Opsytec Dr. Gröbel

Yoke Photometer
ZPM digit

Operating instructions

Version: 1.2.1

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Contents

Options marked with * may not be available on all devices.

1 Change history

Date	Version	Modified by	Changes
07.04.2014	01.2014	Seelmann	created
11.06.2014	02.2014	Paravia	Integrated software
26.05.2015	1.2.1	Paravia	Change due to DIN EN 60825-1:2015

2 Symbol Overview

Meaning:

Failure to follow these instructions can cause an injury to the user.

Meaning:

Failure to follow these instructions can result in equipment damage.

Meaning:

Instructions can be considered for regular operation.

* Optional features that are not available in every yoke photometer

3 Important Notes

The yoke photometer is equipped with a UV-LED, IR LED or VIS-LED or LASER. There is a risk of photochemical or thermal injury to the eye, retinal damage and erythema. The operating personnel is suitable to train.

Do not stare into the LED and not permanently expose the skin radiant! Avoid reflections of the radiation into an eye!

Operate ZPM without reflective hand jewelry (rings, etc).

Sebum and dirt are absorbed in the UV and VIS spectral range. Fingerprints on the optical components are to be avoided. If necessary, the components must be cleaned with isopropyl alcohol.

4 Intended use

The yoke photometer is intended only for determining the transmission of specimens. The operation is allowed only in a dry environment.

When using, depending on the version, IR and UV radiation can be reflected and scattered. If necessary, appropriate safety precautions must be applied for the protection against radiation.
The yoke photometer must not be opened by a user.
Any use other than that described above will damage this product. Furthermore, this involves dangers such as e.g. short-circuit, fire and electric shock. The entire unit must not be modified or rebuilt! The safety instructions must be observed.

5 Functional Overview

This yoke photometer checks the transmission of the sample at the specified wavelength. The transmission is compared with a 100% reference measurement, and the transmission is determined relative to this. The measured transmission indicates the degree to which the workpiece to be tested is permeable for the incident radiation.

The following components are supplied:

- Display unit
- Transmission clamp
- Power cord
- this documentation

The yoke photometer is a modular system; the following optional extensions can be installed:

- Analog 0-10 V output
- Analog 4-20 mA output
- Switching contacts and programmable switching thresholds
- Trigger input
- USB port / software
- Yoke identifier
- Transmission reference
- Adjustable averaging number
- Interchangeable sample holder
- Double-Beam-Photometer

6 Components of the yoke photometer

6.1 Yoke

The actual measuring unit is integrated in the so-called yoke. It consists of a light or a radiation source and a diode sensor facing each other.

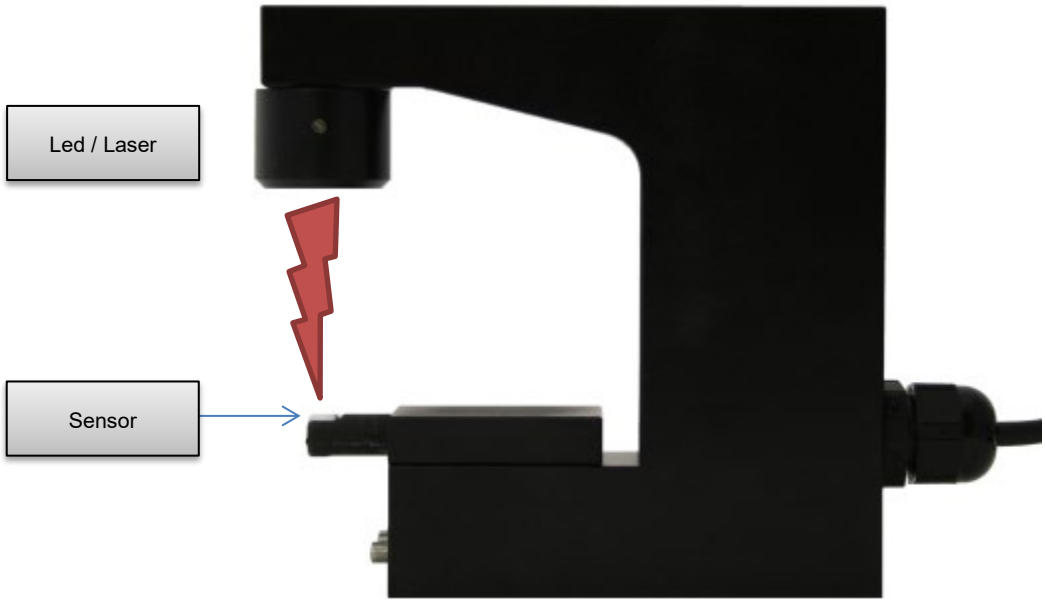


Figure 1: Yoke of the ZPM (illustration similar)

6.2 Display unit

The display unit includes the power supply as well as the evaluation unit with display and keypad.

Figure 2: rear side of display unit, here exemplified with optional 0-10V output

On the back of the chassis there is a power socket for the supply voltage and a yoke connector.

6.3 Optional Extensions

*Voltage/current output**

The transmission signal can be measured as a voltage on the green screw terminal (see technical data chapter). The voltage output follows the linear transmission.

0V/4mA corresponds to 0% transmission
10V/20mA corresponds to 120% transmission

*Double-Beam-Photometer**

For in-line applications, the drift of the light source, for example, caused by aging or temperature fluctuations can be compensated by an internal reference diode. The compensation works from a drift of approximately +/- 1%.

*Trigger input**

At the green screw terminals 4 and 7, a trigger signal can be applied. The measurement is then carried out only when a trigger signal high = 24 V is applied. For the use of a key, the auxiliary voltage (PIN 3) can be used.

*Switching relay contacts**

The grey marked screw terminals 14, 11 and 12 serve as an external tap of a potential-free switching relay. This is active only if the thresholds are enabled.

Terminal	**Signal**
14	N/O
11	COM
12	N/C

USB port

Transmission values can be transferred to a PC via the optional USB port. The yoke photometer is used in this case as a serial interface.

Interchangeable sample holder

Interchangeable sample holder (attachments) can be provided to verify various workpieces. These can be attached for an optimal positioning of the test piece on the sensor and fastened with screws.

For example:

7 Operation

7.1 Initial operation

Connect the display unit to the mains voltage and the yoke - with the display unit. Connect the optional ports, if desired and available.

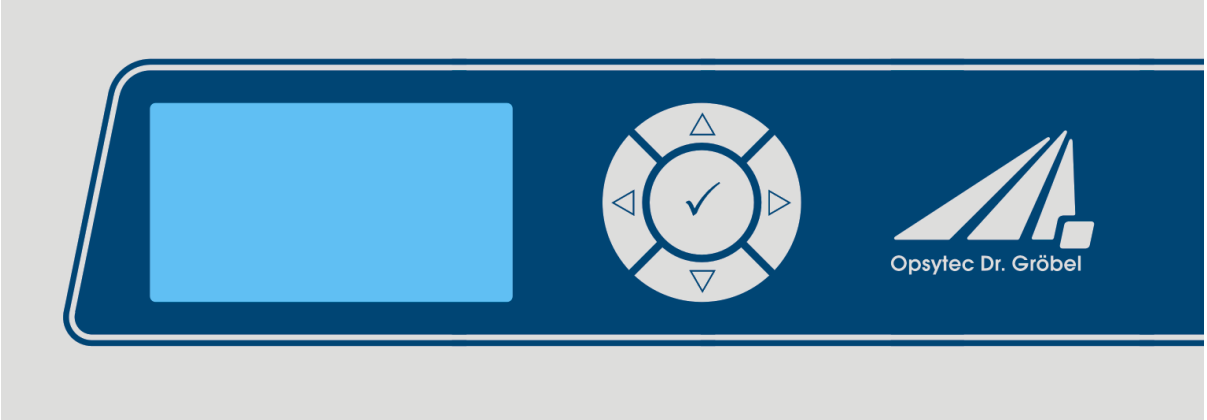
The unit is switched on the back with the line voltage switch.

We recommend warming up the meter at least 30 minutes prior to measurement.

After connecting the yoke manually the reference measurement is always carried out before correct transmission values are displayed.

7.2 Main menu

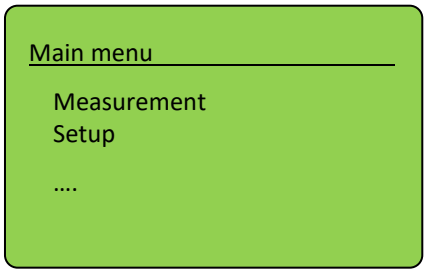
The ZPM is operated via five keys. These keys are arranged in the front, right next to the display. The keys and the function configuration are shown below:



Key	Function
▽	Down
△	Up
◁	Left
▷	Right
✓	Confirm / OK

Initially after starting the device, the logo appears in the display for 2 seconds.

Now the device is in standby and is displayed in the main menu (depicted as example).



In the main menu and all other menus, select the active menu item via the keys ▽ and △. By clicking ✓ you confirm the selected menu item. With ◁ you return to the previous menu without adopting the changes.

The selected menu item is displayed on a black background and inverted.

The menu items in the main menu depend upon the settings, i.e. the menu items “Power 0...100%” and “Set time” are only displayed, when the respective mode has been selected.

7.3 Start

Following the startup of the unit, the logo on the display appears first, and then the device is in the warm-up. This will be shown by a countdown on the screen. A first reference measurement runs automatically after the warm-up. The device is now ready.

Make sure that no objects are in the beam path of the yoke at the start.

7.4 Operation

Figure 3: Transmission display

When correctly started, the yoke photometers indicate 100% transmission on the display. The radiation values are displayed in percent’s and always relative to the reference.

Use to navigate through the menu the ◁, ▷, △, ▽ buttons and the OK button (✓). The selected menu item is always black. To confirm the selected menu item, press ✓. With key ◁ the setting menu is left again.

7.5 Calibration*

To make a new reference-measurement please select calibration (reference measurement) in the menu. Make sure that no objects are in the beam path of the yoke at the start.

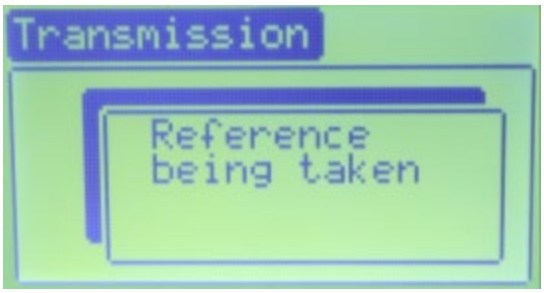


Figure 4: Reference measurement

If the ZPM is delivered with a reference transmission, the set point can be set in the calibration menu. This is an optional feature and not available on all forceps photometers.

Please insert the Trans-mission reference a previously.

For proper transmission measurement the instrument should be warm.

Perform a reference measurement therefore after about 30 minutes of running (again) by.

A change in temperature of the measured value can change at any time slightly. We therefore recommend that the reference measurement to again hollow when needed.

Press the key ◁ to exit the settings menu.

7.6 Switching Threshold*

The sign of "Threshold On" in the upper right corner indicates whether the relay and its terminals on the rear side of the housing are enabled.

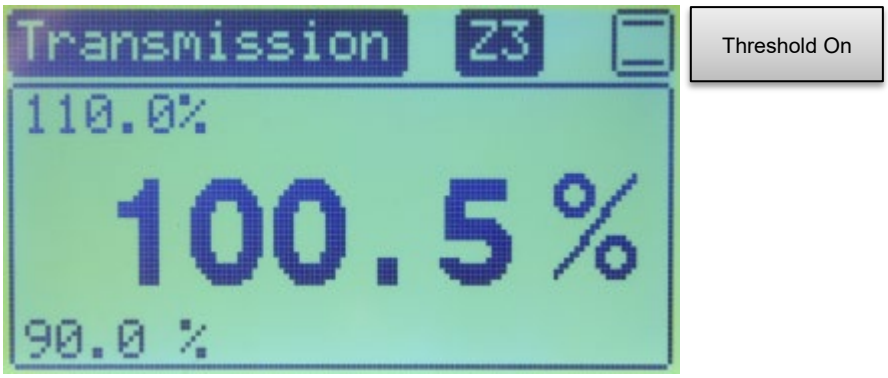


Figure 5: Transmission display with active thresholds

Press the key △ to access the settings menu. The upper and lower threshold percentage [%] can be set there.

Use △ or ▽ keys to select and adjust the desired value. Confirm with OK (✓).

The calibration value is also entered in percent [%] and the thresholds can be enabled and disabled.

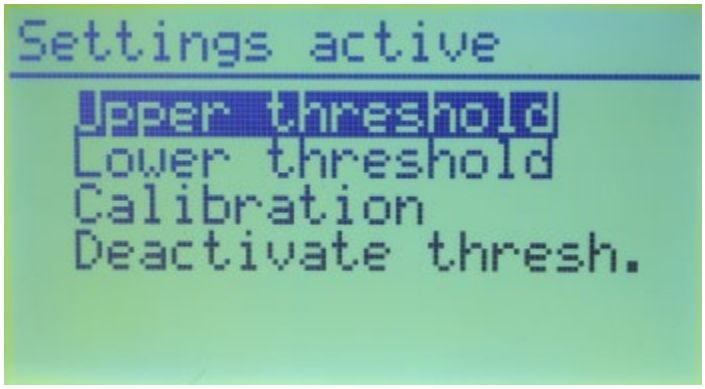


Figure 6: Settings

This is confirmed by OK button. To cancel the entry long press ◁ button.

Press ◁ button to exit the settings menu.

7.7 Additional Settings
Language

A German- and English-language menu is available for the ZPM. Select the desired language using the ▽ and △ buttons and press ✓.

7.7.1 Basic Settings

The basic settings are password protected. The PIN is in the chapter Technical data.

7.7.2 Initial delay *

With the start-up time, we set the time before the reference measurement. It makes sense for a time between 5 s and 10 s.

7.7.3 Resolution *

The display is set to a resolution of 0.1% or 0.01%. Via USB, the display value is output.

7.7.4 Averaging*

Press the key △to access the settings menu. A number of averages can be set for one measurement. Use △or ▽keys to select and adjust the desired value. Confirm with OK (✓). An abort input is possible by long pressing the key◁.

Press the key ◁ to exit the settings menu.

The active averaging is displayed at the top of the screen. Example:

By changing the ADC averaging the data acquisition is set between about 55 Hz and 0.6 Hz.

7.7.5 Yoke identifier*

The yoke photometer is equipped with the yoke identifier to detect whether the ZPM complies with yoke coding and which tool is connected. It sets the switching threshold settings for upper and lower limit as well as the reference value.

The connected yoke is displayed at the top of the screen, as shown in the example on the basis of Z3 yoke.

8 Data Export/USB/ PC Software

The currently displayed transmission value is automatically sent as ASCII data. The included ZPM-LOG software reads the data and stores it in a log file. Alternatively, it can be a yoke photometer with a customer-specific software. For this purpose the yoke photometer is linked up as virtual COM interface (parameters: see section 6.3).

Setting	Value
Baud rate	1200
Data bits	8
Stop-Bits	1
Parity	none

8.1.1. Installation

To install proceed as follows:

1) Disconnect the yoke photometer from the PC if required.

2) Begin the installation with "Setup.exe" in the root directory of the software CD. Follow the instructions of the installation program.

The driver installation is carried out as a virtual COM port.

For the ZPM-LOG software Microsoft .NET Framework version 4.0 or higher is required. This can be found on the installation CD or available free of charge at www.microsoft.de.

3) After the installation is complete, connect the yoke photometer with the PC. The yoke photometer is integrated as a virtual serial interface. The driver installation in Windows 7 is performed automatically.

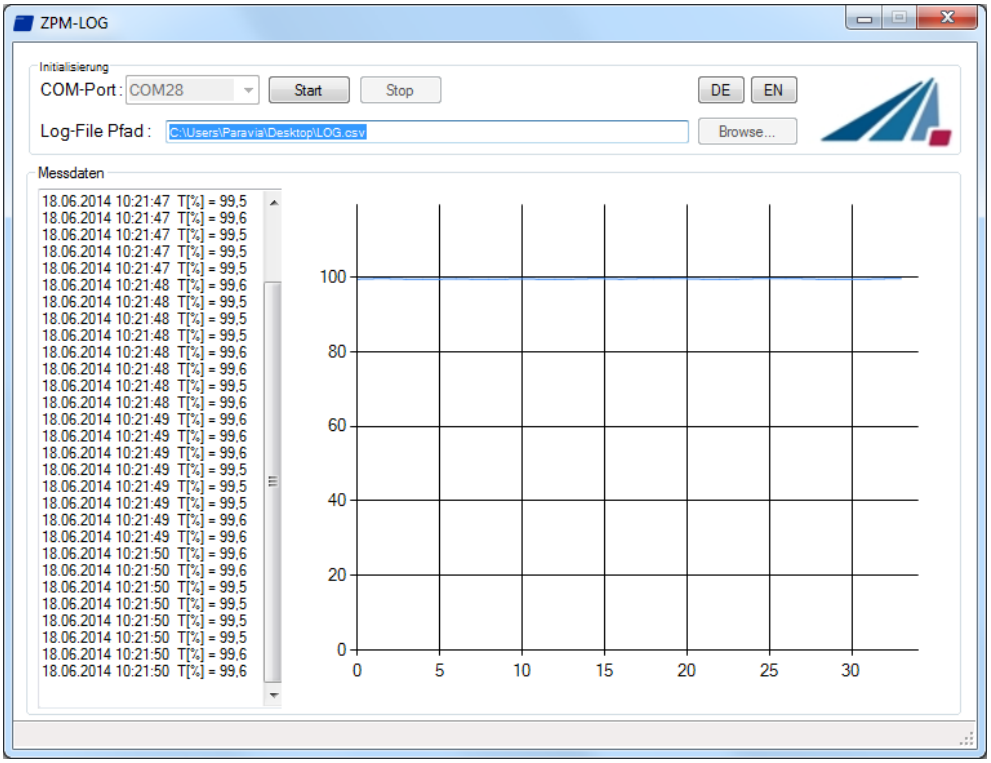
8.1.2. Connecting to the PC

Connect the yoke photometer with the PC and turn it on. No message appears on the display.

8.1.1 Working with the ZPM-LOG software

Start the ZPM-LOG software.
Select the COM port and the log file and confirm with the "Start" button.

The measurement data is displayed and recorded directly into the log file. The log file is readable as a csv file usually directly with Microsoft Excel. It includes the current system time and the measured value of the yoke photometer.



Data recording can be paused and resumed with the "Stop" and "Start" buttons.

The EN and DE buttons allow changing the language (German / English).

If your yoke photometer is equipped with an automatic range switching, the optimal measuring range is selected when strong changes of the transmission are present. A false reading (e.g. 0 or 156%) may be displayed for a short time.

8.1.4. Data Export

The measurement data is immediately stored in the log file. Open the file only if you received the ZPM-LOG program, as it may otherwise cause read / write problems. This measurement data are semicolon-separated and after following a four-line header.

For example:

```
*** ZPM-LOG ***
Software Version: 1.0.1

Date; time; transmission value [%]
11.06.2014;10:03:55;99,9
11.06.2014;10:03:55;99,9
11.06.2014;10:03:55;99,9
11.06.2014;10:03:56;99,9
11.06.2014;10:03:56;99,9
11.06.2014;10:03:56;99,9
```

8.2. Notice

The yoke photometer is designed to to measure transmission values despite the changing ambient light. As a result, an industrial usage is ensured. Too intensive ambient light is displayed as a message. Please, dim the ambient light.

9 Technical specifications

8.2 General data

Mounting position	any
Control electronics	desktop unit
classification according DIN EN 60825-1:2015	Laser class 1
Dimensions (L x W x H), Controller	250 x 185 x 100 mm³
Weight	2,6 kg
Operating temperature	0 … 30 °C
Storage temperature	-10 … 40 °C
Humidity	< 80%, non-condensing
Cooling	Air cooling
Display	Graphical display, 128 x 64 px
Resolution	adjustable, 0,1% or 0,01%
Wavelength	see nameplate
Measurement frequency::	Adjustable by ADC-averaging between ~ 55 Hz (ADC = 1) and ~ 0,6 Hz (ADC = 99)
Averaging / moving average:	Adjustable between 1-20 measurements

8.3 Power supply and connections

Supply voltage	85 – 264 V / 50 - 60Hz / 12 VA
Fuse	2 x 1 A T
Max. input current	ca. 260 mA
Max. Power	ca. 20 W
Connector, Yoke	17-pin connector on backside
I/O Connector (optional)	Phoenix Contact MC 1,5/15-STF-3,81 Part number: 18 27 83 9

8.4 Interface Assignment (optional)*

Interface	Signal	Function
Pin 1	reference mass	Signal [0-10V]
Pin 2	Voltage output	
Pin 3	+24 V	Auxiliary power, max 2 mA
Pin 4	reference mass	
Pin 5	reference mass	Signal [4-20 mA]
Pin 6	Current output	
Pin 7	Trigger IN (24V)*	Trigger
Pin 8-10	Not Connected	-
Pin 11	COM	switching contact
Pin 12	opener	switching contact
Pin 13	Not Connected	-
Pin 14	closer	switching contact
Pin 15	Not Connected	-

8.5 Hardware Software Requirements

USB	USB Typ B
PC Requirements	min Intel CORE i3, 2 GB Ram, >40 Gb HDD
Operating system	Windows 7 with .NET Framework > 4.0

8.6 PIN

PIN	7243

10 Troubleshooting

Problem:	The transmission is permanently more or significantly more than 100%.
Solution:	The reference has not been measured for an empty beam path that leads to increased transmission levels, if there is no sample in the yoke.

Problem:	The ZPM is on, but the display is "empty"
Solution:	Press any button. Alternatively, turn the unit off and after 5s-10s again.

Problem:	The measured value jumps sharply.
Solution:	Too much ambient light disturbs the measurement.

Problem:	The yoke is in operation for hours, and the 100% value decreases slowly.
Solution:	The temperature of the LED stabilizes after short period of operation. Perform measurement reference.

Problem:	The data transfer to the PC is not working.
Solution:	Make sure that the COM port settings are correct.

Problem:	The software does not record data.
Solution:	Switch off the yoke photometer and exit the settings menu. Check the COM port Restart the software.

Problem:	The yoke is in operation for hours, and the 100% value decreases slowly.
Solution:	The temperature status of the light source stabilizes after a certain amount of time. Press the Reference button to set the value back to 100%.