Operating Instructions Light 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 Light analyser ZadPad.

In the event of malfunctioning, switch the meter off immediately.
If the event that smoke develops or unusual odors 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:

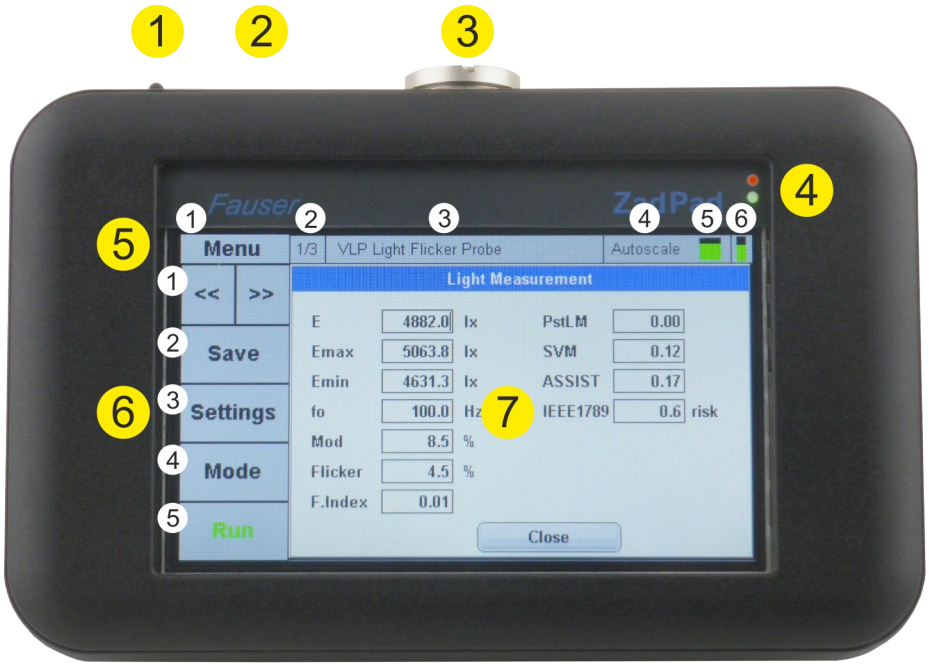
- Never short-circuit rechargeable batteries, and never attempt to open a rechargeable battery.
- Do not expose rechargeable batteries to excessive heat or open fire.
- Do not expose rechargeable batteries to moisture and never immerse rechargeable batteries in water.
- Only use the included original charger. Never use other chargers.
- Never charge batteries unattended!
- Never charge in the vicinity of combustible material or gases.
- Never charge longer then 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 and for battery charging and data transmission
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
① **Menu**
② Page info
③ Probe info
④ Y Scale
⑤ Recording level indicator
⑥ Battery voltage indicator
❻ Main buttons:

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

❼ Measurement windows:
Values <> Time graph <> Frequency graph

3.2. Turn on/off

The ZadPad is turned on through the **On/Off** button ❶ 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* ❺.
Charging is done through the USB port ❷ 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 ❹. 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 flicker analysing the VLP light flicker probe has to be plugged into the *Sensor connector* ❸. The measuring probe can also be connected to ZadPad via the 80 cm long connecting cable.
The connected probe is shown in the *Header info screen* ❺.

3.5. Header info screen

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

3.6. Menu functions

Menu →	Probe →	Installed probes	
	Device →	General →	Date / Time
			Factory Reset
		Customize →	Signal 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

3.7. Main buttons

The *Main buttons* ❻ functions:
Page switch buttons **<< >>** select the different pages of the *Measurement window* ❼.
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.

4. Measurement

4.1. Preparation for measurement

Connect the VLP light flicker probe to the sensor connector.
The influences of other light sources should be avoided if a single lamp is measured.
Avoid any movement or vibration of the sensor during the measurement, especially if a 180 second P_{stLM} measurement is in progress. It is strongly recommend to mount the probe on a holder or tripod.

4.2. Proceeding flicker measurement

First select the required sample time for the measurement with the **Mode** button quick menu:

- ➔ 1 sec for standard measurement
- ➔ 2 sec for ASSIST Mp measurement
- ➔ 180 sec for P_{stLM} measurement

Press the **Run** button to start measurement.
When the measurement is finished the *Measurement windows* ❼ open or refresh.
The illumination level should be between 1000 lx and 10000 lx. So the *Recording level indicator* ⑤ must be checked. For accurate results the level should be in the green range.
The *Measurement window* show the light and flicker values.
With the *Page switch buttons* **<< >>** the different windows *Values*, *Time graph* and *Frequency graph* can be selected.

4.3. 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 spektrum (0..2000 Hz, 2001 values)
Data file type rawl: Curve of illuminance (1 sec, 8192 values)

4.4. Flicker standard reference

EU Directive No 2019/2020: Ecodesign requirements for light sources and separate control gears

IEC TR 61547-1: Objective light flickermeter and voltage fluctuation immunity test method

IEC TR 63158: Objective test method for stroboscopic effects of lighting equipment

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 rawl:	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)
Light measurement:	
Illuminance	mean, maximum, minimum
Flicker	fundamental frequency, percent of flicker, flicker index, modulation depth
Flicker (frequency weighted)	P_{stLM} , SVM, ASSIT Mp, IEEE 1789
P_{stLM} accuracy	according to IEC TR 61547-1
SVM accuracy	according to IEC TR 63158
Light flicker probe VLP:	
Spectral sensitivity	480...660 nm
Spectral approximation	V(λ)
Illuminance	1 lx...20,000 lx
Illuminance accuracy	<5%, Illuminance A at 1000 lx, ε 0°
Frequency range	50 Hz...400 kHz

Technical changes reserved.

5.2. 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 1.03.
The current version of the manual is available on the homepage *www.fauser.biz.*
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