Measuring Systems for Solids

Moisture ♦ Mass Flow ♦ Monitoring ♦ Level

Tradition ♦ Technology ♦ Innovation
HUMY 3000
Continuous inline moisture measuring system for bulk materials

Application and Function
The moisture in solids is an important parameter which strongly influences the quality of the product and can increase the economic efficiency of a production fundamentally. HUMY 3000 is in many processes successfully in use, e.g. for sugar, tobacco, grain, malt, flour, coal, sand, wood shavings, dried food, fertilizer, powder, pigments and plastic granules.

As installation places conveyor belts, screw conveyors, silos, funnels are particularly suitable. The inline moisture measurement is also possible in batch processes.

At the measuring the relative permittivity and the high-frequency recession of the solid is measured in the high-frequency range.

The measurement procedure makes a short and simple calibration as well as a high precision better than 0.1% possible. The measuring probe transmits the data digitally. This makes the measurement assignment disturbance insensitive and allows a distance of the sensor to the end judging unity up to 1000m.

The system supervising itself has an integrated data logger besides an automatic compensation of temperature and ageing drift, digital and alarm exits. On the LC display are represented the measurements analogously and digitally.

A simple control and parameter setting of all functions is carried out via soft keys. For product or process changes different product parameters can be stored.

Main Benefits
- No samples for the laboratory necessary
- Saving of energy costs
- Improvement on the product quality
- Very short amortization time
- High selective sensitiveness
- High measuring speed
- Precision better than 0.1% (depends on product)
- Easy and economic installation
- Fast and simple calibration
- Optional ATEX-Version for zone 20 and zone 0

Examples for Installations

Installation in hopper
Assembly of the moisture measurement sensor at the screw conveyor’s exit

Installation in a free fall application
Installation on a conveyor belt
Chemistry, pharmacy
Powders, granules, tablets, pasta, foils, fertilizer, phosphate, salt, potash, washing powder, Styrofoam, synthetic material, PVC, acryl, pigments

Food and semi luxury food
Grain, strength, flour, malt, hop, soya, rape seed, corn, lenses rice, pasta, beans, sugar beets, beet mash, beet pulp, confectionery, cereals, snack meal, raw coffee, food means, fish meal, dried food, potato products, -flour, -chips, -flakes, sauce powders, powdered milks, spices, nuts

Building materials:
Sand/gravel quartz powder-sand, bricks (raw material), ceramic (raw material), plaster

Recycling:
Bio-, sludge, compost

Other:
Wood shavings, wood flour, coal, coal dust, tobacco, foundry sand, glass/ceramic

Application examples of successfully measured products

Chemistry, pharmacy
Powders, granules, tablets, pasta, foils, fertilizer, phosphate, salt, potash, washing powder, Styrofoam, synthetic material, PVC, acryl, pigments

Food and semi luxury food
Grain, strength, flour, malt, hop, soya, rape seed, corn, lenses rice, pasta, beans, sugar beets, beet mash, beet pulp, confectionery, cereals, snack meal, raw coffee, food means, fish meal, dried food, potato products, -flour, -chips, -flakes, sauce powders, powdered milks, spices, nuts

Building materials:
Sand/gravel quartz powder-sand, bricks (raw material), ceramic (raw material), plaster

Recycling:
Bio-, sludge, compost

Other:
Wood shavings, wood flour, coal, coal dust, tobacco, foundry sand, glass/ceramic

Technical Data
Measuring Unit - Humy 3000

Constitution F:
Field- or wall-mounting housing, B 265 x H 240 x T 250, weight approx. 6.500 g, with sight-door IP65

Constitution T:
Desk-housing B 230 x H 132 x T 330mm, weight approx. 4.500g, Option panel housing

Constitution E:
19”-plugin 3HE / 42 TE, weight approx. 2.000 g

Constitution S:
Panel housing with sight door B270 x H183 x T223, IP 58

Indication:
¼ VGA-LC-Display 100 x 77 mm, 320 x 240 xcolour-pixel. For analogue and digital measurement representation

Display:
Date, time, kind of product, temperature, value of residual, moisture or value of dehydrated substance, Min- and Max-alarm values, analog bar graph indication, dragging pointer width of deviation of measuring value with intensified indication of width of deviation of measuring value, digital indication and description of Min-/Max-limit values and the softkeys

Digital resolution:
20 bit for 0-85.0% moisture and 15-100% dry substance

Measuring range moisture:
Min. 0.02 – 0.10%, max. 0.02 – 90.00%, with 1, 2- or 3 digits behind the point

Measuring range temperature:
Min. 0.0°C, max. 120°C

Accuracy:
max. 0.1 % in accordance to material to be measured

Handling:
Foil-keyboard with each 4 pcs. 10-Block + Function keys + Softkeys

Averaging time:
0.999 sec.

Memory:
User-memory for storage of parameters of 24 different products.

Data logger:
Storage of historical values up to 10 years, Real time clock for measurement record keeping.

Relay output:
Normally opened and normally closed contact for each Min- and Max-alarm relay Contact load: 30VDC or 62.5 VAC

Analog output:
Measuring value of residual moisture or dehydrated substance 0-20 mA (load 750 Ω), measuring value of product temperature, 0-20 mA, max. load 750 Ω.

Analog input:
PT 100, mA and PT 100 input

Digital output:
2x galvanic isolated, 24 V open-drain (max. 50mA)

Digital input:
2x galvanic isolated, active signals (8-36 V) RS 232 with connection for RxO, TxO, OV and Rx2 485

Power supply:
230 V AC / 115 V AC or 24 V AC/DC

All supplies can be available simultaneously (230 V AC und 24 V AC/DC or 115 V AC und 24 V AC/DC).

Applications

Sand
Animal feed
Mounting in discharge screw (wood-fired power plant)

Grain
Cereals
Coal

Technical Data
Moisture Sensor

FMS 400 K:
Measuring surface POM

FMS 400 C:
Measuring surface ceramic

FMS 400 T:
Measuring surface PTFE

Housing:
Stainl. steel 1.4307

Weight:
Approx. 1.050 g

Protection:
IP 67 according to EN 60529

Connection:
Shielded 4-wires cable

Cable length:
max. 1000 m with 0.75 mm²

Process temperature:
-10° to 90° C

Storage temperature:
-10° to 80° C

Response Time:
Approx. 1 sec

Power consumption:
0.4 Watt

Pressure resistance:
Up to 6 bar

Forms of construction:
MF 3000
Mass flow measurement for bulk materials

Application and Function
Our solid flow meter MF 3000 is designed for flow measurement in metallic pipes from a few kg/h to many t/h. The system is suitable for online measurements of powders, dusts, pellets, and granules from 1 nm up to 2 cm in pneumatic or free fall conditions.

The measurement principle of the MF 3000 is based on the physical Doppler-Effect, whereas the sensor generates a uniform field in the microwave frequency range inside the pipe. These microwaves are being reflected by particles passing through the pipe. Calculation of frequency and amplitude changes allows for accurate determination of solid flow. Non-moving particles like dust accumulation are excluded from the calculation.

The installation is simple and cost effective via a welded branch, through which the sensor is screwed flush to the inside of the pipe. The sensor is connected to a DIN-rail mounted transmitter with 4...20 mA, RS232 and RS485 output. The calibration is easy by using our MF-SMART software and a reference flow value.

Main Benefits
- For pneumatic conveyors and free falling processes
- For all solid materials from a few kg/h to many t/h
- No armatures inside the pipe and inside flush fitting
- Very fast and contactless measurement
- Easy, quick and cost effective installation and start-up
- Galvanic separated DIN-Rail Transmitter with RS232- and RS485-Interface
- Robust stainless steel version, abrasion and maintenance free
- Limit value monitoring with alarm contact
- Sensor-transmitter distance up to 2.000 m
- Easy and quick calibration
- Adjustable sensitivity
- Optional: ATEX for Zone 20 and Zone 2

Putting into work
A branch is welded onto the pipe. A 18 mm hole is drilled, the sensor is mounted flush with the inner diameter of the pipe. For commissioning and calibration a notebook with our MF-SMART software needed.

Calibration can be performed with either one or multiple reference flow amounts. The measurement value is output either analog or as digital signal. A serial COM interface is available at the front of the transmitter to connect a notebook computer and a RS485 interface for connection to a PLC system.
Application examples of successfully measured products

MF 3000 is measuring in pneumatic transportsations and free falling processes. The product's grain size can be between 1 nm and 20 mm.

<table>
<thead>
<tr>
<th>Materials:</th>
<th>Range of detection:</th>
</tr>
</thead>
<tbody>
<tr>
<td>All dust, powders, granulates, panels, threads etc. Also sticking or abrasive materials</td>
<td>from kg/h to many t/h</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Industries:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal feed industry</td>
<td>Pharmaceuticals</td>
</tr>
<tr>
<td>Building materials industry</td>
<td>Pigment production</td>
</tr>
<tr>
<td>Cement industry</td>
<td>Plastic industry</td>
</tr>
<tr>
<td>Chemical industry</td>
<td>Production of ceramics</td>
</tr>
<tr>
<td>Detergent industry</td>
<td>Production of rubber goods</td>
</tr>
<tr>
<td>Engineering companies</td>
<td>Production of textiles</td>
</tr>
<tr>
<td>Food industry</td>
<td>Tobacco industry</td>
</tr>
<tr>
<td>Glass production</td>
<td>Washing powder industry</td>
</tr>
</tbody>
</table>

Wood Dust  Jet Material  Plastic Granules
Coal Dust  Fertilizer  Iron-II-Sulfate

Process Data
MF 3000
- Measurement start free fall: Ca. 1 kg/h
- Measurement start pneumatic transport: Ca. 1 kg/h
- Max. pipe diameter: DN 300 (bigger diameter on request)
- Grain size: 1 Nanometer up to 20 mm
- Moisture: Depending on the product
- Pressure: Up to 6 bar (Option up to 30 bar)
- Process temperature: -20 up to +90°C (Option up to +750°C)

Technical Data
Sensor
- Medium touched parts: Stainl. steel 1.4307 and PA 6.6
- Process connecting: Welding flange
- Housing material: Stainl. steel 1.4307 or ST52
- Protection class: IP 65
- Power supply: Via transmitter

Transmitter
- Construction: DIN-Rail, 22,5 mm
- Auxiliary energy: 24 V AC/DC
- Power consumption: Max. 2W (+0,3 – 8,5W for thermocouple)
- Ambient temperature: -10 to +60°C
- Protection class: IP 30

Communication Unit (Optional)

System components
A complete measuring system MF 3000 contains the sensor, a cable, a DIN-rail transmitter and the software MF-SMART.

Materials: Moisture measurement
MF 3000 Mass flow measurement
FS 510M Microwave mass flow monitoring
FS 600E Electrostatic mass flow monitoring
FS 700E Triboelectric dust monitoring
LC 510M Limit level monitoring

HUMY 3000
Moisture measurement

MF 3000
Mass flow measurement

FS 510M
Microwave mass flow monitoring

FS 600E
Electrostatic mass flow monitoring

FS 700E
Triboelectric dust monitoring

LC 510M
Limit level monitoring
FlowSwitch 510M
Continuous flow monitoring for bulk materials

Application
The FlowSwitch 510M is monitoring the conveying stream of solids.
Failures and problems during the transport or feeding of powders, dust, pellets or granules can be detected early with this device. This helps prevent serious difficulties that can occur due to clogged piping, material loss, or other technical problems with the system.

Scope of use
- Animal feed industry
- Building materials industry
- Production of ceramics
- Chemical industry
- Detergent industry
- Food industry
- Glass production
- Metal production
- Pharmaceuticals
- Pigment production
- Power plants
- Production of rubber goods
- Recycling industry
- Synthetic materials
- Production of textiles etc.

Main Benefits
- Reliable, contactless microwave measurement
- For all bulk materials
- Monitors the mass flow in solid handling
- Adjustable sensitivity, damping, hysteresis and filter time
- Easy installation by compact form
- Process connection with welding nozzle

Function
The measurement procedure of the FlowSwitch 510M is based on the physical principle of the Doppler-Effect.
Therefore the sensor sends out a microwave field. If solids move through this field, the microwaves are reflected and received by the sensor again. This is converted into a switching process.
All parameters, like sensitivity, damping, filter time and hysteresis are freely adjustable and, can be configured, due to the bargraph, with an exact value. This enables a variable determination of the switching point resp. a switching process for different mass flows.
The installation can be carried out within pipes, on conveying belts, on fall plates, chutes or at similar transport facilities.
The assembly is simply, economical and easy also afterwards possible.

Technical Data
- Housing material: Stainless steel
- Sensor surface: Teflon (optional ceramic)
- Protection class: IP65
- Ambient temperature: -20°C to +60°C
- Process temperature: -20°C to +80°C
- Process pressure: 2 bar (optional 25 bar)
- Power supply: 24 VDC (18 - 30 VDC)
- Current consumption: Ca. 80 mA at 24 VDC
- Transmitting power: 10 dBm
- Output (switching): Relay contact (change-over contact, potential free)
- Switching voltage: 35 VAC or 45 VDC
- Switching current: min. 10 µA & max. 1 A
- Switching power: 35 VA or 30 W
- Electric connection: Plug-in screw terminals
- Adjustable parameter: Sensitivity, damping, filter, hysteresis, min / max switch
- Parameterization: Direct at device via buttons
- Indicators: LED green (working)
- LED yellow (switch)
- Bargraph (i.e. field intensity)
FlowSwitch 600E
Continuous flow monitoring for bulk materials

Application
The indicator FlowSwitch 600E helps control the mass flow in solid material handling applications such as pneumatic transport lines, feeders or gravity chutes in a wide range of mass flow from g/h to t/h.

Flow problems with transports or the delivery of powders, dust, pellets, or granules can be detected early with this device. This helps prevent serious difficulties that can occur due to clogged piping, material loss, or other technical problems with the system.

Scope of Use
Application
Animal feed industry
Building materials industry
Production of ceramics
Chemical industry
Detergent industry
Food industry
Glass production
Metal production
Pharmaceuticals
Pigment production
Power plants
Production of rubber goods
Recycling industry
Synthetic materials
Production of textiles
Etc.

Function
The multiple-use measurement principle on which FlowSwitch 600E is based is the physical effect of the electric charge of solids particles. This occurs naturally as with, for example, friction or collision with solids.

With a ring sensor, the measurements are taken integrally and without contact over the pipe cross section. The electrically charged particles produce (induce) a charge signal against the grounded conveyor duct. On the basis of statistical fluctuations in the particle flow, a current noise is produced which depends on the solids concentration but also on the solids velocity. Stationary particles such as sediments do not contribute to the results.

Main Benefits
- Contactless and maintenance free
- Integral measuring
- Condition indications with LED
- Adjustable sensitivity, signal damping, hysteresis and filter function
- Potential free contact
- Easy installation by compact form
- Process connection with flange

Technical Data
<table>
<thead>
<tr>
<th>Material</th>
<th>Housing</th>
<th>Process coupling isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stainl. Steel 1.4305, ∅89mm</td>
<td>Stainl. Steel 1.4571 Polyamide (PA), 2mm</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP67</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>Ambient Process</td>
<td>-20°C to +70°C Max. 90°C</td>
</tr>
<tr>
<td>Process pressure</td>
<td>Max. 40 bar</td>
<td></td>
</tr>
<tr>
<td>Electro. connection</td>
<td>Cable input connection</td>
<td>M16 x 1,5</td>
</tr>
<tr>
<td>Power supply</td>
<td>DC</td>
<td>17 to 31 V</td>
</tr>
<tr>
<td>Consumption</td>
<td>&lt; 100 mA</td>
<td></td>
</tr>
<tr>
<td>Switch output</td>
<td>Relay</td>
<td>Max. 48 V AC/DC, 1 A</td>
</tr>
<tr>
<td>Logic</td>
<td>active high/low reversible</td>
<td></td>
</tr>
<tr>
<td>Resistance to jamming</td>
<td>to EN 61000-2</td>
<td></td>
</tr>
<tr>
<td>Adjustment</td>
<td>Sensitivity, Switching point, Damping</td>
<td>1 to 180.000, relative 1 to 10, relative 0 to 10 s</td>
</tr>
</tbody>
</table>

Optional process connections

Material
Housing
Stainl. Steel 1.4305, ∅89mm
Process coupling isolation
Stainl. Steel 1.4571 Polyamide (PA), 2mm
FlowSwitch 700E

Dust monitoring for filter break

Application

The dust monitor FlowSwitch 700E is used for the detection of filter failure functions e.g. crack or defect in assembling.

By the triboelectric measuring principle a dust breakthrough can be recognized reliably.

Scope of Use

FlowSwitch 700E can be put in metallic pipes and channels which shall be monitored on dust.

Main Benefits

- Maintenance free
- Adjustable sensitivity
- Adjustable switch
- Condition indication with LED
- Stainless steel housing
- Compact form
- Easy installation

Function

The technology is based on a modified triboelectric principle detecting particles interacting with the sensing rod and such particles just passing the rod. Build up on the rod surface will not be detected, only moving particles generate a flow rate proportional signal which is monitored by the electronic.

Installation is done on the clean gas side downstream the filter at a metal duct by welding on of a thread bush boring through the duct wall and screwing in dust watch. On and off distance should this 3-fold of the pipe diameter area, the sensor length 1/3 to 2/3 of the pipe diameter.

The device isn’t usable at products, which build an electric conductive coating between sensing rod and pipe wall, caused of abrasion.

Technical Data

<table>
<thead>
<tr>
<th>Material</th>
<th>Housing</th>
<th>Sensor rod (standard)</th>
<th>Isolation (standard)</th>
<th>Sealing (standard)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stainless Steel 1.4571</td>
<td>Stainless Steel 1.4571</td>
<td>Polyamide (PA)</td>
<td>NBR</td>
</tr>
<tr>
<td>Ambient cond temperature</td>
<td>-20°C to +70°C</td>
<td>IP 67 (EN 60529) According to EN 61326-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process</td>
<td>Temperature</td>
<td>Pressure</td>
<td>Max: 2 bar</td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>FlowSwitch_01</td>
<td>Max: 40 V AC/DC, 1A Logic high/flow switchable</td>
<td>FlowSwitch_02</td>
<td>Transistor: galvanic isolated Max: 31 V DC, 15 mA Logic high/flow Switchable</td>
</tr>
<tr>
<td>Power supply</td>
<td>FlowSwitch_01/02</td>
<td>17...31 V DC, max: 60mA, FlowSwitch_20</td>
<td>24 V DC ± 10 %, max 80 mA</td>
<td></td>
</tr>
<tr>
<td>Adjustment</td>
<td>Sensitivity</td>
<td>1...180.000</td>
<td>Damping</td>
<td>0...10 s</td>
</tr>
</tbody>
</table>
**LevelCheck 510M**

Contactless level monitoring for bulk material

**Application**

The microwave barrier LevelCheck 510M is designed for level monitoring of solids in silos, container, bunkers, shafts, etc.

Furthermore it can be used for: blockage-report, for counting piece goods or for positioning items. The devices are certified up to ATEX Zone 20 and optionally authorized for a process pressure up to 25 bar.

**Scope of use**

- Animal feed industry
- Building materials industry
- Production of ceramics
- Chemical industry
- Detergent industry
- Food industry
- Glass production
- Metal production
- Pharmaceuticals
- Pigment production
- Power plants
- Production of rubber goods
- Recycling industry
- Synthetic materials
- Production of textiles
- Etc.

**Main Benefits**

- Reliable microwave measuring principle
- Self-monitoring with additional relay
- For level monitoring
- Adjustable sensitivity, damping, hysteresis and filter function
- Adjustment via 2 key buttons and bargraph
- Easy installation by compact form
- Process connection with flange, thread, etc.

**Function**

The measurement procedure of the LevelCheck 510M is based on the newest microwave technology. Therefore the sensor sends out a microwave signal. The signal is analyzed by the opposite receiver. Material, which has built up within this field, put a damp on the signal effect. This is con-verted into a switching process. The measurement is contactless.

Sensitivity, signal damping and hysteresis of the microwave barrier can be adjusted continuously and exactly by use of the bargraph. This enables a variable determination of the switching point resp. a switching process for different process applications.

The installation can be carried out within silos, bunkers, pipe systems or at similar transport facilities.

The assembly is simple, economical and easy possible also afterwards.

**Technical Data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing material</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Sensor surface</td>
<td>Teflon (optional ceramic)</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP65</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-20°C till +60°C</td>
</tr>
<tr>
<td>Process temperature</td>
<td>-20°C till +80°C</td>
</tr>
<tr>
<td>Process pressure</td>
<td>2 bar (optional 25 bar)</td>
</tr>
<tr>
<td>Power supply</td>
<td>18-30 VDC (typical 24 VDC)</td>
</tr>
<tr>
<td>Current consumption</td>
<td>Ca. 80 mA at 24 VDC</td>
</tr>
<tr>
<td>Transmitting power</td>
<td>10 dBm</td>
</tr>
<tr>
<td>Output (switching)</td>
<td>2x Relay output (change-over contact, pot.-free) optional transistor</td>
</tr>
<tr>
<td>Switching voltage</td>
<td>45 VDC / 35 VAC</td>
</tr>
<tr>
<td>Switching current</td>
<td>Min. 10 µA &amp; max. 1 A</td>
</tr>
<tr>
<td>Switching power</td>
<td>30W / 35 VA</td>
</tr>
<tr>
<td>Electro. connection</td>
<td>Screw terminals (behind a screw cap with cable gland)</td>
</tr>
<tr>
<td>Adjustable parameters</td>
<td>Sensitivity, filter time, hysteresis</td>
</tr>
<tr>
<td>Parameterization</td>
<td>via key buttons and switch</td>
</tr>
<tr>
<td>Indicators</td>
<td>LED green (power supply)</td>
</tr>
<tr>
<td></td>
<td>LED orange (switch)</td>
</tr>
<tr>
<td></td>
<td>Bargraph</td>
</tr>
</tbody>
</table>

**Technical Drawing**

![Technical Drawing](image_url)
A lles im Blick?

A uch Ihre

Produktions-

prozesse?

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