

## Analogue refractometer KERN ORA



Also available with calibration certificate, see page 110!

## Refractive index measurement for laboratories and the industry

#### Features

- The KERN ORA refractometers are universal, maintenance-free analogue handheld refractometers
- The handy and robust design allows the easy, efficient and sustainable use in everyday life
- Manually calculated conversions and errors of the user are avoided by multiple selectable scales
- These scales are especially developed, exactly calculated and checked. They are also characterized by their thin and clear lines
- The optical system and the prism cover are made of special material which allows a low-tolerance measuring
- All ORA models are equipped with an eyepiece for easy and smooth setting for many different diopter strengths
- The models marked with "ATC" have an automatic temperature compensation which enables accurate measurement at different ambient temperatures (10 °C/30 °C)
- The following accessory-parts are included:
  - Storage box
  - Calibration liquid
  - Calibration block (if required)
  - Pipette
  - Screwdriver
  - Cleaning tissue
- Further accessories are optionally available

#### Technical data

- Die-cast housing of copper-aluminium alloy, chrome coated
- Measurement temperature without ATC: 20 °C
- Measurement temperature range with ATC: 10 °C/30 °C
- Dimensions of the box: 205×75×55 mm (depending on the model)
- Product length: approx. 130 – 200 mm (depending on the model)
- Net weight approx. 135 – 600 g (depending on the model)

STANDARD



1 DAY

OPTION

AUTO  
ATC

Datasheet\_ORA\_V2

Analogue refractometer KERN ORA-B · ORA-H

**Scope of application: Sugar**

The following models are particularly suitable for the measurement of the “BRIX” value. They are used to determine the sugar content in food, especially in fruit, vegetables, juice and soft drinks. In the same ideal way these refractometers serve for monitoring processes in the industry (coolant monitoring, oils, water-based mixtures).

The main scope of applications is:

- Industry: Monitoring of lubricants for process and quality control
- Food industry: Beverages, fruits and sweets
- Agriculture: Determination of the degree of ripeness of fruits for quality control in harvesting
- Restaurants and large-scale catering establishment



Model	Scales	Measuring range	Division	ATC	
<b>KERN</b>					
ORA 10BB	Brix	0 – 10 %	0,1 %		
ORA 10BA	Brix	0 – 10 %	0,1 %	✓	
ORA 18BB	Brix	0 – 18 %	0,1 %		
ORA 20BB	Brix	0 – 20 %	0,1 %		
ORA 20BA	Brix	0 – 20 %	0,1 %	✓	
ORA 32BB	Brix	0 – 32 %	0,2 %		
ORA 32BA	Brix	0 – 32 %	0,2 %	✓	
ORA 62BB	Brix	28 – 62 %	0,2 %		
ORA 62BA	Brix	28 – 62 %	0,2 %	✓	
ORA 82BB	Brix	45 – 82 %	0,5 %		
ORA 80BB	Brix	0 – 80 %	0,5 %		

**Scope of application: Honey**

The following models are particularly suitable for the measurement of the “BRIX” value, as well as the water content in honey and “degrees Baumé” to determine the relative density of liquids.

The main scope of applications is:

- Beekeeping
- Honey production



Model	Scales	Measuring range	Division	ATC	
<b>KERN</b>					
ORA 3HB	Brix Baumé Water content	58 – 92 % 38 – 43 °Bé 12 – 27 %	0,5 % 0,5 °Bé 1 %		
ORA 3HA	Brix Baumé Water content	58 – 92 % 38 – 43 °Bé 12 – 27 %	0,5 % 0,5 °Bé 1 %	✓	
ORA 6HB	Water content	12 – 30 %	0,1 %		
ORA 6HA	Water content	12 – 30 %	0,1 %	✓	

Analogue refractometer KERN ORA-S · ORA-W

**Scope of application: Salt**

The following models are particularly suitable for the measurement and concentration control of the mass fraction of sodium chloride in water as well as of the content of NaCl (salt) in water. This is often used in the preparation and the cooking of sauces, bases for pastries, the production of brines (e.g. for white cheese) and the preparation of seafood and marinades for meat.

The main scope of applications is:

- Food industry
- Restaurants and large-scale catering establishment
- Aquaristic: Fishkeepers/Fishfarmers in sea and sweetwater



Model	Scales	Measuring range	Division	ATC	
<b>KERN</b>					
<b>ORA 1SB</b>	Salinity specific gravity	0 – 100 ‰ 1,000 – 1,070 sg	1 ‰ 0,001 sg		
<b>ORA 1SA</b>	Salinity specific gravity	0 – 100 ‰ 1,000 – 1,070 sg	1 ‰ 0,001 sg	✓	
<b>ORA 2SB</b>	Salt (NaCl)	0 – 28 %	0,2 %		
<b>ORA 2SA</b>	Salt (NaCl)	0 – 28 %	0,2 %	✓	
<b>ORA 3SB</b>	Salt (NaCl) Brix	0 – 28 % 0 – 32 %	0,2 % 0,2 %		
<b>ORA 3SA</b>	Salt (NaCl) Brix	0 – 28 % 0 – 32 %	0,2 % 0,2 %	✓	

**Scope of application: Wine**

The following models are particularly suitable for the measurement of the content of sugar in fruits. It indicates the expected °Alcohol of the fruit. The degree of ripeness of fruit (fruit-sugar) can also be determined, such as e.g. grapes.

The main scope of applications is:

- Agriculture: Wine-growing and fruit-growing
- Wine-production
- Must and alcohol production



°Oe = Degree Oechsle, °KMW = Klosterneuburger Must balance

Model	Scales	Measuring range	Division	ATC	
<b>KERN</b>					
<b>ORA 1WB</b>	Oechsle KMW (Babo) Brix	0 – 140 °Oe 0 – 25 °KMW 0 – 32 %	1 °Oe 0,25 °KMW 0,2 %		
<b>ORA 1WA</b>	Oechsle KMW (Babo) Brix	0 – 140 °Oe 0 – 25 °KMW 0 – 32 %	1 °Oe 0,25 °KMW 0,2 %	✓	
<b>ORA 3WB</b>	Oechsle Brix	30 – 140 °Oe 0 – 32 %	1 °Oe 0,2 %		
<b>ORA 3WA</b>	Oechsle Brix	30 – 140 °Oe 0 – 32 %	1 °Oe 0,2 %	✓	
<b>ORA 7WB</b>	Oechsle KMW (Babo) Brix	30 – 140 °Oe 0 – 25 °KMW 0 – 32 %	1 °Oe 0,2 °KMW 0,2 %		
<b>ORA 7WA</b>	Oechsle KMW (Babo) Brix	30 – 140 °Oe 0 – 25 °KMW 0 – 32 %	1 °Oe 0,2 °KMW 0,2 %	✓	

Analogue refractometer KERN ORA-AL · ORA-P

**NEW**

**Scope of application: Beer/alcohol**

The following models are particularly suitable for determining the sugar content of the original wort in its unfermented state. The value can be read straightaway, without having to be converted, using the SG Wort and Degrees Plato scales. In addition, the percent by volume and percent by mass scales can be used to determine the alcohol content of clear spirits.

The main scope of applications is:

- Beer brewers
- Alcohol production



Model	Scales	Measuring range	Division	ATC	
<b>KERN</b>					
<b>ORA 3AB</b>	Brix SG Wort	0 – 32 % 1,000 – 1,130 sgW	0,2 ‰ 0,001 sgW		
<b>ORA 3AA</b>	Brix SG Wort	0 – 32 % 1,000 – 1,130 sgW	0,2 ‰ 0,001 sgW	✓	
<b>ORA 4AB</b>	Plato	0 – 18° P	0,1° P		
<b>ORA 4AA</b>	Plato	0 – 18° P	0,1° P	✓	
<b>ORA 1AB</b>	Percentage by volume	0 – 50 % (v/v) 50 – 80 % (v/v)	1 % (v/v) 2,5 % (v/v)		
<b>ORA 2AB</b>	Percentage by mass	0 – 50 % (w/w) 50 – 80 % (w/w)	1 % (w/w) 2,5 % (w/w)		

**Scope of application: Urine**

The following models are particularly suitable for the measurement of the specific gravity (sg) in urine, the quantity of serum (serumproteine) in urine (doping control among athletes), and the refractive index.

The main scope of applications is:

- Hospitals
- Doctor's surgeries/Physicians
- Medical training institutions
- Nursing homes
- Sports medicine (doping test)
- Veterinary



Model	Scales	Measuring range	Division	ATC	
<b>KERN</b>					
<b>ORA 2PB</b>	Serum protein Urine (spec. gravity) Refractive index	0 – 12 g/dl 1,000 – 1,050 sgU 1,3330 – 1,3600 nD	0,2 g/dl 0,002 sgU 0,0005 nD		
<b>ORA 2PA</b>	Serum protein Urine (spec. gravity) Refractive index	0 – 12 g/dl 1,000 – 1,050 sgU 1,3330 – 1,3600 nD	0,2 g/dl 0,002 sgU 0,0005 nD	✓	
<b>ORA 5PB</b>	Serum protein Urine (s. g. dog) Urine (s. g. cat)	2 – 14 g/dl 1,000 – 1,060 sgU 1,000 – 1,060 sgU	0,1 g/dl 0,001 sgU 0,001 sgU		

Analogue refractometer KERN ORA-F · ORA-U

**Scope of application: Industry/Automotive**

The following models are particularly suitable for the measurement and determination of AdBlue, glycol concentration (ethylene (EG) and propylene (PG)), battery fluid (BF), urea, the freezing point of fountain solution (CW). Furthermore these models are suitable for the measurement of thermal exchange systems.

The main scope of applications is:

- Automotive industry: Car-workshops and producers, in accordance with the VW standards G11/G12 and G13
- Chemical industry
- Solar industry: Antifreeze monitoring



Model	Scales	Measuring range	Division	ATC	
<b>KERN</b>					
<b>ORA 4FB</b>	EG (G11/12) PG (G13) CW BF	-50 - 0 °C -50 - 0 °C -40 - 0 °C 1,10 - 1,40 kg/l	1 °C 1 °C 5 °C 0,01 kg/l		
<b>ORA 4FA</b>	EG (G11/12) PG (G13) CW BF	-50 - 0 °C -50 - 0 °C -40 - 0 °C 1,10 - 1,40 kg/l	1 °C 1 °C 5 °C 0,01 kg/l	✓	
<b>ORA 1UB</b>	Urea	0 - 40 %	0,2 %		
<b>ORA 1UA</b>	Urea	0 - 40 %	0,2 %	✓	
<b>ORA 4UB</b>	Urea EG (G11/12) PG (G13) CW BF	30 - 35 % -50 - 0 °C -50 - 0 °C -40 - 0 °C 1,10 - 1,40 kg/l	0,2 % 1 °C 1 °C 5 °C 0,01 kg/l		
<b>ORA 4UA</b>	Urea EG (G11/12) PG (G13) CW BF	30 - 35 % -50 - 0 °C -50 - 0 °C -40 - 0 °C 1,10 - 1,40 kg/l	0,2 % 1 °C 1 °C 5 °C 0,01 kg/l	✓	

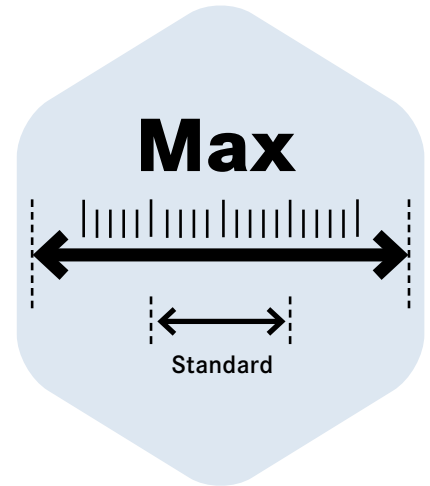
Analogue refractometer KERN ORA-E · ORA-R · ORA-G

**Scope of application: Expert applications**

The following models have a special large measuring range for the refractive index and large divided scales for the measurement and clear reading of Brix values.

The main scope of applications is:

- Universal application, especially when extra large measuring ranges are required



Model	Scales	Measuring range	Division	ATC	
<b>KERN</b>					
<b>ORA 80BE</b>	Brix	0 - 50 % 50 - 80 %	0,5 % 0,5 %		
<b>ORA 90BE</b>	Brix	0 - 42 % 42 - 71 % 71 - 90 %	0,2 % 0,2 % 0,2 %		
<b>ORA 1RE</b>	Refractive index	1,333 - 1,405 nD 1,405 - 1,468 nD 1,468 - 1,517 nD	0,005 nD 0,005 nD 0,005 nD		
<b>ORA 4RR</b>	Refractive index	1,440 - 1,520 nD	0,001 nD		



ORA 4RR



ORA 90 BE/ORA 1RE



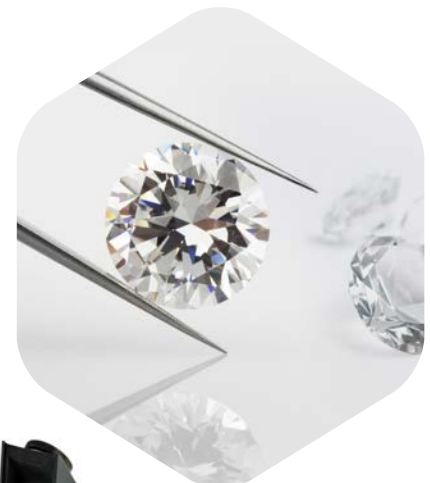
ORA 80BE

**Scope of application: Gemmology/Jewellery**

The Gem models have a special refracting-index range for jewellery. For this refractometer there is a nice leather bag in the scope of delivery included.

The main scope of applications is:

- Jewellers
- Training/Education
- Jewellery industry



Model	Scales	Measuring range	Division	ATC	
<b>KERN</b>					
<b>ORA 1GG</b>	Refractive index	1,30 - 1,81 nD	0,01 nD		



ORA 1GG



Analogue refractometer KERN ORA-A

**Accessory parts: Analogue refractometer – ORA**



Prism coverplate with LED  
ORA-A1101



Calibration liquid/  
Contact liquid



Leather bag  
ORA-A2103



Calibration block

Model	Description	
<b>KERN</b>		
<b>ORA-A1101</b>	Prism coverplate with integrated LED illumination	
<b>ORA-A2103</b>	Leather bag for analog refractometers	
<b>ORA-A2107</b>	Leather bag for Gem refractometers (Spare part)	
<b>ORA-A1010</b>	Calibration liquid – distilled water – Set of 5 Volume: 5× approx. 2,5 ml	
<b>ORA-A1002</b>	Contact liquid – Clove oil (for Calibration value 19,6%) Volume: approx. 2,5 ml	
<b>ORA-A1003</b>	Calibration liquid – saturated salt solution Volume: approx. 2,5 ml	
<b>ORA-A1004</b>	Contact liquid – Clove oil (for Calibration value 78,8%) Volume: approx. 2,5 ml	
<b>ORA-A1005</b>	Calibration block for models ORA 82BB, ORA 3HA, ORA 3HB, ORA 6HA, ORA 6HB , ORA 4RR	
<b>ORA-A1007</b>	Contact liquid – Diiodomethane “Standard” (Refractive index: 1,74 nD) Volume: approx. 2,5 ml	
<b>ORA-A3001</b>	Contact liquid – Diiodomethane “Pro” (Refractive index: 1,79 nD) Volume: approx. 2 ml	
<b>ORA-A1008</b>	Calibration block for model ORA 1GG	
<b>ORA-A2001</b>	Prism coverplate (spare part)	

Relationship overview – refractometer calibration (analogue)

Model refractometer	Calibration value	Calibration liquid	Article number liquid	Calibration block	Article number calibration block
ORA 10BA; ORA 10BB; ORA 18BB; ORA 1WA; ORA 1WB; ORA 20BA; ORA 20BB; ORA 32BA; ORA 32BB; ORA 3SA; ORA 3SB; ORA 3WA; ORA 3WB; ORA 7WA; ORA 7WB; ORA 80BB; ORA 80BE; ORA 3AB; ORA 3AA	0 % Brix	distilled water	ORA-A1010	-	-
ORA 4AA; ORA 4AB	0 ° Plato	distilled water	ORA-A1010	-	-
ORA 1UA; ORA 1UB	0 % Urea	distilled water		-	
ORA 4FA; ORA 4FB; ORA 4UA; ORA 4UB	0 °C EG/PG/CW	distilled water		-	
ORA 1SA; ORA 1SB	0 ‰ Salinity	distilled water		-	
ORA 2SA; ORA 2SB	0 % Salt (NaCl)	distilled water		-	
ORA 2AB	0 % Vol (weight)	distilled water		-	
ORA 2PA; ORA 2PB; ORA 5PB	1,000 sg Urine	distilled water		-	
ORA 62BA; ORA 62BB	29,6 % Brix	saturated salt solution	ORA-A1003	-	-
ORA 3HA; ORA 3HB; ORA 82BB	78,8 % Brix	Clove oil CAS 8000-34-8	ORA-A1004	yes	ORA-A1005
ORA 4RR	1,4875 nD	Clove oil CAS 8000-34-8	ORA-A1004	yes	ORA-A1005
ORA 6HA; ORA 6HB	19,6 % Water content	Clove oil CAS 8000-34-8	ORA-A1002	yes	ORA-A1005
ORA 1GG	1,515 nD	Diiodomethane CAS 90-11-9	ORA-A1007	yes	ORA-A1008

## Pictograms

<b>360° rotatable microscope head</b>	<b>Fluorescence illumination for compound microscopes</b> With 3 W LED illumination and filter	<b>USB 3.0 digital camera</b> For direct transmitting of the picture to a PC
<b>Monocular Microscope</b> For the inspection with one eye	<b>Phase contrast unit</b> For a higher contrast	<b>WLAN data interface</b> For transmitting of the picture to a mobile display device
<b>Binocular Microscope</b> For the inspection with both eyes	<b>Darkfield condenser/unit</b> For a higher contrast due to indirect illumination	<b>HDMI digital camera</b> For direct transmitting of the picture to a display device
<b>Trinocular Microscope</b> For the inspection with both eyes and the additional option for the connection of a camera	<b>Polarising unit</b> To polarise the light	<b>PC software</b> To transfer the measurements from the device to a PC
<b>Abbe Condenser</b> With high numerical aperture for the concentration and the focusing of light	<b>Infinity system</b> Infinity corrected optical system	<b>Automatic temperature compensation</b> For measurements between 10 °C and 30 °C
<b>Halogen illumination</b> For pictures bright and rich in contrast	<b>Zoom magnification</b> For stereomicroscopes	<b>Protection against dust and water splashes IPxx:</b> The type of protection is shown in the pictogram cf. DIN EN 60529:2000-09, IEC 60529:1989+A1:1999+A2:2013
<b>LED illumination</b> Cold, energy-saving and especially long-life illumination	<b>Auto-focus</b> For automatic control of the focus level	<b>Battery operation</b> Ready for battery operation. The battery type is specified for each device.
<b>Incident illumination</b> For non-transparent objects	<b>Parallel optical system</b> For stereomicroscopes, enables fatigue-proof working	<b>Battery operation rechargeable</b> Prepared for a rechargeable battery operation
<b>Transmitting illumination</b> For transparent objects	<b>Integrated scale</b> In the eyepiece	<b>Plug-in power supply</b> 230V/50Hz in standard version for EU. On request GB, AUS or USA version.
<b>Fluorescence illumination for stereomicroscopes</b>	<b>SD card</b> For data storage	<b>Integrated power supply unit</b> Integrated in microscope. 230V/50Hz standard EU. More standards e.g. GB, AUS or USA on request.
<b>Fluorescence illumination for compound microscopes</b> With 100 W mercury lamp and filter	<b>USB 2.0 digital camera</b> For direct transmitting of the picture to a PC	<b>Package shipment</b> The time required to manufacture the product internally is shown in days in the pictogram.

## Abbreviations

<b>C-Mount</b> Adapter for the connection of a camera to a trinocular microscope	<b>LWD</b> Long Working Distance	<b>SWF</b> Super Wide Field (Field number at least $\varnothing$ 23 mm for 10 $\times$ eyepiece)
<b>FPS</b> Frames per second	<b>N.A.</b> Numerical Aperture	<b>W.D.</b> Working Distance
<b>H(S)WF</b> High (Super) Wide Field (Eyepiece with high eye point for wearers of glasses)	<b>SLR camera</b> Single-Lens Reflex camera	<b>WF</b> Wide Field (Field number up to $\varnothing$ 22 mm for 10 $\times$ eyepiece)

**Your KERN specialist dealer:**