

# PRODUCT CATALOGUE

Precise laboratory and analytical devices with highest measurement accuracies and an unbeatable customer service support



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## Automatic and manual refractometers for industry, laboratories and processes



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## 1 DR6000-T model with Peltier temperature control

The P8000-P and P8100-P polarimeter models are equipped with a Peltier sample temperature control system as a standard feature. Thanks to the optimal positioning and isolation of the Peltier elements directly on the polarimeter tube, the temperature control is homogeneous and ensures the necessary temperature equilibrium in the sample. This enables high-precision measurements with no external additional equipment. The P8000-P models are recommended when sample temperature control must be extremely precise and independent of external temperature conditions in a particularly short time and with a short control loop. They are the ideal solution for the pharmaceutical, chemical, and food or beverage industries.



#### **Basic features:**

- Measurement of almost all liquid samples; also turbid or highly viscous samples
- Chemical-resistant materials: stainless steel prism and measuring prism made of sapphire
- Fast Peltier sample temperature control
- Pre-installed & arbitrarily freely definable scales
- Intuitive control via modern 7.0" touch screen display
- Seamless data recording and backup incl. audit trail & user administration
- Flexible data export (network printer, PDF, USB stick)
- Conformity with GMP/GLP, 21 CFR Part 11, pharmacopoeias (USP, BP, JP, Ph. Eur.), FDA, ISO, HACCP, OIML, ASTM, ICUMSA, NIST

7" touchscreen technology with even greater processing power, optimized security & ease of use.

#### 1.1 Basic technical data DR6000-T, DR6100-T, DR6200-T, DR6300-T

Available in four model variants for different requirements in terms of accuracy, resolution and measurement range.

	DR6000-T	DR6100-T	DR6200-T	DR6300-T
MEASUREMENT	nD 1.3200-1.5800	nD 1.3200-1.7000	nD 1.32000–1.58000	nD 1.32000-1.70000
RANGE	0-95 %Brix	0-95 %Brix	0–95 %Brix	0-95 %Brix
MEASUREMENT	nD ±0.0001	nD ±0.0001	nD ±0.00002	nD ±0.00002
ACCURACY <sup>(1</sup>	±0.1 %Brix	±0.1 %Brix	±0.02 %Brix	±0.02 %Brix
RESOLUTION	<ul><li>nD 0.0001</li><li>0.1 %Brix</li></ul>	<ul><li>nD 0.0001</li><li>0.1 %Brix</li></ul>	<ul><li>nD 0.00001</li><li>0.01 %Brix</li></ul>	<ul><li>nD 0.00001</li><li>0.01 %Brix</li></ul>

Specification	Key Data	Specification	Key Data
TEMP. CONTROL RANGE	■ 10–80 °C <sup>(2</sup>	SAMPLE-TOUCHING PARTS	<ul> <li>Sapphire, stainless steel (1.4305)</li> </ul>
ACCURACY OF TEMP. CONTROL	• ±0.1 °C	ADDITIONAL FEATURES	<ul> <li>Audit Trail</li> <li>User administration</li> <li>Measurement value stabilization</li> <li>Temperature compensation</li> </ul>
MEASUREMENT PERIOD	• ca. 4 Seconds <sup>(3</sup>	CONTROL	<ul> <li>7.0" - capacitive touchscreen, 800 x 480 pixel</li> <li>Touchscreen, keyboard, mouse, barcode scanner</li> </ul>
MINIMUM SAMPLE VOLUME	• 0.5 ml	INTERFACES	• 1x USB, 1x RS-232, 1x Ethernet, LIMS
WAVE LENGTH	• 589 nm	DIMENSIONS (W X H X D)	<ul> <li>215 mm x 150 mm x 345 mm</li> </ul>
TEMP. MEASUREMENT RESOLUTION	■ ±0.1 °C	WEIGHT	• 5 kg
TEMP. MEASUREMENT RESOLUTION	■ 0.1 °C	OPERATING VOLTAGE	• 90–240 V, 47–63 Hz
SCALES	<ul> <li>Refractive index (nD)</li> <li>Concentration of sucrose, glucose, fructose and invert sugar [%Brix].</li> <li>User defined (unlimited)</li> </ul>	POWER CONSUMPTION (MEASURING MODE)	• 40 W
METHODS & USERS	<ul> <li>above 10,000 possible</li> </ul>	POWER CONSUMPTION (MAX.)	• 75 W
ADJUSTMENT	<ul> <li>automatic (menu-guided)</li> </ul>		

 $^{(1)}$  under normal conditions for measurement of refractive index ( $\lambda$  = 589 nm, 20 °C, 1013 hPa, 50 % rel. humidity)

<sup>(2</sup> in non-condensing ambient conditions

<sup>(3</sup> after temperature equalization



## 2 DR6000-TF model with semi or fully automatic sample supply

In addition to the Peltier element, the DR6000-TF models have a flow through cell which, in combination with the drying unit, peristaltic pump and autosampler, enables fully automatic operation. These DR6000-TF models are the ideal solution for manufacturers of flavours, fragrances and essential oils, as well as in the pharmaceutical and beverage industries. They are the perfect choice for routine analysis with high sample volumes, quality and purity control of raw materials and end products, or determination of sugar concentration in juices and soft drinks.



#### **Basic features:**

- Semi- or fully automatic measurement of low to slightly viscous samples
- Chemical-resistant materials: stainless steel prism, sapphire measuring prism, PTFE tubing
- Fast Peltier sample temperature control
- Pre-installed & freely definable scales as required
- Intuitive control via modern 7.0" touch screen display
- Seamless data recording and backup incl. audit trail & user administration
- Flexible data export (network printer, PDF, USB stick)
- Conformity with GMP/GLP, 21 CFR Part 11, pharmacopoeias (USP, BP, JP, Ph. Eur.), FDA, ISO, HACCP, OIML, ASTM, ICUMSA, NIST

Fully automated process handling from sample feeding to cleaning & drying.

## 2.1 Basic technical data DR6000-TF, DR6100-TF, DR6200-TF, DR6300-TF

Available in four model variants for different requirements in terms of accuracy, resolution and measurement range.

	DR6000-TF	DR1000-TF	DR6200-TF	DR6300-TF
MEASUREMENT	nD 1.3200-1.5800	nD 1.3200-1.7000	nD 1.32000-1.58000	nD 1.32000-1.70000
RANGE	<ul> <li>0–95 %Brix</li> </ul>			
MEASUREMENT	■ nD ±0.0001	■ nD ±0.0001	■ nD ±0.00002	■ nD ±0.00002
ACCURACY <sup>(1</sup>	■ ±0.1 %Brix	■ ±0.1 %Brix	■ ±0.02 %Brix	■ ±0.02 %Brix
	• nD 0.0001	<ul> <li>nD 0.0001</li> </ul>	nD 0.00001	<ul> <li>nD 0.00001</li> </ul>
RESOLUTION	<ul> <li>0.1 %Brix</li> </ul>	<ul> <li>0.1 %Brix</li> </ul>	<ul> <li>0.01 %Brix</li> </ul>	<ul> <li>0.01 %Brix</li> </ul>

Specification	Key data	Specification	Key data
TEMP. CONTROL RANGE	■ 10–80 °C <sup>(2</sup>	SAMPLE-TOUCHING PARTS	<ul> <li>Sapphire, stainless steel (1.4305), PTFE</li> </ul>
ACCURACY OF TEMP. CONTROL	• ±0.1 °C	ADDITIONAL FEATURES	<ul> <li>Audit Trail</li> <li>User administration</li> <li>Measurement value stabilization</li> <li>Temperature compensation</li> </ul>
MEASUREMENT PERIOD	• ca. 4 Seconds <sup>(3</sup>	CONTROL	<ul> <li>7.0" - capacitive touchscreen, 800 x 480 pixel</li> <li>Touchscreen, keyboard, mouse, barcode scanner</li> </ul>
MINIMUM SAMPLE VOLUME	<ul> <li>0.5 ml</li> </ul>	INTERFACES	<ul> <li>1x USB, 1x RS-232, 1x Ethernet, LIMS</li> </ul>
WAVE LENGTH	<ul> <li>589 nm</li> </ul>	DIMENSIONS (W X H X D)	<ul> <li>215 mm x 150 mm x 345 mm</li> </ul>
TEMP. MEASUREMENT RESOLUTION	■ ±0.1 °C	WEIGHT	• 5.3 kg
TEMP. MEASUREMENT RESOLUTION	■ 0.1 °C	OPERATING VOLTAGE	• 90–240 V, 47–63 Hz
SCALES	<ul> <li>Refractive index (nD)</li> <li>Concentration of sucrose, glucose, fructose and invert sugar [%Brix].</li> <li>User defined (unlimited)</li> </ul>	POWER CONSUMPTION (MEASURING MODE)	• 45 W
METHODS & USERS	<ul> <li>above 10,000 possible</li> </ul>	POWER CONSUMPTION (MAX.)	• 75 W
ADJUSTMENT	<ul> <li>automatic (menu- guided)</li> </ul>		

 $^{(1)}$  under normal conditions for measurement of refractive index ( $\lambda$  = 589 nm, 20 °C, 1013 hPa, 50 % rel. humidity)

<sup>(2</sup> requires circulation thermostat PT31

<sup>(3</sup> after temperature equalization



Measurement of almost all liquid samples; also turbid or highly viscous samples • Chemical-resistant materials: stainless steel prism and measuring prism made of

• Intuitive control via modern 7.0" touch screen display with fast calculation unit • Seamless data recording and backup incl. audit trail & user administration

• Conformity (partly only with external circulators) with GMP/GLP, 21 CFR Part 11, pharmacopoeias (USP, BP, JP, Ph. Eur.), FDA, ISO, HACCP, OIML, ASTM,

With connectors for temperature control with external circulators

Flexible data export (network printer, PDF, USB stick)

#### DR6000 model - specialist for solutions containing sugar 3

The DR6000 digital refractometer models without internal Peltier temperature control are particularly suitable for high-precision measurements of products from the sugar industry. Instead of temperature control, you can use temperature compensation according to ICUMSA or an additional freely definable temperature compensation. The refractometers of the DR6000 range are the ideal solution for determining the sugar concentration in intermediate and end products or for determining the dissolved solids content in liquids.

Pre-installed & freely definable scales,

**Basic features:** 

sapphire



Improved security features for user management with audit trail to ensure data integrity.

User management and audit trail.

#### 3.1 Basic technical data DR6000, DR6100

There are four model variants available for different requirements in terms of accuracy, resolution and measurement range.

ICUMSA, NIST

	DR6000	DR6100	
MEASUREMENT	nD 1.3200–1.5800	<ul> <li>nD 1.3200–1.7000</li> </ul>	
RANGE	• 0–95 %Brix	• 0–95 %Brix	
MEASUREMENT	■ nD ±0.0001	■ nD ±0.0001	
ACCURACY <sup>(1</sup>	• ±0.1 %Brix	• ±0.1 %Brix	
	<ul> <li>nD 0.0001</li> </ul>	<ul> <li>nD 0.0001</li> </ul>	
RESOLUTION	• 0.1 %Brix	• 0.1 %Brix	

Specification	Key data		Specification	Key data
TEMP. CONTROL RANGE	• upgradeable <sup>(2, 3</sup>		SAMPLE-TOUCHING PARTS	<ul> <li>Sapphire, stainless steel (1.4305)</li> </ul>
ACCURACY OF TEMP. CONTROL	• upgradeable <sup>(2</sup>		ADDITIONAL FEATURES	<ul> <li>Audit Trail</li> <li>User administration</li> <li>Temperature compensation</li> </ul>
MEASUREMENT PERIOD	• ca. 4 Seconds <sup>(4</sup>		CONTROL	<ul> <li>7.0" - capacitive touchscreen, 800 x 480 pixel</li> <li>Touchscreen, keyboard, mouse, barcode scanner</li> </ul>
MINIMUM SAMPLE VOLUME	• 0.5 ml		INTERFACES	<ul> <li>1x USB, 1x RS-232, 1x Ethernet, LIMS</li> </ul>
WAVE LENGTH	• 589 nm		DIMENSIONS (W X H X D)	<ul> <li>215 mm x 150 mm x 345 mm</li> </ul>
TEMP. MEASUREMENT RESOLUTION	■ ±0.1 °C		WEIGHT	• 5 kg
TEMP. MEASUREMENT RESOLUTION	■ 0.1 °C		OPERATING VOLTAGE	■ 90–240 V, 47–63 Hz
SCALES	<ul> <li>Refractive index (nD)</li> <li>Concentration of sucrose, glucose, fructose and invert sugar [%Brix].</li> <li>User defined (unlimited)</li> </ul>		POWER CONSUMPTION (MEASURING MODE)	• 25 W
METHODS & USERS	<ul> <li>above 10000 possible</li> </ul>		POWER CONSUMPTION (MAX.)	• 75 W
ADJUSTMENT	<ul> <li>automatic (menu-guided)</li> </ul>	1		

<sup>(1)</sup> under normal conditions for measurement of refractive index ( $\lambda = 589$  nm, 20 °C, 1013 hPa, 50 % rel. humidity)

<sup>(2</sup> requires circulation thermostat PT31

<sup>(3</sup> in non-condensing ambient conditions

<sup>(4</sup> after temperature equalization



## 4 Calibration standards

Order number	Calibration standard
RI34	<ul> <li>Calibration solution with certificate, nD 1.3400 ±0.0002 at 25 °C, temperature coefficient -0.000338 / + °C, 5 %Brix</li> </ul>
RI39	<ul> <li>Calibration solution with certificate, nD 1.3900 ±0.0002 at 25 °C, temperature coefficient -0.000344 / + °C, 35 %Brix</li> </ul>
RI43	<ul> <li>Calibration solution with certificate, nD 1.4300 ±0.0002 at 25 °C, temperature coefficient -0.000400 / + °C, 55 %Brix</li> </ul>
RI48	<ul> <li>Calibration solution with certificate, nD 1.4800 ±0.0002 at 25 °C, temperature coefficient -0.000395 / + °C, 76 %Brix</li> </ul>
RI65	<ul> <li>Calibration solution with certificate, nD 1.6500 ±0.0002 at 25 °C, temperature coefficient -0.000395 / + °C</li> </ul>

## 5 Accessories for digital refractometers

Order number	Item				
	Accessories and consumables				
DR6010	Sample lid				
CMB910	24 character plain paper printer				
CBM916	Interface cable for printer CBM910				
CBM910P	Plain paper roll for printer CBM910				
CBM910F	<ul> <li>Ribbon for printer CBM910</li> </ul>				
KALL	Calibration certificate for laboratory equipment				
	Additional accessories and consumables for DR6000-TF				
A\$80	<ul> <li>Autosampler for 18 or 36 samples, including: sample plate 18 x 50 ml (42 mm x 43 mm) or 36 x 30 ml (28 mm x 65 mm), set of vials made of polypropylene (50 ml) or glass (30 ml); other vials on request PTFE connection tube</li> </ul>				
AS80-T36	<ul> <li>Sample plate for AS80: 36 x 30 ml (28 mm x 65 mm), Material: Polypropylene</li> </ul>				
AS80-V36	Sample containers for AS80-T36, volume: 30 ml				
DR6004	<ul> <li>Large PTFE tube set for the automatic filling, consisting of suction tube (320 mm), drain tube (400 mm); connection tube (340 mm), waste tube (280 mm) and 6 PEEK hollow screws, flanged and fitted</li> </ul>				
D\$7021	<ul> <li>Adapter Olive/UNFa for Tygon hose (to UNF connection), material: ETFE, connections: UNF to 2.38 mm olive</li> </ul>				
D\$7023	Adapter Luer/UNFa for syringe to UNF-connectionn				
D\$7060	Drying unit with 3/2-way valve				
D\$7070	Peristaltic pump				
D\$7071	<ul> <li>Hose set for peristaltic pump DS7070, consisting of: TPE pump hose (105 mm), 5 pieces; PTFE hose connection UNF, 2 pcs.</li> </ul>				
	Additional accessories and consumables for DR6000				
PT31	<ul> <li>Circulation thermostat; Temp. control range: 8-35 °C; Interface: RS-232; Power supply: 100-240 V, 50/60 Hz, 1.3 A; Dimensions (H x W x D): 108 mm x 199 mm x 145 mm</li> </ul>				



## 6 AR2008 model – digital Abbe refractometer

The AR2008 is an Abbe refractometer whereby the sample is placed between a measuring and illuminating prism. The instrument can measure the refractive index or Brix value and show the measured value together with the temperature on the LCD display. Via the serial interface, the measured values, date and time may be directly transferred to a PC or printed. To ensure temperature control, the refractometer can be connected to a circulation thermostat. These instruments can be used in a wide range of applications, e.g. in the chemical, petroleum, oil and grease industries, the food industry and pharmaceutical environments, as well as in research & education.



#### **Basic features:**

- Measurement of liquid and viscous samples, regardless of their viscosity.
- Measurement of films possible and of solid samples that have at least one smooth side
- Wide measurement range from nD 1.3000-1.7200 and 0-95 %Brix
- Digital display of measurement data
- Integrated thermometer
- Hose connections for temperature control with a circulation thermostat
- Automatic temperature compensation for the Brix-scale can be optionally activated
- Robust housing and easy handling
- Serial interfaces for PC or printer (RS-232, RS-422)

#### Special feature: Measurement of foils & solids

#### 6.1 Basic technical data AR2008

Specification	Key data
MEASUREMENT RANGE	<ul> <li>nD 1.3000–1.7200</li> <li>0–95 %Brix</li> </ul>
TEMP. CONTROL RANGE	• upgradable <sup>(1</sup>
MEASUREMENT ACCURACY	■ nD ±0.0002 <sup>(2</sup> ■ ±0.1 %Brix
ACCURACY OF TEMP. CONTROL	<ul> <li>upgradeable<sup>(1</sup>)</li> </ul>
RESOLUTION	<ul><li>nD 0.0001</li><li>0.1 %Brix</li></ul>
WAVE LENGTH	<ul> <li>589 nm</li> </ul>
TEMP. MEASUREMENT RESOLUTION	■ ±0.3 °C
TEMP. MEASUREMENT RESOLUTION	• 0.1 °C
TEMPERING	■ upgradeable <sup>(1</sup>
SCALES	<ul> <li>Refractive index (nD),</li> <li>Concentration of sucrose [%Brix].</li> </ul>

Specification	Key data
ADJUSTMENT	<ul> <li>via adjusting screw</li> </ul>
SAMPLE-TOUCHING PARTS	<ul> <li>optical flint glass (SF4)</li> </ul>
ADDITIONAL FEATURES	<ul> <li>optional temperature compensation for %Brix according to ICUMSA</li> </ul>
CONTROL	<ul><li>drive knob</li><li>selection keys</li></ul>
INTERFACES	<ul> <li>1x RS-232, 1x RS-422</li> </ul>
DIMENSIONS (W X H X D)	<ul> <li>120 mm x 290 mm x 250 mm</li> </ul>
WEIGHT	• 5 kg
OPERATING VOLTAGE	<ul> <li>115/230 V, reversible</li> </ul>
POWER CONSUMPTION (MAX.)	• 40 W

<sup>(1</sup> requires circulation thermostat PT31

<sup>(2</sup> under normal conditions for measurement of refractive index ( $\lambda = 589$  nm, 20 °C, 1013 hPa, 50 % rel. humidity)



Order number	Item	
CMB910	<ul> <li>24 character plain paper printer</li> </ul>	
CBM916	Interface cable for CBM910 printer	
CBM910P	<ul> <li>Plain paper roll for printer CBM910</li> </ul>	
CBM910F	Ribbon for printer CBM910	
AR11		<ul> <li>Measuring prism AR2008</li> </ul>
AR12		<ul> <li>Illumination prism AR2008</li> </ul>
AR17	Thermosensor for AR2008	
RK01	THE NEW YORK OF THE PARTY OF	<ul> <li>Calibration standard for AR-series, nD 1.5166</li> </ul>
CI	■ Cinnamon oil, nD 1.5902 bei 25 °C	
ARK01	Illumination cable for AR2008, incl. LED	
PT31		<ul> <li>Circulation thermostat; Temp. Control Range: 8-35 °C; Interface: RS-232;</li> <li>Power supply: 100-240 V, 50/60 Hz, 1.3 A; Dimensions (H x W x D): 108 mm x 199 mm x 145 mm</li> <li>Pump capacity 20 I/h, pump pressure 2000 Pa</li> </ul>
KALL	Calibration certificate for laboratory instruments	

## 6.2 Accessories, consumables, calibration standards



## 7 AR4 model – classic analogue Abbe refractometer

The AR4 is a classic Abbe refractometer. The scales can be adjusted manually using the drive knob. The refractive index as well as the Brix values are displayed via an ocular. The temperature is measured with the integrated digital thermometer and shown on the LCD display. For tempering, the AR4 refractometer can be connected to a circulating thermostat. This instrument is suitable for a wide range of applications: Identity testing, purity control, the concentration-determination of raw materials, semi-finished products and end products, determination of the sugar concentration, as well as incoming and outgoing goods inspection.

#### **Basic features:**

- Measurement of liquid and viscous samples, regardless of their viscosity.
- Measurement of films possible and of solid samples that have at least one smooth side
- Wide measurement range of nD 1.3000-1.7200 and 0-95 %Brix
- Reading of the measured values via an eyepiece Integrated thermometer
- Hose connections for temperature control with a circulation thermostat
- Robust housing and easy handling
- Temperature indication on LCD display

#### A classic refractometer suitable for the basic setup at pharmacies

#### 7.1 Basic technical data AR4

Specification	Key data
MEASUREMENT RANGE	<ul> <li>nD 1.3000–1.7200</li> <li>0–95 %Brix</li> </ul>
TEMP. CONTROL RANGE	<ul> <li>upgradeable<sup>(1</sup>)</li> </ul>
MEASUREMENT ACCURACY	■ nD ±0.0002 <sup>(2</sup> ■ ±0.1 %Brix
ACCURACY OF TEMP. CONTROL	<ul> <li>upgradeable<sup>(1</sup>)</li> </ul>
RESOLUTION	<ul><li>nD 0.0005</li><li>0.25 %Brix</li></ul>
WAVE LENGTH	• 589 nm
TEMP. MEASUREMENT RESOLUTION	■ ±0.5 °C
TEMP. MEASUREMENT RESOLUTION	• 0.1 °C
TEMPERING	<ul> <li>upgradable<sup>(1</sup>)</li> </ul>

Specification	Key data
SCALES	<ul> <li>Refractive index (nD), concentration of sucrose [%Brix]</li> </ul>
ADJUSTMENT	<ul> <li>via adjusting screw</li> </ul>
SAMPLE-TOUCHING PARTS	<ul> <li>Optical flint glass (SF4)</li> </ul>
CONTROL	<ul> <li>Drive knob</li> </ul>
DIMENSIONS (W X H X D)	• 100 mm x 270 mm x 190 mm
WEIGHT	• 2.5 kg
OPERATING VOLTAGE	• 7.5 V
POWER CONSUMPTION (MAX.)	• 15 W

(1 requires circulation thermostat PT31

<sup>(2</sup> under normal conditions for measurement of refractive index ( $\lambda$  = 589 nm, 20 °C, 1013 hPa, 50 % rel. humidity)

#### 7.2 Accessories, consumables, calibration standards

Order number	Item	
CMB910	24 chars normal paper printer	
CBM916	<ul> <li>Interface cable for printer CBM910</li> </ul>	
CBM910P	<ul> <li>Paper for printer CBM910</li> </ul>	
CBM910F	Printer ribbon for CBM910	
AR11	al	<ul> <li>Measuring prism AR4</li> </ul>
AR12		<ul> <li>Illumination prism AR4</li> </ul>
AR18	Digital thermometer for AR4	
AR41	<ul> <li>Temperature sensor for AR4</li> </ul>	
RK01	<ul> <li>Calibration standard for AR series, nD 1.5166</li> </ul>	
CI	▪ Cinnamon oil, nD 1.5902 at 25 ℃	
PT31	<ul> <li>Circulation thermostat; Temp. control range: 8-35 °C; Interface: RS-232; pump capacity 20 l/h, pump pressure 2000 P; Power supply: 100-240 V, 50/60 Hz, 1.3 A; Dimensions (H x W x D): 108 mm x 199 mm x 145 mm</li> </ul>	





## 8 PR21S model – inline process refractometer

The inline process refractometer PR21S is installed in pipelines at production facilities in order to control the concentration of mixing and fermentation processes. Thanks to their standardised connections, these measuring devices can be easily mounted in pipelines. The measuring chamber is made of stainless steel, and the measurement prism consists of scratch-resistant and especially chemical-resistant sapphire designed to prevent solids from sticking. The PR21S is used in the chemical, petrochemical, automotive, aviation, metal processing, food, sugar, beverage and paper industries, as well as in wastewater control.



#### **Basic features:**

- Measurement in refractive index, %Brix or a user-definable scale.
- Automatic temperature compensation (%Brix and freely definable for customer-specific products)
- Integrated sensor for temperature monitoring
- Stainless steel measurement chamber and sample prisms, made of scratch-proof and chemical-resistant sapphire
- Manual cleaning or via customer process cleaning, CIP capable
- Suitable for process temperatures up to 60 °C and relative pressures up to 9 bar
- Easy connection to process control system or PLC via serial or two-part potential-free current interface (0/4-20 mA Interface: RS232; RS232 for display, 2x analogue 0(4)-20 mA;relay input, 2x relay output

PR21S for integration into the piping of the process or for installation in tank or boiler.

#### 8.1 Basic technical data PR21S model

Specification	Key data
MEASUREMENT RANGE	■ nD 1.3200–1.5200 <sup>(1</sup> ■ 0–90 %Brix
MEASUREMENT ACCURACY	■ nD ±0.0002 <sup>1</sup> ■ ±0.2 %Brix <sup>1</sup>
RESOLUTION	<ul><li>nD 0.0001</li><li>0.1 %Brix</li></ul>
MEASUREMENT PERIOD	• ca. 10 Seconds
WAVE LENGTH	■ 589 nm
PROCESS PRESSURE (RELATIVE)	<ul> <li>0-9 bar</li> </ul>
PROCESS TEMPERATURE	■ 10–60 °C
AMBIENT TEMPERATURE (?)	• 0–40 °C
AMBIENT MOISTURE LEVEL (?)	<ul> <li>10–90 % (non- condensing)</li> </ul>
TEMP. MEASUREMENT RESOLUTION	■ ±0.2 °C
SCALES	<ul> <li>Refractive index (nD),</li> <li>Concentration of sucrose [%Brix], User defined</li> </ul>

Specification	Key data
ADJUSTMENT & SETTING UP	<ul> <li>With PC/Laptop<sup>(3)</sup></li> </ul>
SAMPLE-TOUCHING PARTS	<ul> <li>Sapphire, PTFE, FKM, stainless steel (1.4305)</li> </ul>
INSTALLATION (?)	<ul> <li>Inline</li> </ul>
ADDITIONAL FEATURES	<ul> <li>Temperature compensation (ICUMSA or freely definable)</li> <li>Protection class IP65 (IP67 connections)</li> <li>CIP capable up to 120 °C</li> </ul>
INTERFACES	<ul> <li>1x RS232. 1x RS-232 for display, 2x analogue 0(4)-20 mA; 1x switch input, 2x switch output</li> </ul>
DIMENSIONS (W X H X D)	220 mm x 190 mm x 220 mm
WEIGHT	■ 3.5 kg
OPERATING VOLTAGE	<ul> <li>24 V<sub>DC</sub> (min: +18 V<sub>DC</sub>; max: +30 V<sub>DC</sub>)</li> </ul>
POWER CONSUMPTION (MEASURING MODE)	<ul> <li>5 W (without display) ; 6 W (with display)</li> </ul>
POWER CONSUMPTION (MAX.)	<ul> <li>6 W (without display) ; 7 W (with display)</li> </ul>

(1 Measurement range of the unit is configured individually

 $^{l2}$  under normal conditions for measurement of refractive index ( $\lambda$  = 589 nm, 20 °C, 1013 hPa, 50 % rel. humidity).

<sup>(3</sup> Firmware is included on the device. Separate software is not necessary.



#### 8.2 Accessories for PR21S model

Order number	ltem		
PR2023		<ul> <li>T-connection (flange: DIN32767-DN80, pipe connection: ID 40 mm; OD 44 mm, material: stainless steel 1.4571)</li> </ul>	
PR2025	Weld-on socket (flange DIN32767-DN80, material: stainless steel 1.4404)		
PR2026	<ul> <li>Set blind cover: (flange clamp ISO2582 for flange DIN32767-DN80; material: stainless steel 1.4404, blind cover for DIN32767-DN80; material: stainless steel 1.4404, flange gasket for DIN32767-DN80; material: EPDM)</li> </ul>		
PR2036	• Display connection cable (assembled for the PR2028 display with two round connectors, length 14pprox 1 m)		
PR2028	1.3725 nD 22.6 °C	<ul> <li>Display for PR series: (LCD 2 line, including 2x round plug connections for cable assembly by the user)</li> </ul>	
PR2030	Connection cable set (pre-assembled cables)		



## 9 PRB21S model – bypass process refractometer

The PRB21S (bypass) is connected to the process by means of hoses. In this way it is possible, either by pumping or hydrostatic pressure, to guide the sample as a partial flow of the main process (bypass) through the measuring cell and to measure it without interruption. The PRB21S model is used in the chemical, petrochemical, automotive, aircraft manufacturing, food, sugar and beverage industries, as in wastewater control.



#### **Basic features:**

- Measurement in refractive index, %Brix or a user-definable scale.
- Automatic temperature compensation (%Brix and freely definable for customer-specific products))
- Integrated sensor for temperature monitoring
- Stainless steel measurement chamber and sample prisms, made of scratch-proof and chemical-resistant sapphire
- Cleaning manually or via customer process cleaning, CIP capable
- Suitable for process temperatures up to 60 °C
- Easy connection to process control system or PLC via serial or two-part potential-free current interface (0/4-20 mA Interface: RS232; RS232 for display, 2x analogue 0(4)-20 mA; relay input, 2x relay output

When the RB21S is installed vertically, the sample flows via the bypass to the measuring chamber which is made of stainless steel.

#### 9.1 Basic technical data PRB21S model

Specification	Key data
MEASUREMENT RANGE	<ul> <li>nD 1.3200–1.5600</li> <li>0–95 %Brix</li> </ul>
MEASUREMENT ACCURACY	■ nD ±0.0002 <sup>(1</sup> ■ ±0.2 %Brix <sup>(1</sup>
RESOLUTION	<ul><li>nD 0.0001</li><li>0.1 %Brix</li></ul>
MEASUREMENT PERIOD	• ca. 10 Seconds
WAVE LENGTH	• 589 nm
PROCESS PRESSURE (RELATIVE)	• 0-2 bar
PROCESS TEMPERATURE	■ 10–60 °C
AMBIENT TEMPERATURE (?)	• 0–40 °C
AMBIENT MOISTURE LEVEL (?)	<ul> <li>10–90 % (non- condensing)</li> </ul>
TEMP. MEASUREMENT RESOLUTION	■ ±0.2 °C
SCALES	<ul> <li>Refractive index (nD), Concentration of sucrose [%Brix], User defined</li> </ul>

Specification	Key data
ADJUSTMENT & SETTING UP	<ul> <li>With PC/Laptop<sup>12</sup></li> </ul>
SAMPLE-TOUCHING PARTS (?)	<ul> <li>Sapphire, PTFE, FKM, stainless steel (1.4305)</li> </ul>
Installation (?)	<ul> <li>Bypass with flow-through cell</li> </ul>
ADDITIONAL FEATURES	<ul> <li>Temperature compensation (ICUMSA or freely definable)</li> <li>Protection class IP65 (IP67 connections)</li> <li>CIP capable up to 120 °C</li> </ul>
INTERFACES	<ul> <li>1x RS232, 1x RS-232 for display, 2x analogue 0(4)-20 mA; 1x switch input, 2x switch output</li> </ul>
DIMENSIONS (W X H X D)	• 220 mm x 110 mm x 220 mm
WEIGHT	• 3 kg
OPERATING VOLTAGE	<ul> <li>24 V<sub>DC</sub> (min:+18 V<sub>DC</sub>; max:+30 V<sub>DC</sub>)</li> </ul>
POWER CONSUMPTION (MEASURING MODE)	<ul> <li>5 W (without display) ; 6 W (with display)</li> </ul>
POWER CONSUMPTION (MAX.)	<ul> <li>6 W (without display) ; 7 W (with display)</li> </ul>

<sup>(1)</sup> under normal conditions for measurement of refractive index ( $\lambda = 589$  nm, 20 °C, 1013 hPa, 50 % rel. humidity) <sup>(2)</sup> Firmware is included on the unit. Separate software is not necessary.

#### 9.2 Accessories for PRB21S model

Order number	Item		
PR2037	0	<ul> <li>O-ring (seal for flow-through cell) 16.9 x 3.5 mm, FKM (Set 5 pieces)</li> </ul>	
PR2036	<ul> <li>Display connection cable assembled for the PR2028 display with two round plug connections, length approx. 1 m, other lengths on request</li> </ul>		
PR2028	Display for PR series: (LCD 2 line, including 2x round plug connections for cable assembly by the user)		
PR2030	Connection cable set (pre-assembled cables)		



## 10 DR101-60 model – baseline unit digital handheld refractometer

The DR101-60 is a compact, mobile and splash-proof digital handheld refractometer. Thanks to the automatic temperature compensation for the Brix scale, you can achieve reproducible measurement results even under changing environmental conditions. As a water-tight device, the DR101-60 meets the IP65 standard and can be cleaned under running water. The DR101-60 is used in the food and beverage industries, at pharmacies, laboratories and examination offices, as well as in research and education.



#### **Basic features:**

- Measurement range nD 1.3330-1.4419 and 0-60 %Brix.
- Mobile automatic measurement at the touch of a button
- Reproducible measurement results that are not dependent on the interpretation of the user
- Automatic temperature compensation (Brix-Scale)
- Fast to fill and clean
- With high quality fully chrome-plated sample tray
- Robust housing and low weight

Automatic temperature compensation for the Brix scale.

#### 10.1 Basic technical data DR101-60 model

Specification	Key data	Specification	Key data
MEASUREMENT RANGE	<ul> <li>nD 1.3330–1.4419</li> <li>0–60 %Brix</li> </ul>	ADJUSTMENT	<ul> <li>via keypad</li> </ul>
MEASUREMENT ACCURACY	■ nD ±0.0005 <sup>(1</sup> ■ ±0.35 %Brix <sup>(1</sup>	ADDITIONAL FEATURES	<ul> <li>Temperature compensation für 10 – 40 °C<sup>(3)</sup></li> <li>IP Code IP65</li> </ul>
RESOLUTION	<ul><li>nD 0.0001</li><li>0.1 %Brix</li></ul>	SAMPLE-TOUCHING PARTS	<ul> <li>Optical flint glass (SF4), fully chromed surface</li> </ul>
MEASUREMENT PERIOD	<ul> <li>ca. 1 Second<sup>(2)</sup></li> </ul>	CONTROL	<ul> <li>Membrane keypad</li> </ul>
MINIMUM SAMPLE VOLUME	• 0.3 ml	DIMENSIONS (W X H X D)	<ul> <li>110 mm x 62 mm x 32 mm</li> </ul>
TEMP. MEASUREMENT RESOLUTION	■ ±0.5 °C	WEIGHT	• 160 g
TEMP. MEASUREMENT RESOLUTION	• 0.1 °C	OPERATING VOLTAGE	<ul> <li>1.5 V (1x AAA-Battery)</li> </ul>
SCALES	<ul> <li>Refractive index (nD), Concentration of sucrose [%Brix]</li> </ul>		

<sup>(1)</sup> under normal conditions for measurement of refractive index ( $\lambda$  = 589 nm, 20 °C, 1013 hPa, 50 % rel. humidity)

<sup>(2</sup> after temperature equalisation

<sup>(3</sup> temperature compensation only for scale %Brix

#### 10.2 Calibration standards

Order number	Calibration standard
RI34	<ul> <li>Calibration solution with certificate, nD 1.3400 ±0.0002 at 25 °C, temperature coefficient -0.000338 / + °C, 5 %Brix</li> </ul>
RI39	<ul> <li>Calibration solution with certificate, nD 1.3900 ±0.0002 at 25 °C, temperature coefficient -0.000344 / + °C, 35 %Brix</li> </ul>
RI43	<ul> <li>Calibration solution with certificate, nD 1.4300 ±0.0002 at 25 °C, temperature coefficient -0.000400 / + °C, 55 %Brix</li> </ul>
RI48	<ul> <li>Calibration solution with certificate, nD 1.4800 ±0.0002 at 25 °C, temperature coefficient -0.000395 / + °C, 76 %Brix</li> </ul>
RI65	<ul> <li>Calibration solution with certificate, nD 1.6500 ±0.0002 at 25 °C, temperature coefficient -0.000395 / + °C</li> </ul>



## 11 DR201-95 model – compact digital handheld refractometer

The DR201-95 is a compact, mobile and splash-proof digital handheld refractometer. It is used to measure the refractive index (nD) and the sugar content in % (Brix) of liquid and viscous samples. Thanks to the automatic temperature compensation for the Brix scale, you can achieve reproducible measurement results even under changing environmental conditions. Automatic temperature compensation for the Brix scale supports the user in measurements of sugary beverages and confectionary. The device is splash-proof and meets the IP64 standard. The DR101-60 is used in the food and beverage industries, at pharmacies, laboratories and examination offices, as well as in research and education.



#### **Basic features:**

- Measurement range: nD 1.3330–1.5318 and 0–95%Brix.
- Mobile automatic measurement at the touch of a button
- High measuring accuracy: nD  $\pm 0.0003$  and  $\pm 0.2$  %Brix
- Reproducible measurement results that are not dependent on the interpretation of the user.
- Automatic temperature compensation (Brix-Scale)
- Swift filling and cleaning
- High-quality fully chrome-plated sample tray
- Robust housing and low weight

With automatic temperature compensation for the Brix-Scale.

Specification	Key data	3
MEASUREMENT RANGE	<ul> <li>nD 1.3330–1.5318</li> <li>0–95 %Brix</li> </ul>	,
MEASUREMENT ACCURACY	■ nD ±0.0003(1 ■ ±0.2 %Brix <sup>(1</sup>	,
RESOLUTION	<ul><li>nD 0.0001</li><li>0.1 %Brix</li></ul>	
MEASUREMENT PERIOD	<ul> <li>ca. 1 Second<sup>(2)</sup></li> </ul>	(
MINIMUM SAMPLE VOLUME	• 0.3 ml	
TEMP. MEASUREMENT RESOLUTION	■ ±0.5 °C	,
TEMP. MEASUREMENT RESOLUTION	• 0.1 °C	(
SCALES	<ul> <li>Refractive index (nD), Concentration of sucrose [%Brix]</li> </ul>	

Specification	Key data
ADJUSTMENT	• via keypad
ADDITIONAL FEATURES	<ul> <li>Temperature compensation für 10– 40 °C<sup>13</sup></li> <li>IP Code IP64</li> </ul>
SAMPLE-TOUCHING PARTS	<ul> <li>Optical flint glass (SF4), fully chromed surface</li> </ul>
CONTROL	<ul> <li>Membrane keypad</li> </ul>
DIMENSIONS (W X H X D)	<ul> <li>130 mm x 80 mm x 40 mm</li> </ul>
WEIGHT	• 180 g
OPERATING VOLTAGE	<ul> <li>1.5 V (1x AAA-Battery)</li> </ul>

<sup>(1)</sup> under normal conditions for measurement of refractive index ( $\lambda = 589$  nm, 20 °C, 1013 hPa, 50 % rel. humidity)

<sup>(2</sup> after temperature equalisation

<sup>(3</sup> temperature compensation only for scale %Brix

#### 11.2 Calibration standards

Order number	Calibration standard
RI34	<ul> <li>Calibration solution with certificate, nD 1.3400 ±0.0002 at 25 °C, temperature coefficient -0.000338 / + °C, 5 %Brix</li> </ul>
RI39	<ul> <li>Calibration solution with certificate, nD 1.3900 ±0.0002 at 25 °C, temperature coefficient -0.000344 / + °C, 35 %Brix</li> </ul>
RI43	<ul> <li>Calibration solution with certificate, nD 1.4300 ±0.0002 at 25 °C, temperature coefficient -0.000400 / + °C, 55 %Brix</li> </ul>
RI48	<ul> <li>Calibration solution with certificate, nD 1.4800 ±0.0002 at 25 °C, temperature coefficient -0.000395 / + °C, 76 %Brix</li> </ul>
RI65	<ul> <li>Calibration solution with certificate, nD 1.6500 ±0.0002 at 25 °C, temperature coefficient -0.000395 / + °C</li> </ul>

## 11.1 Basic technical data DR201-95 Model



## 12 DR301-95 model – professional digital hand refractometer

The DR301-95 operates both as a high-quality hand-held device and as a simple digital desktop device. It can measure the salt content [‰] (NaCl) in addition to the refractive index and sugar content. On request, the DR301-95 can additionally be manufactured with any other two scales. Via the menu control it is possible to switch on the automatic temperature compensation for each scale - with measurement reference to sucrose. An alarm option can be set up for monitoring limit values in production processes.

With the supplied power supply unit, the DR301-95 can serve as a small laboratory refractometer. In mobile use, it operates with a 9 V block battery. The DR301-95 is used in the food and beverage industries, at pharmacies, laboratories and examination offices, as well as in research and education.

#### Basic features:

- Measurement range of nD 1.3330–1.5318 and 0–95%Brix.
  - High measurement accuracy: nD  $\pm 0.00015$  and  $\pm 0.1$  %Brix
  - Can also be used for the determination of salinity [‰].
  - Reproducible measurement results that are not dependent on the interpretation of the user.
  - Optionally activatable automatic temperature compensation for all scales
  - Swift filling and cleaning
  - With high-quality, fully chrome-plated measurement tray
  - Robust housing and low weight
  - Operation possible with mains adapter or battery

On request, two additional scales can be integrated

#### 12.1 Basic technical data DR301-95 model

Specification	Key data	S
MEASUREMENT RANGE	<ul> <li>nD 1.3330–1.5318</li> <li>0–95 %Brix</li> </ul>	A
MEASUREMENT ACCURACY	<ul> <li>nD ±0.00015<sup>(1)</sup></li> <li>±0.1 %Brix<sup>(1)</sup></li> </ul>	A
RESOLUTION	<ul><li>nD 0.0001</li><li>0.1 %Brix</li></ul>	S P
MEASUREMENT PERIOD	<ul> <li>ca. 1 Second<sup>(2)</sup></li> </ul>	C
MINIMUM SAMPLE VOLUME	• 0.3 ml	C
TEMP. MEASUREMENT RESOLUTION	▪ ±0.5 °C	v
TEMP. MEASUREMENT RESOLUTION	• 0.1 °C	C
SCALES	<ul> <li>Refractive index (nD), concentration of sucrose [%Brix], salinity [%], up to two additional scales on request</li> </ul>	

Specification	Key data
ADJUSTMENT	<ul> <li>via keypad</li> </ul>
ADDITIONAL FEATURES	<ul> <li>Optional temperature compensation for 10–40 °C</li> <li>IP Code IP50</li> </ul>
SAMPLE-TOUCHING PARTS	<ul> <li>Optical flint glass (SF4), fully chromed surface</li> </ul>
CONTROL	<ul> <li>Membrane keypad</li> </ul>
DIMENSIONS (W X H X D)	<ul> <li>180 mm x 100 mm x 60 mm</li> </ul>
WEIGHT	• 500 g
OPERATING VOLTAGE	<ul> <li>9 V (1x 9V-Battery)</li> </ul>

<sup>(1)</sup> under normal conditions for measurement of refractive index ( $\lambda = 589$  nm, 20 °C, 1013 hPa, 50 % rel. humidity)

<sup>(2</sup> after temperature equalisation

#### 12.2 Calibration standards

Order number	Calibration standard
RI34	<ul> <li>Calibration solution with certificate, nD 1.3400 ±0.0002 at 25 °C, temperature coefficient -0.000338 / + °C, 5 %Brix</li> </ul>
RI39	<ul> <li>Calibration solution with certificate, nD 1.3900 ±0.0002 at 25 °C, temperature coefficient -0.000344 / + °C, 35 %Brix</li> </ul>
RI43	<ul> <li>Calibration solution with certificate, nD 1.4300 ±0.0002 at 25 °C, temperature coefficient -0.000400 / + °C, 55 %Brix</li> </ul>
RI48	<ul> <li>Calibration solution with certificate, nD 1.4800 ±0.0002 at 25 °C, temperature coefficient -0.000395 / + °C, 76 %Brix</li> </ul>
RI65	<ul> <li>Calibration solution with certificate, nD 1.6500 ±0.0002 at 25 °C, temperature coefficient -0.000395 / + °C</li> </ul>



## 13 Handheld refractometer

Our high quality devices differ mainly in the selectable scales, e.g. for the determination of the salt content, water content in honey, serum protein content, Oechsle, Brix and potential alcohol content as well as ethylene- and propylene glycol content. No manual conversion is required thanks to the scales, and application errors can be ruled out. The majority of our handheld refractometers are equipped with an automatic temperature compensation. The measured values are therefore already corrected to 20 °C when a reading is taken.

#### 13.1 Overview handheld refractometer: scales, measurement range and measurement accuracy

Order number	Scales	Measurement range	Measurement accuracy
HRB10-T	<ul> <li>Brix</li> </ul>	• 0–10 %Brix	• ±0.1 %Brix
HRB18-T	Brix	• 0–18 %Brix	• ±0.1 %Brix
HRB32-T	• Brix	• 0–32 %Brix	• ±0.2 %Brix
HRB62-T	• Brix	• 28–62 %Brix	• ±0.2 %Brix
HRB82-T	• Brix	• 45–82 %Brix	• ±0.2 %Brix
HRB92-T	<ul> <li>Brix</li> <li>Baumé</li> <li>Water content in honey</li> <li>Brix (with thermometer</li> </ul>	<ul> <li>58–92 %Brix</li> <li>38–43 °Bé</li> <li>12–27 % Water content in honey</li> </ul>	<ul> <li>0.5%Brix</li> <li>±0.5°Bé</li> <li>±0.5% Water content in honey</li> </ul>
HRH30-T	6–36 °C) ■ Water content in honey	12-30 % Water content in	<ul> <li>±0.1 % Water content in honey</li> </ul>
HRND	<ul> <li>Refractive index (with thermometer 6–36 °C)</li> </ul>	honey 1.3330–1.5170	• ±0.0005
	<ul> <li>Salinity (NaCl)</li> </ul>	• 0–10 %	• ±0.1 %
	<ul> <li>Specific density(D 20/20)</li> </ul>	• 1.000-1.070	• ±0.001
HRS28-T	<ul> <li>Salinity (NaCl)</li> </ul>	• 0–28 %	• ±0.2 %
HRM18-T	<ul><li>Index of refraction</li><li>Serum protein</li></ul>	<ul><li>1.3330–1.3600</li><li>0–12 g/dl</li></ul>	±0.0005     ±0.2 g/dl
	<ul> <li>Specific urine weight(UG)</li> </ul>	• 1.000–1.050 UG	• ±0.002 UG
	<ul> <li>Brix</li> </ul>	• 0–32 %Brix	■ ±0.2 %Brix
HRO32-T	<ul> <li>Oechsle</li> </ul>	▪ 30–130 °Oe	▪ ±1 °Oe
	<ul> <li>Potential alcohol content</li> </ul>	<ul> <li>4.4–19 % Alcohol</li> </ul>	<ul> <li>±0.1 % Alcohol</li> </ul>
HRKFZ-T	<ul> <li>Ethylene and propylene glycol (antifreeze)</li> </ul>	▪ -50–0 °C	• ±5 ℃
	<ul> <li>Battery acid</li> </ul>	<ul> <li>1.10–1.30 g/cm<sup>3</sup></li> </ul>	• ±0.01 g/cm <sup>3</sup>
	<ul> <li>Battery liquid</li> </ul>	<ul> <li>1.10–1.40 g/cm<sup>3</sup></li> </ul>	• ±0.01 g/cm <sup>3</sup>
HRKFZG-T	• G11/12 & G13	▪ -50–0 °C	• ±1 °C
	<ul> <li>Windshield-wiper water (ethanol &amp; isopropanol)</li> </ul>	▪ -40–0 °C	• ±5 °C

## 13.2 Accessories for handheld refractometers

Order number	ltem
HRK01	• Lid
HRK02	<ul> <li>Lid for handheld refractometer with metal hinge</li> </ul>
RK02	<ul> <li>Calibration standard for HRB82-T, HRB92-T, HRH30-T</li> </ul>
CI	■ Cinnamon oil, nD 1.5902 at 25 °C

## Automatic and manual polarimeters for industry, academia and research



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## 14 P8000-P model with Peltier temperature control

The P8000-P and P8100-P polarimeter models are equipped with a Peltier sample temperature control system as a standard feature. The optimal positioning and isolation of the Peltier elements directly on the polarimeter tube ensures homogeneous temperature control and the necessary temperature equilibrium in the sample. This enables high-precision measurements without the need for an external accessory. The P8000-P models are recommended when extremely precise sample temperature control, irrespective of external temperature conditions, is required in a particularly short time and with a short control loop. They are the ideal solution for the pharmaceutical, chemical, and food or beverage industries.



#### Basic features:

- Temperature control and temperature measurement directly at the polarimeter tube.
- Particularly short measuring time of 1-2 s
- Measurement up to an optical density of 3.0
- High-performance LED with 100,000 h service life
- Optional user administration with two three authorization levels
- Easy-to-use menu-driven adjustment
- Pre-installed scales, e.g. optical rotation, specific rotation, international sugar scale and concentration; additional scales can be set up easily
- Compliance with GMP/GLP, 21 CFR Part 11, pharmacopoeias (USP, BP, JP, Ph. Eur.), FDA, ISO, HACCP, OIML, ASTM, ICUMSA, NIST

## Precise, homogeneous, fast Peltier sample temperature control

#### 14.1 Basic technical data P8000-P, P8100-P

Specification	Key data	Specification	Key data
MEASUREMENT RANGE	<ul> <li>±90°</li> <li>±259 °Z</li> </ul>	SCALES	<ul> <li>Optical rotation [°], specific rotation</li> <li>Int. sugar scale [°Z] concentration [g/100 ml], user-defined (unlimited)</li> </ul>
TEMPERATURE CONTROL RANGE	■ 15–40 °C <sup>(1</sup>	METHODS & USERS	• over 10,000 can be set
MEASUREMENT ACCURACY	<ul> <li>For P8000-P: ±0.003°(1 ±0.01 °Z(1)</li> <li>For P8100-P: ±0.002°(1 ±0.01 °Z(1)</li> </ul>	ADJUSTMENT	<ul> <li>Automatic (menu-driven)</li> </ul>
TEMPERING ACCURACY	■ ±0.2 °C <sup>(1</sup>	PARTS IN CONTACT WITH SAMPLES	<ul> <li>Borosilicate glass</li> </ul>
RESOLUTION	<ul> <li>0.001°</li> <li>0.01 °Z</li> </ul>	ADDITIONAL FEATURES	<ul> <li>Audit trail</li> <li>User administration</li> <li>Measured value stabilization</li> <li>Temperature compensation</li> </ul>
MEASUREMENT PERIOD	<ul> <li>1-2 Seconds (1, 2</li> </ul>	CONTROL	<ul> <li>7.0" capacitive touchscreen, 800 x 480 pixels touchscreen, keyboard, mouse, barcode scanner</li> </ul>
SAMPLE PERMEABILITY	> 0.1 % (OD3)	INTERFACES	• 1x USB, 1x RS-232, 1x Ethernet, LIMS
WAVE LENGTH	<ul> <li>589 nm</li> </ul>	DIMENSIONS (W X H X D)	• 670 mm x 200 mm x 360 mm
MAX. TUBE LENGTH	• 220 mm	WEIGHT	• 29 kg
TEMPERATURE MEASUREMENT ACCURACY	■ ±0.1 °C	OPERATING VOLTAGE	■ 110–250 V, 50/60 Hz
TEMPERATURE MEASUREMENT RESOLUTION	• 0.1 °C	POWER CONSUMPTION (MEASUREMENT OPERATION)	• 65 W
TEMPERATURE CONTROL	<ul> <li>With measurement tube PRG-100-EPT (Peltier temperature control)</li> </ul>	POWER CONSUMPTION (MAX.)	• 85 W

() under normal conditions for measurement of optical rotation (20 °C, 1013 hPa, 50 % relative humidity)

<sup>(2</sup> after temperature equalization and with OD < 1

#### 14.2 Recommended measurement tubes P8000-P, P8100-P

Order number	Glass measurement tubes
PRG-100-EPT	<ul> <li>Glass tube with stainless steel jacket, inlet and outlet with integrated Peltier temperature control &amp; temperature measurement, 100 mm, 8 ml</li> </ul>
PRG-100-E	<ul> <li>Glass tube with filling funnel, 100 mm, 6 ml (Included in scope of delivery)</li> </ul>
PRG-200-E	<ul> <li>Glass tube with filling funnel, 200 mm, 12 ml (included in scope of delivery)</li> </ul>



## 15 P8000-T & P-8000-TF water sample temperature-control models

In combination with temperature-controlled measuring tubes and a circulation thermostat (PT80/PT31), the P8000-T and P8100-T polarimeter models enable sample temperature control between 8 °C and 80 °C. They are therefore suitable for high-precision measurements as regards quality assurance and are the right choice when, for example, a large number of different temperaturecontrolled measuring tubes are required. They are used in purity control, chemical composition determination, routine analysis with high sample throughput, or in the analysis of flavours and fragrances. The P8000-TF and P8100-TF polarimeter models additionally provide the option of connecting a peristaltic pump and an autosampler.



#### **Basic features:**

- Temperature measurement directly inside the sample
- Accurate, homogenous, fast Peltier temperature control
- Swift coupling system for an easy tube change
- Highest accuracy over the entire measurement range
- Measurement up to an optical density of 3.0
- Chemical-resistant materials
- Intuitive operation via capacitive touch-screen display
- Pre-installed scales, e.g. optical rotation, specific rotation, International sugar scale and concentration; additional scales can be set up easily
- Optional inclusion of peristaltic pump and autosampler
- Compliance with GMP/GLP, 21 CFR Part 11, pharmacopoeias (USP, BP, JP, Ph. Eur.), FDA, ISO, HACCP, OIML, ASTM, ICUMSA, NIST

Precise, homogeneous, fast Peltier sample Particularly short measuring time of 1-2 seconds

#### 15.1 Basic technical data P8000-T, P8100-T, P8000-TF, P8100-TF

Specification	Key data	Specification	Key data
MEASUREMENT RANGE	<ul> <li>±90°</li> <li>±259 °Z</li> </ul>	SCALES	<ul> <li>Optical rotation [°], Specific rotation</li> <li>Int. sugar scale [°Z] concentration [g/100 ml], user-defined (unlimited)</li> </ul>
TEMPERATURE CONTROL RANGE	<ul> <li>PT31=8-35 °C<sup>(1</sup>)</li> <li>PT80=5-80 °C<sup>(1</sup>)</li> </ul>	METHODS & USERS	• over 10,000 can be set
MEASUREMENT ACCURACY	<ul> <li>For P8000-T: ±0.003°<sup>(1</sup> ±0.01 °Z<sup>(1)</sup></li> <li>For P8100-T: ±0.002°<sup>(1</sup> ±0.01 °Z<sup>(1)</sup></li> </ul>	ADJUSTMENT	<ul> <li>automatic (menu-driven)</li> </ul>
TEMPERING ACCURACY	<ul> <li>PT31 = ±0.2 °C<sup>(1)</sup></li> <li>PT80 = ±0.1 °C<sup>(1)</sup></li> </ul>	PARTS IN CONTACT WITH SAMPLES	<ul> <li>Borosilicate glass, PTFE, stainless steel (1.4305)</li> </ul>
RESOLUTION	• 0.001° • 0.01 °Z	ADDITIONAL FEATURES	<ul> <li>Audit trail</li> <li>User administration</li> <li>Measured value stabilization</li> <li>Temperature compensation</li> </ul>
MEASUREMENT PERIOD	<ul> <li>1-2 Seconds<sup>(1, 2</sup>)</li> </ul>	CONTROL	<ul> <li>7.0" capacitive touchscreen, 800 x 480 pixel touchscreen, keyboard, mouse, barcode scanner</li> </ul>
SAMPLE PERMEABILITY	■ > 0.1 % (OD3)	INTERFACES	<ul> <li>1x USB, 1x RS-232, 1x Ethernet, LIMS</li> </ul>
WAVE LENGTH	<ul> <li>589 nm</li> </ul>	DIMENSIONS (W X H X D)	• 670 mm x 200 mm x 360 mm
MAX. TUBE LENGTH	• 220 mm	WEIGHT	• 29 kg
TEMPERATURE MEASUREMENT ACCURACY	• ±0.1 °C	OPERATING VOLTAGE	■ 110–250 V, 50/60 Hz
TEMPERATURE MEASUREMENT RESOLUTION	• 0.1 °C	POWER CONSUMPTION (MEASUREMENT OPERATION)	• 35 W
TEMPERATURE CONTROL	<ul> <li>With circulating thermostat PT31 or PT80</li> </ul>	POWER CONSUMPTION (MAX.)	• 50 W

<sup>(1)</sup> under normal conditions for measurement of optical rotation (20 °C, 1013 hPa, 50 % relative humidity)

<sup>(2</sup> after temperature equalization and with OD < 1



Order number	Measuring tubes
PRG-100-E	<ul> <li>Glass tube with filling funnel, 100 mm, 6 ml (included in the scope of delivery)</li> </ul>
PRG-200-E	<ul> <li>Glass tube with filling funnel, 200 mm, 12 ml (included in the scope of delivery)</li> </ul>
PRG-100-ET	<ul> <li>Glass tube with stainless steel jacket and filling funnel, temperature-controlled, 100 mm, &lt; 4 ml</li> </ul>
PRG-200-ET	<ul> <li>Glass tube with stainless steel jacket and filling funnel, temperature controlled, 200 mm, &lt; 8 ml</li> </ul>
PRG-100-SDTM-4	<ul> <li>A flow-through micro stainless steel tube, temperature controlled,100 mm, 1.3 ml</li> </ul>
PRM-100-DTT	<ul> <li>Stainless steel flow-through tube with filling funnel and overflow pipe, temperature-controlled, with temperature probe, 100 mm, 12 m</li> </ul>
PRM-200-DTT	<ul> <li>Stainless steel flow-through tube with filling funnel and overflow pipe, temperature-controlled, with temperature probe, 200 mm, 17 ml</li> </ul>
PRT-E	<ul> <li>Stainless steel temperature probe with sensor Pt100</li> </ul>
PRT-T	<ul> <li>Temperature probe made of stainless steel, PTFE coated, with sensor Pt100</li> </ul>

## 15.2 Recommended measuring tubes & temperature probe P8000-T, P8100-T, P8000-TF, P8100-TF



## 16 P8000 model with proven features

The P8000 and P8100 models provide good measurement results in all basic laboratory applications where sample temperature control is not absolutely necessary. Instead of temperature control, these polarimeters are used with temperature compensation according to ICUMSA or an additional freely definable temperature compensation. Your advantage: measurements can be performed at any temperature and the results are then converted to the desired temperature. Thanks to the pre-installed scale of the international sugar scale taking into account the specific rotation and initial weight during conversion, these models are ideally suited for the sugar industry. They are used to determine the concentration of raw materials, test preliminary, intermediate and final products, ascertaine sugar concentration and track chemical processes, e.g. in invert sugar production.



#### **Basic features:**

- Temperature measurement directly on the sample
- Reliable temperature compensation (ICUMSA pre-installed)
- Particularly short measuring time of 1-2 seconds
- Suitable measuring tubes for any type of sample
- Highest accuracy over the entire measuring range
- Scales e.g. optical rotation, specific rotation, international sugar scale and
- concentration are pre-installed; additional scales can be set up easily Conformity with GMP/GLP, 21 CFR Part 11, FDA, ISO, HACCP OIML, ASTM, ICUMSA, NIST

Measurement up to an optical density of 3.0

#### 16.1 Basic technical data P8000, P8100

Specification	Key data		Specification	Key data
MEASUREMENT RANGE	■ ±90° ■ ±259 °Z		SCALES	<ul> <li>Optical rotation [°], specific rotation, int. sugar scale [°Z] concentration [g/100 ml], user-defined (unlimited)</li> </ul>
TEMPERATURE CONTROL RANGE	<ul> <li>upgradeable (1</li> </ul>		METHODS & USERS	<ul> <li>over 10000 can be set</li> </ul>
MEASUREMENT ACCURACY	<ul> <li>For P8000: ±0.003°<sup>(2</sup> ±0.01°Z<sup>(2)</sup></li> <li>For P8100: ±0.002°<sup>(2)</sup> ±0.01°Z<sup>(2)</sup></li> </ul>	ADJUSTMENT		<ul> <li>automatic (menu-driven)</li> </ul>
TEMPERING ACCURACY	<ul> <li>upgradeable (1</li> </ul>		PARTS IN CONTACT WITH SAMPLES	<ul> <li>Borosilicate glass, PTFE, stainless steel (1.4305)</li> </ul>
RESOLUTION	<ul> <li>0.001°</li> <li>0.01 °Z</li> </ul>		ADDITIONAL FEATURES	<ul> <li>Audit trail; user administration</li> <li>Measured value stabilization</li> <li>Temperature compensation</li> </ul>
MEASUREMENT PERIOD	<ul> <li>1-2 seconds<sup>(2, 3)</sup></li> </ul>		CONTROL	<ul> <li>7.0" capacitive touchscreen, 800 x 480 pixel touchscreen, keyboard, mouse, barcode scanner</li> </ul>
SAMPLE PERMEABILITY	<ul> <li>&gt; 0.1 % (OD3)</li> </ul>		INTERFACES	<ul> <li>1x USB, 1x RS-232, 1x Ethernet, LIMS</li> </ul>
WAVE LENGTH	• 589 nm		DIMENSIONS (W X H X D)	<ul> <li>670 mm x 200 mm x 360 mm</li> </ul>
MAX. TUBE LENGTH	• 220 mm		WEIGHT	• 29 kg
TEMPERATURE MEASUREMENT ACCURACY	▪ ±0.1 °C		OPERATING VOLTAGE	• 110–250 V, 50/60 Hz
TEMPERATURE MEASUREMENT RESOLUTION	• 0.1 °C		POWER CONSUMPTION (MEASUREMENT OPERATION)	• 35 W
TEMPERATURE CONTROL	• upgradable (1		POWER CONSUMPTION (MAX.)	• 50 W

(<sup>1</sup> requires circulation thermostat PT31/PT80, sample chamber lead-through P8020 and temperature-controlled measuring tube

<sup>(2)</sup> under normal conditions for measurement of optical rotation (20 °C, 1013 hPa, 50 % relative humidity)

 $^{\mbox{(3)}}$  after temperature equalization and with OD < 1

#### 16.2 Recommended measuring tubes P8000, P8100

Order number	Measuring tube
PRG-100-E	<ul> <li>Glass tube with filling funnel, 100 mm, 6 ml (Included in the scope of delivery)</li> </ul>
PRG-200-E	<ul> <li>Glass tube with filling funnel,, 200 mm, 12 ml (Included in the scope of delivery)</li> </ul>
PRM-100-D	<ul> <li>Flow-through stainless steel tube with funnel and overflow tube, 100 mm, 12 ml</li> </ul>
PRM-200-D	Flow-through stainless steel tube with filling funnel and overflow tube, 200 mm, 17 ml
PRT-E	<ul> <li>Stainless steel temperature probe with Pt100 sensor</li> </ul>
PRT-T	<ul> <li>Temperature probe made of stainless steel, PTFE-coated, with sensor Pt100</li> </ul>



## 17 P3000 model for standard applications

The P3000 polarimeter is the affordable solution for standard measurements where a measurement accuracy of  $\pm 0.01^{\circ}$  is required. Measurements are performed in the record time of less than 2 seconds. The measured values are displayed either as an optical angle of rotation or in the ICUMSA international sugar scale. The option of printing results on an ASCII serial printer is included. Reliable temperature compensation allows measurement at any temperature and notification of the value converted to 20 °C.



#### **Basic features**

- Easily operable 3.5" touchscreen
- Easy, menu-driven adjustment
- Measured values are optionally displayed as an optical angle of rotation or on the international sugar scale
- Reliable temperature compensation (ICUMSA pre-installed)
- Suitable measurement tubes for any type of sample
- Measurement up to an optical density of 3.0
- Very short measurement time of approx. 1 -2 seconds
- Compliance with pharmacopoeias [USP, BP, JP, Ph. Eur. (with temperature control)], GLP, ASTM, ICUMSA, NIST

Economic Polarimeter P3000 with a measuring accuracy of  $\pm 0,01^{\circ}$ 

#### 17.1 Basic technical data P3000

Specification	Key data	Specification	Key data
MEASUREMENT RANGE	<ul> <li>±90°</li> <li>±259 °Z</li> </ul>	SCALES	<ul> <li>Optical rotation [°]</li> <li>Int. sugar scale [°Z]</li> </ul>
TEMPERATURE CONTROL RANGE	<ul> <li>upgradeable <sup>(1</sup>)</li> </ul>	METHODS & USERS	<ul> <li>not provided</li> </ul>
MEASUREMENT ACCURACY	<ul> <li>±0.01°<sup>(2</sup></li> <li>±0.01 °Z<sup>(2</sup></li> </ul>	ADJUSTMENT	<ul> <li>automatic (menu-driven)</li> </ul>
TEMPERING ACCURACY	• upgradeable <sup>(1</sup>	PARTS IN CONTACT WITH SAMPLES	<ul> <li>Borosilicate glass, PTFE, stainless steel (1.4305)</li> </ul>
RESOLUTION	<ul> <li>0.01°</li> <li>0.01 °Z</li> </ul>	ADDITIONAL FEATURES	<ul> <li>Temperature compensation</li> </ul>
MEASUREMENT PERIOD	<ul> <li>1-2 Seconds<sup>(2, 3)</sup></li> </ul>	CONTROL	<ul> <li>5"-touchscreen, 320 x 240 Pixel</li> </ul>
SAMPLE PERMEABILITY	<ul> <li>&gt; 0.1 % (OD3)</li> </ul>	DIMENSIONS (W X H X D)	• 1x RS-232
WAVE LENGTH	• 589 nm	MEASUREMENTS	<ul> <li>645 mm x 200 mm x 360 mm</li> </ul>
MAX. TUBE LENGTH	• 220 mm	WEIGHT	■ 28 kg
TEMPERATURE MEASUREMENT ACCURACY	▪ ±0.1 °C	OPERATING VOLTAGE	• 110–250 V, 50/60 Hz
TEMPERATURE MEASUREMENT RESOLUTION	• 0.1 °C	POWER CONSUMPTION (MEASUREMENT OPERATION )	• 30 W
TEMPERATURE CONTROL	• upgradeable <sup>(1</sup>	POWER CONSUMPTION (MAX.)	• 40 W

(1 requires circulation thermostat PT31/PT80, sample chamber lead-through P8020 and temperature-controlled measuring tube

<sup>(2</sup> under normal conditions for measurement of optical rotation (20 °C, 1013 hPa, 50 % relative humidity)

 $^{(3)}$  after temperature equalization and with OD < 1

#### 17.2 Recommended measuring tube P3000 model

Order number	Measuring tube
PRG-100-E	<ul> <li>Glass tube with filling funnel, 100 mm, 6 ml (Included in the scope of delivery)</li> </ul>
PRG-200-E	<ul> <li>Glass tube with filling funnel,, 200 mm, 12 ml (Included in the scope of delivery)</li> </ul>
PRM-100-D	Flow-through stainless steel tube with funnel and overflow tube, 100 mm, 12 ml
PRM-200-D	Flow-through stainless steel tube with filling funnel and overflow tube, 200 mm, 17 ml
PRT-E	Stainless steel temperature probe with Pt100 sensor
PRT-T	Temperature probe made of stainless steel, PTFE-coated, with sensor Pt100



## 18 P1000-LED model for laboratory and practical training

The P1000-LED polarimeter is the instrument of choice for basic laboratory applications at companies or institutes and is ideally suited for practical training. It measures the optical rotation according to the half-shade principle, and the measurement results are read through an eyepiece and two noniuses. Because of its simple operation, pharmacies also use this polarimeter for the control of incoming and outgoing pharmaceutical products according to pharmacopoeias. In the main field of training in industry or at universities, it is used in practical exercises and experiments on the kinetics of cane sugar inversion, the mutarotation of glucose or the determination of the concentration of polysaccharides by starch hydrolysis.



#### **Basic features:**

- Sample chamber for measurement tubes with a length of up to 220 mm
- Requires very little maintenance due to a high performance LED with a service life up to 2000 times longer than that of conventional sodium discharge lamps
- The scope of delivery includes two measurement tubes (100 and 200 mm length) with a debubbler proper filling.
- Can be validated due to the optional inclusion of quartz control plates for calibration and adjustment.

Measurement of optical rotation in the measuring range over two pitch circles (0-180°)

## 18.1 Basic technical data P1000-LED

Specification	Key data
SCALES	<ul> <li>Optical rotation [°]</li> </ul>
MEASUREMENT AREAS	<ul> <li>2 pitch circles (0-180°)</li> </ul>
SCALE DIVISION	• ]°
READING ACCURACY	<ul> <li>0.05° (with vernier)</li> </ul>
LIGHT SOURCE	<ul> <li>1 LED with filter</li> </ul>
WAVE LENGTH	<ul> <li>589 nm</li> </ul>

#### 18.2 Recommended measuring tubes P1000-LED

Order number	Measuring tube
• PRG-100	<ul> <li>Glass tube, 100 mm, 6 ml (Included in the scope of delivery)</li> </ul>
• PRG-200	<ul> <li>Glass tube, 200 mm, 12 ml (Included in the scope of delivery)</li> </ul>
PRG-50-M	<ul> <li>Micro glass tube, 50 mm, 0.55 m</li> </ul>
• PRG-100-M	<ul> <li>Micro glass tube, 100 mm, 1.1 ml</li> </ul>



## 19 Measurement tubes - overview

## 19.1 Glass measurement tubes - without temperature control

APPLICABLE FOR POLARIMETER						
		P8000	P8000-P	P8000-T	P3000	P1000-
		P8100	P8100-P	P8100-T		LED
MEASURE	MENT TUBES	Without temperature control	Temperature control with Peltier technology	Temperature control circulating thermostat/ temperature- controlled measurement tubes recommended	Without temperature control <sup>2)</sup>	Without temperature control
Glass measurer	nent tubes (without	t temperature cont	rol)			
PRG-50-E und Pl	RG-100-E und PRG-2	200-Е				
Available tube lengths: 50/100/200 mm Luer connection: No Flow-through: No Required sample volume <sup>1)</sup> : 3ml/50 mm 6 ml/100 mm 12 ml/200 mm	Abbreviation: PRG/ P/Polarimeter R/Tube G/Glass E/Filling funnel	PRG-100-E and PRG-200-E Supplied as part of the scope of delivery.	PRG-100-E and PRG-200-E Supplied as part of the scope of delivery.	PRG-100-E and PRG-200-E Supplied as part of the scope of delivery.	PRG-100-E and PRG-200-E Supplied as part of the scope of delivery.	
Glass measurer	nent tube (without	temperature contr	ol)	1	1	
PRG-100 und PR	G-200	1			1	
Available tube lengths: 100/200 mm Luer connections: No Flow-through: No Required sample volume <sup>1)</sup> : 12 ml/100 mm 22ml/200 mm	Abbreviation: PRG/ P/Polarimeter R/Tube G/Glass	Applicable	Applicable	Applicable	Applicable	Glass measurement tube supplied as part of the scope of delivery

<sup>1)</sup> Details of the sample volume are "approximate values" and do not take the filling level of the filling funnel or the respective product tolerances into account.
<sup>2)</sup> Temperature control is possible on request.



## 19.2 Micro measurement tubes – without temperature control

APPLICABLE FOR POLARIMETER						
MEASUREMEN	TTUBES	P8000 P8100 Without temperature control	P8000-P P8100-P Temperature control with Peltier technology	P8000-T P8100-T Temperature control circulating thermostat/ temperature- controlled measurement tubes recommended	P3000 Without temperature control <sup>2)</sup>	P1000- LED Without temperature control
PRG-50-M and	PRG-100-M					
Available tube lengths: 50/100 mm Luer connection: No Flow-through: No Required sample volume <sup>1);</sup> 0.55 ml/50 mm 1.1 ml/100 mm	Abbreviation: PRG/ P/Polarimeter R/Tube G/Glass	Applicable	Applicable	Applicable	Applicable	Applicable
Stainless steel PRM-10-SDM a	micro flow-through n nd PRM-100-SDM	neasurement tul	be (without tem	perature control)		
Available tube lengths: 10/100 mm Luer connection: Yes Flow-through: Yes Required sample volume <sup>1)</sup> : 0.2 ml/10 mm 0.5 ml/100 mm	Abbreviation: PRM/ P/Polarimeter R/Tube M/Metal S/ Tube connection D/ Flow-through M/ Micro	Only applicable with P8020	Only applicable with P8020	Only applicable with P8020	Only applicable with P8020	

<sup>1)</sup> Details of the sample volume are "**approximate values**" and do not take the filling level of the filling funnel or the respective product tolerances into account.

<sup>2)</sup> Temperature control is possible on request.



## 19.3 Flow-through measurement tubes – without temperature control

APPLICABLE FOR POLARIMETER						
MEASUREMEN	IT TUBES	P8000 P8100 Without temperature control	P8000-P P8100-P Temperature control with Peltier technology	P8000-T P8100-T Temperature control circulating thermostat/ temperature- controlled measurement tubes recommended	P3000 Without temperature control <sup>3)</sup>	P1000- LED Without temperature control
PRM-100-SD	flow-through measur	ement tubes (wi	thout temperate	ure control)		
Available tube lengths: 100 mm Luer connection: No Flow-through: Yes Required sample volume <sup>1)</sup> : 1.3 ml/100 mm	Abbreviation: PRM/ P/Polarimeter R/Tube M/Metal S/Tube connection D/Flow-through	Only applicable with P8020 <sup>2</sup> )	Only applicable with P8020 <sup>2)</sup>	Only applicable with P8020 <sup>2)</sup>	Only applicable with P8020 <sup>2</sup> )	
Stainless steel PRM-100-D an	<b>flow-through measur</b> d PRM-200-D	ement tube (wit	hout temperatu	re control)		
Available tube lengths: 100/200 mm Luer connection: No Flow-through: Yes Required sample volume <sup>1</sup> ): 12 ml/100 mm 17 ml/200 mm	Abbreviation: PRM/ P/Polarimeter R/Tube M/Metal D/Flow-through (with filling funnel)	Only applicable with P8020 <sup>2</sup> )	Only applicable with P8020 <sup>2</sup> )	Only applicable with P8020 <sup>2</sup> )	Only applicable with P8020 <sup>2</sup> )	

<sup>1)</sup> Details of the sample volume are "**approximate values**" and do not take the filling level of the filling funnel or the respective product tolerances into account.

<sup>2)</sup> P8020 = Sample chamber bushing

It is essential to organize the sample filling by a pump or to enable the temperature control (hose bushing).

<sup>3)</sup> Temperature control is possible on request.



## 19.4 Measurement tubes - temperature-controlled (circulation thermostat PT80/PT31)

		APPLICABLE	FOR POLA	RIMETER		
		P8000	P8000-P	P8000-T	P3000	P1000-
		P8100	P8100-P	P8100-T		LED
MEASUREMEN	IT TUBES	Without temperature control	Temperature control with Peltier technology	Temperature control circulating thermostat/ temperature- controlled measurement tubes recommended	Without temperature control <sup>3)</sup>	Without temperatu re control
Glass measure	ement tubes (tempera	ture controlled)				
PRG-100-ET un	d PRG-200-ET					
Available tube lengths: 100/200 mm Luer connection: No	Abbreviation: PRM/ P/Polarimeter R/Tube G/Glas			Applicable		
Flow-through: No	<b>E</b> / Filling funnel					
Required sample volume <sup>1):</sup> 4 ml/100 mm 8 ml/200 mm	controlled ( by surrounding water jacket )					
Stainless steel	measurement tube w	ith filling funnel (	temperature-c	controlled)		1
PR/M-100-E1				Only appliaghle		
Available tube lengths: 100 mm	Abbreviation: PRM/ P/Polarimeter			with P8020 <sup>2)</sup>		
connection:	<b>R</b> /Tube <b>M</b> /Metal					
Flow-through:	<b>E</b> /Filling funnel					
No	T/temperature-					
Required sample volume <sup>1)</sup> : 12 ml/100 mm	controlled by surrounding water jacket )					

<sup>1)</sup> Details of the sample volume are "approximate values" and do not take the filling level of the filling funnel or the respective product tolerances into account.

## $^{2)}$ P8020 = sample chamber bushing

It is essential to organize the sample filling by a pump (hose bushing) or to enable the temperature control (temperature control bushing).

<sup>3)</sup> Temperature control is possible on request.



#### 19.5 Polarimeter measurement tubes – temperature-controlled (circulation thermostat PT80/PT31)

APPLICABLE FOR POLARIMETER							
		P8000	P8000-P	P8000-T	P3000	P1000-	
		P8100	P8100-P	P8100-T		LED	
MEASUREMENT TUBES		Without temperature control	Temperature control with Peltier technology	Temperature control circulating thermostat/ temperature- controlled measurement tubes recommended	Without temperature control <sup>3)</sup>	Without temperature control	
Stainless steel	flow-through measur	ement tubes (tem	perature-cont	rolled)			
PRM-100-DTT	and PRM-200-DTT						
Available tube lengths: 100/200 mm Luer connection: No Flow-through: Yes Required sample volume <sup>1</sup> ): 12 ml/100 mm 17 ml/200 mm	Abbreviation: PRM/ P/Polarimeter R/Tube M/Metal D/Flow-through (with filling funnel) T/Temperature controlled (via water jacket) T/Temperature sensor			Only applicable with P8020 <sup>2</sup> )			
Temperature s	ensor	1		1	<u> </u>		
PRT-E and PRT-	Т						
				Can be used with all measurement tubes (equipped with a filling funnel <sup>4</sup> )			
PRT-E Stainless steel temperature sensor							
PRT-T		-					
Stainless steel temperature sensor, PTFE-coated							

<sup>1)</sup> Details of the sample volume are "**approximate values**" and do not take the filling level of the filling funnel or the respective product tolerances into account.

#### $^{1)}$ P8020 = Sample chamber bushing

It is essential to organize the sample filling by a pump (hose bushing) or to enable the temperature control (temperature control bushing).

#### <sup>3)</sup> Temperature control is possible on request.

4) If no funnel is provided, the temperature sensor is located directly in the sample chamber.



## 19.6 Stainless steel flow-through measurement tubes - temperature-controlled (circulation thermostat PT80/PT31)

APPLICABLE FOR POLARIMETER								
		P8000	P8000-P	P8000-T	P3000	P1000-		
		P8100	P8100-P	P8100-T		I FD		
MEASUREMENT TUBES		Without temperature control	Temperature control with Peltier technology	Temperature control circulating thermostat/ temperature- controlled measurement tubes	Without temperature control <sup>3)</sup>	Without temperature control		
Stainless steel flow-through measurement tubes (temperature-controlled)								
Available tube lengths: 200 mm Luer connection: No Flow-through: Yes Required sample	Abbreviation: PRM/ P/Polarimeter R/Tube M/Metal D/Flow-through (with filling funnel) T/Temperature- controlled (via water jacket)			Only applicable with P8020 <sup>2)</sup>				
volume <sup>1)</sup> : 17 ml/200 mm								
Stainless steel flow-through measurement tube (temperature-controlled) PRM-200-SDT								
Available tube	Abbreviation: PRM/ P/Polarimeter			Only applicable with P8020 <sup>2)</sup>				
lengths: 200 mm	<b>K</b> /Tube <b>M</b> /Metal							
Luer connection:	S/Tube connection D/ Flow-through							
Flow-through: Yes Required sample	I/Temperature- controlled (via water jacket)							
17 ml/200 mm								

<sup>1)</sup> Details of the sample volume are "**approximate values**" and do not take the filling level of the filling funnel or the respective product tolerances into account.

<sup>2)</sup> P8020 = Sample chamber bushing - It is essential to organize the sample filling by a pump (hose bushing) or to enable the temperature control (temperature control bushing).

<sup>3)</sup> Temperature control is possible on request.



## 19.7 Measurement tube - temperature-controlled (circulation thermostat PT80/PT31)

APPLICABLE FOR POLARIMETER							
		P8000	Р8000-Р	P8000-T	P3000	P1000-	
MEASUREMENT TUBES		P8100	P8100-P	P8100-T		LED	
		Without temperature control	Temperature control with Peltier technology	Temperature control circulating thermostat/ temperature- controlled measurement tubes recommended	Without temperature control <sup>3)</sup>	Without temperature control	
Stainless steel flow-through measurement tube PRM-100-SDTM-2.5							
Available tube lengths: 100 mm Luer connection: Yes Flow-through: Yes Required sample volume <sup>1</sup> ): 0.5 ml/100 mm Stainless steel min	Abbreviation: PRM/ P/Polarimeter R/Tube M/Metal S/Tube connection D/Flow-through T/Temperature- controlled M/Micro	neasurement		Only applicable with P8020 <sup>2)</sup>			
PRM-100-5D1M-4				1	1		
<u> 4114</u>	Abbreviation: PRM/			Only applicable with P8020 <sup>2)</sup>			
Available tube	<b>P</b> /Polarimeter			Recommended			
lengths:	<b>R</b> /Tube			micro			
100 mm	<b>M</b> /Metal			measurement			
Luer connection:				tube			
Yes	<b>S</b> /Tube connection						
Flow-through:	<b>D</b> /Flow-through						
Yes .	<b>T</b> /Temperature-						
Requirea sample	controlled						
	<b>M</b> /Micro						
1.3 ml/100 mm			I		<u> </u>		

<sup>1)</sup> Details of the sample volume are "**approximate values**" and do not take the filling level of the filling funnel or the respective product tolerances into account.

<sup>2)</sup> P8020 = Sample chamber bushing - It is essential to organize the sample filling by a pump (hose bushing) or to enable the temperature control (temperature control bushing).

<sup>3)</sup> Temperature control is possible on request.



## 19.8 Polarimeter measurement tubes -temperature-controlled (Peltier temperature control)

APPLICABLE FOR POLARIMETER								
MEASUREMENT TUBES		P8000 P8100 Without temperature control	P8000-P P8100-P Temperature control with Peltier technology	P8000-T P8100-T Temperature control circulating thermostat/ temperature- controlled measurement tubes recommended	P3000 Without temperature control <sup>2</sup>	P1000- LED Without temperature control		
Glass measurement tubes (Peltier temperature control) PRG-100-EPT								
Available tube lengths: 100 mm Luer connection: No Flow-through: Yes Required sample volume <sup>1)</sup> : 8 ml/100 mm	Abbreviation: PRG/ P/Polarimeter R/Tube G/Glass EPT/Peltier temperature control (with two filling openings)	Not applicable	Recommended glass measurement tube	Not applicable	Not applicable	Not applicable		

<sup>1)</sup> Details of the sample volume are "**approximate values**" and do not take the filling level of the filling funnel or the respective product tolerances into account.

<sup>2)</sup> Temperature control is possible on request.


### 20 Polarimeter quartz control plates

APPLICABLE FOR POLARIMETER					
Quartz control plates	P8000 P8100 Without temperature control	P8000-P P8100-P Temperature control with Peltier technology	P8000-T P8100-T Temperature control circulating thermostat/ temperature- controlled measurement tubes recommended	P3000 Without temperature control <sup>1)</sup>	P1000- LED Without temperature control
Polarimeter quartz control plate PQI	models				
PQP+17         Angle of rotation: $+17^{\circ} (\pm 1^{\circ}), +50^{\circ}Z (\pm 1^{\circ}Z)$ PQP+34         Angle of rotation: $+34^{\circ} (\pm 1^{\circ}), +99^{\circ}Z (\pm 1^{\circ}Z)$ PQP-17         Angle of rotation: $-17^{\circ} (\pm 1^{\circ}), -50^{\circ}Z (\pm 1^{\circ}Z)$	QP+17ngle of rotation:17° (±1°), +50 °Z (±1 °Z)QP+34ngle of rotation:34° (±1°), +99 °Z (±1 °Z)QP-17ngle of rotation:7° (±1°), -50 °Z (±1 °Z)				ange, s steel
Polarimeter quartz control plate PQE models					
PQE+17Angle of rotation:+17° (±1°), +50 °Z (±1 °Z)PQE+34Angle of rotation:+34° (±1°), +99 °Z (±1 °Z)PQE-17Angle of rotation:-17° (±1°), -50 °Z (±1 °Z)				ange, s steel	

1) Temperature control is possible on request.



### 21 Accessories for polarimeters

Order number	Item		
Accessories and consumables			
PT80	<ul> <li>Circulation thermostat; temperature range: 5-80 °C; Interface: RS-232;</li> <li>Power supply: 100-240 V AC, 50/60 Hz, 2.5 A; Dimensions (W x H x D): 170 mm x 225 mm x 244 mm</li> </ul>		
PT31	<ul> <li>Circulation thermostat; temperature range: 8-35 °C; Interface: RS-232;</li> <li>Power supply: 100-240 V, 50/60 Hz, 1.3 A; Dimensions (W x H x D): 108 mm x 199 mm x 145 mm</li> </ul>		
PRT-E	Stainless steel temperature probe with Pt100 sensor		
PRT-T	Temperature probe made of stainless steel, PTFE-coated, with sensor Pt100		
P8020	Sample chamber feedthrough for temperature and flow tubes		
CMB910	24-character standard paper printer		
CBM916	Interface cable for printer CBM910		
CBM910P	Plain paper roll for printer CBM910		
CBM910F	Ribbon for printer CBM910		
KALL	Calibration certificate for laboratory equipment		
P1000-400	LED illumination for P1000-LED		
P1000-150	<ul> <li>2 glass cover plates d=15 mm for polarimeter tubes</li> </ul>		
P1000-160	<ul> <li>gasket rubber gasket for polarimeter tubes</li> </ul>		
Additional accessories and consumables for P8000-T			
D\$7060	<ul> <li>Drying unit with 3/2-way valve</li> </ul>		
P8001	<ul> <li>Set for connection of circulation thermostat PT31 to polarimeter P8000-T/-TF, consisting of:</li> <li>2 silicone hoses (300 mm): 2 hose connectors, straight</li> </ul>		
P8002	Set for connection of MEASUREMENT TUBES (old version) to polarimeter P8000-T/-TF, consisting of:     2 silicone tubes (250 mm): 2 tube connectors straight		
P8003	<ul> <li>Set for connecting MEASUREMENT TUBES (new version) to polarimeter P8000-T/-TF, consisting of:</li> <li>2 silicone hoses (100 mm); 2 hose connectors, angled</li> </ul>		
	Additional accessories and consumables for P8000-TF		
D\$7070	Peristaltic pump		
D\$7071	<ul> <li>Hose set for peristaltic pump DS7070, consisting of:</li> <li>TPE pump hose (105 mm), 5 pieces; PTFE hose connection UNF, 2 pieces</li> </ul>		
D\$7072	Hose set for peristaltic pump DS7070, consisting of:     TPE pump hose (105 mm), 5 proceeding of:     TPE pump hose (105 mm), 5 proceeding of the proceeding of the pump hose (105 mm).		
AS80	<ul> <li>Autosampler for 18 or 36 samples, including: sample plate 18x 50 ml (42 mm x 43 mm) or 36x 30 ml</li> <li>(28 mm x 65 mm) set of vials made of polypropylene (50 ml) or glass (30 ml); PTFE connection tubing. With integrated rinsing and drying unit and stable needle design.</li> </ul>		
AS80-T36	<ul> <li>Sample vials for AS80: 36x 30 ml (28 mm x 65 mm)</li> </ul>		
AS80-V36	Sample vessels for AS80-T36 (30 ml)		
Additional accessories and consumables for P8000-P			
PRT-P	<ul> <li>Adapter plug for connection of temperature probe PRT-E/PRT-T to polarimeter P8000-P/P8100-P</li> </ul>		

# High-performance Peltier circulators suitable for temperature control of polarimeters and refractometers



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#### 22 PT31 model for temperature range 8-35 °C

The PT31 circulation thermostat is equipped with high-performance features. This 1.5 kg lightweight device is ideally suited for applications requiring a temperature range at a constant level. The proven Peltier technology enables process-reliable temperature control in the range from 8 °C to 35 °C. The accuracy of temperature control is  $\pm 0.2$  °C.



#### **Basic features:**

- Temperature control using Peltier technology
- Temperature range from 8 °C to 35 °C
- Temperature accuracy of ±0.2 °C
- Space-saving, sturdy design
- Suitable for operation with non-flammable liquids (water or water/glycol mixture)
- Bright, easy-to-read LCD matrix display
- Sophisticated, easily accessible operating elements
- Simple and plainly structured functions

The PT31 is one of the world's smallest & extremely silent thermostats for temperature control tasks in the laboratory

#### 22.1 Basic technical data PT31

Specification	Key data	Specification	Key data
TEMPERATURE CONTROL RANGE	■ 8–35 °C <sup>1)</sup>	IP CODE	• IP21
ACCURACY OF TEMPERATURE CONTROL	■ ± 0.2 °C	CLASS OF PROTECTION (DIN 12876-1)	<ul> <li>I; non-flammable liquids</li> </ul>
TEMPERATURE CONTROL RESOLUTION	■ 0.1 °C	FILLING VOLUME	• 100 ml
AMBIENT TEMPERATURE RANGE	■ 5 °C – 40 °C	CONTROL	<ul> <li>Selection keys</li> </ul>
HEATING CAPACITY	• 30 W	DIMENSIONS (W X H)	<ul> <li>108 mm x 199 mm x 145 mm</li> </ul>
COOLING CAPACITY AT 20 °C	• 20 W	WEIGHT	<ul> <li>1.5 kg (without mains adapter and mains cable)</li> </ul>
PUMP PRESSURE	<ul> <li>20 mbar</li> </ul>	ELECTRICAL DATA	<ul> <li>100-240 V AC, 50/60 Hz</li> </ul>
PUMP CAPACITY	• 20 l/h	POWER CONSUMPTION (HEATING / COOLING)	• 30 W / 70 W
DISPLAY TYPE	<ul> <li>LCD matrix display</li> </ul>	POWER CONSUMPTION (MAX.)	• 80 W

<sup>(1</sup> Limits of the temperature control range can be reached at a suitable ambient temperature.

#### 22.2 APPLICATIONS PT31: Temperature control of polarimeter

When used together with polarimeters, the PT31 circulator ensures a constant temperature of the measured samples. This allows highly precise and reproducible measurements, as specified by different standards in the pharmaceutical industry at 20 °C or 25 °C. Water-temperable measuring tubes from all manufacturers can be tempered with our circulators. The connection is smooth and swift thanks to the express couplings for tubing provided in our polarimeter.

#### 22.3 APPLICATIONS PT31: Temperature control of refractometer

The PT31 circulators are popular for sample temperature control of refractometers, with the temperature control of Abbe refractometers being particularly popular. Abbe refractometers can achieve highly accurate and extremely reproducible measurement results completely independent of the ambient temperatures.



#### 23 PT80 model for temperature range 5-80 °C

A clear TFT display shows all relevant information. An easy-to-use touchscreen enables the temperature of the PT80 to be individually adjusted. The easy-access functions and intuitive user guidance in the user menu ensure convenient handling. The circulator can be operated via the serial RS-232 interface without difficulty. This allows effective data exchange and remote control via PC or direct control via the user interface of our P8000 series polarimeters. The PC networking also enables documentation of all important settings. The temperature of the PT80, for example, can be queried with the most basic of programs. With these networking functions, the PT80 is even suitable for automated temperature control in the environment of Laboratory 4.0 applications.



#### **Basic features:**

- N.B.: Only available for purchase in combination with the P8000-T polarimeter
- Circulation thermostat with Peltier technology
- Rapid temperature control from 5 °C to 80 °C
- Temperature accuracy of ±0.1 °C
- Extremely silent and low-vibration operation
- Suitable for operation with non-flammable liquids (water or water/glycol mixture)
- Resistive touchscreen display with clear and intuitive menu navigation
- Standard RS-232 interface for PC communication
- PT80 control by P8000 series polarimeter

## Eco-friendly thanks to 50% lower energy requirements and no refrigerants

#### 23.1 Basic technical data PT80

Specification	Key data	Specification	Key data
TEMPERATURE CONTROL RANGE	■ 5 °C – 80 °C <sup>(1</sup>	CLASS OF PROTECTION (DIN 12876-1)	<ul> <li>I; non-flammable liquids</li> </ul>
ACCURACY OF TEMPERATURE CONTROL	■ ±0.1 °C	FILLING VOLUME	• 250 ml
TEMPERATURE CONTROL RESOLUTION	• 0.1 °C	CONTROL	<ul> <li>Resistive touch screen</li> </ul>
AMBIENT TEMPERATURE RANGE	■ 5 °C – 40 °C	ELECTRONIC INTERFACE	<ul> <li>RS-232 interface</li> </ul>
HEATING CAPACITY	• 120 W	DIMENSIONS (W X H X D)	• 170 mm x 225 mm x 244 mm
COOLING CAPACITY AT 20 °C	• 40 W	WEIGHT	<ul> <li>2.7 kg (without mains adapter and mains cable)</li> </ul>
PUMP PRESSURE	<ul> <li>110 mbar</li> </ul>	ELECTRICAL DATA	• 100-240 V AC, 50/60 Hz
PUMP CAPACITY	• 60 l/h	POWER CONSUMPTION (HEATING / COOLING)	• 130 W/130 W
DISPLAY TYPE	<ul> <li>RGB TFT-display (320 x 240 pixel)</li> </ul>	POWER CONSUMPTION (MAX.	• 140 W
IP CODE	• IP21		

<sup>(1</sup> Limits of the temperature control range can be reached at a suitable ambient temperature.

#### 23.2 APPLICATIONS: Temperature control of polarimeter

When used together with polarimeters, the PT80 circulator ensures a constant temperature of the measured samples. This allows highly precise and reproducible measurements, as specified by different standards in the pharmaceutical industry at 20 °C or 25 °C. Water-temperable measuring tubes from all manufacturers can be tempered with our circulators. The connection is smooth and swift thanks to the express couplings for tubing, which are provided in our polarimeter.



#### 23.3 Accessories for PT31 and PT80

Order number	ltem		
TCA01-05	<ul> <li>ThermostatCare A 500 ml (temperature control medium for operating the PT31 &amp; PT80)</li> </ul>		
TCA01-10	<ul> <li>ThermostatCare A 1000 ml (temperature control medium for operation of PT31 &amp; PT80)</li> </ul>		
TCB01-05	ThermostatCare B 500 ml (coloured tempering medium for operation of the PT31 & PT80)		
TCB01-10	<ul> <li>ThermostatCare B 1000 ml (coloured temperature control medium for operation of PT31 &amp; PT80)</li> </ul>		
PT31 LID	<ul> <li>Replacement lid for circulation thermostat PT31</li> </ul>		
PT31-POWER SUPPLY2	<ul> <li>Replacement power supply for circulation thermostat PT31 with EU plug</li> </ul>		
PT80-POWER SUPPLY	<ul> <li>Replacement power supply for PT80 circulator with EU plug</li> </ul>		
PT80-PC CABLE	<ul> <li>Connection cable (for control via polarimeter or PC) with interface documentation</li> </ul>		
PT35	<ul> <li>Cleaner water bath</li> </ul>		
P8001	<ul> <li>Set for connecting circulator PT31 or PT80 to polarimeter P8000-T/-TF, consisting of: 2 silicone hoses (300 mm); 2 hose connectors, straight</li> </ul>		
STR80	<ul> <li>Flow indicator</li> </ul>		

### Reliable high-speed density meters measure with the oscillating U-tube method.



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### 24 DS7700-M model and DS7800-M model – manual sample supply

These digital density meters for manual sample introduction operate using proven oscillating U-tube technology. With such models, sample introduction of low to high viscosity samples takes place via a Luer syringe. During sample introduction, the viewing window is used to check that the filling is free of bubbles. The internal Peltier temperature control ensures a fast and stable sample temperature. For cleaning, suitable solvents are injected until all sample residues are dissolved and removed. All liquid residues are removed from the flexure transducer with the aid of the drying unit attached to the instrument. Thanks to the chemical-resistant sample-carrying parts made of borosilicate glass and PTFE, our density meters are suitable for almost all liquids, emulsions and pastes. The minimum sample volume of the bender oscillator is less than 1 ml. Almost unlimited configuration options are possible. These cover factors such as density, specific gravity, Brix, alcohol, sulphuric acid concentration or other user configured scales.



Thanks to chemical-resistant sample-carrying parts, almost all liquids, emulsions & pastes are measurable

#### **Basic features:**

- Sample supply and cleaning via syringe
- Suitable for almost all liquids, emulsions & pastes thanks to chemical-resistant sample carrying parts made of borosilicate glass and PTFE
- Intuitive operation via 7.0-inch touchscreen display,
   6 languages selectable
- Easy-to-understand, menu-guided adjustment
- Scales such as density, relative density, Brix, alcohol and sulphuric acid concentration are pre-installed; further scales can be set up
- Conformity with GMP/GLP, 21 CFR Part 11, pharmacopoeias (USP, BP, JP, Ph. Eur.), FDA, ISO, HACCP, OIML, ASTM, ICUMSA, NIST

#### 24.1 Basic technical data density meter (DS7700-M | DS7800-M) - manual sample feed

Technical data are the same for manual, semi-automatic and fully automatic systems

SPECIFICATION	Key data
MEASUREMENT RANGE	<ul> <li>0–3 g/cm<sup>3</sup></li> </ul>
TEMP. CONTROL RANGE	• 10-40 °C(1
MEASUREMENT ACCURACY	<ul> <li>DS7700: ±0.001 g/cm<sup>3(1</sup></li> <li>DS7800: ±0.0001 g/cm<sup>3(1</sup></li> </ul>
ACCURACY OF TEMPERATURE	• ±0.01 °C(1
SCALES	<ul> <li>Density [g/cm<sup>3</sup>], relative density, user defined (unlimited), Brix [%Brix], alcohol concentration [%vol], sulphuric acid concentration [%wt]</li> </ul>
RESOLUTION	<ul> <li>DS7700: 0.001 g/cm<sup>3</sup></li> <li>DS7800: 0.0001 g/cm<sup>3</sup></li> </ul>
MEASUREMENT TIME	<ul> <li>3 seconds<sup>(1, 2</sup>)</li> </ul>
MINIMUM SAMPLE VOLUME	■ 0.9 ml
PRESSURE RANGE (RELATIVE)	■ 0–9 bar
TEMPERATURE MEASUREMENT ACCURACY	▪ ±0.02 °C
TEMPERATURE MEASUREMENT RESOLUTION	• 0.01 °C

SPECIFICATION	Key data
METHODS & USERS	<ul> <li>Above 10,000 possible</li> </ul>
ADJUSTMENT	<ul> <li>Automatic (menu guided)</li> <li>Air pressure sensor for calibration</li> <li>Tempered calibration media</li> </ul>
SAMPLE CONTACTING PARTS	<ul> <li>Borosilicate glass, PTFE</li> </ul>
ADDITIONAL FEATURES	<ul> <li>Audit Trail</li> <li>User administration</li> <li>Measured value stabilization</li> <li>Air pressure display</li> </ul>
OPERATION	<ul> <li>7.0" capacitive touchscreen, 800 x 480 pixel</li> <li>Touchscreen, keyboard, mouse, barcode scanner</li> </ul>
INTERFACES	<ul> <li>1x USB, 1x RS-232, 1x Ethernet, LIMS</li> </ul>
DIMENSIONS (WXHXD)	<ul> <li>220 mm x 220 mm x 430 mm</li> </ul>
WEIGHT	• 5.3 kg
OPERATING VOLTAGE	<ul> <li>100–240 V, 47–63 Hz</li> </ul>
POWER CONSUMPTION (MEASURING MODE)	• 25 W
Power Consumption (Max.)	• 120 W

(1 Under normal conditions for density measurement (20 °C, 1013 hPa, 50 % relative humidity)

(2 After temperature equalisation



#### 25 DS7700-SA model and DS7800-SA model – semi-automatic sample supply

These digital density meters for semi-automatic sample feeding operate using proven oscillating U-tube technology. For low to light viscosity samples, the sample feed and cleaning occur semi-automatically by way of a peristaltic pump. This means higher efficiency and more safety if aggressive or harmful substances are to be analysed. The minimum sample volume of the oscillating U-tube is less than 1 ml. The internal Peltier temperature control ensures a fast and stable sample temperature. Whether density, specific gravity, Brix, alcohol, sulfuric acid concentration or user-configured other scales, the possibilities of configuration are almost unlimited. The instruments are used in various sectors of the pharmaceutical, chemical, petrochemical and food and beverage industries. They can determine quality or purity and measure concentration in binary mixtures.



#### **Basic features:**

- Suited for semi-automatic and manual sample supply
- Drying unit and peristaltic pump with high chemical resistance
- Direct connection with DS7060 drying unit with 3/2-way valve enabling semi-automatic cleaning and drying without changing hoses
- Intuitive operation via 7.0-inch touchscreen display, 6 languages selectable
- Easy-to-understand, menu-guided adjustment
- Scales such as density, relative density, Brix, alcohol and sulphuric acid concentration are pre-installed; further scales can be set up
- Compliance with GMP/GLP, 21 CFR Part 11, pharmacopoeias (USP, BP, JP, Ph. Eur.), FDA, ISO, HACCP, OIML, ASTM, ICUMSA, NIST

7" touchscreen technology with even more processing performance and optimized security and operating comfort.

#### 25.1 Basic technical data density meter (DS7700-SA | DS7800-SA) - semi-automatic sample feed

Technical data are the same for manual, semi-automatic and automatic systems; for details see <u>DS7700-M model and</u> <u>DS7800-M model – manual sample supply.</u>

#### 26 DS7700- A model and DS7800- A model – fully automatic sample supply

These digital density meters for fully automatic sample supply operate using proven oscillating U-tube technology. They are ideal for work environments with high sample throughput that require fully automatic handling of the entire process, from sample supply to cleaning and drying. Both the AS80 and AS90 autosamplers including the DS7070 peristaltic pump are optionally available in the set, thus enabling the automated measurement of up to 89 samples. The minimum sample volume of the oscillating U-tube is less than 1 ml. The internal Peltier temperature control ensures a fast and stable sample temperature. Whether for density, specific gravity, Brix, alcohol, sulphuric acid concentration or other user-configured scales, the configuration possibilities are almost unlimited. Thanks to the chemical-resistant load bearing parts made of borosilicate glass and PTFE, these instruments are suitable for low to slightly viscous, aggressive samples. They are used in various branches of the pharmaceutical, chemical, petrochemical, and food and beverage industries. They can be applied to determine quality or purity and to measure concentration in binary mixtures.



#### **Basic features:**

- Fully automatic sample supply, cleaning & fully automatic drying
- Suitable for automatic, semi-automatic and manual sample supply
- Individual measurement methods and cleaning procedures as well as sampler templates possible
- Intuitive operation via 7.0-inch touchscreen display, 6 languages selectable
- Easy-to-understand, menu-guided adjustment
  - Scales such as density, relative density, Brix, alcohol and sulphuric acid concentration are pre-installed; further scales can be set up
- Integrated rinsing port and optional septum version
- Compliance with GMP/GLP, 21 CFR Part 11, pharmacopoeias (USP, BP, JP, Ph. Eur.), FDA, ISO, HACCP, OIML, ASTM, ICUMSA, NIST

Included in the scope of delivery: one sample plate variant with matching set of polypropylene or glass vials.

#### 26.1 Basic technical data density meter (DS7700-A | DS7800-A) – fully automatic sample supply

Technical data are the same for manual, semi-automatic and automatic systems, for details see <u>DS7700-M</u> model and <u>DS7800-M model – manual sample supply.</u>



### 27 Calibration liquids for density meters DS7700 | DS7800 (all models)

Order number	Calibration liquids
D\$7011	<ul> <li>DAkkS-certified density standard high-purity water, 0.9982g/cm<sup>3</sup> at 20 °C, 10 m</li> </ul>
D\$7012	<ul> <li>DAkkS-certified density standard isooctane, 0.6900g/cm<sup>3</sup> at 20 °C, 10 ml</li> </ul>
D\$7013	<ul> <li>DAkkS-certified density standard n-nonane, 0.7200g/cm<sup>3</sup> at 20 °C, 10 ml</li> </ul>
D\$7014	<ul> <li>DAkkS-certified density standard dichlorotoluene, 1.2500g/cm<sup>3</sup> at 20 °C, 10 ml</li> </ul>

### 28 Accessories for density meters DS7700 | DS7800 (all models)

Order number	ltem
D\$7050	<ul> <li>Drying unit with 2/2-way valve</li> </ul>
D\$7060	<ul> <li>Drying unit with 3/2-way valve</li> </ul>
D\$7070	Peristaltic pump
D\$7071	<ul> <li>Hose set for peristaltic pump DS7070, consisting of:</li> <li>TPE pump hose (105 mm), 5 pcs; PTFE hose connection UNF, 2 pcs.</li> </ul>
D\$7071	<ul> <li>Hose set for peristaltic pump DS7070, consisting of:</li> </ul>
AS80	<ul> <li>Autosampler for 18 or 36 samples, including: sample plate 18x 50 ml (42 mm x 43 mm) or 36x 30 ml (28 mm x 65 mm) set of vials made of polypropylene (50 ml) or glass (30 ml); other vials on request; PTFE connection tubing</li> </ul>
AS80-T36	<ul> <li>Sample plate 36x 30 ml (28 mm x 65 mm)</li> </ul>
AS80-V36	<ul> <li>Sample vials for AS80-T36 (30 ml)</li> </ul>
DS70XX-M	<ul> <li>Tygon/PTFE tubing set for manual sample filling</li> </ul>
DS70XX-SA	<ul> <li>PTFE tubing set for semi-automatic sample filling</li> </ul>
DS70XX-A	<ul> <li>PTFE tubing set for automatic sample filling</li> </ul>
D\$7022	<ul> <li>UNFi/Luer adapter for switching between (semi-)automatic and manual filling</li> </ul>
D\$7020	<ul> <li>PTFE splash guard</li> </ul>
СМВ910	<ul> <li>24-character standard paper printer</li> </ul>
CBM916	<ul> <li>Interface cable for printer CBM910</li> </ul>
СВМ910Р	<ul> <li>Plain paper roll for printer CBM910</li> </ul>
CBM910F	<ul> <li>Ink ribbon for printer CBM910</li> </ul>
KALL	<ul> <li>Calibration certificate for laboratory equipment</li> </ul>

### Flame Photometer- The cost-effective measurement of alkali and alkaline earth metals.



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#### 29 FP8400 - Model – Laboratory version

With the FP8000 series A.KRÜSS Optronic presents unique measuring solutions for the simultaneous measurement of Na, K, Ca and Li. Low operating costs are one of the many strengths of the FP8000 series. In addition, our devices offer high accuracy combined and fast sample measurements. The FP8400 flame photometer is the base version and distinguishes itself by its ease of operation. As an economical entry-level model, it is used for a wide range of laboratory applications: measuring food samples, IV-solutions, determining the quality of high-purity glassware and vials for pharmaceutical packaging or classification of concrete composition just to name a few.



#### **Basic Features:**

- Reliable and simultaneous measurement of up to five alkali/alkaline earth elements
- Suited for applications with moderate sample numbers per day
- Very high precision
- Maximum operational safety ensured by automatic security mechanisms
- User administration providing multiple user levels and individual permisions
- User-friendly and intuitive operation via integrated touchscreen
- Mutiple data interfaces and convenient data transfer
- Compliant with international standards such as GMP / GLP and 21 CFR Part 11

Economical base model with available modular retrofit kits.

#### 29.1 Basic technical data FP8400 - Model

Specification	Key data
CALIBRATION	<ul> <li>Linear with 2 standards</li> <li>Non linear with 6-8 standards, polynomial curve fit</li> </ul>
DRIFT	• 1% in 60min
REFERENCE LINE (OPTIONAL)	<ul> <li>Lithium-reference line (5 mmol/l)</li> <li>Caesium guideline upon request</li> </ul>
SAMPLE VOLUME	• 2.5 ml

Specification	Key data	
COMBUSTION GAS	<ul> <li>Propane: Recommended for alkali metals</li> <li>Butane: Possible propane replacement</li> </ul>	
	<ul> <li>Acetylene for flame photometry: Recommended for alkaline earth elements</li> </ul>	
DISPLAY	<ul> <li>TFT-Display with integrated 8.4" TFT touchscreen, 800x600 Pixel</li> </ul>	
INTERFACES	• 2 x USB, 1 x Ethernet, 1 x RS-232 for printer	
FEASIBILITY OF RETROFITTING	<ul> <li>Retrofit kits to other models available</li> </ul>	

#### 29.2 Measurement specification FP8400 - Model

	Na	К	Li	Ca
MEASURING RANGE	<ul> <li>0.01-4500 ppm</li> <li>0.0004-200 mmol/l</li> </ul>	<ul> <li>0.01-4500 ppm</li> <li>0.0003-110 mmol/l</li> </ul>	<ul> <li>0.01-4500 ppm</li> <li>0.0014-600mmol/l</li> </ul>	<ul> <li>0.50-4500 ppm</li> <li>0.0125-110 mmol/l</li> </ul>
DETECTION LIMIT	<ul> <li>0.01 ppm</li> <li>0.0004 mmol/l</li> </ul>	<ul> <li>0.01 ppm</li> <li>0.0003 mmol/l</li> </ul>	<ul> <li>0.01 ppm</li> <li>0.0014 mmol/l</li> </ul>	<ul> <li>0.03 ppm</li> <li>0.0075 mmol/l</li> </ul>
PRECISION	<ul> <li>0.2 % at 40 ppm</li> <li>0.2 % at 1.74 mmol/l</li> </ul>	<ul> <li>0.2 % at 40 ppm</li> <li>0.2 % at 1.03 mmol/l</li> </ul>	<ul> <li>0.2 % at 40 ppm</li> <li>0.2 % at 5.71 mmol/l</li> </ul>	<ul> <li>0.2 % at 40 ppm</li> <li>0.2 % at 1.00 mmol/l</li> </ul>
ACCURACY	<ul> <li>1 % at 40 ppm</li> <li>1 % at 1.74 mmol/l</li> </ul>	<ul> <li>1 % at 40 ppm</li> <li>1 % at 1.03 mmol/l</li> </ul>	<ul> <li>1 % at 40 ppm</li> <li>1 % at 5.71 mmol/l</li> </ul>	<ul> <li>1 % at 40 ppm</li> <li>1 % at 1.00 mmol/l</li> </ul>



#### 30 FP8500 - Model - Process version

With the FP8000 series A.KRÜSS Optronic presents unique measuring solutions for the simultaneous measurement of Na, K, Ca and Li. Low operating costs are one of the many strengths of the FP8000 series. In addition, our devices offer high accuracy combined and fast sample measurements. The FP8500 flame photometer combines the features of the FP8400 with an automated calibration enabling 24/7 fully automated measurements of continuous liquid streams. Customizable measurement times from one second up to several minutes can be set and for data transmission a variety of interfaces are available. Various laboratory applications are possible with this device, such as process monitoring, bypass measurements or automated continuous measurement.



#### **Basic Features:**

- Reliable and simultaneous measurement of up to five alkali/alkaline earth elements
- Optional remote control of several devices via central process unit
- Optimized for 24-hour operation with continous high precision
- Maximum operational safety ensured by automatic security mechanisms
- User administration providing multiple user levels and individual permisions
- User-friendly and intuitive operation via integrated touchscreen
- Mutiple data interfaces and convenient data transfer
- Compliant with international standards such as GMP / GLP and 21 CFR Part 11

Equipment: Base unit + external valve box with control unit (Online Measurement)

#### 30.1 Basic technical data FP8500 - Model

Specification	Key data		Specification	Key data	
CALIBRATION	<ul> <li>Linear with 2 standards</li> <li>Non linear with 6-8 standards, polynomial curve fit</li> </ul>		COMBUSTION GAS	<ul> <li>Propane: Recommended for alkali metals</li> <li>Butane: Possible propane replacement</li> <li>Acetylene for flame photometry: Recommended for alkaline earth elements</li> </ul>	
DRIFT	• 1% in 60min		DISPLAY	<ul> <li>TFT-Display with integrated 8.4" TFT touchscreen, 800x600 Pixel</li> </ul>	
REFERENCE LINE (OPTIONAL)	<ul> <li>Lithium-reference line (5 mmol/l)</li> <li>Caesium guideline upon request</li> </ul>			INTERFACES	<ul> <li>2 x USB 1 x Ethernet</li> <li>1 x RS-232 for matrix printer</li> <li>Upgrade 4-20 mA analogue, passive current interface</li> </ul>
SAMPLE VOLUME	• 2.5 ml		FEASIBILITY OF RETROFITTING	<ul> <li>Retrofit kits to other models available</li> </ul>	

#### 30.2 Measurement specification FP8500 - Model

	Na	К	Li	Ca
MEASURING RANGE	<ul> <li>0.01-4500 ppm</li> <li>0.0004-200 mmol/l</li> </ul>	<ul> <li>0.01-4500 ppm</li> <li>0.0003-110 mmol/l</li> </ul>	<ul> <li>0.01-4500 ppm</li> <li>0.0014-600 mmol/l</li> </ul>	<ul> <li>0.50-4500 ppm</li> <li>0.0125 - 110 mmol/l</li> </ul>
DETECTION LIMIT	<ul> <li>0.01 ppm</li> <li>0.0004 mmol/l</li> </ul>	<ul> <li>0.01 ppm</li> <li>0.0003 mmol/l</li> </ul>	<ul> <li>0.01 ppm</li> <li>0.0014 mmol/l</li> </ul>	<ul> <li>0.03 ppm</li> <li>0.0075 mmol/l</li> </ul>
PRECISION	<ul> <li>0.2 % at 40 ppm</li> <li>0.2 % at 1.74 mmol/l</li> </ul>	<ul> <li>0.2 % at 40 ppm</li> <li>0.2 % at 1.03 mmol/l</li> </ul>	<ul> <li>0.2 % at 40 ppm</li> <li>0.2 % at 5.71 mmol/l</li> </ul>	<ul> <li>0.2 % at 40 ppm</li> <li>0.2 % at 1.00 mmol/l</li> </ul>
ACCURACY	<ul> <li>1 % at 40 ppm</li> <li>1 % at 1.74 mmol/l</li> </ul>	<ul> <li>1 % at 40 ppm</li> <li>1 % at 1.03 mmol/l</li> </ul>	<ul> <li>1 % at 40 ppm</li> <li>1 % at 5.71 mmol/l</li> </ul>	<ul> <li>1 % at 40 ppm</li> <li>1 % at 1.00 mmol/l</li> </ul>



#### 31 FP8600 - Model – Laboratory version with added autosampler

With the FP8000 series A.KRÜSS Optronic presents unique measuring solutions for the simultaneous measurement of Na, K, Ca and Li. Low operating costs are one of the many strengths of the FP8000 series. In addition, our devices offer high accuracy combined and fast sample measurements. The FP8600 flame photometer is the laboratory version (FP8400) upgraded with an added autosampler (72 sample). The FP8600 measures up to 72 samples as well as perform the required calibrations autonomously calibration. With 300 measurements per hour this model is the premium choice for all applications where high sample throughput is crucial.



#### **Basic Features:**

- Reliable and simultaneous measurement of up to five alkali/ alkaline earth elements
- Automated calibration and sample measurement with high precision
- Minimal supervision by user required after sample preparation
- Maximum operational safety ensured by automatic security mechanisms
- User administration providing multiple user levels and individual permisions
- User-friendly and intuitive operation via integrated touchscreen
- Mutiple data interfaces and convenient data transfer
- Compliant with international standards such as GMP / GLP and 21 CFR Part 11

31.1 Basic technical data FP8600 - Model

Base unit + autosampler with control unit

Specification	Key data		Specification	Key data
CALIBRATION	<ul> <li>Linear with 2 standards</li> <li>Non linear with 6-8 standards, polynomial curve fit</li> </ul>		COMBUSTION GAS	<ul> <li>Propane: Recommended for alkali metals</li> <li>Butane: Possible propane replacement</li> <li>Acetylene for flame photometry: Recommended for alkaline earth elements</li> </ul>
DRIFT	• 1% in 60min	with 35 mg/l or 5 le on request	DISPLAY	<ul> <li>TFT-Display mit integriertem 8.4" TFT- Touchscreen, 800 x 600 Pixel</li> </ul>
REFERENCE LINE (OPTIONAL)	<ul> <li>Lithium guideline with 35 mg/l or 5 mmol/l</li> <li>Caesium guideline on request</li> </ul>		INTERFACES	<ul> <li>2 x USB, 1 x Ethernet, 1 x RS-232 for matrix printer</li> </ul>
SAMPLE VOLUME	■ 2.5 ml		FEASIBILITY OF RETROFITTING	<ul> <li>Retrofit kits to other models available</li> </ul>

#### 31.2 Measurement specification FP8600 - Model

	Na	К	Li	Ca
MEASURING RANGE	<ul> <li>0.01-4500 ppm</li> <li>0.0004-200 mmol/l</li> </ul>	<ul> <li>0.01-4500 ppm</li> <li>0.0003-110 mmol/l</li> </ul>	<ul> <li>0.01-4500 ppm</li> <li>0.0014-600mmol/l</li> </ul>	<ul> <li>0.50-4500 ppm</li> <li>0.0125-110 mmol/l</li> </ul>
DETECTION LIMIT	<ul> <li>0.01 ppm</li> <li>0.0004 mmol/l</li> </ul>	<ul> <li>0.01 ppm</li> <li>0.0003 mmol/l</li> </ul>	<ul> <li>0.01 ppm</li> <li>0.0014 mmol/l</li> </ul>	<ul> <li>0.03 ppm</li> <li>0.0075 mmol/l</li> </ul>
PRECISION	<ul> <li>0.4 % at 40 ppm</li> <li>0.4 % at 1.74 mmol/l</li> </ul>	<ul> <li>0.4 % at 40 ppm</li> <li>0.4 % at 1.03 mmol/l</li> </ul>	<ul> <li>0.4 % at 40 ppm</li> <li>0.4 % at 5.71 mmol/l</li> </ul>	<ul> <li>0.4 % at 40 ppm</li> <li>0.4 % at 1.00 mmol/l</li> </ul>
ACCURACY	<ul> <li>1 % at 40 ppm</li> <li>1 % at 1.74 mmol/l</li> </ul>	<ul> <li>1 % at 40 ppm</li> <li>1 % at 1.03 mmol/l</li> </ul>	<ul> <li>1 % at 40 ppm</li> <li>1 % at 5.71 mmol/l</li> </ul>	<ul> <li>1 % at 40 ppm</li> <li>1 % at 1.00 mmol/l</li> </ul>



#### 32 FP8700 - Model – Laboratory version with added autosampler, diluter and mixer

With the FP8000 series A.KRÜSS Optronic presents unique measuring solutions for the simultaneous measurement of Na, K, Ca and Li. Low operating costs are one of the many strengths of the FP8000 series. The FP8600 flame photometer is the laboratory version (FP8400) upgraded with an added autosampler, diluter and mixer. This model is the premium choice for all application where prior sample dilution is required. Multiple automated safety mechanisms ensure high operational safety. The FP8700 with its automated dilution feature and an autosampler is especially suited for laboratories faced with intensive sample preparation and high sample throughput. Up to five measuring channels can be customised individually to optimize for various element combinations and concentration ranges. The FP8700 achieves 60 measurements per hour with highest precision.



#### **Basic Features:**

- Reliable and simultaneous measurement of up to five alkali/alkaline earth elements
- Automated calibration, dilution and sample measurement with high precision
- Suitable for small sample volumes (microliter range) and high concentrations Fully automated measurements with high precision
- Maximum operational safety ensured by automatic security mechanisms
- User administration providing multiple user levels and individual permisions
- User-friendly and intuitive operation via integrated touchscreen
- Mutiple data interfaces and convenient data transfer
- Compliant with international standards such as GMP / GLP and 21 CFR Part 11

Automated process for high sample volume operation

#### 32.1 Basic technical data FP8700 - Model

Specification	Key data		
CALIBRATION	<ul> <li>Linear with 2 standards</li> <li>Non-linear with 6-8 standards, polynomial curve fit</li> </ul>		
DRIFT	• 1% in 60 min		
REFERENCE LINE (OPTIONAL)	<ul> <li>Lithium guideline with 5 mmol/l</li> <li>Caesium guideline upon request</li> </ul>		
SAMPLE VOLUME	<ul> <li>Microliter range - depending on dilution ration and sample tube</li> </ul>		

Specification	Key data
COMBUSTION GAS	<ul> <li>Propane: Recommended for alkali metals</li> <li>Butane: Possible propane replacement</li> <li>Acetylene for flame photometry: Recommended for alkaline earth elements</li> </ul>
DISPLAY	<ul> <li>TFT-Display with integrated 8.4" TFT Touchscreen, 800x600 Pixel</li> </ul>
INTERFACES	<ul> <li>2 x USB, 1 x Ethernet, 1 x RS-232 for matrix printer</li> </ul>
FEASIBILITY OF RETROFITTING	<ul> <li>Retrofit kits to other models available</li> </ul>

#### 32.2 Measurement specifications FP8700 - Model

	Na	К	Li	Ca
MEASURING RANGE	<ul> <li>0.1-45000 ppm</li> <li>0.004-2000 mmol/l</li> </ul>	<ul> <li>0.1-45000 ppm</li> <li>0.003-1100 mmol/l</li> </ul>	<ul> <li>0.1-45000 ppm</li> <li>0.014-6000 mmol/l</li> </ul>	<ul> <li>5.0-45000 ppm</li> <li>0.125-110 mmol/l</li> </ul>
DETECTION LIMIT	<ul> <li>0.1 ppm</li> <li>0.0004 mmol/l</li> </ul>	<ul> <li>0.1 ppm</li> <li>0.0003 mmol/l</li> </ul>	<ul> <li>0.1 ppm</li> <li>0.0014 mmol/l</li> </ul>	<ul> <li>0.3 ppm</li> <li>0.0075 mmol/l</li> </ul>
PRECISION	<ul> <li>0.6 % at 40 ppm</li> <li>0.6 % at 1.74 mmol/l</li> </ul>	<ul> <li>0.6 % at 40 ppm</li> <li>0.6 % at 1.03 mmol/l</li> </ul>	<ul> <li>0.6 % at 40 ppm</li> <li>0.6 % at 5.71 mmol/l</li> </ul>	<ul> <li>0.6 % at 40 ppm</li> <li>0.6 % at 1.00 mmol/l</li> </ul>
ACCURACY	<ul> <li>1 % at 40 ppm</li> <li>1 % at 1.74 mmol/l</li> </ul>	<ul> <li>1 % at 40 ppm</li> <li>1 % at 1.03 mmol/l</li> </ul>	<ul> <li>1 % at 40 ppm</li> <li>1 % at 5.71 mmol/l</li> </ul>	<ul> <li>1 % at 40 ppm</li> <li>1 % at 1.00 mmol/l</li> </ul>



### 33 Technical Data in Comparison: All Models ppm und mmol/l



#### 33.1 Flame photometer all models technical data comparison in ppm

		FP8400	FP8500	FP8600	FP8700		
TECHNICAL DATA IN PP	TECHNICAL DATA IN PPM						
	Na	0.01-4500 ppm	0.01-4500 ppm	0.01-4500 ppm	0.1-45000 ppm		
	К	0.01-4500 ppm	0.01-4500 ppm	0.01-4500 ppm	0.1-45000 ppm		
MEASURING RAINGE	Li	0.01-4500 ppm	0.01-4500 ppm	0.01-4500 ppm	0.1-45000 ppm		
	Ca	0.50-4500 ppm	0.50-4500 ppm	0.50-4500 ppm	5.0-45000 ppm		
	Na	0.01 ppm	0.01 ppm	0.01 ppm	0.1 ppm		
	К	0.01 ppm	0.01 ppm	0.01 ppm	0.1 ppm		
	Li	0.01 ppm	0.01 ppm	0.01 ppm	0.1 ppm		
	Ca	0.03 ppm	0.03 ppm	0.03 ppm	0.3 ppm		
	Na	0.2 % at 40 ppm	0.2 % at 40 ppm	0.4 % at 40 ppm	0.6 % at 40 ppm		
PRECISION	К	0.2 % at 40 ppm	0.2 % at 40 ppm	0.4 % at 40 ppm	0.6 % at 40 ppm		
recijion	Li	0.2 % at 40 ppm	0.2 % at 40 ppm	0.4 % at 40 ppm	0.6 % at 40 ppm		
	Ca	0.2 % at 40 ppm	0.2 % at 40 ppm	0.4 % at 40 ppm	0.6 % at 40 ppm		
ACCURACY	Na	1 % at 40 ppm					
	К	1 % at 40 ppm					
	Li	1 % at 40 ppm					
	Ca	1 % at 40 ppm					

#### 33.2 Flame photometer all models technical data comparison in mmol/l

		FP8400	FP8500	FP8600	FP8700	
TECHNISCHE DATA IN PPM						
	Na	0.0004-200 mmol/l	0.0004-200 mmol/l	0.0004-200 mmol/l	0.004-2000 mmol/l	
	К	0.0003-110 mmol/l	0.0003-110 mmol/l	0.0003-110 mmol/l	0.003-1100 mmol/l	
MEASURING RAINGE	Li	0.0014-600 mmol/l	0.0014-600 mmol/l	0.0014-600 mmol/l	0.014-6000 mmol/l	
	Ca	0.0125-110 mmol/l	0.0125-110 mmol/l	0.0125-110 mmol/l	0.125-110 mmol/l	
	Na	0.0004 mmol/l	0.0004 mmol/l	0.0004 mmol/l	0.0004 mmol/l	
	К	0.0003 mmol/l	0.0003 mmol/l	0.0003 mmol/l	0.0003 mmol/l	
	Li	0.0014 mmol/l	0.0014 mmol/l	0.0014 mmol/l	0.0014 mmol/l	
	Ca	0.0075 mmol/l	0.0075 mmol/l	0.0075 mmol/l	0.0075 mmol/l	
	Na	0.2 % at 1.74 mmol/l	0.2 % at 1.74 mmol/l	0.4 % at 1.74 mmol/l	0.6 % at 1.74 mmol/l	
PRECISION	К	0.2 % at 1.03 mmol/l	0.2 % at 1.03 mmol/l	0.4 % at 1.03 mmol/l	0.6 % at 1.03 mmol/l	
recijion	Li	0.2 % at 5.71 mmol/l	0.2 % at 5.71 mmol/l	0.4 % at 5.71 mmol/l	0.6 % at 5.71 mmol/l	
	Ca	0.2 % at 1.00 mmol/l	0.2 % at 1.00 mmol/l	0.4 % at 1.00 mmol/l	0.6 % at 1.00 mmol/l	
	Na	1 % at 1.74 mmol/l				
	К	1 % at 1.03 mmol/l				
	Li	1 % at 5.71 mmol/l				
	Ca	1 % at 1.00 mmol/l				



#### 34 FP800-Series Standards, Accessories and consumables

#### 34.1 Certified standards, controls and reference line

Large number of standards, used for testing the flame photometers, for checking the methods and results or the use of lithium as a reference line. Lasts usually over 1 year.



Order number	Description	Content/Function	Quantity
FP8050-001	<ul> <li>A.KRÜSS-Standard 1 (certificated)</li> </ul>	<ul> <li>Na/K/Li/Ca each 10 mg/l</li> </ul>	<ul> <li>100 ml</li> </ul>
FP8050-002	<ul> <li>A.KRÜSS-Standard 2 (certificated)</li> </ul>	<ul> <li>Na/K/Li/Ca each 20 mg/l</li> </ul>	<ul> <li>100 ml</li> </ul>
FP8050-003	<ul> <li>A.KRÜSS-Standard 3 (certificated)</li> </ul>	<ul> <li>Na/K/Li/Ca each 30 mg/l</li> </ul>	<ul> <li>100 ml</li> </ul>
FP8050-004	<ul> <li>A.KRÜSS-Standard 4 (certificated)</li> </ul>	<ul> <li>Na/K/Li/Ca each 40 mg/l</li> </ul>	<ul> <li>100 ml</li> </ul>
FP8050-005	<ul> <li>A.KRÜSS-Standard 5 (certificated)</li> </ul>	<ul> <li>Na/K/Li/Ca each 50 mg/l</li> </ul>	• 100 ml
FP8050-006	<ul> <li>Standard 140/5/1 (certificated)</li> </ul>	<ul> <li>Na 140mmol/ K 5mmol/ Li 1mmol</li> </ul>	• 100 ml
FP8050-007	<ul> <li>Standard 140/5 (certificated)</li> </ul>	<ul> <li>Na 140 mmol/ K 5 mmol</li> </ul>	• 100 ml
FP8050-008	<ul> <li>Standard 100/100 (certificated)</li> </ul>	<ul> <li>Na 100 mmol/ K 100 mmol</li> </ul>	• 100 ml

#### Reference line lithium

The Flame Photometers of the FP8000-series can be operated with or without a reference line (internal standard). The measurement procedure using a reference line is a technique which minimizes system interferences such as unsteady spray, temperature effects and flame fluctuations. In special cases this can improve measurement precision. With this technique, all samples and standards are diluted with a solution containing a constant concentration of a reference element which would not be present in the intended samples otherwise. Lithium is an established reference element for this purpose. Lithium is not present in most samples and thus cannot distort the reference line.

Order number	Description	Content/Function	Quantity
FP8050-009	<ul> <li>Reference line li (lithium)</li> </ul>	<ul> <li>7000 mg/l concentrate</li> </ul>	• 100 ml

#### 34.2 Cleaning Solutions

The dilution concentrate improves the flow of all samples in the instrument and prevents the formation of fungi and algae. Neutral cleaner for the regular flushing of the system and the general cleaning. Alkaline cleaner for eliminating persistent contaminations except poteins. Deproteinsing cleaner is used to specifically remove proteins.

Order number	Description	Content/Function	Quantity
FP8051-001	<ul> <li>Diluent Concentrate</li> </ul>	<ul> <li>Stabilising agent and surfactant</li> </ul>	■ 500 ml
FP8051-002	<ul> <li>Rinse Solution</li> </ul>	<ul> <li>Electrolyte-free neutral cleaner</li> </ul>	• 500 ml
FP8051-003	<ul> <li>Cleaning Solution</li> </ul>	<ul> <li>Alkaline cleaner (pH ~12)</li> </ul>	• 6 x 100 ml
FP8051-004	<ul> <li>Deproteinising Solution</li> </ul>	<ul> <li>Buffer solution for protein removal</li> </ul>	<ul> <li>5 x 100 ml</li> </ul>



### 34.3 Accessories all flame photometers models

Order number	Item		
FP8010	<ul> <li>PVC-Tube, d8mm, D12mm, 2m - Replacement tube – for cutting custom lengths</li> </ul>		
FP8011	<ul> <li>PVC-Tube, d7 mm D11 mm 2 m - Replacement tube – for cutting custom lengths</li> </ul>		
FP8012	PVC Tube, d5mm, D8mm, 2m - Replacement tube – for cutting custom lengths		
FP8013	<ul> <li>Silicon-Tube, d2mm, D5mm, 2m - Replacement tube – for cutting custom lengths</li> </ul>		
FP8014	<ul> <li>Silicon -Tube, d0,8mm, D1,6mm, 2m - Replacement tube – for cutting custom lengths</li> </ul>		
FP8015	<ul> <li>Silicon -Tube, d2mm, D4mm, 2m -</li> <li>Replacement tube – for cutting custom lengths</li> </ul>		
FP8016	<ul> <li>Silicon -Tube, d1mm, D3mm, 2m - Replacement tube – for cutting custom lengths</li> </ul>		
FP8017	<ul> <li>PVC-Tube d10mm, D13mm, 2m - Replacement tube – for cutting custom lengths</li> </ul>		
FP8018	<ul> <li>Drip canula - For drop shaping prior to drop counting</li> </ul>		
FP8019	<ul> <li>Drain canula with plug - For water level stabilization in the liquid drainage system</li> </ul>		
FP8020	<ul> <li>Nebulizer - Nebulizes the aspirated sample</li> </ul>		
FP8021	Nebulizer - gaskets, 3 different types - For replacement of the one inner and two outer gaskets		
FP8022	<ul> <li>Nebulizer - cleaning wires - For removal of internal blockages inside the nebulizer</li> </ul>		
FP8023	<ul> <li>Aspiration canula for manual measurements For manual sample aspiration – blunt needle tip</li> </ul>		
FP8024	• Aspiration canula for autosampler - For sample aspiration via autosampler – sharp needle tip		
FP8025	<ul> <li>Nebulizer Chamber - Selects suited aerosol size for burner</li> </ul>		
FP8027	Gasket burner pot		
FP8028	Gasket burner insert		
FP8047	Seals for glass cylinder outside		
FP8038	Burner pot - Suitable for propane and acetylene		
FP8049	Burner strainer ring - Fixing for wire sieves inner glass cylinder		
FP8029	Burner insert (burner nozzle) - Suited for propane and acetylene		
FP8030	Socket wrench for burner inset - Only required for devices with serial numbers 80880 1 XXXX		
FP8031	Outer Glass cylinder, including already inserted gasket - Material: High-quality laboratory glass     DURAN glass / borosilicate glass		
FP8032	<ul> <li>Inner Glass cylinder, includes ignition mechanism - Material: High-quality laboratory glass DURAN glass / borosilicate glass</li> </ul>		
FP8033	Sieves - Prevents too high flame tips		
FP8034	Container for standby solution (2L) - Including tubing attachments for FP8500, FP8600, FP8700		
FP8036	Test tube plastic (10 mL) - Suited for standard Autosampler tray		
FP8037	<ul> <li>Autosampler tray - Accommodates up to 72 samples</li> </ul>		
FP8037-13	<ul> <li>Autosampler tray d=13mm (for test tubes up to 13 mm Ø) - For smaller tube diameters and lower sample volumes</li> </ul>		
FP8039	Additional fifth detector (please order filter separately)		
FP8040	Filter Na - Wavelength filter for Sodium emission		
FP8041	Filter K - Wavelength filter for Potassium emission		
FP8042	Filter Li - Wavelength filter for Lithium emission		
FP8043	Filter Ca - Wavelength filter for Calcium emission		
FP8044	Filter Cs -Wavelength filter for Caesium emission		
FP8080	Tube set FP8400 - For devices with serial numbers 80880 1 XXXX		
FP8080-2	<ul> <li>Tube set FP8400 - For devices with serial numbers 80880 2 XXXX</li> </ul>		
CBM910	Dot matrix printer for FP8000 series (24 characters per line)		
CBM910F	Ink ribbon for dot matrix printer CBM910		
CBM910P	Paper roll for dot matrix printer CBM910		
CBM916	Cable for dot matrix printer CBM910 For connection to the flame photometer base unit		



#### 34.4 Accessories specific for FP8500- model

Order number	ltem
FP8081	<ul> <li>Tube set FP8500 - Precut tubing</li> </ul>

#### 34.5 Accessories specific for FP8600- model

Order number	ltem	
FP8082	<ul> <li>Tube set FP8600 - Precut tubing</li> </ul>	
FP8024	• Aspiration canula for autosampler - For sample aspiration via autosampler – sharp needle tip	
FP8036	<ul> <li>Test tube plastic (10 mL) - Suited for standard Autosampler tray</li> </ul>	
FP8035	FP8035 Cleaning tube for autosampler (50 mL) - For automated cleaning of the autosampler aspiration nee	

#### 34.6 Accessories specific for FP8700- model

Order number	Item	
FP8083	Tube set FP8700 - Precut tubing	
FP8024	• Aspiration canula for autosampler - For sample aspiration via autosampler – sharp needle tip	
FP8036	<ul> <li>Test tube plastic (10 mL) - Suited for standard Autosampler tray</li> </ul>	
FP8035	Cleaning tube for autosampler (50 mL) - For automated cleaning of the autosampler aspiration needle	
FP8048	• Syringe for diluter 2,5 mL - Glass syringe for FP8700-Diluter	

### Automatic melting point determination - exact, fast and reliable



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#### 35 M3000 model for semi-automatic measurements

With the M3000, powdered substances showing a melting point of up to 360 °C can be analysed swiftly and easily. Due to the triple capillary support, it is possible to analyse up to three samples in a single measurement cycle. Thanks to the high pre-heating rate and built-in fan cooling, fast measurement is possible in any temperature range. Even unknown substances can be conveniently analysed thanks to various adjustable heating rates. Any important measurement data can be immediately and clearly read on the display.



#### **Basic features:**

- Semi-automatic measurement
- 10x observation optics
- 3 capillary intakes
- Display in German or English
- Digital visualization of all important data
- Monitoring of the illuminated sample via lens
- Fast cooling through integrated fan
- Data can be exported via RS-232 interface to CBM910 printer
- Easy-to-clean membrane keypad
- Includes protective cover and 100 capillaries

Analysis of three samples within one measuring run

#### 35.1 Basic technical data M3000

Specification	Key data
MEASUREMENT RANGE	■ 30–360 °C
MEASUREMENT ACCURACY	<ul> <li>±0.3 °C (30–200 °C)</li> <li>±0.5 °C (200–360 °C)</li> </ul>
RESOLUTION	■ 0,1 °C
PREHEATING RATE	<ul> <li>up 200 °C ca. 4.0 min</li> <li>up 300 °C ca. 8.0 min</li> </ul>
HEATING RATE	<ul> <li>1 °C min<sup>-1</sup> / 2 °C min<sup>-1</sup> / 3 °C min<sup>-1</sup> / 4 °C min<sup>-1</sup> / 5 °C min<sup>-1</sup></li> </ul>
NO OF CAPILLARIES	• 10x
MEASUREMENT RANGE	• LCD

Specification	Key data
NO OF CAPILLARIES	• 3
CAPILLARY Ø	• 1.4 mm
INTERFACE	<ul> <li>RS-232</li> </ul>
IP CODE	• IP20
POWER SUPPLY	■ 90–264 V
DIMENSIONS (W X H X D)	<ul> <li>210 mm x 360 mm x 230 mm</li> </ul>
WEIGHT	• 4.3 kg



#### 36 M5000 model for fully automatic measurement by transmission measurement

With the M5000, powdered substances showing a melting point of up to 400 °C can be analysed swiftly, easily and fully automatically. The automatic determination of the melting point ensures an objective measurement result at all times. Thanks to the high preheating rate and builtin fan cooling, the fully automatic measurement is fast and reliable in any temperature range. Even unknown substances can be conveniently analysed thanks to various adjustable heating rates. Important measurement data can be clearly read on the display.

#### **Basic features:**

- Fully automatic measurement
- 1 capillary intake
- LCD display with screen in German and English
- Alarm signal when reaching the melting point
- Digital visualization of all important data
- Fast cooling through integrated fan
- Data can be exported via RS-232 interface to CBM910 printer
- Easy to clean membrane keypad
- Including dust cover and 100 capillaries
- Low sample volume required

Fully automatic examination of powders with a melting point of up to 400 °C

#### 36.1 Basic technical data M5000

Specification	Key data
MEASUREMENT RANGE	■ 25–400 °C
MEASUREMENT ACCURACY	±0.3 °C (25–200 °C)     ±0.5 °C (200–400 °C)
RESOLUTION	• 0.1 °C
PREHEATING RATE	<ul> <li>up 200 °C ca. 4.0 min</li> <li>up 300 °C ca. 9.0 min</li> </ul>
HEATING RATE	<ul> <li>1 °C min<sup>-1</sup> / 2 °C min<sup>-1</sup> / 3 °C min<sup>-1</sup></li> <li>/ 4 °C min<sup>-1</sup> / 5 °C min<sup>-1</sup></li> </ul>
DISPLAY	• LCD
NO OF CAPILLARIES	• 1

Specification	Key data
NO OF CAPILLARIES	• 1.4 mm
CAPILLARY Ø	• RS-232
INTERFACE	<ul> <li>IP20</li> </ul>
IP CODE	■ 90–264 V
POWER SUPPLY	<ul> <li>220 mm x 150 mm x 340 mm</li> </ul>
DIMENSIONS (W X H X D)	• 4.1 kg

#### 37 Certified and traceable calibration standards

We store ready-made standards and reference materials enabling you to meet the requirements for verifiability and traceability of results. Using these standards provides reliable analysis results and reduces the effort required in obtaining your laboratory validation.

Order number	Calibration standard	
KSPS1011	<ul> <li>Vanillin melting point standard (USP Reference Standard) - 81 – 83 °C</li> </ul>	
KSPS1012	Phenacetin melting point standard (USP Reference Standard) - 133 – 136 °C	
KSPS1013	<ul> <li>Sulfanilamide melting point standard (USP Reference Standard) - 164 – 166 °C</li> </ul>	
KSPS1014	■ Caffeine melting point standard (USP Reference Standard) - 234 – 236.5 °C	
KSPS1015	<ul> <li>Vanillin melting point standard (Pharmaceutical Secondary Standard) - 81 – 83 °C</li> </ul>	
KSPS1016	<ul> <li>Phenacetin melting point standard (Pharmaceutical Secondary Standard) - 133 – 136 °C</li> </ul>	
KSPS1017	<ul> <li>Sulfanilamide melting point standard (Pharmaceutical Secondary Standard) - 164 – 166 °C</li> </ul>	
KSPS1018	<ul> <li>Caffeine melting point standard (Pharmaceutical Secondary Standard) - 234 – 236.5 °C</li> </ul>	

#### 38 Accessories for melting-point meters M3000 | M5000

Order number	ltem	
KSPS1010	<ul> <li>Capillary tube</li> </ul>	
CMB910	24 character plain paper printer	
CBM916	Interface cable for printer CBM910	
CBM910P	Standard paper roll for printer CBM910	
CBM910F	<ul> <li>Ribbon for printer CBM910</li> </ul>	
KALL	<ul> <li>Calibration certificate for laboratory equipment</li> </ul>	

### Highly efficient control of the protective atmosphere in packaging



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#### 39 MAT1100 model – basic entry-level model for sample checks

The MAT1100 is a typical basic model for random testing in the food industry. It is ideal for use when the oxygen concentration is of sole interest or is exclusively gassed with nitrogen. A MAT1100 is also indispensable when, during production, high demands are set as regards ease of operation, robustness and documentation capability. With the aid of an electrochemical oxygen cell (EC), the instrument measures in the range from 0.5 to 35 vol.%, this with a repeatability of  $\pm 0.2$  vol.%. Unlike our other models, the MAT1100 requires very little time to heat up and can therefore be swiftly used for occasional measurement or in case of frequent "changes of location".



**Basic features:** 

- Easily and intuitively operable via touchscreen even by untrained personnel
- Low-drift electrochemical oxygen cell (EC) measures O2 in the range of 0.5% to 35% by volume with a repeatability of  $\pm$ 0.2% by volume
- Long service life and low cross-sensitivity to acidic components (e.g. CO2) or combustible gases (e.g. alcohols, CO in coffee)
- Short measurement period
- Only a small sample volume required
- Very short warm-up time <10 s
- Various interfaces for convenient transfer of measured values (USB, Ethernet, RS-232)
- GMP-compliant analytics with high standard of user administration, instrument auto-analysis, and alarm limit as well as method setting

#### 39.1 Basic technical data MAT1100

concentration

Specification	Key data	Specific
AVERAGE MEASUREMENT PERIOD	<ul> <li>7 seconds (1, 2</li> </ul>	ADDITI
MINIMAL HEADSPACE VOLUME	<ul> <li>Starting from 7 ml<sup>(2)</sup></li> </ul>	CONT
AMBIENT TEMPERATURE	◆ 5-40 °C	INTERF
HUMIDITY MEASUREMENT GAS	90% rH (non-condensing)	DIMEN
ADJUSTMENT	<ul> <li>Automatic (menu guided)</li> </ul>	WEIGH
SCALES	Oxygen	POWE
METHODS & USERS	<ul> <li>Above 10,000 possible</li> </ul>	POWER
(1 ofter besting time (2 ofter pre pures		

Specification	Key data
Additional features	<ul> <li>Input of product and charge designations</li> <li>Alarm boundary management</li> <li>User administration</li> <li>Measured value stabilization</li> <li>Air pressure display</li> </ul>
CONTROL	<ul> <li>7.0" capacitive touchscreen, 800 x 480 pixel</li> <li>Touchscreen, keyboard, mouse, barcode scanner</li> </ul>
INTERFACES	<ul> <li>1x USB, 1x RS-232, 1x Ethernet, LIMS</li> </ul>
DIMENSIONS (W X H X D)	<ul> <li>200 mm x 150 mm x 350 mm</li> </ul>
WEIGHT	• 4.6 kg
POWER CONSUMPTION	<ul> <li>100–250 V, 50/60 Hz</li> </ul>
POWER CONSUMPTION (MAX.)	• 60 W

<sup>(1</sup> after heating time <sup>(2</sup> after pre-purge

#### 39.2 Oxygen - analysis data (O<sub>2</sub>) MAT1100

Specification	Key data
MEASURING AREA	• 0.5–35 Vol%
REPEATABILITY	• ±0.2 Vol%
RESOLUTION	• 0.1 Vol%

#### 39.3 O<sub>2</sub> sensor MAT1100

Specification	Key data
ТҮРЕ	Electrochemical cell (EC)
MEASURING PRINCIPLE	<ul> <li>Acid electrolyte</li> </ul>
SERVICE LIFE	<ul> <li>Up to 6 years (by 20 vol% O<sup>2</sup>)</li> </ul>
CROSS-SENSITIVITY	<ul> <li>Low CO<sup>2</sup> cross-sensitivity</li> </ul>
DRIFT	<ul> <li>Low drift, &lt; 3%/month</li> </ul>



#### 40 MAT1200 model - the economical solution for $O_2$ - and $CO_2$ - measurement

The MAT1200 model is the appropriate choice whenever oxygen and carbon dioxide concentrations are to be measured. In addition to an electrochemical oxygen cell, these devices feature a non-dispersive infrared sensor (NDIR) for  $CO_2$  measurement over the measuring range of 0 and 100 volume per cent and a high repeatability of  $\pm 0.5\%$  by volume. In this way the MAT1200 covers most carbon dioxide applications in modified atmosphere packaging – at a very attractive price.



#### **Basic features:**

- Easily and intuitively operable via touch-screen even by untrained personnel
- Low-drift electrochemical oxygen cell (EC) measures  $O_2$  in the measuring range of 0.5 to 35 vol.% with an accuracy of  $\pm$  0.2 vol.%
- Low-drift non-dispersive infrared sensor (NDIR) measures CO<sub>2</sub> in the measuring range from 0 to 100 vol.% with a high repeatability of  $\pm$  0.5 vol.%
- High long-term stability due to pressure and temperature compensation of the CO<sub>2</sub> measurement
- Short measurement period and only a small sample volume required
- Various interfaces for convenient transfer of measured values (USB, Ethernet, RS-232)
- GMP-compliant analytics with high standard of user administration, instrument auto-analysis and alarm limit as well as method setting

MAT1200 determines the concentrations of oxygen and carbon dioxide

#### 40.1 Basic technical data MAT1200

Specification	Key data	Specification	Key data
AVERAGE MEASUREMENT PERIOD	• 10 seconds <sup>(1</sup>	ADDITIONAL FEATURES	<ul> <li>Input of product and charge designations</li> <li>Alarm boundary management</li> <li>User administration</li> <li>Measured value stabilization</li> <li>Air pressure indication</li> <li>CO<sub>2</sub>cell pressure and temperature compensation</li> </ul>
MINIMAL HEADSPACE VOLUME	<ul> <li>Starting from 10 ml<sup>12</sup></li> </ul>	CONTROL	<ul> <li>7.0" capacitive touchscreen, 800 x 480 pixel</li> <li>Touchscreen, keyboard, mouse, barcode scanner</li> </ul>
HEAT TIME	<ul> <li>5 minutes</li> </ul>	INTERFACES	• 1x USB, 1x RS-232, 1x Ethernet, LIMS
AMBIENT TEMPERATURE	▪ 5–40 °C	DIMENSIONS (W X H X D)	<ul> <li>200 mm x 150 mm x 350 mm</li> </ul>
HUMIDITY MEASUREMENT GAS	< 90% rH (non-condensing)	WEIGHT	■ 4.6 kg
ADJUSTMENT	<ul> <li>Automatic (menu guided)</li> </ul>	POWER CONSUMPTION	• 100–250 V, 50/60 Hz
SCALES	<ul><li>Oxygen</li><li>Carbon dioxide</li><li>Nitrogen</li></ul>	POWER CONSUMPTION (MAX.)	= 60 W
METHODS & USERS	<ul> <li>Above 10,000 possible</li> </ul>		

<sup>(1</sup> after heating time

<sup>(2</sup> after pre-purge



#### 40.2 Oxygen - analysis data (O2) MAT1200

Specification	Key data
Oxygen (O <sub>2</sub> )	
MEASURING AREA	• 0.5–35 Vol%
REPEATABILITY	■ ±0.2 Vol%
RESOLUTION	• 0.1 Vol%

Specification	Key data
CARBON DIOXIDI	E (CO <sub>2</sub> )
MEASURING AREA	• 0–100 Vol%
REPEATABILITY	■ ±0.5 Vol%
RESOLUTION	• 0.1 Vol%

Specification	Key data	
NITROGEN	(N <sub>2</sub> )	
ARITHMETICAL DETERMINATION	<ul> <li>Residual gas mixture content</li> </ul>	

### 40.3 O<sub>2</sub> sensor MAT1200

Specification	Key data
ТҮРЕ	<ul> <li>Electrochemical cell (EC)</li> </ul>
MEASURING PRINCIPLE	<ul> <li>Acid electrolyte</li> </ul>
SERVICE LIFE	<ul> <li>Up to 6 years (by 20 vol% O<sup>2</sup>)</li> </ul>
CROSS-SENSITIVITY	<ul> <li>Low CO<sub>2</sub> cross-sensitivity</li> </ul>
DRIFT	<ul> <li>Low drift, &lt; 3%/month</li> </ul>

### (CO<sub>2</sub>) sensor MAT1200

Specification	Key data	
ТҮРЕ	<ul> <li>Dual channel NDIR sensor</li> </ul>	
DRIFT	Low drift < 1 %/ month	



#### 41 MAT1400 model - the specialist for fast high-precision oxygen measurement

The zirconium dioxide sensor ( $ZrO_2$ ) of the MAT1400 measures the oxygen concentration over the entire measurement range between 0 and 100 volume per cent. Especially at a very low concentration, it will achieve an excellent accuracy of  $\pm 0.001$  volume per cent. The MAT1400 is therefore suitable for the inspection both of oxygen-free, as well as oxygen-rich modified atmospheres. It can also be used in the cold storage room from ambient temperatures of 10 °C (non-condensing).



#### **Basic features:**

- Easily and intuitively operable via touch-screen even by untrained personnel
- Low-drift zirconium dioxide sensor (ZrO<sub>2</sub>) in the measuring range from 0 to 100 vol.-%
- Short measurement period
- Only a small sample volume required
- Various interfaces for convenient transfer of measured values (USB, Ethernet, RS-232)
- Any number of measurement methods for the monitoring of the measurement process according to method, batch, product and/or production line incl. limit value monitoring
- GMP compliant analytics with high standard in user management, auto-analysis of the instrument and alarm limit as well as method setting.
- Also suitable for continuous gas mixture monitoring

MAT1400 high O<sub>2</sub> concentrations and high sample volume

#### 41.1 Basic technical data MAT1400

Specification	Key data
AVERAGE MEASUREMENT PERIOD	• 5 seconds (1
MINIMAL HEADSPACE VOLUME	• 5 ml <sup>12</sup>
HEAT TIME	<ul> <li>10 minutes</li> </ul>
AMBIENT TEMPERATURE	▪ 10–50 °C
HUMIDITY MEASUREMENT GAS	< 90% rH (non-condensing)
ADJUSTMENT	<ul> <li>Automatic (menu guided)</li> </ul>
SCALES	<ul> <li>Oxygen</li> </ul>
METHODS & USERS	<ul> <li>Above 10000 possible</li> </ul>

Specification	Key data
Additional features	<ul> <li>Input of product and charge designations</li> <li>Alarm boundary management</li> <li>User administration</li> <li>Measured value stabilization</li> <li>Air pressure indication</li> </ul>
CONTROL	<ul> <li>7.0" capacitive touchscreen, 800 x 480 pixel</li> <li>Touchscreen, keyboard, mouse, barcode scanner</li> </ul>
INTERFACES	<ul> <li>1x USB, 1x RS-232, 1x Ethernet, LIMS</li> </ul>
DIMENSIONS (W X H X D)	<ul> <li>200 mm x 150 mm x 350 mm</li> </ul>
WEIGHT	• 4.6 kg
POWER CONSUMPTION	<ul> <li>100–250 V, 50/60 Hz</li> </ul>
POWER CONSUMPTION (MAX.)	• 60 W

<sup>(1</sup> after heating time <sup>(2</sup> after pre-purge

#### 41.2 Oxygen - analysis data (O<sub>2</sub>) MAT1400

Specification	Key data
MEASURING AREA	• 0-100 Vol%
SENSOR ACCURACY	• $\pm 0.02$ Vol% abs. (< 1 Vol%) • $\pm 2$ Vol. % rol (> 1 Vol%)
RESOLUTION	• 0.001 Vol%

#### 41.3 O<sub>2</sub> sensor MAT1400

Specification	Key data
ТҮРЕ	<ul> <li>Zirconia sensor (ZrO<sub>2</sub>)</li> </ul>
CROSS SENSITIVITY	Cross-sensitive to combustible gases
DRIFT	Drift-free



#### 42 MAT1500 model - premium version flexibly performs different applications

Fitted with a zirconium dioxide sensor and a nondispersive infrared sensor, the MAT1500 is our number one in terms of its range of application, performance and precision. Measurements are completed within no more than approx. ten seconds. As is the case with the MAT1400, highly precise results can be achieved with single measurements of oxygen concentrations thanks to the min/max detection, even if only a small sample volume is available.



#### **Basic features:**

- Easily and intuitively operable via touch-screen even by untrained personnel
- Low-drift zirconium dioxide sensor (ZrO2) in the measuring range from 0 to 100 vol.-%
   Low-drift non-dispersive infrared sensor (NDIR) measures CO2 in the measuring range
- From 0 to 100 vol.% with an accuracy of ± 0.5 vol.%Short measurement period
- Only a small sample volume required
- Various interfaces for convenient transfer of measured values (USB, Ethernet, RS-232)
- Any number of measurement methods for the monitoring of the measurement process according to method, batch, product and/or production line incl. limit value monitoring

MAT1500 all-rounder for the highest demands

#### 42.1 Basic technical data MAT1500

specification	Key dafa	
AVERAGE MEASUREMENT PERIOD	• 10 seconds <sup>(1</sup>	
MINIMAL HEADSPACE VOLUME	■ 5 ml <sup>(2</sup>	
HEAT TIME	<ul> <li>10 minutes</li> </ul>	
AMBIENT TEMPERATURE	▪ 10–50 °C	
HUMIDITY MEASUREMENT GAS	< 90% rH (non-condensing)	
ADJUSTMENT	<ul> <li>Automatic (menu guided)</li> </ul>	
SCALES	<ul> <li>Oxygen / Carbon dioxide/ Nitrogen</li> </ul>	
METHODS & USERS	<ul> <li>Above 10000 possible</li> </ul>	

Specification	Key data	
ADDITIONAL FEATURES	<ul> <li>Input of product and charge designations</li> <li>Alarm boundary management</li> <li>User administration</li> <li>Measured value stabilization</li> <li>Air pressure indication</li> </ul>	
CONTROL	<ul> <li>7.0" capacitive touchscreen, 800 x 480 pixel</li> <li>Touchscreen, keyboard, mouse, barcode scanner</li> </ul>	
INTERFACES	<ul> <li>1x USB, 1x RS-232, 1x Ethernet, LIMS</li> </ul>	
DIMENSIONS (W X H X D)	<ul> <li>200 mm x 150 mm x 350 mm</li> </ul>	
WEIGHT	• 4.6 kg	
POWER CONSUMPTION	<ul> <li>100–250 V, 50/60 Hz</li> </ul>	
POWER CONSUMPTION (MAX.)	• 60 W	

<sup>(1</sup> after heating time <sup>(2</sup> after pre-purge

#### 42.2 Oxygen - analysis data (O<sub>2</sub>) MAT1500

Specification	Key data			
Oxygen (O <sub>2</sub> )				
Measuring Area	• 0–100 Vol%			
SENSOR- ACCURACY	<ul> <li>±0.02 Vol% abs. (&lt; 1 Vol%)</li> <li>±3 Vol% rel. (&gt; 1 Vol%)</li> </ul>			
RESOLUTION	• 0.001 Vol%			

Specification	Key data		Specification	Key data
CARBON DIOXIDE (CO <sub>2</sub> )			NITROGEN (N <sub>2</sub> )	
Measuring Area	• 0–100 Vol%		ARITHMETICAL DETERMINATION	<ul> <li>Residual gas mixture content</li> </ul>
REPEATABILITY	■ ±0.5 Vol%			
RESOLUTION	• 0.1 Vol%			

#### CO<sub>2</sub> sensor MAT1500

)
)

Specification	Key data	
ТҮРЕ	<ul> <li>Zirconia sensor (ZrO<sub>2</sub>)</li> </ul>	
DRIFT	<ul> <li>Drift free</li> </ul>	
CROSS SENSITIVITY	<ul> <li>Cross-sensitive to combustible gases</li> </ul>	

Specification	Key data	
ТҮРЕ	<ul> <li>Dual channel NDIR sensor</li> </ul>	
DRIFT	<ul> <li>Drift arm &lt; 1 %/month</li> </ul>	



### 43 Gas analysers, accessories and consumables

Order number	ltem	
MAT1001	<ul> <li>Suction filter, 10 pieces</li> </ul>	
MAT1002	<ul> <li>Needle, stainless steel (0.8 mm x 40 mm), 12 pieces</li> </ul>	
MAT1003	<ul> <li>Needle, stainless steel (0.45 mm x 18 mm), 12 pieces</li> </ul>	
MAT1004	<ul> <li>Tygon tube, 80 cm</li> </ul>	
MAT1005	<ul> <li>Suction unit (set), consisting of: handle</li> <li>Handle adapter</li> <li>Tygon tube (80 cm)</li> <li>Suction filter, 10 pieces</li> <li>Needle made of stainless steel (0.8 mm x 40 mm), 12 pieces</li> </ul>	
MAT1010	<ul> <li>Septa, white, self-adhesive, roll of 1000 in cardboard dispenser</li> </ul>	
BC876	<ul> <li>Barcode scanner</li> </ul>	
CBM910	24-character plain paper printer	
CBM910P	<ul> <li>Plain paper roll for printer CBM910</li> </ul>	
CBM916	<ul> <li>Interface cable for printer CBM910</li> </ul>	
CBM910F	<ul> <li>Ink ribbon for printer CBM910</li> </ul>	
CAL	Calibration certificate for laboratory instruments	

#### 43.1 Test gases

Order number	ltem	
MAT1023	<ul> <li>Reference gas - 0 % oxygen (O<sub>2</sub>), 100 % nitrogen (N<sub>2</sub>), filling volume: 110 l</li> </ul>	
MAT1021	<ul> <li>Reference gas - 50 % carbon dioxide (CO<sub>2</sub>), 50 % nitrogen (N<sub>2</sub>), filling volume: 110 l</li> </ul>	
MAT1022	<ul> <li>Reference gas - 1 % oxygen (O<sub>2</sub>), 99 % nitrogen (N<sub>2</sub>), filling volume: 110 l</li> </ul>	
ON REQUEST	<ul> <li>Synthetic air and other reference gases on request</li> </ul>	
MAT1020	Miniature valve brass, 0.5 to 1.5 l/min	
MAT1030	<ul> <li>Shoulder bag for reference gases (suitable for 3 cylinders of 110 l each)</li> </ul>	

### Microscopes with high quality optics, precise mechanics - 5 years warranty



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#### 44 Monocular microscope MML1200

These practical microscopes are great for kids or newcomers. Commonly used for simple laboratory applications, excursions and examination of low-light specimens. Generally fitted with a minimum of adjusting screws, these microscopes are extremely user friendly, ensuring that very little can go wrong during use. The single tube is ideal for the eyesight of children, who often find it difficult to look into the microscope with both eyes. Monocular microscopes are small, lightweight and can be flexibly positioned anywhere. In this way they are ideal for teaching purposes and training courses. They are also frequently used to make a preliminary selection of specimens that are later to be examined in more detail with high-quality laboratory microscopes.



360° rotating optical head

**Basic features:** 

Sturdy metal tripod ensures high stability

 $45^\circ$  inclined viewing for ergonomic work

- Coarse and fine adjustment facilitates precise working
- Integrated illumination
- Power supply 230 V, 50 Hz
- A wide range of accessories is available.

Monocular microscope for lab and educational use

#### 44.1 Basic technical data MML1200

MICROSCOPE	OPTICAL EQUIPMENT	OBJECTIVE	ILLUMINATION
MML 1200 Objective revolver: 3-fold	<ul> <li>10x widefield eyepiece</li> </ul>	<ul> <li>Achromatic</li> <li>4x/NA 0.10</li> <li>10x/NA 0.25</li> <li>40x/NA 0.65</li> </ul>	<ul> <li>6 V 10 W with reflector bright field Abbe condenser NA 1.25, with iris diaphragm and filter holder</li> </ul>

#### 44.2 Accessories for microscope MML1200

Order number	Item
MML1116	<ul> <li>Widefield eyepiece 16x</li> </ul>
MML1110	<ul> <li>Widefield eyepiece 10X</li> </ul>
MML1105	<ul> <li>Widefield eyepiece 5X</li> </ul>
MML1016	<ul> <li>Plane eyepiece 16X</li> </ul>
MML1115	<ul> <li>Plane eyepiece 15X</li> </ul>
MML1017	<ul> <li>Eyepiece with pointer 10X</li> </ul>
MML1003	<ul> <li>Stage micrometer</li> </ul>
MML1002	<ul> <li>Micrometer eyepiece 15X</li> </ul>
MML1004	<ul> <li>Micrometer eyepiece 10X</li> </ul>
MML1001	<ul> <li>Polarisation feature</li> </ul>
MML1005	<ul> <li>Mirror</li> </ul>



#### 45 MBL2000 series - Transmitted light binocular microscope basic model

Robust and universally applicable, MBL2000 microscopes display the unmistakable classic design of all A.KRÜSS microscopes. The series comprises a binocular microscope (basic equipment) and microscopes with two eyepieces. It is thus possible to view the sample under examination with both eyes. The varied scope of application includes many tasks in the field of education at schools and universities, such as when biological studies are being conducted. In addition, the MBL 2000 is ideal in many areas of life science research. In particular, this includes studies on animals, plants, microorganisms and cell cultures, e.g. when investigating pathogens, cures or reactions to active substances. The MBL 2000 laboratory microscopes with phototube can be individually configured. It is possible, for example, to connect a camera to a trinocular microscope for image and film recording. With the aid of a special dark field condenser, the microscope also enables blood tests to be performed according to Enderlein.



#### **Basic features:**

- Dioptre compensation with compensation scale
- S turdy metal stand with graduated XY cross table enabling coaxial operation and height adjustment
- Coarse and fine focusing, double coaxial (0–200 μm, division 2 μm), coarse and fine focusing range: 30 mm
- Right-side coarse focusing knob with fast focus adjustment, left-sided knob with quick focus setting
- Low-voltage illumination with lighting control and removable pre-condenser
- Optional LED or halogen lighting
- Twin-lens Abbe condenser: NA 1.25, with iris diaphragm
- Swiveling filter holder
  - Glass filters: blue, yellow, green

Solid all-round microscope, universally applicable

#### 45.1 Basic technical data MBL2000

OPTICAL HEAD	OBJECTIVE REVOLVER	OBJECTIVE (MAGNIFICATION; NA, WORKING DISTANCE)	DIMENSIONS
<ul> <li>Inclined optical head</li> <li>Symmetrical eye distance adjustment (55 – 75 mm),</li> <li>Diopter compensation with scale</li> </ul>	<ul> <li>Quadruple</li> </ul>	<ul> <li>Achromatic</li> <li>4x 0.10 NA 17.04 mm</li> <li>10x 0.25 NA 8.05 mm</li> <li>40x 0.65 NA 0.32 mm</li> <li>100x 1.25 NA 0.13 mm</li> </ul>	<ul> <li>Length: 23 cm</li> <li>Width: 19 cm</li> <li>Height: 40 cm</li> </ul>
EYEPIECES	CONDENSOR	ILLUMINATION	MICROSCOPE STAGE
• 10x	<ul> <li>Double-lens ABBE condenser, NA 1.25, with iris diaphragm, with centering, height adjustment and swing-in filter holder</li> </ul>	<ul> <li>Optional LED or halogen lamp (6 V 20 W)</li> <li>Cold light source for blood examination with brightness control</li> </ul>	<ul> <li>With 0.1 mm increment memory scale, left-right range of movement 74 mm, forwards - backwards 30 mm.</li> </ul>
STAND	OPERATING VOLTAGE	FURTHER EQUIPMENT	
<ul> <li>Made of metal with coaxial coarse/fine knob with a range of 30 mm each.</li> <li>The right coarse adjustment knob comes with a mobility adjustment, the left coarse adjustment knob comes with a quick focusing adjustment</li> </ul>	<ul> <li>Power source: 90-240 V. 50/60 Hz</li> </ul>	<ul> <li>Glass filters in blue, yellow and gree</li> </ul>	n


# 45.2 Technical data MBL2000 models

#### Basic models

MICROSCOPE	SPECIAL FEATURE
MBL2000	
	<ul> <li>Halogen lamp</li> </ul>
MBL2000-LED	
	LED illumination

# △ MBL2000 basic models can be upgraded with a variety of components.

Upgrades are indicated by additions to the model designations, e.g. MBL2000-T-PL-PH or MBL2000-LED-T-PL-PH.

### $\blacksquare$ Opportunities for further enhancement

MBL2000-T	MBL2000-PL	MBL2000-PL-PH
MBL2000-T-PL	MBL2000-T-PL-PH	

T = Trinocular / phototube<sup>(1)</sup> tube for the connection of photo and video cameras.

- → <sup>(1</sup> Microscope cameras sold separately
- PL = Planachromatic objectives
- $PH = Phase \text{ contrast feature}^{12}$  for 10x, 40x and 100x and additional dark field condenser
- → <sup>12</sup> 20x or 40x phase contrast features are available separately. Microscopes with the -PH need no special phase contrast features

#### Special model MBL2000 FOR BLOOD EXAMINATION

MIKROSKOPE	EQUIPMENT
MBL2000-T-B	<ul> <li>Dark field condenser for blood examination</li> <li>Adjustable cold light source KL5125</li> <li>Photo tube <sup>(1</sup> for connection of photo and video cameras)</li> </ul>
MBL2000-T-B-PL	<ul> <li>Planachromatic objectives</li> <li>Dark field condenser for blood examination</li> <li>Adjustable cold light source KL5125</li> <li>Photo tube<sup>(1</sup> for attachment of photo and video cameras)</li> </ul>



#### 45.3 Accessories for microscopes MBL2000 series



Order number	Item
MML1116	<ul> <li>Widefield eyepiece 16x</li> </ul>
MML1110	<ul> <li>Widefield eyepiece 10x</li> </ul>
MML1105	<ul> <li>Widefield eyepiece 5x</li> </ul>
MML1016	<ul> <li>Planocular eyepiece 1 6x</li> </ul>
MML1115	<ul> <li>Planocular eyepiece 15x</li> </ul>
MML1017	Pointer eyepiece 10x
MML1003	Object micrometer
MML1002	<ul> <li>Micrometer eyepiece 15x</li> </ul>
MML1004	Micrometer eyepiece 10x
MML2051	Polarization device
MML2010	Achromatic objective 4x
MML2011	Achromatic objective 10x
MML2012	Achromatic objective 20x
MML2014	Achromatic objective 40x
MML2013	Achromatic objective 60x
MML2017	Achromatic objective 63x
MML2015	Achromatic objective 100x
MML2020	Planachromatic objective 4x
MML2021	Planachromatic objective 10x
MML2022	Planachromatic objective 20x
MML2024	Planachromatic objective 40x
MML2027	Planachromatic objective 63x
MML2025	Planachromatic objective 100x
MML2028	Planachromatic objective 100x with iris diaphragm
MML2030	Large phase contrast feature
MML2032	20x phase contrast feature
MML2031	<ul> <li>40x phase contrast feature</li> </ul>
MML2052	Dark field condenser
MML2053	<ul> <li>Darkfield condenser for blood MBL2000-T-B and MBL2000-T-B-PL</li> </ul>



# 46 Inverted microscope MBL3200 with trinocular tube

This inverted microscope was specially designed for the identification and analysis of biological substances and cultures. It is used, for example, in control laboratories for drug production, food production and waste water analysis. Ideal, too, for examining living cells in petri dishes or culture chambers. The objectives of the MBL 3200 have a large working distance thus enabling samples to be viewed through the bottom of petri plates or the examination of sediments. Via the photo and

C-mount video adapter, it is possible to connect SLR, microscope or video cameras.



#### **Basic features:**

- Large working distance
- Observation in larger containers possible, e.g. cell culture dishes
- Living cells in cell culture dishes or other, larger containers can be analyzed
- Suitable for documentation purposes, via connection for photo and video camera

Inverted microscope for cell examination

#### 46.1 Basic technical data MBL3200 model

OPTICAL HEAD	OBJECTIVE REVOLVER	OBJECTIVE (MAGNIFICATION; NA, WORKING DISTANCE)
<ul> <li>Inclined optical head,</li> <li>Symmetrical eye distance adjustment (55 – 75 mm),</li> <li>Diopter compensation with scale.</li> <li>Photo tube</li> </ul>	• 5-fold	<ul> <li>Planachromatic</li> <li>4x/NA 0.10 // Ø: 5.5 mm</li> <li>10x/NA 0.25 // Ø: 2.2 mm</li> <li>40x/NA 0.65 // Ø: 0.55 mm</li> <li>PH20x/NA 0.45 // Ø: 1.1 mm</li> </ul>

EYEPIECES	CONDENSOR	ILLUMINATION	XY ACROSS TABLE
<ul><li>10x plane eyepiece</li><li>Visual field number: 22</li></ul>	<ul> <li>Dual lens condenser</li> </ul>	<ul> <li>6 V 30 W, adjustable</li> </ul>	<ul> <li>Range of movement: 118 x 80mm</li> </ul>
STAND	OPERATING VOLTAGE	FURTHER EQUIPMENT	
<ul> <li>Made of metal with coaxial coarse/fine drive</li> </ul>	• 90–240 ∨	<ul> <li>Iris diaphragm</li> <li>Filter holder, blue filter, green filter</li> <li>Third tube for connecting photo and</li> <li>Phase contrast device for 20x</li> </ul>	video cameras

#### 46.2 Accessories for microscope MBL3200 model

Order number	Item
MBL3220	<ul> <li>Planachromatic objective 20x/NA 0.45 objective</li> </ul>
MBL3260	<ul> <li>Planachromatic objective 60x/NA 0.85 objective</li> </ul>
MBL3240	<ul> <li>Phase contrast device for 40x</li> </ul>



# 47 MBL3300 - Metallurgical incident-light microscope

The MBL3300 is specially designed for the analysis of metallic materials and surfaces. Thanks to the integrated incident light illumination, it is suitable for quality determination and for checking metal structures. Using different filters, the microscopy image can be adjusted to individual needs. The MBL3000 is equipped with a photo tube for connection to a microscope, photo or video camera.

- **Basic features:** 
  - Incident light illumination
  - Various filter options
  - Connection possibility for microscope, photo or video camera
  - Wide range of accessories

Specialist for the examination of metallic materials

#### 47.1 Basic technical data MBL3300 model

OPTICAL HEAD	OBJECTIVE REVOLVER	OBJECTIVE (MAGNIFICATIO	ON; NA, WORKING DISTANCE)
<ul> <li>Inclined optical head,</li> <li>Symmetrical eye distance adjustment (55 – 75 mm),</li> <li>Diopter compensation with scale</li> <li>Photo tube</li> </ul>	• 3-fold	<ul> <li>Planachromatic</li> <li>5x/NA 0.10, object field Ø</li> <li>10x/NA 0.25, object field Ø</li> <li>50x/NA 0.65, object field Ø</li> </ul>	: 3.6 mm Ø: 1.8 mm Ø: 0.36 mm
EYEPIECES	CONDENSOR	ILLUMINATION	XY ACROSS TABLE
<ul><li>10x plane eyepiece</li><li>Visual field number: 18</li></ul>	<ul> <li>Double-lens ABBE condenser, NA 1.25, with centring and height adjustment</li> </ul>	<ul><li>Incident light</li><li>6V 30W adjustable</li></ul>	<ul> <li>Range of movement: 120x80 mm</li> </ul>

STAND	OPERATING VOLTAGE	FURTHER EQUIPMENT
<ul> <li>Consisting of metal with a coaxial coarse/fine drive (30 mm each).</li> <li>With smoothness adjustment and quick focus device</li> </ul>	■ 90-240 V	<ul> <li>Iris diaphragm</li> <li>Filter holder</li> <li>Blue filter</li> <li>Green filter (optional)</li> </ul>

### 47.2 Accessories for microscope MBL3300 model

Order number	ltem
MBL3320	<ul> <li>Planachromatic objective 20x/NA 0.45</li> </ul>
MBL3360	<ul> <li>Planachromatic objective 60x/NA 0.85</li> </ul>
MMB2314	<ul> <li>Polarisation device</li> </ul>
MMB2310	<ul> <li>Yellow filter</li> </ul>
MMB2311	<ul> <li>Green filter</li> </ul>
MMB2312	<ul> <li>Neutral density filter</li> </ul>



# 48 MSL4000 series

The stereo microscopes of the MSL4000 series offer optimal value for money. Thanks to the wide range of accessories and different eyepieces, they are suitable for a wide range of applications. All microscopes have a 45° inclined view, interpupillary distance adjustment and dioptric compensation. The metal housing is stable and durable. To allow you the option of working anywhere without dependence on any external power supply, the MSL microscopes have a battery providing a user-friendly 25 hours of power.



Stereo microscope for standard examinations

# 48.1 Basic technical data MSL4000 series

MICROSCOPE	OPTICAL EQUIPMENT	OBJECTIVE	ILLUMINATION
MSL4000-10/30-IL-TL	<ul> <li>10x Wide field eyepieces</li> </ul>	<ul> <li>1x and 3x Objective</li> </ul>	<ul> <li>LED incident and transmitted light</li> </ul>
MSL4000-20/40-IL-TL	<ul> <li>10x Wide field eyepieces</li> </ul>	<ul> <li>2x and 4x Objective</li> </ul>	<ul> <li>LED- Incident and transmitted light</li> </ul>

#### 48.2 Accessories for microscopes MSL4000 series

Order number	ltem
MSL4331	<ul> <li>Pair of wide field eyepieces 15x</li> </ul>
MSL4332	<ul> <li>Pair of wide field eyepieces 20x</li> </ul>
MSL4333	<ul> <li>Pair of wide field eyepieces 10x</li> </ul>
MSL4334	<ul> <li>Pair of eyepieces 5x</li> </ul>
MSZ5419	<ul> <li>Dark field</li> </ul>



# 49 MSZ5000 series

A sturdy zoom stereo microscope for the professional examination of electronic, precision mechanical, plastic and medical products. An excellent quality control instrument for inspection, assembly, analysis, and fine machining, it can also be used during soldering and polishing. The large zoom range, long working distance and broad depth of field enable work in many areas to be carried out with maximum comfort. Continuously variable magnification with 7–45x total zoom is possible. The rugged metal housing ensures that tasks are performed accurately and reliably, even in harsh environments. Accessories available: various eyepieces and auxiliary lenses to modify the magnification and working distances.



#### Basic features:

- Increased working distance
- Incident and transmitted light (depending on configuration)
  - Available with LED illumination
- Zoom feature for continuous magnification settings from 7 to 45x
- Optional auxiliary lenses available for maximum magnification adjustment
- Connection possibility for microscope , photo or video camera
- Wide range of accessories

Stereo microscope for advanced examinations

#### 49.1 Basic technical data MSZ5000 series

MICROSCOPE	OPTICAL EQUIPMENT	EQUIPMENT
MSZ5000	<ul> <li>10x wide field eyepieces</li> <li>0.7-4.5x zoom objective</li> <li>7-45x total magnification</li> </ul>	
MSZ5000-T	<ul> <li>10x wide field eyepieces</li> <li>0.7-4.5x zoom objective</li> <li>7-45x total magnification</li> </ul>	<ul> <li>Photo tube for the connection of photo and video cameras</li> </ul>
MSZ5000-RL	<ul> <li>10x wide field eyepieces</li> <li>0.7-4.5x zoom objective</li> <li>7-45x total magnification</li> </ul>	<ul> <li>Incident light (LED ring lamp)</li> </ul>
MSZ5000-T-RL	<ul> <li>10x wide field eyepieces</li> <li>0.7-4.5x zoom objective</li> <li>7-45x total magnification</li> </ul>	<ul> <li>Incident light (LED ring lamp))</li> <li>Photo tube for the connection of photo and video cameras</li> </ul>
MSZ5000-S	<ul> <li>10x wide field eyepieces</li> <li>0.7-4.5x zoom objective</li> <li>7-45x total magnification</li> </ul>	<ul> <li>Large swiveling stand</li> </ul>



# 49.2 Basic technical data MSZ5000 series

MICROSCOPE	OPTICAL EQUIPMENT	EQUIPMENT
MSZ5000-T-S	<ul> <li>10x wide field eyepieces</li> <li>0.7-4.5x zoom objective</li> <li>7-45x total magnification</li> </ul>	<ul><li>Photo tube for the connection of photo and video cameras</li><li>Large swiveling stand</li></ul>
MSZ5000-S-RL	<ul> <li>10x wide field eyepieces</li> <li>0.7-4.5x zoom objective</li> <li>7-45x total magnification</li> </ul>	<ul> <li>Incident light (LED ring lamp)</li> <li>Large swiveling stand</li> </ul>
MSZ5000-T-S-RL	<ul> <li>10x wide field eyepieces</li> <li>0.7-4.5x zoom objective</li> <li>7-45x total magnification</li> </ul>	<ul> <li>Incident light</li> <li>Photo tube for the connection of photo and video cameras</li> <li>Large swiveling stand</li> </ul>
MSZ5000-IL-TL	<ul> <li>10x wide field eyepieces</li> <li>0.7-4.5x zoom objective</li> <li>7-45x total magnification</li> </ul>	<ul> <li>12 V 15 W incident and transmitted light (halogen) infinitely variable</li> </ul>
MSZ5000-IL-TL-LED	<ul> <li>10x wide field eyepieces</li> <li>0.7-4.5x zoom objective</li> <li>7-45x total magnification</li> </ul>	<ul> <li>Incident and transmitted light (LED) infinitely variable</li> </ul>
MSZ5000-T-IL-TL	<ul> <li>10x wide field eyepieces</li> <li>0.7-4.5x zoom objective</li> <li>7-45x total magnification</li> </ul>	<ul> <li>12 V 15 W incident and transmitted light (halogen) infinitely variable</li> <li>Photo tube for the connection of photo and video cameras</li> </ul>
MSZ5000-T-IL-TL-LED	<ul> <li>10x wide field eyepieces</li> <li>0.7-4.5x zoom objective</li> <li>7-45x total magnification</li> </ul>	<ul> <li>Incident and transmitted light (LED) infinitely variable</li> <li>Photo tube for the connection of photo and video cameras</li> </ul>

# 49.3 Accessories for microscopes MSZ5000 series

Order number	ltem
MSZ5419	<ul> <li>Darkfield</li> </ul>
MSZ5405-N	<ul> <li>Auxiliary lens 0.5x</li> </ul>
MSZ5418-N	<ul> <li>Auxiliary lens 2x</li> </ul>
MSZ5019-N	<ul> <li>Halogen lamp for incident light, 12V 10W</li> </ul>
MSZ5010-N	<ul> <li>Eyepiece 10x</li> </ul>
MSZ5008-N	<ul> <li>Halogen lamp for transmitted light, 12 V 10 W</li> </ul>
MSZ5415	Object micrometer
MSZ5416-N	<ul> <li>Micrometer eyepiece 10x</li> </ul>
MSZ5417-N	<ul> <li>Micrometer eyepiece 20x</li> </ul>
MSZ5420-N	<ul> <li>Pair of eyepieces 20x</li> </ul>
MSZ5020-N	<ul> <li>Incident light illumination</li> </ul>
MSZ5050	<ul> <li>Large swiveling stand</li> </ul>
LDR72	<ul> <li>LED daylight ring lamp</li> </ul>



# 50 Microscope illumination

Illumination is indispensable for observing objects. In simple terms, there are two types of illumination: transmitted light illumination and incident light illumination.

In transmitted light illumination, the light source and observation optics are located on different sides of the object. As a result, the light passes through the object or specimen.

With incident light illumination, the object is illuminated from the side on which the observation optics are also located. This allows examination of objects that are not translucent.

#### Light sources

A wide variety of light sources are used for microscopy. Usually, halogen lamps or LEDs are used. In simple microscopes, ambient light can also be focused by means of a mirror. Freely positionable illumination, such as ring lights or cold light sources, can provide additional illumination from the side.

### 50.1 Halogen lamp



A halogen lamp is a light source that is often used for transmitted light microscopy. Depending on the power, this is inexpensive and offers a high luminous efficacy. A dimmer can be used to adjust the light intensity to suit the objective. For most applications, halogen illumination is suitable.

#### 50.2 LED illumination



E A frequently used light source for transmitted light microscopy is a halogen lamp. This is economical and offers a high luminous efficacy regardless of power. A dimmer can be used to adjust the light intensity to match with the objective. Halogen illumination is sufficient for most applications.

50.3 Goosenecks illumination



The illumination by means of movable goosenecks is used to illuminate the spots of an object with pinpoint accuracy. By using two-armed gooseneck illuminators, shadows can be avoided and the area is illuminated evenly. Another advantage, due to the free positioning of the goosenecks, illumination is possible at all angles. Usually, the light source is a halogen lamp, whereby practically no infrared radiation is transmitted through the light conduction. For this reason, this light source is called a cold light source and is particularly suitable for heat-sensitive objects or specimens.

# Detailed in-depth and high-resolution image capture



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# 51 Microscope camera Pulse5

Thanks to the standardized USB 3.0 interface, including USB3 Vision Standard, and to the C-mount thread, the Pulse5 microscope camera can be connected to all commercially available microscopes, macroscopes, endoscopes and objectives. The Pulse5 also offers backward compatibility to USB 2.0, and intuitive software swiftly ensures optimal camera control and image capture. Image processing and analysis of the highest quality are thus ensured.



#### **Basic features:**

- 5.0 megapixel camera with 1/2 " CMOS sensor
- 2592 x 1944 pixels resolution
- Connection via USB 3.0 or USB 2.0 possible
- Camera adapter with C-mount thread
- Live image, image recording and video function
- Inclusive Basler microscopy software
- The set includes the C-mount adapter

#### Create microscope photos easily and with optimal quality.

Ideal for documentation and image processing

### 52 Microscope camera Ace12

The Ace12 microscope camera enables high-resolution observations and measurements in the live image. Equipped with a 1/1.7" CMOS sensor and 12 megapixels, it displays images with high accuracy in the included PC software. In addition, with the appropriate software, it is well suited for the measurement of the microscopic areas and for saving images and videos. Thanks to the standardized USB 3.0 interface, inclusive USB3 Vision Standard, and to the C-mount thread, this microscope camera can be connected to all commercially available microscopes, macroscopes, endoscopes and lenses.



#### Basic features:

- Resolution of 4024 x 3036 pixels
- 12.2 megapixel camera with 1 / 1.7 "CMOS sensor
- USB 3.0 interface
- Camera adapter with C-mount thread
- Live image, image recording and video function
- Inclusive Basler microscopy software
- The set includes the C-mount adapter

The camera can be easily connected to almost all commercially available microscopes.

#### 52.1 Basler Microscopy Software

This software is the ideal solution for monitoring, documentation and archiving in the fields of education and research, industry and the operation of technical facilities. Many advanced software features ensure that even more demanding microscopy applications in life science, materials science and biomedical or industrial research can be easily performed with camera and software. Single shots and videos are possible, as well as time-lapse recordings, all of which are important for fast moving objects such as biological samples.



#### Areas of application:

- Live image, image recording and video function
- Adjustment of hue, saturation, brightness, contrast, gamma and gain
- Calibration, measurement and annotations
- Compensation of lighting conditions by focus enhancement and automatic/manual exposure
- Support of zoom levels for sstereo microscopes
- High-speed videos for slow-motion evaluation

Software for Basler cameras Ace12 and Pulse5



# 53 Microscope camera MKTV5 - Microscopy on the monitor

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Regardless of whether a monitor, television, projector, tablet or smartphone is being used, the HDMI and WiFi interfaces of the MKTV5 microscope camera ensure that images are easily and safely transmitted to the desired display. The software integrated on the camera and a connectable USB mouse offer the option of editing the live image. It is also possible to create image and video files and save them directly on an SD card. A PC is not necessary for any of this.

The camera can be connected to a PC using the PC software included in the delivery package, or to a smartphone or tablet using the app. Thanks to the standardized USB 2.0 Hi-Speed interface and the C-mount thread, the MKTV5 microscope camera can be connected to all commercially available microscopes, macroscopes, endoscopes and lenses.



#### **Basic features:**

- 5.0 megapixel camera with 1 / 1.8 "CMOS sensor
- Resolution of 2592 x 1944 pixels
- USB 2.0 hi-Speed interface
- HDMI interface (HDMI cable included)
- USB interface for USB mouse or WiFi adapter (both included)
- Live image, image recording and video function
- Integrated software & additional PC software
- Storage of image and video files on SD card, included
- The set includes the C-mount adapter

#### High-quality camera which easily

produces perfect microscope photos

#### 53.1 KTV5-display - Microscopy on the monitor

With the MKTV5 display, we also offer a full HD display that can be connected and attached to the MKTV5. Accordingly, the display can be mounted directly on the camera, thus saving space.



#### **Basic features:**

- 11.8 " 1080p IPS LC display
- Resolution of 1920 x 1080 pixels
- HDMI interface for connection to MKTV5

#### Areas of application:

- Live image of a connected video source via HDMI
- High-speed digital visualization of the microscope image
- Stand for a flexible or stand-alone use

Full HD display for connection to the MKTV5



# 54 Connecting of digital cameras

We offer various adapters enabling the connection of digital cameras to the microscopes. The universal camera mount UH80 is mounted directly in the phototube of the microscope in combination with a wide-field eyepiece.

Via the adapter UH80 with its 1/4" UNC thread, any digital compact camera can be connected with the appropriate tripod thread. When connecting digital cameras with a T2 connection, the T2 photo adapter can be used. This is mounted directly in the phototube and includes the matching eyepiece optics.



# **Basic function:**

- Possibility to connect digital cameras
- Can be mounted directly in the phototube of the microscope
- A combination of UH80 and 5x widefield eyepiece (MML1105) for compact camera connection
- Connection to UH80 via 1/4" UNC thread (tripod thread)

Photo adapter T2 (MML2042) for connecting digital cameras with a T2 connection

Digital cameras can be connected directly via suitable adapters.

#### 54.1 Accessories for connecting digital cameras

Order number	Item
UH80	<ul> <li>Universal Camera Mount</li> </ul>
MML1105	<ul> <li>Widefield Eyepiece 5x</li> </ul>
CANON	<ul> <li>Canon digital camera</li> </ul>
MML2042	<ul> <li>Photo adapter T2</li> </ul>

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