



## After the flood. Correctly assessing the impact of damage.

The images of the devastating floods in North Rhine-Westphalia and Rhineland-Palatinate in July 2021 are still fresh in everyone's mind. The catastrophic heavy rain and the flooding of the rivers and streams brought high flood waves for all in the affected regions, enormous material losses and high damage to buildings and infrastructure. After such floods have subsided, the task is not only to clean up, but also to determine the damage to the building substance. This is where moisture measuring devices come into play, which can also be used sensibly by the nonprofessional, provided that a few criteria are observed.

### After the flood is before the reconstruction

After the flooding of a house, it is necessary to pay attention to the floors and walls. For example, even if cement screed does not necessarily have to be destroyed:

Drying out and drying of the underlying structure can cause difficulties, so replacement may be more economical – especially if accompanied by oil or fecal pollution.

The result of the deconstruction would be such a „soaked raw building construction state“. Masonry walls and floors, wooden structures and the like have accumulated large amounts of water. Before reconstruction can be started, it must be sufficiently dried until ready for covering. Dehumidifiers, fans and electric heaters are valuable helpers to remove the water. In addition, there are professional building drying contractors.

Rapid intervention is generally important to prevent unnecessary consequential damage due to prolonged moisture penetration (mold, destruction of building materials, etc.)



Heavy flooding causes considerable damage to the entire building substance



Moisture measurement allows to determine the full extent of the damage

## When to start the rebuilding?

When to start reconstruction or reuse of furniture) depends on the moisture content. It is necessary to determine the drying progress of floors, masonry and furniture. In principle, there is a wide range of moisture measuring devices available -in all price classes - with different measuring methods. Therefore, it is

necessary to make a preliminary selection based on the type of property and the damage to be assessed. Possible measuring methods are resistance and capacitance measuring methods as well as in-direct methods and infrared and microwave methods.

### Comparison of different measurement methods

Method*	Resistance method	Capacitive method	Indirect humidity
Basics	Material moisture = f (resistance, temperature)	Material moisture = f (dielectric constant)	Material moisture = f (rel. humidity, temperature)
Specifics	<p>Measuring nails are hammered into the material or brush probes are inserted into drilled holes, resistance measurement between two probes/ nails</p> <p>Dry wood: many gigaOhms Wet wood: a few kOhm</p>	<p>Folded plate capacitor is placed on material to be measured, dielectric (permittivity <math>\epsilon</math>) is measured</p> <p><b>Permittivity <math>\epsilon</math></b>            Dry wood: ~ 2-3.5            Polyester &amp; epoxy resins: ~ 3...4            Glass: ~ 6...7            Water: ~ 80</p>	<p>The „hygroscopic material“ adjusts its material density to the ambient air</p> <p>Wood in dry air: 8 % u Wood in moist air: 20 % u</p> <p>„Sorption isotherms“</p>

\* Other methods: Infrared, Microwave ...



Measurement in screed insulation through edge insulation strips:  
Moisture beneath screed GMH 3831 with flat electrodes



Moisture measurement allows to determine the full extent of the damage

### Measurement on floor and screed

With floors and screeds, the problems are often hidden deeper than they can be detected with the GMK 100, although it offers two measuring depths. Several centimeters of screed rest on an insulating and impact sound insulation layer (depending on the design, rigid foam, glass wool, or similar) and the entire structure lies on concrete, for example. Properly executed, the screed has no connection to the adjacent walls and the water can pass through the gap almost unhindered.

The GMH 3831 moisture meter with brush probes is suitable for determining the condition of the insulating layer. For the measurement, two 8 mm holes are drilled at a distance of 10 cm at the desired depth through the screed and the brush probes are inserted. In this way, the screed moisture itself can be measured and the "water intrusion" in the underlying insulation layer can also be detected.

### Example application minor water damage:

Observation of a drying progress on a damp wall. Provided that the cause has been eliminated, the drying process may be monitored and, also, the progress of the measures:

Select and mark measuring points, in this case at a water damage, where moisture was seeping through the wall from below:

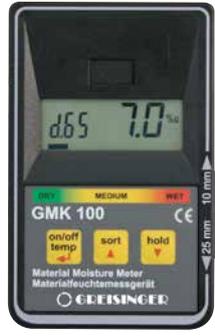
- 1: Moisture Center
- 2: Transition area
- 3: Dry reference point

### Logging, e.g., weekly:

The values determined at these measuring points are to be logged, e.g. weekly, in order to identify the drying progress. In general, two measuring depths of 10 mm and 25 mm can be set on the GMK 100, so that it is possible to assess whether the material has already dried or whether it is a matter of surface moisture. When using the GMK 100, it should be considered that uneven surfaces (rough plaster, mortised walls) can only be measured to a limited extent. However, moisture penetration can still be detected.



Rear panel



Rear panel



The GMI 15 plus is especially strong in nondestructive measurement, e.g. when moisture behind tiles has to be detected. Through two material settings (wood - concrete/screed), a direct estimation of material can be carried out. The measurement is performed simply by placing the device on the to be measured surface.

The GMK 100 is a capacitive material moisture meter with direct moisture display in percent. Therefore, it is ideally suited for home and handicraft. Depending on the application, either the material moisture or the water concentration can be displayed. A fast nondestructive measurement with the professional device pays off already with the first measurements.

The GMH 3831/3851 offer decisive advantages in handling, user-friendliness, functional scope and accuracy. The absolute material moisture of a total of 494 materials is displayed directly and can be automatically converted to the water concentration.

## Moisture meters – field proven

Generally, however, expert knowledge must be applied when using measurement technology. Regardless of the measuring method and manufacturer, there is no electronic measuring method that can replace the expertise of a professional – the displayed value alone has no meaning if the building material, the wall construction and the building structure (e.g. concrete-insulation-screed) are not known and evaluated.

The GMK 100 portable instrument can provide valuable assistance. It is a capacitive, non-contact measuring device with direct moisture display in percent. With the GMK 100, the drying process and also the progress of the drying measures can be monitored in a simple way. Simply place the measuring plate on the rear of the device onto the to be

measured object (wood, concrete, screed, etc.) and take a non-destructive measurement. Depending on the application, either the material moisture or the water concentration can be displayed. The selectable measuring depth: approx. 10 mm or 25 mm, the acoustic measuring signal and a background illumination are also very helpful.

The GMI 15 plus is “the little brother” of the GMK 100. As a moisture indicator, it is used for the rapid determination of moisture in buildings, on the construction site, etc. By using the GMI 15 plus, the moisture of wood (up to a depth of about 3 cm) or of concrete or screed (up to a depth of about 4 cm) can be detected. It even detects moisture behind ceramic tiles or various wall and floor coverings!

	GMI 15 plus	GMK 100	GMH 3831 / 3851
<b>Measuring method</b>	Capacitive measuring method	Capacitive measuring method	Resistance measurement method
<b>Application</b>	Construction moisture, craftsmanship	DIY and crafts: screed, readiness for covering, construction, wood, natural stone	Wood, firewood, crafts, construction, agriculture
<b>Wood</b>	<b>Precision:</b> sufficient <b>Procedure:</b> put on, take reading <b>Measuring time:</b> short	<b>Precision:</b> sufficient <b>Procedure:</b> put on, take reading <b>Measuring time:</b> short	<b>Precision:</b> good <b>Procedure:</b> piercing, take reading <b>Measuring time:</b> short
<b>Construction</b>	<b>Precision:</b> sufficient <b>Procedure:</b> put on, take reading <b>Measuring time:</b> short	<b>Precision:</b> sufficient <b>Procedure:</b> put on, take reading <b>Measuring time:</b> short	<b>Precision:</b> limited <b>Procedure:</b> put on, take reading <b>Measuring time:</b> medium
<b>Measurement input</b>	Measuring area on rear of device	2 measuring areas on the rear of the device	External via BNC: e.g. for impact electrodes
<b>Temperature compensation</b>	–	–	<b>Automatic:</b> external type K probe or device internal temperature measurement <b>Manually:</b> key input
<b>Material characteristics/ groups</b>	Relative measurement	Characteristic for wood and building materials and relative measurement	466 wood types, 28 construction materials
<b>Features</b>	–	Backlit display, 2 measuring levels	Auto hold, logger with GMH 3851