



# LabMaster-aw

*Laboratory instrument for accurate  
water activity ( $a_w$ ) measurement*



*For assurance of :*

**Quality**

**Product safety**

**Microbiological stability**

**novasina**  
The Art of Precision Measurement



**„All life needs water!“  
There is no life without water!**

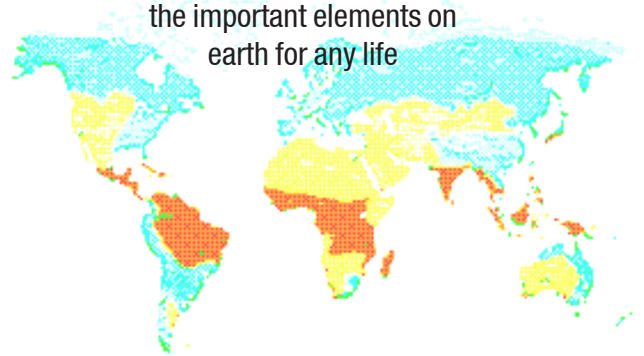
„**Water means life!**“ Thanks to water, life has developed and new life continues to develop.

„**Life needs water**“. Water is the „elixir of life“ for animals, humans and plants. But bacteria, fungi and viruses also need water to live. Water is stored in every product. Either in the form of a chemical compound with other molecules or as free water, which is stored between the compounds. What is the optimum amount of both types of water now? The amount of bound water is depending on the chemical reactivity of the substances used.

Free water can be affected by production processes as well as via storage and packing. Alongside the usage of water, too much free water can particularly damage the product. Microorganisms such as **fungi or bacteria** can optimally grow and thrive on this surface. Their metabolic products are deposited on the product and spoil the **quality**. Too high water activity means limited **durability**. Water activity values, which are too low can spoil the taste or appearance.

**Only an extremely accurate and safe quality measurement of water activity („free water components“) guarantees quality products!**

**Air and water  
the important elements on  
earth for any life**



**Meaning of „water activity“ ( $a_w$ )**

Water (H<sub>2</sub>O) is an important basic element in foods as well as in many pharmaceutical and cosmetic materials and products. For a long time the industry has known how important it is to check free water. The water activity ( $a_w$ ) measurement forms the basis of this and provides important information about the quality of a product. Finally it provides information regarding the possibility of microbiological growth on the surface and then conclusions can be made about the stability and durability of a sample.

Water activity is defined as the availability of free water in a sample. Only this component takes an active part in the exchange with the ambient humidity and can possibly form the ideal medium for microbiological growth on the surface (*difference in partial vapour of water vapour*). Above the sample, the humidity is measured immediately after reaching the humidity balance. The relative humidity is measured in % RH and converted in  $a_w$  electronically.

**0...100% RH corresponds 0.0...1.00  $a_w$**

Free water in products is jointly responsible for the growth of undesirable organisms such as bacteria or fungi, which produce toxins or other harmful substances. But also chemical/biochemical reactions (e.g. *the Maillard reaction*) increasingly take place and possibly change the product's

**colour, taste, shape, texture and appearance.**



**Introduction to  $a_w$  measuring**

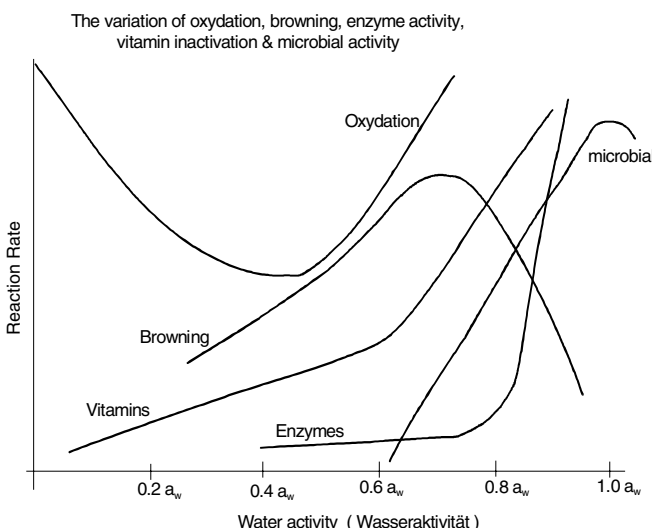
In the food, pharmaceutical and cosmetic industry, water activity ( $a_w$  value) is understood as the humidity balance value of a product, which is ascertained through its partial vapour of water vapour on the surface. This is depending on the following **factors**:

- Chemical compound
- Temperature
- Water content
- Storage environment (T / RH)
- Absolute pressure
- Packing

These factors affect the following **properties**:

- Microbiological stability (*growth*)
- Chemical stability (*see table*)
- Content of proteins and vitamins
- Colour, taste and nutritional value
- Stability of the compound & durability
- Storage and packing
- Solubility and texture

The optimisation and stabilisation of the product properties require an **upper** as well as **lower**  $a_w$  value margin. Therefore, constant supervision of this quality parameter is essential and necessary for efficient production.



There are binding regulations in different regions worldwide with regards to the  $a_w$  value to be met in foods. The measuring principle applied by Novasina was checked by the **FDA, UNO, WTO, FAO, AOAC** and **FOS (EFSA)** and found to be suitable.

With the **LabMaster- $a_w$**  instrument, determination of the water content via the so-called „sorption isotherm“ and  $a_w$  value is also possible. With this process, the sample is not destroyed and can be stored accordingly for future checks. A viable and efficient alternative to the widely used water content measurement!

## Novasina, the market-leading provider of accurate water activity measuring instruments



### LabPartner-aw

**Enter the world of water activity!** For over 40 years Novasina has been developing globally recognised and accurate water activity measuring instruments for quality and research laboratories. The unique measuring technology is based on an electrolytic  $a_w$  value measurement as well as on simple operability and sample conditioning. These are the key factors for correct and repeatable measurements. Thanks to new functions, the effective measuring accuracy and reproducibility could be improved and the scope of applications extended. Most different types of foods, as well as many pharmaceutical, chemical and cosmetic products can be checked with the



Labmaster / Partner-aw system

new **LabMaster-aw** system and their  $a_w$  value established. Thanks to the use of filter systems to protect the measuring sensor, today even samples with non-aqueous additives such as alcohol, acids/bases or chlorine etc. can be measured efficiently and accurately. Such filter systems do not generally affect the measuring of the **water activity**. The **LabMaster-aw** system ideally uses the highest physically possible measuring speed. Thanks to modular expandability and pre-conditioning, a higher number of samples can also be measured quickly and accurately.

The completely redeveloped **LabMaster/Partner-aw** with its simple and clear operation sets a new standard for  $a_w$  laboratory measuring devices. Thanks to modular construction, the system can be expanded by up to 10 measuring chambers. Its unique hardware and software architecture enables highly accurate, reproducible measuring results over a wide measuring range. As a result, for the first time, all recommendations and regulations of authorities/control boards such as HACCP, AOAC, FDA etc. can be met. Each **LabMaster-aw** has a USB and RS-232 interface for exchanging data with Windows-based PC systems. For data and sample visualisation, analysis and archiving Novasina offers a tested PC software. The system has an integrated **multi-user management system**.

For the first time, the **LabMaster-aw** has a temperature pre-conditioning chamber as well as the  $a_w$  measuring chamber. As a result, samples can be brought to the required temperature even before the actual measuring. Therefore, repeated measurements are faster.

The hermetically sealed, temperature-stabilised measuring chamber forms the central unit of the system. Integrated in this is the intelligent measuring unit, which has been developed on an ongoing basis thanks to years of research. Measuring is based on a resistive and electrolytic humidity measurement („Novalyte“ technology) and is one of Novasina's core strengths.

Simple operability using the keyboard interlock, softkey buttons and a large LCD display with graphic capability makes measuring simple. Therefore, access rights and system protection functions can be allocated simply to each operator.



### Your advantages :

- Highest measuring accuracy & quick measuring of  $a_w$  value
- Simple menu navigation with large LCD display
- New, robust and long-term stable  $a_w$  value measuring unit
- Measuring range: 0.03...1.00  $a_w$
- High reproducibility of the sample measurement
- User ID and password protection
- Ultra precision and efficient sample temperature stabilisation
- Pre-conditioning chamber for quick measurements
- Simple testing and adjusting functions using Novasina
- SAL-T  $a_w$  standards
- External printer connection
- Analysis software for PC (Windows) included to scope of delivery
- Protection filter systems for the measuring unit against contamination and falsification of the measuring value (*chemically/mechanically*)

## The **LabMaster / Partner-aw** product range



With the **LabMaster-aw** measuring instrument you acquire a lifelong aw laboratory device, which is upgradeable at all times thanks to its advanced technology. Extra **LabPartner-aw**'s can simply and easily be attached to a **LabPartner-aw** as additional measuring units. A **LabMaster-aw** manages and operates up to 9 **LabPartner-aw**'s using a common communication cable. As a result, for the first time it is possible to measure up to 10 samples simultaneously. The intelligent network (fieldbus system) independently recognises a new user and correspondingly links this in the network. For this, only a new identification number (1...9) has to be allocated to the **LabPartner-aw**. For long-term storage and management of all measuring data, the system can either be connected to a **laboratory printer** or to one of the Windows-based software packages provided by Novasina.

The software of each **LabMaster/Partner-aw** can be updated using an

installed serial interface from your PC via the **Internet**.

If necessary, the aw measuring unit can be replaced quickly and easily by the user. The intelligent measuring unit has a memory function and can be calibrated at 7 aw value points. Delivery takes place in each case with a factory calibration at all points. The tested Novasina humidity standards can be used for checks and recalibration. These are very simple to deal with, long-term stable and generate reproducible aw values. Instead of the sample, the standards are used inside the measuring chamber. A set with 6 aw standards is included to each **LabMaster-aw**. These can be used for several years depending on storage and use.

### **Specifications LabMaster/Partner-aw systems:**

Measuring principle:	Resistive electrolytic humidity measuring system	Surface temperature measurement and stabilisation
Measuring range:	0.03 ..... 1.00 aw (3...100% RH)	0... 50 °C (32...122°F) measuring chamber actively controlled
Measuring accuracy:	+/- 0.003 aw (0.04... 0.97aw)	+/-0.2 °K
Solution:	+/- 0.002 aw	+/- 0.1°C
Control Precision:	Measuring chamber +/- 0.1°C (0...50°C)	Control range: +/- 25 °K above/below room temp.
Supply voltage:	90... 260 VAC 50 / 60 Hz	Max. power demand 65 W per apparatus
Display:	High contrast LCD display	240 x 480 LCD dots with LED background lighting
Operation:	20 watertight keyboard interlock	5 softkey buttons
Communication:	RS-232 and USB 1.0 for PC/printer	Internal fieldbus systems for extra <b>LabPartner-aw</b>
Casings:	Painted steel casings, weight: 10 kg	Dimension: 260 x 440 x 220 mm
Protection class:	IP 21	
Measuring chamber:	Measuring chamber volume 15 ml 3 active sealing barriers under spring pressure	Intake for standard Sample dishes (diameter: 30 x 14 mm)
Specifics:	Pre-conditioning chamber intelligent measuring unit	Intake of the sorption isotherm curve using „SI set“ accessories

### **Quick, accurate, safe**

Thanks to the most modern technology, the **LabMaster/Partner-aw** system combines speed, intuitive operability, accuracy, soundness and traceability of all measuring results.

The unique measuring cell is the core element, which has been continuously further developed by Novasina for over 40 years. As well as the soundness and long-term stability it is convincing through the unique reproducibility of measurements. At all times, the measuring process can be supervised visually on the screen and recorded, analysed and printed out using the Novasina PC software. Therefore, after measuring has been completed, the current measurement values and their variation can be seen at all times. Automatic print commands to an external printer, suitable for connection, allow the measurements to be completely documented.



### **Versatile, variable, modular**

With the extended measuring range, the aw value can be determined with different types of **foods**, as well as with **pharmaceuticals**, and **chemical** and **cosmetic products**. The accurate measurement of the **aw values** helps not only to control microbiological growth but also to optimise the process control.

The **multi-user management** function helps keep the measurement quality at a high level. It also simplifies the operation by different users and upon request, also limits this.



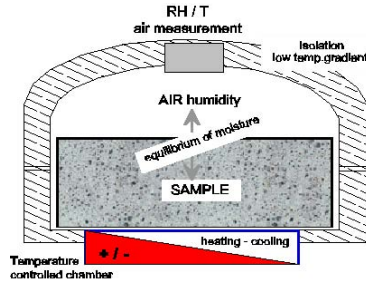
### **Service, accessories, traceability**

The measuring system does not need special care. If required, the filter systems should frequently be replaced and the system checked using aw value standards. The measuring dishes of the measuring chamber can be removed for cleaning. Each **LabMaster-aw** includes 50 sample dishes as well as an aw value standard set (SAL-T).

## The $a_w$ value measuring method

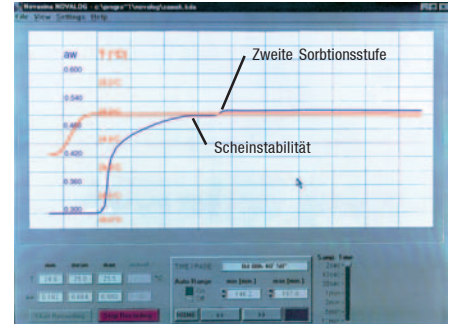
The test sample is placed in a completely **sealed** and **temperature-stabilised measuring chamber**. After sealing, the sample humidifies or dehumidifies the air volume inside the chamber. Only the **free water** component can do this. This exchange takes place until the **partial pressure of water vapour saturation = zero**. A highly accurate humidity and temperature measuring unit continuously determines the climate conditions of the air within the measuring chamber. If these parameters remain stable over a user-adjustable period, the instrument software determines the stable value parameter and converts this into an **aw value**. As a result, the display continuously shows the current measurement. The following factors play an important role in the measuring accuracy and speed:

- **Temperature** of the medium being measured and the measuring chamber
- System **controllability**
- **Tightness** of the measuring chamber
- **Sample preparation**
- **Measuring speed**
- **Measuring accuracy** of the humidity value measurement



The measuring speed is largely dependent on the sample properties. As a result, the ability of how quickly the available free water can be released into the environment plays a decisive role. The gauge electronics mostly have a basic higher usable measuring speed.

The phenomenon of a second sorption level is also known with different fatty samples. Firstly the sample „appears“ to run in a state of quasistability in order to increase later (possibly *hours later*) the  $a_w$  value again (*break through the „fat barrier“*).



### Food industry

Testing of products and raw materials to optimise durability, colour, taste, nutritional value and processing. Final inspection, quality assurance as well as packing optimisation regarding durability. Optimising process and energy costs during production.

**Quality controls** in accordance with

### Typical measuring samples

- Meat, fish, poultry
- Fruit, berries, fruit additives,
- Bread, cakes and pastries, jam, biscuits
- Dried sausage, nuts
- Butter, yoghurt, quark, cheese
- Chocolate, cocoa, chocolate bars, sweets
- Pasta products, rice, cereals
- Spices, dried soups
- Stock cubes, yeast



### Pharmaceutical industry

Tests of basic materials, semi-finished and finished products for process properties and possible reactivities. Checking further process abilities in the subsequent process levels. Checking product properties regarding the intake and release of free water into the environment.

**Quality controls** in accordance with HCCP, SOP, FDA, SOP

### Typical measuring samples

- Different powders
- Granules
- Tablets, coated tablets
- Gels, creams
- Various liquid materials
- Specific drugs



### Cosmetic industry

Quality assurance of basic materials, semi-finished and finished products. Optimising durability, colour, fragrance as well as taste and processing. Optimising packing regarding durability and presentation.

**Quality controls** in accordance with HCCP, WHO, FDA, SOP

### Typical measuring samples

- Powders
- Creams and gels
- Cosmetics
- Colours
- Conditioning creams

Some well known companies, who associate quality with Novasina:



## Novasina – Swiss quality, flexibility and competence

Since its establishment almost 50 years ago, the Novasina company has specialised in the **accurate measuring of air and material humidity**. The basis of this was the world's first, self-developed electronic measuring sensor for measuring humidity. This technology is based on the resistive electrolytic measurement principle. This was further developed and optimised over decades. This measuring principle is generally the most demanding and most accurate. Modern substances and materials allow continuous optimisation and expansion of the area of application of this measuring sensor. Today the highly accurate humidity measurement is among our core competences and forms an important pillar of our success. Intensive research and development further ensures a decisive advantage for us. **Novasina** sensors and measuring instruments are mainly applied to the area of air and material humidity. This is almost exclusively used in industrial applications as well as in research and development.

We fully develop and produce Novasina precision measuring instruments in which our Know-how of many years is always included. We are proud of the „**SWISS MADE**“ label, which guarantees the highest quality, innovation and longevity.

The diversity of our customers, business partners and applications as well as our international orientation makes Novasina the competent partner for demanding humidity measurements in the industrial sphere!

**Customer uses and innovation always  
come first with Novasina!**



For further technical information, see the technical data sheets:

Consultation, sales and services:

### **Manufacturer :**

**Novasina AG**  
Neuheimstrasse 12  
CH - 8853 Lachen SZ  
Switzerland

Phone : +41/ (0)55-642-67-67  
Fax : +41/ (0)55-642-67-70  
E-Mail : [info@novasina.ch](mailto:info@novasina.ch)  
Internet : [www.novasina.com](http://www.novasina.com)



*Subject to technical changes*

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