Analogue refractometer KERN ORA

Also available with calibration certificate.

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 follwoing 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

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
KERN				
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
KERN				
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 natrium 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
KERN				
ORA 1SB	Salinity specific gravity	0 – 100 ‰ 1,000 – 1,070 sg	1 ‰ 0,001 sg	
ORA 1SA	Salinity specific gravity	0 – 100 ‰ 1,000 – 1,070 sg	1 ‰ 0,001 sg	✓
ORA 2SB	Salt (NaCl)	0 – 28 %	0,2 %	
ORA 2SA	Salt (NaCl)	0 – 28 %	0,2 %	✓
ORA 3SB	Salt (NaCl) Brix	0 – 28 % 0 – 32 %	0,2 % 0,2 %	
ORA 3SA	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
KERN				
ORA 1WB	Oechsle KMW (Babo) Brix	0 – 140 °Oe 0 – 25 °KMW 0 – 32 %	1 °Oe 0,25 °KMW 0,2 %	
ORA 1WA	Oechsle KMW (Babo) Brix	0 – 140 °Oe 0 – 25 °KMW 0 – 32 %	1 °Oe 0,25 °KMW 0,2 %	✓
ORA 3WB	Oechsle Brix	30 – 140 °Oe 0 – 32 %	1 °Oe 0,2 %	
ORA 3WA	Oechsle Brix	30 – 140 °Oe 0 – 32 %	1 °Oe 0,2 %	✓
ORA 7WB	Oechsle KMW (Babo) Brix	30 – 140 °Oe 0 – 25 °KMW 0 – 32 %	1 °Oe 0,2 °KMW 0,2 %	
ORA 7WA	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

Scope of application: Beer/alcohol

The following models are particularly suitable for determining the sugar content of the original wort of beer 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
KERN				
ORA 3AB	Brix SG Wort	0 – 32 % 1,000 – 1,130 sgW	0,2 ‰ 0,001 sgW	
ORA 3AA	Brix SG Wort	0 – 32 % 1,000 – 1,130 sgW	0,2 ‰ 0,001 sgW	✓
ORA 4AB	Plato	0 – 18° P	0,1° P	
ORA 4AA	Plato	0 – 18° P	0,1° P	✓
ORA 1AB	Percentage by volume Percentage by volume	0 – 50 % (v/v) 50 – 80 % (v/v)	1 % (v/v) 2,5 % (v/v)	
ORA 2AB	Percentage by mass 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 quantitiy 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
KERN				
ORA 2PB	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	
ORA 2PA	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	✓
ORA 5PB	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 windscreen wash water (CW). Furthermore these models are suitable for the measurement of thermal exchange systems.

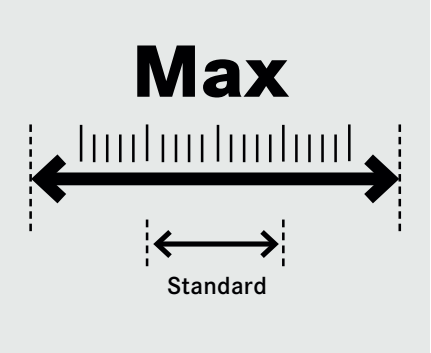
The main scope of applications is:
- Automotive industry: Car-workshops and producers, in accordance with the VW standards G11/G12 and G13
- Chemical industry
- Solar industry: Antifreeze monitoring

Model	Scales	Measuring range	Division	ATC
KERN				
ORA 4FB	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	
ORA 4FA	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	✓
ORA 1UB	Urea	0 – 40 %	0,2 %	
ORA 1UA	Urea	0 – 40 %	0,2 %	✓
ORA 4UB	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	
ORA 4UA	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
KERN				
ORA 80BE	Brix	0 – 50 % 50 – 80 %	0,5 % 0,5 %	
ORA 90BE	Brix	0 – 42 % 42 – 71 % 71 – 90 %	0,2 % 0,2 % 0,2 %	
ORA 1RE	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	
ORA 4RR	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
KERN				
ORA 1GG	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
KERN	
ORA-A1101	Prism coverplate with integrated LED illumination
ORA-A2103	Leather bag for analog refractometers
ORA-A2107	Leather bag for Gem refractometers (Spare part)
ORA-A1010	Calibration liquid – distilled water – Set of 5 Volume: 5× approx. 2,5 ml
ORA-A1002	Contact liquid – Clove oil (for Calibration value 19,6%) Volume: approx. 2,5 ml
ORA-A1003	Calibration liquid – saturated salt solution Volume: approx. 2,5 ml
ORA-A1004	Contact liquid – Clove oil (for Calibration value 78,8%) Volume: approx. 2,5 ml
ORA-A1005	Calibration block for models ORA 82BB, ORA 3HA, ORA 3HB, ORA 6HA, ORA 6HB , ORA 4RR
ORA-A1007	Contact liquid – Diiodomethane “Standard” (Refractive index: 1,74 nD) Volume: approx. 2,5 ml
ORA-A3001	Contact liquid – Diiodomethane “Pro” (Refractive index: 1,79 nD) Volume: approx. 2 ml
ORA-A1008	Calibration block for model ORA 1GG
ORA-A2001	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 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-A1010	–	–
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

360° rotatable microscope head

Monocular Microscope
For the inspection with one eye

Binocular Microscope
For the inspection with both eyes

Trinocular Microscope
For the inspection with both eyes and the additional option for the connection of a camera

Abbe Condenser
With high numerical aperture for the concentration and the focusing of light

Halogen illumination
For pictures bright and rich in contrast

LED illumination
Cold, energy-saving and especially long-life illumination

Incident illumination
For non-transparent objects

Transmitting illumination
For transparent objects

Fluorescence illumination
For stereomicroscopes

Fluorescence illumination for compound microscopes
With 100 W mercury lamp and filter

Fluorescence illumination for compound microscopes
With 3 W LED illumination and filter

Phase contrast unit
For a higher contrast

Darkfield condenser/unit
For a higher contrast due to indirect illumination

Polarising unit
To polarise the light

Infinity system
Infinity corrected optical system

Zoom magnification
For stereomicroscopes

Auto-focus
For automatic control of the focus level

Parallel optical system
For stereomicroscopes, enables fatigue-proof working

Integrated scale
In the eyepiece

SD card
For data storage

USB 2.0 digital camera
For direct transmitting of the picture to a PC

USB 3.0 digital camera
For direct transmitting of the picture to a PC

WIFI data interface:
For transmitting of the picture to a mobile display device

HDMI digital camera
For direct transmitting of the picture to a display device

PC software
To transfer the measurements from the device to a PC.

Automatic temperature compesation
For measurements between 10 °C and 30 °C

Protection against dust and water splashes IPxx:
The type of protection is shown in the pictogram cf. DIN EN 60529:2000-09, IEC 60529:1989+A1:1999+A2:2013

Battery operation
Ready for battery operation. The battery type is specified for each device.

Battery operation rechargeable
Prepared for a rechargeable battery operation

Plug-in power supply
230V/50Hz in standard version for EU. On request GB, AUS or USA version.

Integrated power supply unit
Integrated in microscope. 230V/50Hz standard EU. More standards e.g. GB, AUS or USA on request.

Package shipment
The time required to manufacture the product internally is shown in days in the pictogram.

ABBREVIATIONS

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