

USER MANUAL

MAGNETIC FIELD METER

PCE-MFM 38xx Series



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.

SCOPE OF DELIVERY

- 1 x PCE-MFM 3800 Series Handheld Magnetic Field Meter
- 1 x Sensor
- 1 x USB-C Cable
- 1 x User Manual
- 1 x Carrying Case

Handheld device	Sensor
PCE-MFM 3800	Transverse probe
PCE-MFM 3810	Axial probe
PCE-MFM 3820	Transverse + axial probe

TECHNICAL SPECIFICATIONS

Measured parameters	magnetic flux, temperature
Measurement range	Magnetic flux: DC: 0 ... ± 3500 mT AC: 10 ... 3500 mT AC frequency: 10 ... 50 Hz Optional automatic detection of AC/DC magnetic flux or manual setting of AC/DC magnetic flux
Resolution	0,01 mT
Accuracy	DC: 0 ... 2400 mT: ±1 % rdg 2400 ... 3500 mT: ±3 % rdg AC: 10 ... 2400 mT: ±1 % rdg 2400 ... 3500 mT: ±3 rdg
Magnetic flux units	milliTesla: mT Gauss: G Ampere per centimeter: A/cm kA/m Oersted: Oe Weber per square meter: WB/m²
Temperature measurement	
Measurement range	0 °C ... 80 °C / 32 °F...176 °F
Resolution	0,1 °C / 0,18 °F
Accuracy	±0,4 °C
Temperature units	°C / °F

General	
Display	2.8-inch TFT colour display
Data logger	100 measurement series, each with up to 21,000 data points
Measurement modes	hold, maximum and average functions
Menu languages	English, German, French, Spanish, Italian, Dutch, Portuguese, Turkish, Polish, Russian, Chinese, Danish, Japanese
Interface	USB-C for online measurement and to read out internal memory
Protection class	IP 52
Power supply	internal: rechargeable LiPo battery (3.7 V, 2500 mAh) external: USB 5 VDC, 500 mA
Operation time	approx. 24 h, depending on display brightness and use of the datalogger
Operating and storage conditions	temperature: -20 ... +65 °C / -4 ... 149 °F humidity: 10 ... 95 % RH, non-condensing

SYSTEM DESCRIPTION

Device

- 1 - Connection socket
- 2 - Display
- 3 - Membrane keyboard
- 4 - USB interface
- 5 - Axial sensor
- 6 - Transverse sensor



Function keys

Key	Description	Function
	On/Off	Switch device on/off
	Menu	Open main menu
	Back	Cancel, Back, Reset maximum value
	OK	Confirm, Switch hold on/off
	Rec	Open data logger dialog
	Up	Navigate upwards, switch upwards between numerical, statistical, and graphical views
	Down	Navigate downwards, switch downwards between numerical, statistical, and graphical views
	Right	Navigate to the right, Select automatic or manual mode, Increase the measuring range in manual mode
	Left	Navigate to the left, Select automatic or manual mode, Reduce the measuring range in manual mode

Display

Use the UP or DOWN navigation keys to display three different views:

Numerical view, Graphical view, Statistical view. Use the LEFT or RIGHT navigation keys to select either the automatic or manual range.

Numerical view

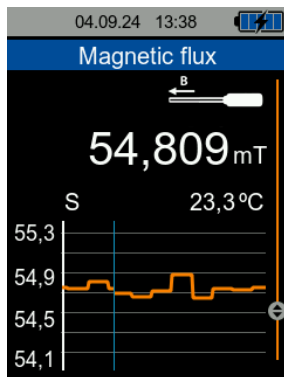
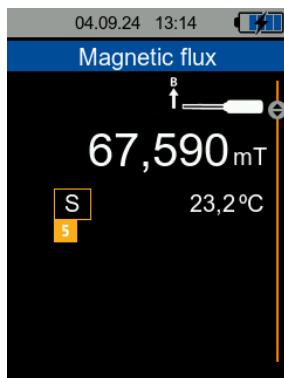
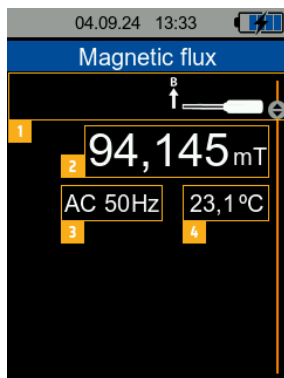
1 - Sensor type display (Axial: left arrow, Transverse: up arrow)

2 - Current magnetic flux value and the unit selected for the measurement

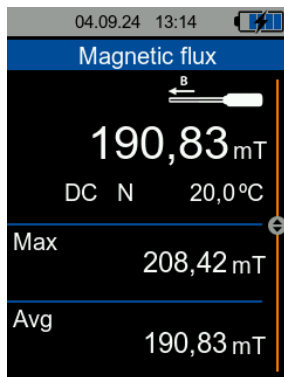
3 - AC magnetic flux reading and its frequency

4 - Current temperature and the unit selected for the measurement

5 - DC magnetic flux reading and the polarity of the measured DC magnetic flux signal (North = N, South = S)



Graphical screen



Statistical screen

GETTING STARTED

Power supply

The meter is powered by an internal rechargeable LiPo battery. With a fully charged battery, an operating time of approximately 20 to 24 hours is possible, depending on the brightness of the display and the use of the data logger. The battery is charged via the USB socket at the bottom of the meter, using a suitable USB charger.

The current charge level of the battery is displayed in the status bar at the top right. When the battery charge level is insufficient for proper operation of the instrument, the meter automatically switches off and displays the screen shown below.

The magnetic flux sensor is connected by simply plugging it into the socket provided at the top of the device. It is disconnected by pulling the plug, touching the ribbed surface to release the plug connection.

Power on/off

The meter is turned on by pressing the ON/OFF key. When the device is powered on, the start screen appears for approximately 1 second before the device enters the measurement screen.

To turn off the meter, press and hold the ON/OFF key. A dialogue with a countdown will then appear on the display to indicate that the instrument is about to power off.

OPERATION

The main menu can be accessed at any time by pressing the MENU key. Use the arrow keys to navigate between menu items, which can be activated with the OK key. To exit submenus, press the BACK key. The main menu of the PCE-MFM 3800 consists of the following submenus: Measurement, Data Logger, Settings, Calibration, Manual, and Info.

Measurement menu: Units

Selection of the units used in magnetic flux and temperature measurement.

Measurement menu: Set Zero function

This function resets the current measurement values for:

- » Magnetic flux
- » Temperature
- » Maximum and average values
- » Chart values

Measurement menu: Auto zero at boot

The device performs a setting to zero after powering on the device.

Measurement Menu: Mode

In this menu option, you can select whether to measure **DC magnetic flux** or **AC magnetic flux**.

If you select **Automatic**, the device automatically detects the type of magnetic flux being measured by the probe and displays it on the screen. For AC magnetic flux, the screen displays AC and the AC frequency; for DC magnetic flux, it displays DC and the polarity. (N = North; S = South)

Measurement View

The measured values are displayed in three different views: the numerical view, the graphical view, and the statistics view (with maximum and average values). You can switch between the views using the UP and DOWN arrow keys. In the **Display** section, you can see the various display formats for the magnetic flux and temperature values.

The following table shows the possible formats for displaying the measured parameters.

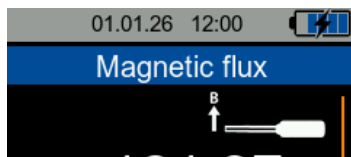
	Magnetic flux	Temperature
Numerical	Magnetic flux value	Temperature value
Statistical	Maximum and average value of the magnetic flux	
Graphical	Magnetic flux value	

Using the LEFT or RIGHT key, you can select the measurement range in the chosen unit for manual range mode or select auto range. If the magnetic flux exceeds the upper limit of the measurement range in manual mode, an **OVERFLOW** indicator will be displayed on the screen.

The following table shows the available measurement ranges.

	Minimum value	Maximum value
Auto range	Auto range	Auto range
Range 1	0	10
Range 2	10	100
Range 3	100	1k
Range 4	1k	10k
Range 5	10k	100k
Range 6	100k	1M
Range 7	1M	10M

The selected sensor type is displayed below the range bar. If the arrow points to the left, the axial Hall probe is selected; if the arrow points upward, the transverse Hall probe is selected.



Data logger menu

The Data logger of the instrument allows to record all measured parameters. The time period as well as the memory interval can be freely configured with the help of this menu.

Data logger menu: Start condition

The data logger can be started either manually by pressing a key while you are in the data logger dialogue or automatically from a date that is set in this menu.

Data logger menu: Stop condition

Three different options are available for stopping the data logger. It can be stopped manually by pressing a key when you are in the data logger dialogue, on a certain date or after an adjustable time interval.

Data logger menu: Interval

The time interval for saving the measured values can be set to a value between 1 and 59 seconds via an input dialogue.

Data logger menu: Records

In this menu, all saved records are displayed and by selecting a record, information on the start and stop time as well as the number of saved data points are displayed. One data point reflects the one-time storage of all measured parameters.

Data logger menu: Delete all

By selecting this menu item and confirming via the dialogue, all saved data records are deleted.

Data logger dialogue

The data logger dialogue can be opened in any screen via the REC key and shows the current settings as well as the status of the data logger. When the dialogue is open, a recording can be started or stopped at any time by pressing and holding OK. In addition, the data logger menu opens when the dialogue is open and the MENU key is pressed.

Settings menu: Decimal separator

Either a dot or a comma can be selected as the decimal separator for measured values.

Settings menu: Date & time

The date and time can be set in this menu. In addition, the date and time format can be selected.

Settings menu: Display

The display brightness can be adjusted between 50 and 100 %. In addition, an automatic dimming function can be activated. After the set time, the display is dimmed to a lower brightness to save power. Pressing any key resets the brightness to the originally set value.

Settings menu: Language

The following menu languages are available: English, German, French, Spanish, Italian, Dutch, Portuguese, Turkish, Polish, Russian, Chinese, Japanese and Danish.

Settings menu: Auto power off

This option can be used to activate an automatic power-off function for the device. If Auto power off mode is activated, the instrument switches off when no key has been pressed for a certain period of time. You can select 1 minute, 5 minutes or 15 minutes. In addition, automatic poweroff can be completely deactivated.

When no entries have been made for the time set in the auto power off option in the settings menu, the meter will turn off automatically to save energy. If you wish to use the meter again after automatic power off, press the ON/OFF key to turn it back on.

Settings menu: Factory settings

The Factory settings menu allows the device to be reset to its factory settings.

When making this reset, the default values for the calibration, the measurement parameters and the menu options are restored.

Since the calibration is also reset, this menu is protected by a code.

Please get in touch with PCE Instruments for a factory reset. You will find our contact details at the end of the manual.

Manual

A QR code is displayed in this menu. The QR code can be scanned with an appropriate reader such as a mobile phone and leads directly to this user manual.

Info

This menu shows the instrument model name, serial number and firmware version.

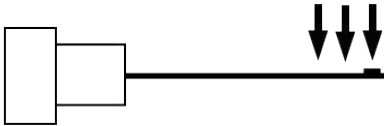
MEASUREMENT

Preparation

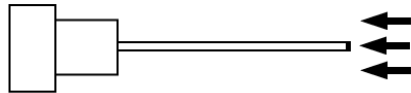
Before starting a new measurement, select the unit for measuring the magnetic flux.

Unit description	Unit
milliTesla	mT
Gauss	G
Kiloampere per meter	kA/m
Ampere per centimeter	A/cm
Oersted	Oe
Weber per m ²	Wb/m ²
Celsius	°C
Fahrenheit	°F

Make sure the sensor has reached the environmental temperature. Place the tip (Hall sensor) in the centre of the magnetic field you wish to measure. The farther the sensor is from the centre of the magnetic field, the lower the magnetic flux density will be. As shown in the picture below, the transversal sensor must be positioned vertically to the flux vector. Allow some time for the reading to stabilise. If the display shows **OVERFLOW**, the measured value is outside the measurement range.



Alignment of the transverse sensor



Alignment of the axial sensor

The maximum magnetic flux density is measured when the flux vector (see arrows) is perpendicular to the sensor plane. The following table shows the measurement deviation based on the angle between the flux vector and the sensor plane.

Sensor's angle to the flux vector	Deviation in %
10°	2,5%
20°	7%
30°	15,2%
45°	30,3%

SET ZERO

Place the sensor probe in a place far away from any magnetic flux source.
There are two methods to reset the measurement to zero:

Using Set Zero in the measurement menu:

This option allows you to set the current measured value to zero. To use this feature, select the Set zero option in the measurement menu. When you press the OK key, a dialogue will appear on the screen to confirm if you want to perform the set to zero operation.

Use the LEFT or RIGHT navigation keys to choose an option and then press the OK key.

Using the BACK key:

It is possible to perform a zero adjustment by pressing the BACK key for 2 seconds in any measurement screen.

Using the Auto zero at boot option

This option performs an automatic zero operation when the device is powered on, if it has been selected. After powering on, the device checks if the magnetic flux around the sensor probe is below 0.4 mT. If the magnetic flux is higher than this level, a dialogue will appear on the screen.

If you move the sensor probe to an area where the magnetic flux is below 0.4 mT, the auto zero operation will be performed.

Hold measurement

You can hold the current measurement value by pressing and holding the OK key for 1 second on any measurement screen. When the hold option is activated, **Hold** will appear in the centre at the top of the screen, below the range bar. The measurement is paused and the values from the last measurement are retained on the screen.

Taking a Measurement

After you have set all parameters, press the BACK button to return to the measurement screen. Place the sensor in the magnetic field you want to measure. The measurement screen displays the magnetic flux and temperature values.

Use the UP or DOWN navigation buttons to view three different screens:

- » Numerical screen
- » Graphical screen
- » Statistical screen

Polarity indication

The meter can display the direction of the magnetic field lines. If the magnetic field lines are aligned with the front side of the Hall sensor, the meter will display N next to the measured magnetic flux value. Conversely, if the magnetic field lines are aligned with the back side of the Hall sensor, the meter will display S next to the measured magnetic flux value.

If the meter detects an AC magnetic flux, it will change the polarity indication to AC and show the frequency of the detected AC magnetic flux.

SOFTWARE

The user manual for the PC software is included in the software. The software can be downloaded for free from our website.

CALIBRATION

The Calibration menu allows you to set a scaling factor that can be determined by calibration and is used to calculate the magnetic flux value.

Since a special measurement setup is required for calibration, this menu is protected by a code.

Please send the device to PCE Instruments for calibration after getting in touch with us. You will find our contact details at the end of the manual.

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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Subject to change without notice

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