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# User manual



## Wood chips moisture transmitter

for the determination of water content of wood chips

Version 4.1  
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## Table of contents

1. General.....	3
2. Installation instructions .....	3
3. Mounting the sensor .....	4
3.1. View upper side .....	4
3.2. Side view.....	4
4. Electrical connection.....	5
5. Scaling analogue output .....	5
6. Calibration curves and measuring range .....	5
7. Interpolation point table for control system .....	6
7.1 interpolation point table for “Coarse wood chips”: .....	6
7.2 interpolation point table for “Industrial wood chips”: .....	7
7.3 interpolation point table for “Fine wood chips”:.....	7
8. Exemption from liability .....	7
9. Technical data .....	7
10. Example pictures for selection of right calibration curve .....	8
11. Device maintenance instructions .....	10
12. Most common reasons for miss readings .....	10
13. Test block .....	10

## **1. General**

The wood chips moisture transmitter allows an online measurement of water content (optionally water content and temperature) of wood chips. Therefore a sensor is embedded in the material stream. This is a ready calibrated system; the measuring values are calculated by the transmitter unit. The water content (and optional also the temperature) are transmitted by a 4 to 20mA analogue output.

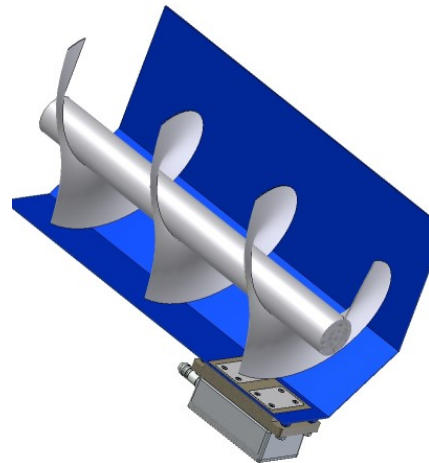
## **2. Installation instructions**

### **Requirements:**

During the measurement, the two stainless metal sheets have to have constant contact with the product (wood chips). To ensure correct measuring results, the wood chips have to exert a minimum pressure of 20 N/dm<sup>2</sup> on the sensor surface. The sensor measures the material that directly touches the sensor field. It must be ensured that no electrically conductive material affects the sensor surface.

### **Possible installation positions:**

- Screw conveyor:  
installation at the bottom of the trough
- In-feed chute with hydraulic ram:  
installation at the side wall
- Bunker:  
installation at the side wall (to ensure the minimum pressure, the sensor possibly has to be mounted at an angle)



### **Measuring principle:**

The wood chips moisture transmitter uses a conductance measurement specially developed by Schaller GmbH. This principle is based on the fact that electrical conductivity changes according to the moisture content of a porous material. Electrical conductivity in dry material is lower than in wet material. The evaluation electronics converts the measured conductance value into weight percent and shows the water content on the display.

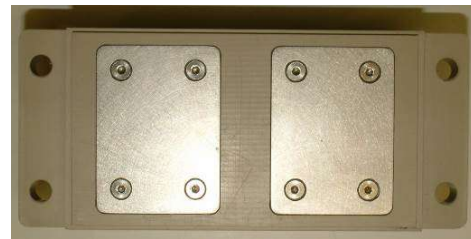
### **Information for installation after dryer:**

After the drying process the material surface of the wood chips is much dryer than its core. Therefore an installation directly after the dryer will lead to too low measuring values. The specified minimum measuring range of 10% water content (for wood chips) will not be possible; in fact the measuring range limit is higher.

### 3. Mounting the sensor

#### 3.1. View upper side

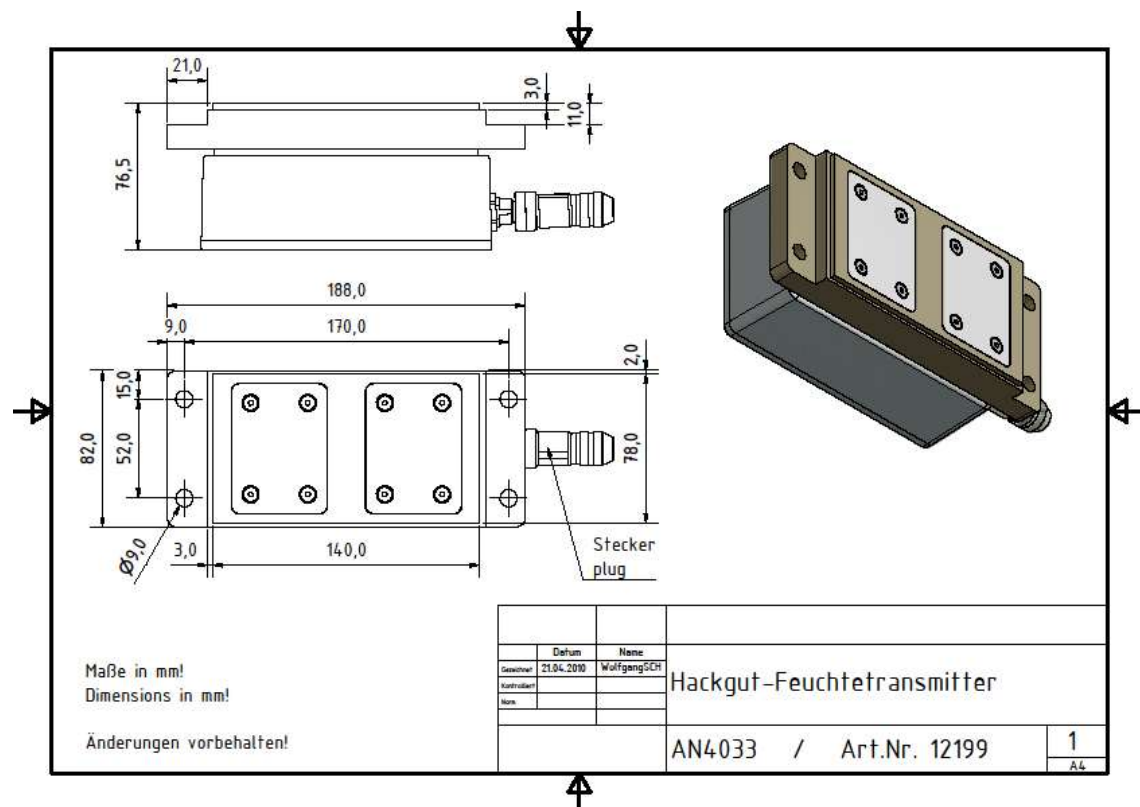
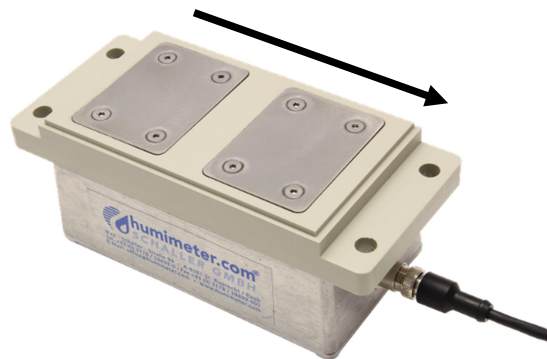
Fix the sensor using the four holes ( $\varnothing 9.0$  mm). Note the correct flow direction of the wood chips as shown on the picture. Take care that the two metal sheets have constant contact with the material.



Flow direction of material

#### 3.2. Side view

Put the sensor plug of the cable into the bush of the moisture transmitter and screw it tightly. Please note that the sensor may be destroyed when screwing too strongly.



## **4. Electrical connection**

The wood chips moisture transmitter has to be powered with 24 VDC (15 to 29 VDC). The output of the measuring results is effected via an analogue 4-20mA output. The delivery includes a plug with open cable ends for power supply and analogue output.

### **Connector pin assignment**

white	24 VDC power supply (15 to 29VDC)
brown	ground power supply & analogue output
yellow/green	shield of cable
blue	analogue output water content 4 to 20mA
grey	<i>optional analogue output for temperature 4 to 20mA</i>

For connecting with the analysing unit (PLC), a shielded cable with minimum wire of 0.25mm<sup>2</sup> has to be used.

The cable shield has to be grounded at the analysing unit (PLC)!



## **5. Scaling analogue output**

The water content is transmitted continuously via the 4 to 20 mA analogue output.  
*The determination of temperature is available optionally!*

signal	type	minimum value	maximum value
moisture	4..20mA	4mA $\triangleq$ 0%	20mA $\triangleq$ 80%
temperature	4..20mA	4mA $\triangleq$ -10°C	20mA $\triangleq$ 70°C

## **6. Calibration curves and measuring range**

name	description	measuring range
wood chips	wood chips P31 - P45	10 – 50 %

The system is calibrated for standard wood chips according to class P16 up to class P45. In practice it may occur that the shown value differs from the real value. That indicates that the present material has a different “moisture calibration curve” than the type of material taken for calibration.

- **Wood chips:** wood chips of class **P31** and **P45** (forest wood chips) according to norm EN ISO 17225-1
- **Coarse wood chips:** coarse wood chips of class **P31** or **P45** with few fines according to norm EN ISO 17225-1
- **Industrial wood chips:** industrial wood chips **without barks and fines**
- **Fine wood chips:** wood chips with a lot of fines (class P16)

#### **Definition of wood chips classes (norm EN ISO 17225-1)**

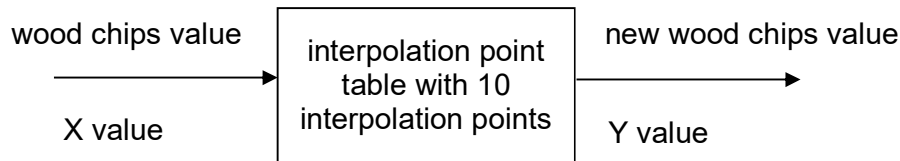
The stated numbers refer to the particle size that goes through round gaps of the corresponding diameters (ONORM M 7133).

- **P16 (G30)** minimum 75% of the bulk is between 3.15 and 16 mm
- **P31 (G50)** minimum 75% of the bulk is between 8 and 31.5 mm
- **P45 (G50)** minimum 75% of the bulk is between 8 and 45 mm
- **P63 (G100)** minimum 75% of the bulk is between 8 and 63 mm

## **7. Interpolation point table for control system**

For measuring coarse wood chips resp. industrial wood chips, in the programming of the control system a special curve for these sorts has to be stored. This is affected via so-called interpolation point tables. The curves are created via fix points, intermediate values are calculated by linear interpolation.

The input value for calculating the interpolation point table is the water content of the transmitter. This value is the value for standard wood chips and corresponds to 4..20mA and 0 to 80% water content.



### **7.1 interpolation point table for “Coarse wood chips”:**

interpolation point no.	analogue output [mA] (X-Wert)	wood chip [%WC] (X value)	coarse wood chips [%WC] (Y value)
0	4.00	0.0	0.0
1	5.20	6.0	6.0
2	5.80	9.0	9.0
3	7.20	16.0	16.0
4	8.70	23.5	24.9
5	10.40	32.0	37.2
6	11.20	36.0	43.0
7	12.16	40.8	50.0
8	14.10	50.5	55.0
9	20.00	80.0	55.0

### **7.2 interpolation point table for “Industrial wood chips”:**

interpolation point no.	analogue output [mA] (X-Wert)	wood chip [%WC] (X value)	industrial wood chips [%WC] (Y value)
0	4.00	0.0	0.0
1	5.20	6.0	6.0
2	5.80	9.0	9.0
3	7.20	16.0	16.0
4	8.70	23.5	26.3
5	10.40	32.0	42.3
6	11.20	36.0	50.0
7	13.24	46.2	55.0
8	17.00	65.0	55.0
9	20.00	80.0	55.0

### **7.3 interpolation point table for “Fine wood chips”:**

interpolation point no.	analogue output [mA] (X-Wert)	wood chip [%WC] (X value)	industrial wood chips [%WC] (Y value)
0	4.00	0.0	0.0
1	5.20	6.0	6.0
2	5.80	9.0	9.0
3	7.20	16.0	16.0
4	8.70	23.5	22.8
5	10.40	32.0	29.4
6	11.20	36.0	32.5
7	14.00	50.0	43.5
8	14.56	52.8	50.0
9	20.00	80.0	55.0

## **8. Exemption from liability**

For misreading's 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. In case of a faulty device, please contact Schaller GmbH ([www.humimeter.com](http://www.humimeter.com)) or your dealer.

## **9. Technical data**

Measuring range	10 to 50 % water content
Material temperature	+5 to +70 °C
Surrounding temperature	-10 to +60 °C
Protection class	IP 65
Power supply	24 VDC (15 to 29 VDC)
Current consumption	90mA & analogue output (4 to 20mA)



## 10. Example pictures for selection of right calibration curve

**Wood chips**



**Coarse wood chips**





## Industrial wood chips



## Fine wood chips



## **11. Device maintenance instructions**

- Please always keep in mind that the moisture sensors are sensitive measuring instruments and handle them **WITH CAUTION**.
- If the measuring system doesn't work properly, please first of all reboot the system (disconnection of power supply).
- The sensor has to be cleaned from pollution or something similar periodically.
- Do not bend the cable of sensor. We recommend the installation of a protection as the sensor may be damaged if the cable is bended too often.
- Wrong pin allocation may destroy the sensor and the control unit! This is no case of warranty.

## **12. Most common reasons for miss readings**

- When there is no material above the sensor, the air value is displayed (5.5%)
- Also when there is dust on the sensor, a measuring value is displayed
- Water drops due to condensation on the measuring surface of the sensor
- Temperature (of material or surroundings) out of specified range. In general the accuracy decreases with rising temperatures due to a higher compensation factor
- The pressure between sensor and material is too low
- The cables must not lie in the area of electro-magnetic interference fields
- The sensors have to be cleaned periodically
- The sensor connector is not connected properly
- Do not open sensor unit! Get in contact with Schaller GmbH or your local dealer in order to clarify possible errors

## **13. Test block**

Via the optionally available test block (article no. 12308) the operation and calibration of the wood chips moisture transmitter can be checked easily.

By pressing the test block on the stainless metal sensor sheets a fixed water content is simulated. Turning the test block, another fixed value is simulated.

