

## MEASUREMENT HEAD MMW-9 & MMW-2

### Measurement of moisture with microwaves (gr/m<sup>2</sup>)

Water has clearly defined resonance bands in the microwave zone of the electromagnetic spectrum as it is depicted in Fig. G.11.1. The MMW-measuring gauges exploit this feature in order to establish exactly the absolute moisture content of materials in on-line modus measuring contact-free. The method used relies on measuring the absorption of microwaves.

A microwave oscillator of low emission power is used to produce waves with a relatively broad band of frequencies. The effect of absorption is inverse to the signal output.

A special developed transmitter produces and radiates microwaves into the web. The receiver senses the wave-energy which is not absorbed by the web, preprocesses it with the electronic circuitry and outputs a voltage directly correlated to the moisture content of the web. The method can be applied in transmission or reflection mode.

The MMW-9 gauge is inherently insensitive to material composition as well as to web properties and filler (e.g. pH, cellulose, ink, CaCO<sub>3</sub>, China Clay, fibre orientation etc.).

The gauge is sensitive in terms of decreasing of measuring accuracy against: carbon black, TiO<sub>2</sub>, metal components

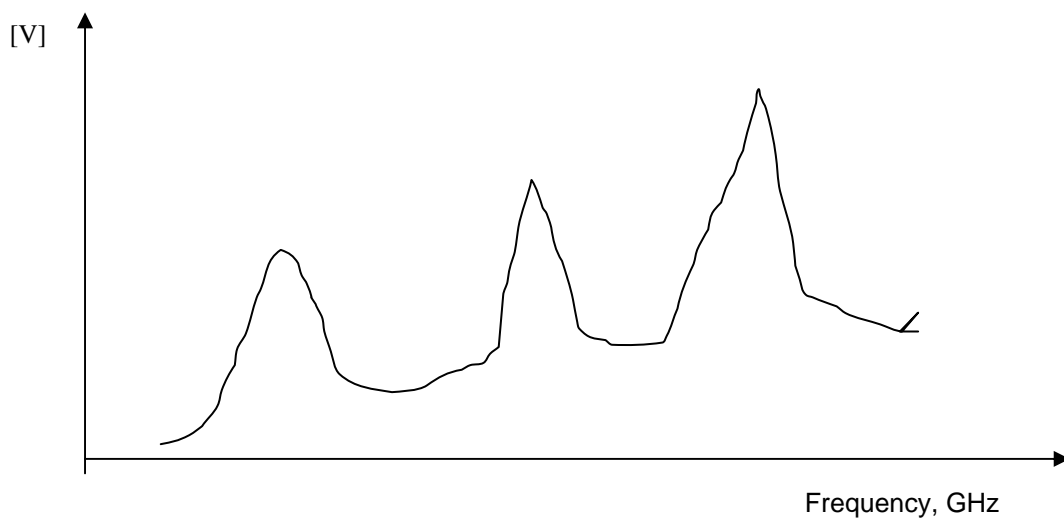


Fig.G.11.1: Absorbtionbands of water in interaction with microwaves

**Transmission method**

In the transmission method the sending transmitter which radiates the microwaves is placed on the one side of the web. On the other web side the receiver collects the not absorbed portion of the web.

The produced signal is proportional to the water content in the web as it is depicted in Fig.G.11.2

## G.11

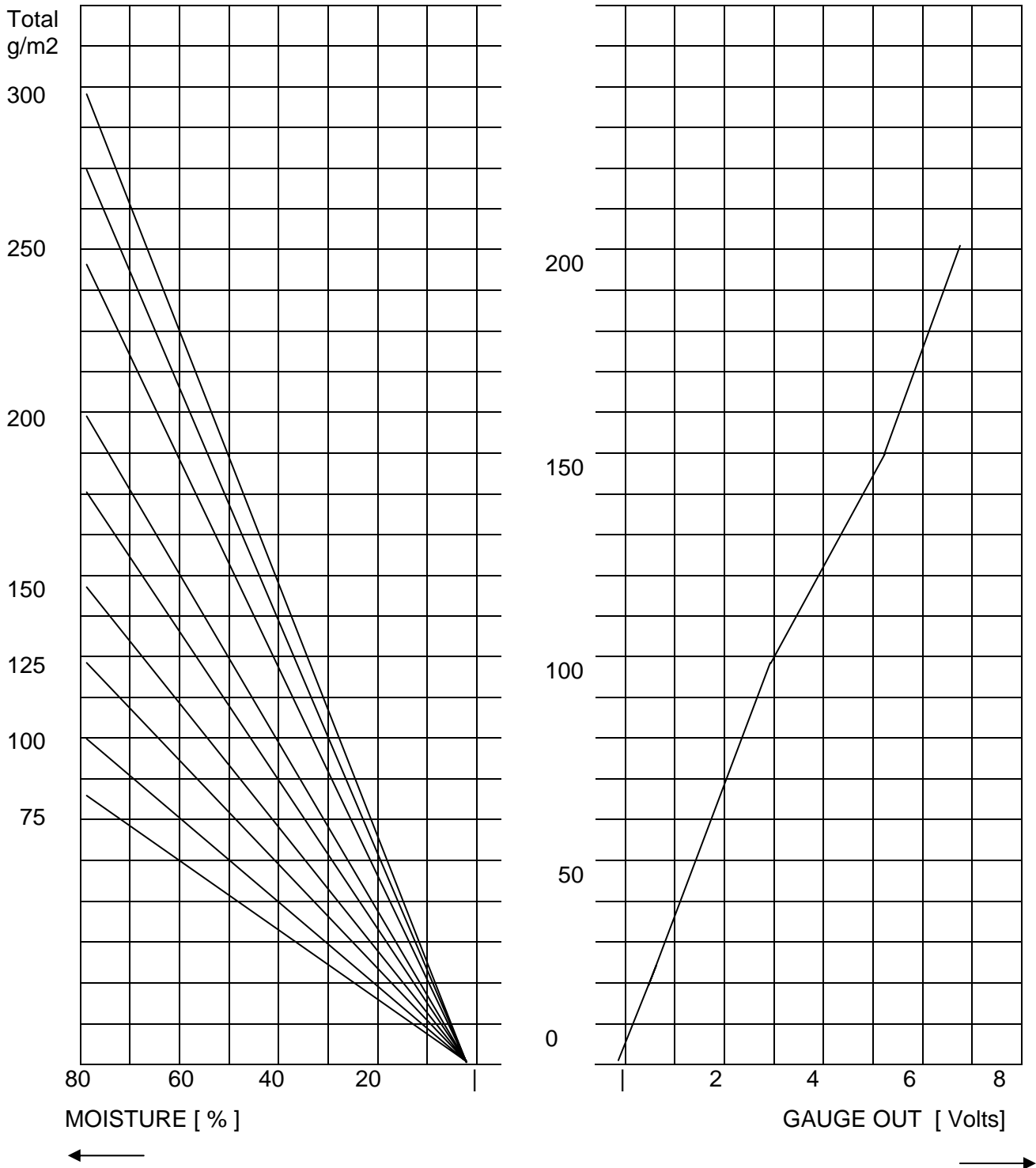


Fig.G.11.2: Gauge signal related to the moisture of the web

**Technical specifications**

<b>Specifications*</b>	<b>MMW-2</b>	<b>MMW -9</b>
Measuring range	200...12000 g/m2	0...300 gr/m2 (L)* 10...2000 gr/m2 (H)*
Measuring principal	continuous	Continuous
supply voltage	24 VDC	24 VDC
emmitter-receiver clearance	300 mm	150 mm/300 mm
uncertainty	2sigma= 1.5% H2O on 1 sec	2sigma= 0.3% H2O on 1 sec (L) 2sigma= 1.0% H2O on 1 sec (H)
outputs	0-10V or 0/4-20 mA	0-10V or 0/4-20 mA
protection class	IP 54	IP 54
ambient conditions	up to 65°(no cooling), 0-95 % rH	up to 65°(no cooling), 0-95 % rH
weight	ca 8 kg	ca 8 kg
dimensions (hxwxd) in mm	250 X 300 X 210	250 X 300X210

L : Low Content

H : High Content

## G.11

### MMW-9 & MMW-2: Head Configuration

The head system consists of the head which incorporates the special transmitter of the wave-beam and the electronics and of the head with the antenna and receiver electronics.

To get an excellent signal to noise ratio it is recommended to position the common head axis in an angle of  $\angle 30$  grad to the web.

The heads components are diagrammatically depicted in Fig. G.11.3

The temperature sensors for temperature compensation of the measuring gap temperature variations are not shown.

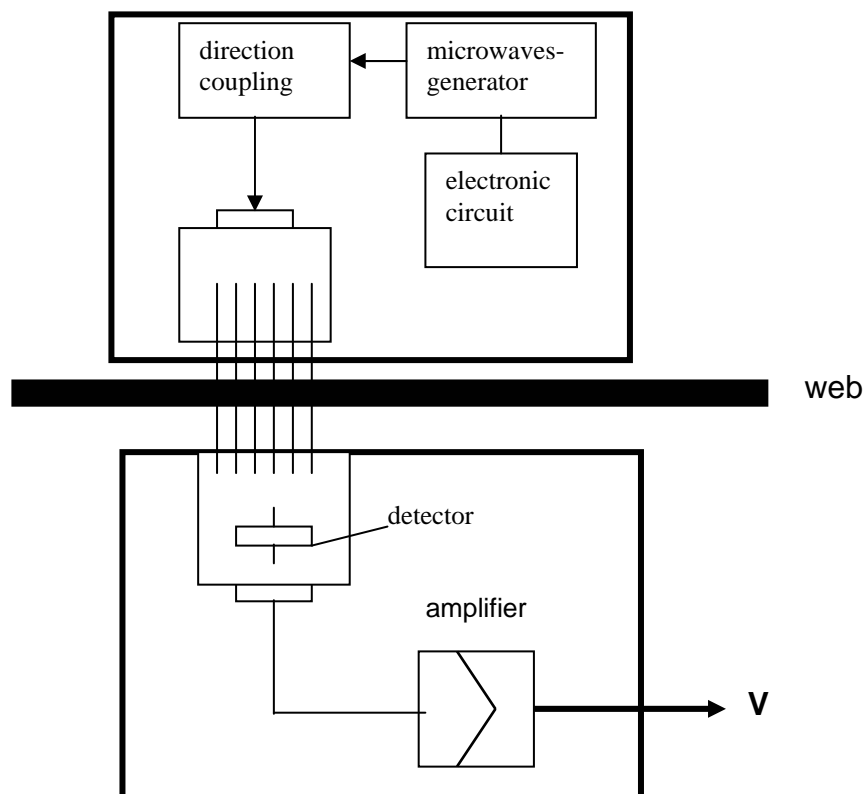


Fig. G.11.3: MMW-9 & MMW-2, Head Configuration