MCP 200/250/300/500 Sucromat
Modular Circular Saccharimeter Series
MCP Sucromat: Modular Circular Saccharimeter Series

Circular saccharimeters for high-quality sugar analysis

The MCP Sucromat series provides a range of high-quality saccharimeters for the sugar industry and sugar institutes. The reliability of MCP Sucromat is appreciated by users in reception labs and payment analysis, quality control and official institutions around the world.

Sugar analysis with MCP Sucromat saccharimeters has a long tradition: beginning in the 1980s with the first Sucromat series, developed and manufactured by Dr. Kernchen GmbH. In 2007 Dr. Kernchen became part of the Anton Paar group. Anton Paar is renowned for its high quality instruments which are realized with a passion for precision, a love of science and a shared enthusiasm, every step of the way.

With Anton Paar’s global sales and service network you have a reliable partner close to you for after-sales service and application support.

Modular to grow with your requirements

Your investment in a MCP Sucromat Saccharimeter is secure, no matter which measurements you will face in the future. All the MCP Sucromat models can be upgraded to fit new or changed requirements. Saccharimeters with a single wavelength of 589 nm can be upgraded on site with the second official ICUMSA wavelength of 880 nm. An intelligent system for automatic sample cell detection can be easily retrofitted. A fast and accurate Peltier temperature module is available as an option.

100% ICUMSA compliance

All MCP Sucromat saccharimeters provide the accuracy prescribed by the official ICUMSA methods and other national and international standards (e.g. OIML and Australian standard K157).

°Z International Sugar Scale (with and without temperature compensation), %Sucrose, %Glucose, %Purity, and °Optical Rotation are programmed into the MCP Sucromat as standard.

The right color for your measurement

Analyze lead-free clarified samples according to ICUMSA with dual wavelengths. The MCP 250/500 Sucromat saccharimeters are equipped with visible and near-infrared wavelengths (589 nm and 880 nm).

Built-in trust in the results

The FillingCheck™ camera inside the sample cell sees more than the human eye: An image of the inside of the sample is saved along with the measurement as proof of the measurement conditions.
Intelligent sample cells and quartz plates
The Toolmaster™ technology saves you time and prevents errors when exchanging sample cells and quartz control plates. Cell and quartz plate data as well as temperature values are fast and securely transferred to the instrument. This provides traceable documentation of the measurements.

Optimal temperature conditions for accurate results
Anton Paar’s most accurate temperature measurement is the basis for accurate results and short measuring times. Powerful Peltier temperature control is available as an option.

Quick startup after purchase
After purchase, the saccharimeter is set up, qualified and validated within a minimal period of time.

Ready for all applications
With over 50 sample cells available, you are equipped for every application.
First-class Technology …

Built-in trust in the results
>> FillingCheck™ (option)

MCP Sucromat has an optional built-in camera which gives you a real-time image of the sample inside the cell during and after filling.

You can see bubbles or streaks in the image more clearly than with the human eye and can intervene if necessary. You can clearly see whether a sample has been properly replaced by the next one and be sure to avoid carry-over effects. This makes operation easier and improves data security.

Each filling process can be monitored and photographed. The image is automatically stored along with the result, giving traceable documentation of the measurement conditions even after years.

Intelligent sample cells and quartz control plates
>> Toolmaster™ technology (option)

When the sample cell or quartz control plate is connected, the MCP Sucromat detects it immediately. All relevant data are transferred by cable or wirelessly.

The instrument software checks whether the sample cell is suitable for the selected method.

As the sample cell length or temperature no longer have to be entered by the operator, Toolmaster™ saves time and prevents incorrect settings. Measurements are therefore fast, clearly documented and traceable.

With this intelligent Toolmaster™ technology, calibration and adjustment of the saccharimeter no longer require tables and manual data entry. The Toolmaster™ memory chip on the quartz control plate contains all the relevant calibration data, which are automatically transferred into the instrument. The software will guide you through the quick and automated adjustment process.

Optimal thermal conditions for accurate results
>> Peltier temperature control (option)

For use in quality control, research or official institutions MCP Sucromat can be equipped with powerful Peltier temperature control. Controlling the temperature gives access to results measured at the standard temperature. There is no need for temperature compensation.

Due to the Peltier module no thermostatic baths are required. The large surface for heat conduction ensures the whole sample reaches thermal equilibrium after a very short time.
... First-class Measurements

The right color for your measurement

>> Dual wavelength models for all clarification processes

Methods using clarification processes may produce colored filtrates which are too dark to be measured at a visible wavelength but transparent enough for near infrared measurement. MCP Sucromat models are available with a second wavelength in the near-infrared range.

MCP 200/300 Sucromats use the visible wavelength of 589 nm and are suitable for measuring lead acetate-clarified samples up to an Optical Density (OD) of 4.0.

The MCP 250/500 Sucromat models use two wavelengths: 589 nm and 880 nm. At 880 nm MCP Sucromat accurately measures colored filtrates after lead-free clarification.

Measurement with near-infrared can also be applied to all raw sugars, white sugars and sugars requiring clarification.

Sample cells

>> Easy filling and secure handling

For easy filling, the sugar sample cells are equipped with a filling funnel. You can perform fast and convenient serial analyses without carry-over effects. To avoid external temperature influences and to minimize the time for temperature stabilization, you can choose cells with outer thermal insulation for temperature-compensated measurements. When using an integrated temperature control for quality control or at official institutions, special cells are available ensuring efficient heat transfer and fast thermal equilibration.

100% ICUMSA compliance

>> Measurements according to official recommendations

"The Braunschweig Method for the Polarisation of White Sugar by Polarimetry" specifies a measuring accuracy of ±0.01 °Z. This accuracy is provided by all MCP Sucromat models over the entire measuring range. MCP Sucromat fulfills the requirements for trading on the world sugar market. For all other ICUMSA methods MCP Sucromat provides the required accuracy. Other scales used in the sugar industry, such as °Z International Sugar Scale (with and without temperature compensation), %Sucrose, %Glucose, %Purity, and Optical Rotation are programmed into the MCP Sucromat as standard. Customer-specific scales are available on request.
Solid, Stable, Strong

[1] Mechanical stability = reliable measurements for years

The optical bench is the base on which all the optical components are mounted. MCP Sucromat’s optical bench is machined from one solid block of aluminum and fixed on flexible mounts. It never bends, twists or deforms. MCP Sucromat delivers stable measurement values based on the sturdy grounding of this block. The results are not affected by shaking, vibration, load, dust, temperature or humidity. There is no drift of the values over time: Values measured today are completely comparable with values measured one year ago.

[2] Long life LED light source

The MCP polarimeter is equipped with a LED light source with a life time of 100,000 hours for the analysis at Sodium D wavelength of 589 nm. This keeps service costs at minimum and reduces downtime.

[3] Light source modularity

Dual wavelengths instruments like the MCP 250/500 Sucromat are equipped with a Tungsten halogen lamp to cover additionally the NIR range.

[4] Protected components

Sensitive optical and electronic components like the analyzer, interference filters, the hollow shaft encoder and photodiode are located in a sealed housing which is resistant to dust and spills.
Clever Construction

[5] Accuracy over the whole measuring range

The MCP Sucromat models give you high angular resolution and accuracy across the entire measuring range. The high resolution is needed for measuring low concentrations and small concentration changes. MCP Sucromat measures in the range from -259 °Z to +259 °Z, which covers 100 % of all measuring requirements.

[6] Temperature sensors close to the sample

To ensure precise temperature control of the sample up to an accuracy of ±0.01 °C, MCP Sucromat has high-quality temperature sensors built into its sample cells. These sensors are positioned close to the sample to prevent thermal gradients. This is particularly important for samples whose optical rotation is strongly temperature-dependent.

[7] Protective housing

The MCP Sucromat housing protects the sensors from spilled liquids, mechanical influences and dust. A large, easy-to-open flap gives you convenient access to the sample cell area and makes it easy to exchange sample cells or insert quartz control plates. The measuring compartment is resistant to spills and equipped with a large drain.

[8] Easily accessible communication interfaces

MCP Sucromat is easily integrated into existing LIMS systems via RS232. It has a VGA port, Ethernet port, and 4 USB ports for connecting a barcode reader, keyboard, mouse, printer or USB stick. Three of these USB connections are on the side of the saccharimeter for easy access when connecting external accessories. There is also a CAN bus connection for adding an Abbemat refractometer.

[9] Intuitive user interface

MCP Sucromat has been designed with the user in mind. The built-in software is intuitive and guides you through measurements and calibration step-by-step. You can choose to operate MCP via the touch screen or the soft keys positioned around the screen. The softkeys are ideal for operation in harsh industrial environments or when wearing gloves.
Measurement Principle

Saccharimetry is a sensitive, non-destructive technique for measuring sugar concentration by determining the optical rotation of the sample. This technique is selective to the optically active constituents of the sample, i.e. the sugars. Other, optically inactive, substances and solvents do not affect the measured value. Optical activity means that the plane of linear polarized light is rotated when passing through the sample. This change of polarization angle is known as optical rotation and measured with the MCP Sucromat. The optical rotation value is automatically transformed into the required sugar concentrations.

To measure the sugar concentration via the optical rotation, a light beam from a lamp inside the saccharimeter first passes through a fixed polarizer in order to obtain a defined orientation of the plane of polarization. The polarized light then passes through the sample. Its plane of polarization becomes rotated depending on the sugar concentration.

The light with the rotated plane of polarization passes through an analyzer, which is a second polarization filter. The transmitted light behind the analyzer is detected with a photodiode. The analyzer is rotated automatically until the transmission minimum is reached. This is at 90° to the plane of polarization after the sample and is therefore a direct measure of the optical rotation.

The right wavelength for the measurement is precisely selected by an interference filter or by a filter wheel with two wavelengths positioned in the light beam in front of the detector.

To further enhance the angular resolution, the polarized light passes through an electromagnetic coil, which superimposes an oscillation onto the plane of polarization by means of the Faraday effect.

The path length of the sample cell, temperature and wavelength are influence the measurement and have to be accounted for.

Measuring system

Your benefits of this technology are:

- **Long life and durability**
  - Robust construction
  - Sensitive components are protected

- **Fast and easy to operate**
  - The correct reading is given within seconds
  - Intuitive menu structure, step-by-step calibration and measurement

- **Secure and traceable operation**
  - Automatic identification of sample cells and quartz control plates by Toolmaster™
  - Visualization of the filling quality with Filling-Check™ technology
  - Different user levels and rights
Sucrelyser

>> Purity, color and ash content

The purity of sugar is measured with a combination of an MCP Sucromat and an Abbemat refractometer connected via CAN bus. The saccharimeter determines the sugar content (°Z). The refractometer is sensitive to all constituents in the sample, i.e. dry substance content or total solids (%Brix). The relationship between the two parameters is a measure for purity of the sugar solution (%Purity).

This setup can be extended with additional instruments like colorimeters or conductivity meters for determining ash content. In this case the control and data acquisition is handled by the SugarLab PC software.

Sample preparation

>> Automated dosage, dilution and filtration

The mashed sugar beets or cane needs to be diluted and clarified for analysis. The DDS automatic dosage and dilution system is a fast and convenient way to do so: The computer-controlled balance and valve system ensures quick and accurate automatic gravimetric dilution.

For fast and easy sample filtration after dilution, the EasyFilt is operated with pressurized air. This saves time and consumables compared to conventional filtration.
Betalyser

**Automated sugar beet quality analysis**

For quality analysis in the beet reception lab and for seed growers, the exact determination of the four beet sugar quality parameters is crucial: sucrose-, K-, Na-, and α-amino nitrogen content.

The Betalyser is a combined automated system consisting of a MCP Sucromat saccharimeter (for sucrose content), Testamin double-beam photometer (for α-amino nitrogen content) and an FP flame photometer (for K and Na content).

A payment system based on the quality of sugar beets (extractable white sugar content) will counteract overpayment for lower quality beets with low extractable white sugar content. This immediately increases the sugar factory’s profitability.

Not only does the Betalyser provide a sound data basis for payment, it also helps farmers’ associations to improve beet quality and fertilization programmes.

The Betalyser system is capable of analyzing lead-clarified sugar beet extracts and aluminum-clarified sugar beet extracts in compliance with the latest ICUMSA standards.
# Specifications

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<th>MCP 200 Sucromat</th>
<th>MCP 250 Sucromat</th>
<th>MCP 300 Sucromat</th>
<th>MCP 500 Sucromat</th>
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<tbody>
<tr>
<td>Measuring scales</td>
<td>°Optical Rotation, °Optical Rotation (cell length corrected), °Specific Rotation, °Specific Rotation (cell length corrected), °International Sugar Scale (temperature compensated, not temperature compensated), % Glucose, % Sucrose, Brix temperature compensated, mathematic functions and user-definable scales</td>
<td></td>
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<tr>
<td>International sugar scale °Z</td>
<td>±259 °Z</td>
<td>±0.01 °Z</td>
<td>±0.02 °Z</td>
<td>±0.01 °Z</td>
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<tr>
<td>Measuring range</td>
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<tr>
<td>Resolution</td>
<td>0.01 °Z</td>
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<tr>
<td>Accuracy</td>
<td>±0.02 °Z</td>
<td></td>
<td>±0.01 °Z</td>
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<tr>
<td>Repeatability</td>
<td>±0.01 °Z</td>
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<tr>
<td>Wavelengths</td>
<td>589 nm</td>
<td>589 + 880 nm</td>
<td>589 nm</td>
<td>589 + 880 nm</td>
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<tr>
<td>Light source</td>
<td>LED</td>
<td>Tungsten Halogen</td>
<td>LED</td>
<td>Tungsten Halogen</td>
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<tr>
<td>Sensitivity</td>
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<tr>
<td>Temperature interface</td>
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<tr>
<td>Sensor</td>
<td>PT 100 sensor for sample temperature measurement</td>
<td></td>
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<tr>
<td>Accuracy</td>
<td>±0.2 °C</td>
<td>±0.2 °C</td>
<td>±0.1 °C</td>
<td>±0.1 °C</td>
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<tr>
<td>Temperature control (option)</td>
<td>Peltier system for automatic temperature control between 10 °C and 45 °C</td>
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<tr>
<td>Temperature control range</td>
<td>20 °C and 25 °C (optional 10 °C to 45 °C)</td>
<td>10 °C to 45 °C</td>
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<tr>
<td>Interfaces</td>
<td>4 USB, RS232, Ethernet, VGA, CAN bus easy connection of keyboard, mouse, printer, bar code reader and networks</td>
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<tr>
<td>Mechanical data</td>
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<tr>
<td>Dimensions</td>
<td>754 (L) x 392 (W) x 231 (H) mm (29.7 x 15.5 x 9.1 inches)</td>
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<tr>
<td>Weight</td>
<td>32 kg (70.5 lbs)</td>
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<td>Power management</td>
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<td>Power supply</td>
<td>Self-adapting to any mains voltage AC 100 to 240 VAC, 50/60 Hz</td>
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<td>Power consumption</td>
<td>100 VA</td>
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<td>Accessories for MCP</td>
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<td>Sample cells</td>
<td>Automatic identification of the sample cell, sample cells from 2.5 mm to 200 mm</td>
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<td>Quartz control plates</td>
<td>Automatic identification of the quartz control plate</td>
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<td>Upgrade options</td>
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<td>Automatic temperature control Peltier</td>
<td>Option</td>
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<td>Wireless Toolmaster™ technology</td>
<td>Option</td>
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<td>FillingCheck™</td>
<td>Option</td>
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