

DSE4111A Inline Moisture Meter

- for baled biomass



DSE4111A Inline moisture control

DSE4111A is a microwave based moisture meter designed for industrial application on conveyors and biomass processing lines.

DSE4111A provides continuous monitoring of moisture content in all types of baled biomass:

- Straw
- Forage (hay, Alfalfa)
- Energy grasses (Miscanthus)
- Harvest residues (corn, sugar cane)

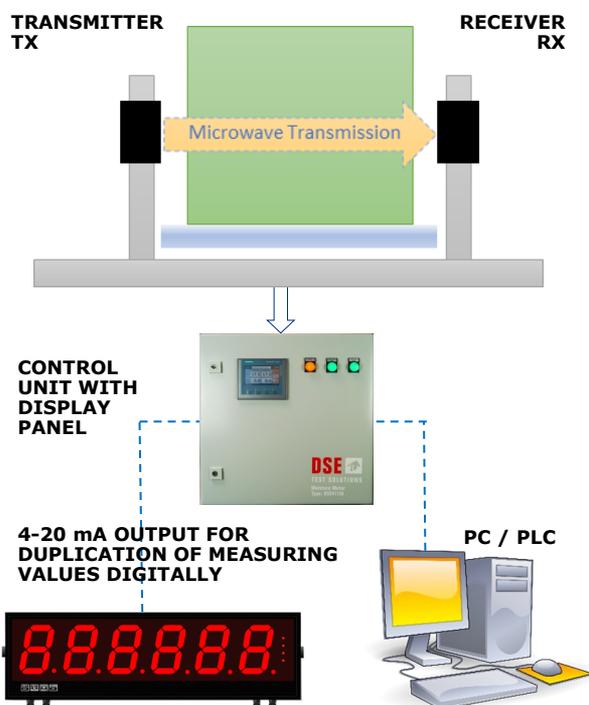


Measuring principle

DSE4111A consists of two sensor units for mounting on each side of the conveyor. As a bale passes by the sensors, a microwave signal is transmitted through the bale.

When exposed to microwaves, the water molecules in the material start to oscillate, causing energy loss of the signal.

The signal attenuation is calculated into moisture % by the control unit. The control units has a number of 4-20 mA outputs to connect to external control systems and display.



*display not included

Advantages of DSE Microwave Technology

✓ High accuracy

The microwave method has a very high measuring accuracy (+/- 1%) in comparison to conventional sampling.

With 3 measurements per second, DSE4111 scans large amounts of material, assuring representative measuring data and identification of wet spots.

✓ Non-contact measurements

DSE Microwave Technology is a contactless system, measuring both the surface moisture and the inbound stem moisture in the material.

Contactless measurements ensure consistent and reliable measurements every time and a low-maintenance need.

✓ Fully automated

DSE4111A is a fully automated system that eliminates the need of manual measurements.

It can be connected to local PC or PLC for continuous monitoring of bale quality and process optimisation.

Application areas

- STRAW DRIVEN POWER PLANTS
- FORRAGE DEHYDRATION PLANTS
- PELLETISING/BRIQUETING PLANTS



System description

The system contains:

- 1 Microwave transmitter
- 1 Microwave receiver
- 1 Control unit with display
- Cables

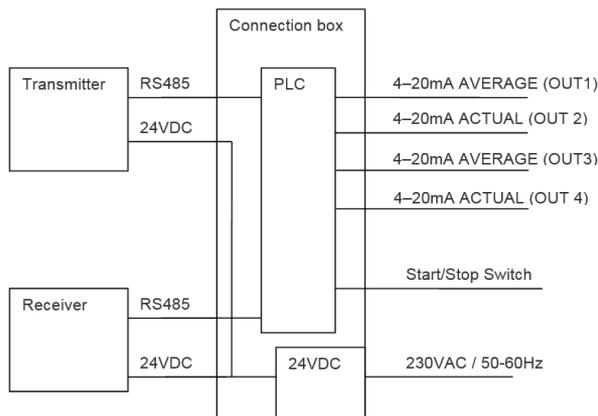
The controller is equipped with four 4-20 mA outputs: No. 1) providing the average moisture content in the entire bale. No. 2) providing the actual moisture readings. No. 3 and 4 is slave outputs of No. 1 and No. 2.

Inputs are available for selecting bale width or height, depending on sensor installation (horizontal or vertical).

Default setup: 120 cm, 90 cm, 70 cm bales.

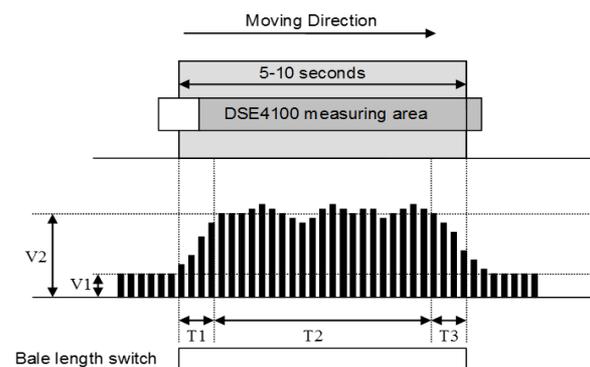
Customer specific setup is available on request.

Illustration of the block diagram



Signal Evaluation

Illustration of signal evaluation



The V1 is the attenuation offset (Tare), and V2 is the total measured attenuation. The offset value V1 is compensated in the calculations before the moisture value is calculated.

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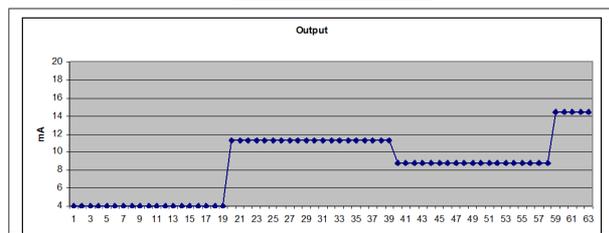
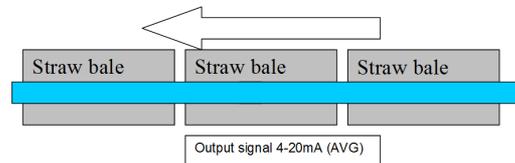
Data output

Output 1

4-20 mA signal giving an analogue output as a function of the average moisture measures within the time T2.

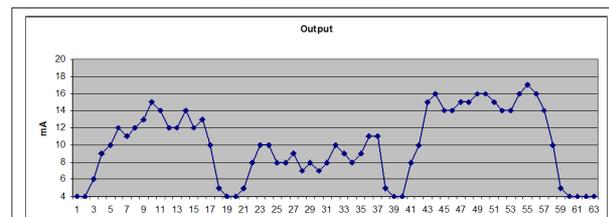
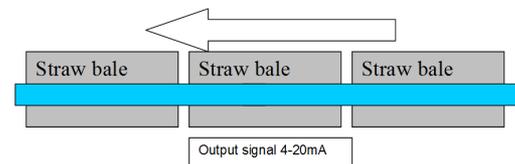
T1 and T3 measurements are not included in the average moisture value calculation.

The T1 and T3 times are configurable, and should be minimum the time it takes fully cover/uncover the sensor units.



Output 2

4-20 mA signal giving an analogue live output as a function of the actual measured moisture between the transmitter and the receiver.





About DSE Test Solutions

DSE Test Solutions is a Danish knowledge based company that develops and manufactures high tech test- and measurement solutions for various industries. Today we are the leading supplier of moisture meters for straw driven thermoelectric plants worldwide. Our Microwave Technology is known for it's precision and has become the preferred technology in the Bio-energy sector. We strive for understanding our customers' needs and adapt our product offering accordingly.

DSE4111A Technical data

Measuring range

7% to 39% relative moisture

Measuring accuracy with uniform density

+/- 1 % up to 30% relative moisture, hereafter +/-2% (Bales: 1.2 m wide; 140 kg/m³)

Size of sensor units

L 220 mm x H 220 mm x W 100 mm

Size of control unit

L 500 mm x H 500 mm x W 220 mm

Measurement frequency

2.4 GHz

Analogue output

4-20 mA

Ambient temperature

Sensors: -15 to +40 °C,
Control unit: 0 to +40 °C.

Ingress Protection

Sensors: IP 65. Control unit: Indoor only.

Power

100-230 VAC 50/60Hz, 120W
(option: 110 VAC/60 Hz)

CE compliance

- EN55011 for emission
- EN55082 for immunity
- EN60204-1

DSE4111A Order options	Basic	Options
1 set of sensors incl. 1 Transmitter and 1 Receiver	✓	
Upgrade to Dual sensor version for extended bale coverage		✓
Control unit incl. Default bale Parameter setting ¹⁾	✓	
Digital input for 3 different bale Parameter settings (bale width/ height/ density)		✓
Control panel with display for Control unit	✓	
Customer specific configuration of Parameter settings by DSE		✓
Cables from sensors to Control unit 20 m	✓	
Cables with extra length		✓
Digital input for TARE	✓	
Digital input for bale length	✓	
2 x 4-20 mA outputs (1 for actual moisture values; 1 for average moisture values)	✓	
Additional 2 x 4-20 mA slave outputs ²⁾	✓	
Profibus DP Slave Network Interface ⁴⁾		✓
EX Protection version/Zone 22 - sensors only ³⁾		✓

¹⁾ Default bale Parameter setting: bale width 1.2 m; dry weigh density 140 kg/m³.

²⁾ Option not available in Dual sensor version.

³⁾ Ex tc IIIB T120°C Dc IP65, EN 60079-0 EN 60079-31

⁴⁾ Replaces the 4-20 mA outputs