



sartorius
mechatronics

Full-range moisture analysis from a single source



turning science **into solutions**



Contents

The right analyzer for any application	5	Sartorius WDS 400	18
Sartorius MA35	6	Selective detection of surface water, capillary water and water of crystallization	
Easy ... very easy!			
Sartorius MA150	7	Specifications Accessories	19
The compact class featuring maximum performance with minimum space requirements		WDS 400	
Sartorius MA100	8	Sartorius LMA300P	22
Analytical precision, combined with flexibility and dynamics		Moisture analysis within a split second	
Sartorius LMA100P	9	Specifications Accessories	23
Workhorse for monitoring production and incoming goods		LMA300P	
Specifications	10	Sartorius PMD300P and PMD301P	24
MA35 MA100 MA150 LMA100P		Online moisture analysis within a split second	
Accessories	12	Specifications Accessories	25
MA35 MA100 MA150 LMA100P		PMD300PA-000U	
Sartorius LMA200PM	13	Sartorius LMA500	26
Speed meets analytical precision		Analyzing moisture content with optics—quick, reliable, non-destructive	
Specifications Accessories	14	Specifications	27
LMA200PM		LMA500PO	
Sartorius reference LA	15		
Efficient management of backweighing data			
Specifications Accessories	16		
LA Reference			



The right analyzer for any application

Foods, chemical | pharmaceutical products, building materials or animal feed—you name it, the moisture or water content has a decisive impact on price, processability and quality, ranging from raw materials to final products. Determining this moisture content is one of the most common analyses in product development and in the manufacturing process. Here, the most diverse requirements on speed, resolution of the values measured or on the operating design of the moisture analyzers must also be considered in all cases. As a leading provider of moisture analysis equipment, Sartorius is thoroughly familiar with the needs of its customers and thus offers a wide range of equipment that is continuously being enhanced.

Infrared drying—fast and precise

A fast alternative to the classic oven drying method, infrared dryers from the Sartorius series of **moisture analyzers** are being increasingly used. These analyzers are compact and designed for routine operation in production and in applications involving incoming inspection. They feature the resolution of an analytical balance, and are ideal for research and development. Moreover, we supply these moisture analyzers in versions with an EC type-approval certificate for use in legal metrology. Sartorius offers a custom solution for nearly any requirements. A wide selection of infrared heat sources, such as a halogen lamp, a CQR quartz glass heater and a ceramic heating element, enable these moisture analyzers to be optimally adapted to the intended application.

Microwave drying

If the sample contains a large amount of water, microwave drying is the fastest and most effective drying method. It takes just 40–120 seconds to vaporize the water out of the sample. If under normal pressure conditions, the temperature of the escaping water vapor

measures slightly over 100°C during the heating process. As such, this method is comparable to the 105°C setting in a classic oven dryer.

Differential weighing

If the oven drying method is absolutely essential, the differential weighing program of the **LA Reference** series of balances efficiently manages large volumes of data and automatically calculates the differences between the tare weight, initial sample weight and backweights.

Coulometry—selective detection of water

If you need to determine not only the moisture, but also the water content of a sample, the coulometric Karl Fisher titration method is the most commonly used technique. A further advancement in KF filtration is the combination method incorporated in the **WDS 400 Water Detection System**. The WDS 400 allows accurate measurements to be performed down to a detection limit of 1 µg of water. At the same time, it enables quantitative differentiation among surface water, capillary water, and water of crystallization. In addition, the WDS 400 completely eliminates the need for using test reagents required in KF titration.

Microwave resonance technology

The microwave resonance method offers the advantage of particularly fast measurement, well below one second. At the same time, it is non-destructive, which means that this versatile method can be used in the laboratory and for online and offline applications.

The basis of this new Sartorius product line is the LMA300P, a modular system. This system consists of a control and evaluation unit and a resonator module in which the moisture of a sample is measured. Applications for the system cover measurement of the moisture in pourable, granulated and viscous products with a moisture content between 0.1% and 60%.

The new PMD300 series can analyze moisture levels online, meaning that the analysis occurs continuously in the running process. Highly sensitive sensors integrated in the production line enable a permanent analysis of moisture content. This information is then sent to the processing unit, which is directly connected to the controller. The result is that the entire process is constantly controlled and documented—and 100% automatic.

NIR technology

Optical or spectroscopic methods exploit the interaction between light and the sample. If light is directed on a sample, a part of that light is reflected, changing it characteristically. The resulting change in the light is then used to calculate the moisture content. NIR spectroscopy is a non-destructive technology, meaning that the samples can be used for further analyses. In addition, NIR spectroscopy is fast, reliable and precise.

The LMA500 NIR calibrator is the first in our new NIR spectroscopy series. It can not only analyze moisture content, it can also do onsite calibration. As a result, methods can be adapted to the materials currently being tested. The NIR calibrator is designed for pourable and granulated substances with a moisture content between 0.1% and 50%, depending on the sample.

Sartorius MA35

Easy ... very easy!

The MA35 is the new basic model in the moisture analyzer series from Sartorius. Its performance functions and operating concept are geared toward daily routine processes such as repetitive QC monitoring of samples as performed during in-process control and incoming goods inspection. To make the MA35 even more user-friendly, we have done away with seldom-used programming options without compromising flexibility or measurement accuracy.



No need for programming

End-point determination is fully automatic. It is no longer necessary to program a shutoff parameter. The MA35 continuously monitors the drying process and stops the measurement as soon as the sample has reached a constant weight—i.e., when no more weight loss can be detected despite heating. A built-in weighing system provides the measurement accuracy required for this with 1-mg resolution that is optimized for use in high temperature ranges. For sample heating, the MA35 is equipped with two powerful metal tubular-shaped heating elements, providing 360 watts of power. These heating elements, also called dark radiators, are both rugged and durable. Compared to heating lamps made from glass, e.g. infrared lamps or halogen heaters, these are especially resistant to dirt and vibration. In addition, the MA35's metal heating elements can be used in accordance with the strict guidelines of the FDA and HACCP in cases where glass is prohibited in certain production processes.

Easy-to-understand and error-free moisture analysis

The operating design focuses on accuracy and ease of use. The concise display shows the user all important information at a single glance. Easy-to-understand icons guide you in three steps from taring the sample pan to starting the measurement. The MA35 has done away with the regular Program Selection menu, opting instead for a limited number of drying routines that can be saved in the non-volatile memory. All important operating parameters can be accessed and changed in seconds, giving you more flexibility.

The optional printer, YDP03-OCE, enables you to print analysis results on a short report to save on paper usage. If you need comprehensive documentation, you can also print out the sample analysis results as well as the weighing system and temperature calibration as a detailed GLP report.



Sartorius MA150

The compact class featuring maximum performance with minimum space requirements

For routine operation

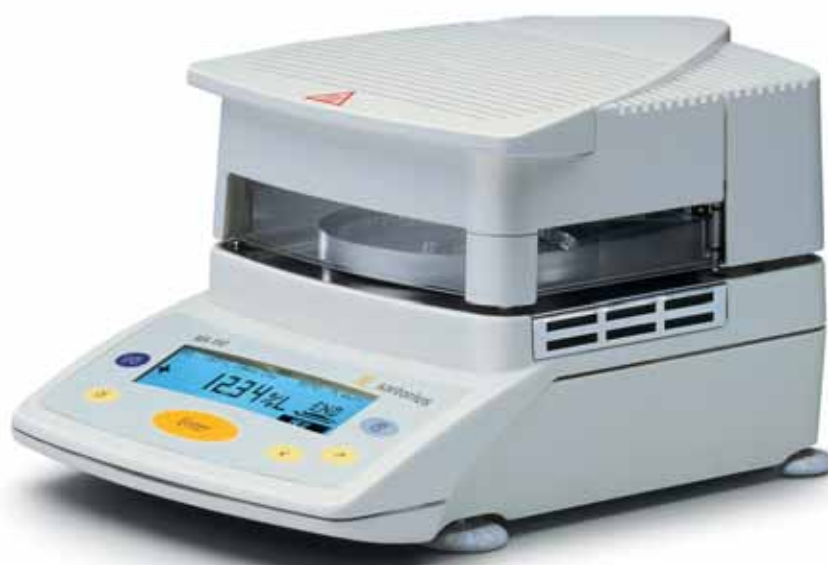
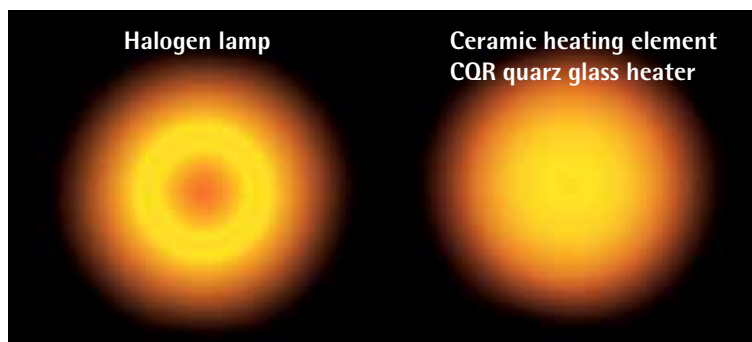
A rugged design with low space requirements and easy operation are the major features of the MA150. Fully automatic drying of a sample until a constant weight is reached eliminates the need for programming an endpoint shutoff parameter. Twenty drying routines can be saved to give you the flexibility you need when the moisture content of additional, "out-of-the-ordinary" samples of material has to be measured.

Customizable and fast

Sartorius offers you a choice of two different moisture analyzers that cover diverse requirements on moisture measurements. Whichever heat source you opt for, both analyzers deliver results within just minutes. For temperature-sensitive samples, a ceramic heating element ensures especially gentle heating over the entire surface. The other choice, a CQR quartzglass heater, optimizes the analysis time even further, which is already ultrafast for the analyzer featuring the ceramic heater.

Application-specific solutions

Practical accessories round off the entire line-up of Sartorius moisture analyzers. These include, for instance, an in-use dust cover that is included with the standard equipment supplied and a special version of the moisture analyzer without openly accessible glass components in compliance with the stringent FDA and HACCP requirements that ban the use of glass in production.



Sartorius MA100

Analytical precision, combined with flexibility and dynamics



As accurate as an analytical balance

The **MA100** is the first infrared dryer in the world that features a built-in weighing system with 0.1-mg resolution and an EC type-approval certificate. A motorized heating unit moves over the sample to open or close the sample chamber. This reduces interfering effects when a sample is placed on the pan or a measurement is started. The pacesetting design enables the MA100 to achieve a measuring accuracy well beyond that provided by conventional infrared dryers.



Automatic adaptation to reference values

The acronym "SPRM" stands for "Swift Parameter Adjustment to a given Reference Method." This function enables the operating parameters of **MA100** to be adapted to the results of an available reference method and to be saved as a drying routine. Optimization of operating parameters doesn't get any faster than this.

Flexible and modular

The Sartorius MA100 analyzers give you a choice of three different infrared heat sources: a halogen lamp for standard applications, a ceramic heating element for gentle heating of temperature-sensitive samples and a CQR quartz glass heater. The CQR combines the fast drying capability of a halogen lamp with the gentle heating capability of a ceramic heater for drying samples evenly over their entire surface. A printer that can be optionally integrated into the housing eliminates the tangle of cables so typical of an external printer, and helps tidy up your work area.

A clean solution

Did you accidentally spill a sample? Are there spatters of grease inside the sample chamber? No problem with the MA 100. The Plug & Dry® feature enables you to easily slide out the cover with the heater for thorough cleaning, without the risk of cleaning agent entering the inside of the housing.



Sartorius LMA100P

Workhorse for monitoring production and incoming goods

A rugged environment and a tremendous influx of samples characterize the incoming goods and production departments.

Unique and modular

The **LMA100P**, a modular moisture analysis tool, is designed for production inspection with heavy sample traffic. Several samples can be analyzed simultaneously since up to four heating modules can be operated in parallel on one control unit. And different measurement parameters can be set for every module. A table saved in the setup menu controls which user can access which module. This guarantees the retraceability of your measurements by preventing confusion with measurements from someone else's module.

Practical ideas for every day use

Entering moisture content tolerances allows the user to identify, after measurement, whether the test results lie within the accepted range or it is necessary to take regulatory action. The device features a large backlit display for easy reading, even under poor lighting conditions. The keyboard and handles are specially designed for operation in the production line and warehouse and can be operated easily while wearing work gloves. The hinged cover has a wide opening angle, allowing the user to insert and remove the sample easily.



Communicative

With RS232, USB and Ethernet ports, the LMA100P supports every common interface available and can be integrated into your current communications infrastructure. Additionally, the LMA100P features an integrated thermal printer to enable onsite data protocolling. And when the device completes a measurement, it lets the user know by emitting an audible signal and activating a blinking red and green LED at the appropriate heating module.



Specifications

MA35 | MA100 | MA150 | LMA100P

	MA35	MA100	MA150	LMA100P
Max. weighing capacity (g)	35	100	150	100
Accuracy of the weighing system (mg)	1	0.1	1	0.1
Weighing system with EC type-approval certificate		•		
Repeatability, average (%)				
– for initial sample weight approx. >1 g	± 0.2	± 0.1	± 0.2	± 0.1
– for initial sample weight approx. >5 g	± 0.05	± 0.02	± 0.05	± 0.02
Readability (%)	0.01	0.001	0.01	0.001
Display mode for results				
– % moisture	•	•	•	•
– volatile matter				•
– % dry weight (solids)	•	•	•	•
– % RATIO	•	•	•	•
– g residue	•	•	•	•
– g/kg residue		•	•	
– g/l residue			•	
– mg/l residue				•
– mg weight loss		•	•	
– Calculated value (measured value × factor)		•		
– ppm moisture				•
– ppm dry weight				•
Temperature range and settings				
– 40°C–160°C, adjustable in 1-degree increments	•			
– 30°C–230°C, adjustable in 1-degree increments		•		
– 40°C–220°C, adjustable in 1-degree increments			•	
– 30°C–210°C, adjustable in 1-degree increments				•
Heating mode				
– Standard drying	•	•	•	•
– Quick drying		•		
– Gentle drying		•	•	
– Phase drying		3 × 0.1–999 min.	1 × 0.1–999 min.	2 × 0.0–99.9 min.
Analysis mode				
– Fully automatic	•	•	•	
– Semi-automatic		1–50 mg/5–300 sec. 0.1–5.0%/5–300 sec.	1–50 mg/5–300 sec. 0.1–5.0%/5–300 sec.	0.010–9.990%/ 0.1–99.9 min.
– Timer settings	1 × 0.1–99 min.	3 × 0.1–999 min.	1 × 0.1–99 min.	2 × 0.0–99.9 min.
– Timer mode × fully/semi-automatic		2 × 0.1–999 min. + automatic		
SPRM® mode for parameter recognition		•		
Heating unit				
– Ceramic IR heating element (infrared)		•	•	
– Halogen lamp (infrared)		•		
– CQR heater (coiled quartz radiator)		•	•	
– Metal tubular-shaped heating element (infrared dark radiator)	•			
– Quartz tube radiator (4 tubes)				•
Later exchange of the heating unit by Plug & Dry®*		•		
Access to the sample chamber				
– via hinged, flip-up cover	•		•	•
– via motorized cover		•		

	MA35	MA100	MA150	LMA100P
Optional version compliant with FDA HACCP regulations**	•		•	
DLG Signam approved			•	
Built-in calibration weight		•		•
Operator guidance features				
– Context-sensitive menu with alphanumeric interactive prompts and symbols (icons)	•	•	•	•
– Text input for sample identification using soft-key prompts		•		•
– Numeric keypad for sample identification and parameter input		•		
– Parameter input using soft-key prompts		•		•
reproTEST for determining the repeatability of the weighing system		•		
Number of program memories	1	30	20	300
Memory for data storage				
– Statistics of the last 9,999 measurements		•		
– End point up to the next moisture analysis run	•	•	•	999
Parameter settings password-protected against unauthorized access		•	•	
Manual input of tare weights		•		
Data printer				
– Integratable (optionally retrofittable)		•		
– External (optional)	•	•	•	
Integrated thermal printer				•
Printout				
– GLP-compliant, user-configurable		•	•	•
– GLP-compliant, inalterable standard configuration template	•			
– Short record	•			
Data interface port				
– RS-232C unidirectional	•		•	
– RS-232C bidirectional		•		•
– Ethernet				•
– USB				•
Bar code scanner can be connected		•		
In-use dust cover for keypad		•	•	
Power consumption (VA)	max. 400	max. 700	max. 700	max. 700***
Housing dimensions (mm) W×D×H	224×366×191	350×453×156	213×320×180.5	495×413×235***
Weight, approx. (kg)	5.8	8.0	5.5	10***

* Does not apply to the CQR heater

** Not available with halogen lamp or CQR quartz glass heater

*** Applies to the combination of one operating and one heating module

Accessories

MA35 | MA100 | MA150 | LMA100P

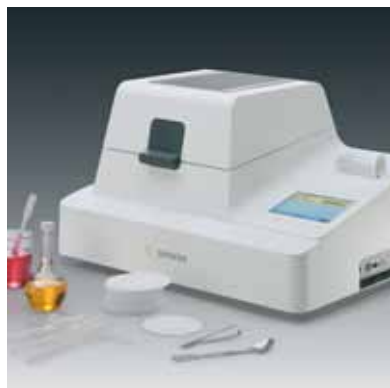


Accessories	MA35	MA100	MA150	LMA100P
Disposable sample pans, 80 units, Aluminum, round, Ø 90 mm	6965542	6965542	6965542	6965542
Reusable sample pans, 10 units, Stainless steel, round, Ø 100 mm				0-2014
Glass fiber filters, 80 units, Ø 90 mm for analysis of liquid, pasty and fatty samples	6906940	6906940	6906940	6906940
Panel replacement set Aluminum panels for replacing glass panels to meet FDA HACCP regulations (conversion kit)	YDS05MA	YDS03MA	YDS04MA	
Windows® 2000 NT XP-compatible software for data collection and for programming drying programs incl. interface cable, 9 25-pin		YMW02MA	YMW02MA	
SartoCollect, Software for communication between moisture analyzer and PC (including 25 Pin/9 Pin, 2 m) cable	•	•	•	
Carrying case		YDB03MA	YDB05MA	
Data printer – Integratable – External	YDP01MA	YDP03-OCE YDP03-OCE	YDP03-OCE	
Ink ribbon cartridge for data printer	6906918	6906918	6906918	
Paper rolls for data printer, – 5 rolls, 50 m each – 5 rolls, 20 m each (thermal paper)	690693	690693	690693	69M30100
External calibration weight – 100 g (E2) – 100 g (E2) DKD Certificate – 30 g ± 0.3 mg – 30 g ± 0.3 mg DKD Certificate – 50 g (E2) – 50 g (E2) DKD Certificate	YSS43-00 YSS43-02	YCW512-00 YCW512-02	YCW452-00 YCW452-02	YCW512-00 YCW512-02
Temperature adjustment set with manufacturer's certificate	YTM01MA	YTM03MA	YTM03MA	YTM06MA
Additional heating module with integrated weighing system				LMA100PQ- 000U

Are you interested in receiving more information about our moisture analyzers?
At www.sartorius.com you will find our applications database packed with information on which analyzer is best for which application and which Sartorius operating parameters are recommended. Moreover, numerous scientific articles are available for download as PDF files.

Sartorius LMA200PM

Speed meets analytical precision



If the sample contains a high moisture content, microwave drying is the fastest and most effective thermogravimetric method (loss-on-drying principle) for moisture analysis. Developed for measuring moisture content ranging from approx. 8% to 100%, the LMA200PM performs moisture analysis in a fraction of the time it takes for other thermogravimetric methods. It delivers results between approx. 40–120 seconds on average. With a cylindrical design, a focused emission of microwave energy is channeled vertically through dual apertures at the bottom of the chamber. This concentrates the microwave energy specifically to the sample. During the test, a carousel spins the sample, permitting an even distribution of microwave energy. This prevents hot and cold spots from occurring, a familiar problem with conventional microwave analyzers.

Built-in analytical balance

The moist and dry weight of the sample required for calculating the loss of moisture is measured by a built-in analytical weighing system featuring 0.1 mg resolution. Thanks to its monolithic design (the cell is robotically etched from a single block), this system is particularly suitable for use in a moisture analyzer, because it considerably reduces zero point drift during heat exposure when compared with classic weighing systems.

Intelligent endpoint determination

A moisture sensor integrated in the exhaust system of the sample chamber monitors the progress of drying. When the measurement begins, the moisture of the air inside the sample chamber continuously increases as water evaporates from the sample. Once the sample has dried and no longer releases water, the air moisture content drops back to its original level—a clear indication of the end point. At the same time, the built-in weighing system monitors the weight progression and confirms when the sample reaches a constant weight. This dual monitoring system ensures optimal moisture analysis results.

High speed

Two factors play a major role for ultra-fast measurements. First, the sample must absorb microwave energy within the shortest time possible and transform it into heat energy. For this purpose, the LMA200PM has a cylindrically shaped sample chamber that focuses the microwave radiation on the sample optimally. Second, the resulting water vapor must be transported away from the sample as fast as possible to obtain rapid analysis results. To accomplish this, a sample is applied to a glass fiber pad that allows water vapor to evaporate not only from the top of the pad and upward through the sample, but also from the bottom of the pad. An exhaust system draws water vapor out of the sample chamber, thus preventing the effects of condensation.



Specifications | Accessories

LMA200PM

Model	LMA200PM
Weighing capacity (g)	70
Measuring accuracy of the weighing system (g)	0.0001
Reproducibility on average Initial sample weight starting at approx. 1 g (%)	± 0.05
Sample carriers	90 mm Ø (3½") glass fiber pads
Display modes	% moisture, ppm moisture, % volatile components, % dry weight (solids), ppm dry weight, g dry weight, mg loss on drying, % RATIO
Measuring range	Approx. 8–100% moisture
Sample heating	– Microwave generator with 1000 W input power
Power control for heating	– 2–100%, adjustable in 1% increments
Endpoint determination	– Fully automatic, by means of weight and moisture sensors – User-defined as loss of weight/time: 1–50 mg/ 1–99 sec. 0.1–9.9 %/ 1–99 sec. – Timer mode: 0.1–99.9 min.
Analysis time (in seconds)	Approx. 40–120 (depends on sample and moisture)
Programs	320, saved to non-volatile memory
Data printer	Thermal printer, built-in
Moisture analysis report	– User-configured GLP record – The report can be printed on non-fading paper by the built-in thermal printer.
Operator guidance	– Menu-driven, alphanumeric dialogue text (English, French, German, Italian and Spanish selectable) – 5 pre-programmed function keys
Data interfaces	– 1 × RS-232 port for PC – 1 × Ethernet port
Housing dimensions W x D x H (mm) (in)	510 × 535 × 304 20 × 21 × 12
Weight, approx. (kg) (lbs)	22 48.5
Power consumption (VA)	1200 max.
Accessories	Order no.
80 glass fiber pads	6906940
500 disposable pipettes	YAT01MA
5 rolls of printer paper, each with 20 m	69M30100

Sartorius reference LA

Efficient management of backweighing data

Management of extensive weighing data, such as those generated, for instance, in the classic oven drying method, is a powerful feature of the differential weighing function in the Sartorius LA Reference series of balances. For up to 999 samples, these balances save the tare weight, initial sample weight and the backweight, and use these data to calculate the final result.

It does not matter in which sequence the measured data are logged—LA Reference adapts to the individual needs of the user. A printout of all weights on the optionally available YDP03-OCE data printer is generated according to the sequence of the sample numbers.



Specifications | Accessories

LA Reference

Model	Readability	Weighing capacity
LA120S	0.1 mg	120 g
LA230S	0.1 mg	230 g
LA230P	0.1 0.2 0.5 mg 60 120	230 g
LA310S	0.1 mg	310 g
LA130S-balance for weighing filters	0.1 mg	150 g
LA1200S	0.001 g	1200 g
LA620S	0.001 g	620 g
LA220S	0.001 g	200 g
LA2000P	0.001 0.01g	1010 2000 g
LA620P	0.001 0.002 0.005 g	120 240 620 g
LA5200D	0.001 0.01g	1010 5000 g
LA3200D	0.001 0.01 g	1000 3200 g
LA6200S	0.01 g	6200 g
LA8200S	0.01 g	8200 g
LA4200S	0.01 g	4200 g
LA2200S	0.01 g	2200 g
LA820	0.01 g	820 g
LA420	0.01 g	420 g
LA2200P	0.01 0.02 0.05 g	400 800 2200 g
LA5200P	0.01 0.02 0.05 0.1 g	1200 2400 3800 5200 g
LA8200P	0.01 0.02 0.05 g	2000 4000 8200 g

Performance features of the differential weighing program

- Memory capacity for 999 samples in up to 100 lots
- Alphanumeric input of lot and sample names
- Taring, sample weighing and backweighing with up to 30 backweighs per sample
- Automatic and manual weight storage
- Evaluation of results with residue and loss (weight unit and %), calculation factor, RATIO values
- List function with display pages for lots, samples, measured values and results
- Statistical evaluation with statistics display page
- Printout as individual, backweighing or statistics record
- User-specific, configurable printout
- Interface port for bar code scanner

Moreover, all LA Reference balances offer the following features:

- Backlit graphic display with full text support and variable digit sizes
- Fully automatic calibration|adjustment function, isoCAL
- Memory for ISO|GLP-compliant calibration|adjustment records
- 4 user-programmable lines, e.g., for entering the company's address
- Standard equipped with application programs for counting, weighing in percent, checkweighing, animal weighing, formulation, totalizing, calculation of weight values, density determination and statistics, time-controlled functions, such as automatic data printout at intervals according to a preset time

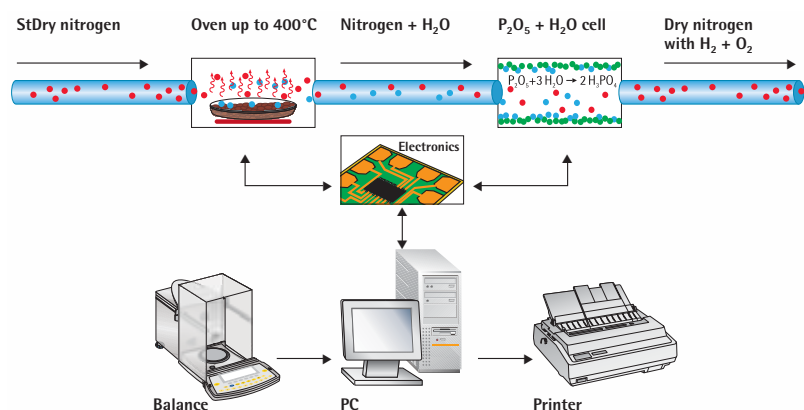
Accessories	Order No.
Data printer with date, time, statistics functions	YDP03-OCE
Ink ribbon cartridge for data printer	6906918
Paper rolls for data printer, 5 rolls, 50 m each	690693

Sartorius WDS 400

Selective detection of surface water, capillary water and water of crystallization

Water, not moisture

Thermogravimetric methods, such as the oven drying method, use the weight loss of a sample to determine the total content of all volatile components and not, however, the pure water content. As a rule, the latter task is performed using electrochemical techniques that are based on the principle of coulometry (coulomb = electric charge). The most commonly known methods are coulometric Karl Fisher titration for solid and liquid samples and the phosphorus pentoxide method for trace analysis of gases. However, both methods require complicated equipment; moreover, KF titration necessitates the use of additional chemicals in order to perform an analysis. The WDS 400 Water Detection System from Sartorius combines these three standard methods into a high-resolution and easy procedure for selective detection of water in solids and pastes.



Get all three in one

The WDS 400 adopts the principle of convection heating from the oven drying method in order to drive out the entire moisture from a sample. A ceramic disc coated with extremely hygroscopic phosphorus pentoxide P₂O₅ completely absorbs the water from the resulting gas mixture and bonds water molecules to phosphoric acid H₃PO₄ on the disc surface in a chemical reaction. By coulometry, i.e., by an electric current generated at the ceramic disc, phosphoric acid is broken down into phosphorus pentoxide P₂O₅, hydrogen H and oxygen O. Based on Faraday's law, it is known how much current is necessary in order to split off all hydrogen atoms from a chemical compound. Thus, the WDS 400 uses the amount of electric current to calculate the quantity of water driven out of a sample.

Highly accurate and selective

This combination method works so accurately that it is even possible to detect one single microgram of water. Beyond that, the WDS 400 enables water fractions to be differentiated according to surface water, capillary water and water of crystallization (the latter is chemically bound water).

Easy operation

All the user has to do is just weigh-in a sample. The WDS 400 does not require any complicated handling of detection reagents, many of which are toxic. For measurement of the water content, the user can choose the type of carrier gas, either nitrogen (Class 5.0) or room air. For using room air, the WDS 400 has a built-in pump and a drying unit.



Specifications | Accessories

WDS 400



Specifications

Moisture analysis method	Thermal analysis followed by coulometric measurement
Sample heating in the built-in stainless steel oven (convection heating)	From room temperature up to 400°C; adjustable in increments of 1°C
Detection limit	1 µg of water
Reproducibility	±2% of the absolute water value measured (depends on sample)
Measuring range	1 ppm to approx. 40% water (depends on sample)
Sample weight, average	15–2,000 mg
Display	ppm/% and µg water, mA current
Analysis time	Average: 10–20 min adjustable in increments of 1 min–10 h
Operator guidance Software	English, for PCs with Windows® 2000 NT XP
Data storage	On the hard drive of the interfaced PC
Number of measuring programs	Limited only by the PC's hard drive memory
Power supply	115 230 V ± 10%
Frequency	50 ... 60 Hz
Carrier gas	– Dry room air (using integrated air pump with molecular sieve) – Nitrogen, N2 (Class 5.0)
Gas prepressure	1 bar (15 psi)
Gas consumption	100–200 ml/min
Power consumption	Standby 100 W At full power 600 W
Dimensions (W×D×H)	500×500 × 180 mm
Weight	20 kg

Accessories

Regeneration kit for electrochemical cell	69MA0224
Calibration standard	69MA0225
PTFE particle-removing filters starting from serial no. 19070049	69MA0226
PTFE particle-removing filters up to serial no. 19170000	69MA0292
Nickel scoops for weighing samples	69MA0228
Electrochemical cell, uncoated	69MA0232
Temperature calibration unit for the oven	6740–86
Molecular sieve for drying unit	69MA0293
Flexible gas tubing, stainless steel, for external gas supply	69MA0229

Recommended balance models

Semi-microbalances	ME235S	ME235P	CP225D		
Weighing range structure	SuperRange	PolyRange	DualRange		
Weighing capacity in g	230	60 110 230	80 220		
Readability in mg	0.01	0.01 0.02 0.05	0.1 0.01 0.01		

Microbalances	SE2	ME5	ME36S	CP2P	LE26P
Weighing range structure	SuperRange	SuperRange	SuperRange	PolyRange	PolyRange
Weighing capacity in g	2.1	5.1	31	0.5 1 2	5 21 g
Readability in µg	0.1	1	1	1 2 5	2 10 g





Sartorius LMA300P

Moisture analysis within a split second

The **LMA300P** works with microwave resonance technology. In this indirect measurement method, a harmonic electromagnetic resonator field is built up by a microwave generator in a sensor (applicator). When the applicator is filled with a sample, the water in the sample interferes with the oscillation behavior (resonance) of the microwave, or interacts with the resonance field, changing the height and width of the resonance frequency peak.

Calibration

This change in resonance field is detected by a sensor, and the analyzer CPU calculates the moisture content of the sample based on the calibration previously carried out. The basic analyzer calibration required can be done by the classic oven drying method or, of course, using an infrared moisture analyzer from the Sartorius MA series.

Fast measurement

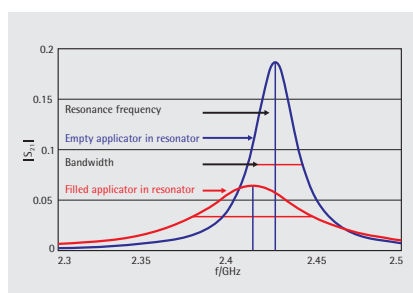
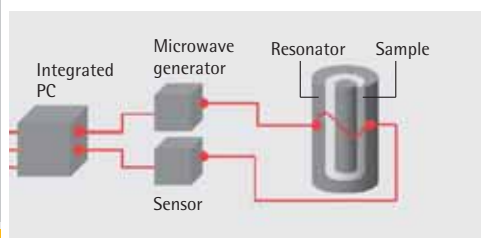
The microwave resonance method offers the advantage of particularly fast measurement in under one second. At the same time, it is non-destructive, which means that samples can be further used for subsequent tests. Changes in the color and surface structure of the sample, as is frequently the case, for instance, in natural raw materials, does not have any effect on calibration or thus on the measured result, unlike near infrared spectroscopy. The microwave resonance method is not limited to measurement of the surface moisture; rather, it also determines the core moisture thanks to its operating principle.

Application areas

The **LMA300P** can be used for nearly all pourable and granulated products as well as viscous liquids, such as whitewash and other similar materials. The measuring range is between approx. 0.1–60% moisture. The prerequisite for operating the analyzer is to calibrate measurements on the basis of a measurement procedure providing absolute accuracy. The major application area for the **LMA300P** is incoming and in-process quality control.

Design

The LMA300P is a modular-designed system consisting of a control and evaluation unit, **LMA300PA**, and a resonator module. This type of modular design allows a different resonator type to be used (available on request), and enables the analyzer to be easily adapted to customer-specific applications.



Specifications | Accessories

LMA300P

Technische Daten*

Measuring range (%)	Approx. 0.1–60
Readability (%)	0.01
Measuring accuracy (%) (depends on calibration and type of sample)	± 0.05
Measuring time (s)	< 1
Display	% moisture, % dry weight (solids)
Measurement method	Microwave resonance technology
Allowable sample temperature (°C)	Approx. 0–70
Operator guidance	Touch screen with demand-driven menu based on alphanumeric prompts (dialogue text and symbols)
Memory for number of measurement programs	40
Data printer, optional	External
GLP-compliant report	Yes, with optionally available printer, YDP03-OCE
Interface port	2 × RS-232 C for printer and PC USB port + 128 MB USB flash drive
Line voltage	110–230 V AC
Frequency	50 ... 60 Hz
Power consumption	60 VA max.
Housing dimensions (in mm) W × D × H	
Control unit, LMA300PA	500 × 430 × 200
Weight approx. (kg)	
Control unit, LMA300PA	11.5

** In addition to the LMA300PR sensor module, other sensors are also available on request. Depending on the desired application, however, the technical specifications will have to be agreed on with a Sartorius applications technician.

Optional Accessories	Order no.
Data printer	YDP03-OCE
Ink ribbon cassette for YDP03-OCE	6906918
Printer paper, 5 rolls, each with 50 m, for YDP03-OCE	690693
Applicator, 60 mm	69MA0294
Applicator, 140 mm	69MA0295
Reference standard	LMA301SY

Sensor Specifications	LMA300PR	LMA301PR	LMA302PR	LMA303PR	LMA304PR
Dimensions (mm)	370 × 245 × 275	370 × 245 × 275	370 × 395 × 375	260 × 270 × 280	370 × 385 × 375
Weight	10 kg	10 kg	11 kg	5 kg	15 kg
Sample volume	(60/150) ml	(90/125) ml	400 ml	27 ml	2000 ml
Resonator diameter	40 mm	50 mm	46 mm	26 mm	96 mm

Sartorius PMD300P and PMD301P

Online moisture analysis within a split second

The moisture analysis systems from the Sartorius PMD300 series have been designed for online, in-process analysis. Through the use of microwave resonance technology, moisture content can be measured in less than one second. The system averages the individual measurements over a user-defined period. Then they are sent over the appropriate interface to a PC, switch cabinet or a PLC controller. Both core and surface moisture content are measured. The analysis is non-destructive and is not influenced by the color, density or surface characteristics of the sample material.

Sensors

A wide variety of sensors is available for the PMD300 series. This way, the analysis method can be customized to the sample and process as each situation requires. Depending on sensor type, the measuring range is between a moisture content of 0.1% and 60%.

Ultrasensitive planar sensors, featuring a special ceramic surface, are especially suited for use in assembly lines or in hoppers. Due to their compact form and high protection rating, all sensors can be used in the food industry. The diameter of the sensors' measuring field is between 50 mm and 130 mm.

Bypass sensors are especially suited for pourable or granulated products that are transported through pipes. Intake and discharge valves controlled by the PMD301P extract a defined sample amount, measure it and then return it to the main current. Optional functions also allow density to be measured together with moisture.

A special fork sensor is available for non-contact analysis. The sample is sent between two sensor surfaces without it touching the surface of the sensors. Ex-protected versions are available for all sensor types.

Applications

Monitoring and retraceability:

These versatile analysis systems can be used in a variety of locations. For example, they can be used in the incoming goods department to analyze raw materials continuously and document the results. Instead of doing spot checks, the entire batch is monitored without interruption. (Meets IFS V5 requirements.)

Optimizing energy consumption:

A significant factor contributing to the success of many processes is exact and immediate moisture analysis. This is why online moisture measurement is often used in baking and drying processes. The ideal conditions for drying and baking processes can be met by continuously monitoring moisture content without loss of time. The temperature in the oven, air supply or conveyor belt speed are adjusted to the current moisture content of the product. This lets you save valuable energy.

Time management:

Frequently, a predefined moisture content must be reached before proceeding to the next step in the process (batch processing). This is possible using Sartorius' online moisture analysis systems because they measure moisture content continuously and send them to the controller without delay. When the target moisture content has been reached, the process will go on to the next step instantaneously and automatically. Online moisture analysis makes your process efficient and transparent.



Specifications | Accessories

PMD300PA-000U

Evaluation unit

Dimensions	410 × 460 × 210 mm
Weight	19 kg
Material	Stainless steel
Protection rating	IP 54

Mains connection (line voltage)

(110–230) V AC / (50–60) Hz / 70 VA

Interface ports

Data	One RS-422 port (for PC, PLC, online computer); two RS-232 ports; optional Profibus and Ethernet ports
Analog output	2 × (0/4–20) mA (active, potential-free)
Analog input	1 × (0/4–20) mA
Control inputs	4 × optocoupler inputs, 24 V, e.g. for start, stop and product selection
Control outputs	5 potential-free (24 V, 0.25 A DC)

Ambient conditions

Temperatures

Sample temperature	0°C to +70°C autom. temperature compensation
Ambient temperature	0°C to +40°C

Accessories

Reference standard for planar sensors	PMD302SY
---------------------------------------	----------

Planar sensor specifications:

PMD310SR

Protection rating	IP 65
Height of microwave field over the sensor	up to 50 mm
Sensor material	ceramic
Sensor diameter	110 mm
Sensor height	188 mm
Sensor height	53 mm
Weight	3 kg

PMD311SR

Protection rating	IP 65
Height of microwave field over the sensor	up to 70 mm
Sensor material	ceramic
Measuring field diameter	120 mm
Sensor diameter	188 mm
Sensor height	53 mm
Weight	3 kg

PMD312SR

Protection rating	IP 65
Height of microwave field over the sensor	up to 80 mm
Sensor material	ceramic
Measuring field diameter	130 mm
Sensor diameter	188 mm
Sensor height	53 mm
Weight	3 kg

PMD313SR

Protection rating	IP 65
Height of microwave field over the sensor	up to 30 mm
Sensor material	ceramic
Measuring field diameter	50 mm
Sensor diameter	80 mm
Sensor height	112 mm
Weight	1.6 kg

Sartorius LMA500

Analyzing moisture content with optics—quick, reliable, non-destructive

The LMA500 uses spectroscopy. It exploits the interaction between light and the sample. If the sample is exposed to near infrared light (NIR), a part of this light is reflected and modified characteristically on interaction with the sample. This change in the NIR light, which is dependent on the water content of the sample, reveals its moisture content.

Calibration

The LMA500 calibrates itself by analyzing data it has collected using sophisticated multivariate statistics (regression analyses, approximation procedures) practically without the need for user input or expert knowledge. If desired, you can quickly adjust the calibration by connecting an MA35 rapid moisture analyzer. This allows you to adjust to changes in sample characteristics, giving you another method for updating your system to new batches. Or you can create calibrations for products that have just been added to your product portfolio. Calibration settings for many classes of substances are available from Sartorius.

Verification made easy

Multivariate evaluation offers index values for evaluating measurements. This information identifies anomalies or samples that have been categorized incorrectly so corrective action can be taken immediately.

Applications

The LMA500 is designed for analyzing the moisture content of pourable and granulated products, and viscous products as well such as slurry. It measures moisture content within a range of approximately 0.1%–50%. Calibration with a direct measurement is required if you wish to use the NIR calibrator. The NIR calibrator is optimized for use with the MA35 moisture analyzer. Naturally, other reference methods can be used. The major applications of the NIR calibrator include laboratory analysis and at-line process control. Analysis does not modify the sample, so the sample can still be used after measurement.

Design

The NIR calibrator and its measuring, operating and evaluating components are contained in a water resistant IP54 housing. A fiber optic cable connects the probe so that measurements can not only be taken in the integrated analysis area but also at other locations, in the MA35 or directly in the production process. Thanks to the device's compact design, it can be quickly transported to other testing locations.

Software

The LMA500's software is easy to use and intuitive. All data are protected. Only users who have authenticated can access the system. User permissions can be individually modified to suit your needs. No expert knowledge is necessary to create, extend or adjust calibration settings.



Specifications

LMA500PO

Spectrometer system

Spectral range	1,100 to 1,700 nm (effective: 1,100 to 1,680 nm)
A/D converter	16 bits
Spectral resolution [$\Delta\lambda$ FWHM]	< 16 nm
Wavelength precision	< 5 nm
Signal to noise ratio	> 3500:1
Photometric linearity	Gradient: 1 ± 0.05 ; Axis intercept: 0 ± 0.05

Functions

Measurement range, typical	0 to 50% moisture (pourable and granulated samples)
Reproducibility, typical (%)	0.2% absolute moisture, dependent on sample and reference method
Precision of comparison, typical (%)	0.5% absolute moisture, dependent on reference method
Measurement time, typical	2 seconds
Memory capacity	1 GB for data and calibration
Sample pan dimensions	Ø 90 mm

Device (Hardware)

Dimensions	(W × D × H) 550 × 387 × 180 mm
Net weight, ca.	11.5 kg
Voltage	100 V to 240 V, -15% ... +10%
Frequency	48–60 Hz
Fuses	2 (ground/phase), 6.3 AT, 5 x 20 mm
Power consumption	45 VA maximum
Temperature range	+10°C ... +30°C
IP protection rating	IP54 (also during use); Front cover, display: IP65
Built-in interface	2+ RS232C (To connect MA35 and YDP03-OCE) Format: 7 bit ASCII, 1 start bit, 1 stop bit Parity: odd Speed: 1200 baud Handshake: hardware
Digital interfaces	1 Ethernet (RJ45): 10/100 Base-T, 1 x USB 1.1, PS/2 Keyboard
Display	Touch Screen 8,4" TFT (SVGA)

Sartorius AG
Weender Landstrasse 94–108
37075 Goettingen, Germany

Phone +49.551.308.0
Fax +49.551.308.3289

www.sartorius-mechatronics.com