

Operating manual Analogue refractometer

KERN ORA 1 WA Wine
ORA 3 WA Wine
ORA 1 AB / 2 AB Alcohol



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Version 1.3

KERN & Sohn GmbH

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

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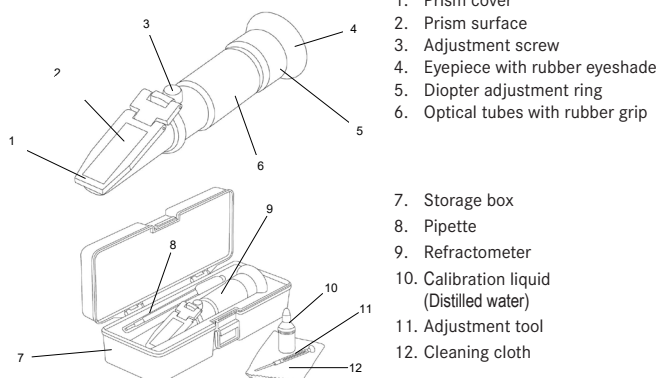
1. Technical data

Models KERN	Measuring range and Scales	Scale graduations Accuracy	Dimensions Product	Net weight
ORA 1WA	0-140°Oe 0-25°KMW (Babo) 0-32% Brix	1°Oe 0,25°KMW (Babo) 0,2% Brix	178x40x40mm	0,145kg
ORA 3WA	30-140°Oe 0-32% Brix	1°Oe 0,2% Brix	178x40x40mm	0,145kg
ORA 1AB (Volume) ORA 2AB (Mass)	0-50 % (v/v) / (w/w) 50-80 % (v/v) / (w/w)	1 % (v/v) / (w/w) 2,5 % (v/v) / (w/w)	198x40x40mm	0,155kg

Example scale on
ORA 1 WA



2. Description



1. Prism cover
2. Prism surface
3. Adjustment screw
4. Eyepiece with rubber eyeshade
5. Diopter adjustment ring
6. Optical tubes with rubber grip
7. Storage box
8. Pipette
9. Refractometer
10. Calibration liquid (Distilled water)
11. Adjustment tool
12. Cleaning cloth

3. General information

3.1 Intended use

The refractometer is a measuring instrument for determining the refractive index of transparent substances in the liquid or the solid state. 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 shall be 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
- ▶ The rubber eyeshade may cause irritation when in prolonged contact with the skin. If this happens, consult your doctor.
- ▶ 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 liquid (Distilled water)

6. Before the first use

Remove the protective film (if present) from the prism surface [2] and check that the rubber eye-cup [4] is fitted correctly.

7. Use/measurement

The refractometer can be used to quickly and accurately determine the refractive index of transparent substances, liquid or solid ones. To ensure correct measurement, the measuring device should be adjusted before measurements are carried out. Please make sure your hands are dry before handling the measuring device.

7.1 Zero point calibration

- ▶ Hold up the refractometer against a sufficiently bright light source and look through the eyepiece [5], holding the rubber eyeshade [4] closely against your eye/glasses.
 - ▶ Rotate the eyepiece [5] to adjust it for your eyesight, until you can see the scale sharply.
 - ▶ Open the prism cover [1].
 - ▶ Thoroughly clean the prism [2] and the underside of the prism cover [1] using a soft cloth or soft paper (with alcohol if necessary) and wipe dry.
 - ▶ Now apply a few drops of the calibration liquid [10] onto the prism surface [2].
 - ▶ Close the prism cover [1]. The amount of fluid should be sufficient to moisten most of the prism surface. There should not be any air bubbles between the measuring prism [2] and prism cover [1].
 - ▶ Wait about 30 seconds to allow the temperatures of the fluid and prism to equalise.
 - ▶ Look through the eyepiece [4] while pointing the refractometer's prism surface [2] at a bright light source.
 - ▶ Through the eyepiece [4], you will see a bright and a blue field. The boundary line between them shows the measured value on the scale which is also visible through the eyepiece [4].
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- ▶ Use the supplied adjustment tool [11] to turn the adjustment screw [3] behind the prism surface [2] (under the rubber cap), and adjust the scale so that the measuring device is optimally set up by moving the boundary line upwards or downwards
- Calibration value ORA 1WA: 0 % (Brix) / 0 °Oe (Oechsle) / 0 °KMW (KMW Babo)
- Calibration value ORA 3WA: 0 % (Brix)
- Calibration value ORA 1AB / 2AB: 0 % (v/v) / (w/w)
- ▶ Repeat step 4 (cleaning).

Important!

The ambient/room temperature and the sample temperature influence the refractometer measuring result. The scales of the refractometer models, which have "WB / AB" in its name, are designed for an ambient temperature of +20 °C! If the measurements are carried out at a temperature other than +20 °C, the results must be correspondingly corrected. A correction table can be found in the annex, Point 14. Refractometer models, which have "WA" in its name, are equipped with an automatic temperature compensation (ATC). Between +10°C and +30°C measurement differences due to temperature changes are automatically compensated.



7.2 Additional advice

It is important that the samples being measured are representative samples. For samples that evaporate easily, measurements should be carried out quickly. The samples should be at the same temperature as the measuring instrument in order to achieve an accurate result.

7.3 Measuring procedure

- ▶ Make sure your hands are dry before handling the refractometer.
- ▶ Open the prism cover [1] and use the supplied pipette [8] to apply a few drops of the sample liquid [8] onto the prism surface [2]. Close the prism cover [1]. Spread the liquid evenly by pressing down on the prism cover [1] and eliminate any air bubbles present.
- ▶ Hold the device horizontally and wait about 30 seconds (for optimal temperature equalisation between the sample and device).
- ▶ View the measurement scale through the eyepiece [4]. Point the prism surface [2] of the refractometer at a bright light source while doing this.
- ▶ Rotate the adjustment ring [5] on the eyepiece [4] to adjust the focus.
- ▶ The boundary line will move on the measurement scale depending on the concentration. This bright/dark boundary line shows the result on the scale.
- ▶ If the temperature deviates from +20 °C and a refractometer without ATC is used, correct the measured result using the corresponding value from the temperature correction table [13].
- ▶ 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 [2] and prism cover [1]. 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 [2].



8. Cleaning and maintenance

Clean the refractometer using a soft, lint-free cloth moistened with either water or, if necessary, 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 [2] with hard tools made from plastic, wood, rubber, metal, glass etc. Hard objects can quickly damage the relatively soft prism glass, resulting 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. Avoid exposing the refractometer to direct sunlight. Never bring the refractometer into contact with solvents.

13. Brix to refractive index (nD) conversion table

Data from „ICUMSA“ International Commission for Uniform Methods of Sugar Analysis, at 20 °C and 589 nm wavelength.

BRIX	%	Reflexive index	nd	BRIX	%	Reflexive index	nd	BRIX	%	Reflexive index	nd
0	1	1.3329	30	1	30	1.3815	60	1	60	1.4413	14420
1	0	1.3342	31	31	31	1.3826	61	1	61	1.4420	14430
2	1	1.3356	32	32	32	1.3847	62	1	62	1.4460	14460
3	3	1.3372	33	33	33	1.3861	63	1	63	1.4481	14481
4	4	1.3387	34	34	34	1.3884	64	1	64	1.4513	14513
5	4	1.3397	35	35	35	1.3902	65	1	65	1.4538	14538
6	6	1.3415	36	36	36	1.3920	66	1	66	1.4584	14584
7	7	1.3435	37	37	37	1.3949	67	1	67	1.4582	14582
8	8	1.3447	38	38	38	1.3960	68	1	68	1.4601	14601
9	9	1.3462	39	39	39	1.3972	69	1	69	1.4603	14603
10	10	1.3472	40	40	40	1.3986	70	1	70	1.4646	14646
11	11	1.3493	41	41	41	1.4018	71	1	71	1.4672	14672
12	12	1.3503	42	42	42	1.4037	72	1	72	1.4703	14703
13	13	1.3520	43	43	43	1.4057	73	1	73	1.4735	14735
14	14	1.3540	44	44	44	1.4076	74	1	74	1.4753	14753
15	15	1.3568	45	45	45	1.4097	75	1	75	1.4787	14787
16	16	1.3579	46	46	46	1.4181	76	1	76	1.4840	14840
17	17	1.3589	47	47	47	1.4185	77	1	77	1.4859	14859
18	18	1.3604	48	48	48	1.4192	78	1	78	1.4852	14852
19	19	1.3618	49	49	49	1.4179	79	1	79	1.4881	14881
20	20	1.3634	50	50	50	1.4209	80	1	80	1.4907	14907
21	21	1.3651	51	51	51	1.4220	81	1	81	1.4933	14933
22	22	1.3672	52	52	52	1.4242	82	1	82	1.4957	14957
23	23	1.3688	53	53	53	1.4264	83	1	83	1.4982	14982
24	24	1.3706	54	54	54	1.4282	84	1	84	1.5019	15019
25	25	1.3721	55	55	55	1.4380	85	1	85	1.5038	15038
26	26	1.3740	56	56	56	1.4329	86	1	86	1.5059	15059
27	27	1.3752	57	57	57	1.4350	87	1	87	1.5079	15079
28	28	1.3775	58	58	58	1.4378	88	1	88	1.5098	15098
29	29	1.3825	59	59	59	1.4387	89	1	89	1.5119	15119

14. Annex

Table 1: International Temperature Correction Table for °Brix (% sugar gradient)
Correct the result by the following values (refractometer must be correctly adjusted at 20 °C).

[illegible]