MEASURING QUALITY. SINCE 1796

KRÜSS

DIGITAL POLARIMETER | P9000 series

Product Informationen

KRUESS.COM

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1 Description

Our new polarimeters combine everything in one device. Faster. Better. More reliable.

The devices from the P9000 series are digital polarimeters that were designed to measure the optical rotation, specific rotation or concentrations of liquid, optically active samples. The measurement is based on the ability of optically active substances to rotate the polarization direction of light. By determining the rotation, the substance and its concentration is determined. With an optical sensor, temperature control, measuring electronics, evaluation electronics and a touch display, the devices contain all the components needed to carry out measurements reliably. All operations are possible on the device itself. A separate PC with software is not necessary.

The devices and their firmware meet all requirements for FDA-regulated areas, as well as for the European (EP / Ph. Eur.), American (USP), British (BP) and Japanese (JP) pharmacopoeia.

Overview of the properties:

- Determining the optical rotation in the range up to ±90° und ±259 °Z
- Resolution up to 0.001° and 0.01 °Z

ⓘ The exact measurement range, measurement accuracy and resolution depend on the particular P9000 model, see chapter Technical data all models P9000 serie

- Measurement time of approx. 1 second
- Internal Peltier temperature control and integrated sensor for temperature monitoring
- High-performance LED with a lifetime of over 100.000 hours and a wavelength of 598 nm
- Measurements possible up to optical density (OD) 3.0
- Integrated camera (on P9200-P) for viewing the glass measurement cuvettes to check for bubbles and contamination (Sample Cell Check)
- Pre-installed scales for optical rotation, specific rotation, international sugar scale
- Pre-installed temperature compensation for quartz and sugar (sucrose)
- Functions allowing the customer to create and edit further measurands and temperature compensations
- Versatile method settings
- Up to two measurands can be measured simultaneously
- Blank value of measurement is clearly displayed
- Internal memory for storing measurement results and an optional audit trail
- 2-point adjustment by the customer
- Activatable user management with three user levels
- Chemical-resistant measurement cuvettes
- Device connections: 2x USB connections (2.0; type A); 1x serial interface (RS-232); 1x LAN connection (RJ-45); 1x AUX (currently not supported)
- Firmware with user interface for measurement, configuration, adjustment and management on the device itself.

1.1 Application areas

Polarimeter with measurement of optical rotation, specific rotation and other derived concentrations is a widely used analysis method in identity and purity testing of liquid, optically active samples. The polarimeters in the P9000 series are used as laboratory instruments.

Polarimeters are used to determine concentrations and mixture ratios and for purity control, mainly in the following sectors/industries:

- Pharmacy
- Sugar industry
- Food & Beverages
- Chemistry
- Flavourings
- Cosmetics/hygiene
- Education/research

1.2 Overview of device models

The polarimeters of the P9000 series are available in several different models. The models vary in measurement range, measurement accuracy, resolution, temperature control range, and data integrity functionality.

Model	Measurement range	Measurement accuracy	Resolution at	Features	Temperature control range	21 CFR Part 11
P9100-P	±90 °; ±259 °Z	3 digits after the decimal point	3 digits after the decimal point	---	15 °C – 45 °C	compatible
P9200-P	±90 °; ±259 °Z	3 digits after the decimal point	3 digits after the decimal point	Camera for use of Sample Cell Check	15 °C – 45 °C	compatible

1.3 Overview P9100-P model and P9200-P model

P9100-P model

- MEASUREMENT RANGE: ±90°; ±259 °Z
- MEASUREMENT ACCURACY: ±0.003°; ±0.01 °Z
- RESOLUTION: 0.001°; 0.01 °Z
- TEMPERATURE CONTROL RANGE: 15°-45°C
- 21 CFR PART 11 compatible

Price: upon request

P9200-P model

- MEASUREMENT RANGE: ±90°; ±259 °Z
- MEASUREMENT ACCURACY: 0.002°; ±0.01 °Z
- RESOLUTION: nD 0.001°; 0.01 °Z
- TEMPERATURE CONTROL RANGE: 15°-45°C
- FEATURE: Kamera für Sample Cell Check
- 21 CFR PART 11 compatible

Price: upon request

2 Technical data all models P9000 series

2.1 Basic device data

DESIGNATION	KEY DATA
MEASUREMENT RANGE	▪ ±90° ▪ ±259 °Z
MEASUREMENT ACCURACY[1]	▪ P9100-P model: ±0.003°; ±0.01 °Z ▪ P9200-P model: ±0.002°; ±0.01 °Z
REPEATABILITY [1]	▪ P9100-P model: ±0.002°; ±0.01 °Z ▪ P9200-P model: ±0.001°; ±0.01 °Z
RESOLUTION	▪ 0.001°; ±0.01 °Z
TEMPERATURE COMPENSATION	▪ Automatic temperature compensation for für Quartz und Zucker (Saccharose) ▪ Temperature compensation can be created by the customer
MEASUREMENT PERIOD[2]	▪ Approx. 1 s
FILLING QUANTITY	▪ Depending on measurement cuvette
MAXIMALE KÜVETTENLÄNGE	▪ 200 mm
LIGHT SOURCE	▪ LED 589 nm
OPERATION	▪ 7.0 inch capacitive touchscreen; 800 x 480 pixels
AUDIT TRAIL FUNCTIONALITY	▪ Fully available
INTERFACES	▪ 2x USB (2.0; type A; max. 500 mA); 1x RS-232; 1x LAN; 1x AUX (currently not supported)
IP CODE	▪ IP20 (Protection against access with a solid foreign object with a diameter of ≥ 12.5 mm; no water protection)
DIMENSIONS (W X H X D)	▪ 680 mm x 170 mm x 330 mm
HOUSING	▪ Polyurethane, coated; rear panel aluminium 3.3206 (EN-AW 6060); cover and adapter panel stainless steel 1.4509 (X2CrTiNb18)
COMPONENTS IN CONTACT WITH THE SAMPLE	▪ Borosilicate glass; PVDF, NBR, Hastelloy B3, stainless steel 1.4404 (X2CrNiMo17-12-2)
DEVICE WEIGHT	▪ P9100-P model: 16 kg ▪ P9200-P model: 16.5 kg

[1] Under normal conditions for measurement of the refractive index (**λ** = 589 nm, 20 °C, 1013 hPa, 50 % rel. humidity)

[2] After temperature equalisation

2.2 KRÜSS Assistance Systems

DESIGNATION	KEY DATA
SAMPLE CELL CHECK	▪ Yes
SAMPLE CELL CHECK WITH CAMERA	▪ P9100-P Model: No ▪ P9200-P Model: Yes
TEMPGATE®	▪ Yes
MEASURING STABILITY CHECK	▪ Yes
AUTOMATIC DETECTION OF: CUVETTES/QUARTZ CONTROL PLATES	▪ Yes
AUTOMATIC (MENU-GUIDED) ADJUSTMENT	▪ Yes

2.3 Temperature data

DESIGNATION	KEY DATA
TEMPERATURE CONTROL	▪ Integrated Peltier temperature control
TEMPERATURE CONTROL RANGE[3)]	▪ 15 – 45 °C
TEMPERATURE CONTROL ACCURACY	▪ ±0.1 °C
TEMPERATURE MEASUREMENT	▪ Integrated Pt100 temperature sensor
TEMPERATURE MEASUREMENT RANGE	▪ 5 – 60 °C
TEMPERATURE MEASUREMENT ACCURACY	▪ ±0.1 °C
TEMPERATURE MEASUREMENT RESOLUTION	▪ 0.01 °C
AMBIENT TEMPERATURE	▪ 10 – 40 °C
TEMPERATURE CONTROL	▪ 10 – 90 % (non-condensing)

[3) normal conditions for measurement of the refractive index (λ = 589 nm, 20 °C, 1013 hPa, 50 % rel. humidity)

2.4 Electrical data

DESIGNATION	KEY DATA
OPERATING VOLTAGE	▪ 90 – 240 V_{AC}
POWER CONSUMPTION	▪ P9100-P Model: 85 W in measurement mode (85 W maximum value) ▪ P9200-P Model: 86 W in measurement mode (86 W maximum value)
RATED FREQUENCY	▪ 50/60 Hz
POLLUTION DEGREE	▪ 2 (Only non-conductive contamination. However, temporary conductivity due to condensation is occasionally expected.)

[4 Under normal conditions for measurement of the refractive index (λ = 589 nm, 20 °C, 1013 hPa, 50 % rel. humidity)

3 Advantages of the P9000 series

3.1 Perfect measurement results with KRÜSS assistance systems

RELIABLE MEASUREMENT RESULTS

Safe. Compliant. Automatic.

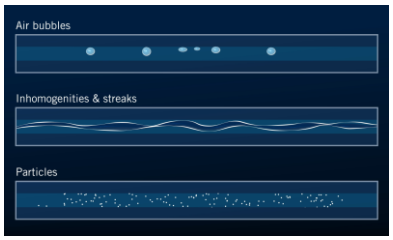
Precise and reproducible measurements require exact filling, stable temperature conditions and constant measured values.

With the state-of-the-art technology of the new P9000 series, you can achieve maximum precision and make informed decisions based on reliable data.

The KRÜSS ASSISTANCE SYSTEMS accompany you step by step – for perfect measurement results

Sample monitoring during filling

- Check your samples live on the camera image during filling
- Detect all interferences along the entire length of the cuvette
- Fill the Measurement cuvette directly in the measurement device with uniform temperature control



The following influences on the measurement are avoided

- ➡ Air bubbles in the sample
- ➡ Inhomogeneities / streaks in the sample
- ➡ Particles in the sample

Intelligent temperature control of the sample

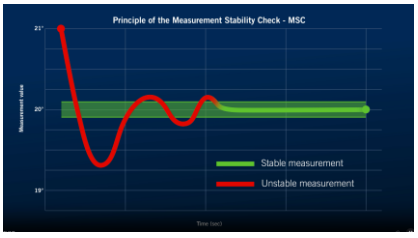
- Continuous monitoring of sample temperature control and measurement devices
- Accurate sample temperature control up to ±0.1°C
- A continuous status LED indicates that the measurement devices are ready for use

The following influences on the measurement are avoided

- ➡ Temperature gradients in the sample and in the measurement devices

Ensuring precision and reliability

- Continuous monitoring of sample temperature control and measurement devices
- Preliminary measurements are continuously analyzed for stability
- Only measured values that meet defined stability criteria are stored in the results memory



The following influences on the measurement are avoided

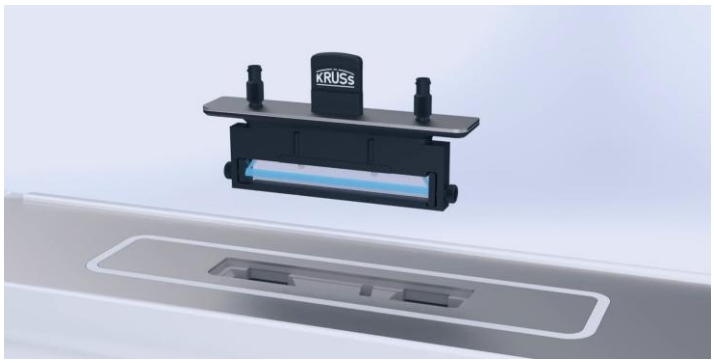
- ➡ Incomplete temperature equalization of the sample
- ➡ Air bubbles in the sample
- ➡ Inhomogeneities / streaks

3.2 Polarimeter cuvettes – Automated cuvette recognition

POLARIMETER CUVETTES
Transparent. Simplified. Unique.

Take advantage of our modern cuvette design: the new, rectangular shape offers numerous functional advantages over classic, round polarimeter tubes – and in particular facilitates handling, temperature control and bubble detection

MINIMUM SAMPLE VOLUME



A volume of just 1.3 ml is sufficient for precise measurement with our 100 mm long cuvette. Filling is done conveniently with a syringe – either directly in the temperature-controlled polarimeter or outside on the laboratory bench. The user-friendly design with a flat base enables safe, easy handling.

AUTOMATIC CUVETTE RECOGNITION

For an intuitive measurement and calibration process, the polarimeter automatically recognizes the cuvette equipped with an RFID tag and records all relevant cuvette data such as:

- Length
- Material
- Temperature control parameters

For maximum process reliability, error-free documentation and automated measurement and calibration processes.

INSIGHTS INTO YOUR SAMPLES DURING FILLING

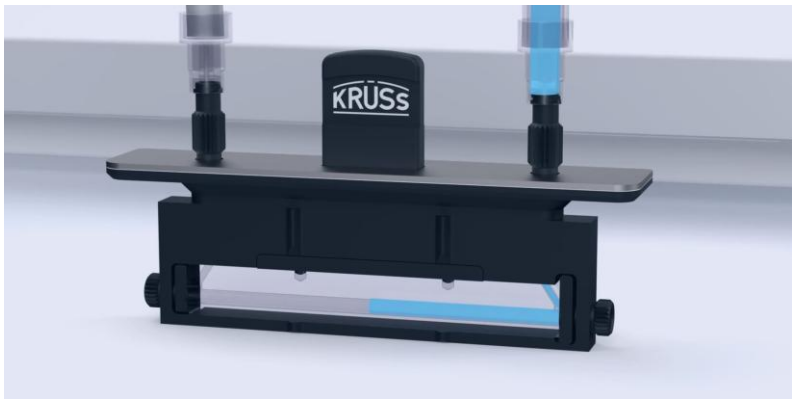
The rectangular shape of our glass cuvettes allows visual control of the sample filling over the entire length of the cuvette.
As with an aquarium, the sample can be inspected from all sides – air bubbles, particles or streaks are immediately visible.

This makes it very easy to detect and reliably avoid measurement errors with the naked eye.

3.3 Polarimeter cuvettes – sample filling, temperature control and cleaning

AUTOMATIC DOCUMENTATION OF SAMPLE FILLING

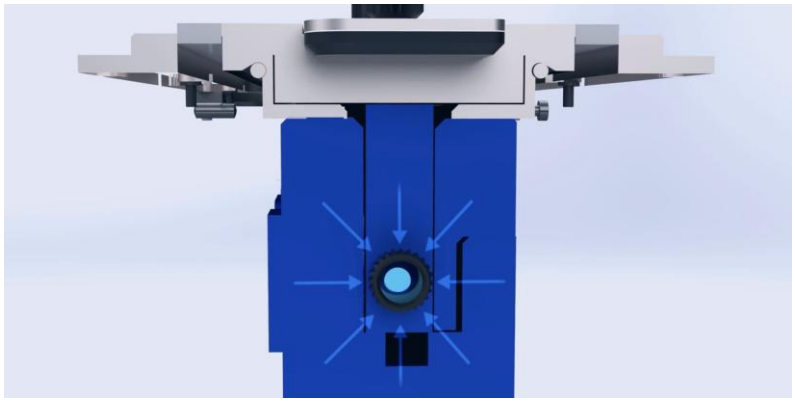
With the Sample Cell Check, the filling process itself becomes part of quality assurance. The cuvette can remain in the polarimeter during filling. An integrated camera transmits the filling process directly to the display – conveniently, precisely and without interrupting temperature control.



- The automatic sample cell check function reliably checks and documents the entire filling process.
- Especially with automated sample supply (e.g. with autosamplers), the recorded and stored images can be used for documentation or error analysis.
- This allows you to rule out potential sources of error in advance – for reproducible and reliable measurement results.

HOMOGENEOUS SAMPLE TEMPERATURE CONTROL

Thanks to its well thought-out rectangular shape, the cuvette is actively tempered across all side surfaces. The result is a homogeneous temperature distribution in the sample over the entire length of the cuvette – without any disturbing gradients.

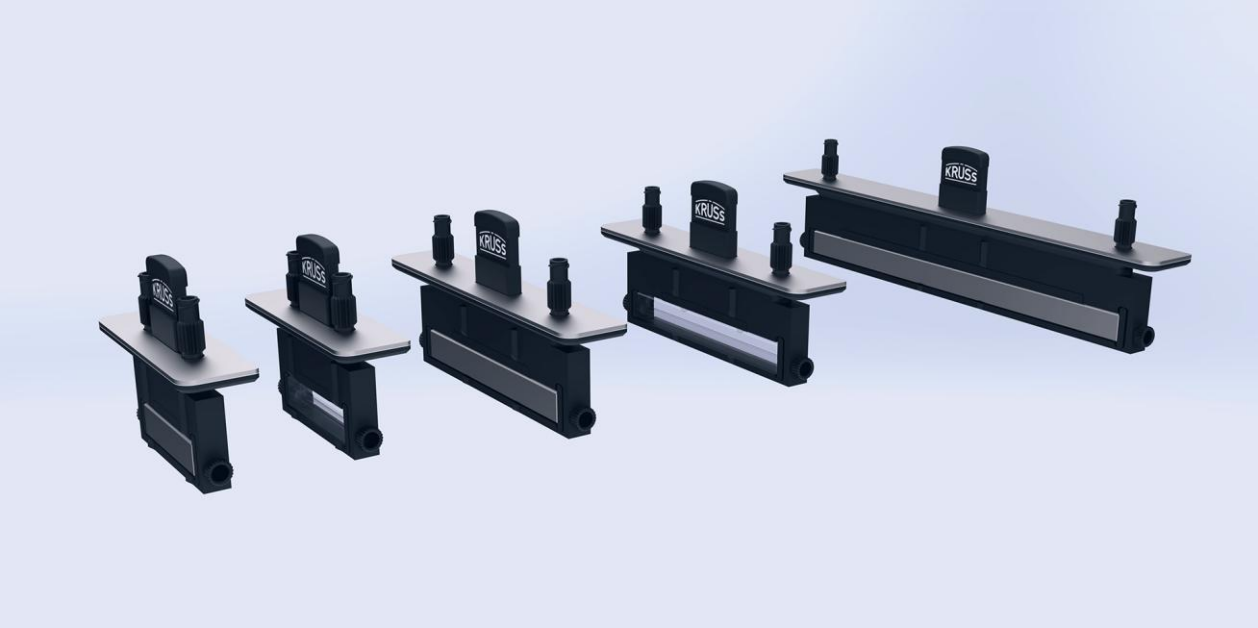


- This ensures that your sample is consistently maintained at the optimal temperature – providing stable conditions and highly accurate measurement results.
- Fast temperature stabilization for short measurement preparation times
- Homogeneous temperature curve – no measurement deviations due to temperature gradients
- Maximum measurement accuracy due to constant sample conditions

EASY TO CLEAN DOWN TO THE LAST DETAIL

- Quick to clean – in record time
- Our cuvettes are fully dismountable – in just 8 seconds, as demonstrated by our current record.
  In doing so, we deliberately rely on a design without active electronic components
- Waterproof, robust and durable.

3.4 Selection of different polarimeter cuvettes



THE OPTIMAL CUVETTE FOR EVERY APPLICATION

We offer a large selection of different polarimeter cuvettes:

- Materials: glass, stainless steel or Hastelloy
- Lengths: 50 mm, 100 mm or 200 mm
- Do you need a cuvette with special properties or dimensions? No problem – we also offer customized solutions specifically for your measuring task.
- Our cuvettes combine ease of cleaning, optimum temperature control and maximum flexibility – so that you can concentrate fully on your measurements.

3.5 Accessories: Order polarimeter cuvettes

ORDER NUMBER	ITEM
PKG-50	▪ Polarimeter cuvette made of borosilicate glass; length 50 mm; volume 0.6 ml; includes adapter plate for 50 mm cuvettes (P9001)
PKG-100	▪ Polarimeter cuvette made of borosilicate glass; length 100 mm; volume 1.2 ml; includes adapter plate for 100 mm cuvettes (P9002)
PKH-50	▪ Polarimeter cuvette made of Hastelloy B3; length 50 mm; volume 0.6 ml; includes adapter plate for 50 mm cuvettes (P9001)
PKH-100	▪ Polarimeter cuvette made of Hastelloy B3; length 100 mm; volume 1.2 ml; includes adapter plate for 100 mm cuvettes (P9002)
PKS-50	▪ Polarimeter cuvette made of stainless steel; length 50 mm; volume 0.6 ml; includes adapter plate for 50 mm cuvettes (P9001)
PKS-100	▪ Polarimeter cuvette made of stainless steel; length 100 mm; volume 1.2 ml; includes adapter plate for 100 mm cuvettes (P9002)
PKS-200	▪ Polarimeter cuvette made of stainless steel; length 200 mm; volume 2.5 ml; includes adapter plate for 200 mm cuvettes (P9003)

3.6 Calibration and adjustment with temperature-controlled quartz control plates

CALIBRATE AND ADJUST

Automatic. Precise. Certified.

Intuitive calibration with wireless RFID recognition

Each of our quartz control plates is equipped with an RFID tag. When the quartz is inserted into the polarimeter, detection is automatic and wireless – without any manual input. Fast, secure and standardized. Calibration then starts in a menu-guided and user-friendly manner directly via the display of your device.

TEMPERED QUARTZ CONTROL PLATES

Precision starts with the temperature

Quartz control plates are characterized by extremely stable optical properties – ideal for the calibration and adjustment of polarimeters. But even with solids such as quartz, temperature changes have a direct effect on the angle of rotation.

- **Example:** For a quartz control plate with a defined angle of rotation of +34°, a temperature deviation of just 1 °C leads to a measured value shift of 0.005°.
- The optical rotation of quartz increases with temperature – exact temperature control is therefore crucial for reliable measurement results. Our intelligent TempGate®-system automatically achieves the required accuracy of temperature control and keeps it constant.

PTB- CERTIFIED QUALITY

We only use quartz control plates certified by the Physikalisch-Technische Bundesanstalt (PTB) – both for the manufacturer's calibration of our polarimeters and for later use in your laboratory.

- Traceability to national standards
- Highest precision and long-term stability
- Reliable reference values over many years

3.7 Order quartz control plate as an accessory

ORDER NUMBER	ITEM
PQPK+17	▪ Premium quartz control plate; +17° (+/- 1°); accuracy ±0.001°
PQPK+34	▪ Premium quartz control plate; +34° (+/- 1°); accuracy ±0.001°
PQPK-17	▪ Premium quartz control plate; -17° (+/- 1°); accuracy ±0.001°

3.8 Data management and secure data storage in GXP environments

CONFORMITY AND COMPLIANCE

Secure data. Clear standards. Audit-proof.

The pharmaceutical industry places the highest demands on documentation, data integrity and regulatory compliance. Our solution supports you in complying with all relevant regulations with comprehensive functionality and a well thought-out system architecture. With our legally compliant documentation package, you are optimally prepared for every audit.

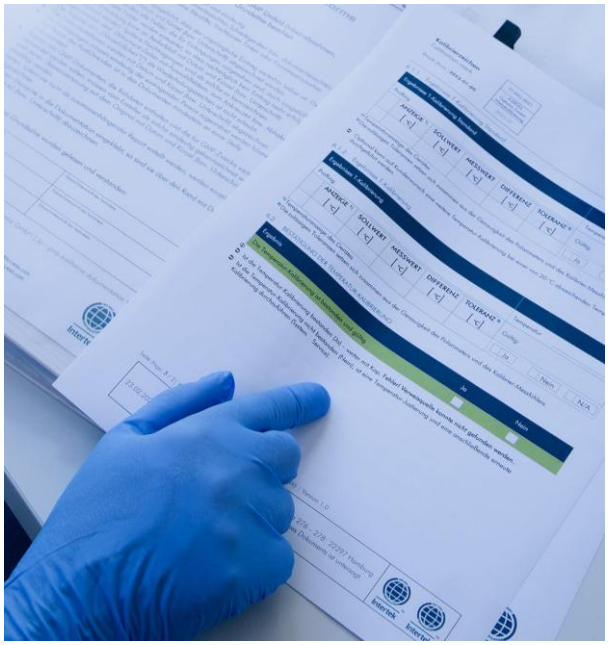
DATA INTEGRITY WITHOUT COMPROMISE

Rely on maximum security and traceability of your measured data – at all times and in the long term:

- Fully compliant with 21 CFR Part 11 & EU GMP Annex 11
- Tamper-proof data recording with lifelong audit trail
- Protected PDF/A exports
- Measured value preview for control during stabilization
- Multi-level user and password management
- Configurable interfaces for seamless system integration
- Simple network integration thanks to integrated DHCP client

3.9 KRÜSS commissioning ensures compliance and certified device qualification

Choosing a KRÜSS measuring instrument means more than simply investing in cutting-edge technology - it constitutes a strategic assurance of regulatory compliance, operational reliability, and sustained quality confidence.With our solutions, you can be sure of meeting regulatory requirements at all times. And when the instrument is integrated into your laboratory through certified commissioning, compliance becomes effortless while audit readiness is powerfully supported.These are the added-value services we provide to ensure your qualified commissioning delivers maximum impact:



- **Installation Qualification (IQ)** – Documented evidence of GMP-compliant installation, including verification of all components and materials.
- **Operational Qualification (OQ)** – Testing and documentation of performance under defined operating conditions.
- **Performance Qualification (PQ)** – Confirmation that your instrument consistently operates within specified parameters and fulfils user requirements.

- For highly regulated environments and for the pharmaceutical industry, we are pleased to support you with enhanced qualification services. This also includes **Design Qualification (DQ)** support (instrument concept) through the processing of customer-specific requirement specifications.

➔ **Discover everything about our tailored**
KRÜSS- service packages

3.10 Overview Details: Data integrity and device security

KRÜSS measuring instruments are equipped with state-of-the-art technologies, ensuring that your data is reliably captured, stored, and traceable at all times. Strict access control guarantees that only authorised personnel can work with the data. If the instrument features an audit trail, complete traceability is assured. Below is an overview of the functions and technical features we provide to ensure that data remains securely validatable.

AUDIT TRAIL FUNCTION	
RECORDING	▪ Secure electronic records of system activities (measurements, signatures, exports, setting changes) including comment option
DATA MANIPULATION	▪ Data cannot be deleted or manipulated the audit trail and measurement results cannot be deleted or manipulated for the entire service life of the device. ▪ Deleting user accounts is not possible. Unused user accounts are blocked for use

FUNCTIONS FOR DATA SECURITY	
DATA PRINTOUT	▪ GxP-compliant printout of data and device settings, fully traceable
TAMPER-PROOF	▪ Tamper-proof thanks to individual authorization of the time and date setting
DATA TRANSMISSION	▪ Data transmission using standard protocols (LAN, network share protocol)

UNIQUE AND NON-CONFUSABLE ASSIGNMENT OF USER ACCOUNT	
USER ACCOUNTS	▪ Creation and identification of users at three predefined levels (User, Application Administrator, System Administrator)
USER ACCOUNT LOGIN	▪ Each user account has a unique combination of name and login information to correctly and uniquely identify the user account
PASSWORD SECURITY	▪ Enhanced security through complex passwords (letters, numbers, special characters) and individual, defined expiry periods

EXTENDED COMPLIANCE FUNCTIONS	
RAW DATA ACCESS	▪ Possibility to access raw data and save raw data

FUNCTIONS FOR COMPLETE TRACEABILITY OF MEASUREMENT RESULTS	
MEASURED VALUE STORAGE	▪ All measurement results are saved together with all method settings so that results are fully traceable

DATA IMPORT AND EXPORT	
SIGNED & PROTECTED IMPORT	▪ Only files that are signed and recognized as permissible by the system can be loaded and processed by the system
INTERFACES CONFIGURATION	▪ It is possible to define the interfaces for export and import system wide. Note: If a interface is not selected, it is not possible to export and import to it.

3.11 Different wavelengths suitable for different measurement requirements

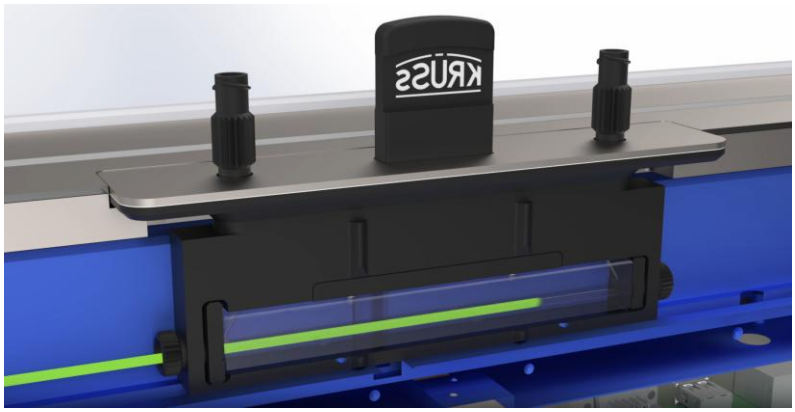
FLEXIBLE AND EXPANDABLE AT ANY TIME - Wavelength. Camera. Software.

Your requirements continue to evolve – and our system evolves with them.

Thanks to the modular design, additional wavelength modules, cameras for extended documentation or new software functions can be retrofitted at any time. Fast, uncomplicated and without investing in a new measurement device.

LIGHT SOURCES WITH MODERN LED TECHNOLOGY

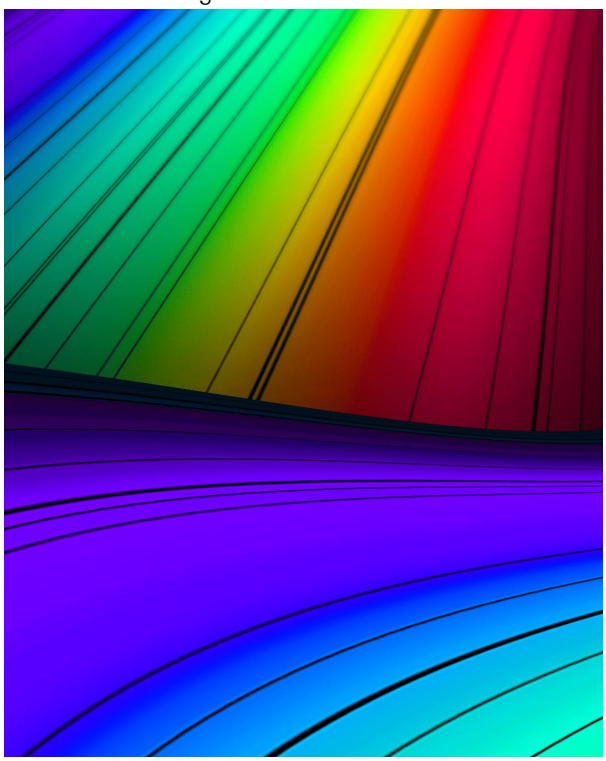
100% LED – Durable. Low maintenance. Efficient.



- We consistently use state-of-the-art LED technology to generate all available wavelengths.
- The high-performance LEDs we use offer an impressive service life of up to 100,000 hours - which significantly reduces maintenance and operating costs.

WAVELENGTHS SUITABLE FOR YOUR MEASURING TASKS

Simply select the right wavelength for you from the 8 available. The 589 nm (sodium D-line) is always included as a standard wavelength.



Wavelength (nm) Application (example)*

- 880 nm - Sugar analysis
- 633 nm - Biotechnology
- 589 nm - Standard - Sodium D-line (always included)
- 578 nm - Pharmaceutical Applications
- 546 nm - Pharmaceutical Applications
- 436 nm - Pharmaceutical Applications
- 405 nm - Concentration adjustments
- 365 nm - Special applications

* Applications are for illustrative purposes only - please select according to specific measurement requirements..

3.12 Customer service and technical support

CUSTOMER CARE FOR THE HIGHEST DEMANDS

Our products and services are designed to offer you long-term reliability and minimal maintenance costs. Benefit from our comprehensive Customer Care offer:

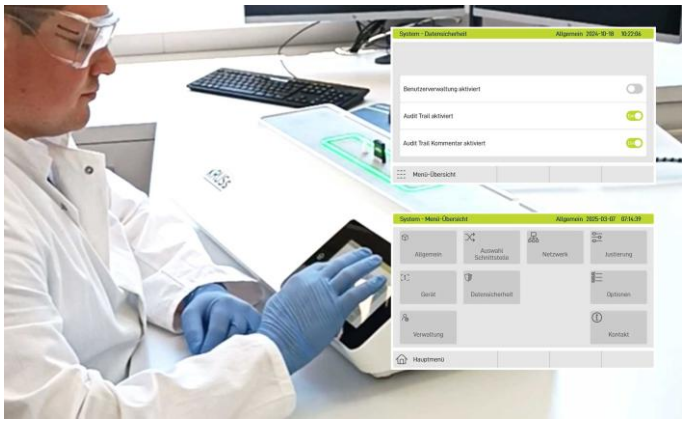
- Low maintenance - for trouble-free and efficient operation
- Up to 3-year warranty - maximum security and investment protection
- On-site calibration and maintenance service - directly at your premises, fast and uncomplicated
- Maintenance contracts available on request - Individually tailored to your needs
- Certified installations (DQ/IQ/OQ/PQ)- To comply with all regulatory and internal requirements

You can rely on our expertise - we provide you with reliable support from installation to regular maintenance.

3.13 Operation and Design

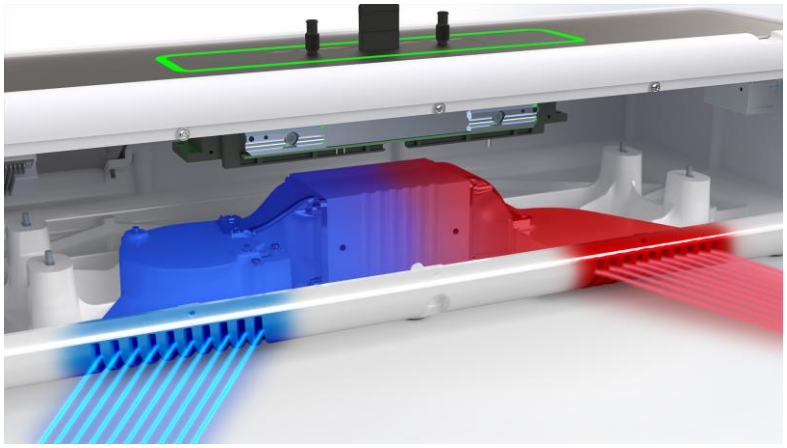
KRÜSS takes regulatory frameworks, audit requirements and compliance solutions into account both in the development of measuring instruments and software, as well as during commissioning.
We know that in a world of ever-advancing digital measurement technology, usability matters.
That's why our systems are designed to be intuitive, offer clear benefits, and provide validated measurement results you can rely on every day.

OPERATION– LIGHTWEIGHT. FAST. USER-FRIENDLY



- Capacitive 7.0-inch touch display
- Interactive user interface in several languages
- Easy-to-understand, menu-guided adjustment
- Any number of user profiles possible
- Export as print via network / printer or to USB stick
- Export also to several password protected network folders
- Operation also via keyboard and/or PC mouse

DESIGN REDEFINED – LOW MAINTENANCE. SECURE. SMART



- 24-bit display – 16.7 million colours for crystal-clear images
- Innovative ventilation design – optics and electronics hermetically sealed
- Dust-protected electronics – reliable, low-maintenance performance.
- Intelligent ventilation control and heat dissipation management
- Low noise during operation

3.14 Instruction Manual

➔ For CSP partners, available in German and English with log-in on the website
download page

3.15 Further accessories

ORDER NUMBER	ITEM
P9001	▪ Adapter plate for 50 mm cuvettes
P9002	▪ Adapter plate for 100 mm cuvettes
P9003	▪ Adapter plate for 200 mm cuvettes
P9004	▪ Blind cover 50 mm
P9005	▪ Blind cover 100 mm
P9006	▪ Blind cover 200 mm
P9007	▪ 4 glass cover plates for cuvettes; d = 8 mm
P9008	▪ 10 sealing rings for cuvettes
P9009	▪ Set of end plate for cuvettes (consisting of glass cover plate, sealing ring, and holder)
P9010	▪ 2 hollow screws for cuvettes
P9011	▪ 2 Luer-Lock connections for cuvettes
P9012-M	▪ Hose set for manual filling

4 Promotional material

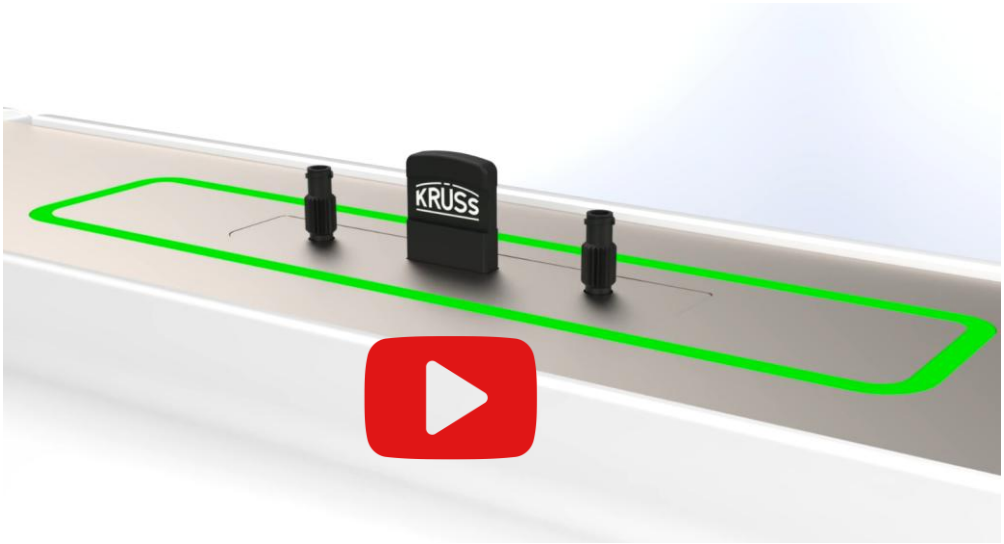
4.1 Website

➔ Product released (in the following languages: German/English/Spanish/French)

➔ Information on polarimetry on the campus

4.2 Video

➔ Coming December 2025: KRÜSS-Channel YouTube



4.3 Product brochure

➔ Coming December 2025