mütec Instruments

# 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.

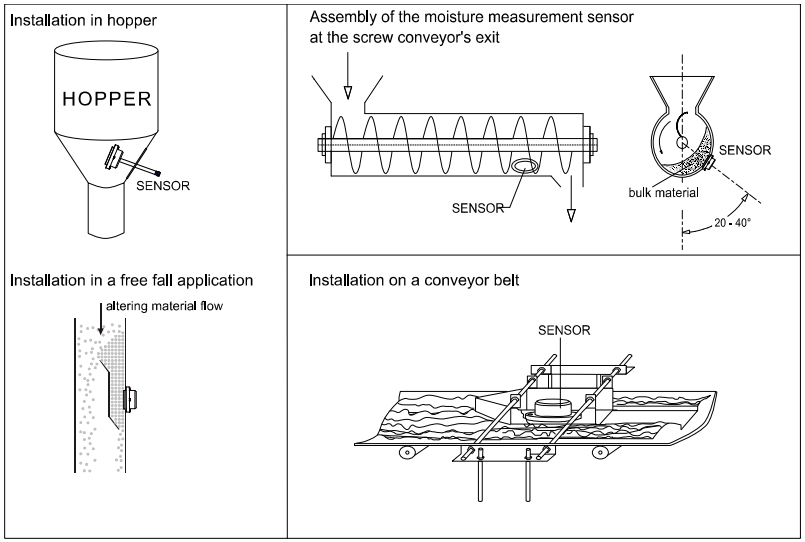
The system supervising itself has an integrated data logger besides an automatic compensation of temperature and ageing drift, digital and alarm exits. On the LC display are represented the measurements analogously and digitally.

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



## 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

## Applications

**Sand**

**Animal feed**

**Mounting in discharge screw (wood-fired power plant)**

**Grain**

**Cereals**

**Coal**

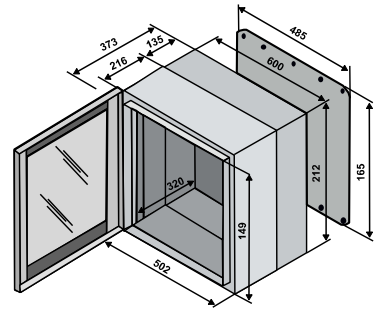
## Technical Data
## Measuring Unit - Humy 3000

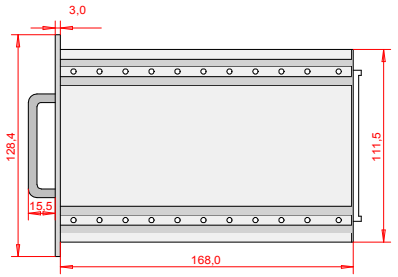
| | |
|---|---|
| Construction F: | Field-/wall-mounting housing, B 265 x H 240 x T 250, weight approx. 6.500 g, with sight-door IP65 |
| Construction T: | Desk-housing B 236 x H 132 x T 330mm, weight approx. 4.500g, Option panel housing |
| Construction E: | 19"-plugin 3HE / 42 TE, weight approx. 2.000 g |
| Construction 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 colour-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: | Span min.: 0-5° C<br>Span max.: 0-120° 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 0/4-20 mA (load 750 Ω. measuring value of product temperature, 0/4-20 mA, max. load 750 Ω. |
| Analog input | 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) |
| Interface | RS 232 with connection for RxD, TxD, OV and RS 485 |
| Power supply | 230 V AC / 115 V AC or 24 V AC/DC<br>All supplies can be available simultaneously (230 V AC und 24 V AC/DC or 115 V AC und 24 V AC/DC). |

## 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 class: | IP 67 according to EN 60529 |
| Connection cable: | Shielded 4-wires cable, 0.25 up to 0.5 mm² |
| Cable length | max. 1000 m with 0.75 mm² |
| Process-temperature: | -10° to 90° C<br>140°C with cooling |
| Storage temperature: | -10° to 80° C |
| Response Time: | Approx. 1 sec |
| Power consumption: | 0.4 Watt |
| Signal: | RS 485 |
| Pressure resistance: | Up to 6 bar |

## Forms of construction:




- Cover: System in desk-housing
- Figure at top: wall housing
- Figure at bottom: 19"-plug in

# 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 on-line 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.

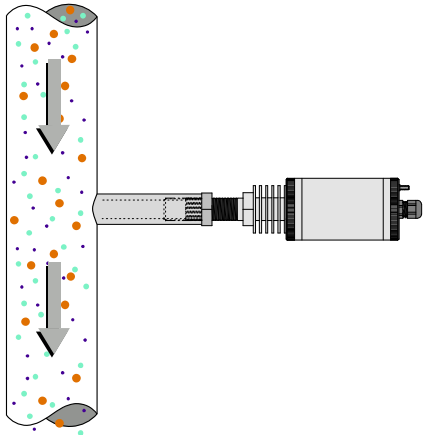
### Main Benefits

- 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 Ex

### 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 transportations and free falling processes. The product's grain size can be between 1 nm and 20mm.

The moisture of the measured material is allowed to be changed up to 12%.

**Materials:**

All dust, powders, granulates, panels, threads etc. Also sticking or abrasive materials

**Range of detection:**

from kg/h to many t/h

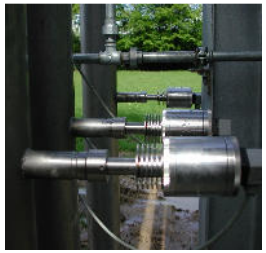
**Industries:**

Animal feed industry
Building materials industry
Cement industry
Chemical industry
Detergent industry
Engineering companies
Food industry
Glass production
Metal production
Pharmaceuticals
Pigment production
Plastic industry
Production of ceramics
Production of rubber goods
Production of textiles
Tobacco industry
Washing powder industry

## Applications

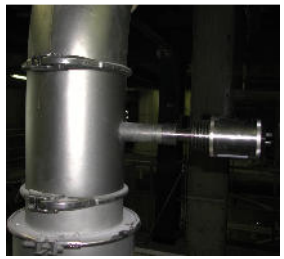
**Wood Dust**

**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

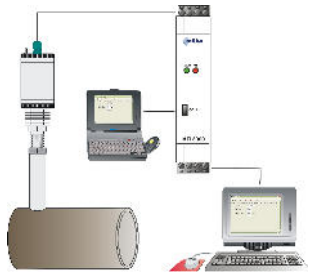
| | |
|---|---|
| Medium touched parts | Stainl. steel 1.4307 and PA 6.6 |
| Process connecting | Welding flange |
| Housing material | Stainl. steel 1.4307 or ST52 |
| Protection class | IP 65 |
| Power supply | Via transmitter |

## Technical Data 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 |

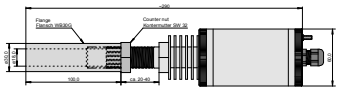
## **Communication Unit** (Optional)

## System components

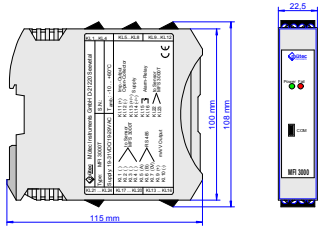


A complete measuring system MF3000 contains the sensor, a cable, a DIN-rail transmitter and the software MF-SMART .

## Sensor



## Transmitter



# 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

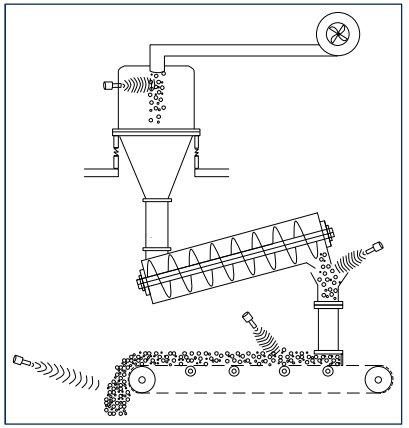
The measurement procedure of the FlowSwitch 510M is based on the physical principle of the Doppler-Effect.

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.

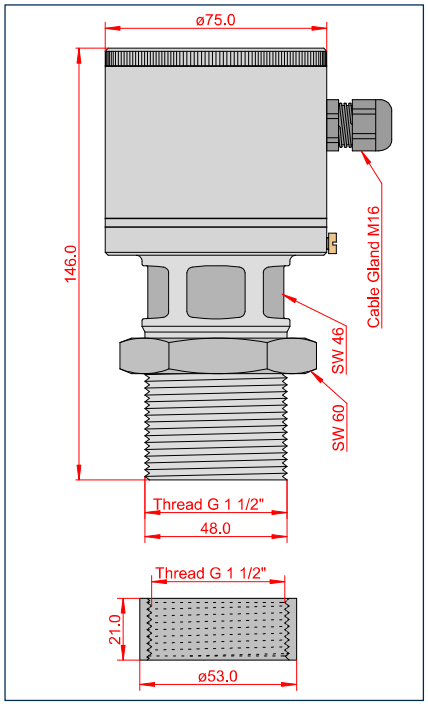
The installation can be carried out within pipes, on conveying belts, on fall plates, chutes or at similar transport facilities.

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 |
| Electr. connection | Plug-in screw terminals |
| Adjustable parameter | Sensitivity, damping, filter, hysteresis, min / max switch |
| Parameterization | Direct at device via buttons |
| Indicators | LED green (working)<br>LED yellow (switch)<br>Bargraph (i.a. 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

Animal feed industry
Building materials industry
Producion 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.

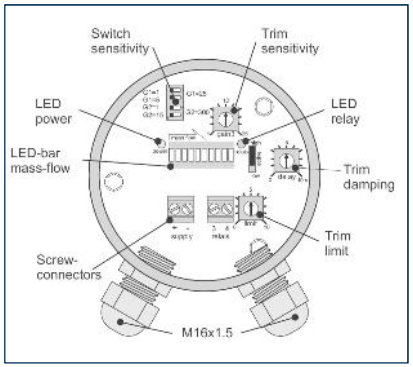
### Main Benefits

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

### 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.

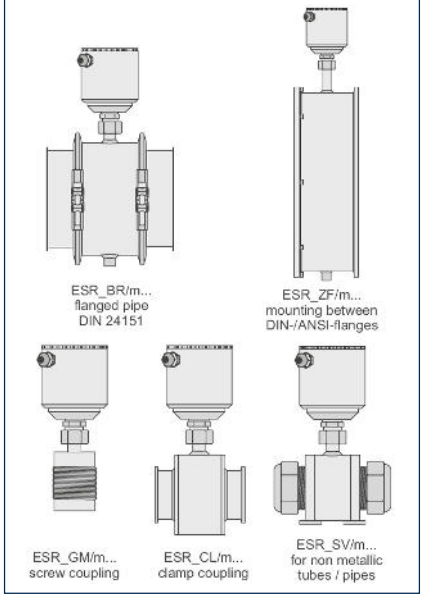
With a ring sensor, the measurements are taken integrally and without contact over the pipe cross section. The electrically charged particles produce (induce) a charge signal against the grounded conveyor duct. On the basis of statistical fluctuations in the particle flow, a current noise is produced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




### Technical Data

| | | |
|---|---|---|
| Material | Housing | Stainl. Steel 1.4305, ∅89mm |
| | Process coupling | Stainl. Steel 1.4571 |
| | Isolation | Polyamide (PA), 2mm |
| Protection class | | IP67 |
| Temperature | Ambient | -20°C to +70°C |
| | Process | Max. 90°C |
| Process pressure | | Max. 40 bar |
| Electr. connection | Cable input | M16 x 1,5 |
| Power supply | DC | 17 to 31 V |
| Consumption | | < 100 mA |
| Switch output | Relay | Max. 48 V AC/DC, 1 A |
| | Logic | active high/low reversible |
| Resistance to jamming | to EN 610006-2 | Industry area |
| Adjustment | Sensitivity | 1 to 180.000, relative |
| | Switching point | 1 to 10, relative |
| | Damping | 0 to 10 s |

### Optional process connections



# 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 reliable.

### Scope of Use

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


### Main Benefits

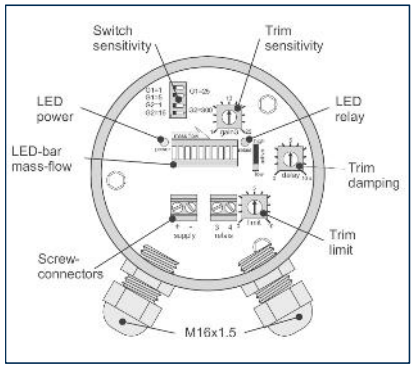
- Maintenance free
- Adjustable sensitivity
- Adjustable switch
- Condition indication with LED
- Stainless steel housing
- Compact form
- Easy installation

### 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.

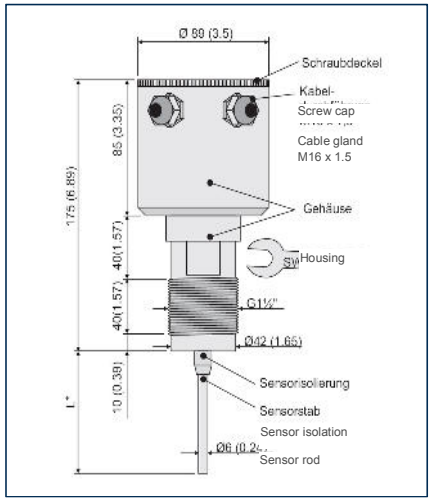
Installation is done on the clean gas side downstream the filter at a metal duct by welding on of a thread bush boring through the duct wall and screwing in dust watch. On and off distance should this 3-fold of the pipe diameter area, the sensor length 1/3 to 2/3 of the pipe diameter.

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




### Technical Data

| | | |
|---|---|---|
| Material | Housing | Stainl. Steel 1.4571 |
| | Sensor rod (standard) | Stainl. Steel 1.4571 |
| | Isolation (standard) | Polyamide (PA) |
| | Sealing (standard) | NBR |
| Ambient cond | temperature | -20°C to +70°C |
| | Protection class | IP 67 (EN 60529) |
| | EMC | According to EN 61326-1 |
| Process | Temperature | Max. 90°C |
| | Pressure | Max. 2 bar |
| Output | FlowSwitch_01 | Max. 48 V AC/DC, 1A Logic high/low switchable |
| | FlowSwitch_02 | Transistor: galvanic isolated Max. 31 V DC, 15 mA Logic high/low Switchable |
| | FlowSwitch_20 | 4-20 mA, galvanic isolated, load < 500 |
| Power supply | FlowSwitch_01/02 | 17...31 V DC, max. 60mA., |
| | FlowSwitch_20 | 24 V DC ± 10 %, max. 80 mA |
| Adjustment | Sensitivity | 1...180.000 |
| | Damping | 0...10 s |
| | Switchpoint | 1...10 FlowSWITCH_01/02 |
| | Zero set | 4 mA, FlowSWITCH_GM20 |



# 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.

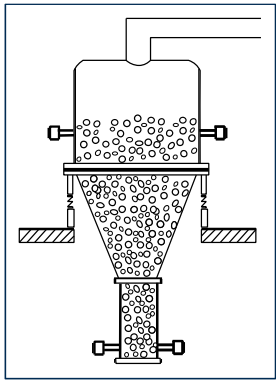
### Function

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.

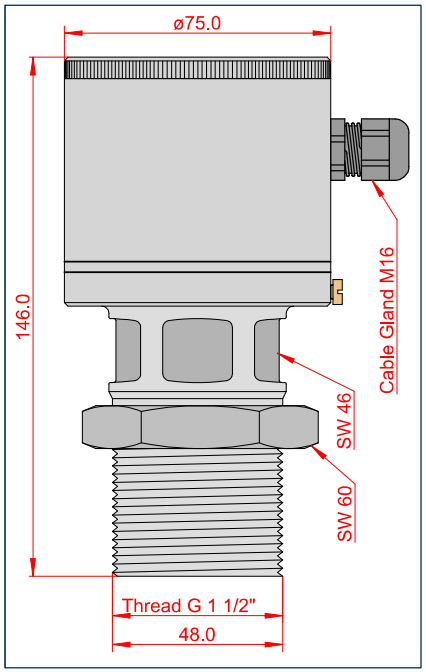
The installation can be carried out within silos, bunkers, pipe systems or at similar transport facilities.

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



### Technical Data

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

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