7. Calibration curves

The following calibration curves are available:

Calibration curve	Definition	Unit	Measuring range	Calibrated range
Absolute humidity g/m³	absolute humidity	g/m³	0 to 130 g/m³	-
Relative humidity	relative humidity	% RH	0 to 100 %	10 to 90 %
Wheat	equilibrium moisture content of wheat	% WC	10 to 18 % WC	12 to 16 %
Barley	equilibrium moisture content of barley	% WC	10 to 18 % WC	12 to 16 %
Rye	equilibrium moisture content of rye	% WC	10 to 18 % WG	12 to 16 %
Triticale	equilibrium moisture content of triticale	% WC	10 to 18 % WC	12 to 16 %
Corn	equilibrium moisture content of corn	% WC	10 to 20 % WC	12 to 18 %
aw-value	water activity	aw	0 to 1	0.1 to 0.9
Free 1 - 5	free calibration curves for self-calibration			

7.1 Definition of calibration curve

Absolute humidity

The absolute air humidity shows the contained amount of water in gramme 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 condensate can precipitate or how much water has to be evaporated in order to obtain the desired humidity.

Relative humidity

Relative humidity indicates the ratio between the current water vapor pressure and the highest possible pressure, known as saturation vapor pressure.

The relative humidity shows the degree the air is saturated with water vapor.
Examples:

50% relative humidity: At the current temperature and pressure, the air is half saturated with water vapor. 100% relative humidity means that the air is totally saturated

with water vapou.
If the air has more than 100% humidity, the excessive humidity would condense or precipitate as mist.

Equilibrium moisture content of grain

Displays the grain equilibrium moisture in % water content and the temperature in the selected unit (°C or °F).

aw-value

Water activity (Activity of Water) is also described as free or non-cellularly bound water in products such as food. The water activity is described in chapter "7.2 Definition water activity".

Free calibration curves

There are free calibration curves in the measuring device, which can be used for measuring special fruits or products.

Schaller Messtechnik GmbH can also develop customer-specific calibration curves for your product on request.

7.2 Definition water activity

Water activity is the ratio of the water vapor partial pressure in food (p) to the saturation vapor pressure of pure water (p0). It is an important indicator of product quality in food, tobacco or pharmaceutical industries and is represented in aw from 0 to 1.

Water activity is equivalent to equilibrium humidity - the relative humidity at which the product is in equilibrium with the surrounding air. However, equilibrium humidity is expressed as a percentage.

The aw-value is temperature dependent, for an aw-value determination at the desired temperature the instrument and the sample should be pre-stored at this temperature. The humimeter RHL Aw-value measuring device is suitable for measuring materials such as grain products, coffee, cocoa, cereals, butter, dried fruit mixtures, spices, granulates, mushrooms, sugar, xylitol, cookies or even dried sausage as well as many other food products for which a testing of the aw-value is necessary. The Aw value measuring device is generally not suitable for liquids and juices (syrup), acidic foods such as onions and tropical fruits as well as fruit or alcoholic beverages and foods such as filled chocolates. Vinegar and acids destroy the calibration and the sensor.

Materials with a moisture content above the fiber saturation point, i.e. with an aw-value above 1, cannot be measured either. In this case, only the water content of the sample can be determined.

The water activity should not be mistaken for the water content - the percentage of water in a product! The water content is used to calculate the dry content of food and materials, it indicates the ratio of water to the total mass as a percentage (kg/kg) x 100.

Water activity affects the following properties of a product:

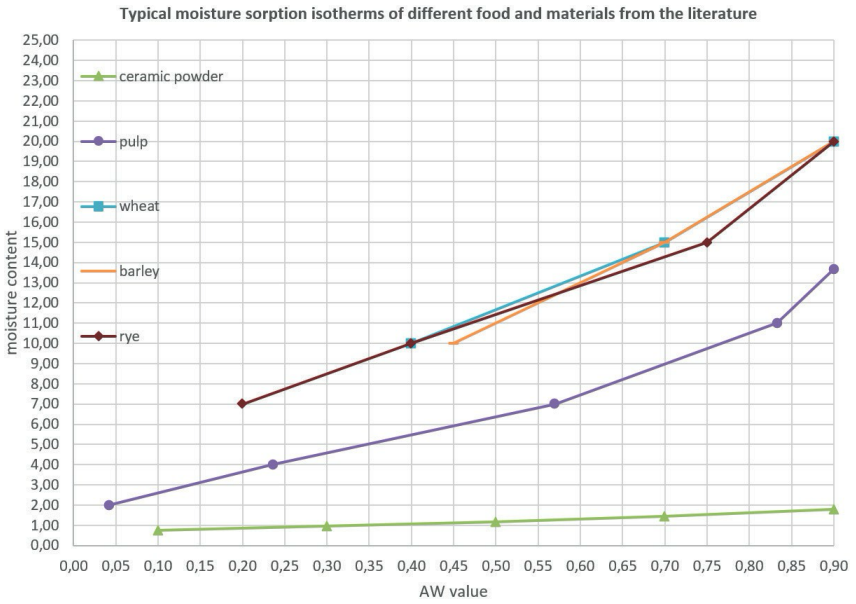
- microbiological stability
- chemical stability
- enzymatic stability
- color, flavor and nutritive value
- protein and vitamin content
- composition stability
- expiration date
- storage and packaging

Every life form depends on water. Water activity indicates the amount of water available to microorganisms such as bacteria, fungi, molds, etc. Each microorganism species has a minimum water activity value below which no growth is possible.

Typical minimal water activity values from the literature:

Water activity	Organism
aw = 0.91 - 0.95	Bacteria
aw = 0.88	Yeasts
aw = 0.80	Mould
aw = 0.75	Halophilic bacteria
aw = 0.70	Osmiophilic yeasts
aw = 0.65	Xerophilic moulds

Typical sorption isotherms of various foods and materials from the literature:



7.3 Application range

The device functions in the normal application range (normal range) within the specified accuracy. Long-term use outside the normal application range (max. range), especially at humidity above 80 %, can lead to higher measurement deviations (+3 % after 60 h). When returning to the normal application range, the sensor returns to the specified accuracy by itself.