

# Modular Circular Polarimeters



**MCP**  
Series



# Longstanding know-how

Anton Paar has over forty years of experience in developing and producing polarimeters. From research and development to production and quality assurance, you can count on solutions from Anton Paar realized with a passion for precision, a love of science and a shared enthusiasm, every step of the way.

Choose one: Measure compactly



**MCP 100**

**For economic routine analysis**

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**MCP 150**

**For convenient analysis and full  
pharma compliance**

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

Choose one: Be modular



MCP 200

**Open for flexibility**

MCP 300

**Intelligent and flexible**

MCP 500

**Top of the class**

MCP 500 MW 325

**For special applications**

# Choose one:

You have always made sure that your optically active substances meet all quality standards. Of course you want to keep your promise to your customers and meet all applicable standards in a fully traceable fashion.

Regulations in your field are constantly growing and requirements keep changing. That's why most older polarimeters no longer give you the safety and traceability you need.

Anton Paar's Modular Compact Polarimeters MCP 100 and MCP 150 help you to reach all requirements automatically with the latest technology – at a truly **budget-friendly price** and with a **small size for limited space** on the lab bench. MCP 100/150 is the right choice, especially for pharmaceutical applications, universities and the flavor and fragrance industry.



## MCP 100

**"For economic routine analysis"**

- ▶ Accuracy of 0.01 °OR for standard analysis
- ▶ Automatic Peltier temperature control at 20 °C and 25 °C
- ▶ Wireless transfer of temperature measured inside the cell or quartz control plate
- ▶ 3 default measuring modes (optical rotation, specific rotation and concentration) for straightforward operation
- ▶ Compliance with all national and international pharmacopoeias
- ▶ Partially compliant with 21 CFR Part 11 (excl. electronic signature)

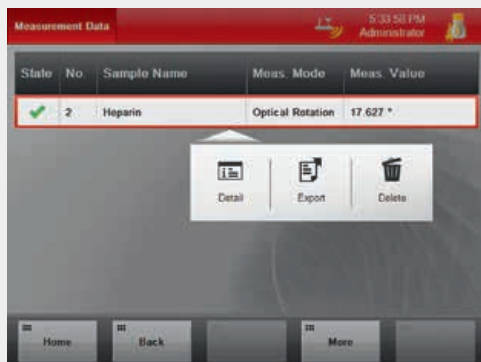
## MCP 150

**"For convenient analysis and full pharma compliance"**

- ▶ Accuracy of 0.005 °optical rotation for precise measurements
- ▶ Automatic Peltier temperature control from 15 °C to 35 °C
- ▶ Wireless transfer of temperature measured inside the cell
- ▶ 3 default measuring modes (optical rotation, specific rotation and concentration) and 4 customizable scales ready for your application
- ▶ Multiple measurements of up to 5 single measurements including mean and standard deviation
- ▶ Full compliance with all national and international pharmacopoeias
- ▶ Full 21 CFR Part 11 compliance incl. user management, Audit Trail and electronic signature
- ▶ LIMS- and FTP connectivity for safe and convenient data export



# Measure compactly



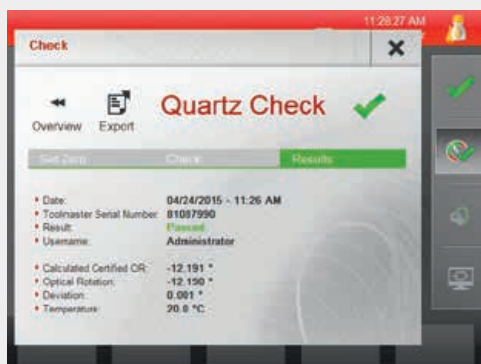
## Convenient

With its extremely **compact design**, MCP 100/150 requires **next to no space** and fits into any laboratory. The instrument is easy to operate – simply switch it on, measure your sample and get correct results within seconds. You no longer need to write down results in the laboratory book – an internal data memory ensures that no data is lost. The measured data can be **automatically exported** to a connected printer or to a server via Ethernet. MCP 100/150 offers the possibility to disable the internal data storage with the “non-storage mode”. This makes validation in the pharmaceutical industry easier because it is then classified as “Cat. B” according to USP 1058.

## Reliable

MCP 100/150 complies with **all national and international pharmacopoeias**. Defined user hierarchies ensure that only authorized personnel operates the instrument. MCP 100/150's Audit Trail function clearly and irrevocably documents every instrument interaction as required by e.g. **21 CFR Part 11**. MCP 150 additionally offers an **electronic signature** to traceably sign the measured data and a **freely definable user group administration**.

To minimize the time it takes to integrate your new MCP polarimeter into your workflow, Anton Paar offers a Pharma Qualification and Validation Package.



## Safe

MCP 100/150 can be **automatically adjusted and calibrated** with Toolmaster™ quartz control plates. The instrument guides you safely and easily through the required process and all relevant **parameters are automatically transferred** into the polarimeter with with wireless Toolmaster™ technology (Patented US: 8,908,179 B2). The result: **no data input errors, seamless documentation and full traceability**.

MCP 100/150 offers a number of safe solutions for the export of measured data, Audit Trail, check and adjustment results. FTP connectivity and LIMS connectivity are built-in features of MCP 150. MCP 100/150 provides fast and stable **automatic Peltier temperature control** which speeds up the measurement and entirely eliminates the risk of measurement errors due to inaccurate sample temperature. The sample temperature is precisely measured and wirelessly transferred to the instrument.

# Proven technology – packed into a powerful compact polarimeter

Anton Paar's MCP 100/150 polarimeters are equipped with the latest technology which ensures fast and reliable measurements with the most convenient operation. With their small size, MCP 100/150 polarimeters are the solution for limited space on the lab bench.

## Fast and accurate temperature control

The powerful automatic Peltier temperature control ensures a quick and homogenous temperature distribution in the cell and sample. This means you receive fast and accurate results.

## Operating convenience

The built-in color LCD screen and membrane keys are resistant to spillage and dirt. You can even operate the polarimeter when wearing gloves. For easy access, the USB ports are positioned on the side of the MCP 100/150.

## Durability for a long life

The LED light source guarantees 100 000 hours of operation. All parts of the polarimeter and the sample cells are resistant to aggressive chemicals.





## ⊖ Communication unlimited

The MCP 100/150 communicates with other instruments via CAN bus. Data export is available via USB, Ethernet and RS232 interfaces.

## ⊖ Intelligent sample cells and quartz plates

The wireless Toolmaster™ technology saves you time and prevents errors when changing sample cells and quartz control plates. Cell and quartz plate data as well as temperature values are transferred quickly and securely into the instrument. This provides traceable documentation of the measurements.

# Choose one:

The Modular Circular Polarimeters are a range of high-quality polarimeters for research and industry. They measure the optical rotation of liquids and use derived scales to determine the concentration or specific rotation of optically active substances. This ensures, for example, correct enantiomer separation and the required purity of materials. Determining the specific rotation is also part of the characterization of new optically active substances.



## MCP 200

**“Open for flexibility”**

- ▶ Accuracy:  $\pm 0.005$  °OR (standard mode) and up to  $\pm 0.002$  °OR (most precise mode) over the entire measuring range of  $\pm 89.9$  °OR
- ▶ Automatic Peltier temperature control at 20 °C or 25 °C
- ▶ Full 21 CFR Part 11 compliance incl. electronic signature
- ▶ Wireless transfer of temperature measured inside the cell

### Options

- Extended temperature range from 10 °C to 45 °C
- Wireless Toolmaster™ technology (automatic identification of sample cells and quartz control plates)
- FillingCheck™ (shows a real-time image of the inside of the cell)
- Air pump for emptying and drying the sample cell
- Multiple wavelength option for up to 8 different wavelengths

## MCP 300

**“Intelligent and flexible”**

- ▶ Accuracy of  $\pm 0.003$  °OR over the entire measuring range of  $\pm 89.9$  °OR
- ▶ Automatic Peltier temperature control from 10 °C to 45 °C
- ▶ Full 21 CFR Part 11 compliance incl. electronic signature
- ▶ Wireless Toolmaster™ technology (automatic identification of sample cells and quartz control plates)

### Options

- FillingCheck™ (shows a real-time image of the inside of the cell)
- Air pump for emptying and drying the sample cell
- Multiple wavelength option for up to 8 different wavelengths



# Be modular

Your investment in an MCP polarimeter is secure, no matter which measurements you will face in the future. Due to the modular concept all the MCP models can be upgraded to fit new or changed requirements (e.g. an additional wavelength or a built-in "FillingCheck™" camera to see inside the sample cell). This means you are ready for today and fit for tomorrow. The MCP polarimeters are equipped with state-of-the-art data management and sophisticated features like safe data export via FTP and LIMS.



## MCP 500

### "Top of the class"

- ▶ Accuracy better than  $\pm 0.002^\circ \text{OR}$  over the entire measuring range of  $\pm 89.9^\circ \text{OR}$
- ▶ Automatic Peltier temperature control from  $10^\circ \text{C}$  to  $45^\circ \text{C}$
- ▶ Full 21 CFR Part 11 compliance incl. electronic signature
- ▶ Wireless Toolmaster™ technology (automatic identification of sample cells and quartz control plates)
- ▶ FillingCheck™ (shows a real-time image of the inside of the cell)
- ▶ Air pump for emptying and drying the sample cell

### Options

- Multiple wavelength option for up to 8 different wavelengths

## MCP 500 MW 325

### "For special applications"

- ▶ Dual-wavelength polarimeter equipped with 589 nm and 325 nm, e.g. for the analysis of Dextromethorphan hydrobromide according to US Pharmacopeia
- ▶ Accuracy better than  $\pm 0.002^\circ$  optical rotation over the entire measuring range of  $\pm 89.9^\circ \text{OR}$  (589 nm)
- ▶ Automatic Peltier temperature control from  $10^\circ \text{C}$  to  $45^\circ \text{C}$
- ▶ Full 21 CFR Part 11 compliance incl. electronic signature
- ▶ Wireless Toolmaster™ technology (automatic identification of sample cells and quartz control plates)
- ▶ FillingCheck™ (shows a real-time image of the inside of the cell)
- ▶ Air pump for emptying and drying the sample cell



# High-quality components – excellent accuracy

Anton Paar's MCP 200/300/500 are renowned for their modular concept. Your requirements are met – from automatic identification of sample cells and quartz control plates (Toolmaster™) to a real-time image of the inside of the cell (FillingCheck™).

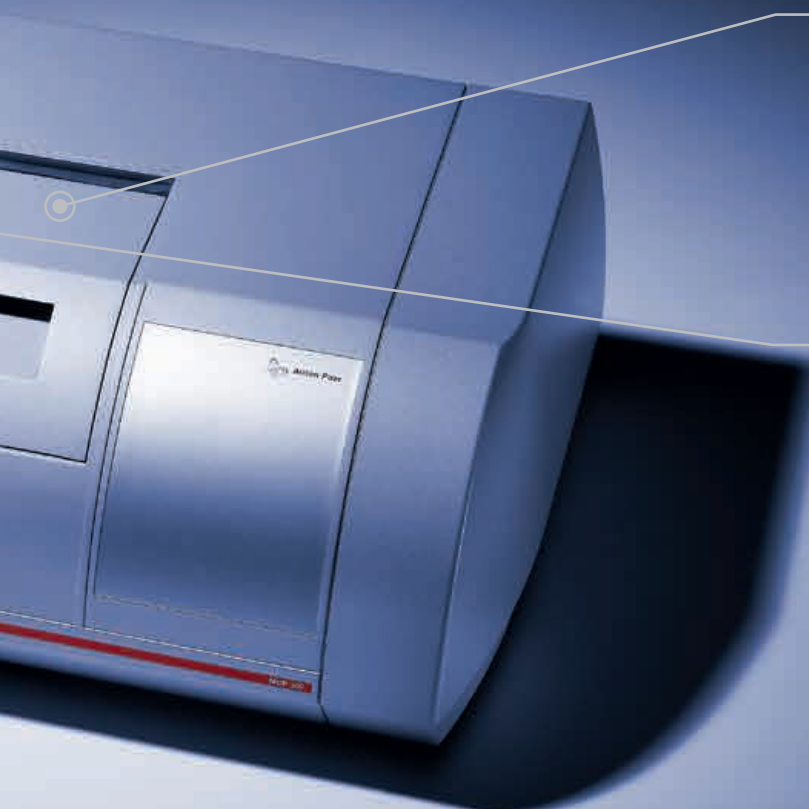
## The right color for your measurement

With the multiple wavelength option you are free to equip one instrument with up to eight wavelengths.

## Built-in trust in the results

The FillingCheck™ camera gives you a real-time image of the sample in the cell during and after filling. Each filling process can be monitored and photographed.





## 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

Powerful automatic Peltier temperature control ensures a quick thermal equilibrium and a homogenous temperature distribution in the sample. This is the basis for accurate results and short measuring times.

## Quick start-up after purchase

After purchase, the polarimeter is set up, qualified and validated within a short period of time using Anton Paar's qualification and validation package.

# Wide variety of applications



## Drugs

The MCP polarimeter can be used to ensure, for example, proper enantiomer separation, to determine the concentrations of optically active substances or to investigate correlations between toxicological and pharmacological properties and chirality.

MCP meets the standards of international pharmacopoeias and provides full compliance with 21 CFR Part 11 according to FDA.



## Starch

An MCP polarimeter can be used for the quality control and purity determination of starch and starch-based products, dextrose or corn syrup, e.g. HFCS (High Fructose Corn Syrup).



## Fragrances

In perfume manufacturing, MCP polarimeters in combination with DMA density meters and Abbemat refractometers are used to carry out purity measurements on valuable essential oils and to ensure the constant quality of the perfumes.



## Food flavors

In food production, incoming raw materials and finished products are characterized and tested for purity with MCP polarimeters in combined setups with Abbemat refractometers.



## Soft matter

Gels undergo sol-gel transitions as a function of temperature, composition, solvent exchange with the environment and other external parameters. To determine the gel-sol transition in optically active samples (e.g. gelatine) MCP with automatic Peltier temperature control can be used for precise stepwise heating around the transition temperature of the product.



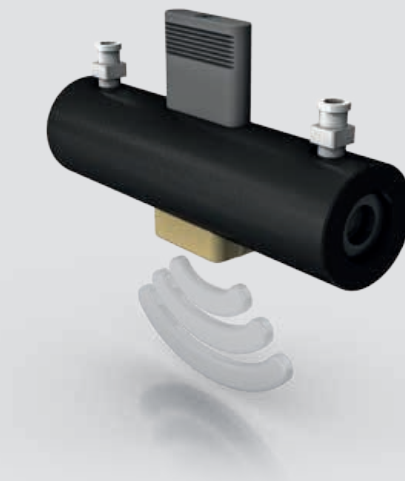
## Honey

MCP can be used to characterize honey by identifying the carbohydrate composition. The different optical activity of the carbohydrates in the honey also gives insight into the product quality. Good quality honey will show a low content of sucrose but a high content of glucose/fructose. Moreover, with an MCP polarimeter you can distinguish between blossom and honeydew honeys due to their opposed optical rotations.

# Accessories: Simplify your work

## Quartz control plates with automatic detection: Toolmaster™ technology

Quartz control plates are solid reference standards for checking and adjusting the polarimeter. They are delivered with a manufacturing certificate traceable to PTB (Physikalisch Technisches Bundesanstalt Braunschweig, Germany). All quartz control plates comply with international standards (ICUMSA and OIML). The accuracy of the optical rotation (OR) value is  $\pm 0.002$  °OR. Using intelligent quartz plates with Toolmaster™ technology, calibration and adjustment of the polarimeter 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 guides you through the quick and automated adjustment process.



## Sample cells with automatic detection: Toolmaster™ technology

Relevant parameters (path length, sample temperature, material type, serial number, last service date) are transferred into the MCP software automatically to enable maximum traceability and easy handling.

### Safe, quick and user-friendly wireless data transmission

- ▶ No handling of external temperature sensor required
- ▶ No cross-contamination from an external temperature sensor
- ▶ No cables and connectors
- ▶ Cells are waterproof

### Stainless steel or Hastelloy cells with LUER filling port or filling funnel

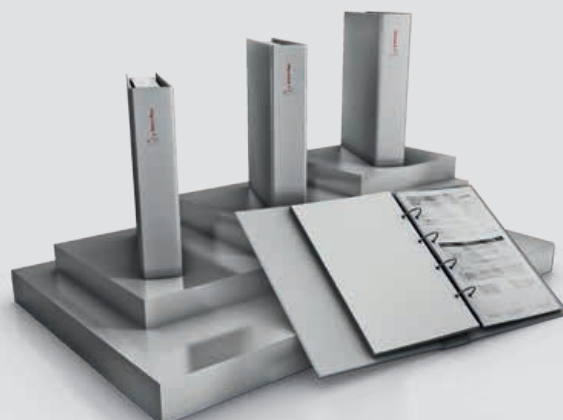
- ▶ Range of cells, from standard stainless steel up to Hastelloy
- ▶ Different path lengths from 2.5 mm to 200 mm
- ▶ Volumes from 0.7 mL to 20 mL



## Assistance with qualification and validation

The MCP polarimeter software fully supports the requirements of the pharmaceutical industry, including GMP, 21 CFR Part 11, GAMP 5, USP<1058> and international pharmacopoeia (e.g. Ph. Eur., USP, JP).

Anton Paar offers a Pharma Qualification and Validation Package which helps to integrate your new MCP into your workflow within a minimal period of time.



# Specifications

|                                            | MCP 100                                                                                                                          | MCP 150                                                                                                      |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
|                                            |                                                                                                                                  |                                                                                                              |
| Measuring scales                           | °Optical Rotation, % concentration (g/100 mL, g/L, g/100 cm³, kg/m³), °Specific Rotation                                         | Optical Rotation, % concentration (g/100 mL, g/L, g/100 cm³, kg/m³), °Specific Rotation, customizable scales |
| Measuring range                            | ±89.9°                                                                                                                           | ±89.9°                                                                                                       |
| Resolution                                 | 0.001°                                                                                                                           | 0.001°                                                                                                       |
| Accuracy                                   | ±0.01°                                                                                                                           | ±0.005°                                                                                                      |
| Repeatability                              | ±0.01°                                                                                                                           | ±0.005°                                                                                                      |
| Wavelength                                 | 589 nm                                                                                                                           | 589 nm                                                                                                       |
| Light source                               | High-intensity LED (lifetime of 100 000 hours)                                                                                   |                                                                                                              |
| Temperature control & measurement          |                                                                                                                                  |                                                                                                              |
| Sensor                                     | Pt100 sensor for sample temperature measurement inside the cell or quartz control plate; wireless transfer to the instrument     |                                                                                                              |
| Accuracy                                   | ±0.2 °C                                                                                                                          | ±0.1 °C                                                                                                      |
| Peltier temperature control range          | 20 °C and 25 °C                                                                                                                  | 15 °C* to 35 °C                                                                                              |
| Dimensions, power requirements, interfaces |                                                                                                                                  |                                                                                                              |
| Dimensions (L x W x H)                     | 370 mm x 320 mm x 130 mm (14.6 in x 12.6 in x 5.1 in)                                                                            |                                                                                                              |
| Weight                                     | 8.6 kg (19 lbs)                                                                                                                  |                                                                                                              |
| Power management                           | Self-adapting to any mains voltage<br>100 to 240 VAC, 50/60 Hz                                                                   |                                                                                                              |
| Power consumption                          | typ. 70 VA, max. 120 VA                                                                                                          |                                                                                                              |
| Interfaces                                 | USB, RS232, Ethernet, CAN bus.<br>Easy connection of keyboard, mouse, printer, bar code reader and networks.                     |                                                                                                              |
| Accessories                                |                                                                                                                                  |                                                                                                              |
| Sample cells                               | Sample cells from 2.5 mm to 100 mm with wireless temperature measurement                                                         |                                                                                                              |
| Quartz control plates                      | Automatic identification of the quartz control plate and automated wireless transfer of reference parameters into the instrument |                                                                                                              |

\* at max. 30 °C ambient temperature

## Features

|                                              | MCP 100 | MCP 150 | MCP 200/300/500, MCP 500 MW 325 |
|----------------------------------------------|---------|---------|---------------------------------|
| <b>Automatic Peltier temperature control</b> | ●       | ●       | ●                               |
| <b>Wireless Toolmaster™ technology</b>       | ●       | ●       | ●                               |
| <b>Audit trail</b>                           | ●       | ●       | ●                               |
| <b>Access control</b>                        | ●       | ●       | ●                               |
| <b>User levels</b>                           | ●       | ●       | ●                               |
| <b>User group administration</b>             | ○       | ●       | ●                               |
| <b>Electronic signature</b>                  | ○       | ●       | ●                               |
| <b>Multiple measurement</b>                  | ○       | ●       | ●                               |
| <b>21 CFR Part 11 compliance</b>             | ⦿       | ●       | ●                               |

○ not available | ⦿ partly available | ● standard

|                                            | MCP 200                                                                                                                                                                                                                                                                                   | MCP 300                     | MCP 500             | MCP 500 MW 325                                                    |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------|-------------------------------------------------------------------|
|                                            |                                                                                                                                                                                                                                                                                           |                             |                     |                                                                   |
| Measuring scales                           | °Optical Rotation, °Optical Rotation (cell length corrected), °Specific Rotation, °Specific Rotation (cell length corrected), % concentration (g/100 mL, g/L, g/100 cm³, kg/m³), °International Sugar Scale (not temperature-compensated), mathematic functions and user-definable scales |                             |                     |                                                                   |
| Measuring range                            | ±89.9°                                                                                                                                                                                                                                                                                    | ±89.9°                      | ±89.9°              | ±89.9°                                                            |
| Resolution                                 | 0.001° / 0.0001° (optional)                                                                                                                                                                                                                                                               | 0.001° / 0.0001° (optional) | 0.0001°             | 0.0001°                                                           |
| Accuracy                                   | ±0.002° (most precise)<br>±0.005° (fast)                                                                                                                                                                                                                                                  | ±0.003°                     | better than ±0.002° | better than ±0.002°                                               |
| Repeatability                              | ±0.002°                                                                                                                                                                                                                                                                                   | ±0.002°                     | better than ±0.001° | better than ±0.001°<br>(at 589 nm)                                |
| Wavelengths                                | 589 nm and optionally up to eight wavelengths. Standard spectral wavelengths (365, 405, 436, 546, 578, 633, 880 nm) and others upon request.                                                                                                                                              |                             |                     | 325 nm and 589 nm<br>(optionally 365, 405, 436, 546, 578, 633 nm) |
| Light source                               | High-intensity LED (lifetime of 100 000 hours)<br>Tungsten halogen lamp for multi-wavelength option (6 V/20 W, lifetime of 2000 hours)                                                                                                                                                    |                             |                     |                                                                   |
| Sensitivity                                | Up to Optical Density (OD) 4.0, measures samples with transmittance as low as 0.01 %                                                                                                                                                                                                      |                             |                     |                                                                   |
| Temperature control & measurement          |                                                                                                                                                                                                                                                                                           |                             |                     |                                                                   |
| Sensor                                     | Pt100 sensor for sample temperature measurement inside the cell or quartz control plate; wireless transfer to the instrument                                                                                                                                                              |                             |                     |                                                                   |
| Accuracy                                   | ±0.2 °C                                                                                                                                                                                                                                                                                   | ±0.1 °C                     | ±0.03 °C            | ±0.03 °C                                                          |
| Peltier temperature control range*         | 20 °C and 25 °C<br>(optional 10 °C to 45 °C)                                                                                                                                                                                                                                              | 10 °C to 45 °C              | 10 °C to 45 °C      | 10 °C to 45 °C                                                    |
| Dimensions, power requirements, interfaces |                                                                                                                                                                                                                                                                                           |                             |                     |                                                                   |
| Dimensions (L x W x H)                     | 754 mm x 392 mm x 231 mm (29.7 in x 15.5 in x 9.1 in)                                                                                                                                                                                                                                     |                             |                     |                                                                   |
| Weight                                     | 32 kg (70.5 lbs)                                                                                                                                                                                                                                                                          |                             |                     |                                                                   |
| Power management                           | Power supply self-adapting to any mains voltage, 100 to 240 VAC, 50/60 Hz                                                                                                                                                                                                                 |                             |                     |                                                                   |
| Power consumption                          | 100 VA                                                                                                                                                                                                                                                                                    |                             |                     |                                                                   |
| Interfaces                                 | 4 USB, RS232, Ethernet, VGA, CAN bus. Easy connection of keyboard, mouse, printer, bar code reader and networks.                                                                                                                                                                          |                             |                     |                                                                   |
| Accessories                                |                                                                                                                                                                                                                                                                                           |                             |                     |                                                                   |
| Sample cells                               | Sample cells from 2.5 mm to 100 mm with automatic identification and wireless temperature measurement                                                                                                                                                                                     |                             |                     |                                                                   |
| Quartz control plates                      | Automatic identification of the quartz control plate and automated wireless transfer of reference parameters into the instrument                                                                                                                                                          |                             |                     |                                                                   |

\* at max. 20 °C ambient temperature

## Features

|                             | MCP 200  | MCP 300  | MCP 500  | MCP 500 MW 325 |
|-----------------------------|----------|----------|----------|----------------|
| <b>FillingCheck™</b>        | Optional | Optional | ●        | ●              |
| <b>Air pump</b>             | Optional | Optional | ●        | ●              |
| <b>Multiple wavelengths</b> | Optional | Optional | Optional | ●              |

