Moisture probes for construction

The right moisture probe for every application



Moisture Sensor Experts

The broad range of applications for TRIME technology

History

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- IMKO Micromodultechnik GmbH has been founded in 1984 and focused ever since on top of the class + moisture measurement
- ✤ Based on TRIME-TDR technology, IMKO developed the first probes in the early 1990s
- → A few years later products for moisture measurement in the construction industry followed: individually tested, meeting the requirements on site, reliable, durable, exact
- ✤ IMKO became an independent subsidiary of the Endress + Hauser Group in October 2017
- → IMKO develops and produces precision measurement technology at its original location in Ettlingen: Made in Germany















The SONO probe technology

Time Domain Reflectometry (TDR) is a radar-based dielectric measurement technique that uses the transit time of electromagnetic pulses to measure dielectric constants or water content.

The SONO probe as a moisture tomograph

The guided radar wave (indicated in green) propagates at close to the speed of light. The probe measures the bulk material layer by layer along the sensor surface in the shape of disks. With this patented measuring method (TRIME TDR measuring method), the transit time of this pulse is measured with a resolution of one picosecond.

Advantages of the technology and the design concept

- The measuring distance remains unchanged due to abrasion on the probe surface and therefore the measurement quality and accuracy are not affected by wear in challenging environments
- The defined measuring field produces exact measurements with minimal material coverage and allows increased flexibility in mechanical integration





SONO process moisture probes for construction

Characteristics for SONO probes

IMKO moisture probes

- Increase your system safety
- Save time and resources with fast measurement results
- Measure any aggregate thanks to innovative sensor technologies
- Developed for construction industry applications, they are characterized by their durability, reliability and accuracy

The IMKO probes are differentiated - per group - in resolution and measuring range. The higher the conductivity range of a probe, the lower the resolution and accuracy.

The following illustration provides an overview of the application for the three IMKO sensor families for construction. The IMKO application team will be pleased to provide you with advice.



ologies e characterized by their durability, reliability and

SONO process moisture probes for construction

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Mobile measurement in sand and gravel

Ensure quality on delivery



- + Verification of the agreed maximum moisture content on delivery, in real time and without a laboratory
- Lowest maintenance requirements and high reliability, as the TDR technology is robust, independent of wear and tear and consequently stable in the long run
- + Reliable measurement of sand, gravel and crushed stones up to 32 mm in size as well as expanded clay
- + Aggregates that are not measured in the process, can be measured quick and simple and considered for the respective recipe
- ✤ Calibrations for all common aggregates are pre-installed
- Individual adjustment to your own materials is an option
- Data acquisition and advanced parameterization with a PC via optional accessories



Mobile moisture measuring system for sand, gravel, crushed stone and other materials

Description





Case

for various probes: SONO M1

- SONO M1C
- SONO M2

SONO M1

sand

- gravel
- crushed stones
- expanded clay With integrated TDR electronics

rod length

SONO M1C

- clay sand ٠
- iron oxide
- fly ash blast furnace slag
- lime lignite coal

Probe with integrated TDR electronics and 64 mm probe diameter and coated rods with 100 mm rod length

SONO M2

- gravel

• crushed stones For deeper penetration into the pile of material With integrated TDR electronics

Telescopic extension for SONO M2 Telescopic extension up to 2 meters





Complete measuring case HD2 with SONO M1

The set includes: • HD2 mobile display • SONO M1 moisture probe • Plug-in power supply (12 V / 2 A)

Ruggedized battery-operated mobile display unit

Mobile moisture probe for:

Probe diameter 64 mm and uncoated rods with 130 mm

Mobile moisture probe for conductive materials such as:

Slimline mobile moisture probe for:



- No change in measuring accuracy due to wear on the probe surface ٠
- + High reliability, as the TDR technology is long-term stable and robust
- ✤ Wear and tear does not require recalibration
- Reliable measurement of sand, gravel and crushed stones up to 32 mm and other aggregates such as expanded clay
- ✤ Easy commissioning
- Calibrations for all standard aggregates are pre-installed
- Customization to your own materials is also possible
- Simple parameterization and calibration with optional accessories (such as SONO VIEW)







Inline moisture measurement system for sand, gravel, crushed stones and other materials



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Description

SONO VARIO Xtrem

sand

gravel

• coarse gravel • crushed stones

in special ceramic

SONO SILO Standard

sand

• gravel up to 8 mm grain size With integrated TDR electronics

SONO SILO Xtrem

- sand gravel
- coarse gravel

crushed stones

in special ceramic

SONO VIEW

- Stand-alone display

 $0 - 4 \, \text{mm}$

14.7 13.3 14.2 10.8

SONO'-VIEW





SONO VARIO Standard

Inline moisture measurement for normal abrasive:

- gravel up to 8 mm grain size
- With integrated TDR electronics

Stainless steel probe head with rectangular ceramic window

Inline moisture measurement for:

- Highly abrasive materials such as:
- With integrated TDR electronics
- Replaceable probe head in hardened steel with rectangular window

Inline moisture probe for normal abrasive:

- Replaceable probe head made of stainless steel with rectangular
- ceramic window

Inline moisture measurement for:

- Highly abrasive materials such as:
- With integrated TDR electronics
- Replaceable probe head in hardened steel with rectangular window
- Visualization for up to 16 probes
- Tool for parameterizing the probes
- Optional interface converter to PC via free software

Moisture measurement for gravel and crushed stones: 4 – 32 mm



SONO probes in challenging applications

Intuitive integration

- The electrical integration of SONO sensors is identical to other measuring systems
- Power is supplied by system voltage
- Analog output signal 0 20 mA, 4 20 mA or 0 10 V
 Digital output signal via serial interface (RS 485) and IMP bus

Probe head with special features

- Design guarantees long-term stability of measurement regardless of wear
- Measurement technology is not sensitive to variations in the grading curve
 Measuring conductor is located between two ceramic plates and is in direct contact with the material to be measured
- Maximum sensitivity of the probe due to this direct contact with the material
- No measurement through the ceramic cover
- Measuring geometry does not change over time





TRIME - Technology

MKOV







Online moisture measurement in the mixer

Quality control, directly in the mixer and in real time

- Mixing Turning raw materials into concrete
- ✤ No change in measuring accuracy due to wear on the probe surface
- Reliable measurement for all standard concretes, regardless of their consistency
- + High reliability, as the TDR technology is long-term stable and robust
- Wear and tear does not require recalibration
- Suitable for all mixer types, such as planetary mixers, intensive or twin-shaft mixers
- Easy commissioning
- With replaceable probe head (cost efficient)
- Simple parameterization and calibration with optional accessories (such as SONO VIEW)

Installation in the base plate of the mixer



Description

SONO MIX



- intensive mixers
- planetary mixers •
- twin-shaft mixers





Installation in the scraper of the mixer

SONO'-VIEW



- Toughest inline moisture sensor for use in:
- With integrated TDR electronics
- Probe head made of steel with a solid carbide steel insert and a rectangular special ceramic window

SONO MIX Mini HC

- Very compact inline moisture probe with low space requirement, suitable for:
- Installation in the scraper of the intensive mixer • Installation in the laboratory mixer With integrated TDR electronics

SONO VIEW

- Stand-alone display
- Visualization for up to 16 probes
- Tool for parameterizing the probes

Mobile moisture measurement in ready-mix concrete

• No change in measuring accuracy due to wear on the probe surface

Simple measurement in the shortest possible time and without laboratory equipment

✤ Fast measurement result (measured value before the truck mixer has fully unloaded)

Optional wireless interfaces are available to simplify the use and transmission of measurement data from

Reliable measurement results for all standard concretes

Quality control and consistency all the way from the concrete plant to the construction site



Quality control of the fresh concrete by the manufacturer, testing laboratory or customer



Mobile moisture measurement in ready mix concrete











moisture probes Robust weatherproof aluminum housing IP67

SONO WZ

Complete measuring case SONO DIS with SONO WZ

The set includes:

- SONO DIS mobile display
- SONO WZ moisture probe
- Case













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the SONO WZ





IMKO CONNECT

- Moisture measurement client application for IMKO probes
- Connect your phone to a compatible probe and turn your mobile device

SONO WZ CONNECT

- Robust and highly accurate mobile probe for measuring water content and conductivity in ready-mix concrete
- Integrated Bluetooth wireless solution to connect with a smartphone (IMKO CONNECT required)

Ruggedized mobile display unit for SONO WZ and SONO M1/M2

- Robust and highly accurate mobile probe for measuring water content and conductivity in ready-mix concrete
- With integrated TDR electronics, Stainless steel probe head with rectangular special ceramic window

• Plug-in power supply (12 V / 2 A)



Sensor connectivity by intelligent device communication

SONO probes allow easy and user-friendly sensor networking

SONO probes are typically connected to the Programmable Logic Controller (PLC) via analog interface (0-20 mA, 4-20 mA or 0-10 V) as with all other moisture probes. The SONO probes have 15 typical product calibrations as standard (e.g. aggregates, sand, gravel, crushed stones).

SONO CONNECT as a wireless interface or SONO VIEW as a wired display are used for parameterization and initial commissioning of the probe. The devices can be used to select, change or create calibrations and display the probe's measurements directly. SONO CONNECT also offers the option of transmitting readings wirelessly, recording and analysing data, which makes the parameterization of new aggregates in particularly easy.



Alternatively, our SONO probes can be connected over long cable lengths using the very robust IMP bus. This requires a display unit (SONO VIEW). Alternatively, a connection via a serial interface is feasible (RS 485), for which you might want to consult one of our experts.

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