humimeter.com®

by Schaller Messtechnik

User Manual

Humimeter AW2 Meter

Scigiene

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User manual - Definitions

Water Activity: Water activity or aw is the partial vapor pressure of water in a substance divided by the standard state partial vapor pressure of water. In simplified terms, aw is the measure of “free” water in food or other product of interest that is available to support the growth of microorganisms including spoilage organisms.

Relative air humidity: indicates the relation between the current water vapour pressure and the maximal possible water vapour pressure (called saturation vapour pressure).

The relative humidity shows the degree to which air is saturated with water vapour. For example:

50% relative humidity indicates that at the current temperature and the current pressure the air is saturated with water vapour for half of its value, 100 % relative humidity means that the air is totally saturated. When the air has more than 100 % of relative humidity, the excessive moisture would condense or form fog.

Absolute humidity: shows the contained amount of water in grams per cubic metre of air. The absolute humidity is a direct degree for the amount of water vapour contained in a certain air volume. It shows how much moisture can maximally condense or how much water has to be evaporated to receive a certain desired air humidity.

Dew point temperature: The dew point indicates the temperature that the not completely saturated air has to reach in order to be completely saturated with water vapour. If the room with the current relative humidity is cooled down to the dew point temperature, the water vapour begins to condense.

Empty calibration curves: There are another 10 empty calibration curves stored in the measurement device. These can be used for special fruits or variety calibration.

Detailed definition of Water Activity:

Water activity or a_w is the relationship between the partial water vapour pressure in food (p) and the saturation vapour pressure of pure water (p0). It is an important indicator for product quality in the food, tobacco and pharmaceutical industry and is indicated in an a_w value from 0…1.

Water activity is synonymous with the equilibrium moisture content – the relative humidity of air in equilibrium with the sample product.

The relative humidity of air however is indicated in %.

Water activity value is temperature dependent. For the determination of water activity at a desired temperature, the measuring device and the product sample should be stored at the same temperature before starting the measurement.

The humimeter A_W water activity meter is suited for the measurement of materials like cereal products, coffee, cocoa, muesli, butter, mixtures of dried fruit, spices, granulates, mushrooms, sugar, xylitol, biscuits or dry sausages and many other types of food where a check of the water activity is required.

The humimeter A_W is in general not suited for liquids and juices (syrup), acidic food like onions, fruits and tropical fruits or food and beverages containing alcohol, e.g. filled chocolates. Vinegar and acids destroy the calibration and the sensor.

Materials with moisture above the fibre saturation point, (this means an a_w value above 1), cannot be measured. For such materials only the water content can be determined.

Water activity must not be confused with water content – the percentage of water contained in a product.

The water content is used for billing according to the dry content of food and materials, it indicates the ratio of water to the total mass in percent (kg/kg x 100).

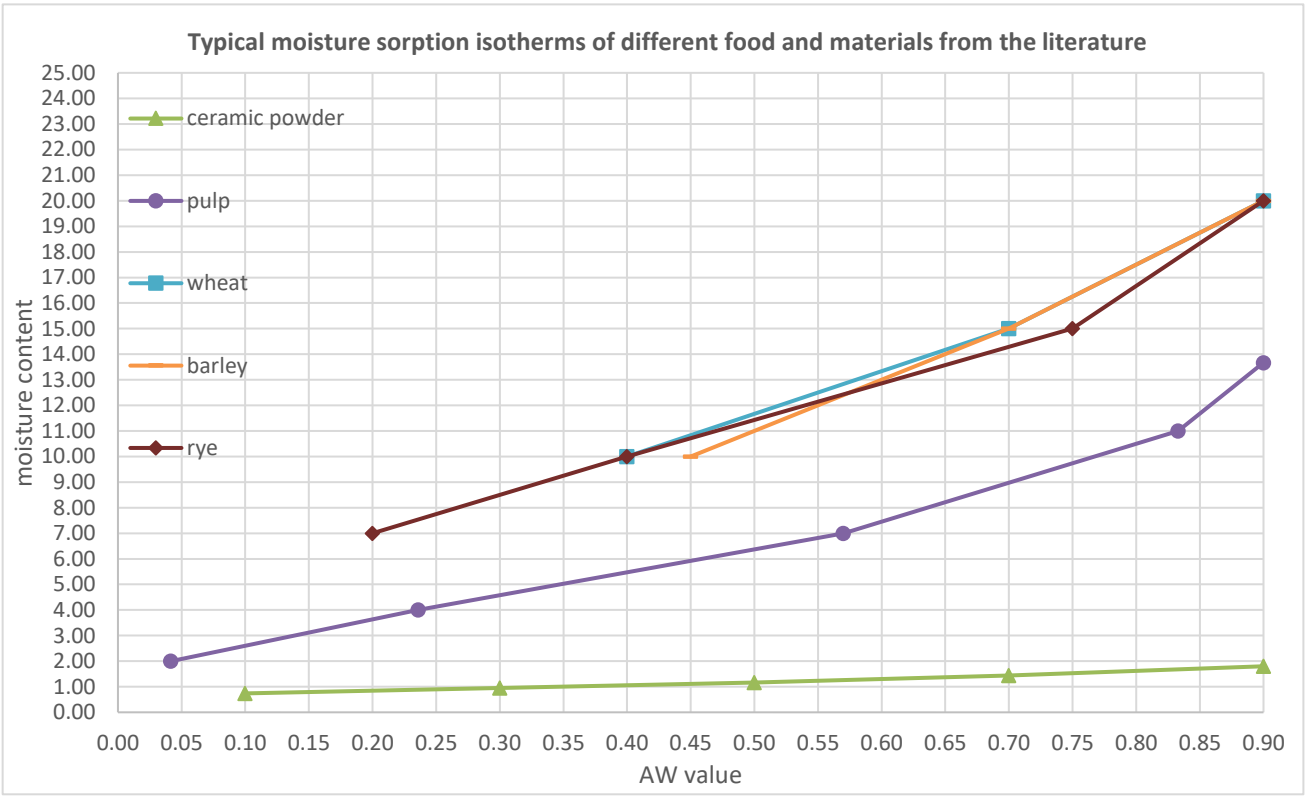
The water activity influences the following characteristics of a product:

- microbiological stability
- chemical stability
- enzymatic stability
- colour, taste and nutritional value
- content of proteins and vitamins
- stability of composition
- shelf life
- storage and packaging

All forms of life depend on water. The water activity indicates the amount of water available for microorganisms such as: bacteria, fungi, moulds etc. Each type of microorganism needs a certain minimum water activity value being able to grow. A lower water activity value doesn´t allow any growth.

Minimum water activity:

Water activity	Organism
aw = 0.91...0.95	bacteria
aw = 0.88	yeasts
aw = 0.80	moulds
aw = 0.75	halophilic bacteria
aw = 0.70	osmiophilic yeasts
aw = 0.65	xerophilic mould



Measurement

To switch on the instrument, press the ⏻ key for three seconds. After showing the logo, the measuring window opens and the current a_w value is displayed.

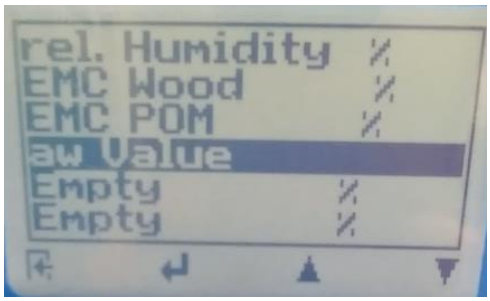
If a different calibration curve is set, select the curve “aw value” using the ▲ or ▼ button. The calibration curves saved in the device can be found in the following list:

Calibration curves

calibration curve	description	unit	measuring range
a_w value	water activity	a_w	0 to 1
rel. humidity	rel. air humidity	%rh	0 to 100%
dew point	dew point	°C / °F	-55 to +60°C -67 to 140°F
abs. humidity	abs. air humidity	g/m³	0 to 130 g/m³
empty	free curve for own calibration	%rh	
CO2	CO_2 value	ppm	0 to 5000ppm
IR temperature	temperature infrared sensor	°C or °F	-25 to 125 °C -13 to 257 °F

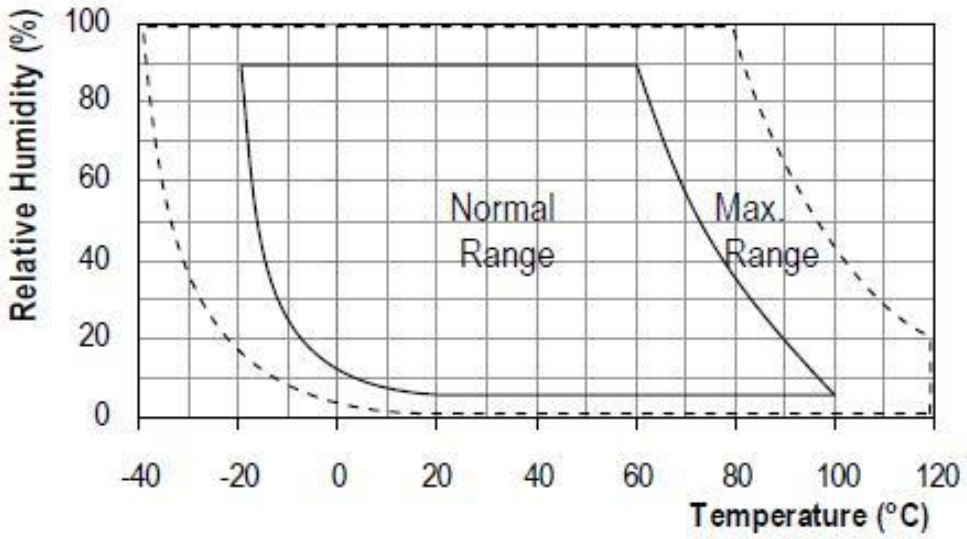
List of calibration curves

Pressing the ▲ or ▼ key in the measuring window for at least 3 seconds, a list with all available calibration curves appears. Select your sort by pressing ▲ or ▼ and confirm by pressing the ↵ key.



Application range

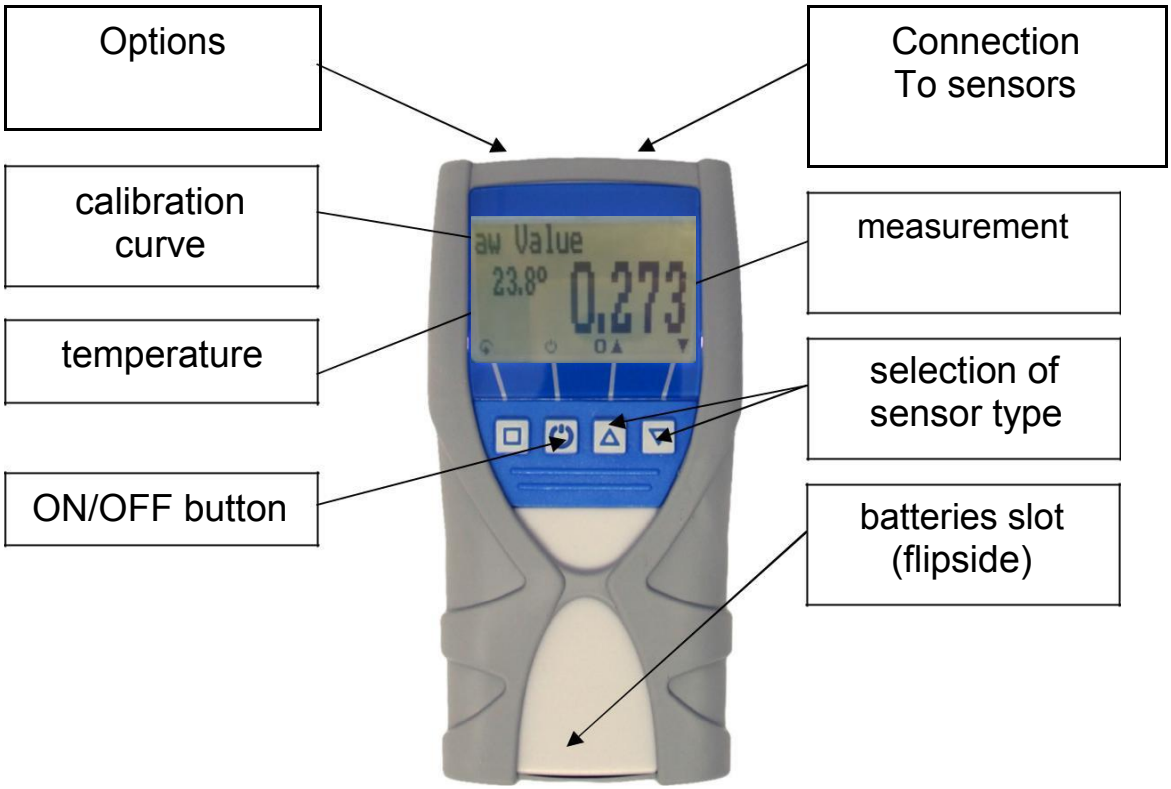
Within the normal application range (normal range) the accuracy of the device is as indicated. A long-term application beyond the normal application range (max. range), particularly at an air humidity of more than 80%, can lead to higher measuring errors (+3% after 60 hours). Back in the normal application range, the sensor will return to the indicated accuracy automatically.



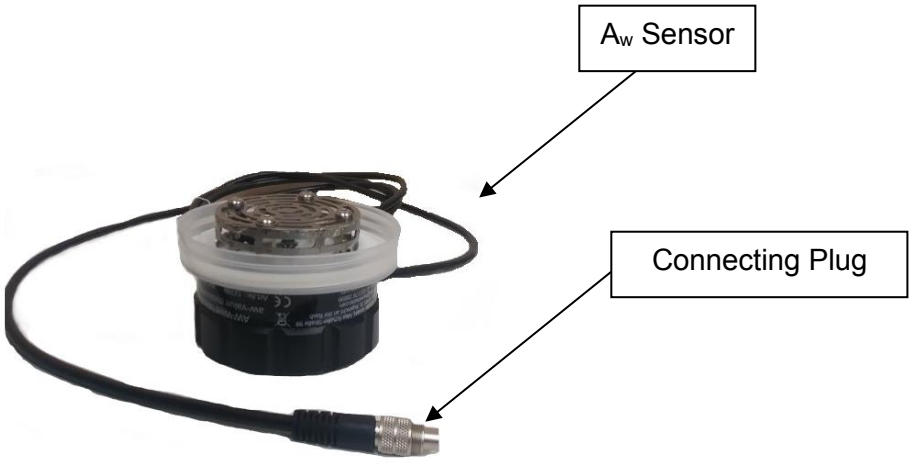
Other instrument functions – overview

- Manual saving of single measuring values in a measurement series
- Display of measuring series and measuring values directly on the instrument
- Printing the saved measuring series (only with PC interface and printer)
- Transfer and saving of measuring series on a PC (only with PC interface)
- Automatic single-point adjustment with 50% humidity standard
- Selection of menu language (DE, EN, FR, IT, ES, RU)
- Display of temperature in Celsius or Fahrenheit

Design of the device

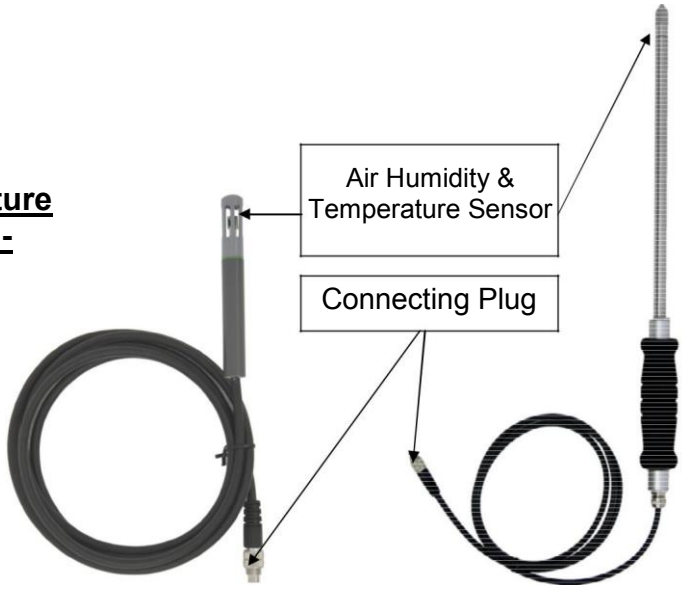


Aw Sensor (Part#: HM-13700)

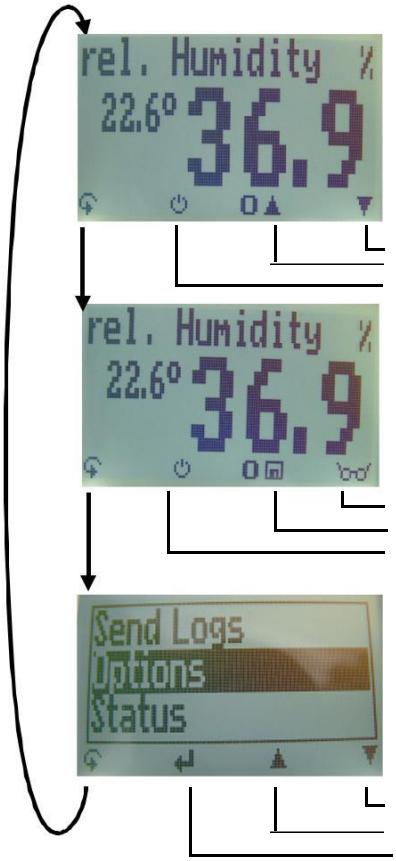


Moisture & Temperature Sensor (Part#: HM-12032)

Precision Rel. Humidity & Temperature Sensor (Part#: HM-12004)



Menu level overview



Edit Logs	*Options*
Manual Logs	Date/Time
Auto Logs	Datalog Time
Clear Logs	Language
	Unlock
Print Logs	°C/°F
Last Logs	User level
All Logs	BL On Time
Clear Logs	Auto Off Time
	Calibrate
Send Logs	Material calib.
Manual Logs	Online Send
Auto Logs	Online Print
Clear Logs	Adjust
	Password
	Reset
	Status

Keypad symbols

Measuring window:

- Rolling Menu
- Power ON / OFF
- Switch upper
- Switch lower
- Save
- Hold
- Autolog
- Watch saved data
- Enter supplier´s data

Menu:

- Enter
- Switch upper
- Switch lower
- Exit
- 0..9 Enter numbers
- A..Z Enter letters
- Next or right
- Left
- Yes
- No
- Shift
- OK OK

Operating the instrument

Switching on: Press for three seconds.

Changing the calibration curve: or .

Setting date and time: two times - *Options – date / time*

Set date and time using the button 0..9, according to the format indicated (JJ.MM.TT). After entering the year, press the button for entering the month and again for entering the day. For changing from date to time also press the button . After finishing, press OK for saving the entered data.

Datalog: Select your desired interval in the menu *Options – Log Time* using the arrow keys, and confirm by pressing **OK**. Now in the store menu appears the symbol . By pressing this symbol you can activate the AutoLog.

Info: In order to save battery power, the device switches off automatically after an interval of 1 minute or longer; and then activates again for saving the logs!

For completing the AutoLog, switch on the device (if necessary) and press the button. If you want to add supplier´s data please press the button. Supplier´s Lot/Product data can also be entered on the PC subsequently.

Switching on the display lighting: Press the key briefly; the display lighting switches off automatically after approx. 20 seconds. Pressing any key activates the display lighting again, and the period for switching off again is prolonged to 4 minutes (The display lighting time can be modified in menu level *Options – BL On Time).*

Switching off: Press the key for five seconds. The instrument switches off after releasing the key. The instrument switches off automatically after approx. four minutes. (The turn-off time can be modified in menu level O*ptions – Auto Off Time).*

Transfer saved data to the PC (NOTE: Only applicable if the HM-12778 humimeter USB data interface module with LogMemorizer)

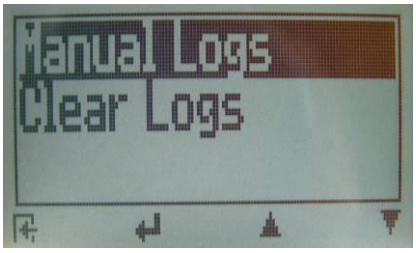
To send your saved logs to the PC, connect the humimeter device to your PC using the USB cable that was delivered with your device. Carefully loosen the protection cap on your humimeter and plug in the USB mini B connector. The bigger connector has to be connected to a USB port on your PC.

Start the LogMemorizer software on your PC and switch on your humimeter AW1.

The data transfer can be started on your humimeter or on the software:

<u>Starting data transfer on the humimeter:</u>

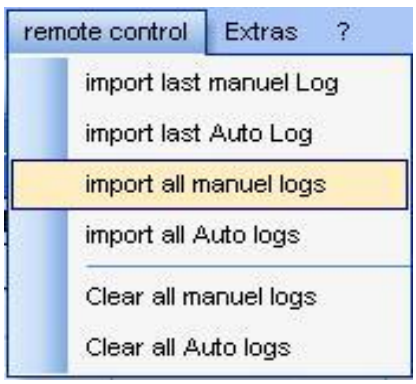
Press the ↶ key until you reach the menu (see image on the right). Then choose “Send Logs” and confirm by pressing the ↵ key. Now choose “Manual Logs” or “Auto Logs” and confirm with ↵ again. All saved logs will be transferred to your PC.



<u>Starting data transfer on the PC:</u>

Press the button “remote control” in the LogMemorizer software. A drop-down menu with several options opens (see image below).

For transferring the data you can select “Import last manual log” (the last saved measuring series is transferred) or “Import all manual logs” (all saved logs are transferred.



If you click on one of these menu items, the transfer starts immediately.

For the basic adjustments of the software please look through the instructions on the LogMemorizer CD.

Print saved data **(NOTE: Only applicable if the HM-11733 Thermo Printer is ordered)**

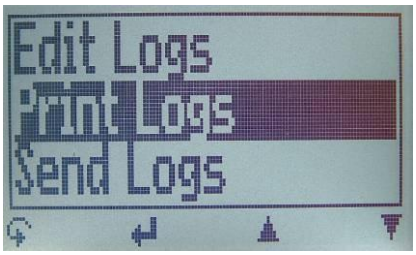
To print your saved data, connect the device to the printer using the printer cable that was delivered with your device: Carefully loosen the protection cap on the humimeter. At first plug in the side of the connector with the close plastic casing on the humimeter (*DO NOT PLUG IN OTHER SIDE INTO THE PRINTER YET*). Then switch on the device.

Now the other side of the cable can be plugged in to the printer. Switch on the printer by pressing ⏻. NOTE: The green LED should blink. If it does not blink, please change the batteries and try again.

Press the ↶ button on your humimeter until you reach the menu (see image on the right). Choose “Print Logs” and confirm by pressing ↵.

Now you can select if you want to print the last saved measuring series or all saved measuring series (logs).

Confirm by pressing ↵ again. The selected logs are will be printed.



Info: To save paper, please clear the data storage regularly.

Handling of water activity measuring chamber

Connect the sensor plug of the aw sensor to the basic device. Now the switched on device shows the current temperature and activity of water value.

Fill the plastic container with material at least two thirds full (~50-60g). In case of coarse, lumpy material the container should be filled at least half-way so that the moisture conditioning can be guaranteed. The higher the filling, the faster the conditioning. A too low material quantity may cause a deviation of the measuring result.

The material to measure must not come into contact with the metal protective grid (the red line on the picture below is the absolute maximum level)

The material must not enter the inside of the grid!!

After the filling, close the measuring chamber tightly.

The right measuring value can be read off when the displayed value does not change any more over a longer period.

(Experience value for adjustment time: Change of aw value from 0.4 to 0.6 within 10 minutes).

With unpeeled materials such as nuts it may take longer until the sample releases moisture in its surroundings for the measurement.

For a rapid conditioning, the water activity measuring chamber is equipped with a ventilator. If the humimeter basic device is switched off, the conditioning time is extended. In case of using the automatic datalog with a datalog time of more than 30 seconds, the device switches off automatically between the measurements.

The filled and closed measuring chamber must not be turned over. Otherwise the measuring sensor positioned in the cap may be polluted by the sample material, which leads to wrong measuring results.

Do not fill above this line

Steps To "Real" a_w

Step 1: Insert Sample into AW Cup

Step 2: Grind / Homogenize Sample

Step 3: Close AW Cup

Step 4: Turn on to Log Readings To Stability; typically < 5 minutes

Checking Calibration

In order to avoid the impairment of the measuring accuracy due to pollution or a drift of the sensor by aggressive gases, we recommend a periodical calibration check of the water activity measuring chamber with certified calibration standards.

The check should be effected in the smaller sample cup and in the approximate normal scope of application.

Examples:

If the measured range is between 0.4 and 0.75 a_w, the calibration ampules of 50% rh should be used.

Subsequently the sample container must be cleaned thoroughly.

Single-point adjustment with 50% humidity standard

For the adjustment, the appropriate calibration equipment as well as calibration humidity standards of 50% rh are required. (http://www.scigiene.com/SC-AW3650)

Preparation

To ensure proper results it is essential that the components of the calibration equipment have approximately the same temperatures. The best way to do that is to leave the calibration components at room temperature (+20°C to +25°C) for at least 60 minutes (or more if you have time available).

Temperature must be between 20°C and 25°C.

The best way to ensure the same temperature of the different components is to store all components together in a room with only small temperature fluctuations ideally overnight (even better if done for 24 hours).

Components of calibration equipment

Aw Salt Standard Solutions (0.500 and 0.754), Calibration Jar (Container jar with sponge base), RH2 Water Activity (Aw meter) and measuring chamber (Sensor).

Precaution:

Aw standards are reusable and should be used as it is supplied along with the jar. The standards solutions are not meant for pouring into any other containers.

Please note the Aw standards shouldn't be left open. Close the lid immediately when not in use with the Aw measuring unit. Store and use at room temperature and away from sunlight (at +15°C to +25°C).

Cross Verification using 0.754 Aw standards:

1. Open the lid of the calibration jar. Open the lid of the Aw standard and place the whole plastic jar on top of sponge inside the calibration jar. Quickly close the plastic jar using the sensor head of the water activity measuring chamber.
2. Make sure the other end of Aw sensor is connected to the RH2 meter and turn the device ON.
3. Change the scales to Water Activity (Aw) using UP and DOWN arrows. Let the whole set-up stay there until you see a stable reading on the screen (could take around 10 to 20 minutes to stabilize).

If the meter reads within the tolerance of standard solution +/-0.02 (i.e., Aw between 0.734 and 0.774), then Adjustment/Recal is not required. If it differs from that tolerance range, we recommend carrying out a recalibration as follows (next page):

Single Point Adjustment using 0.500 Aw Standards:

1. Switch off the meter and while switching is back on, take a note of the serial number of your unit – This is the password you might require later.
2. Replace the 0.754 standard with 0.500 standards in the calibration jar (follow instructions similar to step 1 before). Close the measuring chamber and make sure AW Meter is turned on. Let the whole set-up stay there until you see a stable reading on the screen (may need to wait for 10 to 20 mins).
3. Once stable, press the Rolling Menu button until you reach the main menu.
4. Select the menu item *Options* by pressing the button ▼ and confirm by pressing OK.
5. Select to **Adjust** using the ▼ button and confirm by pressing OK again. Enter the password (serial number of the unit) if required here using the buttons 0..9 and A..Z respectively and confirm by pressing ↵.
6. A query reinitialize appears. Confirm by pressing ✓.

Wait until the bar has risen completely. The device adjusts by itself and automatically jumps back to the measuring window. The adjustment/calibration is completed now.

Note: Check the result before you remove the device from the calibration equipment. The display should show water activity of 0.500 now.

Assembly of calibration equipment for Probe Sensors Only

1. Push in the sensor completely into the upper part.
2. Lie in the textile pad in the bottom part of the calibration device, and pour the humidity standard carefully at the textile pad.

3. Take the upper part with the Humimeter and carefully attach this to the bottom part of the calibration device.

4. Pick up the Humimeter together with the calibration device **STRAIGHT** and **DON'T TURN IT AROUND**.

5. Then put the Humimeter with the calibration device down on a table carefully and proceed as follows:

Conditioning the sensor

To achieve the best results, let the sensor stabilize for two hours.

The temperature must be between 20°C and 26°C.

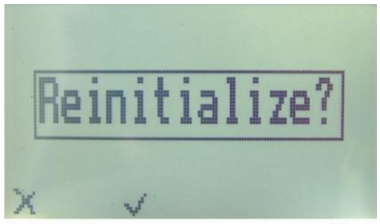
If the shown measuring value differs more than the factory tolerance (0.015 (1.5%) rh), we recommend that you carry out a recalibration as follows:

Offset adjustment

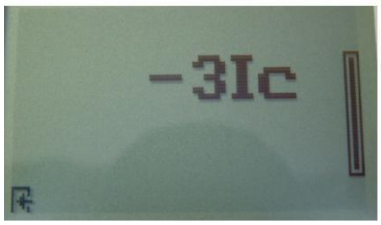
1. Leave the measuring device in the calibration equipment, and switch it on.
2. Press the Rolling Menu button ↻ until you reach the main menu.
3. Select the menu item *Options* by pressing the button ▼ and confirm by pressing **OK**.
4. Navigate to `Setting` using the ▼ button and confirm by pressing **OK** again.

5. Enter the main user password using the buttons 0..9 resp. A..Z and confirm by pressing ↵.
   - The main user password after consignment is the serial number of the device, shown on the display after switching on the device or in menu item **Status**.

6. A query if a setting is desired appears. Confirm by pressing ✓.



7. Wait until the side bar has risen completely. The device adjusts by itself and automatically jumps back to the measuring window. The calibration is completed now.



8. Check the result before you remove the device from the calibration equipment. Depending on the temperature the display should show a water content of about 50% now.

In case of a mistake during the setting, you can reset to the factory calibration as follows:

Reset to factory calibration

1. Press the button two times to reach the menu point *Options.*
2. Select the menu item *Reset* using the ▼ button and confirm by pressing **OK**.
3. Enter the main user password using the buttons 0..9 resp. A..Z and confirm by pressing ↵.
   - The query **reset?** appears on the display.
4. Press the button ✓ for resetting the device to the factory calibration.
   - The software reloads the factory calibration data and reboots the device. This will need about 15 to 20 seconds.
5. Pressing the button ✗ you can exit without any changes.

Conditioning of the sensor

The conditioning of the sensor (time until the device shows the actual measuring value) depends on several parameters. The parameter responsible for the highest measuring error is a temperature discrepancy between the sensors respective to the whole measuring instrument and the material to measure respective to the air.

Care instructions

Do not drop the instrument or expose it to excessive temperatures. The instrument is not waterproof. Do not immerse the sensor in liquid.

The intervals for checking the instrument depend on your operational demands and the required level of accuracy. In general, the drift of the sensor according to the degree of use (constant humidity or use within the whole moisture measuring range) is beneath 0.5% per year. You can check instruments of the **humimeter AW** series by yourself using the calibration equipment (see optional accessories). For a fee, Scigiene can also carry out a calibration in their test lab. On demand, you will also receive a calibration certificate

Changing the batteries

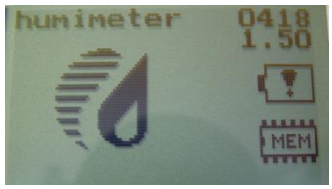
First, remove the rubber protection cover. For that, hold the rubber protection cover at the upper side and pull it over. If your humimeter is provided with an optional USB port, you have to remove the protection cap before. Press with your finger onto the arrow of the battery cap and pull it back.

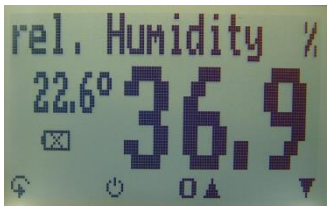
Remove the empty batteries. Put four new **1.5 Volt AA Alkaline batteries** in the device. Make sure that the position of the battery poles is correct. Press down the batteries and close the cap.

Exemption from liability

For mis-readings and wrong measurements and of this resulting damage we refuse any liability. This is a device for quick determination of moisture. The moisture depends on multiple conditions and multiple materials. Therefore we recommend a plausibility check of the measuring results. Each device includes a serial number and the guarantee stamp. If those are broken, no claims for guarantee can be made.

If the battery symbol appears in the measuring window or if a critical charge of battery is shown in the status, the batteries have to be changed IMMEDIATELY. Also if you do not use your humimeter device for a longer period, remove the batteries. For resulting damages, we cannot provide any warranty.





In case of a faulty device, please contact Scigiene Corporation at 416-261-4865 or www.scigiene.com.

!IMPORTANT! Please read!

Common reasons for incorrect measurements

- **Sunlight or other sources of heat or cold that doesn´t correspond to the surrounding temperature (See AW options)**
- **Dripping or sprayed water**
- **Irreversible damage of the sensor due to aggressive gases**
- **Danger of condensation because of changing temperature**
- **Polluted moisture sensor**
- **Foreign objects on the sensor**
- **Measuring errors due to incomplete conditioning**

To demonstrate the importance of temperature adjustment, the table below shows measuring errors due to a temperature difference of only 1°C / 1.8°F between the measuring instrument and the substance to be measured at different ambient temperatures.

	10°C (50°F)	20°C (68°F)	30°C (86°F)
10%r.h.	±0.7%	±0.6%	±0.6%
50%r.h.	±3.5%	±3.2%	±3.0%
90%r.h.	±6.3%	±5.7%	±5.4%

At room temperature (20°C/68°F) and an assumed moisture value of 50%r.h. a deviation of 1°C / 1.8°F between the measuring sensor and the substance to be measured results in a measuring error of 3.2%r.h. A deviation of 3°C / 5.4°F would result in a measuring error of over 10% (See AW3 for solution).

Technical Data

Water Activity (AW1) Sensor	Measurement:		
	Measuring Range	Resolution	Accuracy
Water Activity (A_w)	0.03 to 0.98 aw	0.001 a_w	0.10 to 0.80 +/-0.01 a_w
Rel. Humidity	0 to 100% RH	0.1%	
Temperature °C / °F	0 to +50 °C / 32°F to 122°F		

Humidity and Temperature Sensor (Part#: 12032)	Measurement:		
	Measuring Range	Resolution	Accuracy
Rel. Humidity	0 to 100% RH	0.1%	+/-2.0% RH (at 25°C)
Temperature °C / °F	-20 to +85°C / -4 to 185°F	0.1°C/0.3°F	+/-0.3° (at 25°) or +/-0.5°F (at 77°F)
Dew Point °C / °F	-55 to +60°C / -67 to 140°F	0.1°C/0.3°F	

Precision Rel. Humidity Sensor (Part#: 12004)	Measurement:		
	Measuring Range	Resolution	Accuracy
Rel. Humidity	0 to 100% RH	0.1%	+/-1.5% RH (at 25°C)
Temperature °C / °F	-20 to +120°C / -4 to 248°F	0.1°C/0.3°F	+/-0.3°C at 25°C (+/-0.5°F at 77°F)
Dew Point °C	-55 to +60°C / -67 to 140°F	0.1°C/0.3°F	

Humimeter Specifications:

Operating temperature range	-10°C to 60°C/ 14 to 140°F
Storage Temperature:	-20°C to 60°C / -4 to 140°F
Temperature Compensation:	Automatically
Data Storage:	approx. 10,000 measurements
Menu Languages:	English, French, German, Italian, Spanish, Russian
Power Supply:	4 pcs. 1.5Volt AA Alkaline batteries (for approx. 1800 measurements)
Auto Device Shut Down:	After approx. 4 minutes
Power Consumption:	30 mA (with display lighting)
Display:	128 x 64 matrix display, with LED backlighting
Dimensions housing:	145 x 63 x 24mm
Weight:	Approx. 210g (including batteries)
Protection Class:	IP 40
Scope of Supply:	RH2 Humimeter, Humimeter measuring device with water activity measuring chamber with 2 meter connection cable, certification of Humimeter with Aw sensor, 12 certified single use Aw standards (6x 0.500 and 6 x 0.754 Aw) as well as one reusable saturated 0.754 Aw reference for daily checks, 2 x 125 ml sample Aw jars and plastic case.