User Manual

X1

Optometer (X1-1, X1-2 and X1-5)

Table of contents:

1. General information

1.1 Safety precautions

- Please read this instruction manual carefully before using the device! Trouble-free functioning of the device as well as the operational safety can only be guaranteed when the safety precautions and the general safety measures described in this user manual are observed.
- The device should only be used for its intended purpose and according to its technical specifications. Any other use of the device is not allowed.
- Immediately after unpacking and before device start-up, it should be inspected for any mechanical damages or loose parts. In such cases, the device should not be used.
- Safety can also be impaired if the device is not functioning properly.
- In case it is suspected that safety during operation has been impaired, the device should be switched off and its use by third parties ruled out.

1.2 Hazard clause

- The device described in this instruction manual is designed for stationary use for. The device offers no protection against radiation risks affiliated with the measured objects.
- Persons in charge of performing the measurements and use of the device are obliged to read the instructions manual at the beginning of the measurement and adhere to it.
- Persons in charge of performing the measurements and the use of the device must be well informed about the accident prevention regulations in their field.
- The device handling requires intermittent operator concentration on the device. The device should therefore not be used in surroundings that might lead to interrupted operator attentiveness. This possible risk must also be included in the briefing of the device operator.

    Through this instruction manual, Gigahertz-Optik as the device producer, informs the device owner of the possible hazards while using the device. The owner and the responsible device users confirm the receipt and approval of this instructions manual. The owner and operator of the device have been informed about the diligence required when choosing and briefing the device users and operators.

1.3 Liability

- The responsibility for all consequences that might arise from the use of the device or its accessories lies solely on the user and/or owner.
- Gigahertz-Optik or its supplier can under no circumstances be liable for any direct or indirect business interruptions, loss of profits or data. This also applies to damages that may arise during the device operation.
- The Gigahertz-Optik Terms and Conditions of Delivery and Payment generally apply.

1.4 Safety

- The device is designed for operation in a clean environment and within operating temperatures ranging from +5 to +40 ºC.
- The device or its accessories are not to be exposed to direct sunlight or moisture.
- The device should be switched off and secured against unintended start-up by third users in case of indications suggesting that safe operation of the device might not be possible. Such indicators include:
    - when the device shows visible damages
    - when the device has internal or external lose parts
    - when the device is not functional
- The safe operation of the device can be impaired in the case of any of the following circumstances:
    - Storage in a free or moist environment over a long period of time or other adverse conditions.
    - Excessive strain during transport (e.g. due to improper packaging)
    - Operation in aggravated environmental conditions such as high temperatures, humidity, etc.
    - Operation in dangerous conditions (explosive gas, fumes, dust, etc.)

1.5 Environmental conditions

- Optical and photometric devices are sensitive to influences resulting from certain environmental conditions e.g. high temperatures, humidity and contamination. Contamination of the diffuser window, which acts as the light sensor, can particularly lead to measurement errors!
- The device should not be taken from a cold environment and directly put to operation in a warm surrounding. The possi-

ble condensation could negatively impact on the electrical and optical functions. One should wait for the device temperature adjustment to be completed to match that of the surrounding.
- The device should not be operated within high magnetic, electromagnetic or electrostatic fields.

1.6 Maintenance and cleaning

- The set deadlines and intervals for the recurrent recalibrations must be observed!
- Opening of the device as well as device repair should only be done by authorized persons.
- Off-the-shelf, residue-free detergents can be used for the exterior cleaning of the device.
- While cleaning, it should be made sure that the detergent doesn't penetrate the interior of the device. This can lead to short circuiting or device operational errors.
- Do not use aggressive cleaning agents.

1.7 Guarantee

- Gigahertz-Optik GmbH warrants for a period of 12 months from the delivery date that the product is free from material and production defects. In case defects are experienced within the warranty period, Gigahertz-Optik repairs or replaces the device free of charge.
- In order for the warranty to be effective, the customer should submit the product name, serial number, date of purchase as well as the description of the defect in writing to Gigahertz-Optik GmbH after which he/she will receive a service number (RMA) enabling him/her to send back the device.
- The user is responsible for the appropriate packaging of the device.
- Shipping through the user must be done on a free to buyer's address basis.
- The guarantee does not cover consequential damages.
- The Gigahertz-Optik GmbH Terms and Conditions of Delivery and Payment generally apply.

1.8 Conformity declaration

- Gigahertz-Optik GmbH declares that the device, with regards to its design and conception, conforms to the EG/EU-guidelines and corresponding harmonized norms.
- The CE-conformity declaration can be requested separately.
- If any alteration is made on this device without prior agreement, this declaration loses its validity.

1.9 Review clause

Gigahertz-Optik reserves the right to changes in this instructions manual without prior notice.

1.10 Contact details

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1.11 Miscellaneous

The device needs to be recycled according WEEE-Guideline (2012/19/EU).

2. Device series X1

2.1 Intended use

The X1 series is used for reading and displaying optical sensors When not in use, remove the batteries from the device.

2.2 Review

Upon receipt of the device, please check its packaging for possible transport damage.
In the event of damage in transit, immediately report this to the carrier.
After unpacking, please check the delivery for possible transport damage, for completeness and correctness. The delivery includes:

- an X1
- a manual
- if necessary accessories we connection cables

2.3 Technical specifications

These can be found on the corresponding product page on the website.

Temperature range: Storage: (-10 - 50) ° C
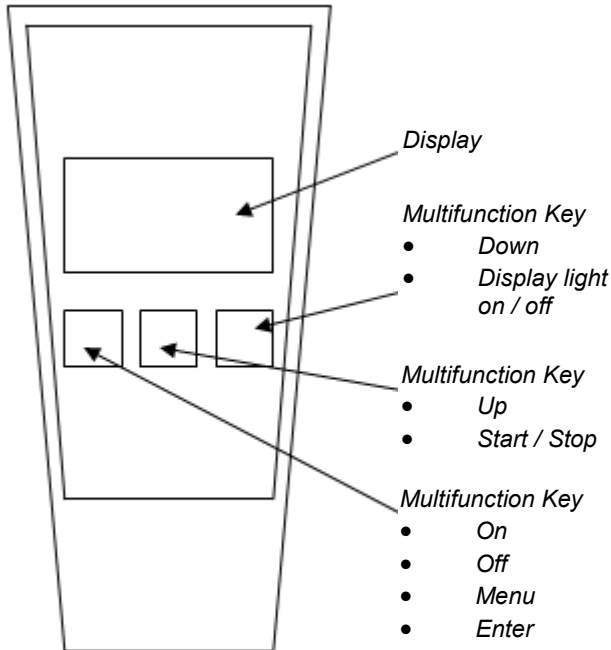   Application: (5 - 40) ° C
Humidity: The device shall not be exposed to high humidity. Range 20% ~ 70% RH non-condensing.
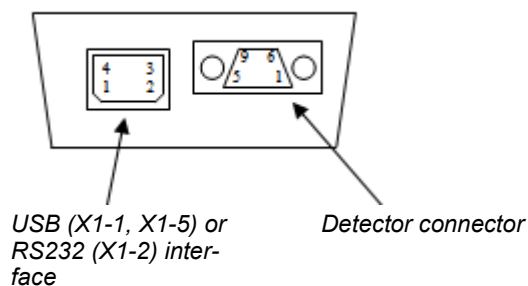

2.4 Preparation for operation

The device requires two AA batteries. If the battery voltage is too low, "Low Battery" is shown in the display.

Do not work with the device again until the housing is completely and securely closed!

2.4 Device description

Display

Multifunction Key
- Down
- Display light on / off

Multifunction Key
- Up
- Start / Stop

Multifunction Key
- On
- Off
- Menu
- Enter

Picture 7.1: X1

USB (X1-1, X1-5) or RS232 (X1-2) interface

Detector connector

Picture 7.2: X1

2.4.1 General:

The Optical Multimeter (Optometer) X1 is a microprocessor-based optical size meter. To measure these optical quantities, various detectors are used in combination with the optometer. These detectors have in common that they convert the optical signal into electricity. This current is measured, calculated and displayed by the X1.

The optometer has 4 current input channels. It uses a current amplifier with 7 areas. The output voltage of this amplifier is sampled by an ADC and measured. A microcontroller calculates the result displayed on an LCD display.

The X1 can be controlled manually or via a remote interface (X1-1, X1-5: USB, X1-2: RS232). Measurement parameters can be manually set and changed using the front panel buttons under a menu function and stored in continuous memory.

The firmware of the X1 is stored in flash memory and allows easy software updates via the interface.

The device has a built-in rechargeable battery and a display with backlight. When connected to the USB interface, the X1 is powered via the interface (X1-2: external + 5VDC with special adapter cable).

2.4.3. Inital Set-Up

- Before starting, two AA type batteries may need to be inserted.
- Only the cables or similar supplied may be used.

Quick Start:

- Connect the detector to the X1
- Press <on / off> to switch on the device
- Now you can adjust the corresponding measurement settings with the help of the keys
- Press the center button to start a measurement

2.4.4 Manual mode:

General

The X1 can be manually operated and set-up for measurement using the front panel keypads (3 keys) to access its menu for function selection.
The keys have multiple functions:
key 1: <on> / <off> / <menu> / <enter>
key 2: <▲> / <run> / <stop>
key 3: <▼> / <light>
Pressing **<menu>** key selects the main menu. There are further sub-menus. The up <▲> and down <▼> arrow keys are used to switch between the different menus. Selecting <escape> aborts menu selection without changing parameters. By pressing <enter> key the menu item displayed is selected. On selecting a setting, the X1 requests confirmation ("CHANGE DATA?") to change the parameter. Select <Yes> to confirm that you really want to change the setting.

menu item	submenu item	function
1. Mode	CW	displays the measurement respective of any offset and calibration factors programmed
	Dose	accumulates the single readings and displays the result as exposure for measured quantity
	CIE Yxy & T (only X1-1)	displays the CIE Color Values Yxy & T
	CIE Yuv & T (only X1-1)	displays the CIE Color Values Yuv & T
	CW Maximum (only X1-5)	displays the maximum of CW measurement
2. Setup	Zero Adjust	performs a zero adjustment of the internal amplifier and ADC
	Integration	sets the measurement (integration) time
	Dose Time	sets max. dose measurement time
	Auto Pow. Off	enables / disables auto power off
	Unit Area (only X1-5)	Selects Unit Area default = shows Unit as set in calibration factor m² = set Unit fix to m² e.g. xW/m² or xJ/m² cm² = set Unit fix to cm² e.g. xW/cm² or xJ/cm²
3. Detector		selects calibration data to calculate the measurement result. With the X1-5, the calibration data are loaded from the connected detector. If no detector is connected display shows "Err. Cal.-Data".
4. Offset		performs an automatic offset adjustment ("Offset = CW" or "Offset = 0")
5. Range		sets the measurement range (auto, manual)

X1 Switch On
Pressing <on> key turns the X1 on.

X1 Switch Off
Pressing <off> key for more then 2 seconds turns off the X1.
Display Illumination On / Off
Pressing <light> key (if the X1 is not at menu level), switches the display illumination on / off.
Measurement Result Display Update On - Off / Dose Run - Stop
Pressing <run/stop> key (if the X1 is not at menu level) stops updating the measurement display (the last display will be frozen). For mode <Dose> dose measurement is started / stopped (each start resets the actual dose value to zero).

Menu Mode
Allows selection of the measurement and display mode.
„CW" displays the result for each activated channel for the pre-set measurement (integration) time.
„Dose" performs an integration of the measurement results and displays the result as a dose value. Key <run/stop> starts or stops the dose measurement. If dose measurement is started, the initial dose value will be set to zero. With menu „Setup / Dose Time" the max. dose measurement time can be adjusted. If this time is reached, dose measurement is automatically stopped.
The color modes "CIE Yxy & T" and "CIE Yuv & T" measure the currents of the channels and calculate (using the color calibration data) the color values.
"CW Maximum" shows the maximum result for each activated channel for the pre-set measuring (integration) time. The <run / stop> key resets the display to zero.

Menu Setup
"Zero Adjust" performs a zero adjustment of the internal amplifier and ADC.
"Integration" sets the measurement time (20ms - 1s). For this period of time the input signal is sampled (4 times each ms) and the average value (max. value for measurement mode "peak-peak") of the samples is calculated and displayed.
If the input signal has big AC components, to obtain a stable measurement result it may be useful to set the integration time to an integer multiple of the AC time period of the input signal!
"Dose Time" sets the max. time for dose measurement (1s to 255h). After this time dose measurement is automatically stopped. If a value of 0 is selected dose measurement is only stopped bei key.
"Auto Pow. Off" selects if the X1 is automatically switched off after a defined time period. Every key press restarts autopower off time period.
"Unit Area" selects in which unit area-related units are displayed. "default" shows the unit as it is saved in the calibration entry. "m²" sets the unit to m² (e.g. xW / m² and xJ / m² - x = f, μ, m, , k, M, G, T.). "cm²" sets the unit to cm².

Menu Detector
Allows selection of the calibration data used to calculate the measurement result. The calibration data has to be selected according to the connected detector head. If the selection is not valid, "Err. Cal.-Data "appears on the display.

Menu Offset
"Offset = 0" sets the offset value to zero. "Offset = CW" performs a measurement and sets the measured current as the new offset value. The offset value will be subtracted from the following measurement results. Offset is useful to compensate ambient light or dark currents of detectors.

Menu Range
Allows selection of the measurement range (see specification on webpage). Fixed range adjustment (Range 0 min - 6 max) or Auto (for automatically range switching depending on the input signal) can be selected.

2.4.5 Interfaces Operation:
See the documentation for the optional S-SDK-X1

Pin	Function USB (X1-1, X1-5)	Function RS232 (X1-2 only)
1	+5VDC Input	+5VDC Input
2	D-	TxD (connect to RxD of PC)
3	D+	RxD (connect to TxD of PC)
4	GND	GND

3. Miscellaneous

3.1 Calibration

The calibration of the device is done once by Gigahertz-Optik GmbH. Gigahertz-Optik GmbH recommends that its customers to test regularly calibration of the device if the application requires it.

3.2 Cleaning

Caution: Make sure the device is switched off before cleaning!

The device should be cleaned using off-the-shelf, unaggressive, plastic cleaning detergents. When cleaning the USB socket surrounding, care should be taken not to let any moisture into the device.

3.3 Possible causes of error

- A highly conspicuous deviation in the actual use to the previous use

    ⇒ Restart the device and repeat the measurement
    ⇒ Check the device initialization.

If the error persists, please contact the Gigahertz-Optik support. You can alternatively send the device with its accessories to Gigahertz-Optik for review.

- The device does not power on

    ⇒ Mobile use: check if the batteries are charged
    ⇒ PC operation: check if the connection or the PC is correct

If the error persists, please contact the Gigahertz-Optik support. You can alternatively send the device with its accessories to Gigahertz-Optik for review.

3.4 Service address

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