MEASURING QUALITY. SINCE 1796

KRÜSS

POLARIMETERS

FAST AND RELIABLE ANALYSIS OF OPTICALLY ACTIVE SUBSTANCES

MADE IN GERMANY



www.kruess.com

A.KRÜSS OPTRONIC – CUTTING-EDGE TECHNOLOGY, MADE IN GERMANY

A.KRÜSS Optronic is a leading manufacturer of high-precision optoelectronic measuring devices and analytical instruments. The family enterprise founded in 1796 offers an extensive range of products and customised solutions for quality assurance in the pharmaceutical, chemical, petrochemical, food and beverage industry as well as for research and science. We also offer a wide variety of products for professional gemology. Whether it is a refractometer, polarimeter, density meter, gas analyser, flame photometer, melting point meter or microscope – our instruments meet the highest requirements in terms of speed, accuracy and reliability. Thanks to our strong R&D capacities, we are a driving force in the technology market setting the standards for functional scope and user-friendliness. A dense network of sales partners and certified service partners allows us to provide individual consultation as well as optimised service and support for our customers around the globe.

OVER 200 YEARS OF PIONEERING SPIRIT AND SUCCESS

1796

The Mechanicus Opticus Edmund Gabory sets up his optical workshop in Hamburg

1823

The daughter of the late Gabory, Mary Ann, marries Andres Krüss, who continues the company together with his brother-in-law, Edmund Nicolas. He responds to the increasing demand for nautical instruments by selling sea charts

1844

Andres Krüss establishes his own company Optisches Institut von A. Krüss and in 1848 incorporates Gabory into the company

1862

Andres' son, Edmund Johann Krüss, who took over the company in 1851, is awarded the first prize for his photographic lenses at the world exhibition in London

1865

Krüss has his improvement of the Laterna Magica patented

1888

The heydays of the company boasting many innovations and inventions begin after Edmund Johann Krüss' son, Hugo, took over the management. Dr. Hugo Krüss' handbook of electrotechnical photometry lays the groundwork for this subject

1920

The son of Dr. Hugo Krüss, Paul, takes over the company and leads it successfully through World War II and the time of reconstruction. He not only makes important contributions to the spectral analysis and photometry, but he also invents and produces the corresponding devices, among other things, for school lessons

1946

Ing. Andres Krüss becomes joint partner of the company in the sixth Krüss generation. Hard work and the economic miracle bring new markets and customers

1975

A.KRÜSS Optronic offers a digital tensiometer for the automatic measurement of the boundary and surface tension of liquids

CONTENT

SUCCESS FACTOR POLARIMETRY 4
POLARIMETERS WITHOUT TEMPERATURE CONTROL – P8000 AND P8100 6
POLARIMETERS WITH WATER BATH TEMPERATURE CONTROL – P8000-T AND P8100-T 8
POLARIMETERS WITH PELTIER TEMPERATURE CONTROL – P8000-P AND P8100-P 10
MAXIMUM EFFICIENCY THROUGH AUTOMATION 12
A STRONG PERFORMANCE PACKAGE 14
THE ECONOMICAL SOLUTION FOR STANDARD MEASUREMENTS – P3000 16
IDEAL FOR BASIC LAB APPLICATIONS AND TRAINING – P1000-LED 17
TEMPERATURE-CONTROLLED GLASS TUBES 18
QUARTZ CONTROL PLATES – FOR A STEADILY HIGH MEASUREMENT ACCURACY 20
OUR EXTENSIVE RANGE OF SERVICES 21
APPLICATIONS FOR OUR POLARIMETERS ACCORDING TO INDUSTRIES 22
FEATURES OF OUR POLARIMETERS 23
TECHNICAL DATA 24
OVERVIEW OF POLARIMETERS, ACCESSORIES AND CONSUMABLES 26

1980

Andres Krüss' daughter, Martina Krüss-Leibrock, is the seventh generation to take over the A.KRÜSS Optronic GmbH. She makes important advances in the internationalisation of the company

2000

A.KRÜSS Optronic launches a refractometer featuring a fully automatic data acquisition

2003

A.KRÜSS Optronic is the first company in this sector to offer measuring devices and analytical instruments with a touch-screen display

A.KRÜSS Optronic develops the P8000 series that are still the fastest polarimeters in the world

2005

The daughter of Martina Krüss-Leibrock, Karin Leibrock, joins the management

A.KRÜSS Optronic is awarded with the "Top 100" seal of approval for especially innovative mid-sized companies

2008

A.KRÜSS Optronic is the first manufacturer in Germany to offer density meters

2011

A.KRÜSS Optronic puts a flame photometer on the market – worldwide one of a kind to this day – allowing for a simultaneous high-precision measurement of up to five elements

2013

Thomas Schmauck joins the management and is now together with Karin Leibrock in charge of the operative business of A.KRÜSS Optronic

2014

With a new user interface, the digital devices from A.KRÜSS Optronic set the standard for user-friendliness

In addition to the existing ISO 9001 certification, A.KRÜSS Optronic now also boasts an ISO 14000 certified environmental management system

2015

With the gas analysers of the MAT1000 series, A.KRÜSS Optronic offers solutions for controlling modified atmosphere packaging

SUCCESS FACTOR POLARIMETRY

One of the most important quality control methods used in the pharmaceutical, chemical, cosmetics, food and beverage industry is polarimetry – optically active substances are analysed by determining their angle of rotation. The angle of rotation allows you to ascertain the identity and quality of substances as well as their concentration in mixtures. It can also indicate the progress of reactions and conversions. Polarimeters are used in a wide range of applications – from the determination of the purity and concentration of ingredients in pharmaceuticals to the maturity testing of agricultural products to the measurement of the sugar content in beverages and candies.

Their sophisticated optical technology makes the chirality of molecules measurable and thus distinctions possible when other measured variables such as density or refractive index won't allow it. A filter polarises light emitted by a light source, i.e. it filters out all the waves that are not inclined at a defined angle. The light is directed towards a second polariser, the analyser, which is rotated by 90° from the first one. No light will therefore fall on the detector located behind it. However, if you place an optically active substance between the polarisers, which changes the inclination of the light waves to the right or to the left depending on its molecular structure, light will again fall on the detector. The analyser is now rotated until it is back in the "dark position". As each optically active substance has its characteristic angle of rotation, it is then possible to characterise the sample.

In order to achieve a high measurement accuracy, the sample temperature must be accurately controlled since the optical activity of substances depends on the temperature. In addition, polarimeters must meet the increasing requirements on process efficiency and not only perform reliable and fast measurements but must also be easy to handle and allow for an automatic operation.

Optical rotation °

°Z International sugar scale

Concentration g/100 ml

Specific rotation

OUR POLARIMETER MODEL SERIES

P8000

Our devices of the P8000 series are the fastest polarimeters in the world – thanks to our patented measurement procedure, which reduces the measurement time to approx. 1 s regardless of the sample's angle of rotation. They achieve a high measurement accuracy of up to ±0.002°, offer the option of a water bath or Peltier temperature control as well as an automatic operation and feature all the functions that are important in FDA-regulated sectors. Their self-explanatory, well-arranged user interface ensures a convenient user experience.

P3000

The polarimeter P3000 is a simplified version of the devices of the P8000 series. It applies the same measurement procedure and is therefore just as fast but built for standard applications in terms of measurement accuracy and functional range. The P3000 is our solution for all sectors where measurement results with two decimals and the possibility of a print-out on a serial ASCII printer are sufficient – and it boasts an excellent price-performance ratio.

P1000-LED

Our polarimeter P1000-LED – an analogue classic of opto-electronics – is suitable for basic applications in the lab and training. It operates according to the half-shade principle, and the measurement results are read through an eyepiece and two noniuses. Thanks to the integrated high-performance LED, whose service life is 2000 times longer than that of conventional sodium discharge lamps, the P1000-LED requires only little maintenance and is very cost-effective.



FOCUS ON QUALITY

WITH POLARIMETERS FROM A.KRÜSS

POLARIMETERS WITHOUT TEMPERATURE CONTROL – P8000 AND P8100

If the maximum functional range is desired but a temperature control of the sample for high-precision measurements not required, our polarimeter models P8000 and P8100 will be the right choice. They only differ in their measurement accuracy when measuring the optical rotation. The devices are very robust and yet precise and suitable for nearly all samples as the parts that come in contact with the sample are chemical-resistant.

The P8000 and P8100 are especially recommended in case of a high sample throughput in the sugar industry and for all basic measurements. Instead of a temperature control, the temperature can be compensated according to ICUMSA. That allows you to take measurements at any temperature; the results will then be converted to the desired temperature. In addition, the international sugar scale has been predefined on our devices, and the initial weight is taken into account for the conversion into the specific rotation.

For any type of sample, we offer the suitable measurement tube in glass or stainless steel. The tube is filled manually via a funnel or the opened screw connection on the side. Once the tube has been inserted into the measurement chamber and the measurement has been started, the display will show the measured values on the selected scales within seconds. In addition to the international sugar scale, the optical rotation, specific rotation and concentration have been predefined, too, and the user can use any number of self-defined scales. He also has the choice between two measurement procedures, the measurement with a manual measurement time input and an optimised measurement time thanks to the automatic stability recognition, as well as between the individual, continuous and interval measurement modes. For cleaning purposes, the tube is removed, unscrewed at the sides and rinsed with the appropriate medium.

The P8000 and P8100 feature a self-explanatory, well-arranged user interface that is also easy to use by non-expert personnel. It is found on all of our measurement instruments so that the user will always be able to work in the same straightforward way. A state-of-the-art TFT display ensures a clear, bright representation of all the information, and the integrated touch-screen tops off the convenient user experience. The menu-driven adjustment of our devices using our quartz control plates (see page 20) is also completed in next to no time.

YOUR ADVANTAGES

- Intuitive operation via touch-screen display
- Optional user administration with two authorisations
- Easy, menu-driven adjustment
- Freely assignable shortcut keys
- Any number of freely configurable methods
- Predefined scales (opt. rotation, spec. rotation, int. sugar scale, concentration)
- Any number of freely definable scales with conversions based on tables or formulas
- Suitable tubes for any type of sample
- Measurement up to an optical density of 3.0
- Temperature measurement directly inside the sample
- Reliable temperature compensation
- Very short measurement time of approx. 1 s
- Manual measurement time input or optimised measurement time thanks to automatic stability recognition
- Highest accuracy over the entire measurement range
- Compact, robust powder-coated steel housing
- High-performance LED with a service life of 100,000 h
- Interfaces for the convenient transfer of measured values
- Extensive connections for peripheral equipment
- Compliance with GMP/GLP, 21 CFR Part 11, OIML, ICUMSA etc.
- IQ/OQ/PQ by A.KRÜSS Optronic or one of our certified service partners
- Service, maintenance, calibration and adjustment on site

RECOMMENDED MEASUREMENT TUBES

- PRG-100-/-200-E with temperature probe PRT-E/ PRT-T (tubes included in the scope of delivery)
- PRM-100-/-200-D

Complete measurement tube catalogue, see page 26.



PRG-100-E



PRG-200-E



PRM-100-D



P8000 with measurement tube PRG-100-E and temperature probe PRT-E

	P8000	P8100
SCALES	Optical rotation [°] Int. sugar scale [°Z] Concentration [g/100 ml] Spec. rotation User-defined	
MEASUREMENT RANGES	±90° ±259 °Z	
ACCURACY	±0.003° ±0.01 °Z	±0.002° ±0.01 °Z
RESOLUTION	0.001° 0.01 °Z	
MEASUREMENT PERIOD ±90°	Approx. 1 s	
LIGHT SOURCE	1 LED with filter	
WAVELENGTH	589 nm	
TEMPERATURE MEASUREMENT	With temperature probe PRT-E or PRT-T	
TEMPERATURE MEASUREMENT RANGE	0–99.9 °C	
TEMPERATURE MEASUREMENT RESOLUTION	0.1 °C	
TEMPERATURE MEASUREMENT ACCURACY	±0.1 °C	
TEMPERATURE CONTROL	Can be retrofitted (requires circulation thermostat PT31/PT80, sample chamber bushing P8020 and temperature-controlled measurement tube PRG-100-ET)	
TEMPERATURE CONTROL RANGE		
TEMPERATURE CONTROL ACCURACY		

POLARIMETERS WITH CIRCULATING THERMOSTAT TEMPERATURE CONTROL – P8000-T AND P8000-T80

The polarimeter models P8000-T/-T80 and P8100-T/-T80 have the same functional scope as the P8000 and P8100 but will also allow for a circulating thermostats temperature control in the range between 8 °C and 80 °C when combined with temperature-controlled measurement tubes such as our PRG-100-ET. That makes them suitable for high-precision measurements as they are, for example, required in the pharmaceutical industry. Especially if a multitude of different temperature-controlled measurement tubes are to be used, the P8000-T/TF and P8100-T/-TF are the right choice. We offer a very large selection of this type of tubes. Micro-cuvettes required in case of small sample volumes are available in different shapes, capacities and optical lengths – all can be temperature-controlled.

Our PT80 or PT31, which are electronic circulators with Peltier elements, provide the necessary sample temperature. The thermostat connections integrated in the P8000-T/-T80 and P8100-T/-T80 allow you to connect it in next to no time, and the measurement tubes can also be quickly inserted and changed thanks to the quick coupling system. PT31 and PT80 can heat as well as cool, and this despite its very small size compared to conventional lab thermostats, which allows it to be easily placed on any working surface. Both thermostats can be controlled via a digital control element, the PT80 even additionally can be controlled via the user interface of the polarimeter. The target temperature can be saved so that it is already set when the device is switched on.
The temperature control is homogeneous; there will be no temperature gradient in the sample. The temperature sensor Pt100 integrated into the temperature probe determines when the set temperature is reached. The temperature is measured directly inside the sample, which is why we offer the temperature probe also in the PTFE-coated PRT-T version in addition to the stainless steel version PRT-E. By preheating the sample, it is possible to significantly shorten the temperature adjustment time and to take advantage of the very short measurement period of our devices.
The user can himself perform the regular calibration and adjustment of the temperature sensor required for an accurate temperature control using a certified thermometer. By request, they can be performed by A.KRÜSS Optronic or one of our certified service partners within the scope of an on-site maintenance.

The P8000-T and P8100-T can also be used with our standard tubes without temperature control if the required precision is ensured through temperature compensation.

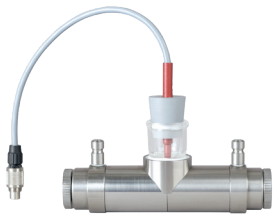
YOUR ADVANTAGES

- Intuitive operation via capacitive touch-screen display
- Optional user administration with two authorisations
- Easy, menu-driven adjustment
- Freely assignable shortcut keys
- Any number of freely configurable methods
- Predefined scales (opt. rotation, spec. rotation, int. sugar scale, concentration)
- Any number of freely definable scales with conversions based on tables or formulas
- Measurement up to an optical density of 3.0
- Temperature measurement directly inside the sample
- Accurate, homogeneous circulating thermostat control
- Large selection of temperature-controlled tubes
- Quick coupling system for an easy tube change
- Very short measurement time of approx. 1 s
- Manual measurement time input or optimised measurement time thanks to automatic stability recognition
- Highest accuracy over the entire measurement range
- Compact, robust powder-coated steel housing
- High-performance LED with a service life of 100,000 h
- Interfaces for the convenient transfer of measured values
- Extensive connections for peripheral equipment
- Compliance with GMP/GLP, 21 CFR Part 11, Ph. Eur., OIML, ICUMSA etc.
- IQ/OQ/PQ by A.KRÜSS Optronic or one of our certified service partners
- Service, maintenance, calibration and adjustment on site

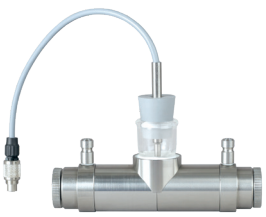
RECOMMENDED MEASUREMENT TUBES

- PRG-100/-200-Ewith temperature probe PRT-E/PRT-T (tubes included in the scope of delivery)
- PRG-100-/-200-ET with temperature probe PRT-E/PRT-T
- PRM-100/-200-DTT
- PRM-25/-50/-100/-200-SDTM

Complete measuring tube catalogue available to order.



PRG-100-ET mit PRT-T



PRG-100-ET mit PRT-E

We also offer the devices – then called P8000-TF and P8100-TF – with flow-through function, integrated drying unit DS7060 and peristaltic pump DS7070 for semi- or fully automatic measurements – see page 12 f. For the appropriate flow-through measurement tubes, see page 26.



P8000-T80 with measurement tube PRG-100-ET, temperature probe PRT-T and circulating thermostat PT80



P8000-T/-T80 **P8100-T/-T80**

SCALES	Optical rotation [°] Int. sugar scale [°Z] Concentration [g/100 ml] Spec. rotation User-defined	
MEASUREMENT RANGES	±90° ±259 °Z	
ACCURACY	±0.003° ±0.01 °Z	±0.002° ±0.01 °Z
RESOLUTION	0.001° 0.01 °Z	
MEASUREMENT PERIOD ±90°	Approx. 1 s	
LIGHT SOURCE	1 LED with filter	
WAVELENGTH	589 nm	
TEMPERATURE MEASUREMENT	With temperature probe PRT-E or PRT-T	
TEMPERATURE MEASUREMENT RANGE	0–99.9 °C	
TEMPERATURE MEASUREMENT RESOLUTION	0.1 °C	
TEMPERATURE MEASUREMENT ACCURACY	±0.2 °C	
TEMPERATURE CONTROL	With circulating thermostat PT31 (P8000-T / P8100-T) und PT80 (P8000-T80 / P8100-T80) (requires temperature-controlled measurement tube such as PRG-100-ET) PT31: 8-35 °C | PT80: 5-80 °C	
TEMPERATURE CONTROL RANGE	8–80 °C	
TEMPERATURE CONTROL ACCURACY	±0,2 °C	

POLARIMETERS WITH PELTIER TEMPERATURE CONTROL – P8000-P AND P8100-P

High-precision measurements through temperature control without an additional device – this is what our polarimeter models P8000-P and P8100-P offer, which otherwise have the same functional scope and the same characteristics as the other devices of the P8000 series. They are recommended if the temperature of the sample is to be controlled extremely accurately within a very short period of time and with a short control cycle and independent of the outside temperature.

This also requires the measurement tube PRG-100-EPT consisting of a chemical-resistant glass body with an unbreakable stainless steel jacket which is fitted with three Peltier elements allowing for a direct temperature control. The target temperature is entered on the user interface of the polarimeter; the device will automatically detect whether the tube is connected. Thanks to the ideal positioning and insulation of the Peltier elements, a homogenous temperature is provided ensuring the required temperature equilibrium in the sample. The temperature sensor Pt100 integrated into the tube determines when the target temperature is reached.

The advantages of a direct temperature control of the tube are obvious: The measurement operation is more efficient, no circulation thermostat PT31 needs to be readjusted and maintained while it saves space and material since there is no thermostat and no external tubing. Shortening the temperature adjustment time by preheating the sample is possible but hardly necessary as the P8000-P and P8100-P in combination with the measurement tube PRG-100-EPT are capable of controlling the temperature of any sample very fast even when the temperature differences are high. The temperature change common in the pharmaceutical industry between 20 °C for Ph. Eur. and 25 °C for USP, for example, takes only 2–3 min for the tube and sample. In the interval measurement mode, the fast, accurate temperature control allows you to monitor reactions and conversions or to carry out HPLC applications in an optimal way.

The user can himself perform the regular calibration and adjustment of the temperature sensor required for an accurate temperature control; all he needs is a certified thermometer. By request, they can be performed by A.KRÜSS Optronic or one of our certified service partners within the scope of an on-site maintenance.

The P8000-P and P8100-P can also be used with our standard tubes without temperature control if the required precision is ensured through temperature compensation. In this case, the temperature probe PRT-E/PRT-T will be connected via the adaptor plug PRT-P.

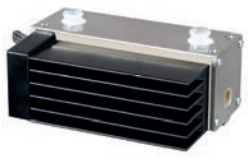
YOUR ADVANTAGES

- Intuitive operation via touch-screen display
- Optional user administration with two authorisations
- Easy, menu-driven adjustment
- Freely assignable shortcut keys
- Any number of freely configurable methods
- Predefined scales (opt. rotation, spec. rotation, int. sugar scale, concentration)
- Any number of freely definable scales with conversions based on tables or formulas
- Measurement up to an optical density of 3.0
- Temperature measurement at the tube
- Accurate, homogenous, fast Peltier temperature control
- Chemical-resistant, unbreakable measurement tube
- Very short measurement time of approx. 1 s
- Manual measurement time input or optimised measurement time thanks to automatic stability recognition
- Highest accuracy over the entire measurement range
- Compact, robust powder-coated steel housing
- High-performance LED with a service life of 100,000 h
- Interfaces for the convenient transfer of measured values
- Extensive connections for peripheral equipment
- Compliance with GMP/GLP, 21 CFR Part 11, Ph. Eur., OIML, ICUMSA etc.
- IQ/OQ/PQ by A.KRÜSS Optronic or one of our certified service partners
- Service, maintenance, calibration and adjustment on site

RECOMMENDED MEASUREMENT TUBES

- PRG-100-EPT
- PRG -100-/-200-E with temperature probe PRT-E/PRT-T and adaptor plug PRT-P (tubes included in the scope of delivery)

Complete measurement tube catalogue, see page 26.



PRG-100-EPT



P8000-P with measurement tube PRG-100-EPT

	P8000-P	P8100-P
SCALES	Optical rotation [°] Int. sugar scale [°Z] Concentration [g/100 ml] Spec. rotation User-defined	
MEASUREMENT RANGES	±90° ±259 °Z	
ACCURACY	±0.003° ±0.01 °Z	±0.002° ±0.01 °Z
RESOLUTION	0.001° 0.01 °Z	
MEASUREMENT PERIOD ±90°	Ca. 1 s	
LIGHT SOURCE	1 LED with filter	
WAVELENGTH	589 nm	
TEMPERATURE MEASUREMENT	With measurement tube PRG-100-EPT	
TEMPERATURE MEASUREMENT RANGE	0–99.9 °C	
TEMPERATURE MEASUREMENT RESOLUTION	0.1 °C	
TEMPERATURE MEASUREMENT ACCURACY	±0.1 °C	
TEMPERATURE CONTROL	With measurement tube PRG-100-EPT with 3 integrated Peltier elements	
TEMPERATURE CONTROL RANGE	15–40 °C	
TEMPERATURE CONTROL ACCURACY	±0.2 °C	

MAXIMUM EFFICIENCY THROUGH AUTOMATION

SAMPLE SUPPLY OPTIONS

MANUAL

We offer a large selection of measurement tubes for manual operation. While filling the sample into the tube via a funnel or the opened screw connection on the side, you check whether the filling is free of bubbles. For cleaning purposes, the tube is removed, unscrewed at the sides and rinsed with the appropriate medium until all sample residues have been dissolved and eliminated.

SEMI-AUTOMATIC

Semi-automatic operation requires a P8000-TF/P8100-TF with flow-through function and drying unit DS7060, a flow-through measurement tube and the peristaltic pump DS7070, which sucks the sample or the cleaning medium into the tube. Thanks to the drying unit's 3/2-way valve, you do not need to reconnect any tubes when switching from sample supply or cleaning to drying.

FULLY AUTOMATIC

The P8000-TF/P8100-TF with flow-through function and drying unit DS7060, a flow-through measurement tube, the peristaltic pump DS7070 and the autosampler AS80 or AS90 allow for a fully automatic operation. The samples on the rotary plate of the autosampler are taken with the suction needle and sucked into the tube by the pump. If desired, the system can be automatically rinsed and dried after each measurement.



Semi-automatic sample supply with P8000-TF and peristaltic pump DS7070

SEMI-AUTOMATIC SOLUTIONS

In case of low-viscous to slightly viscous samples, it is possible to perform a semi-automatic sample supply and cleaning of the measurement tube using the peristaltic pump DS7070. This means higher efficiency and more safety if aggressive or harmful substances are analysed. It also improves the reproducibility of the measurement results and saves costs as the peristaltic pump sucks only the required sample volume into the measurement tube.

The drying unit DS7060 integrated into the polarimeter allows for a fully automatic drying: It is directly connected to the peristaltic pump, and via its 3/2-way valve, the flow of the sample or cleaning medium and the drying air is regulated. The DS7060 also has a high resistance to chemicals as the parts that come into contact with the sample are made of FFKM and PVDF.

This configuration is especially helpful if

1. the sample throughput is high and/or

2. only a small sample volume is available, for example in case of
- products from the natural substance synthesis
- expensive pharmacological agents
- aromas
- fragrances
- perfumes
- essential oils

The measurement tube can remain in the beam path of the polarimeter during the cleaning. Note: This configuration requires flow-through micro-cuvettes.

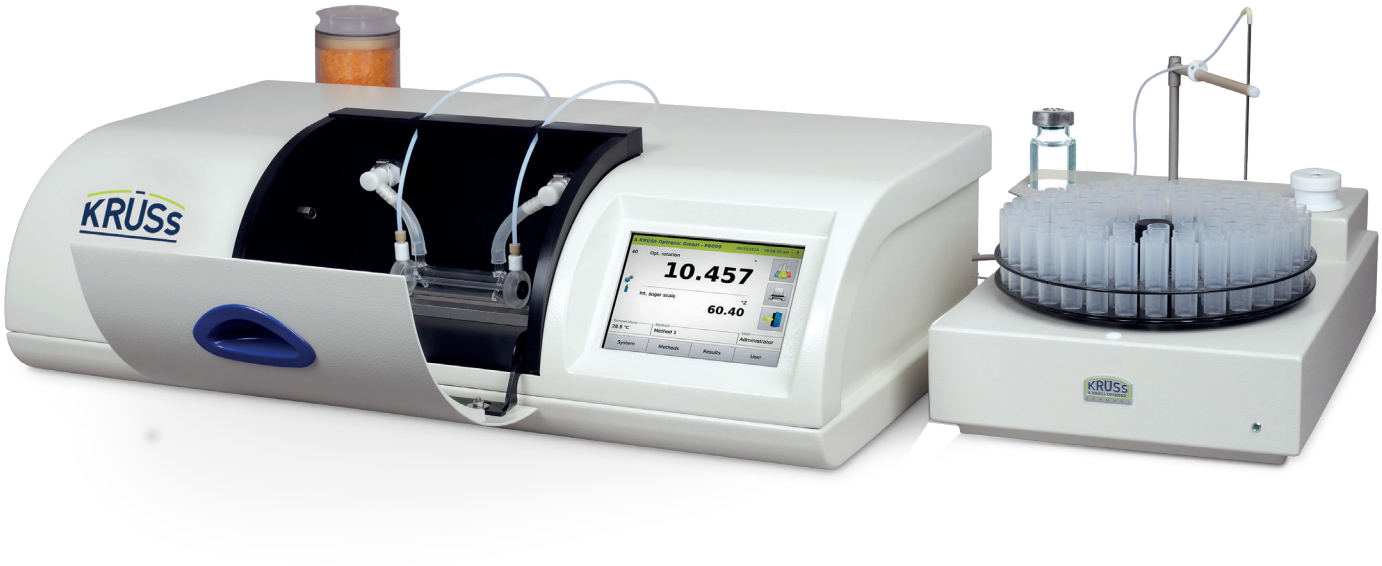
ADVANCED TECHNOLOGY FOR DIGITAL POLARIMETERS 2022

New touch screen technology with 7.0 inch display

- Operation is via capacitive touchscreens with fast computing unit
- The glass surface can be operated with gloves and cleaned with solvents
- The 18-bit colour depth delivers 262,000 colours and produces clear images
- Glare effects in sunlight are reduced to a minimum

Higher data security with better authorisation concepts

- From now on with specific setting of network access restrictions
- Enhanced authentication methods with Secure Login
- The combination of user name & password protects saved data from unauthorised access
- Audit trail to record configuration changes
- Possibility of data reports with own logo



Fully automatic sample supply with P8000-TF, peristaltic pump DS7070 and autosampler AS90

FULLY AUTOMATIC SOLUTIONS

Working environments involving a high sample throughput require flexible, powerful and robust solutions for a fully automatic execution of the entire process from the sample supply to the cleaning and drying. Our AS80 and AS90 autosamplers meet these high requirements. Together with the peristaltic pump DS7070, they allow for an unsupervised measurement of up to 89 samples.

You can create any number of individual measurement methods and cleaning procedures as well as sampler templates on the polarimeter's user interface. The AS80 and AS90 require very little space, are easy and fast to install and very durable. For both autosamplers, the scope of delivery includes one of two sample plates of different sizes with a corresponding set of polypropylene or glass vials.

Autosamplers AS80 and AS90

- Also suitable for aggressive and slightly viscous samples
- Can each be fitted with two types of sample plates:
  AS80-T18: 18x 50 ml (42 mm x 43 mm) or
  AS80-T36: 36x 35 ml (28 mm x 65 mm)
  AS90-T53: 53x 16 ml (22 mm x 55 mm) or
  AS90-T89: 89x 6 ml (16 mm x 55 mm)
- Set of polypropylene or glass vials included
- Sample supply via peristaltic pump DS7070
- Integrated rinse port
- Optional design for use with vials with a penetrable membrane
- Suitable for measuring stations using more than one analysis device (requires LIMS software)
- Control via the polarimeter's serial interface (RS-232)

A STRONG PERFORMANCE PACKAGE

FLEXIBLE DATA EXPORT

- Print-out on serial ASCII printer
- Print-out on network printer in PDF or PS format
- Print-out as PDF on USB flash drive or to network share
- Export in HTML or CSV format on USB flash drive or to network share
- Can be connected to a keyboard, mouse, barcode scanner or external PC in order to use the KrüssLab software
- Easy integration into existing networks (DHCP Client) or a LIMS

COMPLETE DATA RECORDING AND BACKUP

- Records all measured data as well as system or method selections in a tamper-proof measured data storage
- Audit trail for logging configuration changes
- Documentation of all measured values of the last 999 measurements with consecutive numbering
- Data reports with own logo



INTELLIGENT USER ADMINISTRATION

- Can be activated or deactivated depending on the requirements
- Two authorisation levels
- Optional setup of user profiles
- Customised settings for different users or work groups

UNLIMITED NUMBER OF METHODS

- Create any number of methods and analyse each sample using the desired parameters
- Method parameters: scales, temperature, temperature compensation, sample supply, wavelength, tube length, limit values, comment and many more
- Measurement modes: single, continuous or interval measurement
- Predefined scales for optical rotation, specific rotation, sugar content and concentration
- Any number of freely definable scales with conversions based on tables or formulas

POLARIMETER SOLUTIONS FOR ANY NEED

- P8000/P8100 without temperature control
- P8000-T/P8100-T with water bath temperature control
- P8000-P/P8100-P with Peltier temperature control
- P8000-TF/P8100-TF with water bath temperature control and flow-through function

COMPLIANCE WITH GLOBAL STANDARDS

- GMP/GLP
- 21 CFR Part 11
- Pharmacopoeias (USP, BP, JP, Ph. Eur.)
- FDA, ISO, HACCP, OIML, ASTM, ICUMSA, NIST



INTUITIVE OPERATION

- State-of-the-art touch-screen display, uniform operating of all A.KRÜSS devices
- Secondary scale for displaying a second measured value
- Freely assignable shortcut keys for the most important functions
- Easy, menu-driven adjustment
- A selection of six languages (de, en, es, fr, it, pt)

FAST, RELIABLE MEASUREMENT

- Measurement up to an optical density of 3.0
- Very short measurement time of approx. 1 s – the fastest polarimeters in the world!
- Measurement with manual measurement time input or optimised measurement time thanks to automatic stability recognition
- Reliable temperature compensation
- Highest accuracy over the entire measurement range

EASY FILLING AND CLEANING

- Suitable tubes for any type of sample
- Manual, semi-automatic or fully automatic sample supply
- Chemical-resistant materials
- Freely configurable cleaning procedures
- Semi-automatic or fully automatic drying

THE ECONOMICAL SOLUTION FOR STANDARD MEASUREMENTS – P3000

The polarimeter P3000 is based on the technology of the P8000 series but built for standard applications for which a measurement accuracy of ±0.01° is sufficient and a temperature control can be omitted. The device is, for example, used for quality control in the food industry. It performs its tasks in the record measurement time of approx. 1 s that you are familiar with from our digital polarimeters.

Also in terms of robustness and resistance to chemicals, the P3000 matches the devices of the P8000 series, the user has access to the same variety of measurement tubes, and the process from the sample supply to the cleaning is identical to the process with the P8000 and P8100.

The measured values are optionally displayed as an optical angle of rotation or on the international sugar scale of the ICUMSA. If desired, they can be printed on a serial ASCII printer. Thanks to the reliable temperature compensation, it is possible to take measurements at any temperature; the results will then be converted to the value for 20 °C.

The P3000 is operated via touch-screen and very easy to operate thanks to the reduced functional scope. The user interface is available in two languages – English and German. The P3000 therefore boasts a very solid performance at an attractive price.



P3000 with measurement tube PRG-100-E and temperature probe PRT-E

RECOMMENDED MEASUREMENT TUBES

- PRG -100-/-200-E with temperature probe PRT-E/ PRT-T (tubes included in the scope of delivery)
- PRM-100-/-200-D

Complete measurement tube catalogue, see page 26.



PRG-100-E *PRG-200-E*



PRM-100-D

	P3000
SCALES	Optical rotation [°] Int. sugar scale [°Z]
MEASUREMENT RANGES	±90° ±259 °Z
ACCURACY	±0.01° ±0.01 °Z
RESOLUTION	0.01° 0.01 °Z
MEASUREMENT PERIOD ±90°	Approx. 1 s
LIGHT SOURCE	1 LED with filter
WAVELENGTH	589 nm
TEMPERATURE MEASUREMENT	With temperature probe PRT-E or PRT-T
TEMPERATURE MEASUREMENT RANGE	0–99.9 °C
TEMPERATURE MEASUREMENT RESOLUTION	0.1 °C
TEMPERATURE MEASUREMENT ACCURACY	±0.1 °C
TEMPERATURE CONTROL	Can be retrofitted (requires circulation thermostat PT31/PT80, sample chamber bushing P8020 and temperature-controlled measurement tube PRG-100-ET)
TEMPERATURE CONTROL RANGE	
TEMPERATURE CONTROL ACCURACY	

IDEAL FOR BASIC LAB APPLICATIONS AND TRAINING – P1000-LED

Our polarimeter P1000-LED is used by numerous companies and institutes for basic lab applications and training, for example the experiment on saccharose inversion. It measures the optical rotation according to the half-shade principle, and the measurement results are read through an eyepiece and two noniuses.

The P1000-LED features a sample chamber for tubes with a length of up to 220 mm, a polariser and an analyser. A high-performance LED is used as the light source whose service life is up to 2000 times longer than that of conventional sodium discharge lamps – the device therefore requires only little maintenance and is very cost-effective. A high-quality metal stand and a pivoted cover make the equipment complete.

The scope of delivery for the P1000-LED includes a 100 mm and a 200 mm measurement tube with a debubbler for the proper filling.

This simple, analogue device can also be validated. The sample chamber is adapted to receive our quartz control plates for the calibration and adjustment.



P1000-LED

RECOMMENDED MEASUREMENT TUBES

- PRG-100-/-200
  (tubes included in the scope of delivery)
- PRG-50-/-100-M

Complete measurement tube catalogue, see page 26.



PRG-100



PRG-200

P1000-LED

SCALE	Optical rotation [°]
MEASUREMENT RANGE	2 graduated circles (0–180°)
SCALE DIVISION	1°
READING ACCURACY	0.05° (with nonius)
LIGHT SOURCE	1 LED with filter
WAVELENGTH	589 nm

TEMPERATURE-CONTROLLED GLASS TUBES

FOR WATER BATH TEMPERATURE CONTROL

The PRG-100-/-200-ET is an especially robust, externally temperature-controlled and versatile measurement tube. Its glass body makes it chemical-resistant, which is, for example, very important in the pharmaceutical and chemical industry where samples are often analysed in 10% hydrochloric acid. The tube is also unbreakable thanks to its stainless steel jacket. The inlets for the temperature-control medium located at the side allow for an accurate, homogeneous temperature control across the entire tube length and thus the required temperature equilibrium in the sample. The temperature probe inserted into the filling funnel of the tube determines when the target temperature is reached. Since it is inserted directly into the sample, it is available in two versions: in stainless steel (PRT-E) and in PTFE-coated stainless steel (PRT-T).

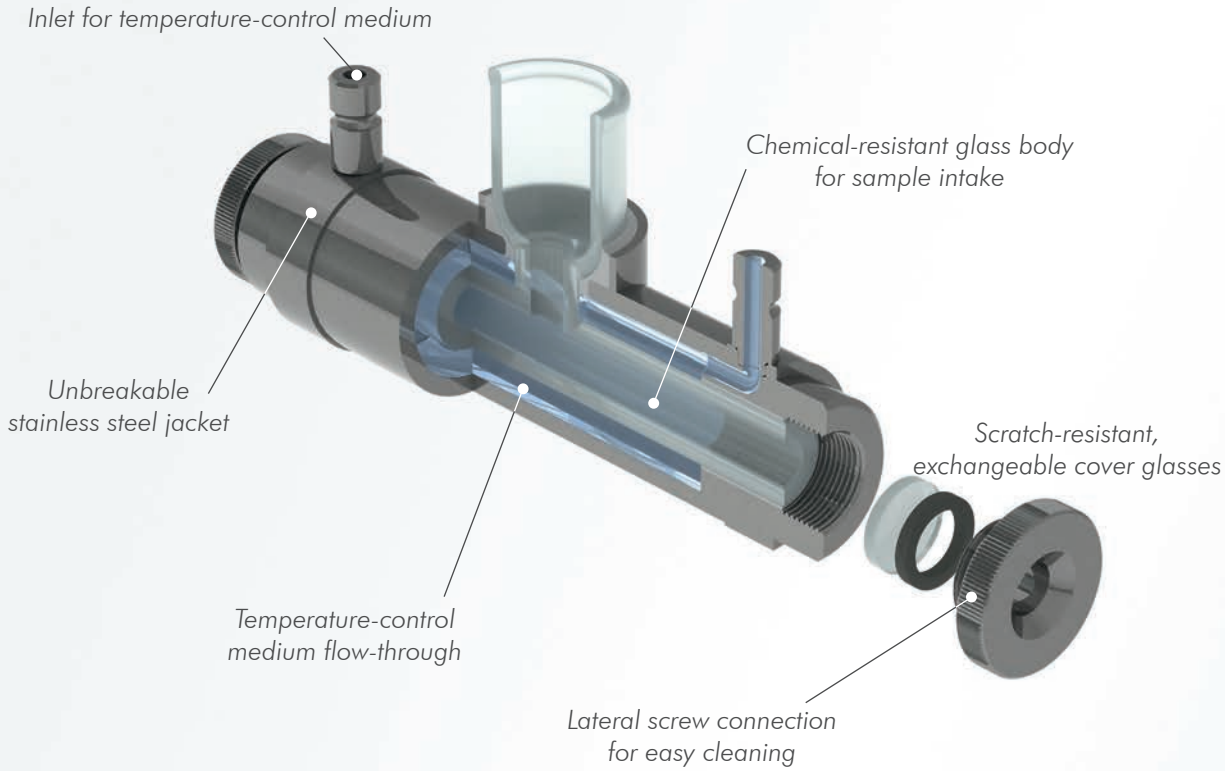
YOUR ADVANTAGES

- Suitable for all samples, even aggressive chemicals, thanks to glass body
- Easy to fill and degas via the wide filling funnel
- For standards-compliant work available in the lengths 100 mm and 200 mm
- Scratch-resistant, exchangeable cover glasses
- Precise temperature measurement directly inside the sample with temperature probe PRT-E/PRT-T
- Nearly any temperature range, depending on the connected circulation thermostat
- Easy to clean by opening the lateral screw connection; cover glasses are also easy to change
- Flexibility thanks to a wide selection of additional temperature-controlled glass tubes for the whole range of applications

GLASS TUBE WITH STAINLESS STEEL JACKET AND FILLING FUNNEL, TEMPERATURE-CONTROLLED

ORDER NO.	LENGTH IN MM	VOLUME IN ML
PRG-100-ET	100	< 4
PRG-200-ET	200	< 8

DESIGN OF MEASUREMENT TUBE PRG-100-/-200-ET



FOR PELTIER TEMPERATURE CONTROL

With the PRG-100-EPT, we have developed a directly temperature-controlled measurement tube for our polarimeters P8000-P and P8100-P which allows high-precision measurements without the use of an additional external device. Three Peltier elements ensure an accurate, fast temperature control in the range between 15 and 40 °C. Thanks to their ideal positioning and insulation, the temperature control is homogeneous over the entire tube length, and there will be no temperature gradient. The temperature sensor Pt100 integrated into the tube determines when the target temperature is reached. Just like the PRG-100-/-200-ET, the PRG-100-EPT features a chemical-resistant glass body and an unbreakable stainless steel jacket. That makes it also suitable for aggressive samples and very durable as well.

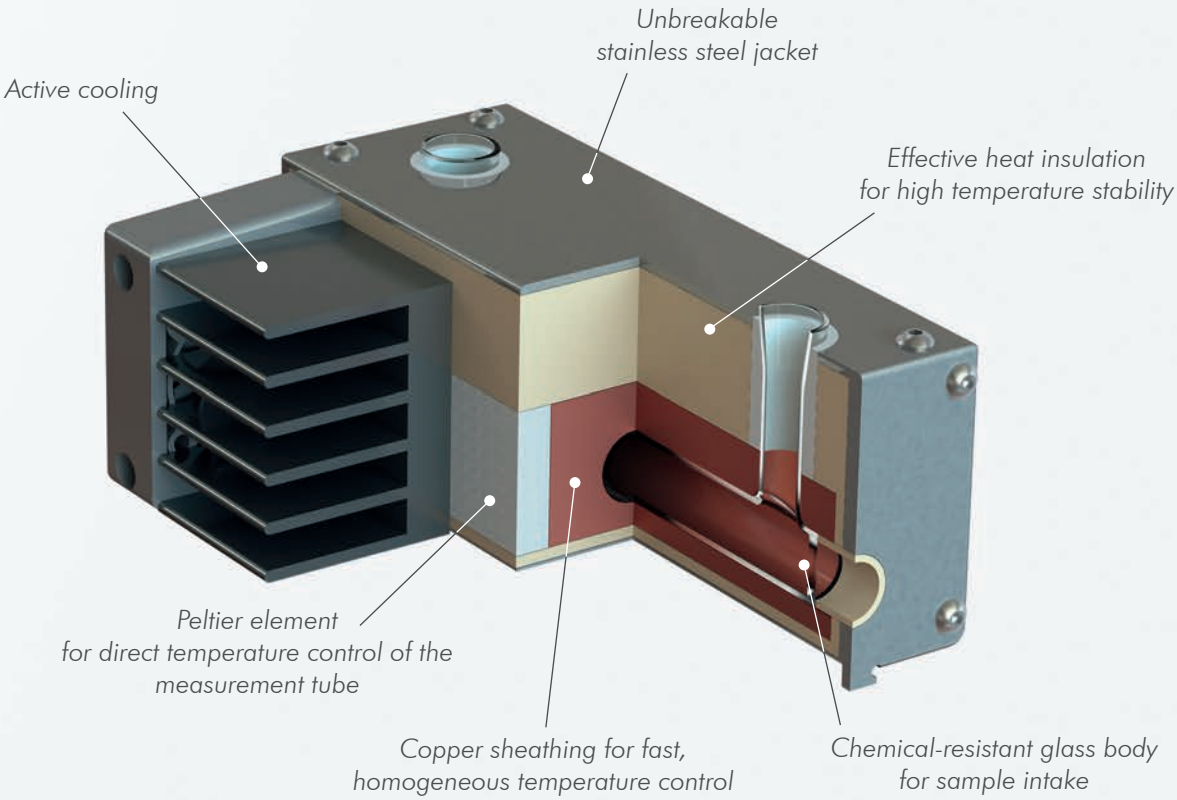
YOUR ADVANTAGES

- Suitable for all samples, even aggressive chemicals, thanks to glass body
- Easy to fill and degas via the dual opening
- All relevant control parameters, as well as the serial numbers are listed in the data memory and can be read out from the polarimeter
- Precise temperature measurement close to the sample with integrated temperature sensor
- Accurate, homogeneous and very fast temperature control
- Recommended in case of frequent temperature changes (for example from 20 °C for Ph. Eur. to 25 °C for USP)

GLASS TUBE WITH STAINLESS STEEL JACKET AND INTEGRATED PELTIER TEMPERATURE CONTROL

ORDER NO.	LENGTH IN MM	VOLUME IN ML
PRG-100-EPT	100	8

DESIGN OF MEASUREMENT TUBE PRG-100-EPT



QUARTZ CONTROL PLATES – FOR A STEADILY HIGH MEASUREMENT ACCURACY

Like all measurement devices, polarimeters should be calibrated and adjusted on a regular basis. Sugar solutions are widely used as a standard for this purpose. Their disadvantage: They always have to be freshly produced for measurements. User errors during the initial weighing are difficult to prevent, and the high temperature dependency of the respective solutions also needs to be taken into account. Optically active quartz is better suited for the calibration and adjustment of polarimeters, which is cut from mono-crystals and installed in stainless steel casings.

We offer you a selection of PTB-certified, OIML-, ICUMSA- and pharmacopoeia-compliant premium quartz control plates. For applications that do not require a PTB certification and where a PTB-traceable factory certificate is sufficient, we can provide the corresponding more inexpensive versions. The following applies to both of our quartz control plate versions: They are highly accurate and last for an indefinite period of time compared to calibration fluids used with other measurement devices. However, they should also be calibrated on a regular basis.



P3000 with premium quartz control plate

PREMIUM QUARTZ CONTROL PLATES WITH PTB CERTIFICATE

	PQP+17	PQP+34	PQP–17	
TYPE	Polarimeter Quartz Professional (PQP)			
ACCURACY	±0.001°			
ANGLE OF ROTATION	+17° (±1°), +50 °Z (±1 °Z)	+34° (±1°), +99 °Z (±1 °Z)	–17° (±1°), –50 °Z (±1 °Z)	
WAVELENGTH	589 nm			
TEMPERATURE	20 °C			
HOUSING	Stainless steel			
SUITABLE FOR	P8000 series and P3000			

SIMPLE QUARTZ CONTROL PLATES WITH FACTORY CERTIFICATE, TRACEABLE TO PTB CERTIFICATE

	PQE+17	PQE+34	PQE–17	PQE–34
TYPE	Polarimeter Quartz Economy (PQE)			
ACCURACY	±0.005°			
ANGLE OF ROTATION	+17° (±1°), +50 °Z (±1 °Z)	+34° (±1°), +99 °Z (±1 °Z)	–17° (±1°), –50 °Z (±1 °Z)	–34° (±1°), –99 °Z (±1 °Z)
WAVELENGTH	589 nm			
TEMPERATURE	20 °C			
HOUSING	Stainless steel			
SUITABLE FOR	P3000, limited suitability for P8000			

QUALITY AT A GLANCE



WE ARE MORE THAN A MANUFACTURER OF HIGH-PRECISION LABORATORY INSTRUMENTS

Customers who decide to buy our devices, do not only receives a quality measurement device, they also gain access to professional services and comprehensive support.

- Together with our certified service partners we offer customer service directly on site and technical support in over 130 countries around the globe.
- We demonstrate our devices on site or via online video-conferencing directly from our laboratory in Hamburg. So you can get a live experience of our measurement devices.
- Your full confidence is a priority for us even before you make your investment. We offer you the opportunity to test the equipment in your individual working environment.
- Are you interested in an advanced training course for yourself or your employees? So join our training courses and online webinars and workshops and get new knowledge, valuable informations and expert tips.
- Many of our customers already benefit from our scalable service and maintenance services. Use our know-how for sample temperature control, calibration and adjustment or for validation and qualification.

CERTIFIED SERVICE

- APPLICATION CONSULTING
- PRODUCT DEMONSTRATION
- INSTALLATION
- IQ / OQ / PQ / DQ
- CALIBRATION AND ADJUSTMENT
- MAINTENANCE AND REPAIRS
- GUARANTEE EXTENSIONS
- SERVICE AND MAINTENANCE CONTRACTS

YOU LIKE TO KNOW MORE? PLEASE VISIT OUR WEBSITE!

Here you will find everything about our measurement devices with product descriptions. In the Campus you will find information on polarimetry with typical applications, overviews of standards, samples and solutions for automation. Furthermore, on our website you will find details on service and maintenance support, training courses as well as sales partners in your region. We would be pleased to welcome you!

www.kruess.com

APPLICATIONS FOR OUR POLARIMETERS ACCORDING TO INDUSTRIES

PHARMACEUTICAL INDUSTRY

Typical applications:	Analysed substances:	Special requirements:	Standards:	Recommended polarimeters:
• Determination of the concentration of sugar as an ingredient of pharmaceutical agents • Purity control and content determination • Determination of the stereochemical composition and mutarotation • Characterisation of new synthetic substances	Sugar, amino acids and proteins, blood sera, vitamins, steroids, antibiotics, hormones, painkillers, amphetamines etc.	Precision, compliance with standards	Pharmacopoeias (USP, BP, JP, Ph. Eur.), GLP	P8000-T, P8000-P

CHEMICAL INDUSTRY

Typical applications:	Analysed substances:	Special requirements:	Standards:	Recommended polarimeters:
• Purity control and concentration determination • Monitoring of chemical processes during the production of optically active substances • Characterisation tests in research laboratories • Reaction kinetic analyses	Biopolymers, synthetic polymers, glycerinaldehydes, various hydrocarbons etc.	Accurate temperature control at different temperatures, variability of the measurement methods, option of interval measurements	AOAC, OIML, ASTM, GLP	P8000-T, P8000-P

FOOD AND BEVERAGE INDUSTRY

Typical applications:	Analysed substances:	Special requirements:	Standards:	Recommended polarimeters:
• Characterisation, quality and purity control of raw materials and end products • Setermination of the sugar concentration in beverages and candies • Routine analysis with high sample throughput	Sugar, lactic acid, starch (polysaccharide) in food and feed, aromas, lactose in milk, glucose in wine, sugar composition in honey etc.	Fast measurement with easy handling, robust, acid-resistant measurement tubes	AOAC, OIML, ASTM, GLP	P8000-T, P8000-TF

SUGAR INDUSTRY

Typical applications:	Analysed substances:	Special requirements:	Standards:	Recommended polarimeters:
• Determination of the sugar concentration in raw materials, preliminary, intermediate and end products • Monitoring of chemical processes, e.g. during the manufacture of invert sugar • Purity control	Sugar cane, beet pulp, molasses, refined sugar, syrup, invert sugar etc.	Availability of the international sugar scale, no need for maintenance	ICUMSA, GLP	P8000, P3000 with temperature control

MANUFACTURERS OF AROMAS, FRAGRANCES AND ESSENTIAL OILS

Typical applications:	Analysed substances:	Special requirements:	Standards:	Recommended polarimeter:
• Quality control of raw materials and additives • Monitoring of the production of intermediate and end products	Essential oils such as orange, lavender, lime and peppermint oil, glyceric acid, aromas and perfumes for the food and cosmetics industry etc.	High resistance to chemicals, availability of micro-cuvettes	Ph. Eur., AOAC, OIML, GLP	P8000-TF

HOSPITALS AND PHARMACIES

Typical applications:	Analysed substances:	Special requirements:	Standards:	Recommended polarimeters:
• Incoming/outgoing goods inspection • Control of pharmaceutical products according to pharmacopoeias	Pharmaceutical agents as well as raw materials and additives	Robustness, easy handling, low price	Pharmacopoeias (USP, BP, JP, Ph. Eur.), GLP	P1000-LED, P3000 with temperature control

TRAINING IN THE INDUSTRY OR AT UNIVERSITIES

Use for practical exercises and experiments:	Special requirements:	Standard:	Recommended polarimeters:
• Kinetics of the cane sugar inversion • Mutarotation of glucose • Determination of the concentration of polysaccharides through amylolysis	Easy handling, low price	GLP	P1000-LED, P3000 with temperature control

FEATURES OF OUR POLARIMETERS

P8000 SERIES

- Measurement of optical rotation
- Easy operation thanks to self-explanatory, well-arranged user interface and touch-screen display
- User administration that can be activated or deactivated depending on the requirements, with optional password protection and different user rights
- Easy, menu-driven adjustment
- Any number of measurement methods for monitoring the measurement process according to method, batch, product and/or production line incl. limit value monitoring
- Measurement modes: single, continuous or interval measurement
- Measurement with manual measurement time input or optimised measurement time thanks to automatic stability recognition
- Predefined scales for optical rotation, specific rotation, sugar content and concentration
- Any number of freely definable scales with conversions based on tables or formulas
- Suitable tubes for any type of sample
- Measurement up to an optical density of 3.0
- Manual, semi- or fully automatic sample supply
- Temperature measurement with calibratable and adjustable temperature sensor
- Reliable temperature compensation
- Optionally with efficient water bath or Peltier temperature control
- Very short measurement time of approx. 1 s
- Compact, robust powder-coated steel housing
- Chemical-resistant materials
- High-performance LED with a service life of 100,000 h
- Optional drying unit
- Tamper-proof data storage (saves the last 999 measurements)
- Customised layout of the result reports
- Interfaces for the convenient transfer of measured values (USB, Ethernet, RS-232)
- Compliance with GMP/GLP, 21 CFR Part 11, Pharmacopoeias with temperature control (USP, BP, JP, Ph. Eur.), FDA, ISO, HACCP, OIML, ASTM, ICUMSA, NIST

P3000

- Measurement of optical rotation
- Easy to use thanks to touch-screen display
- Easy, menu-driven adjustment
- Measured values are displayed as an optical angle of rotation or on the international sugar scale
- Suitable tubes for any type of sample
- Measurement up to an optical density of 3.0
- Temperature measurement with calibratable and adjustable temperature sensor
- Reliable temperature compensation
- Very short measurement time of approx. 1 s
- Compact, robust powder-coated steel housing
- Chemical-resistant materials
- Interface for printing measured values (RS-232)
- Compliance with GMP/GLP, pharmacopoeias (USP, BP, JP, Ph. Eur.), each case with temperature control, FDA, ISO, HACCP, OIML, ASTM, ICUMSA, NIST

P1000-LED

- Measurement of optical rotation according to the half-shade principle
- Manual adjustment on the scale
- Measurement results are read through an eyepiece and two noniuses
- Tube chamber for tubes with a length of up to 220 mm
- High-performance LED with a service life of 100,000 h
- Robust cast aluminium housing
- Includes two measurement tubes with a debubbler
- Low-maintenance, cost-effective solution

TECHNICAL DATA

	P8000	P8100	P8000-T/-T80/-TF	P8100-T/-T80/-TF
SCALES	Optical rotation [°] Int. sugar scale [°Z] Concentration [g/100 ml] Spec. rotation User-defined		Optical rotation [°] Int. sugar scale [°Z] Concentration [g/100 ml] Spec. rotation User-defined	
MEASUREMENT RANGES	±90° ±259 °Z		±90° ±259 °Z	
ACCURACY	±0.003° ±0.01 °Z	±0.002° ±0.01 °Z	±0.003° ±0.01 °Z	±0.002° ±0.01 °Z
RESOLUTION	0.001° 0.01 °Z		0.001° 0.01 °Z	
MEASUREMENT PERIOD ±90°	Ca. 1 s		Ca. 1 s	
LIGHT SOURCE	1 LED mit Filter		1 LED mit Filter	
WAVELENGTH	589 nm		589 nm	
SAMPLE PERMEABILITY	> 0.1 % (OD3)		> 0.1 % (OD3)	
MAX. TUBE LENGTH	220 mm		220 mm	
TEMPERATURE MEASUREMENT	With temperature probe PRT-E oder PRT-T		With temperature probe PRT-E oder PRT-T	
TEMPERATURE MEASUREMENT RANGE	0–99.9 °C		0–99.9 °C	
TEMPERATURE MEASUREMENT RESOLUTION	0.1 °C		0.1 °C	
TEMPERATURE MEASUREMENT ACCURACY	±0.2 °C		±0.2 °C	
TEMPERATURE CONTROL	Can be retrofitted (requires circulating thermostat PT31 or PT80, sample chamber bushing P8020 and temperature-controlled measurement tube PRG-100- ET)		With circulating thermostat PT31(P8000-T) or with circulating thermostat PT80 (P8000-T80) (requires temperature-controlled measurement tube such as PRG-100-ET)	
TEMPERATURE CONTROL RANGE			PT31=8°–35° C (standard), PT80=5°–80° C	
TEMPERATURE CONTROL ACCURACY			±0.2 °C	
METHODS	A practically unlimited number of methods can be set			
ADJUSTMENT	Automatic (menu-driven)			
HOUSING	Steel, powder-coated			
CONTROL	7,0” capacitive touch-screen, 800 x 480 pixels			
INTERFACES	1x USB, 1x RS-232, 1x Ethernet			
OPERATING VOLTAGE	110–250 V, 50/60 Hz			
POWER CONSUMPTION (MEASUREMENT OPERATION)	35 W		35 W	
POWER CONSUMPTION (MAX.)	50 W		50 W	
DIMENSIONS (W X H X D)	670 mm x 200 mm x 360 mm			
WEIGHT	29 kg			

P8000-P	P8100-P	P3000	P1000-LED
Optical rotation [°] Int. sugar scale [°Z] Concentration [g/100 ml] Spec. rotation User-defined		Optical rotation [°] Int. sugar scale [°Z]	
±90° ±259 °Z		±90° ±259 °Z	
±0.003° ±0.01 °Z	±0.002° ±0.01 °Z	±0,01° ±0,01 °Z	
0.001° 0.01 °Z		0.01° 0.01 °Z	
Ca. 1 s		Ca. 1 s	
1 LED mit Filter		1 LED mit Filter	
589 nm		589 nm	
> 0.1 % (OD3)		> 0.1 % (OD3)	
220 mm		220 mm	
With measurement tube PRG-100-EPT		With temperature probe PRT-E or PRT-T	
0–99.9 °C		0–99.9 °C	
0.1 °C		0.1 °C	
±0.2 °C		±0.2 °C	
With measurement tube PRG-100-EPT with 3 integrated Peltier elements		Can be retrofitted requires circulating thermostat PT31 or PT80, sample chamber bushing P8020 and temperature-controlled measurement tube PRG-100-ET	
15–40 °C			
±0.2 °C			
		N/a	
		Automatic (menu-driven)	
		Steel, powder-coated	
		3,5" touch-screen, 320 x 240 pixels	
		1x RS-232	
		110–250 V, 50/60 Hz	
65 W		30 W	
85 W		40 W	
		645 mm x 200 mm x 360 mm	
		28 kg	

SCALE	Optical rotation [°]
MEASUREMENT RANGE	2 graduated circles (0–180°)
SCALE DIVISION	1°
READING ACCURACY	0.05° (with nonius)
LIGHT SOURCE	1 LED with filter
WAVELENGTH	589 nm
MAX. TUBE LENGTH	220 mm
ADJUSTMENT	Manual adjustment on the scale
HOUSING	Cast aluminium
OPERATING VOLTAGE	110–250 V, 50/60 Hz
POWER CONSUMPTION (MEASUREMENT OPERATION)	15 W
POWER CONSUMPTION (MAX.)	15 W
DIMENSIONS (W X H X D)	140 mm x 330 mm x 500 mm
WEIGHT	4.3 kg

Picture credits:
Page 21: © www.fotolia.de/gstockstudio

OVERVIEW: POLARIMETERS, ACCESSORIES AND CONSUMABLES

ORDER NUMBER	POLARIMETERS
P8000	Digital polarimeter without temperature control and with a measurement accuracy of up to ±0.003°
P8100	Digital polarimeter without temperature control and with a measurement accuracy of up to ±0.002°
P8000-T	Digital polarimeter with circulating thermostat (PT31) temperature control,measurement accuracy of up to ±0.003°
P8100-T	Digital polarimeter with circulating thermostat (PT31) temperature control,measurement accuracy of up to ±0.002°
P8000-T80	Digital polarimeter with circulating thermostat (PT80) temperature control,measurement accuracy of up to ±0.003°
P8100-T80	Digital polarimeter with circulating thermostat (PT80) temperature control,measurement accuracy of up to ±0.002°
P8000-TF	Digital polarimeter with circulating thermostat temp. control, flow-through function, measurement accuracy of up to ±0.003°
P8100-TF	Digital polarimeter with circulating thermostat temp. control, flow-through function, measurement accuracy of up to ±0.002°
P8000-P	Digital polarimeter with Peltier temperature control and a measurement accuracy of up to ±0.003°
P8100-P	Digital polarimeter with Peltier temperature control and a measurement accuracy of up to ±0.002°
P3000	Digital polarimeter without temperature control and with a measurement accuracy of up to ±0.01°
P1000-LED	Analogue polarimeter with a reading accuracy of up to 0.05°

ORDER NUMBER	GLASS MEASUREMENT TUBES
PRG-100	Glass tube, 100 mm, 12 ml
PRG-200	Glass tube, 200 mm, 22 ml
PRG-50-E	Glass tube with filling funnel, 50 mm, 3 ml
PRG-100-E	Glass tube with filling funnel, 100 mm, 6 ml
PRG-200-E	Glass tube with filling funnel, 200 mm, 12 ml
PRG-100-ET	Glass tube with stainless steel jacket and filling funnel, temperature-controlled, 100 mm, < 4 ml
PRG-200-ET	Glass tube with stainless steel jacket and filling funnel, temperature-controlled, 200 mm, < 8 ml
PRG-100-EPT	Glass tube with stainless steel jacket, inlet & outlet, integrat. Peltier temp. control and temperature measurement, 100 mm, 8 ml
PRG-50-M	Micro glass tube, 50 mm, 0.55 ml
PRG-100-M	Micro glass tube, 100 mm, 1.1 ml
PRG-50-MT	Micro glass tube, temperature-controlled, 50 mm, 0.4 ml
PRG-100-D	Flow-through glass tube, 100 mm, 8.7 ml
PRG-100-DT	Flow-through micro glass tube, temperature-controlled, 100 mm, 0.7 ml

ORDER NUMBER	STAINLESS STEEL MEASUREMENT TUBES
PRM-100-ET	Stainless steel tube with filling funnel, temperature-controlled, 100 mm, 12 ml
PRM-100-D	Stainless steel flow-through tube with filling funnel and overflow pipe, 100 mm, 12 ml
PRM-200-D	Stainless steel flow-through tube with filling funnel and overflow pipe, 200 mm, 17 ml
PRM-100-DT	Stainless steel flow-through tube with filling funnel and overflow pipe, temperature-controlled, 100 mm, 12 ml
PRM-200-DT	Stainless steel flow-through tube with filling funnel and overflow pipe, temperature-controlled, 200 mm, 17 ml
PRM-100-DTT	Stainless steel flow-through tube with filling funnel and overflow pipe, temperature-controlled, with temperature probe, 100 mm, 12 ml
PRM-200-DTT	Stainless steel flow-through tube with filling funnel and overflow pipe, temperature-controlled, with temperature probe, 200 mm, 17 ml
PRM-50-SD	Stainless steel flow-through tube with hose connections, 50 mm, 10 ml
PRM-100-SD	Stainless steel flow-through tube with hose connections, 100 mm, 12 ml
PRM-200-SD	Stainless steel flow-through tube with hose connections, 200 mm, 17 ml
PRM-10-SDM	Stainless steel flow-through micro tube with hose connections, 10 mm, 1.5 ml
PRM-50-SDM	Stainless steel flow-through micro tube with hose connections, 50 mm, 1 ml
PRM-100-SDM	Stainless steel flow-through micro tube with hose connections, 100 mm, 0.5 ml
PRM-100-SDT	Stainless steel flow-through tube with hose connections, temperature-controlled, 100 mm, 12 ml
PRM-200-SDT	Stainless steel flow-through tube with hose connections, temperature-controlled, 200 mm, 17 ml
PRM-25-SDTM	Stainless steel flow-through micro tube with hose connections, temperature-controlled, 25 mm, 0.5 ml
PRM-50-SDTM	Stainless steel flow-through micro tube with hose connections, temperature-controlled, 50 mm, 1 ml
PRM-100-SDTM	Stainless steel flow-through micro tube with Luer connections, temperature-controlled, 100 mm, 0.5 ml
PRM-200-SDTM	Stainless steel flow-through micro tube with Luer connections, temperature-controlled, 200 mm, 2.5 ml
PRM-100-SDTT	Stainless steel flow-through tube with hose connections, temperature-controlled, with temperature probe, 100 mm, 12 ml
PRM-200-SDTT	Stainless steel flow-through tube with hose connections, temperature-controlled, with temperature probe, 200 mm, 17 ml

E = *with filling funnel;* **ET** = *with filling funnel, temperature-controlled*
EPT = *with integrated Peltier temperature control and temperature measurement*
M =*micro tube;* **MT** = *micro tube, temperature-controlled*
D = *flow-through tube with filling funnel*
DT = *flow-through tube with filling funnel, temperature-controlled*
DTT = *flow-through tube with filling funnel, temperature-controlled with temperature probe*

SD = *flow-through tube with hose connections*
SDM = *flow-through micro tube with hose connections*
SDT = *flow-through tube with hose connections, temperature-controlled*
SDTM = *flow-through micro tube with hose connections, temperature-controlled*
SDTT = *flow-through tube with hose connections, temperature-controlled with temperature probe*

ORDER NUMBER	QUARTZ CONTROL PLATES
PQE+17	Factory-certified economy quartz control plate for P3000 (to a limited extent P8000 series); accuracy: ±0.005°, angle of rotation: +17° (±1°), +50 °Z (±1 °Z) at 20 °C
PQE+34	Factory-certified economy quartz control plate for P3000 (to a limited extent P8000 series); accuracy: ±0.005°, angle of rotation: +34° (±1°), +99 °Z (±1 °Z) at 20 °C
PQE–17	Factory-certified economy quartz control plate for P3000 (to a limited extent P8000 series); accuracy: ±0.005°, angle of rotation: –17° (±1°), –50 °Z (±1 °Z) at 20 °C
PQE–34	Factory-certified economy quartz control plate for P3000 (to a limited extent P8000 series); accuracy: ±0.005°, angle of rotation: –34° (±1°), –99 °Z (±1 °Z) at 20 °C
PQP+17	PTB-certified premium quartz control plate for P8000 series and P3000; accuracy: ±0.001°, angle of rotation: +17° (±1°), +50 °Z (±1 °Z) at 20 °C
PQP+34	PTB-certified premium quartz control plate for P8000 series and P3000; accuracy: ±0.001°, angle of rotation: +34° (±1°), +99 °Z (±1 °Z) at 20 °C
PQP–17	PTB-certified premium quartz control plate for P8000 series and P3000; accuracy: ±0.001°, angle of rotation: –17° (±1°), –50 °Z (±1 °Z) at 20 °C

ORDER NUMBER	ACCESSORIES AND CONSUMABLES
PT80	Circulating thermostat; adjustment range: 5–80 °C; interface: RS-232; power supply: 100–240 V, 50/60 Hz, 60 W; dimensions (w x h x d): 170 mm x 225 mm x 244 mm
PT31	Circulating thermostat; adjustment range: 8–35 °C; interface: RS-232; power supply: 100–240 V, 50/60 Hz, 60 W; dimensions (w x h x d): 108 mm x 199 mm x 145 mm
PT31-DECKEL	Cover for circulating thermostat PT31
PT31-NETZTEIL	Mains adaptor for circulating thermostat PT31 with EU connector
P8001	Set for the connection of circulating thermostat PT31 to polarimeter P8000-T/-TF, consisting of: 2 silicone tubes (300 mm); 2 tube connections, straight
P8002	Set for the connection of measurement tubes (old version), consisting of: 2 silicone tubes (250 mm); 2 tube connections, straight
P8003	Set for the connection of measurement tubes (new version), consisting of: 2 silicone tubes (100 mm); 2 tube connections, angled
PRT-E	Temperature probe made of stainless steel with sensor Pt100
PRT-T	Temperature probe made of stainless steel, PTFE-coated, with sensor Pt100
PRT-P	Adaptor plug for the connection of temperature probe PRT-E/PRT-T to polarimeter P8000-P/P8100-P
DS7009	Luer syringe, 2 ml, 10 pieces
DS7010	Luer syringe, 10 ml, 10 pieces
DS7019	PE waste container with lid, 600 ml
DS7060	Drying unit with 3/2-way valve
DS7070	Peristaltic pump
DS7071	Tube set for peristaltic pump DS7070, consisting of: TPE pump tube (105 mm), 5 pieces; PTFE tube connection UNF, 2 pieces
DS7072	Tube set for peristaltic pump DS7070, consisting of: TPE pump tube (105 mm), 5 pieces; PTFE tube connection (olive), 2 pieces
AS80	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 polypropylene vials (50 ml) or glass vials (30 ml); other vials on request; PTFE connecting tube
AS90	Autosampler for 53 or 89 samples, including: sample plate 53x 16 ml (22 mm x 55 mm) or 89x 6 ml (16 mm x 55 mm) set polypropylene vials (16 or 6 ml); other vials on request; PTFE connecting tube
AS80-T18	Sample plate 18x 50 ml (42 mm x 43 mm)
AS80-T36	Sample plate 36x 30 ml (28 mm x 65 mm)
AS90-T53	Sample plate 53x 16 ml (22 mm x 55 mm)
AS90-T89	Sample plate 89x 6 ml (16 mm x 55 mm)
BC876	Barcode scanner
CBM910	Drucker sowie umfangreiches Drucker-Zubehör

EN

A.KRÜSS Optronic GmbH
Alsterdorfer Straße 276–278
22297 Hamburg | Germany

Phone +49 40 514317-0
Fax +49 40 514317-60

E-mail info@kruess.com
Web www.kruess.com

Version: 3.5| Stand: February 2023 | Subject to modifications and errors