

Operating Instructions Multi analyser ZadPad

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1. Safety Precautions, Warnings

Please read these safety precautions carefully before using your meter. This will help you to avoid damaging the product and prevent personal injury.



This symbol identifies important warnings which should be read in any case before initial startup of the Multi analyser ZadPad.



In the event of malfunctioning, switch the meter off immediately.

If the event that smoke develops or unusual occurs become apparent, which are caused by either the meter or the power pack, disconnect from mains power immediately and switch the device off in order to prevent possible fire. Continuing to operate the meter or the power pack after such malfunctions have occurred may result in severe injury. Please contact your local dealer or Fauser Elektrotechnik Service in order to eliminate malfunctioning.



Do not use the meter in proximity to flammable gases.

Electronic devices should never be used in proximity to flammable gases. Danger of explosion and fire is otherwise immanent.



Store the meter at a location which cannot be accessed by children.

The meter and its accessories include parts which can be swallowed. Make sure that these parts (e.g. housing covers, rechargeable batteries etc.) do not fall into the hands of children who might swallow them. Otherwise, danger of suffocation prevails.



Use suitable cables only.

Use included, original cables only for connection to external devices. Fauser Elektrotechnik assumes no liability if other cables are used.



Do not dismantle the meter.

Never touch any parts inside the housing. Injury may result. Do not repair the meter yourself. Repairs may only be conducted by appropriately trained personnel. If the meter's housing is damaged due to dropping or other external influences, contact your local dealer or Fauser Elektrotechnik Service for repair.



Avoid any and all contact with the liquid crystals.

If the display is damaged (e.g. broken), danger of injury due to contact with glass shards or discharge of liquid crystals exists. Make sure that skin, eyes and mouth do not come into contact with the liquid crystals.



Be careful when handling rechargeable batteries.

The ZadPad includes a rechargeable Lithium Ion battery. Rechargeable batteries may leak or explode if handled incorrectly. Please adhere to the following safety precautions:

- Never short-circuit rechargeable batteries, and never attempt to open a rechargeable battery.
- Do not expose rechargeable batteries to excessive heat or open fire.
- Do not expose rechargeable batteries to moisture and never immerse rechargeable batteries in water.
- Only use the included original charger. Never use other chargers.
- Never charge batteries unattended!
- Never charge in the vicinity of combustible material or gases.
- Never charge longer than 6 hours.

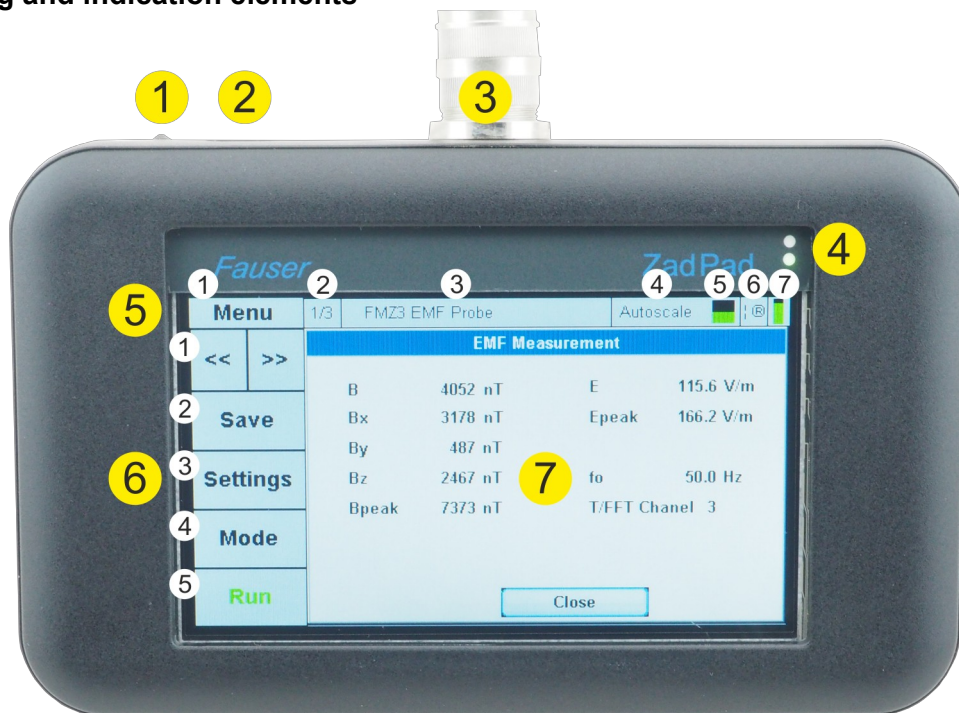
2. Introduction

ZadPad is a measuring device for different physical metrics, selectable via the attached probes. Fast and precise data acquisition and high-performance processing power offer extensive possibilities of data acquisition and analysis for a hand-held measuring device.

Also time and frequency domain analysis of the measurement signals are displayed as a chart. The measurement data can be saved on the internal USB drive.

3. Device description

3.1. Operating and indication elements



❶ On/Off button

❷ USB port (micro-B-USB)

For connecting the ZadPad with a PC for data transmission and battery charging

❸ Sensor connector

For inserting the various measuring probes.

❹ Control LEDs (Charging indicator LED red, Function LED tricolor)

Touch display functions:

❺ Header info screen

❶ Menu

❷ Page info

❸ Probe info

❹ Y Scale

❺ Recording level indicator

❻ USB Remote indicator

❼ Battery voltage indicator

⑥ Main buttons:

- ① << >> Page switch buttons
- ② **Save** button
- ③ **Settings** button
- ④ **Mode** button
- ⑤ **Run** button

⑦ Measurement windows:

Values <> Time graph <> Frequency graph

3.2. Turn on/off

The ZadPad is turned on through the **On/Off** button ① and turned off by *Menu* → *Off*. If no software turn off is possible, the **On/Off** button can be pressed for 5 seconds.

If no key is pressed for the selected Auto-Power-Off time or the battery falls to minimum voltage ZadPad turns off automatically.

3.3. Charging the battery and battery indicator

The ZadPad has a rechargeable Lithium Ion battery. The operating time significantly depends on use and settings (e.g. backlight). Operation time is between 5 and 20 hours.

The battery voltage level is shown in the *Header info screen* ⑤.

Charging is done through the USB port ② with the attended power supply of 5 V/1500 mA.

Never use other chargers; this may lead to damage the ZadPad. Never charge in the vicinity of combustible material or gases. Never charge batteries unattended!

Recharge device approximately every 6 months in case of prolonged non-usage.

Charging is done once the charger is plugged in; this is visible through the light of charging indicator-LED ④. The charging time is approximately three hours for a discharged battery. The charging indicator turns off after completion of charging.

When any fault condition occurs, the charging indicator LED blinks at 1 Hz. In this case disconnect the charger immediately.

3.4. Connecting the Sensor

For field strength measurement the FMZ3 or FMZ30 field probe has to be plugged into the *Sensor connector* ③.

The connected probe is shown in the *Header info screen* ⑤ and the value display ⑦ is adapted..

3.5. Header info screen

The *Header info screen* ⑤ shows the status informations. Clicking the **Menu** opens the menu functions.

3.6. USB Remote Anzeige

The status of the USB interface and the remote function is shown in the USB Remote indicator.

USB Status:

| USB connection missing
| connection established
|| switches USB connection active

Remote Status:

Ⓡ Remote Mode active
Ⓢ Remote Control is running

3.7. Main buttons

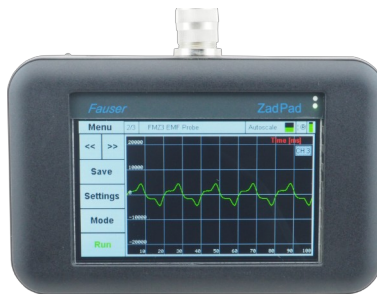
The *Main buttons* Ⓣ functions:

Page switch buttons << >> select the different pages of the *Measurement window* Ⓡ.

In the time graph and frequency graph, the measurement channel displayed can be selected using the **Ch** button (Ch1 Bx, Ch2 By, Ch2 Bz, Ch4 E).



Values



Time graph



Frequency graph

Save button saves the data from the last measurement.

Settings button opens the quick menu for X Scale and Y Scale selection.

Mode button opens the quick menu for Sample Time and Sample Mode selection.

Run button starts the measurement.

3.8. Menu functions

Menu →	Probe →	Installed probes	
	Device →	General →	Date / Time USB Remote Control Decimal separator Factory Reset
		Customize →	Signal tone Acoustic tone Backlight brightness % Power Saving time Power Saving % Auto Power Off time
		Graphics →	FFT Scale FFT AC Scale Mode Frequency Scale Time Scale
		User →	User Data
		About →	Device Info
Off			

Table 1: Functions in menu mode

4. Measurement

4.1. Setup of the EMF-measurement probe FMZ3/FMZ30

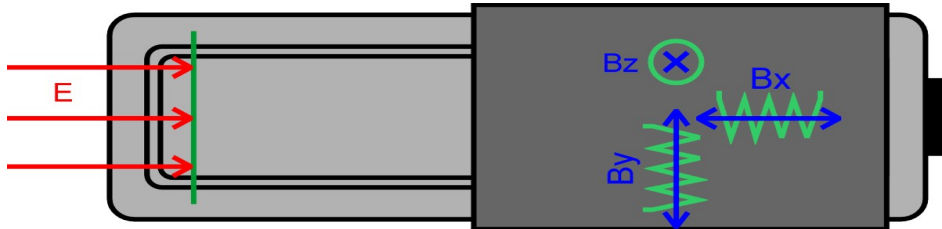


Figure 2: alignment and arrangement of sensors in the multi-purpose measurement probe

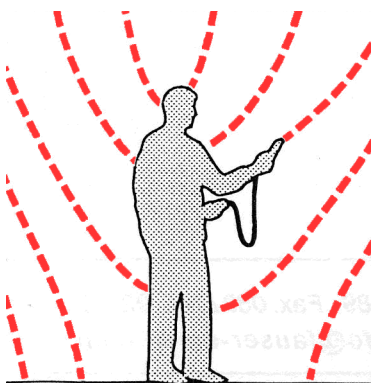
The **sensor** to measure alternating electrical fields is located at the front side of the measurement probe. Due to its directional directivity the streamlines of the electrical field hitting the probe are completely acquired, while the sensitivity for the lateral streamlines of the field declines steadily. Thus, a location and detection of the origin of the field is possible by rotating the probe.

In order to achieve the stated measurement accuracy, there is a minimum distance of 50 cm to the producer and other objects in the room that must be adhered. In the majority of cases, the accuracy is granted at a distance of 25 cm.

The front part of the probe's housing should be kept clean from all kinds of contamination even fingerprints, and if necessary it should be cleaned with a paper moistened in pure alcohol. Never use other detergents. When confronted with severe contamination, please contract the manufacturer.

The multi-functional probe contains three **coils** installed vertically on top of each other for every **spatial direction** (x-, y-, z-direction) in order to measure alternating magnetic fields three-dimensional and omni-directional. The arrangement and alignment of each separate coil is illustrated in the above figure.

4.2. Alternating electric fields



Electrical fields generate around all conductible materials like cables, metal lamps and damp walls to which an alternating voltage is applied. The higher the applied voltage and the higher the object to which voltage is applied, the higher is the field strength excited by the object.

Regarding power supply lines, the generation of fields is independent of the fact whether the electric consumer is attached to the line or not.

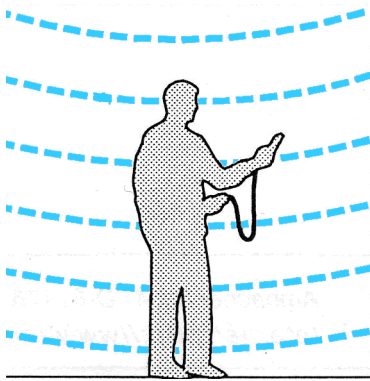
The electric field/ is mostly shielded through all, even poor conductible materials connected to the earth.

4.3. Potential-referenced measurement of electric fields

When measuring in interior rooms, especially with plastic floors and rubber soles, the ZadPad has to be grounded connecting the grounding cable to the USB port ②. The grounding can be applied to the protective ground contact (do not plug in the holes!) of the electric socket, or with the aid of the ground strap connected to the blank water-, gas- and heating pipes.

When measuring outdoor, the device normally does not need to be grounded as the ground contact of the person is sufficient. In order not to distort the measurement results the probe must be held at the special conductible rubber grip during the measurement. The probe needs to be kept clear from shielding effects of the human body. Therefore, the front part must not be shielded with the hand and it should be kept away from the body towards the assumed origin of the electric field. The probe should be guided calmly and steadily, as jerky movements lead to temporarily artificially excessive measurement values through static electric fields.

4.4. Physical basics of magnetic fields



Magnetic fields generate around all cables that are current-carrying. They only generate when the attached consumer is in operation. The higher the current flow is, the higher is the field strength. Devices that are based on the principles of electromagnetism generate especially strong alternating magnetic fields. These are mainly transformers and electric motors. The magnetic field can virtually not be shielded. For that reason, even such disturbance sources that are outside of measuring room must be regarded. For instance, the magnetic field of a high voltage power line can be detected at a great distance of some hundred meters.

4.5. Measurement of alternating magnetic fields

The multi-purpose probe is attached to the ZadPad in order to measure alternating magnetic fields. Now, the isotropic measurement process detects the three single spatial components and calculates the consequential resulting total field strength. An alignment of the probe in direction of the magnetic field, as with the one-dimensional measurement devices, is unnecessary. The direction of the field is determined by the flux density of the three field components.

Pay attention to the fact that fast movements of the probe display temporarily artificially excessive measurement values since the earth's static magnetic field acts as an alternating field and is also acquired. By choosing the filter setting highpass 50 Hz this effect is suppressed.

A distance of 10 cm is to maintain between the multi-purpose probe and the ZadPad as it might lead to measurement errors due to the magnetic fields radiated by the electronics of the ZadPad. If the ZadPad is operated with a power supply unit during long-term measurements, the distance between the multi-purpose probe and the power supply unit should amount to 2 meters.

4.6. Saving Measured Values

The ZadPad has an internal USB drive as data storage. Pressing the **Save** key saves the values from the last measurement.

The data format is CSV. The default file name consists of sensor type, date, time and file type, the name can also be edited.

The following data can be stored:

- Data file type val: Measurement protocol (11 measurement values)
- Data file type fft: Frequency spectrum (0..2000 Hz, 2001 values)
- Data file type rawl: Time diagram (1 sec, 8192 values)
- Data file type log: Data logger (sample time 1 sec)

If the *Log data file (log)* checkbox is activated, a data logger file is generated in sample mode *continuous* when a measurement starts.

To ensure that the country-specific EXCEL version correctly recognizes the measured values, the decimal separator can be changed between comma (,) and period (.) under *Menu→Device→General→Decimal separator*.

4.7. Measurement Control via USB

The measurement of the ZadPad can be remotely controlled via the USB interface. Remote control is enabled in the Device – General menu by activating the USB Remote Control checkbox (Remote Mode).

The status of the USB interface and the remote function is shown in the USB Remote Display. Connect the ZadPad to the PC using the USB cable provided.

The measurement is controlled by writing a command file (command.csv) to the “/Settings” directory, which is automatically deleted after execution. The ZadPad is then ready for a new command file.

The command file (command.csv) is structured as follows:

- Run;1 (CR LF) 1 carries out the measurement
- Save;1 (EOF) 1 saves the measurement data in the “/Data” directory;
0 does not save any measurement data

Copying the command file and reading the measurement data can be automated with Excel macros using the “File Copy” instruction.

4.8. Standards and Directives

26. BImSchV	Notification of the recast Ordinance on Electromagnetic Fields
BGR B11	Evaluation of exposure to electromagnetic fields (EMF)
ICNIRP 2020	Guidelines on Limiting Exposure to Electromagnetic Fields

In accordance with the Standard of Building Biology testing methods SBM-2015 the following values are recommended:

Field		Anomaly			
		none	weak	strong	extreme
Electric ground ref.	V/m	<1	1 - 5	5 - 50	>50
Electric potential-free	V/m	<0,3	0,3 - 1,5	1,5 - 10	>10
alternating magnetic fields	nT	<20	20 - 100	100 - 500	>500
Elektrostatics	V	<100	100 – 500	500 – 2000	> 2000
Magnetostatics	μT	<1	1 – 5	5 – 20	> 20

Table 3: Recommendation according to the standard of Building Biology testing methods

5. Annex

5.1. Technical information

Display:	4,3 " TFT capacitive touch panel
Data conversion:	16 Bit, 4 channel
Sampling rate:	up to 1.6 MHz
Data storage memory:	32 Gbyte
Data format:	CSV file
Data file type val:	Measurement protocol (11 measurement values)
Data file type fft:	Frequency spektrum (0..2000 Hz, 2001 values)
Data file type raw:	Curve of illuminance (1 sec, 8192 values)
Interface:	USB 2.0, data transmission, battery charging
Sensor detect:	Automatic sensor recognition
Power supply:	Lithium ion battery
Dimensions:	154 x 96 x 34 mm
Weight:	350 g
Operating temperature:	5..30 °C
Storage temperature:	0..40 °C
Humidity range:	10..70 % (non-condensing)
Field probe FMZ3	
Frequency range	10 Hz...400 kHz
Measurement accuracy	<5% [50Hz] magnetic <10% [50Hz] electric
Measurement ranges	
Alternating magnetic field	20000 nT
Alternating electric field	2000,0 V/m
Resolution	
Alternating magnetic field	1 nT
Alternating electric field	0,1 V/m
Field probe FMZ30	
Frequency range	10 Hz...400 kHz
Measurement accuracy	<5% [50Hz] magnetic <10% [50Hz] electric
Measurement ranges	
Alternating magnetic field	200,00 µT
Alternating electric field	20000 V/m
Resolution	
Alternating magnetic field	0,01 µT
Alternating electric field	1 V/m

Technical changes reserved.

5.2. Scope of delivery

Scope of delivery Multi analyser ZadPad

Art.-Nr. 310

Multi analyser ZadPad, Field probe FMZ3, grounding cable, USB Interface cable, power supply 5V/1,5A, touch pen, transport case, operating instructions, test certificate

Scope of delivery Multi analyser ZadPad

Art.-Nr. 311

Multi analyser ZadPad, Field probe FMZ30, grounding cable, USB Interface cable, power supply 5V/1,5A, touch pen, transport case, operating instructions, test certificate

5.3. More information

Product video with example measurements.

https://fauser.biz/download/zadpad_en.mp4



5.4. Waste disposal

This product has the recycling symbol in accordance with EU Directive 2002/96/EC. This means the device must be returned to the manufacturer for recycling after its useful life. Waste disposal along with household waste is not done.

Disposal address: Fauser Elektrotechnik
Ambacher Straße 4
D-81476 München



Manual version 1.06.

The current version of the manual is available on the homepage www.fauser.biz

Technical changes reserved; we do not accept liability for any errors.