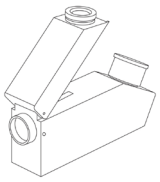
KERN OPTICS

GB

Operating manual
Analogue refractometer

KERN ORA 1 GG Analogue nD
Gemology/gemstones



KERN & Sohn GmbH
Ziegelei 1
D-72336 Balingen
E-Mail: info@kern-sohn.com
Tel: +49-[0]7433-9933-0
Fax: +49-[0]7433-9933-149
Internet: www.kern-sohn.com

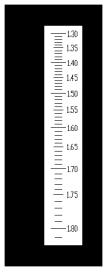
Version 1.1 05/2016

CONTENTS

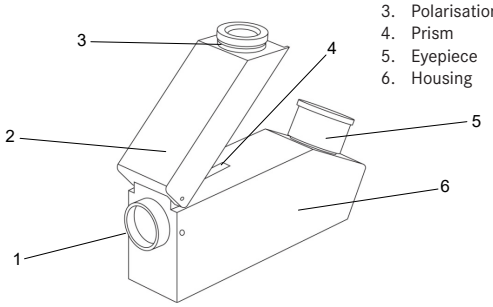
1. Technische Daten

Models KERN	Measuring range and Scales	Scale graduations Accuracy	Dimensions Product	Net weight
ORA 1 GG	RI: 1,30-1,81 nD	0,01 nD	130x20x30mm	0,400kg

Example scale on ORA 1 GG



2. Description



1. Illumination aperture with filter
2. Cap
3. Polarisation filter
4. Prism
5. Eyepiece
6. Housing

3. General information

3.1 Intended use

The refractometer is a measuring instrument for determining the refractive index of gemstones. It is used to observe the behaviour of light as it passes from a prism with known properties to the substance being tested.
Use of the refractometer for other purposes is contrary to its intended use and may be hazardous. The manufacturer shall not be liable for any damages caused by improper use.

3.2 Warranty

The warranty is void in the event of:

- Failure to observe the instructions in the operating manual
- Use for purposes other than those described
- Modifications or opening the device housing
- Mechanical damage and/or damage resulting from media, liquids, natural wear and tear

4. Basic safety information

4.1 Follow the instructions in the operating manual

Carefully read through the operating manual even if you have prior experience with KERN refractometers.
Every language version includes a non-authoritative translation.
The original German document is the definitive version.

4.2 Warning

Do not let acids come into contact with skin or eyes. If acid comes into contact with skin, flush with copious amounts of water. Shower if larger areas of skin are affected.

If acid comes into contact with eyes, keep the eyelid open and flush the eye with running lukewarm water from the outer corner to the inner corner. Flush eyes for at least 15 minutes. Then consult a doctor or ophthalmologist immediately.

Thoroughly clean the refractometer after each use.

The refractometer must not be exposed to extreme temperatures, high mechanical stresses, strong direct sunlight or high humidity.

This refractometer is not a toy. Keep out of reach of children.

Make sure that you will not be hit by anything else while you are using the refractometer, as this could cause serious eye injuries

Do not touch the lenses with your fingers.

5. Supplied items

After unpacking and before using the device for the first time, check that all listed parts have been supplied. Replace damaged or faulty parts immediately and do not put them into operation.

- Refractometer
- Storage box
- Pipette
- Adjustment tool
- Cleaning cloth
- Calibration block + Contact liquid (Diiodomethane)

6. Before first use

Remove the protective film (if present) from the prism surface [4].

7. Use/measurement

The refractometer can be used to quickly and accurately determine the refractive index of gemstones. Please make sure your hands are dry before handling the measuring device.

Some gemstones are monorefringent, they have only one refractive index. Other gemstones - and actually the majority - have two different refractive indexes. Birefringency is a measure of the difference between two refractive indexes in bire-fringent gemstones and ranges between 0.003 and 0.287.
Only a very few gemstones are monorefringent – the only known gemstones displaying this property are diamond, spinel and garnet.

The gemstone refractometer is small, lightweight and is frequently used in the jewellery business.

Important!

The ambient/room temperature and the sample temperature influence the refractometer measuring result.
The scales are designed for an ambient temperature of +20 °C!

7.1 Calibration with the calibration block

Prior to any kind of measuring operation a calibration of the device has to be done.
Please put one drop of the contact liquid (Diiodomethane) on the prism [4]. Now put the calibration block with the smooth and polished surface on the prism [4]. Use only slight pressure. There must not be any pimples between the calibration block and the prism.
Close the prism cover [2].
Now please look into the eyepiece.
You should read 1,515 at the light/dark boundary.
In case you read a different value the calibration of the refractometer has to be redone.
This recalibration can only be done in a dealers workshop.
After having finished please clean the refractometer. See point [8].

*7.2 Measuring procedure **

- Make sure your hands are dry before handling the refractometer. Put the refractometer always on a flat table surface and do not tilt or hold it up with your hands during the entire measuring process.
- Open the prism cover [2] and apply one drop only of the contact liquid* onto the prism surface [4]. Now place the gemstone with as flat a face as possible onto the prism [4]. There is now an oil film between the gemstone and the prism [4]. Close the prism cover [2] and wait about 30 seconds (for optimal temperature equalisation between the sample and device).
- View the measurement scale through the eyepiece [5]. Point the refractometer's illumination aperture [1] at a bright light source while doing this (If the daylight should not be sufficient, you can use an additional LED.
- Raise or lower the eyepiece [5] to focus the optics.
- Depending on the type of gemstone the light/dark boundary on the scale reveals the result.
- To determine the birefringency index unscrew the polarisation filter [3] and place it on the eyepiece [5]. Bring the light/dark boundary on the scale into focus by rotating the polarisation filter [3] and read off the value. Now rotate the gemstone by 90° and make a new measurement as described. Read off the second value.
- The difference between the first and the second value is the birefringency.
- For birefringent gemstones it is between 0.003 and 0.278. When the measurements are complete screw the polarisation filter [3] back into its mount on the cover [8].
- Carefully clean the supplied pipette [8] and the refractometer after carrying out the measurement.

Important!

After every measurement, use a lint-free, absorbent cloth to remove the fluids from the prism surface [4]. Then carefully clean the prism and prism cover using a cloth moistened with water or if necessary alcohol, and dry both parts using a soft, dry and lint-free cloth.
Avoid rubbing the prism [4].

8. Cleaning and maintenance

Clean the refractometer by using a soft, lint-free cloth moistened with water, or if necessary use pure alcohol. Do not use any aggressive or abrasive cleaning agents. Never immerse the device in water or hold it under running water. Never handle the device with wet or damp hands.

Never touch the measuring prism [4] with hard tools made from plastic, wood, rubber, metal, glass etc. Hard objects can quickly damage the relatively soft prism glass, re-sulting in measurement errors.

The refractometer is maintenance-free.

Cleaning should be carried out immediately before and after each use of the refractometer to maximise its life and optimise measurement results.

9. Storage

Store the refractometer in a dry, non-corrosive environment, preferably between 10 °C and 30 °C.

10. Service

After reading this operating manual, if you have any questions about setting up or using the refractometer, or if any unexpected problem occurs, please contact your dealer. The device housing may only be opened by trained service technicians authorised by KERN.

11. Disposal

The packaging consists of environmentally friendly materials which can be disposed of via local recycling facilities.
The device and storage box should be disposed of by the operator in accordance with applicable national or regional regulations at the place of use.

12. Additional information

The product may differ slightly from the illustrations. We reserve the right to make changes to reflect technical advancements, decorations not included.
Avoid exposing the refractometer to direct sunlight!
Never bring the refractometer into contact with solvents.

* Further information on Measuring

The contact liquid (Diiodomethane), included with the standard outfit, has a Refractive Index of 1.7425 nD.
If the gemstone to be tested has a Refractive Index, that is higher than 1.7425 nD, another contact liquid (Anderson liquid), of which the Refractive Index is higher than the Refractive Index of the gemstone, must be used.