




## Operating Manual Injection probe

for resistive material moisture measuring device with BNC connector  
with integrated temperature sensor (thermocouple type K)

# GSF 50TF and GSF 50TFK



-  Please carefully read these instructions before use!
-  Please consider the safety instructions!
-  Please keep for future reference!



WEEE-Reg.-Nr. DE 93889386

## 1 General Note

Read this document carefully and get used to the operation of the device before you use it. Keep this document within easy reach near the device for consulting in case of doubt.

Mounting, start-up, operating, maintenance and removing from operation must be done by qualified, specially trained staff that have carefully read and understood this manual before starting any work.

The manufacturer will assume no liability or warranty in case of usage for other purpose than the intended one, ignoring this manual, operating by unqualified staff as well as unauthorized modifications to the device. The manufacturer is not liable for any costs or damages incurred at the user or third parties because of the usage or application of this device, in particular in case of improper use of the device, misuse or malfunction of the connection or of the device.

The manufacturer is not liable for misprints.

## 2 Safety

### 2.1 Intended Use

The injection probe has to be used only for measuring in bulk material, bales and similar. The probe is optimized for measuring wood chips, but splints, isolation material, straw and hay can be measured, too. An additional display has to be connected (e.g. GMH 3830 / -50).

The measuring is based on electrical resistance measuring and therefore suitable compression has to be provided to get sufficient contact during the measuring.

The temperature measuring via the integrated sensor in the tip has to get enough adjusting time.

### 2.2 Safety signs and symbols

Warnings are labeled in this document with the followings signs:



**Caution!** This symbol warns of imminent danger, death, serious injuries and significant damage to property at non-observance.



**Attention!** This symbol warns of possible dangers or dangerous situations which can provoke damage to the device or environment at non-observance.



**Note!** This symbol point out processes which can indirectly influence operation or provoke unforeseen reactions at non-observance.

### 2.3 Safety guidelines

This device has been designed and tested in accordance with the safety regulations for electronic devices. However, its trouble-free operation and reliability cannot be guaranteed unless the standard safety measures and special safety advises given in this manual will be adhered to when using the device.



**Risk of injury!** Only use this injection probe is extremely carefully, keep it out of reach from children.

## 3 Operating and Maintenance

- Treat the injection probe carefully (do not throw, hit against etc.). Protect plugs and sockets from soiling.
- When disconnecting the cable from the socket **(5)** do not pull at the cable but on the plug. For locking and unlocking the movable ring has to be turned in its according direction. When having attached the plug right, it can be connected or disconnected gently without effort.
- The plastic insulator **(3)** has to be clean and dry in the range of the sensor pike, when not, faulty measurements may occur.

## 4 Measurement Basics

The resistance of the medium between the conical metal surfaces **(1)** and **(2)** is measured. The medium being measured has to be compressed well enough.

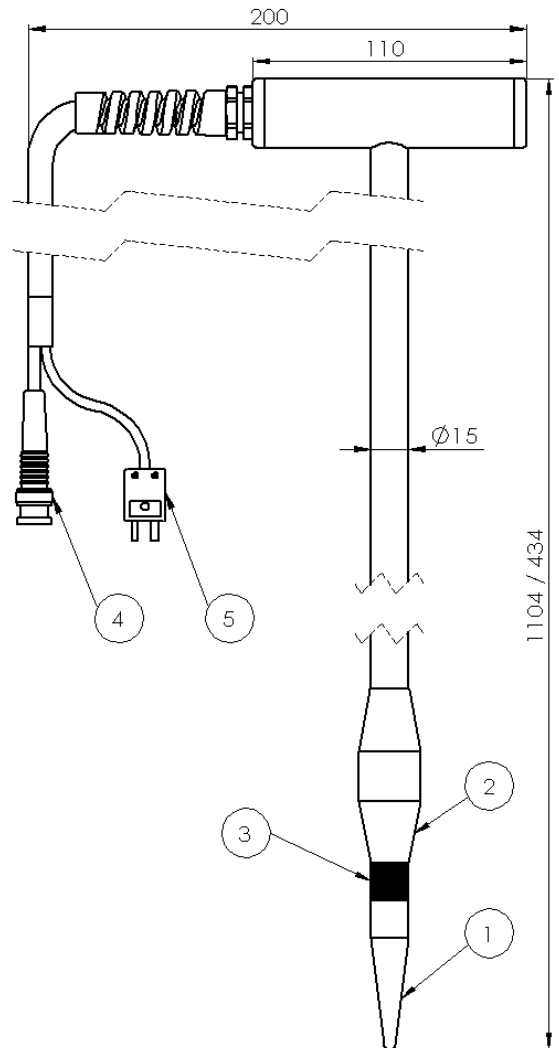
**The best is, having a constant pressure onto the medium during the measurement. Do not release handle during the measuring, otherwise the contact to the medium can be interrupted, in this case a to dry value would be measured.**

Attention: Especially at bulk material stored outside or very wet material, large distribution of the actual moisture values can appear.

**It is best to do several measurements and taking the average in order to get meaningful results:**

The measurement of wood chips or things like that is depending on temperature. For an exact measuring result the temperature is automatically compensated when using the suitable instrument (e.g. GMH 3830). The temperature-measuring is done at the tip of the probe **(1)**, a sufficient time to adjust the sensors temperature to the material has to be waited for.

Different measuring results are depending on different types of material. Select correct material-group or material type before measuring. Refer to operation manual of the connected measuring device. When pushing in the probes, oscillating movements have to be avoided. Otherwise hollows between the probes and the material may falsify the measurement.



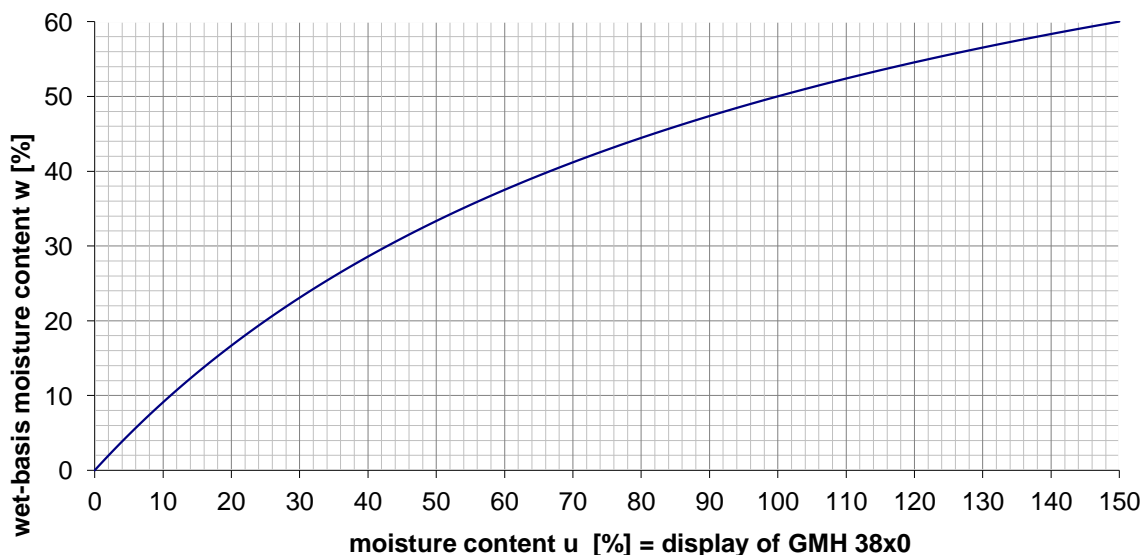
## 5 Unit conversion: moisture dry-and wetbasis

Older instruments (e.g. GMH 3830 before V1.4) cannot be switched from moisture content u to w, in this case the wet basis moisture content can be calculated like following:

$$\text{Wet-basis moisture } w \text{ [\%]} = 100 * \text{Moisture content } u \text{ [\%]} / (100 + \text{Moisture content } u \text{ [\%]})$$

Example: 1 kg of wet wood, which contains 500 g of water has a moisture content u of 50%

**Conversion moisture content u - wet-basis moisture content w**



## 6 Measuring bales of straw hay bales

Always inject the electrodes from the plain side of round bales never from the round side, the probe can be inserted much easier. For strongly pressed bales we suggest the probe GSF 40 or GSF 40 TF instead.

## 7 Wood Chips as fuel

### Instrument settings for measuring wood chips:

GMH 3830/3850/3851 Version  $\geq$  1.5: **h.461 (specialised GSF 38 / GSF 50 curve)**

others: We recommend "Wood group C" (GMH 38x0 instruments: "h. C"). This group delivers a sufficient accuracy for the fuel application up to 30% MC – above there is larger deviation.

### Wood chips are classified in different quality groups.

The size and the moisture content (MC or u) or the wet-basis moisture content (w) are the measure for the usability. Usually moisture content (w) of maximum 30% is recommended.

### Chip size

Class		Size
<b>G 30</b>	small chips	smaller than 3 cm
<b>G 50</b>	mid size chips	3 – 5 cm
<b>G 100</b>	crude chips	5 – 10 cm

### Moisture content

Class		Wet basis moisture content w <small>(can be displayed directly of GMH 3830 V<math>\geq</math>1.5)</small>	moisture content u
<b>w 20</b>	air dry	<20 % w	<b>&lt;25 % u</b>
<b>w 30</b>	storable	20 – 30 % w	<b>25 – 43 % u</b>
<b>w 35</b>	conditionally storable	30 – 35 % w	<b>43 – 54 % u</b>
<b>w 40</b>	wet	35 – 40 % w	<b>54 – 67 % u</b>
<b>w 50</b>	fresh cut	40 – 50 % w	<b>67 – 100 % u</b>

The higher the moisture content, the lower is the heating value per weight!

### 7.1 Field measuring

At measuring in containers, silos, chip bunkers or similar storages and a measuring depth > 0.5 m commonly the compression is high enough for direct measuring.

Although keep pressure on the handle during the measuring!

For measuring in less than 0.5 m or in loose bulk material, best is to step on the measuring spot and insert the probe below the foot.

At values above 20%u the display may have falling values: The display after 10 seconds is valid!

### 7.2 Reference procedure: „Bucket test“

The probes from suitable places in Your material into a bucket (  $\geq$ 10 litre).

Compress: Step into the bucket and compress with roughly 10 kg. Measure under Your foot:



During measuring keep pressure on the handle!

Repeat Your measuring and take average of 3 measurings!

At values above 20%u the display may have falling values: The display after 10 seconds is valid!