Level Measurement
For 50 years …

… KSR KUEBLER has designed and manufactured measurement and control devices for liquids and bulk materials.

The foundation for the development of KSR KUEBLER was laid in 1962 by Dipl.-Ing. Heinrich Kübler with the invention of the magnetic switch – something completely new at that time, and a very simple design concept which rapidly spread across the whole world. A series of developments like the KSR Magnetic Float Switch, the KSR Level Sensor and the KSR Bypass Level Indicator followed.

Over the past decades, a strategy of steady expansion lead to the forming of our branches in China, UK, Singapore and the USA, a joint venture and a global net of distributors. This makes KSR KUEBLER a global player.

Putting ourselves in the customers’ position, searching with them for the best solution, working as a team, constantly striving for improvement – this is our daily goal – this is our philosophy.
"In the beginning there was water",

one could say. Indeed! However, this was just the beginning. Highly aggressive, caustic, viscous and soiled liquids have been added to simple water. The problems and requirements have become constantly more complex and demanding and our field of activity has expanded.

KSR KUEBLER AG today manufactures a broad range of level measurement devices covering temperatures up to 450 °C and pressures up to 40 MPa. Tailor-made solutions for chemical and pharmaceutical plants, offshore and oil industry, shipbuilding, plant construction, food and beverages industry, water purification plants and an ever growing number of applications in the environmental industry make up a big share of our new developments.

Our highly qualified members of staff are constantly engaged in customising new solutions to solve individual problems. The latest in production technology, an uncompromising commitment to quality and national and international approvals are the foundations that build up the reputation of our company.
Magnetic Float Switches
Detection of one or more distinct levels of a liquid

Operating Principle
Magnetic Float Switches are based on the float principle with individual reed contacts for every level to be monitored. A float with a built-in magnetic system actuates the small preset contacts through the wall of the guide tube enabling the detection of distinct levels of the liquid.

This simple and proven operating principle is suitable for a wide variety of applications.

The measurement is independent of foam, conductivity, dielectric constant, pressure, vacuum, temperature, vapour, condensation, bubbles, boiling effects and vibration.

Technical Advantages
- Suitable for virtually all liquids
- Switching operation is without direct contact with the liquid, free of wear and tear and does not require any power supply
- Universal signal processing of volt-free contacts:
  - PLC
  - Initiator circuit to DIN NAMUR 60947-5-6
- Multiple switch points in one unit (up to 8)
- Explosion-proof designs
- Temperature – 196 °C to +300 °C
- Pressure Vacuum to 100 bar,
  S.G. ≥ 400 kg/m³
- Interface measurement ∆ ≥ 50 kg/m³
- Application specific designs available
- Simple installation and commissioning, maintenance-free
**Opto Level Switch**

Opto Level Switches are used for monitoring liquid levels.

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**Working principle**

The level limit detection with the conic tip is independent of physical properties of the fluids such as density, dielectric constant, conductivity, color and refractive index.

The curve in the diagram level shows the switching transition. With 1.1 it is in a range that can never be reached of gases or liquids (all gases have a refractive index < 1.05 and all fluids > 1.25). The interface measurement, however, uses the refractive index dependence of the rounded sensor tip.

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**Technical advantages**

- Approvals: ATEX, WHG § 19, DGRL, SIL1
- Level and interface
- High precision
- Range of pressure 0 ... 500 bar
- Range of temperature – 269 ... + 400 °C
- independent of color, density, dielectric constant, conductivity and refractive index
- small measurement volume
- small size

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**Function principle**

**Level**

![Level Diagram]

**Interface**

![Interface Diagram]
Level Sensors
Continuous level measurement, interface measurement

Operating Principle / Reed chain
Level Sensors are based on the float principle with a 3-wire potentiometer circuit. A float with a built-in magnetic system actuates small reed contacts through the wall of the guide tube. These reed switches form a resistance measuring chain that continuously generates a voltage proportional to the height of the level.
The resistance measuring chain is closely stepped and is made up from small chips soldered onto a PCB. The chips contain the necessary reed contact-resistor combination. Due to this assembly the generated voltage is virtually continuous. Depending on requirements and design, different contact separations from 5 to 20 mm are available.
Continuous measurement of liquid levels independent of foam, conductivity, dielectric constant, pressure, vacuum, temperature, vapour, condensation, bubbles, boiling effects and vibration.

Operating Principle Magnetostrictiv
The measuring is initiated by a current pulse. This generates a circular magnetic field along a magnetostrictive wire in the probe tube. At the measuring point (liquid level) a float with permanent magnet is used as a position sensor. This magnetic field of the float twists the wire.
The superposition of the two magnetic fields initiates a mechanical wave in the wire. This is converted into an electrical signal at the end of the wire in the sensor housing by a piezo-ceramic. The time of flight measurement allows to determine the starting point of the mechanical wave and therefore the float position with high accuracy.

Technical Advantages
- Approvals: ATEX, SIL 2, Ex d, NEPSI
- Protocols: EDDL, DTM, HART
- Signal transmission over large distances
- Simple installation and commissioning, one-time calibration only, no re-calibration necessary
- Display proportional to the height of the level or the contents of the vessel.
- Set point relays continuously adjustable over full range
- High repeatability of set points
- Temperature range –80 °C to +200 °C
  Pressure Vacuum to 100 bar
  S.G. ≥ 400 kg/m³
- Interface and product level measurement simultaneously possible at S.G ∆ ≥ 50kg/m²
- Application specific designs available

Signal transmission
- External control units and set point relays
- 2-wire head-mounted transmitters with 4...20 mA signal
- Programmable HART®-Protocol, PROFIBUS® PA, FOUNDATION™ Fieldbus
Glass level gauges
Level measurement with glass level gauges – reflex and transparent

KSR Reflex glass level gauges
The principle of the reflex sight glass is the reflection of the outdoor light. In the gas or vapor phase you get a bright display, because the light in the prismatic grooves of the sight glass is reflected.

In the liquid phase, the light is absorbed, so a dark display indicates the fluid level.

KSR Reflex sight glass gauges are available with housing for the pressure range up to PN25 and cover design for the pressure range up to PN100. They are the best and cheapest indicator for steam application up to 35 bar, but can also be used in numerous applications of process industries.

KSR Transparent glass level gauges
In this type of sight glass indicators the liquid is included between two transparent sight glasses. This allows a sight of the fluid and therefore provides a clear indication of the level.

KSR transparent sight glass indicators are available in double-cover design for pressures up to PN100. They are the most appropriate indicator for steam application above 35 bar, where micas must be used, to protect the sight glass against corrosion of the boiler water. They can also be used in numerous applications, particular for the observation of interface or liquid paint. They also can be equipped on their backside with a lighting device in order to improve visibility.

Function principle reflex

Function principle transparent
Bypass Level Indicators
Continuous level measurement with visual indication of level without power supply

Operating Principle
A communicating bypass chamber is connected to the side of a vessel. As the liquid level in the tank rises or falls, a float with a built-in magnetic system inside the chamber rises or falls with it.

The radial magnetic field of the permanent magnet of the float actuates the level display and sensors mounted on the outside of the bypass chamber.

KSR Level Sensor
- Continuous level measurement with 3-wire potentiometer circuit for external control units
- 2-wire level transmitters
  Head-mounted transmitter 4–20 mA
- Programmable HART®-Protocol, PROFIBUS® PA, FOUNDATION™ Fieldbus
- High precision, magnetostrictive level sensors, accuracy < 1.0 mm

KSR Magnetic Switch
- Detection of one or more discrete levels
- Reed contact bistable
- Reed contact NAMUR, DIN 60947-5-6
- Inductive for safety applications
- Pneumatic

① Transmitter 4–20 mA, programmable: HART®-protocol, PROFIBUS® PA, FOUNDATION™ Fieldbus
② KSR Magnetic Roller Display – two-color continuous visual monitoring of the actual level without auxiliary power
③ High-resolution transducers
Technical Advantages

- Simple, robust, and solid design
- Display proportional to the height of the level or the contents of the vessel
- Pressure- and gas-proof separation of chamber and display
- Available for applications in all areas of industry through versatile design and corrosion-resistant materials
- Pressure range to 420 bar
- Temperature range to 450 °C
- S.G. ≥ 400 kg/m³
- Explosion-proof designs
- Interface and product level measurement at S.G. Δ ≥ 50 kg/m³
Level Sensors
(guided microwave)
The universal sensor for bulk solids and liquids

Working principle
High-frequency microwave pulses are coupled to a cable or rod and guided along the probe. The time from transmission to reception of the signal is proportional to the level in the tank. An adjustment with the medium is not necessary. All devices are preset to the ordered probe length. The shortable rope design and rod versions can be adapted to local conditions.

Applications in liquids
Density changes, steam or high pressure and temperature changes have no influence on measurement results. Also deposits on the probe or on the vessel wall do not affect the measurement. An ideal application is the level measurement in a bypass pipe, where products with a dielectric constant below 1.6 can be measured safely. Also the connecting pipes tank-bypass have no influence.
Interface measurement in liquids

The measuring principle was developed for the detection of interface layers. Typical applications are the measurements of oil or solvent on water. The microwave pulse is reflected a second time at an interface with different permittivity. This allows the detection of a second filling level.

The advantage against displacers is that the measurement principle works independent of density. No moving parts are used, so a maintenance-free operation is ensured.
Measurement of bulk material

The paddle switch type DF is especially suited for powders, granules and viscous media like sand, fodder, oats, small components etc. The paddle switch can be top or side mounted on the container or silo.

- Supply voltages 24 V AC/DC, 110 V AC, 230 V AC
- Magnetic clutch for pressurised containers
- Flat and cross paddle
- Adjustable position of paddle

Bypass seamlessly (without welding)

Enamelled slide tube with glass float

Level measurement of electrically conductive media

The KSR electrode relays work according to the conductivity measurement method and can be used in combination with KSR electrodes for level monitoring or control of electrically conductive fluids such as water, alkalis or acids.

- Adjustable sensitivity
- Multiple electrodes, adjustable
- Materials: stainless steel, Hastelloy, titanium, PTFE-insulated, ECTFE-coated
A magnetic switch consists of Reed contact which are built-in in a hermetically sealed glass tube filled with protective gas. By approximating a permanent magnet the overlapping contact tongues ends come together and touch each other suddenly. When removing the permanent magnet the contact tongues immediately go instantly back to its resting position.

- Potential free contact
- Installation independent of orientation
- Stable switching point, repeatability of switch point 0.1 mm

Rotary pulse encoder, stroke position e.g. in machines and apparatus engineering etc.

Variable-area flow measurement at any mounting position for gases or liquids

- High switching accuracy
- High functional safety
- Low hysteresis
- Adjustable switch point
- Wide switching range
- Viscosity compensated types available

The KSR-TF can be used as a universal level switch in liquids

They detect levels with high precision and can be used in tanks and pipelines, regardless of the installation position.

- Setup without adjustment
- Product-independent switching point
- Very high reproducibility
- Wear- and maintenance-free
- Minimum installation dimensions
Partnership

Individual problems require tailor-made solutions

To address our customers’ problems on site we work through our branches and distributors in the Middle and Far East, in Africa, the USA, and of course in Germany and Europe. Our unique solutions are as different as our customers’ applications and requirements. A steadily growing customer base proves it.


Our products and applications are found worldwide in the following application fields:

- **Chemical and pharmaceutical plants**
- **Off-Shore and oil industry**
- **Shipbuilding**
- **Plant construction**
- **Water purification and environmental industry**
- **Food and beverage industry**
KSR KUEBLER Level Measurement Worldwide

The exact addresses can be found on our website

www.ksr-kuebler.com
### Product Range

- Magnetic Float Switches
- Level Sensors
- Bypass Level Indicators
- Glass Level Gauges
- Top Mounted Level Indicators
- Paddle Switches
- Safety Leakage Detectors
- Flow Monitors
- Ultrasonic Level Sensors
- Conductive Level Relays
- Opto Level Switches
- Electrodes
- Magnetic Switches
- Controls/Transmitters
- Level Displays

### Approvals

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