off the meter Press and release to open the menu
	Change	Change between different materials
	Back	Cancel, back, exit
	OK	Confirm
	Up	Navigate up, increase value
	Down	Navigate down, decrease value

GETTING STARTED

Power supply
Three 1.5 V AA batteries are required for power supply. The battery compartment is located on the back of the instrument and is secured with two screws. Before replacing the batteries, switch off the device. Loosen the screws, lift off the cover, insert the batteries as marked and close the battery compartment again by tightening the screws.

First use
Before switching on the instrument, insert the probe into the probe socket of the instrument. To start the meter, press the on/off & menu key until the display shows the name of the meter. The interface for measuring the sound velocity will then open. The thickness of the material is determined by measuring the sound velocity. The measurement can be started here.

MENU

The menu of the meter can be reached by pressing the menu key after startup. With the arrow keys, you can navigate through the menu. You can confirm your selection with the OK key. To navigate one step back, press the back key.

Measure
In this menu item, make the measurement settings:
» Material to be measured (sound velocity)

» Unit of measurement m/s (unit)

» Resolution

Probe (PCE-TG 150 only)
In this menu item, select the probe you want to use for the measurement.

Limit
In this menu item, make the limit value settings:
» Set the upper and lower limit value for the measurement

» Enable or disable the alarm for exceeded limit values

Memory
Measurement processes can be saved and started under this menu item. If you activate Auto save, all measuring processes are saved automatically.
» Select a directory in which the measurement is to be saved.

» View saved data

» Delete the data of the selected file

Analyze
Under this menu item, you can display the saved data in the form of a graph.
» You can view basic information such as the data number, the maximum value, the minimum value and the average value

» You can enlarge the diagramme

» Use the cursor to view a certain data value

Settings
Make further settings in the meter:
» Language

» Automatic power off time

» Key tone

» Backlight brightness

» Colour

» Software version number

» Factory reset

SUBMENU

Operation
Enter the submenu:
» Press the back key in the measuring interface to open the submenu.

Select menu item:
» Press the up and down keys to change between the menu items

Opening the selected menu item:
» Press OK to enter the selected menu item

Leave menu item:
» Press the back key to leave the menu item

Functions of the submenu
Save:
» Save current readings to the selected file

Clear:
» Delete readings and measuring information

Calibration (Cal):
» See calibration instructions for details

Sound velocity calibration (V.Cal):
» See Sound velocity calibration (V. Cal) for details.

MEASUREMENT

Apply the TT-Gel evenly to the surface to be measured. Place the probe onto the surface covered with the coupling agent.

Clean surface
Before the measurement, the surface of the object to be tested should be cleaned of dust, dirt and rust. Coatings such as paint must also be removed.

Reducing the roughness
Rough surfaces can cause measurement errors or missing readings. Before the measurement, the material surface should be made as smooth as possible by grinding, polishing or using a high-viscosity coupling agent.

Rough surfaces due to heavy machines
Regular fine grooves which occur, for example, during production with lathe machines and planers can also cause measurement errors. The corrective measure is the same as in Reducing the roughness. In addition, a better result can be obtained by adjusting the angle using the silver marking on the centre of the probe head and the fine grooves of the material to be tested (orthogonal or parallel to the marking).

Measurement of a round surface
To measure a round surface such as a pipe or an oil barrel, it is important to set the angle between the silver line of the probe and the axis of the material to be tested. In short, the mark in the sensor head must be kept parallel or perpendicular to the axis of the material under test. Slowly move the probe head perpendicular to the axis across the material under test and the values on the display will change regularly. The lowest reading displayed is the minimum thickness of the material being measured.
The direction in which the probe is guided depends on the curvature of the material. For large diameter pipes, the mark in the probe head should be perpendicular to the pipe axis; for smaller diameter pipes, the mark in the probe head can be parallel or perpendicular to the material axis. The lowest reading is saved as the measured value.

Measurement of composite material
When measuring composite shapes (such as pipe elbows), the method described in Measurement of a round surface can be used. However, the measurement must be carried out twice to obtain two readings. The silver line of the probe must be vertical or parallel to the axis. The lower value is used as the measured thickness.

Non-parallel surfaces
To obtain a satisfactory result, the surface of the material to be tested must be parallel or coaxial to the surface of the sensor, otherwise measurement errors will occur or no reading will be obtained.

Effects of the material temperature
The material thickness and the transmission speed of ultrasonic waves are influenced by the temperature. To achieve high measurement accuracy, measure samples of the same material under the same temperature conditions. In case of steel, high temperatures cause strong measurement errors (measured values are lower than the actual data).

Damping materials
Materials with fibres, pores and coarse particles cause strong scattering and energy attenuation of the ultrasonic waves, resulting in abnormal readings or even missing readings (usually the abnormal reading is lower than the actual thickness). In this case, the material is not suitable for testing with this thickness gauge.

Reference examples
A material of known thickness or sound velocity is used to calibrate the meter. At least one reference sample is required to calibrate the instrument. The ultrasonic thickness gauge is equipped with a calibration block with a thickness of 4.0 mm / 0.16". Refer to the calibration instructions this manual for the calibration method.

CALIBRATION

Calibration instructions

» Press the back key when you are in the measuring interface, select the menu item Calibration and confirm this selection with the OK key.

» The display will look as shown in the image to the right.

» During the measurement, the sound velocity is automatically set to 5900 m/s.

» Press the probe onto the calibration block to calibrate the meter.

Sound velocity calibration (V. Cal)

» Enter the submenu and select the item Sound velocity calibration (V.Cal).

» The display will look as shown in the image to the right.

» As shown in the image, press the up and down keys to set the value.

» When the value has been adapted, press OK to complete the calibration.

MAINTENANCE

Cleaning

Alcohol and thinner can damage the housing, especially the display. Therefore, only clean the meter with a damp cloth.

TROUBLESHOOTING

Very thin material

With any ultrasonic thickness gauge, measurement errors occur when the thickness of the material being tested is smaller than the lower limit of the probe. When measuring ultra-thin materials, an error called double refraction sometimes occurs, where the measured value is twice the actual thickness. Another error is called pulse envelope and loop jump where the measured value is higher than the actual thickness. To avoid such errors, repeat the control measurement of critically thin material.

Rust stains and corrosion

Rust stains and corrosion pits on the surface to be measured will cause the readings to change irregularly or not at all in extreme cases; in addition, small rust stains are sometimes difficult to detect. If pits (blowholes) are found or suspected, be careful when measuring this area and place the silver line of the probe at different angles for several tests.

Incorrect material identification
If you have calibrated the instrument with one material and use it to test another material, an incorrect result will be displayed. Make sure to select the correct sound velocity. If the sound velocity in the current test has some deviation from the calibration, errors may also occur. Make an adjustment when using it.

Probe abrasion
The surface of the probe is made of acrylic resin. After prolonged use of the meter, the roughness of the probe surface increases, resulting in a decrease in accuracy. If the user can detect measurement errors caused by this, the probe surface can be polished with a little bit of sandpaper or 500 grit grindstone to smooth the surface and ensure parallelism. If the result is still incorrect, you may need to replace the probe.

Laminated material, composite material
It is not possible to measure uncoupled laminated materials because ultrasonic waves cannot penetrate the uncoupled space. Since ultrasonic waves cannot be transmitted at a constant velocity in composite materials, measuring instruments that measure thickness by ultrasonic reflection are not suitable for measuring laminated and composite materials.

Effects of oxide layers on surfaces
Some metals can form a dense oxide layer on the surface, for example aluminium. This oxide layer is firmly bonded to the substrate without an obvious boundary layer. However, the transmission speed of ultrasonic waves is different in these two substances, which causes errors.
Different oxide layers cause different errors that the user should be aware of. You can use a piece of the same material the thickness of which you have checked with a gauge to calibrate the meter.

Use and selection of the coupling agent
Coupling agent is used to transmit high frequency ultrasonic waves between the probe and the material being tested. The wrong coupling gel or improper use can lead to errors or failed measurements. It should be used in appropriate amounts and applied evenly.

The coupling agent is usually applied to the surface of the material under test. If the temperature is too high, the coupling agent is applied to the bottom of the probe.
Only PCE Instruments coupling gel should be used.

DISPOSAL

For the disposal of batteries in the EU, the (EU) 2023/1542 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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