MICROWAVE TECHNOLOGY

Micro-Polar

Dry Substance, Concentration and Water Content measured by Microwaves

BERTHOLD TECHNOLOGIES

Applied Instruments

Measuring with Microwaves

Fields of Application

Using the microwave measuring systems from BERTHOLD TECHNOLOGIES, **concentration, dry substance, moisture and water content** can be measured during the ongoing process in a wide variety of products.

The fields of application for our microwave systems are manifold ranging from the food industry to power plants through to mines and paper mills. The choice of sensors and technical features such as dynamics, frequency etc. is extensive.

Micro-Polar can be used for measurement on the following:

- **Bulk Materials**
- **Fluids**
- **Suspensions**
- **Pastes**

Technical support

We will be pleased to select the optimal system configuration suitable for your personal application. Free of charge and non-binding, naturally!

Quality you can trust

BERTHOLD TECHNOLOGIES is certified according to ISO 9001 and ISO 14001 and has more than 20 years of experience in microwave technology. Our worldwide sales and service network ensures fast and competent on-site support.

The Measuring Principle

Microwaves penetrate the measured product, causing different strengths of polarization in the material components. Water molecules are naturally polar, which causes the microwaves to weaken and slow down significantly. This effect makes it possible to determine the water content very accurately.

The multi-frequency technology used by BERTHOLD TECHNOLOGIES ensures a very stable and reliable measurement that is unaffected by reflexes or resonances.

The integrated reference line ensures reliable compensation of environmental influences. Micro-Polar operates with very low power microwaves (approx. 0.1 mW), therefore the material being measured is neither warmed nor modified. The system has radio licences approved by FCC, IC and ETSI.

The Advantages

- **Cost-effective production due to real-time measurements**
  The online monitoring in production enables trend analysis and if necessary, early intervention in production. The result is significant cost reduction as well as improved product quality.
- **Reliable and accurate**
  Factors such as colour, viscosity, inhomogeneous composition or dust have no or only a negligible effect on the measurement. The complete material interface is measured. In addition, multi-frequency technology and reference line ensure a very stable and representative outcome.
- **Non-contact**
  The majority of sensors do not come into contact with the measured product and are therefore not subjected to wear and tear so no maintenance or special cleaning is necessary.
- **Easy Operation and Handling**
  Micro-Polar is easy to install in existing plants. The evaluation unit features a large display and user-friendly software. Furthermore, automatic on-site calibration is possible

Measuring of Bulk Materials

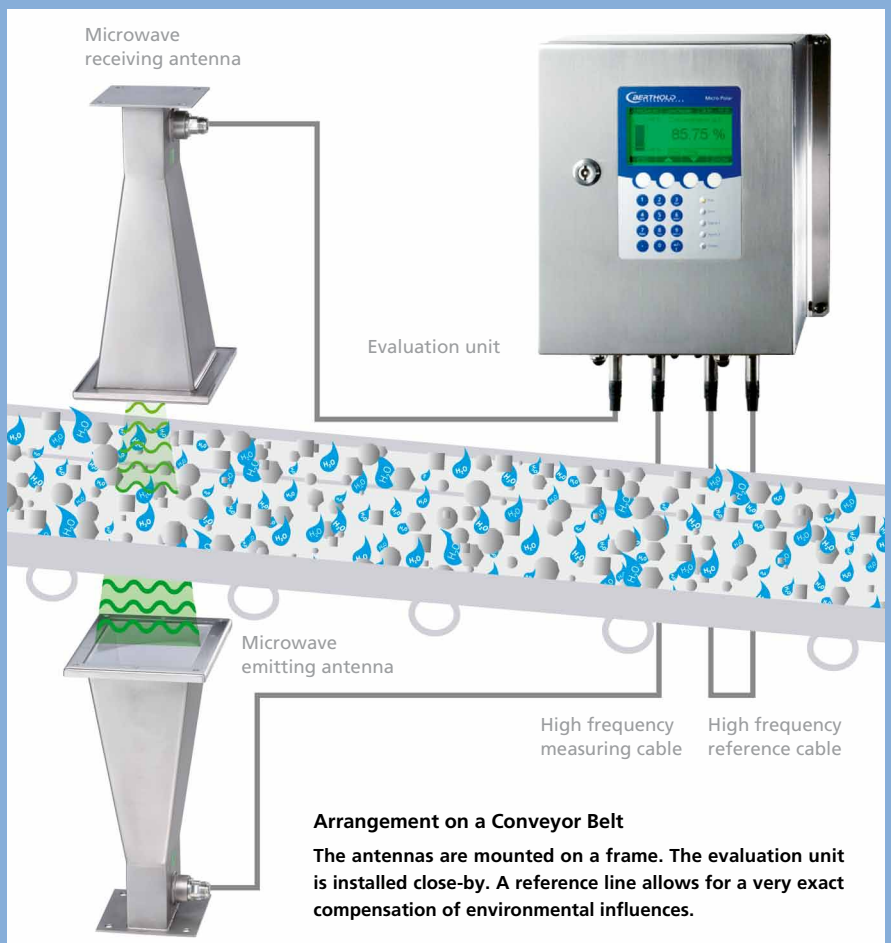
Micro-Polar

The Micro-Polar measures the moisture of the most varied products online. The measurement can take place on:

- **Conveyor Belts**
- **Bunkers or Silos**
- **Chutes**

The applied microwave technology enables the non-contact measurement of the complete material interface. The outcome is an accurate and representative online measurement for quality assurance and process optimization.

Typical fields of application are to be found in the mining industry and power plants, in the chemical, pulp and paper and building material industries.



Arrangement on a Conveyor Belt

The antennas are mounted on a frame. The evaluation unit is installed close-by. A reference line allows for a very exact compensation of environmental influences.

High Performance System

The antennas do not come into contact with the bulk material and are therefore not subjected to wear and tear. The high dynamics favours measurement on even very high bulk loads.

The system offers the possibility of compensating fluctuant bulk heights by means of separate distance sensors (e .g. ultrasonic). In case of fluctuant bulk densities a radiometric area weight compensation can be installed too.

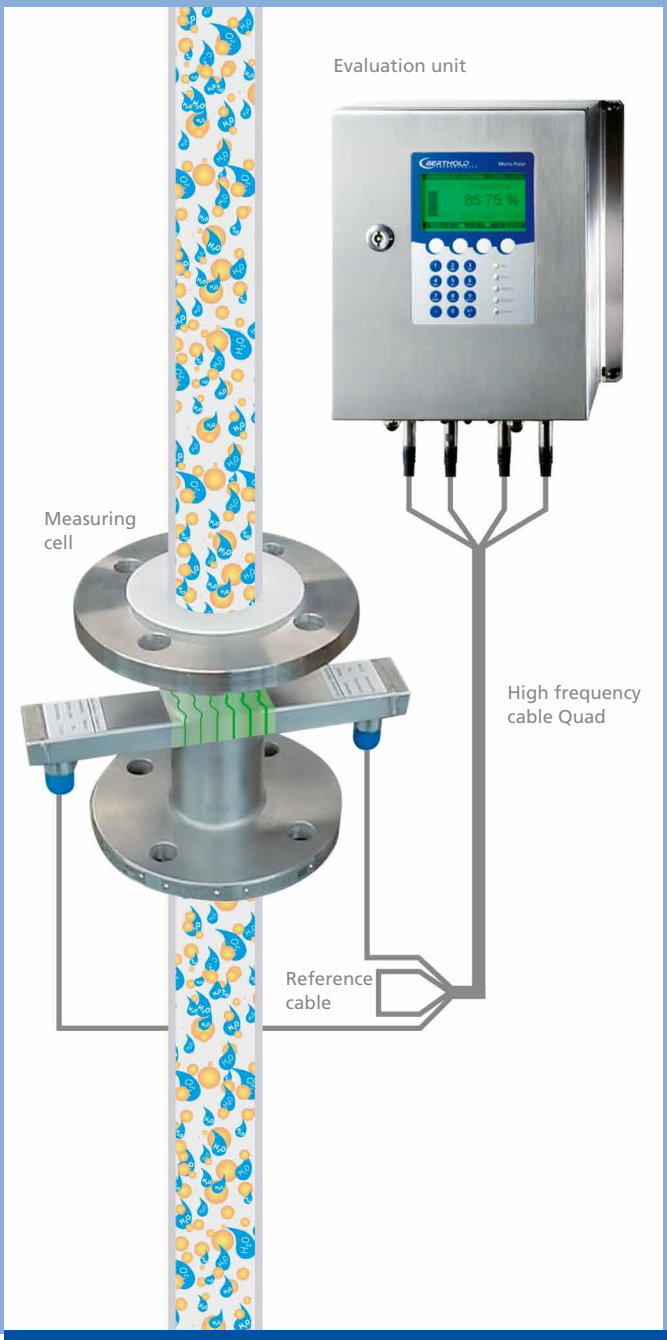
Microwave spiral antennas are used for confined spaces

Examples of successful Micro-Polar applications

- **Bauxite**
- **Bentonite**
- **Lignite and hard coal**
- **Fertilizer**
- **Grain**
- **Gypsum**
- **Wood chips**
- **Wood fibres**
- **Sand lime brick**
- **Potato chips**
- **Methylcellulose**
- **Sand**
- **Chipboard chips**
- **Starch pellets/Starch**
- **Clay mass**
- **Sugar beet chips**

Measuring of Viscous Materials

The measuring cell is integrated into the pipeline. All material flowing through the pipeline is measured. The evaluation unit is installed in close proximity to the measuring cell. A reference line allows for a very exact compensation of environmental influences.



Micro-Polar

The Micro-Polar measures online density, concentration, dry substance or water content in fluids, suspensions, pastes or powders.
The measurement is carried out in

- **Pipelines**
- **Vessels**
- **Other process related plant components**

Typical fields of application are to be found in power plants, in sewage technology as well as in the pulp and paper, food and chemical industries.

High Performance System

Micro-Polar will operate extremely accurately and reliably for many years. The high dynamics of the Microwave system favour the measurement even in large pipeline diameters.

The sensors are extremely robust and provide long operational safety. The measuring cell works virtually non-contacting and is fitted with wear resistant and smooth walled Teflon. Therefore it is particularly well protected against abrasion, easy to clean and meets highest hygiene requirements. Our microwave technology works with very low transmission power that causes neither warming nor changes in the material.

Configuration

Micro-Polar consists of an evaluation unit, the microwave sensor and a high frequency cable. The microwave sensor is available in various designs:

- **Measuring Cell**
- **Container Probe**
- **Container Probe with flushing device**

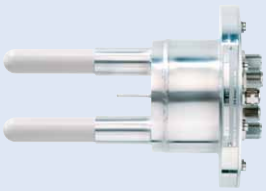
Examples of successful application of the Micro-Polar:

- **Butter**
- **Milk of Lime**
- **Silicic Acid**
- **Curd, Cream Cheese**
- **Caramel**
- **Tar**
- **Water in Oil / Oil in Water**
- **Sewage Sludge**

Safe Measurement

The measurements are absolutely non-destructive, as the power emitted is lower than that of a mobile telephone. The Micro-Polar has radio licences approved by FCC, IC and ETSI.

Container Probe



Container Probe with flushing device

Technical Data Micro-Polar

Evaluation Units	
Assembly	Wall housing made of stainless steel (1.4571) HxWxD: 300x323x140 mm or HxWxD: 400x338x170 mm Protection class IP 65 Weight approx. 6.5 or 8.0 kg Graphic LC display (114x64 mm), alphanumeric keyboard and 4 soft-keys
Mains supply	1. 90…265 V AC (45…65 Hz) 2. 24 V AC/DC (DC: 18…36 V, AC: -20…+5 %, 40…440 Hz) 3. 24 V DC (18…36 V)
Power consumption	max. 30 VA (AC/DC) or 48/60 VA (AC/DC)
Operating temperature	-20…+60 °C (-4…+140 °F) or -20…+50 °C (-4…+122 °F) no condensation
Interfaces	RS 232, RS 485
Inputs	
Analog inputs	2 x 0/4 - 20 mA, load 50 Ω, invertible 1 x insulated, 1 x instrument ground
Digital inputs	3 x digital inputs: start/stop, product selection, sample measurement, measurement hold
PT-100 connection	Measuring range -50…+ 200°C (-58…392 °F)
Outputs	
Analog outputs	1 x 4…20 mA, 1 x 0/4…20 mA load max. 800 Ω, insulated, invertible
Digital outputs	2 x relay (SPDT), insulated Configuration options: - collective error message - measurement hold - threshold (min. and max.)

HF Sensor connection	
HF-channels	Measurement and reference channel
HF-cable	Various types and lengths, typical lengths 2...4 m, max. 10 m (distance sensor- evaluation unit)
Sensors	
Antennas	Horn and spiral antennas (Transmitter and receiver)
Measuring cell	Material: PTFE-lining, stainless steel Product temperature: 10…130 °C (50…266 °F) Pressure range: Nominal pressure up to 20 bar, depending on nominal width and type of flange Flange: according DIN or ASA Varieties: Pipe nominal widths: 50…150 mm
Container probe	Material: Plastic, stainless steel Product temperature: 10…120 °C (50…248 °F) Flange: according DIN or ASA Varieties: 1. without flushing device, with PT 100 2. with flushing device, 2 x 3/8" flush connection
Measurement chute	Internal dimensions HxWxD: 360x360x250 mm Varieties: 1. Plastic PP-H, max. temperature 100 °C (212 °F) 2. Ceramics, max. temerature 500 °C (932 °F)
Radio licences	
	FCC, IC, ETSI

Applied Instruments

For more information please contact...

Telephone: +64 (09) 579 2633
Fax: +64 (09) 579 2630

www.applied-inst.co.nz
Instrumentation for Process Measurement and Control