

Polarimeters

- P8000 Series
- PS8000 Series
- LabGuide
- P3000 Series
- P1000
- HP100
- Polarimeter Accessories



innovation since 1796

What is polarimetry?

If we regard light as an electromagnetic wave propagating through space, it is possible to illustrate the phenomenon of "polarized light".

The oscillation and the direction of propagation of the wave define a very specific plane. If you would look towards the beam you would see this wave as a line which is inclined at a certain angle in space.

Regular light includes waves that are inclined in any direction of the space while polarized light is inclined only at a defined angle.

This polarization can only be achieved by a very close meshed grating – a polarization filter. This one filters out all waves from the regular light that do not have the same inclination as the filter's grating. Is the light now directed to a second grating which is exactly 90° to the first grating, no light will fall on the detector or the human eye located behind it. If you place an optically active substance between the two filters, light will again pass through the second filter.

Optically active substances change the inclination of the lightwave. Depending on the design of the device, the second filter is rotated (manually or automatically) until no light will fall on the detector. This technical setup explains the terms "optical rotation", "rotation angle" as well as the terms "clockwise" and "anticlockwise".

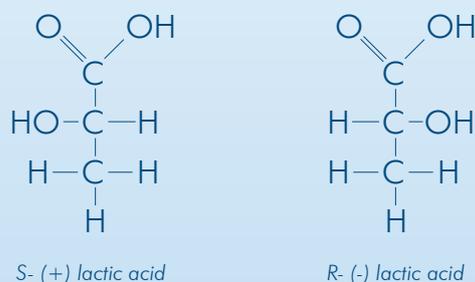
The two later terms describe the behavior of the wave mentioned above during the passage through an optically active substance. Depending on the molecular structure of the substance, the direction of the inclination of the wave is towards the right or towards the left.

In order to be able to measure this change, the second filter has to be rotated anticlockwise or clockwise.

Typical substances are sugar, lactic acid, tartaric acid but also many other biologically active substances.

Optically active are chiral substances whose molecules can take up different spatial arrangements that can not be aligned with by a rotation. Hence, this is a form of configuration isomerism. The different molecules of the substance are called enantiomers.

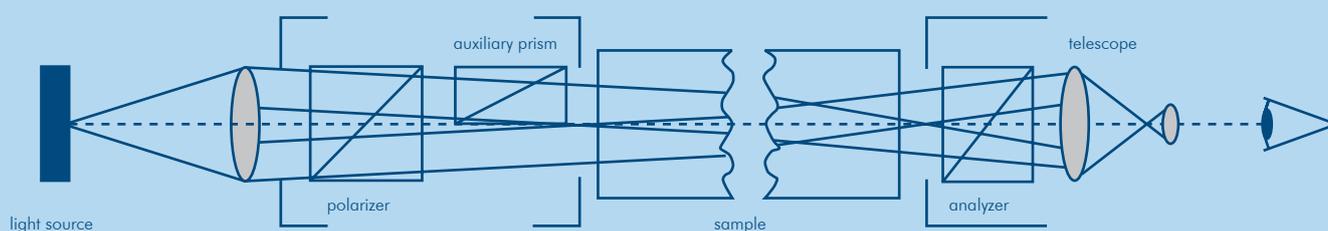
The following two enantiomers of lactic acid are an example of such a molecule:



The chiral center of the lactic acid is the middle carbon atom. Since the two enantiomers have different rotation angles, the polarimetry will provide information about the molecular structure.

In addition to the properties of the substance, the following factors also have an influence on the strength of the optical activity: the temperature, the wavelength of the light, the concentration of the substance and possibly also the solvent.

The following applies as well: The longer the path of the light through an optically active substance, the larger the angle of rotation.



Polarimeters from A.KRÜSS Optronic



P8000 Series Automatic Polarimeters S.04

PS8000 Series Automatic Sugar Polarimeters S.07



LabGuide LIMS-Software S.08



P3000 Series Automatic Polarimeters S.10



P1000 Manual Lab Polarimeter S.11



HP100 Compact Handheld Polarimeter S.12



Polarimeter Accessories S.13

P8000 Series | Automatic Polarimeters

The digital polarimeters of the P8000 series feature an innovative measuring principle to measure optically active liquids.

This development reduces the measuring time to one second irrespective of the rotation angle of the sample which – compared to conventional polarimeters – saves a lot of time.

All adjustments on the device are made via an easy to use touchscreen.

In addition, an easy to understand help display can be called up at any time.

With only very little effort, the user can carry out a simple menu-driven calibration using test quartz.

The T-models of the P8000 series are equipped with thermostat interfaces and the delivery includes an external PT31 thermostat. This allows the connection of temperature-controlled gauge heads to achieve high-precision measuring results.

The devices are intended for use in FDA regulated sectors due to their GLP compliance, integrated user management and full network support, for simple connection to the laboratory environment and an LIMS. 21 CFR Part 11 software is also available for the device.

All internal data (measurement values, parameters and methods) are organised in an SQL database. This can be accessed externally using SQL queries through a fixed interface (e.g. LIMS).

A self-explanatory touch screen with clear menu navigation and data output and USB/RS-232 interfaces fulfil all demands.



The features at a glance

- Automatic, digital polarimeter with a high accuracy and resolution
- Reliable, robust and easy to operate
- Reduces the measuring time to 1 second irrespective of the angle of the sample
- Menu-driven touchscreen operation
- Sample parameters can be customized
- Ideal for individual, continuous analyses
- RS-232, USB and Ethernet interfaces for PC and printer
- Simple output of all important measuring data including date and time
- Low noise level

Range of applications

Pharmaceutical industry

- Monitoring chemical processes
- Purity control and determination of concentrations
- Examination of substances listed in the German Pharmacopoeia

Chemical industry

- Purity control and determination of concentrations
- Analysis of optically active components (qualitative and quantitative)
- Determination of changes in the configuration
- Monitoring chemical processes

Sugar industry

- Quality control of original and end product
- Determination of fructose and glucose

Food industry

- Determination of concentration
- Purity control
- Quality control

A.KRÜSS Optronic GmbH P8000 18.08.08 12:14 ?

5

(M)

23.457

20.0 °C Opt. Rotation °

Einstellungen

Benutzer	Administrator	Temp	200.0 mm	λ 589.0 nm
Methode	1 Method 001	Temp	Keine	
Modus	Einzelmessung			

Modus Methoden System Ergebnisse Benutzer

Methoden ?

Nr.	Name
002	Method 002

Ändern

Kommentar

Ändern

Parameter

Solltemp = Keine
Einheit = Opt. Rotation °

Abbrechen Löschen Neu Bearbeiten Ok

Benutzer Einstellungen - Schutz ?

Login ID: C

Passwort: *****

Recht: User

Gültig bis: 12.04.2007 00:00

Abbrechen Ok

Main measuring display

This is where the measurement is carried out and the results as well as the important parameters are displayed.

- Reading [$^{\circ}$, $^{\circ}Z$, g/ml], optical rotation, concentration
- Tube temperature
- Sample number
- Tube length
- Wavelength
- Thermostat temperature
- Status information

Parameter selection

This menu is used to adjust the measuring parameters.

- Sample designation
- Comment
- Tube length
- Wavelength
- Measuring unit [$^{\circ}$, $^{\circ}Z$, g/ml]
- Specific rotation

Help monitor

The symbols used in the main measuring display are explained on the help monitor.

	P8000	P8000-T	P8100	P8100-T	P8200	P8200-T
Measuring method	Optical rotation, int. sugar scale, concentration, spec. rotation user-defined	Optical rotation, int. sugar scale, concentration, spec. rotation user-defined	Optical rotation, int. sugar scale, concentration, spec. rotation user-defined	Optical rotation, int. sugar scale, concentration, spec. rotation user-defined	Optical rotation, int. sugar scale, concentration, spec. rotation user-defined	Optical rotation, int. sugar scale, concentration, spec. rotation user-defined
Measuring range	±90 ° ±259 °Z 0...99.9 g/ml					
Measuring units	Angle [°, °Z], conc. [g/100 ml], user defined	Angle [°, °Z], conc. [g/100 ml], user defined	Angle [°, °Z], conc. [g/100 ml], user defined	Angle [°, °Z], conc. [g/100 ml], user defined	Angle [°, °Z], conc. [g/100 ml], user defined	Angle [°, °Z], conc. [g/100 ml], user defined
Resolution	0.001° 0.01 °Z 0.1 g/ml					
Accuracy	±0.003° ±0.01 °Z ±0.5 g/100 ml	±0.003° ±0.01 °Z ±0.5 g/100 ml	±0.002° ±0.01 °Z ±0.5 g/100 ml	±0.002° ±0.01 °Z ±0.5 g/100 ml	±0.002° ±0.01 °Z ±0.5 g/100 ml	±0.01° ±0.03 °Z ±0.5 g/100 ml
Reproducibility	0.002°	0.002°	0.002°	0.002°	0.002°	0.002°
Measuring time +/- 90°	1 sec	1 sec	1 sec	1 sec	20 sec	20 sec
Light source	1 LED with filter 589 nm	Halogen bulb	Halogen bulb			
Wavelength	589 nm others optional	589 nm others optional	589 nm others optional	589 nm others optional	Several wavelengths on request	Several wavelengths on request
Wavelength selection	One fixed wavelength	One fixed wavelength	One fixed wavelength	One fixed wavelength	Automatically via menu	Automatically via menu
Connection for temperature sensor	Special tube with temperature sensor PT100 required	Installed sensor	Installed sensor			
Temperature measurement	0...99.9 °C	0...99.9 °C	0...99.9 °C	0...99.9 °C	0...75.0 °C	0...75.0 °C
Temperature resolution	0.1 °C					
Temperature accuracy	±0.2 °C	±0.2 °C	±0.2 °C	±0.2 °C	±0.3 °C	±0.3 °C
Temperature reading point	Tube	Tube	Tube	Tube	Tube	Tube
Thermostat	–	Peltier Thermostat with water	–	Peltier Thermostat with water	–	Peltier Thermostat with water
Range of temperature control	–	15...40.0 °C	–	15...40.0 °C	–	15...40.0 °C
Accuracy of temperature control	–	±0.2 °C	–	±0.2 °C	–	±0.2 °C
Max. length of tube	220 mm					
Sensitivity	min 0.1 % (OD3)					
Calibration	Automatic (menu-driven)					
Display	LCD 5.7 " 320x240 pixel color display					
Operation	Touchscreen	Touchscreen	Touchscreen	Touchscreen	Plastic foil keyboard	Plastic foil keyboard
Measured data storage	999 measurements					
Interfaces	RS-232 USB Ethernet	RS-232 USB Ethernet	RS-232 USB Ethernet	RS-232 USB Ethernet	RS-232 USB Ethernet	RS-232 USB Ethernet
Operating voltage	100 V...250 V~ 50/60 Hz					

PS8000-Series | Automatic Sugar Polarimeters

The PS8000 is a precise and fast polarimeter especially designed for the application in the sugar industry. The operation and the measuring functions are same as those for the P8000. The measuring values are displayed in the international sugar scale. The rotation angle is shown as additional information. The display of the international sugar scale is possible for different initial weights: except for the standard unit of 26 g, initial weights of 13 g and 6.5 g can also be selected.



Technical data | PS8000 and PS8000-T

	PS8000	PS8000-T
Measuring method	International sugar scale	International sugar scale
Measuring range	±250 °Z	±250 °Z
Measuring units	Angle (°Z)	Angle (°Z)
Resolution	0.01 °Z	0.01 °Z
Accuracy	±0.01 °Z	±0.01 °Z
Reproducibility	0.02 °Z	0.02 °Z
Measuring time +/- 90°	1 sec	1 sec
Light source	1 LED with filter	1 LED with filter
Wavelength	589 nm (others optional)	589 nm (others optional)
Wavelength selection	One fixed wavelength	One fixed wavelength
Connection for temperature sensor	Special tube with temperature sensor PT100 requires	Special tube with temperature sensor PT100 requires
Temperature measurement	0...99.9 °C	0...99.9 °C
Temperature resolution	0.1 °C	0.1 °C
Temperature accuracy	±0.2 °C	±0.2 °C

	PS8000	PS8000-T
Temperature reading point	Tube	Tube
Thermostat	–	Peltier Thermostat with water
Range of temperature control	–	15...40.0 °C
Accuracy of temperature control	–	±0.2 °C
Max. length of tube	220 mm	220 mm
Sensitivity	min 0.1 % (OD3)	min 0.1 % (OD3)
Calibration	Automatic (menu-driven)	Automatic (menu-driven)
Display	LCD 5.7" 320x240 Pixel color display	LCD 5.7" 320x240 Pixel color display
Operation	Touchscreen	Touchscreen
Measured data storage	999 measurements	999 measurements
Interfaces	RS-232 USB Ethernet	RS-232 USB Ethernet
Operating voltage	100...250 V 50/60 Hz	100...250 V 50/60 Hz

KRÜSS LabGuide

The LabGuide program from Krüss allows the lab technician to facilitate the measuring process and the associated documenting of the readings. It replaces all previous manual records in the form of an electronic journal. LabGuide meets all the requirements on the treatment of electronic records and electronic signatures (ER/ES) according to 21 CFR Part 11.

LabGuide has been developed in cooperation between the A.KRÜSS Optronic GmbH and the iCD GmbH on the basis of the lab information and management system (LIMS) LABS/Q and has been producing high-precision optical-electronic measuring devices for more than 200 years in Hamburg.

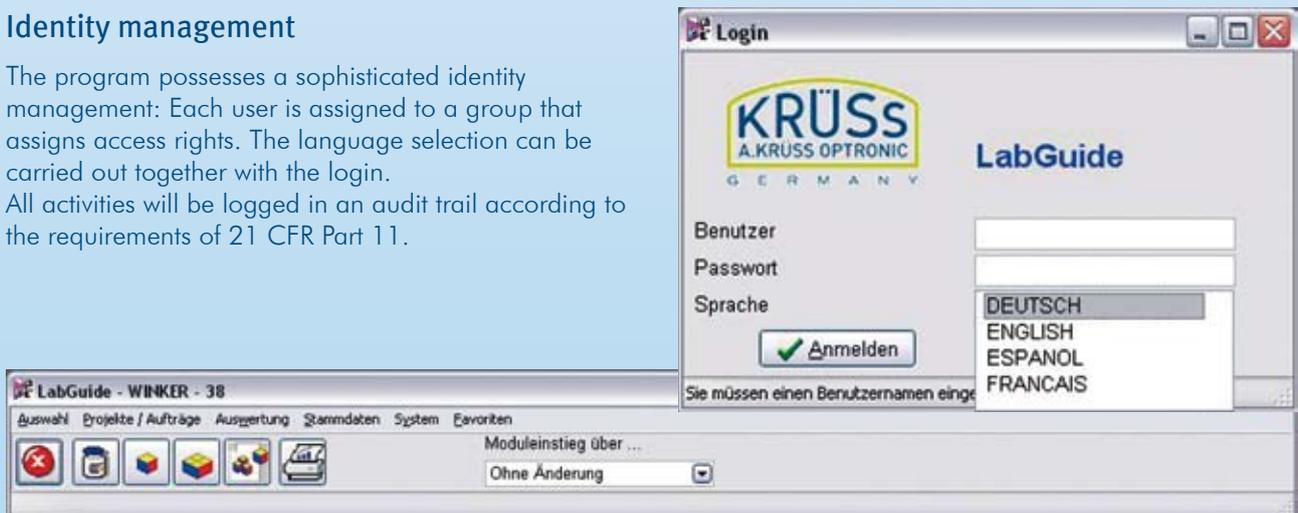
The iCD. GmbH specializes in the development of software and the associated consulting of labs in the sectors of process industry, public authorities, energy and water supply.

The software is compatible with the new device generation of the digital polarimeters and refractometers. The goal is – especially in the pharmaceutical environment – to meet the requirements on the documentation and data security. In addition to multi-lingual user guidance, the system features a standardized interface for the data exchange with other systems.

A certified interface to the SAP-QM is optionally available.

Identity management

The program possesses a sophisticated identity management: Each user is assigned to a group that assigns access rights. The language selection can be carried out together with the login. All activities will be logged in an audit trail according to the requirements of 21 CFR Part 11.



Managing the measuring devices

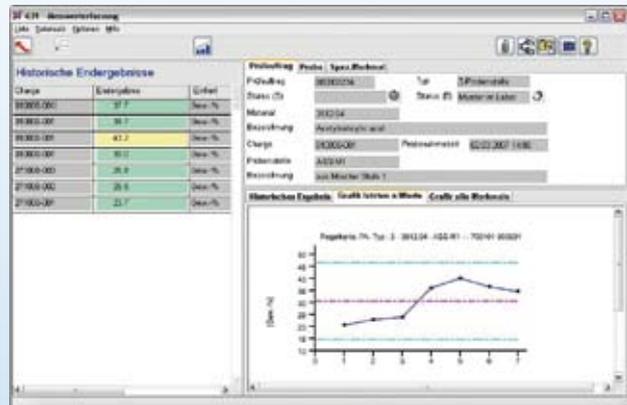
The supported lab devices are linked via an Ethernet interface. The devices automatically register with LabGuide and are available to the user for measurements.

Managing the measuring methods

On the basis of the set up measurement methods for polarimeters and refractometers, the user can create and manage his/her own measurement methods with product-specific limit values.

Analysis and reporting

In addition to the statistical analysis of the recorded data, there are different reports available to the user that can be used to print the results and the measuring data. Individual reports can be prepared by using external reporting tools via the standardized database interface.

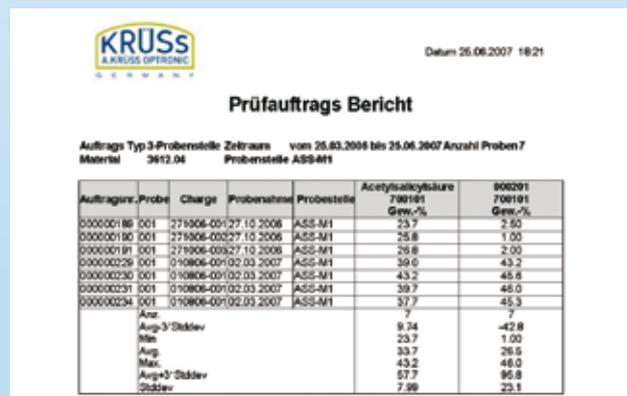


Scalability

LabGuide is a database-based program. It can be used by a single user together with a measuring device but also within the network as an Intranet application with different measuring devices and a central database.

Interfaces

In addition to the standardized XML interface that can be used to exchange measuring data between LabGuide and other systems, the system offers an additional option allowing the data exchange with SAP-QM via a certified interface.



Add-ons:

Thanks to a number of modules – ranging from the incorporation of other devices such as analysis scales to the management of the test equipment – LabGuide can be upgraded to the complete and powerful Lab Information and Management System (LIMS).

P3000-Series | Automatic Polarimeters

The P3000 is a very easy to operate polarimeter for the fully automatic measurement of the optical rotation. The measurement value is automatically shown directly after the sample has been inserted and output in angular degrees. The delivery of the polarimeter includes accessories and PC software for the operation and storage.



Range of applications

Pharmaceutical industry

- Monitoring chemical processes
- Purity control and determination of concentrations
- Examination of substances listed in the German Pharmacopoeia

Chemical industry

- Purity control and determination of concentrations
- Analysis of optically active components (qualitative and quantitative)
- Determination of changes in the configuration
- Monitoring chemical processes

Sugar industry

- Quality control of original and end product
- Determination of fructose and glucose

Food industry

- Determination of concentration
- Purity control
- Quality control

Technical data

	P3001RS	P3002RS
Measuring range	$\pm 45^\circ$	$\pm 45^\circ$
Resolution	0.005°	0.001°
Accuracy	$< 0.01^\circ$	$< 0.004^\circ$
Measurement duration	1°/sec	1°/sec
Minimum light transfer of sample	10 %	1 %
Light source	Sodium lamp (589 nm)	
Power supply	230 or 110 V, AC, 50/60 Hz, 100 W	

Scope of delivery

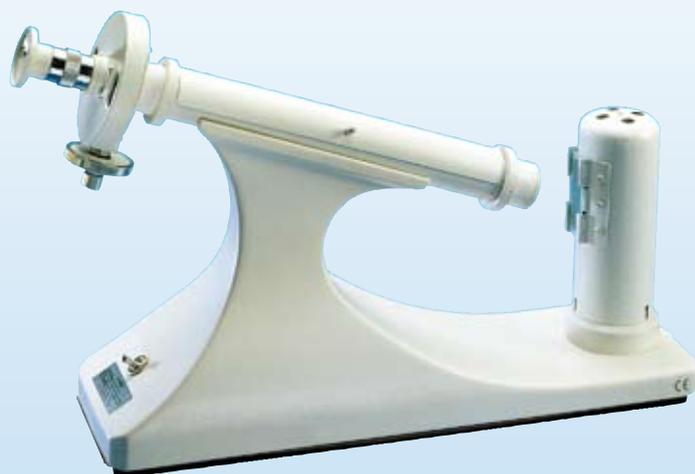
- Polarimeter tubes 100 and 200 mm
- Spare sodium lamp 589 nm
- Small glass cover plates for polarimeter tubes

P1000 | Manual Lab Polarimeter

The P1000 polarimeter is a simple and robust device for basic applications in the lab and for training. It operates according to the half-shade principle and the reading takes place via an eye-piece and two noniuses.

The P1000 features a high-quality metal stand and a sample chamber for tubes of up to 220 mm length.

It is equipped with a swivel-mounted cover, polarizer and analyzer and the delivery includes accessories.



Technical data

Measuring range	2 semi-circles (0-180°)
Glass tubes	100 and 200 mm
Scale division	1°
Reading precision	0.05° (with nonius)
Light source	Sodium lamp (589 nm)

Scope of delivery

- Polarimeter tubes 100 and 200 mm
- Spare sodium lamp 589 nm

HP100 | Compact Handheld Polarimeter



The compact handheld polarimeter HP100 is ideally suited for measuring the optical activity of dissolved substances during the process or when goods are received.

When using the integrated temperature sensor at the same time, the temperature-compensated values to be determined can be displayed in angular degrees, concentration and sugar scale.

The display is shown on a graphic display and the displayed value to be determined is selected via a robust plastic foil keyboard. An average determination is possible and the stored measured values can be transferred from the handheld device to a computer via an infrared interface where they can be further processed.

The handheld polarimeter can be operated with a provided wall power supply or with rechargeable batteries. The switch takes place automatically.

The features at a glance

- Fast application and easy operation
- Universal and mobile measurements
- Battery supplied measurements (approx. 10 000 measurements)
- No measurement tubes required
- Integrated temperature measurement and temperature compensation
- Infrared interface
- Data storage
- Measurement quality control

Technical data

Measuring range	±35° optical resolution
Wavelength	589 nm
Measuring accuracy	0.05° optical rotation
Measuring resolution	0.001° optical rotation
Display	Angular degrees, °Z, concentration, individual linear scale, specific rotation
Interface	Infrared
Data storage	99 measurements

PT31 | Peltier Thermostat



The electronic water bath thermostat with Peltier element is a versatile and powerful device used to control the temperature of refractometers, polarimeters etc. It is extremely robust, compact and easy to operate. Saves space in the lab due to its small size.

Specifications PT31

Resolution	0.1 °C
Heating output	30 W
Cooling efficiency	15 W
Power supply	115-230 ~
Pump pressure	2000 Pa
Pump capacity	20 l/h
Temperature	8-40 °C (continuously variable)
Temperature accuracy	±0.2 °C
Dimensions	L/B/H 140 x 80 x 210 mm
Weight	1.5 kg

CBM910 | Printer



24 characters regular paper printer for digital refractometer from the DR6000 series and the digital Abbe refractometer AR2008 as well as for our digital polarimeters from the P8000 series.

Polarimeter Tubes

P1000-100

Polarimeter tube 100 mm

P1000-200

Polarimeter tube 200 mm

Stainless Steel Flow-Through Tubes

P1000-D100

Stainless steel flow-through tube with funnel and overflow pipe, length: 100 mm

P1000-D200

Stainless steel flow-through tube with funnel and overflow pipe, length: 200 mm

Glass Cover Plate

P1000-150

Glass cover plate for polarimeter tube, package of 2 pieces

Sodium Lamps

P1000-300

Spare sodium lamp

Quartz Control Plate

P800 Premium Series (certifiable)

Quartz control plate for polarimeter calibration
 in °: -10°, +8°, +17°, +26°, +33°, +34° (+/-1°)
 in °Z: -30 °Z, +25 °Z, +49 °Z, +75 °Z, +95 °Z, +99 °Z
 (+/-1 °Z)

P1000 Economy Series

Quartz control plates for polarimeter calibration
 in °: -34°, -17°, +17°, +34° (+/-1°)
 in °Z: -99 °Z, -49 °Z, +49 °Z, +99 °Z (+/-1 °Z)

Accessories for P8000 and PS8000 Series

	Length in mm	Volume in ml	Article number
Glass tube with bubble trap	100	8.0	P1000-100
	200	18.0	P1000-200
Glass tube with filler tube	50	3.0	P8-50E
	95	5.5	P8-95E
	100	6.0	P8-100E
	190	11.0	P8-190E
	200	12.0	P8-200E
Stainless steel tube with filler tube, temperature controlled	100	12.0	P8-100ET
	200	17.0	P8-200ET
Stainless steel flow-through tube, temperature-controlled with temperature sensor PT-100	100	12.0	P8-100ETT
	200	17.0	P8-200ETT
Flow-through tube with funnel, overflow pipe	100	12.0	P1000-D100
	200	17.0	P1000-D200
Flow-through tube with funnel, overflow pipe, temperature-controlled	100	12.0	P8-100DT
	200	17.0	P8-200DT
Flow-through tube with hose connections	50	10.0	P8-50DS
	100	12.0	P8-100DS
	200	17.0	P8-200DS
Flow-through tube with hose connection, temperature-controlled	100	12.0	P8-100DST
	200	17.0	P8-200DST
Micro-tube	50	0.55	P8-50M
	100	1.10	P8-100M
Micro-flow-through tube	10	1.5	P8-10MD
	2.5	0.2	P8-2MD
Micro-flow-through tube, temperature-controlled	2.5	0.2	P8-2MDT
Quartz controlled plates with certificate	Quartz control plate for calibration (°Z): -30, +25, +50, +75, +95, +99, (+/-1 °Z) Different angles (°, °Z) (please contact us)		P8000 Premium-Series

Custom-made product: If this selection of polarimeter tubes and quartz plates does not meet your requirements, please do not hesitate to contact us!



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