Litronic-FMS
Reliable Moisture Measuring System.
Liebherr-Mischtechnik GmbH is one of more than 130 companies of the international Liebherr group.

The product portfolio of measuring systems has been developed from the experience in mixing technology.

To guarantee a constant high quality and best results of produced concrete a reliable moisture measurement is most essential. This well-engineered and innovative system is used worldwide for a wide range of materials today.

60 years of worldwide experience

Horizontal concrete mixing plant type Mobilmix

Moisture measurement of sand in a concrete mixing plant
Sensor production

Since 1985 Liebherr develops, produces and distributes efficient moisture measurement systems for the industrial automation around the world. At the Liebherr factory in Bad Schussenried the sensors are produced and calibrated in an ESD-protected production line. Each sensor will be tested separately in a several hour process across the entire working temperature range before leaving the factory.

Development

Sensor development at Liebherr includes the total R&D value chain from the physical idea to the final solution, from the first concept to the finished product.

The competent electronic development and the experience from the field of construction machines under extreme conditions guarantee a very high reliability and a long life time of the sensors.

During the development phase FEM-simulations allow accurate statements about the future characteristics of the sensors.
System overview

An autonomous stand-alone-system with almost unlimited possibilities. Highest quality and best results during process are guaranteed by the exact material moisture measurement. The Litronic-FMS will meet your requirements in any case. An easy-to-use PC software enables a fast and exact calibration.

Features:
- Modular expandable construction
- Fully reproducible sensors
- Adjustable measuring range
- Material curves change over
- Material temperature compensation
- Suitable for high material flow
- Interference-free digital signal transmission
- Installation of electronic components on DIN mounting rail (TS-35)
- Suitable for batch and continuous processes
Litronic-FMS
interchange and evaluation unit

- Up to 16 sensors
- Digital inputs for start/stop control and material curves change over
- Analogue output
  - 0-10 V 12 bit or 0/4-20 mA 12 bit
- Bluetooth
- RS-232
- Ethernet

- PROFIBUS DP
- Sensor bus RS-485

[Images of sensors and wiring diagram]
Application examples

Sensor installed in material chute under silo outlet

For sand and other aggregates

In sliding shoe for cullet (recycling glass)

Food compliant execution e.g. for margarine

Sensor P30 for small and space limited plants, e.g. for powder and fine aggregates

Fleece-, film- and felt webs

For wooden chips, sawdust, etc.

View in a bulk funnel with installed sensor

In the paper and cardboard industry

With DN 80 flange for diesel, oil and other emulsions
**Materials**

- Sand, quartz sand
- Recycling glass, soda
- Incineration and flue ash
- Ore, minerals
- Dust, slag
- Different aggregates
- Foundry sand
- Raw materials, filter cake
- Ceramic powder
- Coal, coke, charcoal
- Gypsum, talc
- Lime, loam, clay
- Mineral-, aluminium granules
- Fertilizer
- Diesel, biodiesel
- Oil, crude oil, hardening oil
- Wax, resin
- Margarine
- Carton and paper webs
- Fleece, plastic film, felt webs
- Plastic granules
- Shredded plastic
- Different pellets
- Colour pigments
- Washing powder, detergent
- Wood fibre, -slab, -chips
- Sawdust
- Cat litter
- Pet litter
- Silage
- Biomass
- Silica
- Coolant, lubricant
- Sludge
- Methyl, ethanol, acetone
- Grease
- Pet food (dry + liquid)
- Coarse grain, cereals, mash
- Food and luxury food
- Fruits, marc
- Seed, sugar beet pulp
- Corn, maize, malt
- Rice
- Sugar, salt
- Marzipan
- Coffee, cocoa
- Gelatine, -capsules
- Tobacco
- Lactose, cellulose
- Paint and colour
- Solvents
- Ceramic slurry
- ... 

**Installation places**

Silo outlets, material chutes, baffle plates, conveyor belts, transfer points, dryers, screw conveyor, pipes, tanks, ...

**Options and accessories**

Stainless steel housing for electronic module

Sensor with dust Ex-protection, zone 22

Funnel for fast moisture measurements in laboratories
### Sensor / Electronic module

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>0% - 100% F</td>
</tr>
<tr>
<td>Physical principle</td>
<td>Capacity determination with high-frequency leakage field</td>
</tr>
<tr>
<td>Field Frequency</td>
<td>20 MHz</td>
</tr>
<tr>
<td>Capacity resolution</td>
<td>$10^{-15}$ F</td>
</tr>
<tr>
<td>Cycle of up-date</td>
<td>32.64 ms</td>
</tr>
<tr>
<td>Sampling rate</td>
<td>$16 \times 10^6 - 25 \times 10^6$</td>
</tr>
<tr>
<td>Measuring precision max.</td>
<td>$\pm 0.05% F$ 1.)</td>
</tr>
<tr>
<td>Measured value transmission</td>
<td>RS-485, multiprocessor protocol</td>
</tr>
<tr>
<td>digital</td>
<td></td>
</tr>
<tr>
<td>Max. numbers of sensors</td>
<td>16 at bus</td>
</tr>
<tr>
<td>Max. cable length</td>
<td>1.2 km</td>
</tr>
<tr>
<td>Working-ambient temperature</td>
<td>0°C - 80°C (optional: 100°C)</td>
</tr>
<tr>
<td>Working temperature electronic</td>
<td>-20°C - 80°C</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP68</td>
</tr>
<tr>
<td>Wearing protection</td>
<td>ZrO$_2$Al$_2$O$_3$ / PEEK</td>
</tr>
<tr>
<td>Material shell / flange</td>
<td>V4A (1.4404)</td>
</tr>
</tbody>
</table>

1.) Representative according to the batch or the period of continuous operation with the corresponding evaluator Litronic-FMS, depending on ideal material, flowability and calibration according to the rules.

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For emulsions and powder & bulks in Ex areas up to zone 0 or 20 there are special WMS water content measurement sensors available. Further measurement products like our coating control measurement system you will find on www.liebherr.com category components/measuring technology.