

# IN EVERY SITUATION, THE BEST SOLUTION

**Whether you are active in the water sector, responsible for tank or silo management, or involved in waste management, Avic offers the ideal radar solution for any situation where (liquid) levels need to be measured.**

Avic radar sensors, in combination with the Avison IoT platform, provide you access to your measurements wherever and whenever you need them. Thanks to versatile interface options, you can integrate the data into other systems where necessary. Safety, reliability, and precision are at the core of our radar products.

Accurate real-time data provides you with a wealth of information to optimize processes, avoid risks, and protect the environment.

- Inventory and Waste Management
- Water Management
- Flood Alerts
- Monitoring Groundwater Extraction
- Predicting Maintenance Periods
- Quality Control and Environmental Monitoring
- Smart city applications



Reliable



Maintenance-Free



Universally Applicable

## Avic Radar Solution®

A revolution in liquid level measurements

AVIC .....



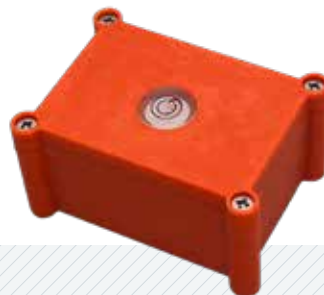
## THE RADARGATE

The RadarGate is a fully wireless radar solution, including a 4G modem, designed specifically for level measurements. This solution is ideal when there is no direct power source available but measurements are still needed. Thanks to the compact form of the RadarGate, it can be quickly installed. With just four easily replaceable AA batteries, the RadarGate can perform measurements for over 5 years. The RadarGate uses the modem to periodically send the collected data to the data center.



## THE RADARWISE

When multiple radar measurements are required at the same location, using a wireless sensor network of radar sensors offers numerous advantages. There is no need for wiring, and the installation is quick and does not require local configuration. With standard AA batteries that are easy to replace, measurements can be taken for over 5 years. A centrally located RF Hub ensures the global availability of measurement data, with a maximum distance of 500 meters between the radar sensor and the RF Hub.



TWO RADAR PRODUCTS,  
THE SOLUTION  
FOR ALL YOUR LEVEL  
MEASUREMENTS.

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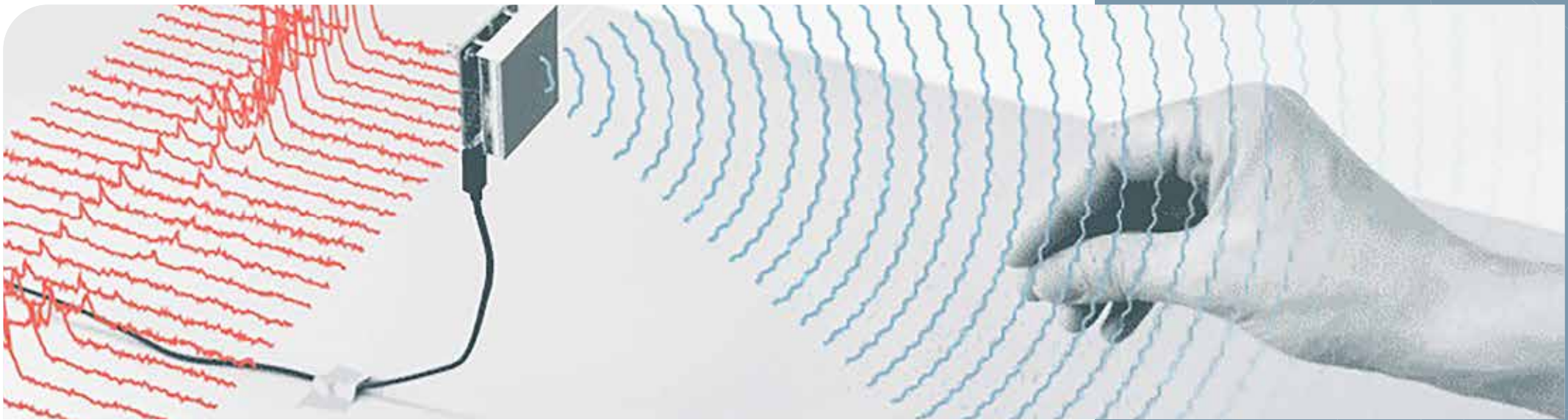
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## WHAT IS A RADAR SENSOR?

A Radar Sensor is an electronic device that uses radar waves to detect objects or liquids and determine their distance. A radar sends a signal (pulse) into the air with radar waves. If there's something in the air, the radar sees an 'echo,' and the distance can be determined. Radar sensors are widely used in various applications because of their ability to measure accurately regardless of weather conditions and lighting conditions. Avic's radar products are designed to accurately determine distances, whether the medium is liquid, solid, hot, cold, or highly aggressive.

## BENEFITS OF RADAR SENSORS

Measurements can take place outside the medium

Radar waves can penetrate plastic, allowing the contents of a tank or container to be determined without the need for contact between the sensor and the medium. Pressure sensors can also be used to determine fluid levels, but they come into contact with the medium, and strong acids or alkaline substances can damage pressure sensors. Radar waves are not affected by light and are less prone to contamination, as can be the case with ultrasonic sensors. Avic's radar sensors combine the advantages of various measuring principles with ease of use, extremely high precision, and low costs.

AVIC RADAR SENSORS:  
EASE OF USE, EXTREME  
HIGH PRECISION, AND  
LOW COSTS.



YEARS OF OPERATION  
POSSIBLE ON BATTERIES  
THANKS TO EXTREMELY  
LOW ENERGY USAGE.

## Low energy usage

Modern radar chips are highly compact. The complete radar functionality, including the radar antennas, is integrated into the "chip." The advantage is a reliable, robust radar sensor combined with very low energy consumption. The energy usage is so low that it allows for years of operation on just a few batteries, even with frequent measurements.

## No regular calibration necessary

Unlike other sensors, such as conductivity or pressure sensors, radar sensors typically do not require regular or routine calibration. Radar sensors use advanced digital signal processing technologies to reduce noise and improve measurement accuracy. These technologies help maintain performance without the need for frequent calibration. Although radar sensor measurements typically do not drift, it may still be useful to occasionally validate or verify their operation. A one-time offset correction can be useful, for example, when there is a thick layer of plastic between the radar sensor and the surface being measured.

*An overview of the advantages and disadvantages of various measurement principles:*

Technology vs feature	Radar	Infrared	Ultrasonic	Laser / Lidar	Camera
Detection range	High	Low	Low	Medium	Low
Range Accuracy	High	Low	High	High	Medium
Angle Accuracy	Medium	Low	Low	High	High
Object separation	High	Low	High	High	High
Environmental robustness	High	Low	Low	Medium	Low
Design flexibility	High	Low	Medium	Medium	Low
Cost	Low	Low	Low	High	Low



EXTREME LOW  
ENERGY USAGE



NO REGULAR CALIBRATION  
NECESSARY

## APPLICATIONS FOR RADAR SENSORS

Measuring distances with radar is commonly used to measure liquid levels and is therefore widely applied in the water and sewage industry. However, it can also measure levels of solids, making radar sensors useful in waste management.

### Groundwater levels and water levels in rivers and sewers

#### Water management

For agricultural businesses, municipal water utilities, and other water management authorities, monitoring groundwater levels is essential to effectively manage water resources. They can use the data to optimize irrigation practices, plan water usage, and sustainably utilize water sources.

#### Environmental monitoring

Environmental organizations and government agencies monitor groundwater levels to detect environmental changes. Fluctuations in groundwater levels can indicate potential environmental changes, such as contamination, soil erosion, or other ecological issues..

#### Flood Warnings

In flood-prone areas, real-time information on ground-water levels can help predict potential floods. This gives residents and emergency services time to prepare and respond.

#### Construction projects

In construction projects, it is important to know groundwater levels to prevent water from seeping into excavations, which can jeopardize the stability of structures. By using real-time data, construction companies can take appropriate measures.

#### Groundwater extraction

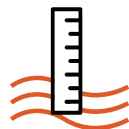
Companies or individuals relying on groundwater extraction for industrial processes, agricultural irrigation, or drinking water production need to monitor groundwater levels to ensure they do not drop below critical levels.

#### Research and science

Researchers can use real-time data on groundwater levels to understand how aquifers behave and respond to climate change, precipitation patterns, and human activities.



REAL-TIME INFORMATION  
ABOUT GROUNDWATER  
LEVELS, EVEN WITH  
SOLAR-POWERED  
TELEMETRY.



(GROUND) WATER  
LEVELS



REALTIME OR NEAR  
TIME MEASUREMENTS



TRACKING THE FILL  
LEVEL OF CHEMICAL  
TANKS CAN HELP IN  
THE EARLY DETECTION  
OF POTENTIAL LEAKS  
OR SPILLS.

## Fill level of tanks, barrels, and silos

### Inventory management & maintenance

Companies using chemicals in their production processes want to know precisely how much material is still available in the storage tanks. This helps them refill in a timely manner and can assist in predicting when tanks need to be emptied for maintenance, cleaning, or inspection. This can help prevent unplanned downtime and operational disruptions.

### Operational efficiency

By monitoring the fill level of tanks in real-time, companies can optimize their processes. For instance, they can plan material supply logistics based on the current fill level, which can save time, costs, and energy.

### Safety and compliance

Certain chemicals have specific regulations and safety standards regarding storage limits. By monitoring the fill level, companies can ensure they comply with these regulations and prevent overfilling or leakage.

### Orders and deliveries

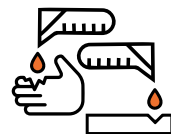
For chemical suppliers, real-time information about fill levels can help in planning deliveries to customers. This minimizes the risk of insufficient stock or overstock.

### Environmental monitoring

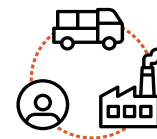
Tracking the fill level of chemical tanks can aid in the early detection of potential leaks or spills. This contributes to environmental protection and prevents contamination.

### Quality control

Some chemical processes require precise proportions of different substances. By monitoring the fill level, companies can ensure the correct quantities are used, improving product quality.



MEASURING WITHOUT  
CONTACT WITH THE MEDIUM



RADAR MEASUREMENTS FOR  
EFFICIENCY IN THE SUPPLY CHAIN



## Overflow registration

### Environmental monitoring

Sewer overflows can result in the discharge of untreated wastewater and pollutants into surface waters such as rivers, lakes, and oceans. Monitoring these overflows in real-time is crucial to understand and minimize their impact on the aquatic ecosystem.

### Water quality

Untreated sewage released into surface waters can seriously degrade water quality. People want real-time information about overflows to know when and where these events occur, allowing them to limit their exposure to contaminated water.

### Public health

Contaminated water due to overflows can lead to the spread of pathogens and bacteria that can be harmful to human health. By providing real-time information, health authorities can issue warnings promptly and inform the public about potential risks.

### Urban infrastructure management

For urban planners and sewer system managers, real-time information about overflows is essential for monitoring and managing the operation of the sewage system. This can help identify areas with frequent overflows and take measures to improve the infrastructure.

### Regulatory compliance

Many regions have laws and regulations that specify when and how overflows must be reported to the relevant authorities. Real-time monitoring assists in complying with these regulations and promptly reporting overflow events.

### Damage mitigation

During heavy rainfall or sudden weather changes, overflows can occur more frequently. Real-time information enables municipalities and emergency services to respond quickly and mitigate any damage.



BY PROVIDING  
REAL-TIME  
INFORMATION, RISKS  
CAN BE MINIMIZED.







TELEMETRY  
CONTRIBUTES TO  
MORE EFFICIENT,  
COST-EFFECTIVE, AND  
ENVIRONMENTALLY  
FRIENDLY WASTE  
MANAGEMENT.

### Waste management

Using radar-based telemetry, the contents of containers and trash bins can be determined. The long battery life, combined with the robustness of the RadarGate, makes it ideal for waste management.

#### **Efficient waste collection**

Telemetry allows administrators to monitor the fill level of waste containers in real-time. This ensures that containers are only emptied when necessary, improving the efficiency of the waste collection process. It also prevents unnecessary garbage truck trips, resulting in cost savings and reduced environmental impact.

#### **Preventing environmental complaints**

Telemetry enables waste managers to proactively address issues such as overfilled containers. This contributes to improved customer service by reducing resident complaints about overflowing containers.

Overall, telemetry contributes to more efficient, cost-effective, and environmentally friendly waste management. It enables waste managers to make data-driven decisions and optimize their operations.



## AVIC'S RADAR PRODUCT OFFERINGS

Avic has developed two different radar products. The core of all these products is an advanced digital 61 GHz FMCW radar sensor. The internal lens is designed to generate a radar beam with a focused beam of 8x8 degrees, particularly suitable for measuring liquid levels. This narrow beam minimizes the influence of obstacles, such as walls or built-in agitators. The sensor

combines energy efficiency with the ability to measure distances up to 20 meters with millimeter accuracy. Several built-in filter mechanisms ensure accurate measurements in various situations. Avic's Avision platform allows you to easily configure the radar sensor for your specific application, without complex apps or software. Our goal at Avic is to make advanced technology accessible. To meet the unique needs of each application, we have developed two different variants of our radar solutions.

OUR GOAL IS TO  
MAKE ADVANCED  
TECHNOLOGY  
ACCESSIBLE.



## RadarGate

The RadarGate is an innovative product that integrates a radar sensor with an IoT data logger from the LegioBox family. This complete solution allows you to send measurement data directly to the data center, where you can effortlessly manage all your measurements.

The RadarGate excels in energy efficiency, making it possible to take measurements for up to 10 years with just 4 AA penlight batteries. The exact duration may vary depending on your settings. To accurately calculate how many years the RadarGate can function in your specific situation, Avic has developed a handy application.

The RadarGate uses the latest 4G Cat M technology, specially designed for IoT projects. The significant advantage of Cat M is its excellent range, enabling reliable communication even in locations with previously limited coverage. This impressive range goes hand in hand with low power consumption, allowing the RadarGate to operate for an extended period without the need for frequent battery replacements.

## RadarWise

The RadarWise is a product that combines an advanced radar sensor with an RF transceiver (transceiver) at 868 MHz. The RadarWise seamlessly integrates into a wireless radio network, in which various (radar) sensors work together to send their data to the data center via an IoT RF gateway.

In practice, you can combine up to 50 RadarWise sensors with a single gateway, making it ideal for monitoring the fluid levels in groups of tanks. Avic offers an extensive range of "Wise" products. Some variants come with internal temperature and relative humidity sensors, while other models can connect to 4-20 mA sensors or 0-10 Volt sensors, allowing nearly any sensor to be wirelessly read.

What makes the Wise products particularly attractive is their exceptional energy efficiency, enabling them to take measurements for over 5 years in most cases before a battery replacement is needed. Thanks to the frequency of operation used, there is no interference with Wi-Fi networks, and you can count on an excellent range of up to 600 meters in an open field.

	RadarGate	RadarWise
Measure Range	20 meters	
Minimum distance	50 mm	
Process temperature	-40... 200 °C	
Accuracy	2 mm	
Frequency	61 GHz	
Beam	8 x 8 degrees	
Materiaal van de behuizing	ASA with 40% glass	
Protection rating	IP67	
Ambient temperature	-40... 80 °C	
Connection	No connector Hermetically closed	
Dimensions LxBxH	102 x 94 x 48 mm	94 x 68 x 48 mm
Communication	4G Cat M1	RF 868 Mhz





## AVISION: THE ULTIMATE IOT PLATFORM FOR ALL YOUR MEASUREMENTS

Avision, Avic's IoT platform, combines a device management platform, an asset management platform, and a maintenance platform. With Avison, you have access to sleek dashboards, and managing your alarms is easy. If desired, you can automatically generate and distribute reports.

- **Device Management**

With our platform, you can effortlessly manage and monitor all your IoT devices. At a glance, you can check the status of your IoT devices, including battery status. Thanks to the built-in acceleration sensors in all our radar products, you can also verify whether the radar sensor is correctly positioned above the liquid, ensuring accurate measurements.

- **Asset management**

We represent your asset through a digital twin that describes your asset as accurately as possible. You gain immediate insight into the liquid level or the content of your tank in liters or kilograms.

- **Maintenance management**

Avic also offers predictive modules that inform you when a tank will run empty or when there is a leakage. Please note that these predictive modules depend on your specific situation and may require additional sensors for optimal operation. Feel free to contact us if you're interested in this functionality.

WITH OUR PLATFORM,  
YOU CAN EFFORTLESSLY  
MANAGE AND MONITOR  
ALL YOUR IOT DEVICES.





IN ADDITION TO THE  
CAPABILITIES OF RADAR  
SENSORS, AVIC ALSO  
OFFERS SENSORS  
FOR VIRTUALLY EVERY  
APPLICATION.

## DIGITAL TWIN

Avic has created an extensive range of digital twin objects for various applications. These standard objects can be seamlessly integrated into your application. We are ready to advise you on which objects are most suitable for your needs. In addition to radar sensor capabilities, Avic also offers sensors for nearly every application. With the Avison IoT platform, you can develop a complete IoT application where all your technical data converges, and you can draw understandable conclusions based on reliable information.

### **Data As A Service (DAAS)**

If you only want to receive the data in your own environment (DAAS), you can do this with Avison as well. The available API makes it easy to continuously stream your data to your own platform.

An API, or Application Programming Interface, is a set of rules and protocols that allow different software applications to communicate and exchange information. It is a way for different pieces of software to work together and share data without users being aware of the complexity of this interaction.

Our API acts as a seamless communication bridge between your business systems and our services. It enables your software to communicate directly with ours, as if they are speaking the same language. Your application sends a request to our API with specific instructions or data needed. Our API processes the request and retrieves the required information. The API sends the results of the request back to your application in a structured format such as JSON or XML.

## ACCESSORIES

To simplify the installation of radar products, Avic has developed various accessories that allow for quick and reliable mounting. The integrated level indicator indicates whether the sensor is mounted horizontally. The internal accelerometers also provide remote insight into whether the radar sensor is correctly mounted.

### Wall mounting

The wall mounting bracket can be used for both the RadarGate and the RadarWise.



Pipe mounting for 50mm (optional 32mm, 40mm) pipe

The "pipe adapter" can be used for both the RadarWise and the RadarGate.



It is recommended to use a minimum pipe diameter of 50mm. A narrower pipe is possible, but the maximum measuring distance and accuracy decrease with smaller pipe diameters.



Mounting for 1 ¼", 1 ½", 2" connection:

The pipe adapter can be used in combination with an adapter. The pipe adapter has a milled edge of 50mm and is suitable for standard adapters from 2" to 1 ¼", 1 ½", or 2" threads.

### IBC tank mounting



The IBC mounting bracket can be easily screwed to the frame of the IBC tank using a wing nut. The radar sensor then lies horizontally on the IBC tank for the best measurement. For IBC tanks, you can also use Velcro or double-sided tape, but this bracket is practical in most cases. The IBC bracket can be used for both the RadarGate and RadarWise.

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OUR PRODUCTS CAN  
BE EASILY ATTACHED  
TO THE WALL OR ON  
A PIPE OR TUBE.



THE SOLARMAX IS  
A SOLAR-POWERED  
GATEWAY THAT CAN  
OPERATE ENTIRELY  
AUTONOMOUSLY.

#### Wireless access point for RadarWise

##### **NanoGate**

For communication from the RadarWise to Avison, an IoT Gateway is required. Avic offers a NanoGate that can serve as an RF hub.



##### **SolarMax**

It's also possible to use the SolarMax. The SolarMax is a solar-powered gateway that can operate autonomously, making it ideal for locations without a power source.





# IoT made simple.



Tank monitoring



Sewage



Drinking water



Process water



Urban water and  
sewer management



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