



Analog Polarimeter

OAB 20LED



PROFESSIONAL MEASURING

Operating Manual

Version 1.1
 2026-01
 English
 OAB-LED-BA-e-2611

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OPTICS

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1 Technical Specifications

Model KERN	OAB 20LED
Measuring Range	0 to $\pm 180^\circ$
Scale Division	1°
Vernier	$0,05^\circ$
Wavelength	589 nm
Light Source	LED
Stabilization Time LED	Not required
Magnification	3x
Round Cuvette Length / Fill Volume	100 mm / ca. 10 ml 200 mm / ca. 20 ml
Power Supply	100-240 V AC / 50-60 Hz
Dimensions	500 x 135 x 330 mm
Net Weight	2,8 kg
Gross Weight	4,4 kg
Storage Temperature (Recommended)	+10 °C to +30 °C (ideal at +20 °C)
Package Dimensions (L x W x H)	580 x 210 x 400 mm

2 Declaration of Conformity

The current EC/EU Declaration of Conformity can be found online at:

<https://www.kern-sohn.com/shop/de/DOWNLOADS/>

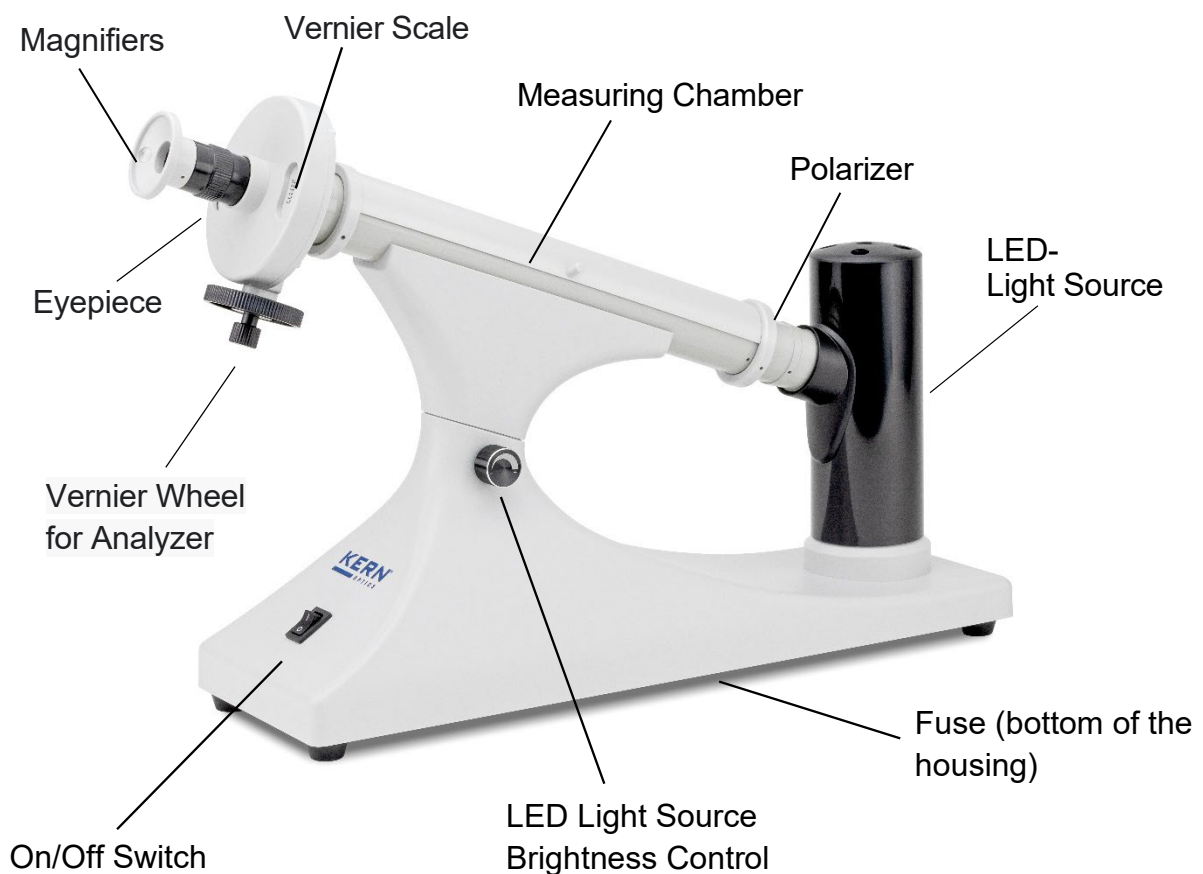
3 Device Overview

3.1 Scope of Delivery

After unpacking and before initial operation, check that all parts listed in the scope of delivery are included. Replace any damaged or defective parts immediately and do not put them into operation.

- ⇒ Analog LED-Polarimeter
- ⇒ Round Cuvette 100 mm (ca. 10 ml)
- ⇒ Round Cuvette 200 mm (ca. 20 ml)
- ⇒ Set of replacement lenses, sealing ring, and fuse
- ⇒ Operating Instructions (German/English)

3.2 Nomenclature



4 General Instructions

4.1 General Safety Information

This operating manual uses warning notices to alert you to potential personal injury or property damage in certain situations.

Symbols and Safety Warnings:

Symbol	Meaning
Warning Symbols	Warning symbols alert you to hazards that may result in personal injury. The symbol indicates the type of hazard.
	Indicates general hazards or a hazardous area.
	Warning of Electrical Voltage.

Symbol	Meaning
Mandatory symbols	Mandatory symbols prescribe actions you must take to prevent personal injury or property damage. The symbol indicates the required actions or items to avoid damage.
	Indicates a mandatory action.

4.2 Proper Use

The manual polarimeter OAB-L is used to determine the concentration of optically active substances.

4.3 Improper Use

The polarimeter must not be used for medical purposes and must not be operated in areas classified as explosion hazards.

Measurements in liquids, on live electrical components, or any unauthorized structural modifications, as well as additions or alterations to the instrument, are strictly prohibited.

4.4 Warranty

Warranty becomes void in case of:

- ⇒ Failure to follow the instructions in this operating manual
- ⇒ Use beyond the described applications
- ⇒ Any modification or opening of the device
- ⇒ Mechanical damage and damage caused by substances, liquids, natural wear and tear, and deterioration
- ⇒ Incorrect positioning or improper electrical installation
- ⇒ Improper assembly or electrical installation

5 Basic warnings and safety instructions

5.1 Follow the instructions in the operating manual



Read the operating manual carefully before commissioning or using the device, even if you already have experience with KERN devices. Always keep the manual close to the device.

5.2 Staff training

The device must only be used by individuals who have read and fully understood the operating manual, particularly the safety section.

5.3 Safety Information

WARNING



Read all safety warnings and instructions.

Failure to follow the safety warnings and instructions may result in electric shock, fire, and/or serious injury. Keep all safety warnings and instructions for future reference.

- Avoid contact of acid with skin or eyes. Rinse affected skin thoroughly with plenty of water. Take a shower if larger areas are affected.
- If eyes are affected by acid, rinse them with lukewarm, running water from the outside toward the inside while keeping eyelids open. Continue rinsing for at least 15 minutes. Then seek immediate medical attention from a doctor or ophthalmologist.
- Clean the polarimeter thoroughly after each use.
- Do not modify the measuring device. Any structural changes may lead to incorrect measurement results, safety hazards, and destruction of the device.
- Do not operate or place the device in explosive environments or areas.
- Protect the device from permanent direct sunlight.
- Do not expose the device to strong vibrations.
- Do not remove safety signs, stickers, or labels from the device. Keep all safety markings in a legible condition.
- Do not open the device.
- Do not touch the lenses with your fingers.
- This polarimeter is not a toy and must be kept out of the reach of children.

⚠ WARNING



Risk of injury due to electric shock!

- The device may only be used in a dry environment and never in rain or at a relative humidity above the specified operating conditions.
- Risk of short circuit due to liquids entering the housing!
- Do not immerse the device or accessories in water. Ensure that no water or other liquids enter the housing.
- Work on electrical components must only be carried out by an authorized specialist company!

! NOTICE

- To avoid damage to the device, do not expose it to extreme temperatures, excessive humidity, or moisture.
- Do not use harsh cleaners, abrasive agents, or solvents to clean the device.

6 Transport and Storage

Notice:

If the device is stored or transported improperly, it may be damaged. Please observe the information regarding transport and storage of the device.

Transport:

Use the packaging included in the delivery for transporting the device to protect it from external impacts.

Storage:

When the device is not in use, observe the following storage conditions:

- ⇒ Dry, protected from frost and heat
- ⇒ The storage temperature must comply with the technical specifications.

Packaging/Return Transport:

A return is only possible within the limits of the general terms and conditions. Keep all parts of the original packaging for a possible return transport.

- ⇒ Only the original packaging may be used for return transport.
- ⇒ Before shipping, disconnect all connected cables and remove any loose or movable parts.
- ⇒ Reinstall any transport locks provided.
- ⇒ Secure all parts against slipping and damage.

7 Unpacking and Initial Operation

7.1 Unpacking



In case of a return, please refer to the instructions in the chapter “Packaging/Return Transport”

Upon receipt of the device, first check that no transport damage has occurred and that the outer packaging, the housing, other parts, or the device itself have not been damaged. If any damage is visible, please notify the KERN service team immediately.

7.2 How the Polarimeter Works

The polarimeter operates on the half-shade principle and measures the rotation of the plane of polarization of light with a wavelength of 589 nm as it passes through an optically active substance.

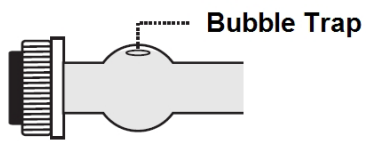
A half-shade prism divides the field of view into two halves with slightly different polarization. When correctly set to zero, both halves appear equally bright. If the sample rotates the plane of polarization, one half becomes brighter while the other becomes darker. By rotating the analyzer, extinction is restored, creating a balance point.

Note: When observing a non-optically active substance, the field of view remains uniformly dark. Even when rotating the analyzer, no balance point is achieved. No optical rotation occurs.

7.3 Filling a Cuvette

1. Thoroughly clean the cuvette with distilled water.
2. Then place the cuvette on a level surface and slowly fill the substance to the top edge using a pipette, avoiding bubbles.
3. Securely close the cuvette and tighten evenly, but do not overtighten.
4. Dry the outside surfaces of the cuvette.

Note: If bubbles have formed, they must be directed into the air bubble trap.



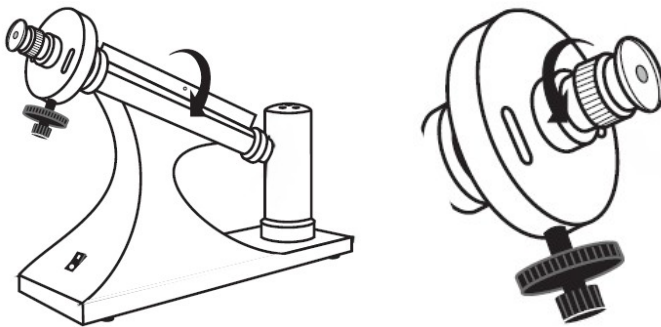
7.4 Check the zero setting

Before starting the measurement, make sure that the polarimeter is correctly set to 0° .

1. Switch on the polarimeter.

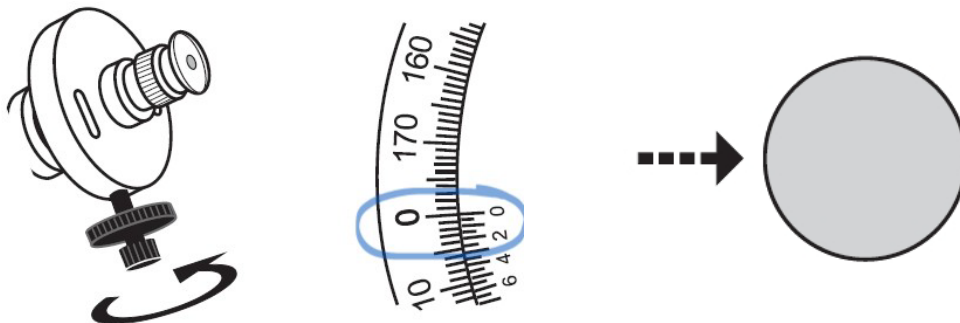
Note: The LED does not require any stabilization time.

2. Insert a cuvette filled with distilled water into the sample chamber.
3. Close the sample chamber cover and adjust the focus of the field of view.



4. Set the scale to 0° using the vernier wheel.

Both halves in the field of view appear equally bright.

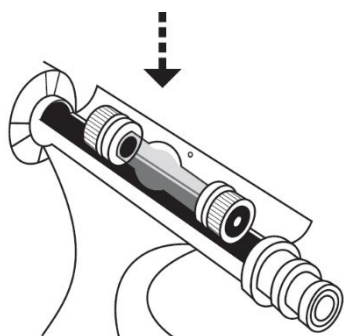


Note: At 90° , both halves of the field of view also appear equally bright, but intensely bright. At this position, the entire light beam passes through.

5. If the zero check with distilled water does not result in exactly 0° , this correction angle must be recorded and taken into account for every measurement.

7.5 Perform the measurement

1. Open the cover of the sample chamber and insert the filled cuvette, making sure that the bubble trap is facing upward.

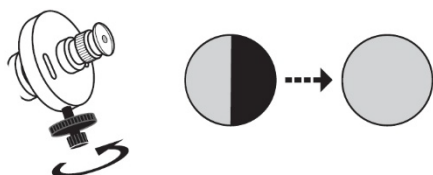


2. Close the cover and turn the scale to 0°.

Look through the eyepiece and check:

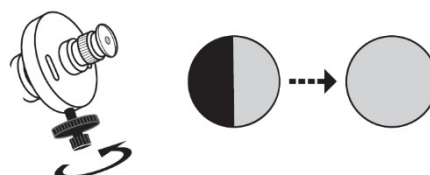
Half-shade on the right:

Substance = dextrorotatory (+)
(rotates to the right)



Half-shade on the left:

Substance = levorotatory (-)
(rotates to the left)



3. Rotate the analyzer in the direction that equalizes the halves.

⇒ For a dextrorotatory substance: rotate the analyzer to the left.

⇒ For a levorotatory substance: rotate the analyzer to the right.

Compensation point: both halves equally bright (not glaringly bright).

4. Read and record the rotation angle α from the scale.

Note: Depending on the zero setting, take the correction angle into account!

7.6 Calculate the optical rotation angle α .

Formula: $\alpha = \text{observed angle} - \text{correction angle from the zero setting}$

Given: correction angle = $+0,2^\circ$ / observed angle = $15,4^\circ$

Calculation: $\alpha = 15,4^\circ - 0,2^\circ$
 $\alpha = 15,2^\circ$

7.7 Calculation of the specific rotation $[\alpha]$

The measured rotation depends on the light path through the cell (length in dm) and the concentration of the substance (g/mL or g/cm³).

Formula: $[\alpha] = \frac{\alpha}{c \cdot l}$

α = measured rotation angle ($^\circ$)

l = curvett length (dm)

c = concentration of the solution (g/ml oder g/cm³)

$[\alpha]$ = specific rotation ($^\circ \cdot \text{dm}^{-1} \cdot \text{g}^{-1} \cdot \text{ml}$)

Example Calculation:

Given: $\alpha = 15,2^\circ$ / $l = 2 \text{ dm}$ (200 mm) / $c = 0,05 \text{ g/ml}$

Calculation: $[\alpha] = 15,2 / (2 \cdot 0,05)$
 $[\alpha] = 15,2 / 0,1$
 $[\alpha] = 152^\circ \cdot \text{dm}^{-1} \cdot (\text{g/ml})^{-1}$
 $[\alpha] = +152^\circ$

7.8 Compact overview with sources of error

Step	Purpose	Possible Error
Check zero position	Set zero reference	Dust in the beam path, wrong lighting
Fill the cuvette	Bubble-free sample for accurate measurement	Air bubbles, dirty cuvette
Carry out the measurement	Determine the angle of polarization	Turning too fast, incorrect reading
Calculate the rotation angle	Correction of zero setting and result	Failure to apply zero correction

7.9 Check against reference values

By comparing the specific rotation with literature values, the following aspects can be assessed, among others:

- ⇒ the purity of a substance (deviations indicate impurities),
- ⇒ the concentration of a solution, if the purity is known,
- ⇒ the identity of a substance, since many optically active compounds have characteristic specific rotations,
- ⇒ the configuration (D- or L-form) of chiral molecules,
- ⇒ whether a reaction has gone to completion (e.g., during the conversion of sugars).

7.10 Temperature dependence of polarimeter measurements

The ambient temperature, room temperature, and sample temperature influence the measurement result of a polarimeter. The scales are generally calibrated for a reference temperature of +20 °C. For most substances, at a light wavelength of 589 nm, the measured rotation angle decreases by approximately 0.3 % per 1 °C increase in temperature.

- ⇒ Specific rotation is usually indicated as $[\alpha]^{D_{20}}$:
- ⇒ D = Sodium D-line (589 nm)
- ⇒ 20 = Reference temperature in °C

The specific rotation is temperature-dependent because the interaction between light and molecules changes with kinetic energy. Without temperature correction, deviations from literature values may occur, which can lead to incorrect conclusions about the purity, concentration, or identity of the substance.

8 Cleaning

8.1 Cleaning the cuvette

- ⇒ After each measurement, completely pour out the solution.
- ⇒ Rinse the cuvette 2–3 times with distilled water.
- ⇒ If necessary, additionally rinse with a suitable solvent (e.g., ethanol) to remove any substance residues.
- ⇒ Before the next measurement, briefly rinse the cuvette with the new sample solution to prevent residuals from affecting the results.
- ⇒ Carefully wipe the glass windows with a soft, lint-free cloth or lens paper.
- ⇒ Do not use harsh cleaning agents or abrasive materials, as scratches can distort the measurement.

8.2 Cleaning the Polarimeter

- ⇒ Turn off the instrument and disconnect it from the power supply before cleaning.
- ⇒ Wipe the exterior with a soft, dry cloth.
- ⇒ Do not spray liquids directly onto the instrument!
- ⇒ Clean lenses or polarization filters only with lens paper or specialized optical cleaning cloths.
- ⇒ Avoid causing scratches.
- ⇒ Every few weeks, check for dust, fingerprints, or moisture that could impair the optics.
- ⇒ If visible dirt is present, clean carefully immediately.

9 Storage of the Polarimeter and Cuvettes

- ⇒ Store the polarimeter and cuvettes in a clean, dry, and dust-free environment.
- ⇒ Avoid direct sunlight, high humidity, and significant temperature fluctuations.
- ⇒ Keep cuvettes separately in a padded box or holder to prevent scratches and damage.
- ⇒ Protect both components from shocks and mechanical stress.

10 Service

If, after carefully reviewing this operating manual, you still have questions regarding commissioning or operation, or if unexpected problems occur, please contact your authorized dealer.

Opening or servicing the instrument must only be carried out by trained service personnel authorized by KERN.

11 Disposal

The packaging is made of environmentally friendly materials that can be disposed of through local recycling facilities.

Disposal of the storage box and the instrument must be carried out by the operator in compliance with applicable national or regional regulations at the user's location.



Old devices and accessories must not be disposed of in household waste.

Disposal of packaging and the instrument must be carried out by the operator in compliance with applicable national or regional regulations at the user's location.

The instrument consists of various components and materials, such as:

- ⇒ Electronic components (circuit boards, electrical wiring)
- ⇒ Plastic (housing)
- ⇒ Metal (screws)

Improper disposal of the instrument can have harmful effects on human health and the environment.

By disposing of the device in a proper and environmentally responsible manner, these harmful effects can be avoided, and valuable raw materials can be recovered.

12 Further Information

Figures may differ slightly from the actual product.

Modifications for improvement and adaptation to technical progress are subject to change without notice.

Decorative items are not included in the scope of delivery.

The polarimeter should preferably not be exposed to direct sunlight.

Avoid any contact of the instrument with solvents to prevent damage.