



**TEWS**  
Elektronik

*technology that works for you*

**Innovative Microwave Resonance Technology**

# Process and Laboratory Moisture Measuring



**The experts for moisture,  
density and mass measurement  
with microwaves.**



Dear Customer,

We are pleased to introduce ourselves to you as the next generation of managers of TEWS Elektronik. After successfully leading the company for 43 years, Mr. Manfred Tews retired last year, and his son, Mr. Andre Tews succeeded him as the company's Chief Executive thus continuing the family-owned tradition of TEWS customer-oriented technical excellence. After he joined TEWS in 1999, Mr. Andre Tews had managed the business jointly with this father.

He is now joined by Dr. Tim Richter who assumed the full responsibilities for the commercial and financial activities of the business. With the new leadership in place and the generational transition completed, the company is now well prepared to aim for a new and bright future.

TEWS Elektronik was founded in 1970 in Hamburg, Germany and since the late eighties has centered its principal activities in developing, producing and selling its patented state-of-the-art microwave moisture and density measuring systems. Over the last 25 years, those systems have amply demonstrated their capability to measure the moisture and density of numerous products accurately, reliably and rapidly, to within milliseconds, regardless of variations in both color and bulk density of the product flow. TEWS devices can now be found in every part of the world where their effectiveness, usefulness and robustness is well recognized and appreciated.

They include the handheld MW 1100 devices, the MW 1150 and MW 43XX lab series, the inline MW 42XX systems, the high-speed MW 301X units, able to measure up to 20.000 times per second, and the MW-T for bulky objects like bales and boxes.

Forward-looking while based on solid Hamburg corporate traditions, TEWS Elektronik is prepared to respond to the most exacting requirements from its global customer-base.



Handwritten signature of Andre Tews in blue ink.

Andre Tews

Handwritten signature of Dr. Tim Richter in blue ink.

Dr. Tim Richter



# Contents



## Enterprise and Technology

- 4 Corporate History and Product Development
- 6 The Patented „TEWS Method“

## Advice and Service

- 8 Expert Service
- 10 Global Support



## Applications

- 12** Food and Feedstuff Industries

---

- 14** Coffee Industry

---

- 16** Tobacco Industry

---

- 18** Pharmaceuticals and Chemicals

---

- 20** Wood and Paper Processing

---

- 22** Moisture Measuring in Process Systems

---

- 24** Sensors

## Measuring Instruments

- 26** Laboratory Instruments MW 4300 / MW 4310

---

- 28** Laboratory Instrument MW 1150

---

- 30** Handheld Instruments MW 1100 / MW 1100S

---

- 32** Process Instruments MW 4260 / MW 4270

---

- 34** Software TEWS Moisture View ©

---

- 36** Profile Measuring Instruments  
MW 4420 / MW 4430

---

- 38** High-speed Instrument MW 3011

---

- 40** Transmission Measuring Instrument MW-T

---

- 42** Accessories

---

- 44** Technical Data Tables

# TEWS Elektronik - Combining Tradition with Innovation



Established: August 1, 1970  
Founder: Manfred Tews



Move to Sperberhorst, Hamburg: March 10, 1978

Workforce: 12

Workforce: 3

1970

1975

1980

1985

1990

First manufactured instrument:  
Computing Data Printer RD-1



Distribution of  
Quadra Beam  
NIR moisture  
meters

First TEWS  
computer TC 25



Microwave  
moisture meter  
MW 2300 sold





Another storey added to TEWS Elektronik building in Hamburg, summer 2005



New management

First building expansion

Workforce in 2007: 46

100th microwave instrument sold

Workforce: 28

1,000th microwave instrument sold

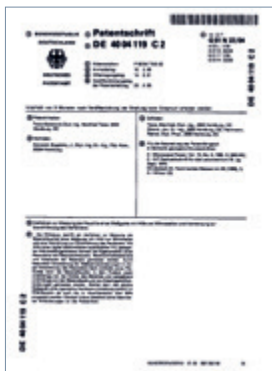
1995

2000

2005

2010

2013



Master patent published

MW 2xxx model range replaced with 3rd generation instruments



Launch of Mobile Microwave Moisture Meters MW 1000

New „Blueline®“ range presented

Introduction of online measuring using planar sensors and high-speed microwave measuring at 10,000 readings per second



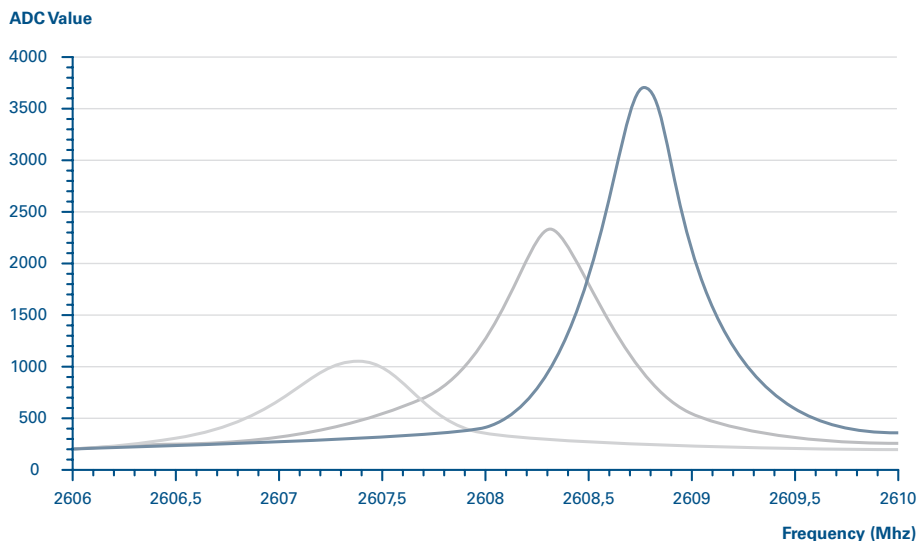
## Measuring Moisture by Microwave Resonance

# The Patented „TEWS Method“

**Moisture** Moisture is defined as the percentage of water contained in the total mass of a solid substance. Other terms are used synonymously - such as humidity, material moisture, absolute moisture, moisture content, gravimetric water content etc., these words must be clearly distinguished from all expressions referring to the share of steam in gases such as humidity, relative humidity, water vapor content etc. The ATRO moisture details only refers to the water content in the dry mass of the substance.

### Water molecules and resonant microwave field

Water molecules residing on the surface or in the pores of solid substances align themselves with electromagnetic fields while drawing energy from the field. One practical example of using this effect is a microwave oven where oscillating water molecules generate heat. The interaction between microwavefields and water molecules are also measured and, thus, put to technical use. Since microwaves will penetrate deeply into the product, the technique will detect water both inside and on the surface of an object or substance.



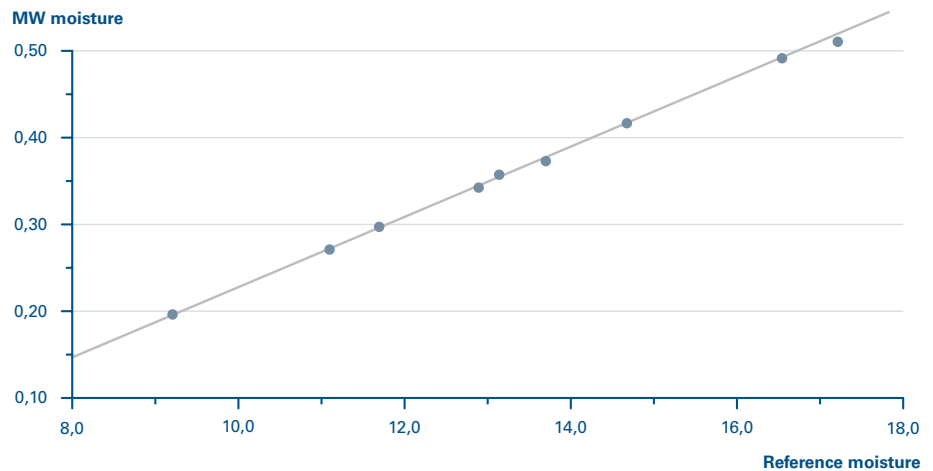
*Typical resonance plot of different moisture contents*

**Microwave resonance** The TEWS moisture measuring method uses a sensor to generate a low-powered microwave field resonating characteristically within well-defined parameters. Filling or covering the sensor with a product – e.g. a powder or granules – will change the position and strength of the resonance. These changes largely depend on how much water the product contains. The resonance readings are proportional to moisture. The effects of the product density variations or sensor load are compensated for. The TEWS' method allows several dozen, or even several thousand, readings to be taken and shown every second.



**Calibration** For the moisture content to be shown as a percentage, the instrument first needs to be calibrated. This is done by collecting samples of the product with different moisture contents, which cover a typical range of applications. Moisture in the sample is then measured using both a suitable laboratory method and the microwave resonance method. In the drying process (drying kiln, drying balance), the sample moisture is determined mainly by the amount of weight lost. A chemical method, such as the Karl Fischer titration, can also be applied occasionally to determine the water content.

The system uses the pairs of values obtained from the microwave and laboratory measurements to calculate a calibration curve, which is then used to convert the measured microwave readings into moisture percentages. Under certain circumstances, the instruments can also be calibrated for measuring densities. Calibration is required only once for every product.



*Example of a calibration graph  
Number of samples measured: 9, Correlation: 0.99,  
Mean deviation: +/- 0.1%, Lab reference method: drying kiln*

#### MEASURING METHOD BENEFITS:

- Very fast results, also suitable for measuring online
- High accuracy of results
- Measuring independent of product density or product load
- No impact of optical factors on measuring, such as color changes, product surface structure, dust
- Measuring of moisture at product surface and core
- Non-destructive measuring
- No consumables, such as reagents, etc.
- Testers are maintenance-free and easy to use

## Our Service

# Expert Service



At TEWS, customer services play a crucial role. Although our products and procedures operate at the highest levels of reliability and process safety, requirements are constantly becoming more demanding. TEWS is committed to customer satisfaction and our services with its long-term business relationships are focused on application support, service, training and spare parts.

Expert answers  
are always available

Our technical telephone support specialists will give you all the application support you need to optimize your processes and operate the TEWS devices.

Our support team is there for you - no need to dial in to an expensive service number. Get immediate and individual support with your technical inquiry.

Fast and at  
minimum cost

Clear-cut fault diagnosis and perfect troubleshooting allow us to make repairs extremely quickly. Our factory will take 1-5 working days to complete a normal repair.

### WHAT WE CAN DO FOR YOU:

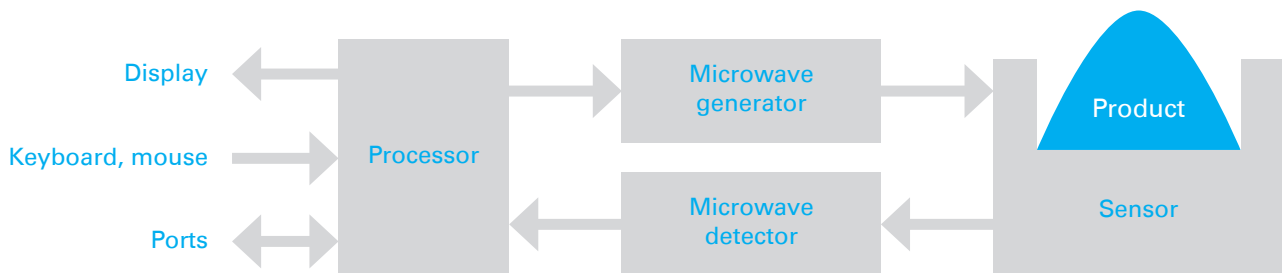
- Express service; generally, repairs can be done within a few working days
- Retrofitting of optional add-ons
- Hardware and software upgrades/updates
- Backup of your customer-specific configuration data
- Warranty for any repairs made
- Repairs report upon request
- Cost estimates upon request
- Support via telephone, email and remote access via Internet
- Maintenance contracts with fixed prices

So that everything is smooth sailing

TEWS products always conform to the latest industry standards and integrate perfectly into existing facilities. As a special service, we offer our support with commissioning and to optimize your system to be the most cost-effective possible.

#### YOUR BENEFITS:

- Configuration by qualified engineer
- Expert compilation of device parameter settings
- Acceptance and logging
- Storing parameter files on your PC using the software TEWS Moisture View ©
- Instructions and training for your employees
- Free test equipment available



*Microwave resonance method*

The productivity of your system matters

To enhance productivity, we work closely in a partnership with our customers to determine together which practical programs of machine and system maintenance are required and reasonable.

Everything we do will be accurately tailored to meet your needs – a true partnership.

During maintenance intervals ask us about a B-type acceptance test certificate for your complete moisture measuring chain in conformity with EN 10204.

Contact our hardware and software upgrade/update service team.

## Our Service

# Global Support



### YOUR BENEFITS:

- Optimum instrument availability between maintenance intervals
- Maintenance report including all logs relevant to quality
- Assistance for your own service technicians
- Minimized downtimes
- Free testing equipment

### WHAT WE CAN DO FOR YOU:

Perfect adaptation  
to your process

- Configuration of new devices according to your requirements
- Assistance in defining your requirements and product selection
- Optional preconfiguration for fast user-site setup
- Preparation of customized wiring diagrams
- Documentation of the configuration
- Optimum adaptation to your task
- Utilization of all options available from your TEWS product
- Cost effective since the user is not required to handle configuration details
- If needed, we will transfer the configuration from the old to the new instrument



Your direct line to our  
technical support

Our technical support specialists will answer all your questions concerning commissioning and starting up, optimizing and operating your TEWS products. They will also help you find the causes of any problems you may encounter. Remote access via Internet can also be made from our location. Submit your questions and inquiries to:

**info@tews-elektronik.com**

(service options, applications, measuring instruments, etc.)

**service@tews-elektronik.com**

(maintenance, configuration, calibration, etc.)

Your equipment  
availability matters

This is always available. That's why we hold a comprehensive system of approximately 2,000 different parts in stock for you.

TEWS spare parts service is fast and reliable: 80 percent of all orders are processed within three working days. Express orders will be delivered within 24 hours.

TEWS Consulting  
gives you a  
competitive edge

Know-how: Walking off the beaten track may be the best way of getting ahead of competition. This will take vision, increased knowledge and optimized processes.

Rely on TEWS to obtain that cutting edge. Use our know-how and years of experience!

### Measuring the Moisture in Foods and Feedstuffs

## Fast and accurate Measuring to save you Time and Money

The amount of water contained in foods and primary products is vital to quality, processing and durability. The legal requirements concerning food products also need to be taken into account. Ensuring the correct product moisture at all stages of the manufacturing process requires continuously measuring the actual product or samples of it. Conventional moisture measuring involves a drying kiln or a drying balance - which often demand some preparation of samples and



will always impose some delay before a result is obtained: a couple of minutes if all goes well or frequently several hours.

#### Immediate results

Moisture meters supplied by TEWS Elektronik provide you with immediate results. Extremely fast results and simple operation of the measuring instrument save you considerable time. All TEWS' laboratory systems and process systems are simple to operate and almost entirely maintenance-free.

#### No preparation of samples

Results obtained with the microwave resonance method of moisture measuring are not influenced by the density, height of pile or color of the product analyzed. Therefore, natural variations in the grain size, color, mineral content, etc. especially of grains, oilseeds and products made from primary produce, will not affect results. Another problem with conventional laboratory measuring is that samples need to be precisely weighed. Process systems benefit from the

sensor value being unaffected by the amount of product on the sensor or by varying grain sizes. A broad range of laboratory sensors also enables moisture measuring of many different products, even with large-size particles, in their original shape and form without grinding or any other preparation.

**Total moisture** Microwave measuring will detect the moisture at both the surface and core of the product. This gives them an advantage when measuring those difficult products which, for example, may be dried at the surface only. Both drying processes and optical measuring methods will find it difficult to measure those products.



#### PRACTICAL EXAMPLES:

Product		Moisture Range
Sugar	granulated	0.1 – 0.4 %
Banana chips	dried fruit	1.6 – 3 %
Cocoa beans	whole beans, nibs	4 – 12 %
Soybeans	whole and ground	8 – 13 %
Rapeseed	oil press	5 – 13 %
Pasta	samples in beaker sensor	5 – 14 %
Nuts, almonds	whole and chopped	5 – 10 %
Marzipan, almond paste	beaker sensor	7 – 16 %
Waffles, crispbread	slices, sheets	2 – 6 %
Corn Flakes, Grain flakes	breakfast cereals, feed	3.5 – 15 %
Savory snacks	chips, extruded pellets	5 – 12 %
Pet food	extruded pellets	6 – 15 %
Fishmeal	feed, pellets	7 – 15 %

## Measuring the Moisture in Coffee

# From whole Beans to Powder

Coffee is one of the most popular beverages. Knowing the moisture content at various stages of coffee production is one of the keys to quality and cost control.

### Economic aspects

Since coffee beans are traded by weight, the water content in this product is a particularly important cost element. Sellers will try to supply best quality but, at the same time, ensure they go up to the admissible moisture limit. Moreover, many countries, such as Germany, levy a special coffee tax, so knowing the moisture content at as many stages of production as possible is another way of reducing costs. Increasing moisture by as little as half a percent can help to considerably increase a company earnings.



### Quality

Another important aspect is the fact that, in many countries, consumer protection legislation limits the water content in the finished product to 5% and, therefore, the manufacturer undertakes measures not to exceed this limit. The use of TEWS microwave moisture measuring can provide efficient assurance that the water content limits are adhered to with high accuracy at many stages of coffee processing. One prime example is green coffee which should contain no more than 13% water to safely exclude the risk of fermentation starting during storage or transit.

### BENEFITS:

- Highly accurate measuring system for laboratory use and process control
- Simultaneous measuring of moisture and bulk density
- Volume moisture measuring regardless of color, even of freshly roasted whole beans





**To conclude** Knowing the exact water content of their coffee helps companies to comply with legal regulations while optimizing production - meeting both their objectives of ensuring a high quality level and maximizing profitability.

#### PRACTICAL EXAMPLES:

<b>Product</b>		<b>Moisture Range</b>
Green coffee	laboratory and process	8 – 15 %
Roasted coffee	laboratory and process	3 – 6 %
Ground coffee	density measurement	3 – 6 %
Instant coffee	laboratory and process	2 – 6 %
Instant drink powder	laboratory and process	2 – 6 %

## Measuring Moisture and Density of Tobacco

# Quality Monitoring in Primary and Secondary



Many cigarette and cigar factories in Europe, Africa, America and Asia successfully deploy our devices for measuring the moisture in leaf tobacco, cut tobacco, stems, cigarettes or cigars.

### MEASURING SYSTEMS FOR THE TOBACCO PROCESSING INDUSTRY:

- MW-T** Moisture and density measurement of tobacco bales and cut tobacco in boxes.
- MW 1100** Portable tester MW 1100 and lance probe MW 1100S are designed for fast and  
**MW 1100S** easy moisture measuring in leaf tobacco and cuts.
- MW 4300** Versatile instruments for frequent use in the quality laboratory or at the process  
**MW 4310** line. Different sensors can be attached to the analyzer. Touchscreen (MW 4300) and software facilitate easy analysis of data, displaying charts etc. Instruments can be easily be connected with a PC or a local network, e.g. for exporting and saving data.
- MW 1150** Easy-to-use laboratory instrument, optimized for fast and accurate routine tests.
- MW 3011** Systems of the MW 3011 type feature cigarette rod sensor and very fast electronics. They can be installed in cigarette or cigar or filter making machines to measure tobacco weight for weight monitoring resp. to inspect filter rods (embedded capsules, multi-segment filters).
- MW 4420** Testing station for measuring and analyzing the moisture and density profiles of cigarettes, including a system for suggesting improved settings of the cutter in the cigarette making machine.
- MW 4430** Testing station or measuring and analyzing moisture and density profiles of cigarettes, for optimizing cut position of cigarettes, and for analyzing the position an integrity of aroma capsules and filter segments in cigarettes.



#### APPLICATIONS IN THE PRIMARY PROCESS:

Tobacco	Step	Moisture range
Tobacco bales	Incoming goods / warehouse	7 – 15 %
Slices of tobacco bales	After slicer, before DCC-cylinder	7 – 15 %
Blended leaf	After mixing box	10 – 16 %
Burley leaves	After Burley toaster	16 – 24 %
Cut stems	Before and after stem expansion dryer	12 – 35 %
Cut expanded tobacco	After expansion / reordering cylinder	11 – 13 %
Cut tobacco	Before and after cut tobacco dryer. After top flavor cylinder, mixing box or / and casing cylinder	11 – 24 %
Cut tobacco final blend	After top flavor or / and casing cylinder	11 – 16 %

#### APPLICATIONS IN THE SECONDARY PROCESS:

Product	Measuring Site	Reading
Tobacco rod	Cigarette maker	<ul style="list-style-type: none"> <li>• Tobacco weight and density</li> <li>• Foreign body detection</li> </ul>
Cigarettes, cigarillos	At-line / quality laboratory	<ul style="list-style-type: none"> <li>• Tobacco and moisture distribution profile</li> <li>• Densing-value</li> <li>• Cut position</li> </ul>
Filter rod, filter tips, Multisegmented filters	At-line / cigarette maker	<ul style="list-style-type: none"> <li>• Capsule position</li> <li>• Charcoal content</li> <li>• Edge detection, gap detection</li> <li>• Triacetine</li> </ul>

## Measuring the Moisture in Pharmaceuticals and Chemicals

# Meeting the Demand for 100% Verification



It is easy to understand why no other business puts as much stress on the quality of products, raw materials and processes as the pharmaceutical industry. When it comes to precision and speed, measuring must meet the very highest standards.

### Fluid Bed (Dryer), Powder drying and granulation

Moisture readings play a crucial role in processes such as powder drying and granulation. Drying is best controlled if accurate sensor values are always available. You may, for example, wish to measure the moisture as the material is inserted in a spray dryer. Taking continuous readings can help you determine when the process has achieved its target moisture. Thus, drying and granulation can be monitored properly.

### Hard gelatine capsules

The properties of hard gelatine capsules depend on moisture to a very high degree. Prior to automatic filling, the capsules need to be conditioned to attain a specific moisture level to ensure their physical properties are optimized.

Moisture content can be measured online in the dryer in order to verify whether the capsule moisture is met for further processing. Automatic sampling is carried out in a bypass system to monitor the hard gelatine capsules. The moisture in the pressed powder could also be measured prior to insertion in the tablet pressing machine.

### 100% inspection of tablets and capsules

As the production of pharmaceuticals has a tendency to increase continuous production control and documentation, there is a constant growing demand for 100% monitoring of all the weight in tablets produced and filled capsules. The weights cannot be monitored 100% by using balances at the speed of modern production lines.



The TEWS Elektronik MW 3011 microwave instrument returns 10,000 moisture and mass readings every second, therefore making it the perfect tool for the high-speed separate measurement of rapidly passing tablets and capsules. The number of objects measured per unit of time is limited solely by the speed at which the objects are passed through the sensor - not by the measuring frequency. Microwave resonance sensors can be installed directly into the production machine or can operate in separate inspection equipment.

#### PRACTICAL EXAMPLES:

Product		Moisture Range
Gelatine capsules	laboratory and process	2 – 15 %
Vitamin powder	laboratory	3 – 8 %
Granules	for making tablets	2 – 5 %
Calcium ammonium nitrate (fertilizer)	laboratory and process	0.15 – 0.5 %
Silicic acid	laboratory and process	2 – 5 %
Washing powder	basic powder for process system	9 – 15 %
Methacrylate pearls	laboratory	0.1 – 1 %

### Measuring the Moisture in Wood and Paper

## Chips, Fibers, Boards, Pellets, Rolls, Sheets, Webs

The properties of wood products, like all solid and bulk materials, can be measured with increasing accuracy as the homogeneity of the product increases. This makes the microwave resonance method a particularly good choice when it comes to measuring the moisture in well-mixed, pre-dried wood fibers and chips - and the finished products made from them. Measuring specifically benefits from the fact that differences in color, density or board thickness will have no effect.

#### Quality assurance

During the entire process of plywood, particle and fiber board and wood pellet production, measuring the product moisture plays a decisive role. If the product moisture is too high or too low, it will lead to lower quality, or further processing of the intermediate products may be stopped altogether. Ongoing and accurate moisture measuring allows operators to quickly correct the process if there are any problems and helps to ensure a high level of quality standard.

#### Dryer control

At various points in the process, moisture must always be within a specified target range. Energy can be wasted if the product is dried more than necessary. For example, if a drier is integrated into the production line, by continuously measuring the moisture content of the product, the drying process can be adjusted automatically to reduce the energy costs.



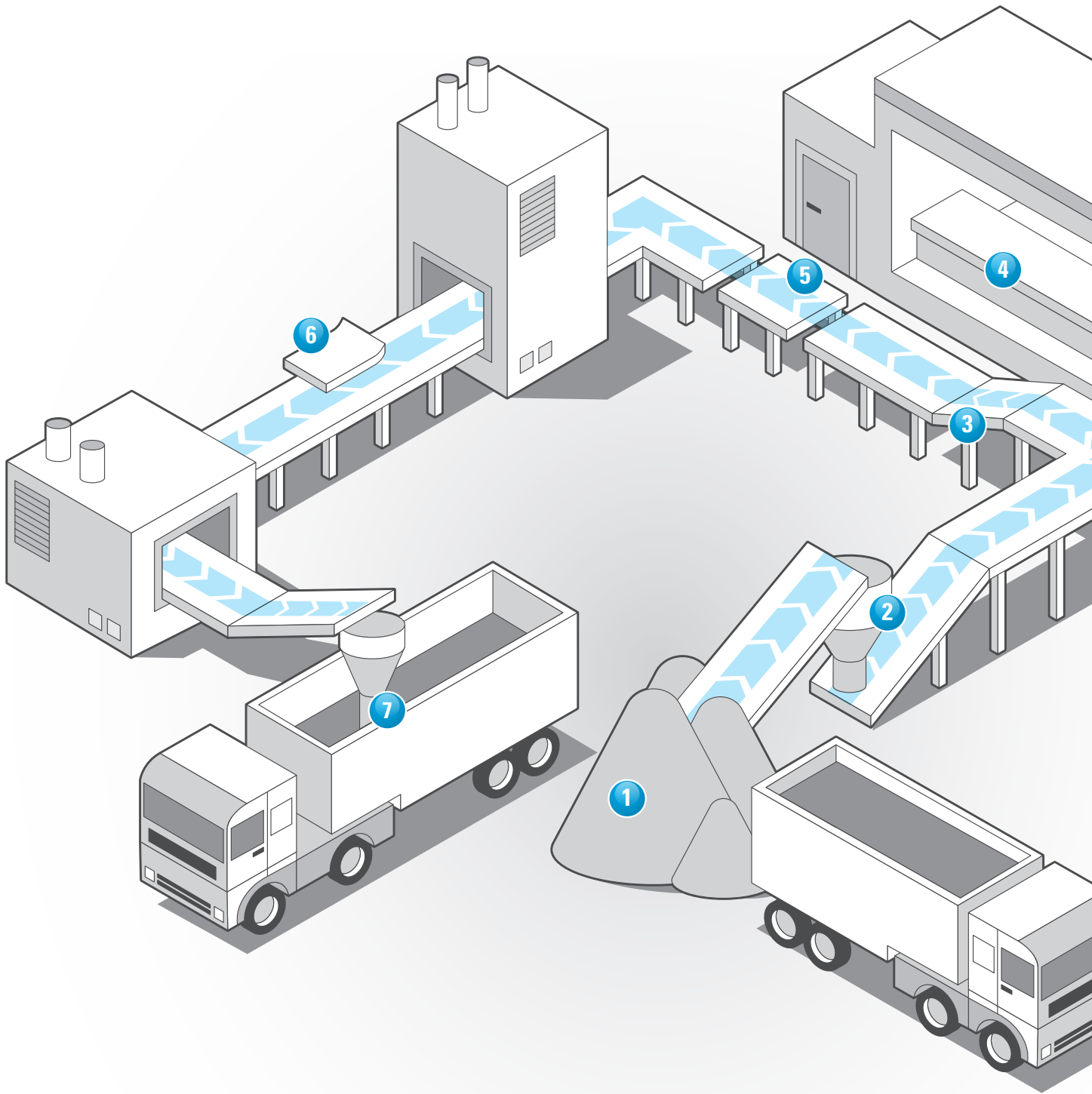


#### PRACTICAL EXAMPLES:

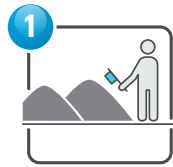
Product		Moisture Range
MDF fiber	fiber board production	5 – 15 %
OSB strands	board production	2 – 5 %
Fiber Boards, transformer boards	finished boards	3 – 8 %
Molded wood cellulose	high voltage insulation	2 – 8 %
Wood sticks, wood boards	parquet production	4 – 12 %
Shavings, sawdust	pellet production	25 – 60 %
Wood pellets	moisture	4 – 12 %
Wood pellets	bulk density, online	600 – 700 kg/m <sup>3</sup>
Paper web	in paper machine	4 – 8 %
Paper sheets, strips	samples	4 – 8 %
Tissue paper	rolls	4 – 8 %
Shredded recycling paper	thermal insulation	2 – 8 %

Typical Measuring Points

# Moisture Measuring in Process Systems

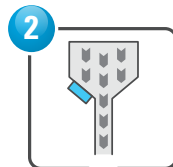






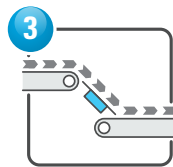
#### 1 Hand-held for portable measurement

For quick moisture measurement during goods receipt inspection, or in storage.  
MW 1100 and MW 1100S.



#### 2 Sensor installation in the Silo hopper

Online measurement: Directly in the exhaust hopper or over a bypass.  
MW 4200, MW 4260 or MW 4270 with planar sensor or MW 4260 or MW 4270 with bypass.



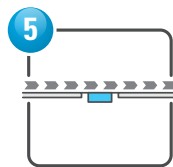
#### 3 Sensor installation at ejection location

Sensor installation at the drop-off point at the end of a conveyor.  
MW 4200, MW 4260 or MW 4270 with planar sensor.



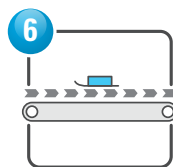
#### 4 Laboratory sensors for measurement on samples

For quality control and for ensuring quality, for product development or goods receipt inspection.  
MW 1150 – For routine measurements, MW 4300 / MW 4310 for sophisticated laboratory applications.



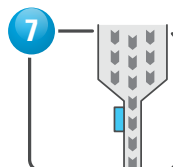
#### 5 Vibrating conveyor system

Installation of the planar sensor directly in a vibrating conveyor.  
MW 4260 or MW 4270 with planar sensor and special cable set.



#### 6 Sensor installation in the sliding block

Installation of the planar sensor above the product stream before the swaging, or granulating, of material on conveyor belts.  
MW 4200, MW 4260 or MW 4270 with planar sensor.



#### 7 Sensor installation in the wall on the buffer silo

Installation of the planar sensor between two conveyor belts, or vibrating conveyors.  
MW 4200, MW 4260 or MW 4270 with planar sensor.

## Moisture and Density Sensors

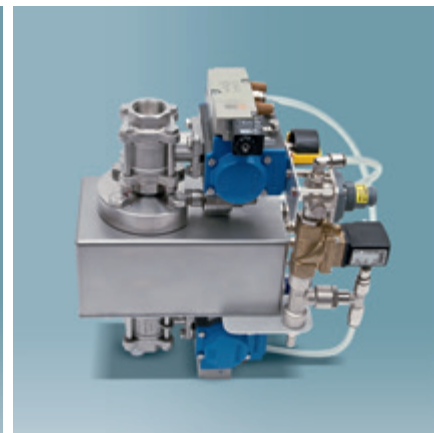
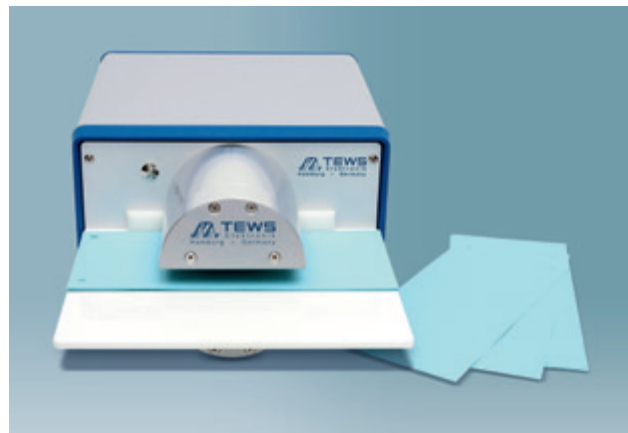
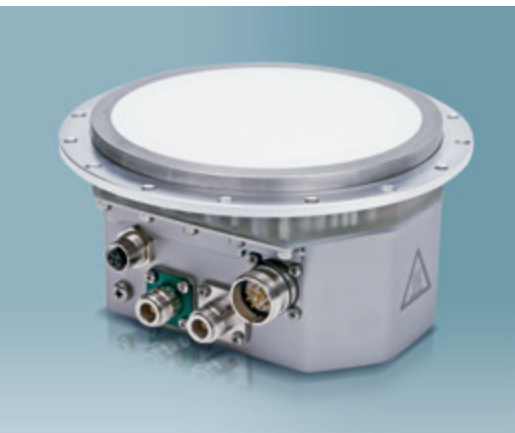
# As versatile as you need them



In practice, moisture sensors need to cope with very different practical requirements depending on the products to be measured, the range of moistures and temperatures, the amount of samples available, the conditions of measuring points etc.

TEWS Elektronik has developed a broad range of microwave sensors of different designs, sizes and sensitivities. Therefore, the instrument that best suits any potential application can be selected.

Except for a few models, every sensor can be operated in every measuring instrument, which can also be used for changing applications. The sensors of the new „Blueline®“ model range feature a built-in ID chip which the measuring system reads out for automatic configuration.



#### Tubular sensors

Tubular sensors are filled with the product to be measured. They are suitable for single moisture measurements of powders, granules, pellets etc. Samples of free flowing, non-adhesive products are simply poured through a hopper and, after analysis, released into a dish or similar container under the sensor. Samples of sticky or staining substances or materials that are detrimental to human health can be put into a beaker which is then sealed and briefly placed in the sensor for measuring.

Tubular sensors are used mainly for laboratory use or for making random sample measuring during production. They can be installed in a conveyor bypass, where they are automatically filled and emptied to produce a semi-automated online analysis. Tubular sensors are also suitable for measuring density.

#### Planar sensors

Planar sensors can be installed at a suitable location along a conveyor belt or in a container, to measure the moisture of bulk material in process systems. The product to be analyzed moves in direct contact across the sensor. Stainless steel and high-strength ceramics are used so that the sensors are robust and durable.

#### Fork sensors

Fork sensors are made up of two semi-cylinders that generate the microwave field between them. A typical product sample to be measured will usually come in the shape of boards, foils, strips or fibers, which pass through the fork sensor. Samples can also be pulled continuously through the sensor, which makes fork sensors suitable for both laboratory and process system applications.

#### TipTop and other special-purpose sensors

These sensors can be installed on planar surfaces where they are fixed locally to measure very small sample volumes - of approx. 0.5 cm<sup>3</sup>. Other special-purpose sensor models can measure the moisture in up to 12 small-size objects at the same time.

Laboratory Instruments MW 4300 / MW 4310

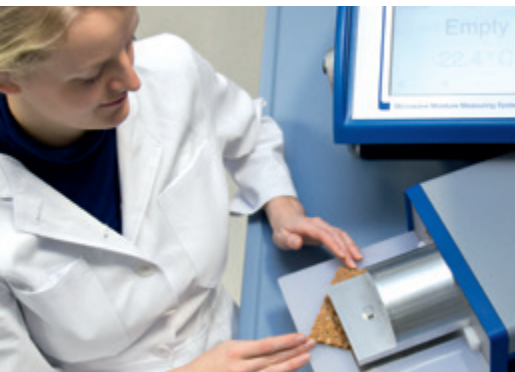
## Accurate, fast and easy to operate



TEWS Elektronik laboratory measuring instruments should be deployed whenever the moisture content of product samples needs to be measured accurately. They are useful where conventional moisture measuring methods, such as drying cabinets and Karl Fischer titrations are too time-consuming.

Analyses are independent of natural variations in product properties, such as color, grain size, salt content or bulk density. These robust and functional systems are extremely easy to operate - making operator error extremely unlikely. Measurements can be stored on a PC network or USB memory stick for further analysis.

A large number of different moisture sensors will be used in the operations of our laboratory measuring instruments. The tubular sensors are also able to measure density.



**No preparation  
of samples  
required**

The TEWS Elektronik measuring method allows the moisture in product samples to be measured without any preparation. No grinding, weighing before and after the test, or use of chemical reagents. The sample under analysis is neither modified nor heated and can usually be returned to ongoing use.

**Results obtained  
within seconds**

Measurement results are obtained within seconds. As soon as the sample is filled into the sensor, the result will be displayed and can be stored. The speed of the results can often help to avoid costly process delays.

**Analysis of results**

Results are stored in the instrument together with the date, time and other operational details. The measuring system or an external PC, can be used to prepare a statistical analysis of results or display a time vs. value chart of sensor readings.

**MW 4300 and  
MW 4310**

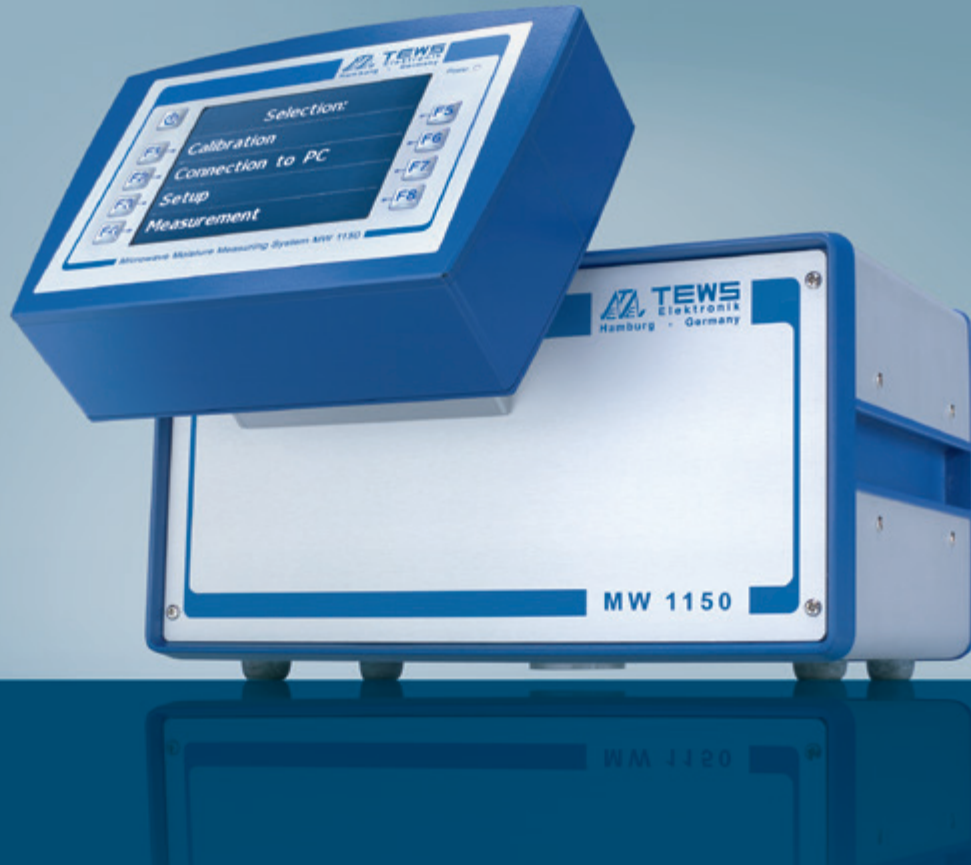
Laboratory tester MW 4300 features a 10.4" (26,4 cm) color touchscreen monitor for displaying sensor values and for the configuration parameter setup. For display and configuration, MW 4310 requires a commercially available monitor and PC-keyboard. TEWS Moisture View © is installed in both instruments.

**STANDARD INTERFACES OF MW 4300 / 4310  
LABORATORY MEASURING INSTRUMENTS:**

- Serial RS 232 (service)
- Ethernet
- 3 USB
- Analog input (0/4-20mA) for optional IR sensor
- Pt100 temperature sensor port
- Mouse, PC-keyboard, VGA monitor ports
- Automatic sensor detection

Laboratory Instrument MW 1150

## Ideal for Routine Measuring



The MW 1150 is designed as a small compact laboratory instrument or atline instrument. It is based on the MW 11xx technology which allows readings within milliseconds to obtain sensor values quickly and reliably. The backlit 5.7" (14,5 cm) monitor displays the results - up to 250 readings can be stored in the system memory, atline applications use the standard 4-20mA interface to transfer values to a PLC. There are ports for a P 1150-type printer and various temperature sensors.

MW 1150 is set up and calibrated via a PC connection. The cables required and the software TEWS Moisture View Lite © are included in the package.

Almost all MW 4XXX-series laboratory sensors adapt to the MW 1150 circuitry.

MW 1150 introduces you to fast microwave moisture measuring at a reasonable cost.



**Configuration** The moisture analyzer comes as a compact instrument designed for IP20 protection and equipped with a backlit LCD graphics display and an integral sensor of any of the very many different types. Power is supplied through an external pluggable power supply.

**Measuring range** The actual measuring range is specific to the material under analysis and sensors, ranges from 0.1% – 70.0% and can be selected in some sections. Supported product temperatures, ranging from 5°C to 60°C, are read using an optional external Pt100 or infrared temperature sensor and are compensated by optional using an automatic temperature-stabilized calibration.

**Measuring time** Less than one second

**Product memory** The EEPROM stores calibrations for up to 25 different products and a total of 250 measuring results.

**Ports** The instrument features an analog output (4-20mA), a USB port for PC connection, a port for external temperature sensor connection (Pt100 or IR), and a printer port for the optional TEWS thermotransfer printer P 1150.

**Software** Besides the on-board firmware, PC communication can be operated using the convenient software TEWS Moisture View Lite ©.

Handheld Instruments MW 1100 and MW 1100S

## Portable, accurate, universally applicable



Portable moisture meters MW 1100 and MW 1100S are light-weight and handy models which allow operators to quickly and accurately monitor the moisture in a wide variety of products. They are intended in applications for manufacturers, goods receiving stations and quality control departments.

### Handling

The sensor of the MW 1100 is flat and dish-like at the bottom, designed to ensure full contact with the sample under analysis. The moisture content is obtained within one second and then displayed. A MW 1100S measurement is made when the lancet probe with the sensor at its tip is pushed into a bale, filled box or similar package.

### Standard configuration

The compact instrument is battery-operated and features a backlit LCD graphics display and integral planar sensor.

MW 1100-series instruments come in a compact portable case containing the measuring system, a universal loading net part and USB interface cable.





- Measuring range** The actual measuring range is specific to the material under analysis, ranges from 1 – 50%, and can be selected in some sections. Supported product temperatures range from 5°C to 60°C, are read using the integral infrared temperature sensor and are compensated by optional thermally stabilized calibration.
- Measuring time** Less than one second
- Product memory** The EEPROM stores calibrations for up to 25 different products and a total of 250 measuring results.
- Ports** The instrument features an USB port for PC connection and a charging socket.
- Software** Besides the on-board firmware, PC communication can be operated using the convenient software TEWS Moisture View Lite ©.

Process Instruments MW 4200 / MW 4260 / MW 4270

## Accurate Online Measuring of Material Moisture



Moisture plays an important role in determining product quality or as a process parameter during the processing of food and feedstuffs, chemical, pharmaceutical and mineral substances etc.

### High measuring throughput

Whereas conventional lab-based moisture measuring methods such as drying balances, drying kilns or Karl Fischer titration will return accurate results if handled correctly, they will, however, take at least a couple of minutes or, with some products, several hours before they produce results. These measuring methods are not suitable when a continuous stream of accurate results is required for process or quality control. The microwave resonance method developed by TEWS Elektronik delivers results within a fraction of a second, with the total measuring speed peaking at more than 100 readings per second. This is enough to analyze even quickly flowing products.



#### In insensitive to interference

There are various methods of online moisture measuring to choose from. By selecting a suitable measuring system for a certain application, care must, however, be taken that the readings will not be corrupted by varying product properties (e.g. density, color, graining, surface drying) or by ambient conditions at the measuring point (dust, different piling heights). On account of the measuring technique applied, TEWS moisture Elektronik measuring systems are designed to be insensitive to such interference.

#### Practical equipment



Like the instruments for laboratory use, the process measuring instruments are also made with tough industry environments in mind. For example, MW 42XX-series instruments optionally come in a compact housing equipped with a 24V power supply. Variants with special explosion protection are available for use in areas at risk of explosions. All systems feature a complete set of standard interfaces for sensor value output, the transfer of control signals or for communication with control units. MW 42XX-series process measuring systems can operate all sensors from our „Blueline®“ model range.

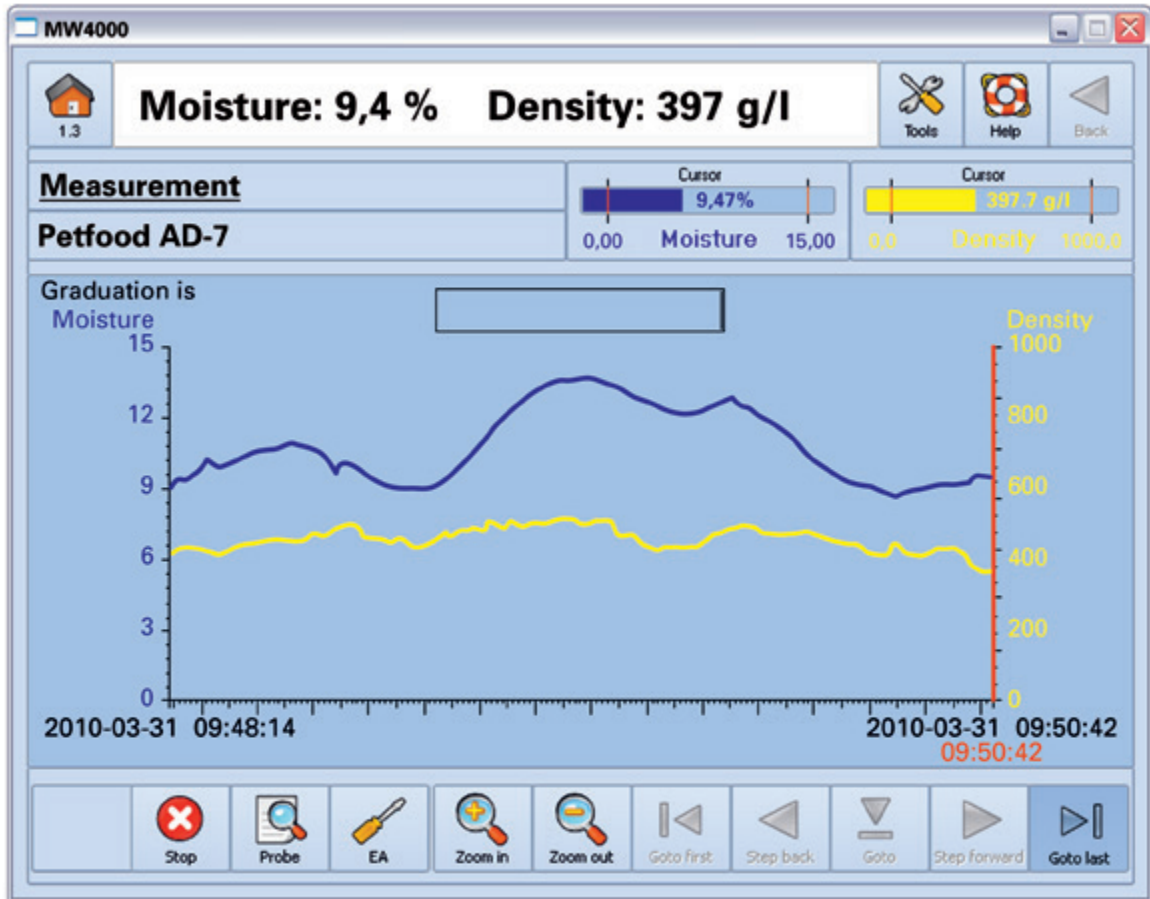
#### Touch screen and PC operation

There are various machine types suitable for particular specifications for the MW42xx-Series, such as those with a 10.4" (26,4 cm) colour touchscreen, an LCD of three lines or a single line analogue display. Function keys or touchscreen can be calibrated immediately at the test point. For parameterisation and calibration, all machines can be connected to a PC and controlled using the Tews Moisture View ® software included.

#### STANDARD INTERFACES OF MW 42XX PROCESS MEASURING INSTRUMENTS:

- Serial RS 422 (PC,PLC etc.)
- Serial RS 232 (service)
- Ethernet
- 1 analog input (0/4-20mA)
- 3 analog outputs (0/4-20mA)
- 8 no potential digital inputs
- 8 no potential digital outputs
- Automatic sensor detection

## Display, Analyze, Report



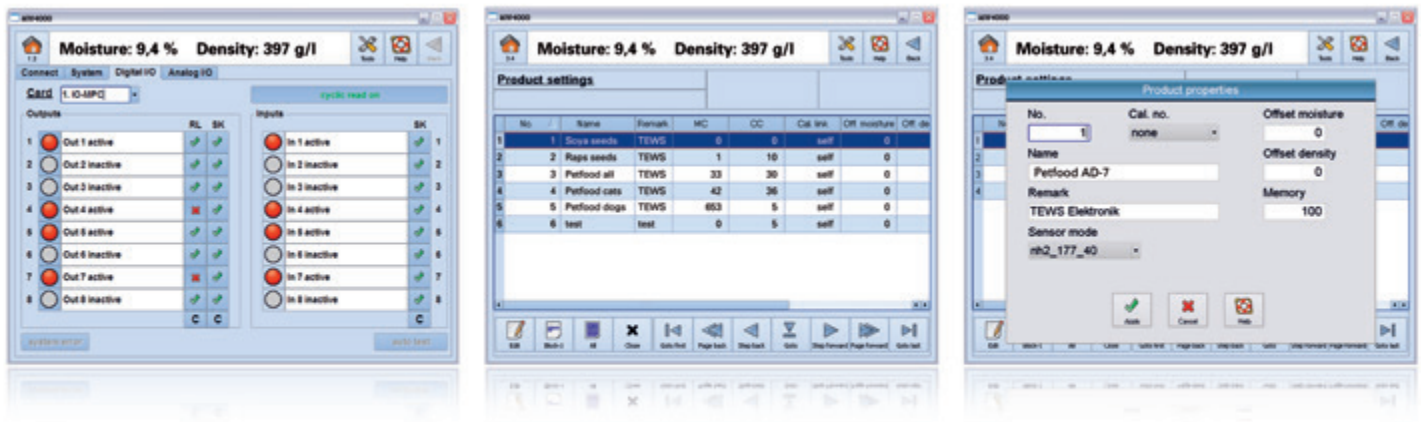
TEWS Moisture View © software has a single user interface to connect to all the measuring instruments in the new „Blueline®“ model range. Its many operational, configuration and device management functions are built on 19 years of TEWS Elektronik experience.

### Laboratory data

The laboratory version of TEWS Moisture View © has extended spreadsheet functions for the display of measurement results. It supports USB memory sticks and local networks for data exchange. All standard printers are also supported to enable printing straight from the screen.

### Process data display

TEWS Moisture View © features an extended set of display options for measuring the moisture in process systems. The measuring system or a PC attached to it can be used to graphically display moisture, density and temperature against time. The software can also be run as an easy-to-use means of configuring the analog and digital interfaces.



### TEWS MOISTURE VIEW ©:

- Simple and comprehensible icons for easy operation
- Statistics and diagram functions for data analysis and display
- User administration includes log-in function and log files
- Memory stores personal setup and user profiles
- Context-sensitive help
- Multiple language selection

#### PC and laptop

If your measuring instrument has no monitor for operation and sensor value display, simply install TEWS Moisture View © software on a personal or laptop computer running the LINUX or Microsoft Windows® operating systems. The computer will communicate with the measuring instrument via Ethernet either in a network or via a PC link cable.

#### TEWS Moisture View Lite ©

Use TMVL © for data analysis, data storage and configuration of MW 11XX-series portable moisture meters and laboratory measuring instruments. The software controls a reduced set of functions and is included in the package of these systems.

Profile Measuring Instrument MW 4420 / MW 4430

## Moisture and Density Profiles of Cigarettes and Cigars



### Quality and cut control

The MW 4420 measuring station is for fast measurement of tobacco mass and distribution, cigarette moisture, position and integrity of aroma capsules and charcoal content. This system is ideal for final check of quality.

The patented measuring technique allows accurate measuring of cigarette moisture and density regardless of the surface structure or color of the cigarette under analysis. The horizontal cigarette transport bar ensures perfect results, allowing the moisture and density profile of every cigarette brand to be calculated independently of each cigarette diameter. The MW 4430 measures cigars the same way.

New features are monitoring of the position and integrity mentol capsules in filter rods and filter tips. Furthermore measuring of segment position and charcoal content in multi segment filters.

### Easy operation

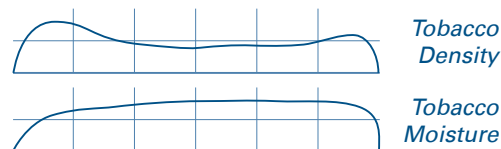
The integrated color touch screen and the self-explanatory user interface allow the system to accurately keep track of results in conformity with ISO 9000. The following details are read and kept: time, date, cigar and cigarette brand as well as minimum, maximum and average moisture and density values.



Results as mean values, standard deviation, minimum and maximum are shown graphically as an output to the screen and printer. Data can be exported to an USB memory stick for further processing by external programs such as spreadsheets. The Ethernet port allows integration into enterprise network, as appropriate.

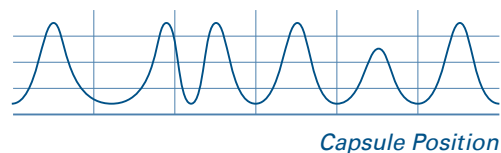
The MW 4420 test station measures cigarettes or filter rods with max. length 144 mm and max diameter 9 mm. The MW 4430 test station measures cigars with max. length 280 mm and max. diameter 20 mm.

#### Cigarettes



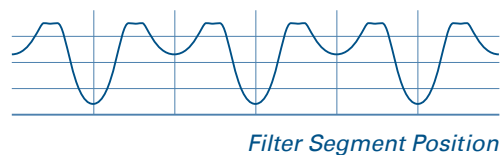
- Control densing values
- Control cut position
- Improve cigarette quality
- Avoid loose end
- Reduce waste production

#### Menthol Capsules



- Detect misapplied and damaged aroma capsules
- Ensure high filter quality
- Reduce rejects

#### Charcoal Content



- Control charcoal content
- Check segment position
- Ensure high filter quality
- Reduce rejects

High-speed Instrument MW 3011

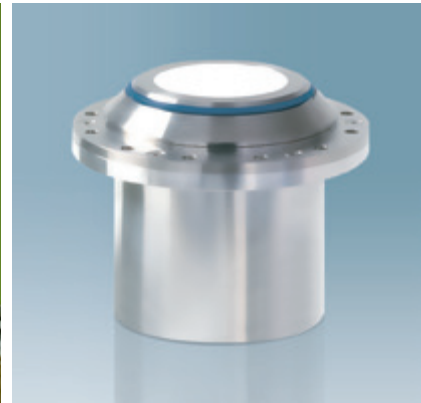
## For Machine Integration by our OEM Customers



**100% control** High-speed microwave measuring system MW 3011 is the latest innovation by TEWS Elektronik for parallel moisture and density measurement in rapidly moving products - for instance, cigarette rods during manufacture. Up to 20,000 readings produced via an analog interface can be taken every second.

**Applications** The MW 3011 is used in the tobacco industry for online measurements of moisture and density in the production of cigarettes and cigar rods. Due to its high spatial resolution as well as many other factors, the system can perform an exact control of the cutting position or detection of foreign particles in the product. Another application is the online measurement of filter rods for the detection of embedded capsules or the characterization of multi-segment filters.





The measuring of the filter raw material triacetin can also be controlled during fiber production for the tobacco industry.

Online measurements in quickly moving threads, yarns, weight measurements of tablets or gelatine capsules at a measuring speed of 50 capsules per second using this instrument have also already been performed successfully.

This allows 100% quality control of the measured material.

#### TECHNICAL DATA:

Measuring speed	Up to 20,000 readings per second For example, assuming a production speed of 12,000 cigarettes per minute, equaling 200 cigarettes per second, every single cigarette will be measured at 50 different positions.
Accuracy (moisture)	$\pm 0,1$ bis $\pm 0,3\%$ for tobacco in a moisture range of 5 – 20%
Accuracy (mass)	for example $\pm 0,5\%$ of final tobacco result within the set density range (0 – 400) mg/cm <sup>3</sup>
Microwave output	low 15 mW
Data outputs	analog outputs (0-10 V), (0/4-20 mA) for moisture and density, RS 232, RS 422, CAN interface, optional SRM 8000.

## Transmission Measuring Instrument MW-T

# Non-contact Measuring through Bales and Boxes



Core moisture is of particular interest in the case of large boxes and bales.

The MW-T is an in-line stand-alone, fully automated and contactless measurement system for determining the moisture irrespective of product density.

### Microwave Transmission Technology

The MW-T technology is a moisture measuring system that is based on the interaction between transmitted low-power microwaves and water molecules inside of the tested material.

Bales travel through a microwave (MW) field created by the system, consisting of both a MW Transmitter and Receiver, and water molecules present in the bales are agitated. The MW-T system detects and analyses the changes of power and phasing of the microwaves, and calculates the moisture of the material.

TEWS Elektronik patents cover the MW transmission technology.

### High Measuring Throughput

The wide measurement field used by MW-T covers a large portion of the sample, thus providing both high-resolution moisture profiles and average values, the latter representing the mean moisture of each sample bale.



### Fully automatic Measuring of Parcelled Goods

Light barriers/detectors provide the system with the capability to operate fully automatically. The touch screen displays the measurement results in real-time and a warning marker signals when moisture does not meet specifications, or when moisture is dispersed inhomogeneously throughout the bale.

The measurement data can be transferred in real-time to the measuring station using the following networked interfaces: Network (TCP/UDP), serial (RS232/422/485), and mA-interface (4...20mA). Optionally prevalent field busses such as Profibus or Profinet can be integrated.

A barcode reader can be used to assign the correct production process parameters to each product ID, or to import the bale ID.

The MW-T can be used as a stand-alone system. However, it can also be integrated into networked corporate data acquisition systems.

### Practical equipment

MW-T is also built to a robust and industrial design. A dust-proof and airtight stainless steel enclosure keeps its electronics insulated, turning the instrument into a low-maintenance piece of machinery for every industrial environment.

### STANDARD INTERFACES OF THE MW-T PROCESS MEASURING INSTRUMENT:

- Ethernet
- Remote maintenance via Internet
- USB
- Analog inputs and outputs
- Serial (RS232/422/485)
- Digital inputs and outputs
- Field busses (optionally)
- Barcode reader (optionally)

## Accessories

# Extensive, user-friendly Range

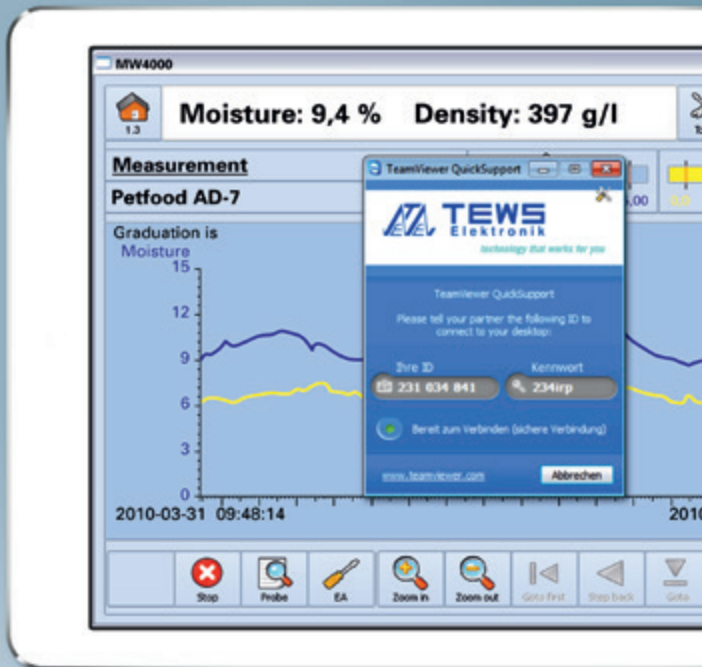


### MW 1100 / MW 1100S:

- Belt bag
- Charger lead for operation in vehicles

### MW 1150:

- Thermoprinter P 1150
- Pt100 temperature sensor
- External infrared temperature sensor
- Connector kit for analog output 4-20 mA
- Hoppers, brushes, dishes
- Spare beakers for beaker sensors



#### MW 4300 / MW 4310:

- Hoppers, brushes, dishes
- Spare beakers for beaker sensors
- Analog remote display
- PC software TEWS Moisture View ©

#### MW 4200 / MW 4260 / MW 4270:

- Remote maintenance via Internet
- Infrared temperature sensor
- Analog remote display
- Display and control panel
- PC software TEWS Moisture View ©

## Technical Data

# Instruments, Sensors, Combinations, Dimensions.

### SENSORS:

	Model	Typical product	Sensitivity	Volume (ml)	Ø* (mm)	Beaker possible	Size* WxHxD (mm)
Labsensors	<b>SLE-10</b>	powder, cigarettes	high	9	10	no	255x265x280
	<b>SLE-10B</b>	powder, granules	medium	5	10	yes	255x105x270
	<b>SLE-16</b>	powder, granules	very high	22	16	no	255x265x280
	<b>SLE-20B</b>	powder, granules	medium/high	14–22	20	yes	255x150x280
	<b>SLE-26</b>	powder, granules	very high	80	26	no	255x305x280
	<b>SLE-26exz</b>	cigars	medium/high	–	26	no	150x280x315
	<b>SLH-40B / SLH-50B</b>	paste-like, bulk material	low/medium	60–160	40/50	yes	365x205x275
	<b>SLH-46</b>	powder, bulk material	medium/high	350	46	no	365x390x280
	<b>SLH-40B / 46-Kombi</b>	paste-like, bulk material, powder	low/medium/high	60–160	40	yes	365x390x280
	<b>SLE-75B</b>	bulk material	medium	375	75	yes	365x390x410
	<b>SLH-96</b>	bulk material	medium/very high	1600	96	no	365x390x410
	<b>SLF-60-16</b>	foils, paper	very high	–	–	no	255x155x390
Online-Sensors	<b>SPP-160-008</b>	very moist products	low	–	–	no	188x90
	<b>SPP-80-008</b>	very moist products	low	–	–	no	140x130
	<b>SPP-160-015</b>	boards, granules	low	–	–	no	188x85
	<b>SPP-160-030</b>	boards, granules	medium	–	–	no	188x85
	<b>SPP-160-080</b>	boards, granules	high	–	–	no	188x85
	<b>SPP-160-200</b>	paper, granules	very high	–	–	no	188x85
	<b>SPE-20 / SPE-26</b>	powder, granules	high/very high	50/80	20/26	no	245x122x130
	<b>SPH-46-CS</b>	bulk material	medium/high	approx. 500	50	no	390x320x250
	<b>SPH-96-C</b>	bulk material	medium/very high	approx. 2000	100	no	450x550x300
	<b>SPP-4200-XX</b>	boards, granules	low/very high	–	–	no	325x225x105

### MEASURING INSTRUMENTS:

Model	Size* WxHxD (mm)	Weight* (kg)	Housing	Display	Laboratory use	atline use	online use	Moisture-display	Density-display
<b>MW 4300</b>	350x220x435	12	plastic/aluminium	10.4" (26,4 cm)	yes	yes	no	yes	yes
<b>MW 4310</b>	350x220x435	12	plastic/aluminium	no	yes	yes	no	yes	yes
<b>MW 1150**</b>	240x70x170	1.5	plastic	5.7" (14,5 cm)	yes	yes	no	yes	no
<b>MW 1100</b>	210x100x310	1.5	plastic	3.5" (8,9 cm)	yes	yes	no	yes	no
<b>MW 1100S</b>	240x130x960	3.5	aluminium	3.5" (8,9 cm)	yes	yes	no	yes	no
<b>MW 4200</b>	370x250x160	7	stainless steel	optional	no	no	yes	optional	optional
<b>MW 4260</b>	415x530x240	20	stainless steel	5.7" (14,5 cm)	no	no	yes	yes	yes
<b>MW 4270</b>	415x530x240	21	stainless steel	10.4" (26,4 cm)	no	no	yes	yes	yes
<b>MW 3011</b>	430x270x160	8	aluminium	no	no	no	yes	–	–
<b>MW-T</b>	600x540x350	approx. 50	stainless steel	10.4" (26,4 cm)	no	yes	yes	yes	yes
<b>MW 44X0</b>	550x610x550	23	aluminium	10.4" (26,4 cm)	yes	yes	no	yes	yes

\* 1 kg = 2.2 pound, 1 mm = 0.039 inch

\*\* plus sensor

Weight* (kg)	Housing	Combines with	MW 1100	MW 1100S	MW 1150	MW 4200	MW 4260	MW 4270	MW 4300
5	aluminium	>>	no	no	yes	no	no	no	yes
5	aluminium	>>	no	no	yes	no	no	no	yes
5	aluminium	>>	no	no	yes	no	no	no	yes
5	aluminium	>>	no	no	yes	no	no	no	yes
6	aluminium	>>	no	no	yes	no	no	no	yes
6	aluminium	>>	no	no	yes	no	no	no	yes
9	aluminium	>>	no	no	yes	no	no	no	yes
11	aluminium	>>	no	no	yes	no	no	no	yes
11	aluminium	>>	no	no	yes	no	no	no	yes
14	aluminium	>>	no	no	yes	no	no	no	yes
15	aluminium	>>	no	no	yes	no	no	no	yes
6	aluminium	>>	no	no	yes	no	no	no	yes
3	aluminium	>>	no	no	no	no	yes	yes	no
3	aluminium	>>	no	yes	no	no	yes	yes	no
3	stainless steel	>>	yes	no	no	no	yes	yes	no
3	stainless steel	>>	yes	no	no	no	yes	yes	no
3	stainless steel	>>	no	no	no	no	yes	yes	no
3	stainless steel	>>	no	no	no	no	yes	yes	no
4	stainless steel	>>	no	no	no	no	yes	yes	no
27	stainless steel	>>	no	no	no	no	yes	yes	no
23	stainless steel	>>	no	no	no	no	yes	yes	no
6	stainless steel	>>	no	no	no	yes	no	no	no

Temperature display	Including TMV © PC software	USB	Ethernet	Printer port	Analog outputs	Digital outputs	Digital inputs	Sensor detection	Pt100 jack
yes	no	yes	yes	yes	no	no	no	yes	yes
yes	no	yes	yes	yes	no	no	no	yes	yes
yes	Lite version	yes	no	P 1150	yes	no	no	yes	yes
yes	Lite version	yes	no	no	no	no	no	yes	no
yes	Lite version	yes	no	no	no	no	no	yes	no
–	yes	no	yes	no	yes	yes	yes	yes	yes
yes	yes	no	yes	optional	yes	yes	yes	yes	yes
yes	yes	no	yes	optional	yes	yes	yes	yes	yes
–	no	no	no	no	yes	yes	optional	no	no
yes	no	yes	yes	optional	optional	optional	optional	no	no
yes	no	yes	yes	yes	no	no	no	no	no

**Innovative Microwave Resonance Technology**

## **Process and Laboratory Moisture Measuring**



TEWS Elektronik is an international company with a large number of sales partners all over the world.  
For an up-to-date list of agencies visit our website: [www.tews-elektronik.com](http://www.tews-elektronik.com)

**TEWS Elektronik GmbH & Co. KG**

Sperberhorst 10  
22459 Hamburg  
Germany

Phone +49.40.555.911.0  
Fax +49.40.552.575.9

[info@tews-elektronik.com](mailto:info@tews-elektronik.com)  
[www.tews-elektronik.com](http://www.tews-elektronik.com)

Your local agent

---