ATEX-Products

ATEX Guideline 2014/34/EU| II 2 D Ex tb IIIC T75°C Db conformable EPS 20 ATEX 1 237 X

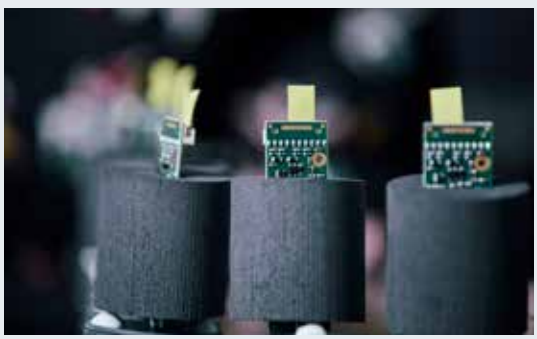
The right moisture sensor
for every application

Moisture Sensor Experts

IMKO

History

- Founded in 1984 as an engineering company, IMKO GmbH has been working on moisture measurement for over 30 years now.
- Based on the unique TRIME-TDR technology, IMKO experts developed sensors for science and meteorology in the early 90s. A few years later, the product range was extended with solutions for measuring moisture in grain, primarily for applications in the agricultural sector.
- Since the introduction of the SONO series in 2010, IMKO GmbH now offers a product portfolio that enables moisture measurement in any material, even for detection of just a few drops of water in solids, for example.
- Today, we are an innovative and motivated team of around 20 employees and, since October 2017, we have been a subsidiary of the Endress+Hauser Group. IMKO GmbH continues to develop and produce products with the "Made in Germany" quality mark at its original location in Ettlingen.



IMKO – Application fields

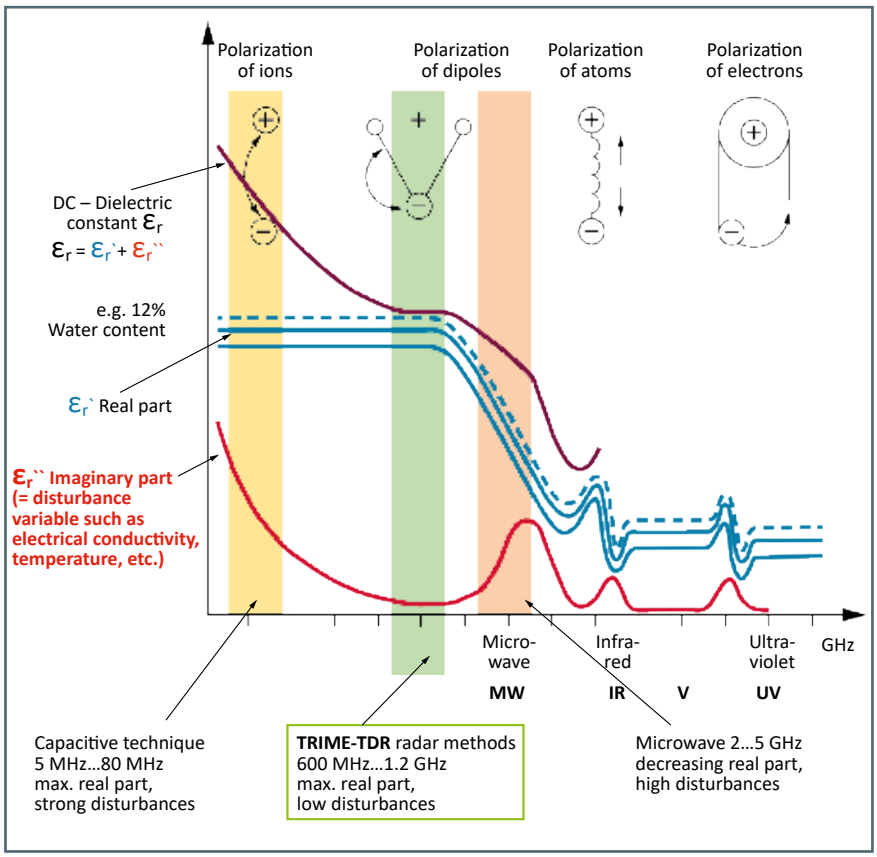
Bulk solids

Concrete

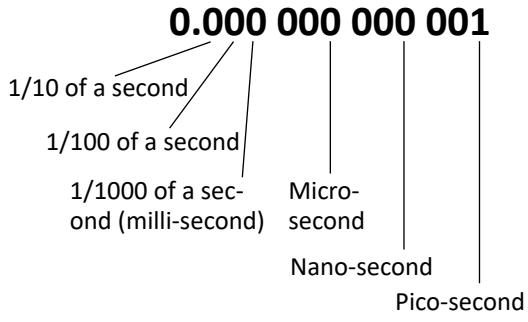
Soil

The IMKO TRIME-TDR measurement method

The sensors developed by IMKO are based on measurement with **Time Domain Reflectometry**, or TDR for short.
In principle, this measurement method is suitable for a range of applications, such as cable break detection or even measurement of fill levels.
When applied specifically for measuring moisture in bulk solids and liquids, the physical effect is used, which correlates the propagation speed of electromagnetic waves with the dielectric properties of the material to be measured.
Since water has a significantly higher dielectric constant than the materials to be measured, such as sand, grain or even oil, it is possible to determine the water content with a high degree of accuracy.

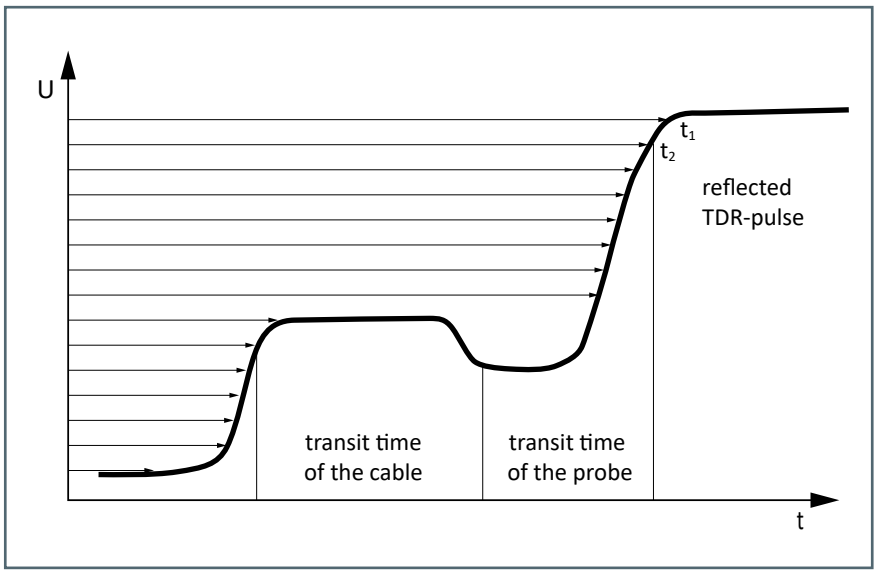


Time resolution of the IMKO sensor technology

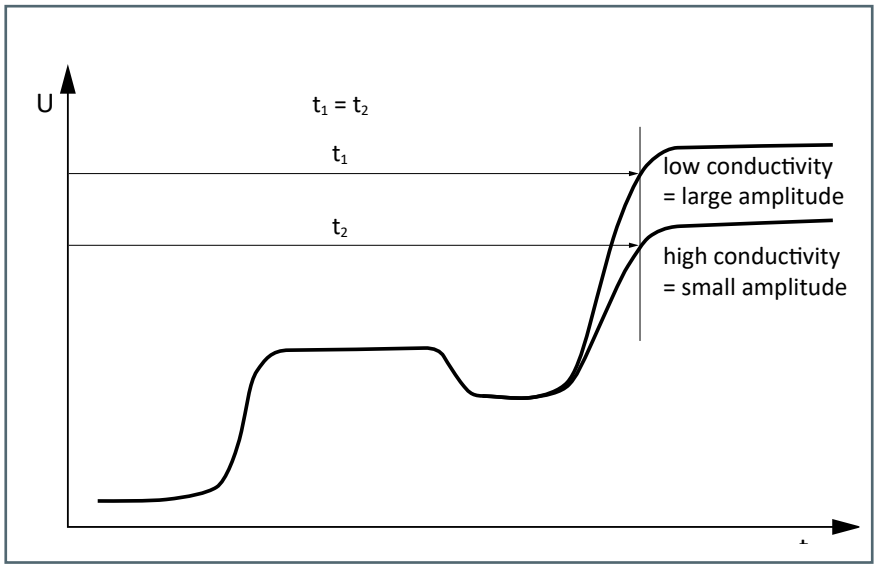


TDR measurement with the patented TRIME method

Implementing a TDR measurement is usually associated with significant technical effort. Very accurate pulses must be generated and the measurement requires the utmost in precision. Therefore, for a long time, TDR technology remained a laboratory measurement method kept back for science. Measuring devices based on TDR were not only very expensive, but also large and unsuitable for field use.
The TDR technology optimized by IMKO specifically for material moisture measurement, the **TRIME method** (**T**ime Domain **R**eflectometry with **I**ntelligent **M**icromodule **E**lements), is a robust measurement technology, which enables a compact and industry-compatible design with a very good price/performance ratio.



One of the biggest interference influences in all kinds of moisture measurement is the electrical conductivity of the medium to be measured. Electrical conductivity influences the measurement result. Even in tap water, the mineral content fluctuates over the year by up to 50% compared to the annual average. TDR technology is very robust as far as the electrical conductivity of the medium is concerned too. Intelligent signal analysis compensates for this disturbance variable and, if necessary, the analyzed signal can even be used to record the enrichment or discharge of minerals.



TRIME®-TDR – Winner of multiple awards
Innovation awards, such as the Bauma Innovation Award 2016 and DLG Approved certification from the German Agricultural Society (DLG – 2018), show how successful the high-tech potential of TRIME-TDR technology has proven in practice. Countless industrial and scientific projects have demonstrated the advantages of TRIME technology.

GEWINNER DES: bauma Innovationspreis 2016

ANERKANNT 2018 DLG IMKO TRIME GWS ✓ Messgenauigkeit Weizen ✓ Messgenauigkeit Gerste ✓ Messgenauigkeit Raps DLG-Prüfbericht 6936

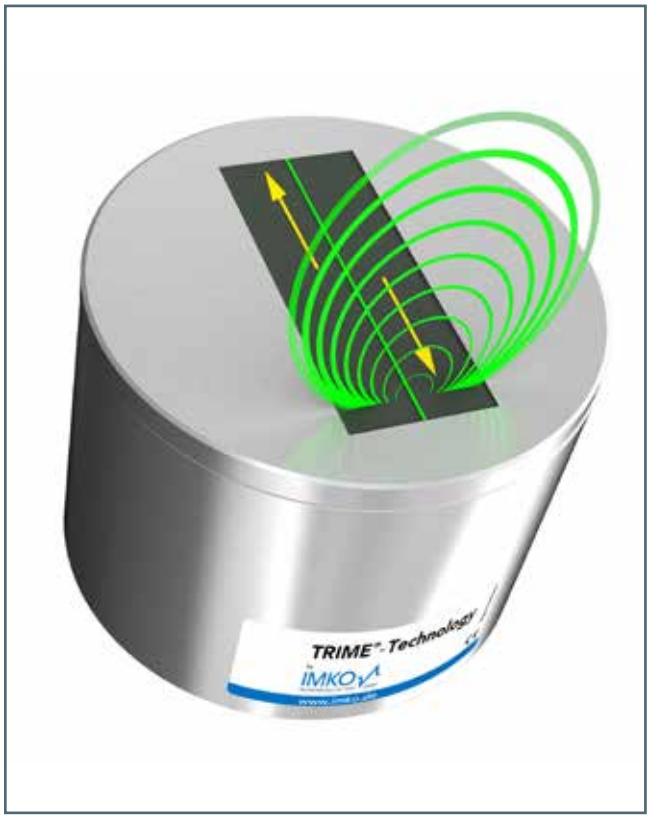
The SONO probe as a "moisture tomograph"

The guided radar wave (in green) propagates at approximately the speed of light. The sensor measures the material layer by layer discoidally and transverse to the sensor surface, as is familiar from a computer tomograph, for example.

This method results in a sensor with an exactly defined measurement field, which can measure without errors even in the event of fluctuating fines or varying grain size. By measuring transverse to the sensor surface, the mechanical condition of the sensor surface does not represent a disturbance variable, i.e. the recurring and unavoidable wear of the sensor surface does not falsify the measured value.

The defined measurement field also enables accurate measurement for applications in which the material coverage is too low or fluctuates. This results in a high degree of flexibility in terms of mechanical integration in the application.

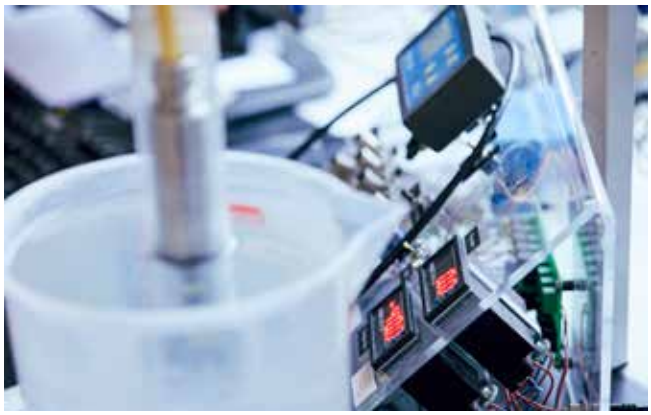
The IMKO sensor portfolio allows you to choose a suitable sensor design, enabling you to find the ideal solution for your application, always taking into account the framework conditions, such as moisture range, electrical conductivity, wear and mechanical installation.



SONO process moisture probes for the bulk solids industry

Increase your plant safety and save time and resources through innovative sensor technologies

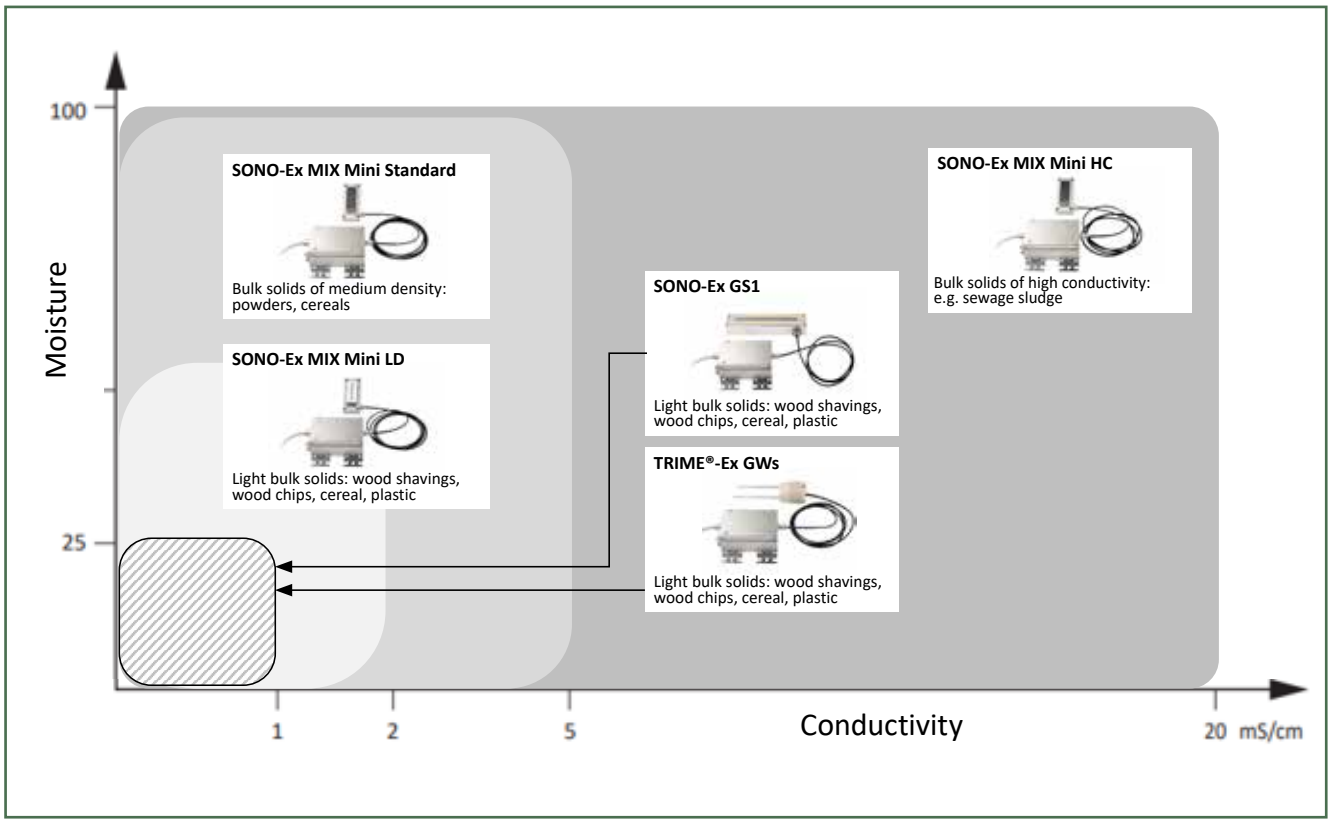
All foodstuffs and bulk solids contain a proportion of water. The moisture content not only determines the quality of products, but also their shelf life and due to the weight, their price. Legal requirements lay down the framework. With material moisture measurement, you can determine the water content in your foodstuffs and bulk solids. IMKO is presenting a new generation of moisture probes in the form of its SONO probes. These were specifically developed for applications in food manufacturing and the construction industry, as well as the chemical and pharmaceutical industries, but can be used in other industries too.



ATEX sensor applications

Depending on the group, IMKO sensors differ in resolution and measuring range. The higher the conductivity range of a sensor, the lower the resolution performance characteristics.

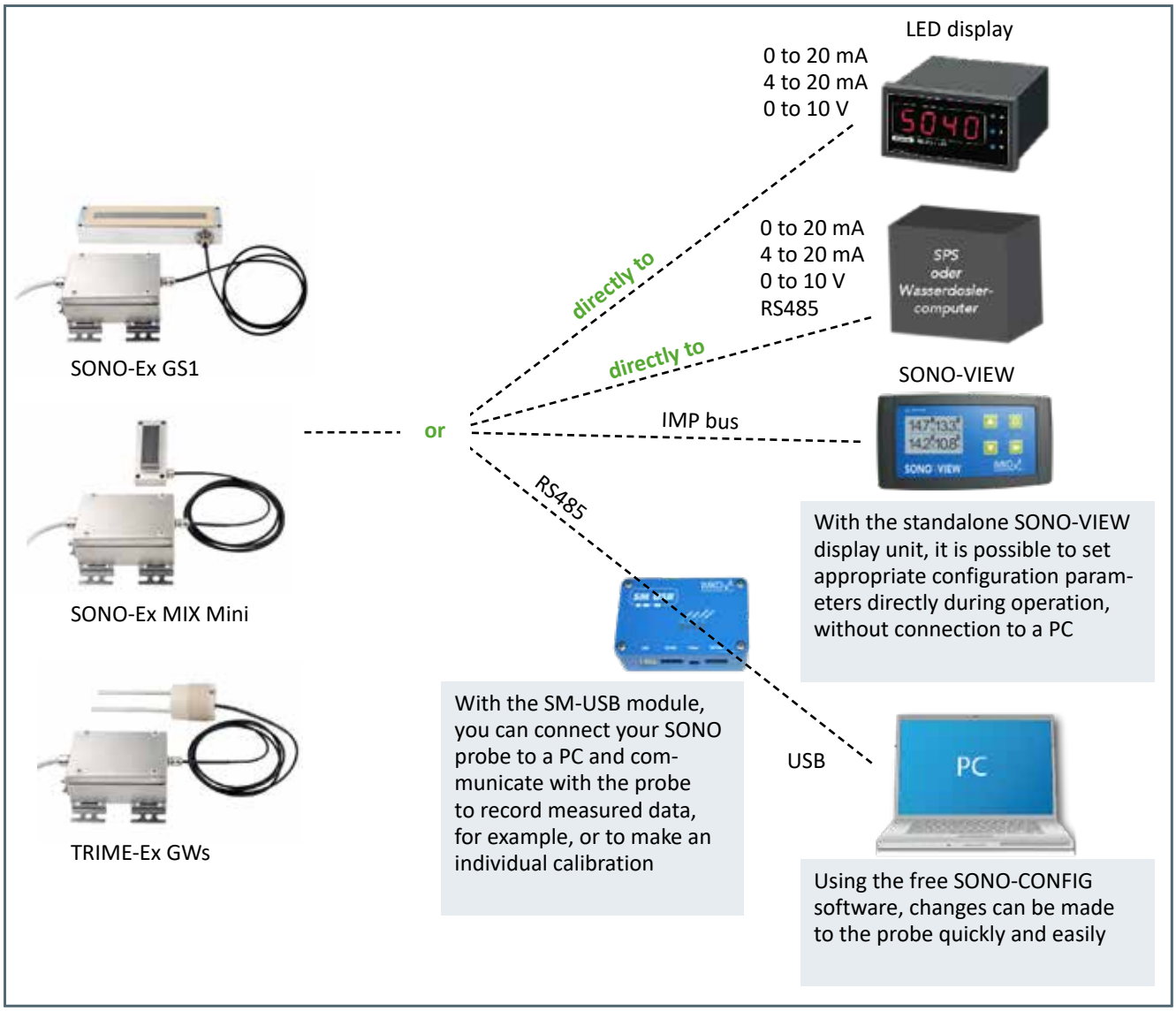
Use the following diagram to help you chose your IMKO ATEX sensor. The IMKO application team would also be pleased to provide assistance anytime.



Predictive sensor networking through intelligent device communication

SONO-Ex Probes enable easy and user-friendly sensor networking

Standard RS485 interfaces often pose significant challenges. They are not galvanically isolated and there is always the risk of ground loops or interference pulses, which can result in significant safety problems. For long cable lengths in particular, a shielded and twisted cable must be used. Depending on the wiring plan (topology), a 100 Ohm terminating resistor must be installed at sensitive locations in the RS485 network when there are individual spurs. In practice, this means significant effort for the plant operator. With SONO-VIEW, up to four SONO probes can be connected via the SONO-internal IMP bus. The robust IMP bus guarantees safety.



Predictive sensor networking through intelligent device communication ensures smooth processes in the application. The IMP bus does not transmit its data packets as voltage pulses, but as current pulses. Thus, the process works even with long cable lengths on existing and already laid lines. A shielded cable is not required and even spurs in wide-ranging network topologies are not a problem.

Application field for SONO-Ex MIX Mini probes

SONO-Ex MIX Mini series enables:

- Direct moisture measurement in the material, even at hard-to-reach areas of your process
- Continuous recording and monitoring of moisture content and temperature
- Improved and more accurate process control during all steps
- Improved process stability and thus lower product losses (over-drying: structural loss; under-drying: moulding)
- Cost savings by improved energy efficiency (due to less overdrying)

SONO-Ex MIX Mini HC

The SONO-Ex MIX Mini HC is the ideal humidity probe for determination of material moisture in more compact bulk materials under particularly tricky conditions such as high conductivity (High Conductivity) and narrow installation spaces. Its measuring field geometry has been specially designed for the determination of high water contents of up to 100% vol. water content and high electrical conductivities (up to.. 20 mS/cm)
A typical application of the probes is maintained at bulk densities of approx. 1.0 to 3.0 kg/dm³.

SONO-Ex MIX Mini Standard

The SONO-Ex MIX Mini standard provides the best solution to determine material moisture in medium bulk densities and narrow installation spaces. Bulk materials up to 5mS/cm can be determined at even high water contents of up to 100% vol. water content.

SONO-Ex MIX Mini LD

The SONO-Ex MIX Mini LD has been specially designed to determine material moisture in light bulk materials. Its measuring field is larger than that of the SONO-Ex MIX Mini Standard and HC, thus the accuracy grows with the dimension of the measuring field. The measuring range of the probe ranges up to 50% water content in environments of up to 2mS/cm electrical conductivity. The typical bulk densities are in a range of 0.3 to 1.0 kg/dm³ for this application.

Installation example screw conveyor drying and processing

SONO-Ex MIX Mini LD

The SONO-Ex MIX Mini LD has been specially designed to detect the material moisture in light bulk materials such as grass-pellets. The self-cleaning application in a screw conveyor providing constant material densities permanently delivers an ideal determination of material moisture at highest levels of accuracy.

Drying of pellets, exemplary installation situation SONO-Ex MIX Mini LD

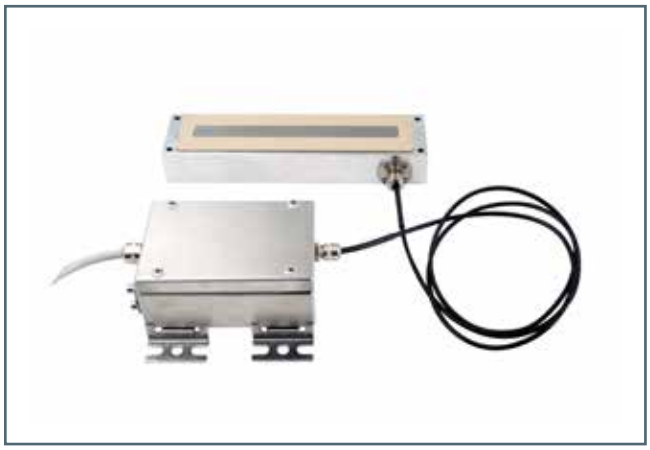
Installation example in sawdust and wood chips/wood pellets, powders, flours, dusts

Using SONO-Ex GS1 enables:

- Direct moisture measurement in the material, even at hard-to-reach places
- Continuous recording and monitoring of moisture content and temperature
- Improved and more accurate process control during all work processes
- Increased process stability and thus lower scrap rates
- Cost savings due to increased energy efficiency (due to less over-drying)

Drying bulk solids in belt dryers

When drying bulk solids with belt dryers, an air-permeable belt is filled with the product to be dried. The height of the bulk solids on the belt and the dwell time in the dryer are defined based on the product type and properties, and the water volume to be removed. By adjusting the dwell time to the mean value, it is possible to compensate for a varying moisture content. This is necessary in the production of wood pellets, for example, because the quality is no longer guaranteed if the material is excessively dry, and operating times are put at risk if the material is too moist, provided the compactor closes.



Overdrying or underdrying costs financial resources

In the past, belt dryers were often controlled manually, or by means of laborious offline sampling. This is not only time-consuming, but also results in a significant lack of process precision, as it is not possible to compensate for any inhomogeneity. In addition, the sampling is implemented as a snapshot, which in practice can result in significant inaccuracies if, for example, a sample is drawn from a non-representative state (wet-pocket). Due to a lack of alternatives, a wide range of control versions have been developed over the years, either based on thermal balance or air humidity, but these methods are all indirect and depend both on the local climate and on the current weather.

SONO-Ex GS1 – monitors the water content and optimizes your process control.

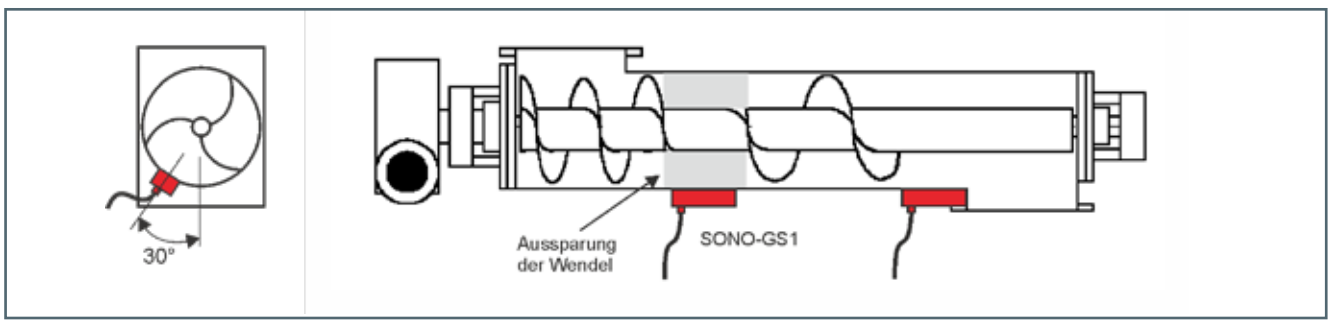
With the SONO-Ex GS1 probe, you can measure the product moisture directly in the material flow and the measurement is ideal for determining the input moisture in the inlet to the dryer or the output moisture at the dryer discharge. Measurement in the dryer or on the belt is not recommended, as the material does not dry homogeneously during the drying process and since this inhomogeneity varies over the dwell time, this would falsify a measurement. Therefore, measurement should be taken at the discharge point, after mixing the product, e.g. at the end of the discharge screw.

Installation example screw conveyor in goods with a particularly low density

SONO-Ex GS1

The SONO-Ex GS1 with its particularly large measuring field was specially designed to detect the material moisture of bulk materials with very low density. The self-cleaning application under constant material densities permanently ensures an optimal determination of highly accurate measuring values. Also the measurement of flours, dusts and pigments is an ideal application field for the SONO-Ex GS1.

If the SONO-Ex GS1 probe is installed along the screw conveyor on the discharge, an installation angle of 30° is recommended (see sketch) since this allows an optimized material flow at the sensor surface. Optionally, the spiral can be (partially) omitted, so that a buffer of material on top of the sensor is maintained. This helps eliminating inconsistent material flow, too.



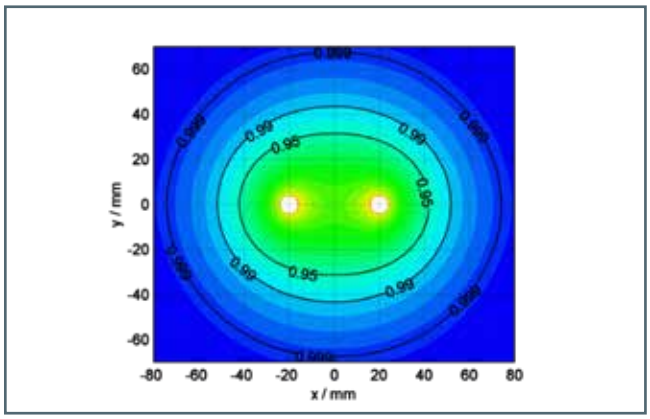
Installation example grain drying

Using TRIME®-Ex GWs enables:

- eine direkte Feuchtemessung im Material an schwer zugänglichen Orten
- die kontinuierliche Erfassung und Überwachung von Feuchtegehalt, Temperatur und Leitfähigkeit
- eine verbesserte und genauere Prozesskontrolle bei sämtlichen Arbeitsgängen
- eine verbesserte Prozessstabilität bei sämtlichen Arbeitsgängen
- somit geringere Warenverluste durch (Über- / Untertrocknung)
- Kosteneinsparungen durch eine verbesserte Energieeffizienz

Drying of bulk solids in vertical dryers

When grain is harvested, it usually contains excess water. If the grain is stored in a silo, this excess water would cause mold to form immediately, resulting in the total loss of the product. Therefore, all common grain types are dried before being stored in a silo, usually using a vertical dryer with product passing through it once (continuous dryer). The input moisture is measured to determine the water quantity to be removed, and the dwell time or throughput rate is controlled based on the known dryer performance. This not only ensures that the product does not go moldy later in the silo, but also that you are not wasting energy unnecessarily by overdrying the product.



The figure shows the measurement field of the standard GR probe. The broad distribution of the measurement field up to 95% (green area) ensures optimal measurement results.

Overdrying or underdrying costs financial resources

Manually controlled dryers are hard to monitor. They can achieve inaccurate results, which mean financial losses due to time-consuming sampling, excessively moist or dry product or cost-intensive follow-up treatment. For the first time, the innovative TRIME® TDR method enables accurate, continuous measurements directly in the drying process at temperatures of up to 120°C (248°F) and regardless of the type and composition of the product to be dried, such as corn, cereals, oil seeds, animal food and other granules.

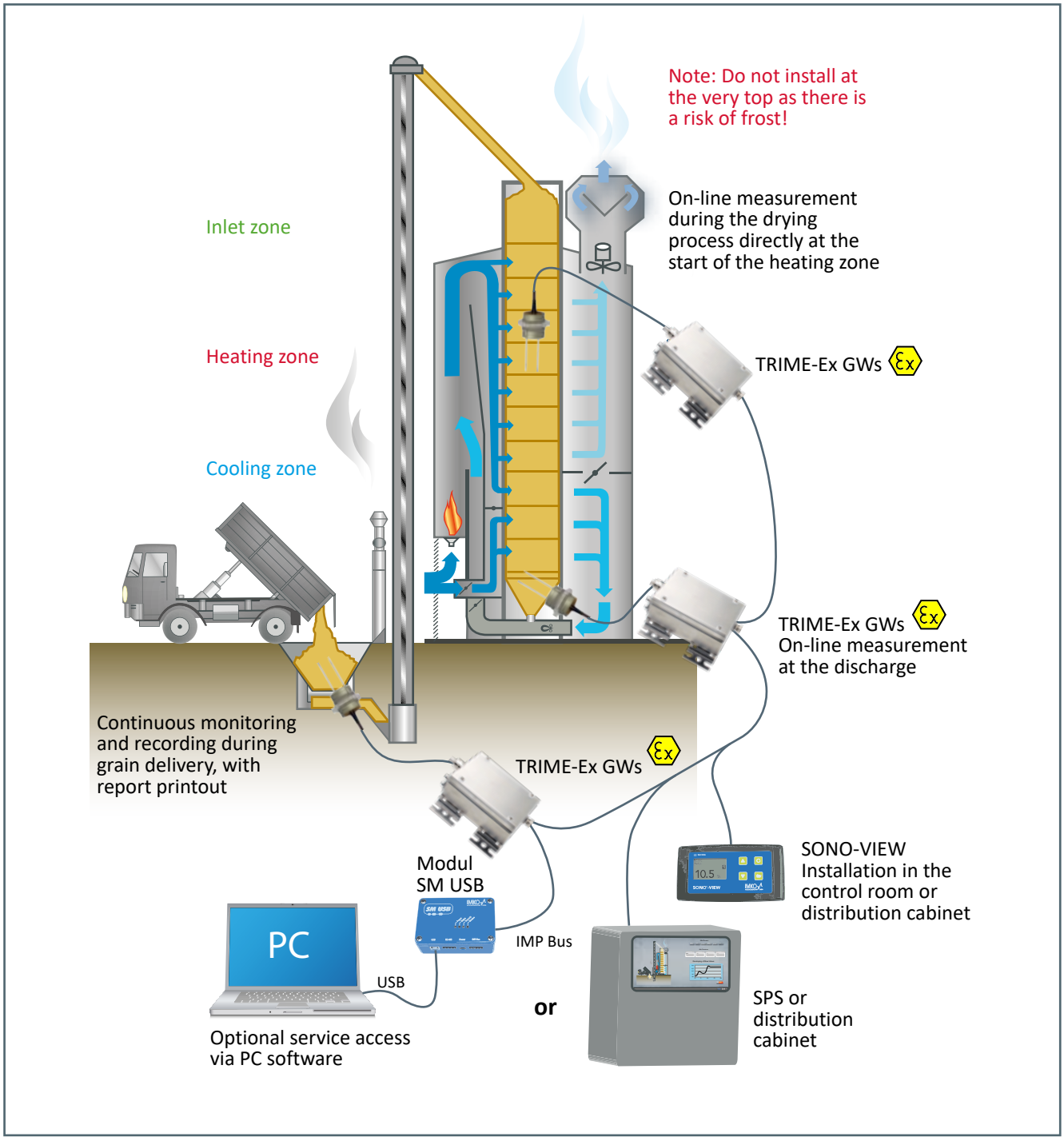
TRIME GR probe with electromagnetic field

TRIME-Ex GWs (…) monitors water content and optimizes your process control

With TRIME-Ex GWs, you can monitor the product moisture directly, even during the drying process, without taking samples. There is therefore no longer any need for indirect measuring methods, such as via the exhaust air humidity or the temperature. TRIME® GWs directly measures the water content of the product to be dried regardless of the type, temperature or mineral content of the medium. This means you can continuously monitor the water content of the product to be dried, and optimize your process control.

Use of TRIME® probes in malt

Installation example for a continuous dryer



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