



**PRODUCT OVERVIEW
LEVEL MEASUREMENT TECHNOLOGY**

INTELLIGENT. ROBUST. AT HOME EVERYWHERE.

Automation Is Our World. A Perfect Application Solution Is

A willingness to take entrepreneurial risks, a pioneering spirit, and a firm belief in their own inventive powers – these were the assets that Walter Pepperl and Ludwig Fuchs started out with when they opened their Mannheim radio repair shop in 1945. Their invention of the proximity switch a few years later proved their strength. It was also the starting point in a successful history defined by close customer relationships as well as innovative automation technologies and procedures.

Then as now, our focus is directed squarely on the individual requirements of each customer. Whether as a pioneer in electrical explosion protection or as a leading innovator of highly efficient sensors, close communication with our customers is what allowed us to become the leader in automation technology. Our main objective is combining state-of-the-art technologies and comprehensive services to optimize our customers' processes and applications.

For more information, please visit our website: www.pepperl-fuchs.com





Our Goal.

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Accurate, Robust, Reliable. And

Whether you work in the oil and gas industry, for pharmaceutical and chemical companies, or in water and wastewater engineering: level measurement technology must meet crucial requirements to ensure the error-free operation of modern process plants. These requirements include reliably monitoring limit levels and supplying accurate data on fill levels and consumption. The level measurement products from Pepperl+Fuchs offer these features – and much more. The wide range of measurement techniques and materials means our products can be used in virtually any application and industry. Worldwide.

At Home No Matter What the Environment

Tanks, silos, and portable containers are used to store bulk goods as well as pastes and liquids. Our products monitor fill levels using simple limit switches that offer reliable protection against overfills and running dry, or with more complex technology that continuously provides accurate level data to ensure the best possible process.

Reliable and Powerful

Only intelligent and reliable level measurement technology guarantees an efficient and trouble-free process. Pepperl+Fuchs offers high-performance products for the most diverse measurement tasks. The devices are precise, self-monitoring, and extremely robust. Measuring technologies are available that fulfill all requirements and ensure maximum process reliability.



Endlessly Versatile.

Suitable for All Requirements

When it comes to measurement principle, configuration, material, and coating, Pepperl+Fuchs' level measurement devices are available in a wide variety of designs. This variety allows tailor-made solutions that can be used universally, regardless of media, even under the toughest measurement conditions – anywhere in the world. The devices are equipped with standard process connections and meet the technical requirements of major national and international standards. Most are suitable for use in hazardous areas and have ATEX, FM, CSA, IECEx, SIL, or WHG approvals.

A Match for Any Task

Variations in temperature, high pressure, turbulence, dust, and foam are just a small sample of the demands placed on modern level measurement technology in day-to-day operation. The toughest process conditions and the specific composition of the media must not affect the measurement result. Pepperl+Fuchs provides measurement technology for virtually every application requirement, from simple floats to ultrasonic sensors. In a nutshell: the right solution for every requirement.



Limit Level or Continuous. Two Measuring Methods, a Host

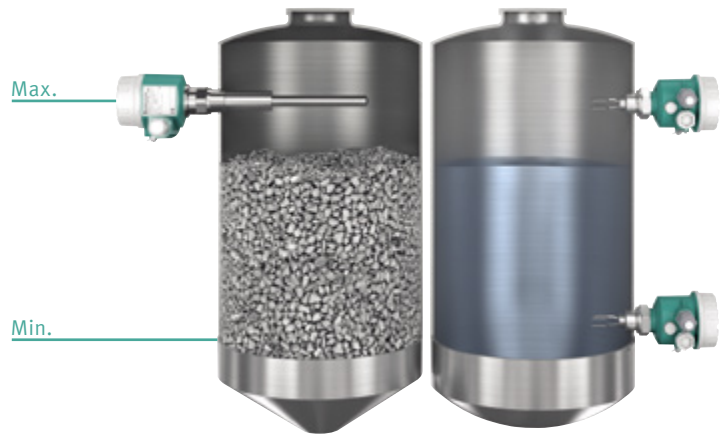
Whether you need continuous measurement data on the fill level or you want to monitor a medium with limit level measurement, it is clearly a question of method. Pepperl+Fuchs supports you by offering measurement technology that is tailored specifically to your needs.

Reliable Monitoring: Limit Level Measurement

Limit level measurement is used to ensure that monitored media neither exceed nor fall below a specified level. This form of measurement can prevent overflow in containers or pumps from running dry. The essential function of level sensors is to measure data quickly and reliably.

Application Examples:

- Overflow safety device
- Minimum/maximum controls
- Overflow and dry-run protection



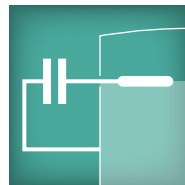
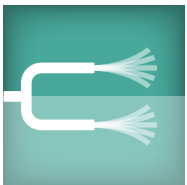
Limit Level Measurement

SOLID

- Vibracon S
- Capacitive limit value switches

LIQUID

- Vibracon
- Conductive electrodes
- Magnetic immersion probes
- Float switches



Vibration

Vibration level measurement is a proven method for recording the limit level in liquids and bulk goods. A tuning-fork sensor oscillates by means of a piezoelectric charge. When the sensor comes into contact with the product as it rises, the frequency of the oscillations changes. The evaluation electronics then convert this change into a switching signal.

Vibracon S see page 14
Vibracon see page 16

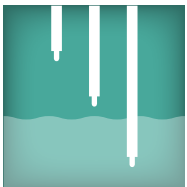
Capacitive

Capacitive limit switches provide a simple method for limit level detection in light bulk goods. A rod or cable probe forms a capacitor together with the tank wall. As the quantity of product changes, so too does the capacity of the capacitor. A full tank has a high capacity; a tank that is emptying has a lower capacity that corresponds with the rate at which it is emptying. This change in capacity is measured and used to calculate the fill level.

Capacitive limit value switches see page 14

Choosing the Right Technology for

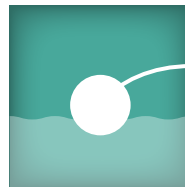
Pressure, vibration, ultrasound, float – the range of measuring methods is extensive. Choosing the right technology depends entirely on your specific requirements: Are you monitoring bulk goods or liquids? Do you have abrasive or corrosive media? The range of products available from Pepperl+Fuchs provides the perfect method for all measurement tasks.



Conductive

This method is suitable for recording limit levels in all conductive fluids. To record the limit level, electrodes are arranged at a specified fill limit. If the contents of a vessel reach this limit, the contact between the electrodes closes, and the closed circuit triggers a switching signal.

Conductive electrodes see page 16

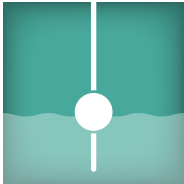


Float

Floats are suitable for providing a simple means of trip value detection in liquids. The float, complete with built-in switching element, is buoyant on the surface and is fixed at the level of the defined trip value. If this value is exceeded or not reached, the tilting motion triggers the switching process.

Float switches see page 18

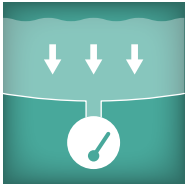
Your Measurement Application.



Guided Float

This method can be used for recording trip values as well as for providing continuous measurement. A magnetic float is guided by a sliding tube. If the built-in magnet rises or falls, it activates reed contacts integrated into the probe tube.

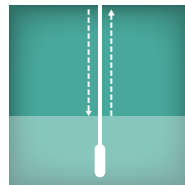
Magnetic immersion probes see page 21



Hydrostatic Pressure Measurement

Hydrostatic pressure measurement is a proven method of continuously determining the fill level of a product. This approach takes advantage of the fact that pressure in a liquid rises constantly as the fill level increases. A stainless steel membrane transfers the pressure of the measurement sample to the measurement cells and converts it into a fill level signal proportional to the amount.

Pressure transmitters see page 22
Level sensors see page 22



Ultrasound

Ultrasound is a contactless method of providing continuous level measurement. With this method, a measurement is taken of the time that elapses between an ultrasonic pulse being emitted and the echo reflected by the product surface being received. The run time can then be used to calculate the exact distance between the emitter and the surface to determine the fill level.

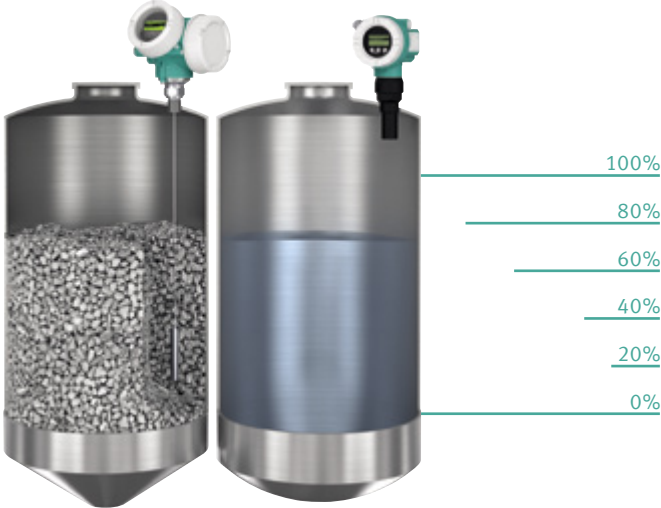
Guided Microwave

This method is based on the principle of measuring the run time of microwave pulses in liquids and bulk goods. This is accomplished by feeding a direct-current pulse through a probe rod or cable and reflecting it on the product surface. The measured run time of this pulse is used to calculate the level of the measurement medium.

Ultrasonic sensors see page 24

Pulscon see page 24

of Applications.



Always Up to Date: Continuous Measurement

With continuous measurement, the fill level of media is monitored at all times. The exact rate at which materials are consumed, information regarding balancing, and loss control – continuous level measurement provides a wealth of important information that makes accurate process control possible.

Application Examples:

- Consumption determination
- Stocking
- Loss control
- Storage capacity
- Balancing

Continuous Measurement

SOLID

- Ultrasonic sensors
- Pulscon

LIQUID

- Ultrasonic sensors
- Pulscon
- Magnetic immersion probes
- Level sensors
- Pressure transmitters



Our Products. For Your Applications.

Pepperl+Fuchs offers a wide range of robust, high-performance products. The vast choice of measurement techniques and materials means our sensors can be used in virtually any application and industry. Worldwide.



Extremely Resilient. Even with the Toughest Bulk Goo

Sugar or cement, coarse grains or powder – the requirements for measuring the limit level of solids are as diverse as they are demanding. And the range of level measurement technologies offered by Pepperl+Fuchs provides the optimum solution for each of these tasks.

Vibracon S – Solid Reliability

This stainless steel sensor is perfect for recording the limit level in powdery fine-grained or coarse-grained bulk goods. Even with low bulk weights, the fill level limit switch works with the highest level of accuracy – regardless of the dielectric constant and conductivity. What’s more, it’s resistant to abrasion, even when in contact with building materials. Plus, its resistance to buildup ensures reliable measurement with no maintenance.

- Compact or tube-extended insertion sensor
- Resistant to vibrations and flow noise
- No mechanically moving parts
- Design eliminates material buildup on the sensor
- No calibration required, rapid commissioning

SOLID

Measuring Type	Vibration
Main Application	Silos
Approval	ATEX, CSA, IECEx

Capacitive Limit Value Switch – Consistently Accurate

Capacitive limit value switches are a simple and inexpensive solution for detecting limit levels in light bulk material such as cereals, flour, milk powder, mixed feed, cement, chalk, or plaster. The sensors feature built-in active buildup compensation that ensures a precise switching point even in media that are highly prone to buildup. Depending on the application, the switches are available as rod or cable probes that can be shortened exactly in line with the measuring point.

- Robust mechanics
- Durable and maintenance-free
- Relay output with AC or DC current connection
- PNP output with three-wire DC current connection

SOLID

Measuring Type	Capacitive
Main Application	Silos
Approval	ATEX, CSA, FM, WHG

ds.



Always Reliable. Perfect Solutions, in Any Liquid.

Sensors that accurately record the fill level, even under extreme conditions, or cost-effective electrodes specially designed for use in conductive liquids – when it comes to measuring the limit level of liquid media, Pepperl+Fuchs offers more than just one solution for obtaining the required results.

Vibracon – Universally Applicable

Vibracon sensors are ideal and versatile when determining limit values of liquids. The sensors are available in compact or extended designs, with housings made of aluminum, plastic, or stainless steel. This provides a wide range of options that enables the sensors to be individually tailored to each and every application. The range of uses is correspondingly large: the sensors can be used for all types of liquids, in all industries. They are extremely low maintenance and tolerate significant fluctuations in temperature, as well as high-pressure cleaning, sterilization, and disinfection processes. They are also resistant to buildup formation, abrasion, and turbulence, delivering reliable measurement results.

- Durable and maintenance-free
- Various output options
- All established process connections
- No calibration required, rapid commissioning



Measuring Type	Vibration
Main Application	Pumps (dry-run protection), tanks, containers, and piping
Approval	ATEX, CSA, FM, WHG

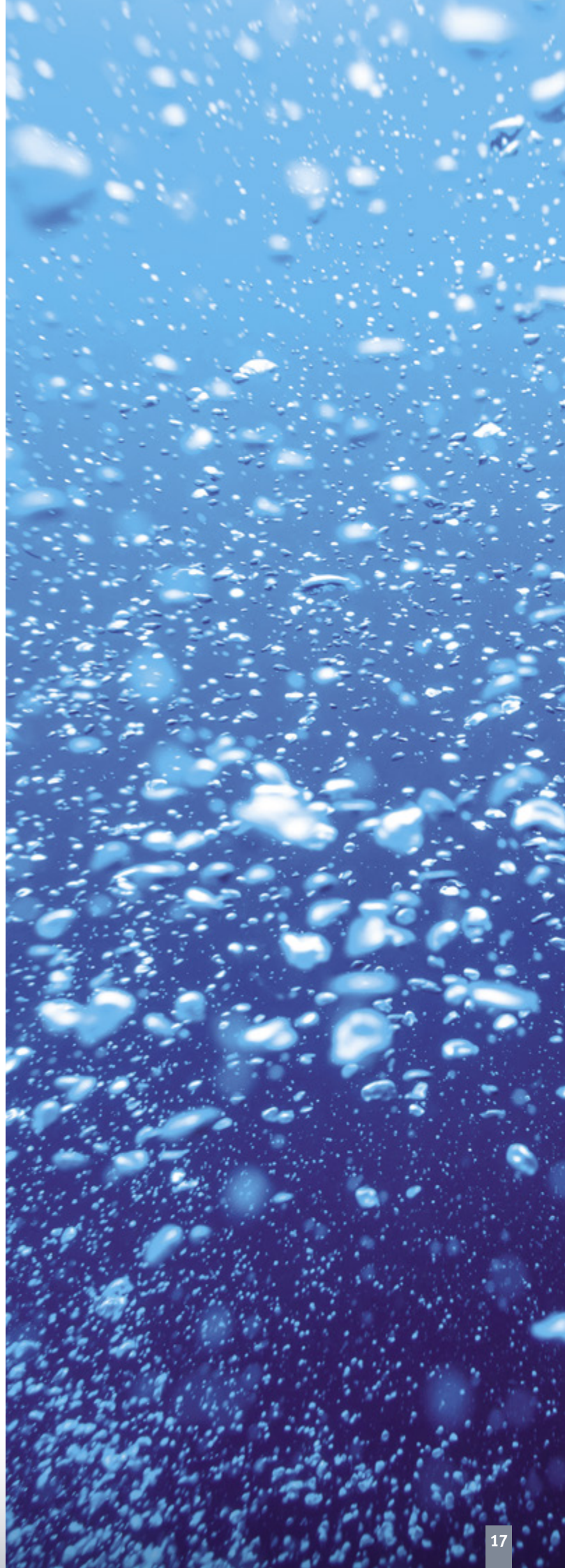
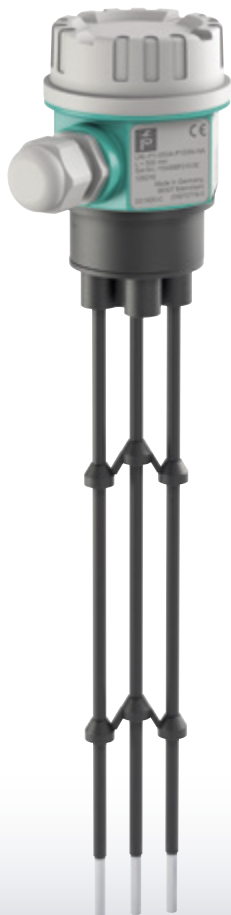
Conductive Electrodes – for Water, Acids, or Alkalis

Conductive electrodes are perfectly suited to the precise measurement of limit levels in conductive liquids such as water, acids, or alkalis. Depending on the specific requirements, the electrodes are available in a compact version with built-in electronics or with a separate electrode relay. The devices are used to deliver overflow and dry-run protection or for pump control. The conductive electrodes support between two and five switching points per probe.

- Rod version up to 4 m; cable version up to 15 m
- No mechanically moving parts
- No wear, long service life
- Various output options available
- Simple commissioning with no calibration required

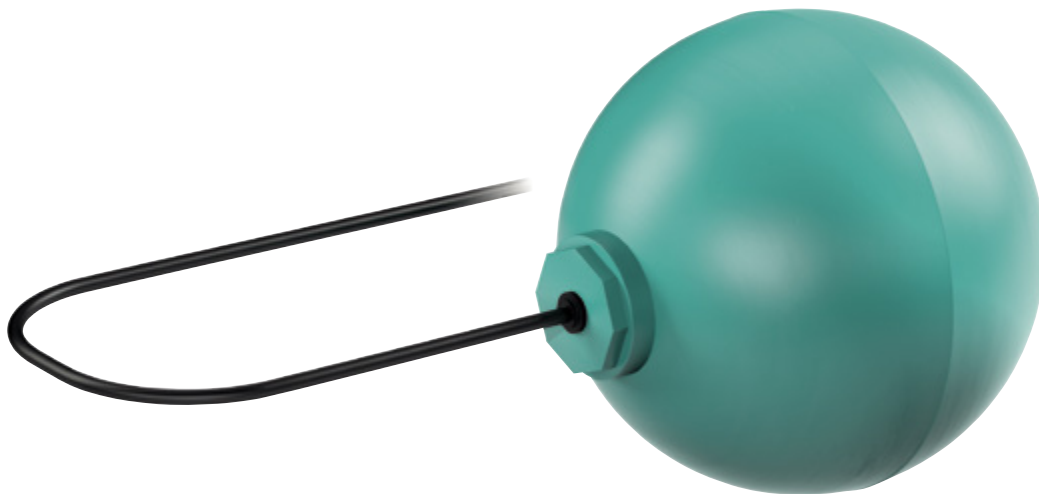


Measuring Type	Conductive
Main Application	Water/wastewater, wastewater treatment plant (interlayer measurement), oil and gasoline separators
Approval	ATEX, WHG



Simple Solutions. An Easy Way to Reliable Measurement.

The installation and handling are remarkably simple. The limit level measurement is absolutely reliable. The costs are unrivaled. When it comes to simple limit value detection applications, such as those in water and wastewater storage tanks, float switches are the perfect choice.



Float Switches – Reliable and Cost-Effective

Float switches are an extremely reliable and cost-effective method of detecting limit values in liquids. The markedly simple means of installing and handling this measurement principle presents a huge benefit. Float switches are available in sleeve form for small assembly diameters or in spherical form for liquids that require more buoyancy.

- Cable material: PVC, PUR, or CSM for a whole range of liquids
- Variety of switching elements
- Various cable lengths



Measuring Type	Float
Main Application	Water/wastewater
Approval	Up to hazardous area Zone 1 with switch in accordance with NAMUR (IEC 60947-5-6)





Individually Tailored. The Right Design for Every Application.

Magnetic immersion probes from Pepperl+Fuchs are designed for flexibility. Available in plastic or stainless steel, the robust probes adapt to the different requirements of liquid media. Offering both limit value detection and continuous measurement, the probes are capable of both measuring methods at the same time.



Magnetic Immersion Probes – Process-Independent

Magnetic immersion probes are suitable for measuring limit levels and for providing continuous measurement in liquid products. The probes are used in clean liquids such as water, solvents, oils, or fuels. The parts that come into contact with the medium are available in different versions: in plastic for aggressive acids and alkalis, and in stainless steel for water, oils, or solvents.

- Reliable, robust technology
- Installation without the need to remove the float
- Various process connections



Measuring Type	Guided float
Main Application	Tanks
Approval	ATEX

Consistently Accurate. Regardless of the Environment.

Whether you are dealing with sludge, pastes, or liquids, hydrostatic pressure sensors and level sensors play a significant role in the continuous measurement of liquids. And they really come into their own when conditions are particularly difficult.

Pressure Transmitters – Highly Versatile

Hydrostatic pressure sensors are characterized by extremely high measurement accuracy and satisfy all the hygiene requirements set down by the food and pharmaceutical industries. The sensors reliably measure the absolute and relative pressure in gases, vapors, and liquids. What's more, with a selection of electronic inserts, suitable connections for all control systems, and process connections according to the EHEDG, the devices can also be used universally.

- Robust and highly accurate load cell (piezo-resistive or ceramic-capacitive)
- Measuring range: up to 400 bar
- Aluminum or stainless steel housing
- System integration via HART, PROFIBUS PA



Measuring Type	Pressure measurement
Main Application	Tanks
Approval	ATEX, CSA, FM, IECEx, SIL

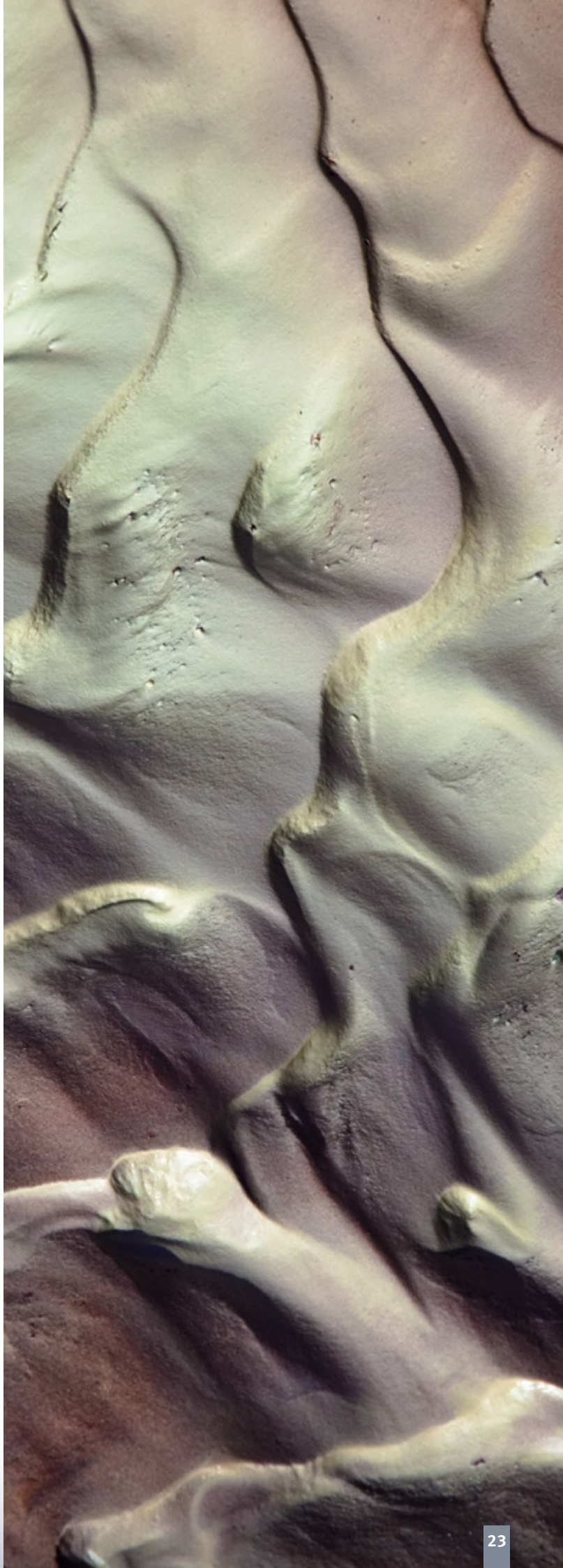
Level Sensors – Extremely Resistant

The probes are ideal for continuous level measurement in liquid media, including water, paste, or sludge. Even under difficult process conditions, level sensors are characterized not only by high measurement accuracy, but also by extreme mechanical and electrical resistance. With a wide range of accessories such as display devices, power supply units, evaluation devices, and registration devices, the probes deliver measuring-point solutions for all typical applications.

- Robust and highly accurate load cell (accuracy >0.2%)
- Measuring range: 0–0.1 bar to 0–20 bar
- With temperature measurement as an option
- Permanently hermetically sealed



Measuring Type	Hydrostatic pressure measurement
Main Application	Water/wastewater, deep wells, wastewater treatment plants
Approval	ATEX, CSA, FM



Noncontact Precision. Great Versatility for Demanding Ta

The ultrasonic and microwave-sensing technologies offer numerous benefits, one of which is media independence. Because whether coarse or fine, dry bulk or liquid, noncontact methods always deliver precise measurement results.

Ultrasonic Sensors – Suppress All Obstructions

Ultrasonic sensors from Pepperl+Fuchs are a reliable and cost-effective solution for measuring levels in liquids and bulk goods. The sensors are particularly suited for use in abrasive and aggressive media. Measurement results are independent of density, conductivity, and the relative dielectric constant of the material. All obstructions, such as welding seams or struts, can be suppressed with software. The sensors are also equipped with compensation circuitry to eliminate temperature effects on the sensor output.

- Measuring range: up to 7 m in bulk goods, up to 15 m in liquids
- Simple menu-guided on-site operation
- Rapid and simple commissioning
- System integration via HART, PROFIBUS PA



Measuring Type	Ultrasound
Main Application	Silos, wastewater treatment plants, thickeners, tanks, biogas plants
Approval	ATEX, CSA, FM

Pulscon – Precise at All Times

Pulscon transmitters are the ideal solution for continuous level measurement of powdery to coarse-grained bulk goods and liquids. The transmitters deliver precise measurement results under the most difficult conditions. Turbulence and foaming in liquids, dusty environments, and product cones do not affect the results. In powdery bulk goods, reliable measurements are possible during filling. The probes are available in rod, cable, and coax versions and are optimally tailored to the requirements of each and every medium.

- Various output options
- Simple menu-guided on-site operation
- Simple process for commissioning and calibration



Measuring Type	Guided microwave
Main Application	Tanks, silos
Approval	ATEX, CSA, FM, IECEx, SIL, WHG

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Staying in Touch. The World Over.

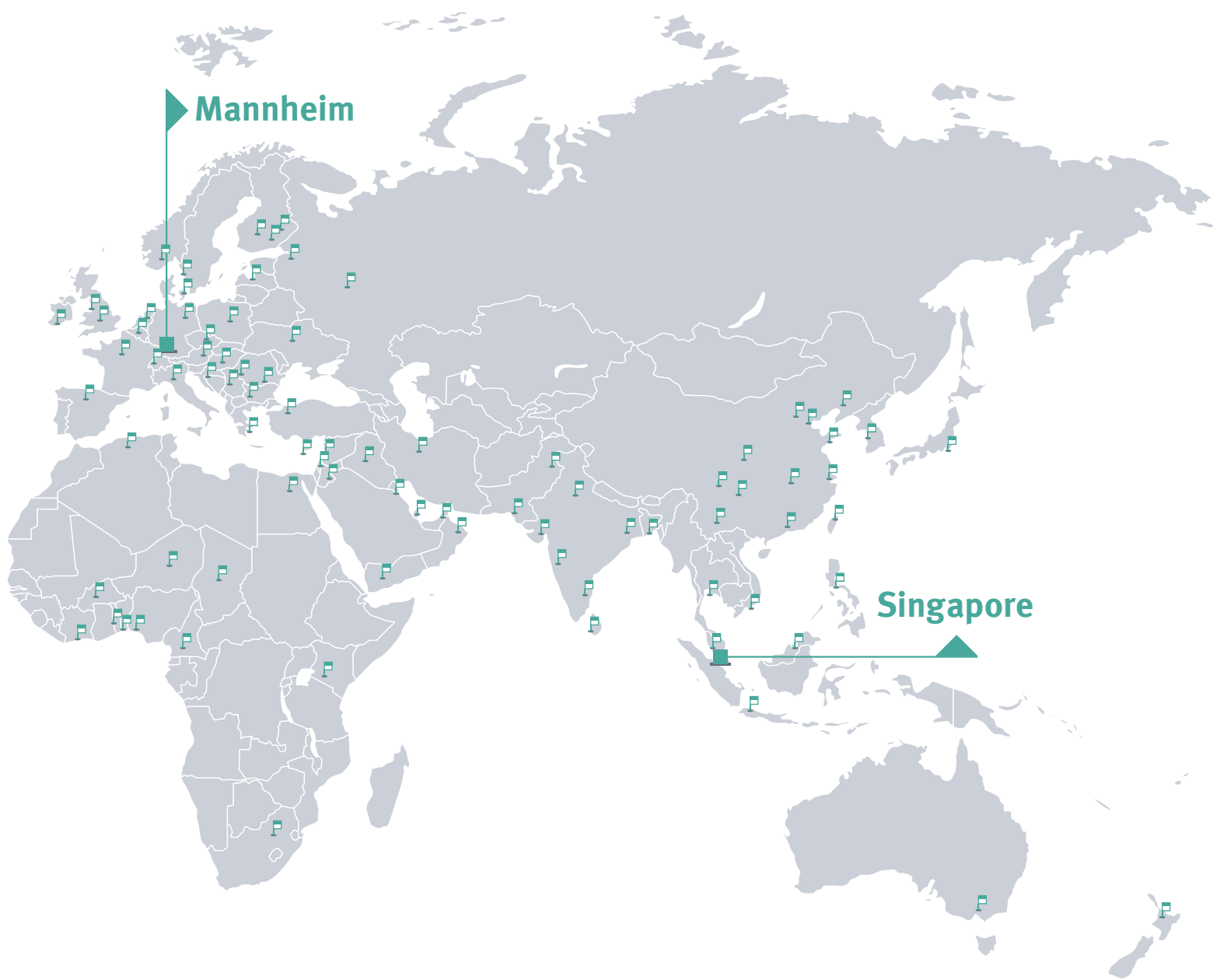
Good customer relationships need care and attention. They are an indication of genuine interest, trust, and a cooperative spirit: the foundation of Pepperl+Fuchs' strengths. No matter where you might be, we are always nearby. And we speak your language – in more than 140 countries the world over.



At Home on All Continents

Our customers are at the center of all our activities. Our worldwide network ensures that we provide them with the best possible service and support. Our world headquarters in Mannheim services Europe through a network of more than 40 affiliates. Asia is handled by our office in Singapore, with more than 1,000 employees in manufacturing, service, and sales. And our North American headquarters in Twinsburg, Ohio, is responsible for a comprehensive network of offices and sales partners in the USA, Canada, and Mexico.

No matter where in the world you may be, Pepperl+Fuchs is right nearby – and always there for you.



Mannheim

Singapore

YOUR APPLICATION. OUR CHALLENGE.

EXPLOSION PROTECTION

- Intrinsically Safe Barriers
- Signal Conditioners
- Fieldbus Infrastructure
- Remote I/O Systems
- HART Interface Solutions
- Wireless Solutions
- Level Measurement
- Purge and Pressurization Systems
- Industrial Monitors and HMI Solutions
- Electrical Explosion Protection Equipment
- Solutions for Explosion Protection

INDUSTRIAL SENSORS

- Proximity Sensors
- Photoelectric Sensors
- Industrial Vision
- Ultrasonic Sensors
- Rotary Encoders
- Positioning Systems
- Inclination and Acceleration Sensors
- AS-Interface
- Identification Systems
- Logic Control Units
- Connectivity



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 **PEPPERL+FUCHS**