SmartRef

Anton Paar

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DIGITAL REFRACTOMETER
SMARTREF BY ANTON PAAR

SmartRef
D I G I T A L   R E F R A C T O M E T E R

Smart technology for consistent measurement results & convenient monitoring:

- ✓ Compact & lightweight
- ✓ Stainless steel sample well
- ✓ Superior lab-grade precision (accuracy of 0.2 °Brix)
- ✓ SmartGuide+ for reliable results
- ✓ Automatic temperature compensation (ATC)
- ✓ Versatile measurement units: °Brix, ppt, SG, <u>40+ more</u>
- ✓ Simple zero adjustment with distilled water
- ✓ Water resistant (IP66)
- ✓ Free mobile app for iOS & Android

The SmartRef Digital Refractometer is a portable smart device suitable for a wide range of requirements. In combination with a free mobile app, this refractometer offers more than 40 different measurement units.

SmartRef is the result of high-precision craft and passion for research. Made in Austria.

More info
w w w . m y - s m a r t r e f . c o m

SmartRef

DIGITAL WINE REFRACTOMETER

Smart technology for consistent measurement results & convenient monitoring:

- ✓ Compact & lightweight
- ✓ Stainless steel sample well
- ✓ Superior lab-grade precision (accuracy of 0.2 °Brix)
- ✓ SmartGuide+ for reliable results
- ✓ Automatic temperature compensation (ATC)
- ✓ Versatile measurement units:
  °Brix, °KMW, °Oechsle, °Baumé, °Babo, and <u>40+ more</u>
- ✓ Simple zero adjustment with distilled water
- ✓ Water resistant (IP66)
- ✓ Free mobile app for iOS & Android

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More info
www.my-smartref.com

SmartRef

DIGITAL BEER REFRACTOMETER

Smart technology for consistent measurement results & convenient monitoring:

- ✓ Compact & lightweight
- ✓ Stainless steel sample well
- ✓ Superior lab-grade precision (accuracy of 0.2 °Brix)
- ✓ SmartGuide+ for reliable results
- ✓ Automatic temperature compensation (ATC)
- ✓ Versatile measurement units: °Plato, SG, °Brix, <u>40+ more</u>
- ✓ Simple zero adjustment with distilled water
- ✓ Water resistant (IP66)
- ✓ Free mobile app for iOS & Android

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SmartRef
S A L I N I T Y   R E F R A C T O M E T E R

Smart technology for consistent measurement results & convenient monitoring:

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- ✓ Superior lab-grade precision (accuracy of 0.2 °Brix)
- ✓ SmartGuide+ for reliable results
- ✓ Automatic temperature compensation (ATC)
- ✓ Versatile measurement units: ppt, SG, PSU 40+ more
- ✓ Simple zero adjustment with distilled water
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SmartRef
S M A R T   T E C H N O L O G Y

iOS & Android app
The SmartRef is used in combination with a free mobile app via Bluetooth Low Energy, enabling intelligent handling of the measurement results.

Instant results
In-app calculations and automatic temperature compensation of the measurement results make manual corrections obsolete.

Smart data management
The app allows easy storage, visualization, management, and sharing of measurement data.

SmartGuide+
The integrated SmartGuide+ detects and helps to eliminate any measurement problems through high ambient light detection, continuous check of prism and sample condition, and more.
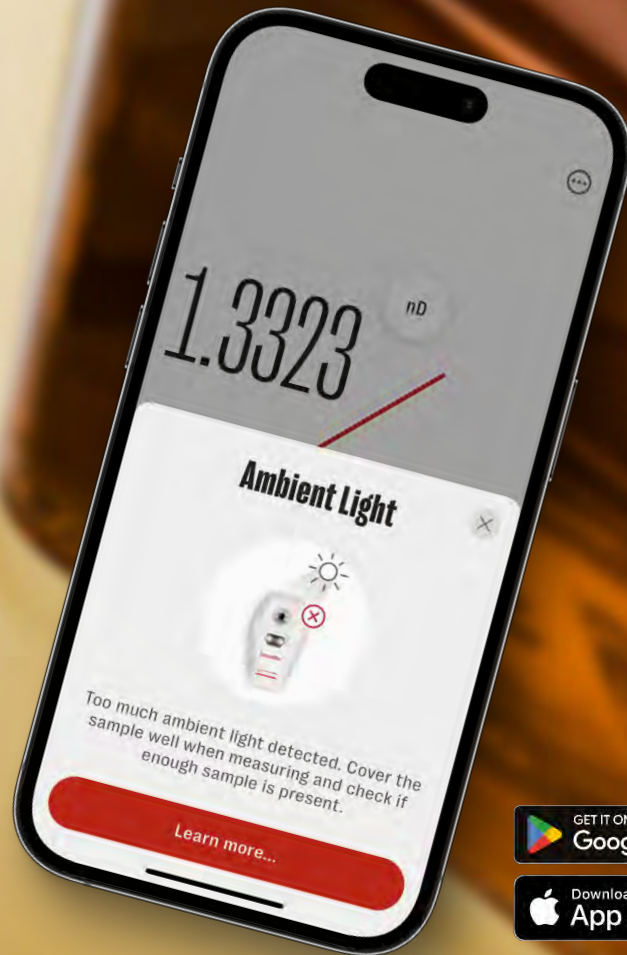
Multiple measurement modes
In addition to the quick measurement mode, measurements in continuous mode allow a more detailed understanding of the samples' properties.

Over-the-air updates
Constant app development keeps the digital refractometer up to date with the latest features.

SmartRef
MEASUREMENT

Compact & lightweight design
With its pocket-sized design the SmartRef is suitable for quick measurements on the go.

Refractive index measurement
The SmartRef refractometer measures the refractive index of fluids. This allows to retrieve relevant sample properties in a wide variety of applications.

Easy maintenance with stainless steel sample well
The unit is water- and dust-protected (IP66) and has an easy-to-clean stainless steel sample well.

Zero with distilled water
SmartRef supports an one-point zero adjustment with distilled water and requires only a few drops of sample (0.4 mL).

Fast, easy & highly accurate results
The SmartRef measurement cell is based on a high-resolution CMOS sensor with more than 1.500 high-definition elements providing fast results. It displays results in under 2 seconds and has a measurement range of 0 to 85 °Brix with an accuracy of 0.2 °Brix.

SmartRef

FOR BEER BREWING

Connected to the **Brew Meister smartphone app** for iOS and Android, the SmartRef determines highly accurate results for the extract content of wort, follows the fermentation process, and calculates the estimated alcohol content of beer with digital accuracy.

Brew Meister takes care of all the necessary calculations. The **results are already compensated for temperature, wort and alcohol** – allowing full focus on brewing beer without the hassle of additional calculation steps.

SmartRef is the first refractometer with automatic wort and alcohol correction. The correction factors can be adjusted universally within the app or individually for each batch to get precise values for different beer styles.

With a small sample volume of only 0.4 mL the SmartRef delivers accurate results for:

- ✓ Brix [°B]
- ✓ Plato [°P]
- ✓ Specific gravity [SG 20/20]
- ✓ Est. ABV [% v/v]
- ✓ Temperature [°C], [°F]

SmartRef
F O R   W I N E M A K I N G

Connected to the **Wine Meister smartphone app** for iOS and Android, the SmartRef determines the sugar content of grapes in seconds and enables quick measurements in the vineyard to determine grape ripeness.

The corresponding Wine Meister app is specially adapted to the needs of winemakers and allows efficient handling of measurement data through easy data storage, management, visualization, and export.

With a small sample volume of only 0.4 mL the SmartRef delivers accurate results for:

- ✓ Babo [°Babo]
- ✓ Baumé [°Bé]
- ✓ Brix [°Bx]
- ✓ Klosterneuburger Mostwaage [°KMW]
- ✓ Oechsle CH [°Oe CH]
- ✓ Oechsle GER [°Oe GER]
- ✓ Temperature [°C], [°F]

SmartRef
FOR SALTWATER TANKS

Connected to the **Reef Meister smartphone app** for iOS and Android, the SmartRef determines the salt content of saltwater aquariums in seconds to ensure the health of fish and the thriving of plants.

The corresponding Reef Meister app is specially adapted to the needs of saltwater tank owners and allows efficient handling of measurement data through easy data storage, management, visualization, and export.

With a small sample volume of only 0.4 mL the SmartRef delivers accurate results for:

- ✓ Practical salinity units [PSU]
- ✓ Salinity in parts per thousand [ppt]
- ✓ Salinity specific gravity [SG 20/20]
- ✓ Temperature [°C], [°F]

SmartRef
F O R   B E E K E E P E R S

Checking if the moisture in honey is at the right level is important for quality assurance in beekeeping. Too much moisture could cause the honey to start fermenting and taste sour. And since it is not easy to find completely sealed frames, a measurement with a refractometer is essential.

In combination with the **Lab Meister smartphone app**, the SmartRef digital refractometer determines % water in seconds and additionally allows easy storage and visualization of the measurement results.

With a small sample volume of only 0.4 mL the SmartRef delivers accurate results for:

- ✓ Brix [°Bx]
- ✓ Moisture in honey [% water]
- ✓ Refractive index [nD]
- ✓ Refractive index at 20 °C [nD @20]
- ✓ Temperature [°C], [°F]

SmartRef
F O R   C O F F E E

Coffee goal: a perfectly balanced taste! The digital refractometer SmartRef determines coffee %TDS in seconds and helps you find the right balance between strength, sourness and sweetness for your coffee.

In combination with the **Lab Meister smartphone app** measurement results can be managed and stored for later reference.

With a small sample volume of only 0.4 mL the SmartRef delivers accurate results for:

- ✓ Brix [°Bx]
- ✓ Total dissolved solids [% TDS]
- ✓ Refractive index [nD]
- ✓ Temperature [°C], [°F]

SmartRef

FOR FRUITS & VEGETABLES

Measuring the sweetness of fruits and vegetables provides information about their quality. The sugar content can not only be used as an indicator for best timing in harvesting but also for the market value of fruits and vegetables or to decide whether they should better be used as a fresh or preserved product.

In combination with the **Lab Meister smartphone app**, the SmartRef digital refractometer determines the sugar content in °Brix and additionally allows easy storage and visualization of the measurement results.

With a small sample volume of only 0.4 mL the SmartRef delivers accurate results for:

- ✓ Brix [°Bx]
- ✓ Corn syrup AC DE (28, 42, 55) [% w/w]
- ✓ Corn syrup DC DE (32, 63, 70, 95) [% w/w]
- ✓ Fructose [% w/w Fru]
- ✓ Glucose [% w/w Glc]
- ✓ HFCS (42, 55, 90) [% w/w]
- ✓ HMCS (42, 50) [% w/w]
- ✓ Invert sugar [% w/w IS]
- ✓ Refractive index [nD]
- ✓ Refractive index at 20 °C [nD @20]
- ✓ Temperature [°C], [°F]

SmartRef
FOR KETCHUP & DIPS

With the SmartRef digital Brix refractometer, the Brix value of fruits and vegetables can be used for further processing into ketchup, sauces, and dips and make decisions regarding dilution based on that.

Connected to the **Lab Meister smartphone app**, the SmartRef digital refractometer determines the sugar content of the raw ingredients in °Brix and additionally allows easy storage and visualization of the measurement results.

With a small sample volume of only 0.4 mL the SmartRef delivers accurate results for:

- ✓ Brix [°Bx]
- ✓ Corn syrup AC DE (28, 42, 55) [% w/w]
- ✓ Corn syrup DC DE (32, 63, 70, 95) [% w/w]
- ✓ Fructose [% w/w Fru]
- ✓ Glucose [% w/w Glc]
- ✓ HFCS (42, 55, 90) [% w/w]
- ✓ HMCS (42, 50) [% w/w]
- ✓ Invert sugar [% w/w IS]
- ✓ Refractive index [nD]
- ✓ Refractive index at 20 °C [nD @20]
- ✓ Temperature [°C], [°F]

SmartRef

F O R   J A M   &   J E L L Y

The sweetness of jam and jelly is not only an indication of the unique taste but also gives information about the preservation of the finished products. Therefore, it is necessary to measure the sugar content of the products for quality assurance.

Connected to the **Lab Meister smartphone app**, the SmartRef digital refractometer determines the sugar content in °Brix and additionally allows easy storage and visualization of the measurement results.

With a small sample volume of only 0.4 mL the SmartRef delivers accurate results for:

- ✓ Brix [°Bx]
- ✓ Corn syrup AC DE (28, 42, 55) [% w/w]
- ✓ Corn syrup DC DE (32, 63, 70, 95) [% w/w]
- ✓ Fructose [% w/w Fru]
- ✓ Glucose [% w/w Glc]
- ✓ HFCS (42, 55, 90) [% w/w]
- ✓ HMCS (42, 50) [% w/w]
- ✓ Invert sugar [% w/w IS]
- ✓ Refractive index [nD]
- ✓ Refractive index at 20 °C [nD @20]
- ✓ Temperature [°C], [°F]

SmartRef

FOR CUTTING OIL

The SmartRef digital refractometer allows quick measurements of a cutting oil-water mixture to ensure its appropriate concentration. To verify the required dilution ratio and quality, it is recommended to take regular measurements of the cutting oil concentration. This can reduce hazards for employees, machine wear, as well as problems during the machining process.

Connected to the **Lab Meister smartphone app**, the SmartRef allows easy measurement, storage and visualization of the measurement results for later reference.

With a small sample volume of only 0.4 mL the SmartRef delivers accurate results for:

- ✓ Brix [°Bx]
- ✓ Cutting oil concentration [% Oil]
- ✓ Refractive index [nD]
- ✓ Refractive index at 20 °C [nD @20]
- ✓ Temperature [°C], [°F]

SmartRef

F O R   H E A T   T R A N S F E R   F L U I D S

The SmartRef digital refractometer helps control the blend ratio of heat transfer fluids consisting of glycol and water with highly accurate measurement results. This makes the SmartRef a perfect tool for engineers working with air conditioners, heat exchangers, or even pasteurizers.

Connected to the **Lab Meister smartphone app**, the SmartRef allows easy measurement, storage and visualization of the measurement results for later reference.

With a small sample volume of only 0.4 mL the SmartRef delivers accurate results for:

- ✓ Ethylene glycol [% v/v], [% w/w]
- ✓ Ethylene glycol freezing point [°C], [°F]
- ✓ Propylene glycol [% v/v], [% w/w]
- ✓ Propylene glycol freezing point [°C], [°F]
- ✓ Refractive index [nD]
- ✓ Refractive index at 20 °C [nD @20]
- ✓ Temperature [°C], [°F]

SmartRef

FOR AUTOMOTIVE INDUSTRY

Testing engine coolants at regular intervals can reveal serious problems that could lead to expensive engine damage if not corrected.

The SmartRef digital refractometer determines the freezing point for coolant and antifreeze based on ethylene glycol or propylene glycol.

Connected to the **Lab Meister smartphone app**, the SmartRef allows easy measurement, storage and visualization of the measurement results for later reference.

With a small sample volume of only 0.4 mL the SmartRef delivers accurate results for:

- ✓ Ethylene glycol [% v/v], [% w/w]
- ✓ Ethylene glycol freezing point [°C], [°F]
- ✓ Propylene glycol [% v/v], [% w/w]
- ✓ Propylene glycol freezing point [°C], [°F]
- ✓ Refractive index [nD]
- ✓ Refractive index at 20 °C [nD @20]
- ✓ Temperature [°C], [°F]

SmartRef
F O R   P E T   H E A L T H

Animals are quite good at hiding a disease, which makes it very difficult to detect changes in their health.

Connected to the **Lab Meister smartphone app**, the SmartRef allows easy measurement, storage and visualization of the measurement results for later reference.

By conducting regular at-home check-ups, you can keep an eye on your pets' health, avoid stress for your pets and reduce veterinary expenses.

With a small sample volume of only 0.4 mL the SmartRef delivers accurate results for:

- ✓ Cat urine SG 20/20 [USG Cat]
- ✓ Dog urine SG 20/20 [USG Dog]
- ✓ L. mammal urine SG 20/20 [USG LM]
- ✓ Refractive index [nD]
- ✓ Refractive index at 20 °C [nD @20]
- ✓ Temperature [°C], [°F]

SmartRef
FOR ATHLETE TESTING

From monitoring compliance with anti-doping regulations to boosting athletic performance through optimum hydration, the SmartRef is the ideal assistant for measuring urine concentration for athletes.

Connected to the **Lab Meister smartphone app**, the SmartRef allows easy measurement, storage and visualization of the measurement results for later reference.

With a small sample volume of only 0.4 mL, the SmartRef delivers accurate results for:

- ✓ Human urine SG 20/20 [USG Human]
- ✓ Refractive index [nD]
- ✓ Refractive index at 20 °C [nD @20]
- ✓ Temperature [°C], [°F]

SmartRef
SPECIFICATIONS

Unit	Accuracy	Resolution	Range	ATC
Babo (°Babo)	0.2	0.1	0 to 30	✓
Baumé (°Bé)	0.2	0.1	0 to 40	✓
Brix (°Bx)	0.2	0.1	0 to 85	✓
Cutting Oil (% Oil)	0.2	0.1	0 to 100	✓
Ethylene Glycol (% v/v, % w/w)	0.4	0.1	0 to 60	✓
Freezing Point Ethylene Glycol (°C)	0.5	0.1	0 to -40	✓
Freezing Point Ethylene Glycol (°F)	1	0.1	32 to -40	✓
Freezing Point Propylene Glycol (°C)	0.5	0.1	0 to -40	✓
Freezing Point Propylene Glycol (°F)	1	0.1	32 to -40	✓
Honey Moisture (% Water)	0.2	0.1	13 to 25	✓
Klosterneuburger Mostwaage (°KMW)	0.2	0.1	0 to 30	✓
Oechsle CH (°Oe CH)	1	1	0 to 205	✓
Oechsle GER (°Oe GER)	1	1	20 to 205	✓
Plato (°P)	0.2	0.1	0 to 40	✓
Potential Alcohol Brix (%v/v)	0.2	0.1	0 to 25	✓
Potential Alcohol Oe (%v/v)	0.2	0.1	0 to 25	✓
Practical Salinity Units (PSU)	2	1	0 to 50	✓
Propylene Glycol (% v/v)	0.4	0.1	0 to 50	✓
Propylene Glycol (% w/w)	0.4	0.1	0 to 60	✓
Refractive index (nD)	0.0003	0.0001	1.3330 to 1.5040	✓
Refractive index at 20 °C (nD)	0.0003	0.0001	1.3330 to 1.5040	-
Salinity (ppt)	2	1	0 to 150	✓
Salinity specific gravity at 20 °C (SG)	0.002	0.001	1.000 to 1.114	✓
Specific gravity at 20 °C (SG)	0.002	0.001	1.000 to 1.114	✓

Unit	Accuracy	Resolution	Range	ATC
Temperature (°C)	0.2	0.1	5 to 30	-
Temperature (°F)	0.4	0.1	41 to 86	-
Total dissolved solids (%TDS)	0.2	0.1	0 to 25	✓
Total dissolved solids custom (%TDS)**	0.2	0.1	0 to 25	✓
Urine SG 20/20 Cat (USG Cat)	0.001	0.001	1.000 to 1.120	✓
Urine SG 20/20 Dog (USG Dog)	0.001	0.001	1.000 to 1.070	✓
Urine SG 20/20 Human (USG Human)	0.001	0.001	1.000 to 1.039	✓
Urine SG 20/20 Large Mammal (USG LM)	0.001	0.001	1.000 to 1.070	✓

Unit*	Accuracy	Resolution	Range	ATC
Corn syrup AC DE (28, 42) (% w/w)	0.3	0.1	0 to 70	✓
Corn syrup AC DE (55) (% w/w)	0.3	0.1	0 to 84	✓
Corn syrup DC DE (32, 63, 70) (% w/w)	0.3	0.1	0 to 84	✓
Corn syrup DC DE (95) (% w/w)	0.3	0.1	0 to 74	✓
Fructose (% w/w Fru)	0.2	0.1	0 to 85	✓
Glucose (% w/w Glc)	0.2	0.1	0 to 85	✓
HFCS (42) (% w/w)	0.5	0.1	0 to 84	✓
HFCS (55, 90) (% w/w)	0.3	0.1	0 to 84	✓
HMCS (42, 50) (% w/w)	0.3	0.1	0 to 84	✓
Invert sugar (% w/w IS)	0.2	0.1	0 to 85	✓

*Additional measurement units with Lab Meister Pro mobile app.
**For the calculation, you can enter a factor between 0.80 and 0.90.

SmartRef
S P E C I F I C A T I O N S

Data	
Dimensions (L x W x H)	108 x 64 x 35 mm (4.3 in x 2.5 in 1.4 in)
Weight (incl. batteries)	~135 g (0.31 lbs.)
Power supply	2x AAA 1.5V LR03 alkaline batteries or AAA NiMH rechargeable batteries
Enclosure rating	IP66 according to IEC 60529

Further Specifications	
Sample volume	0.4 mL
Measurement time	< 2 s
Auto. temp. compensation 20 ˚C %Brix	10 ˚C – 100 ˚C (50 ˚F – 212 ˚F)
Auto. temp. compensation 20 ˚C PSU, ppt, S.G. (20/20)	10 ˚C – 40 ˚C (50 ˚F – 104 ˚F)
Ambient temperature	10 ˚C to 40 ˚C / 50 ˚F to 104 ˚F
Humidity	5% to 95% relative air humidity, non-condensing
Sample area	Stainless steel and glass, FKM O-Ring
Interface	Bluetooth Low Energy
Mobile operating system	iOS & Android