

# RADAR IS THE BETTER ULTRASONIC



Compact level sensors with  
80 GHz radar technology

Looking Forward

**VEGA**

# ULTRASONIC WAS YESTERDAY – THE FUTURE IS 80 GHZ RADAR!

As the market leader, VEGA has been developing radar based level sensors for 30 years. These radar sensors are currently in use in more than 750,000 applications. Users all around the globe appreciate the many advantages of this technology:

- **Maximum reliability and accuracy**
- **Unaffected by temperature fluctuations**
- **Resistant to dirt and buildup**
- **Measurement under vacuum and high pressure**
- **Wear and maintenance free**

A new era in radar measurement technology began a few years ago when VEGAPULS sensors based on an operating frequency of 80 GHz were introduced. The 80 GHz technology allows a much more precise focusing of the transmission signal. This makes it easier to separate actual level signals from interfering signals – this means the measurement becomes easier to make and much more reliable. That's why VEGA radar sensors with 80 GHz are steadily taking over new applications all over the world.

VEGA has now added a new compact instrument series to this portfolio of radar sensors. These devices are also ideal for more economical applications such as those found in the water and wastewater industry or for auxiliary measuring points in process automation.

Level measurement with ultrasonic sensors, which are still in use today, is thus rapidly becoming a thing of the past. The future is radar!

## About VEGA

VEGA is a world-leading manufacturer of process instrumentation. Their product portfolio includes sensors for measurement of level and pressure as well as point level detection, with additional devices and software for integrating sensors into process control systems.

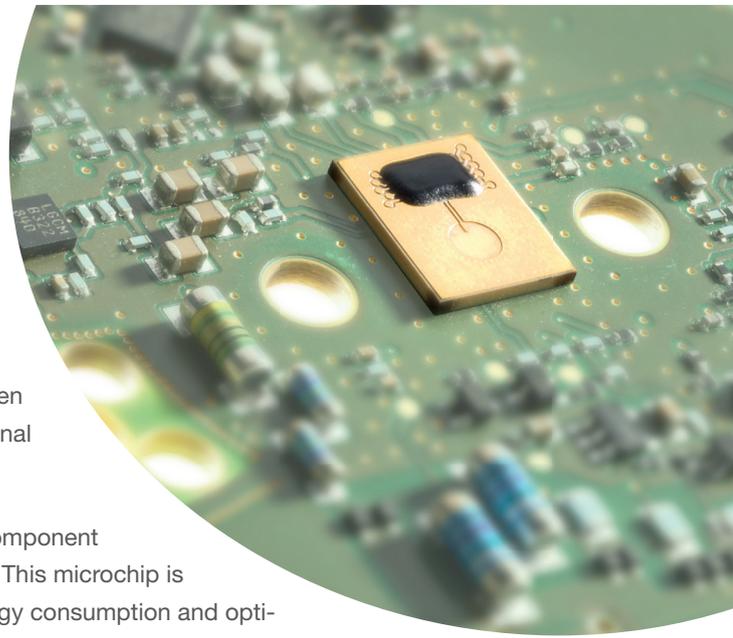
Founded in the Black Forest in 1959, VEGA today employs over 1,600 people worldwide, more than 750 of them at the headquarters in Schiltach in the Black Forest. Each and every one of them works with great passion to find the best solution for the customer's application – across all industries.



## A new heart for radar sensors

Today, radar sensors can be found in all areas of daily life, from simple motion detectors for door openers to complex distance sensors in vehicles. The technical requirements for industrial level measurement, however, are completely different. While people and vehicles reflect radar signals very well, process media are often difficult to detect. For this task, sensors require a much higher signal sensitivity.

That's why VEGA have developed their own radar microchip, a component specifically optimized for the requirements of level measurement. This microchip is at the heart of the new sensors. Thanks to its small size, low energy consumption and optimized frequency ranges, very compact radar instruments can now be built. These are considerably less expensive and can replace ultrasonic measurement technology in virtually all applications.



## Made for everyday use

80 GHz radar sensors feature excellent signal focusing capability. Unaffected by temperature fluctuations and virtually all other operational conditions, they impress users with their reliable measured values. The new compact instrument series is designed for standard measuring tasks and thus ideally complements the existing range of VEGAPULS 60 series plics® radar sensors.

### Compact version

- Small PVDF process fittings
- For liquids and bulk solids
- Optional display



VEGAPULS  
11, 21, 31



Adjustment via  
smartphone



VEGAMET  
841/842,  
861/862

### Controllers

in combination with up to two radar sensors

- Large graphical display
- Optimized for applications in water and wastewater
- Weatherproof housing

### Cable version

- Fixed cable connection (IP68)
- Reliable performance, even during flooding
- Direct output signals  
4 ... 20 mA, HART, SDI-12, Modbus



VEGAPULS  
C 11, C 21, C 22, C 23

# THE ADVANTAGES OF RADAR TECHNOLOGY

Radar sensors measure much more reliably than ultrasonic sensors. During the development of the new compact instrument series, the focus was also on simple installation and operation. All application parameters can now be set very quickly. Via the VEGA Tools app, also wirelessly with a smartphone or tablet.

## Process and environmental influences



Due to their physical measuring principle, ultrasonic sensors are easily affected by ambient conditions: the transit time of sound, for example, is affected by variation of temperature (e.g. solar radiation), changing vapours or gasses affect the accuracy. Strong wind or rain, or even fog, can also damp the emitted sound waves and further restrict the measurement performance.

**Radar sensor performance is not affected by temperature, pressure or vacuum and remains able to deliver correct, reliable readings under all environmental conditions.**

## Dirt and condensate



In many applications, sensors struggle with buildup. This applies especially to ultrasonic sensors: buildup affects the reliability of the measurement signal and increases the dead zone. Optimized signal processing enables radar sensors to suppress interference caused by buildup on the antenna system.

**Radar sensors are immune to the effects of dirt and buildup and do not have to be cleaned.**

## Dead zone and submersion



Due to process conditions, sensors are regularly flooded in some applications. To counteract this, ultrasonic sensors are often equipped with anti-submersion shields. However, these shields can also easily collect dirt and flotsam, which ultimately degrades their measurement reliability. Radar sensors have no dead zone (blanking distance) so they don't need this protection, they function reliably, even when flooded.

**Radar sensors enable reliable measurement right up to the sensor antenna itself, even when flooded.**

## Reliability and accuracy



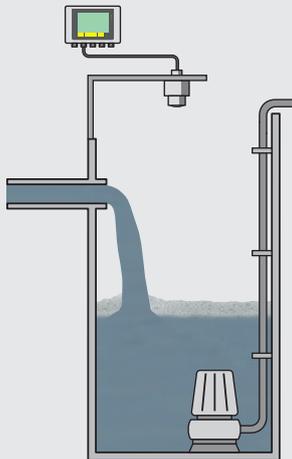
Thanks to the strong focusing of 80 GHz technology, the radar beam can be aimed at the measured medium with pinpoint accuracy. As a result, even narrow shafts or deposits on vessel walls or internals such as pipes or pumps cannot generate interfering signals. In contrast to ultrasonic, no false signal suppression is necessary.

**Radar sensors are highly suited for use in confined spaces and vessels with internal installations.**



## No interfering signals due to cramped operating space

### PUMPING STATION



Pumping stations are used to compensate for unfavourable sewer gradients. Level measurement in the pump shaft enables cost-effective control of the pumps. Radar sensors deliver exact readings even with dirt, foam or condensate in the shaft, even spider webs don't bother the radar sensor. Thanks to its narrow focusing, the new radar sensor performs extremely well in confined spaces resulting from small shaft dimensions, buildup on the walls or protruding fixtures.

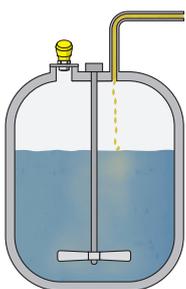
- Exact measuring results unaffected by shaft internals
- Long service life through use of highly resistant materials
- Controller with intelligent pump management for optimal operation and energy usage



### Storage and buffer tanks

#### Maximum utilization of the entire tank volume

Storage and buffer tanks guarantee the supply of raw materials for ongoing processes. Compact radar sensors can exploit their strengths here, as they can be installed in very confined spaces and onto small process fittings. Since they have no dead zone, the sensors can measure dependably right up to the top of the container. Even if the medium generates gases, the sensors remain accurate and deliver reliable measurements.



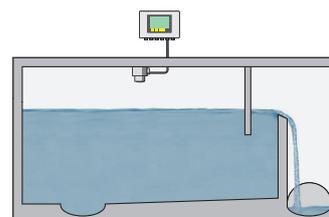
- Independent of medium and process properties
- Long measuring ranges with small process fittings
- Ex approval for flammable media



### Stormwater overflow chambers

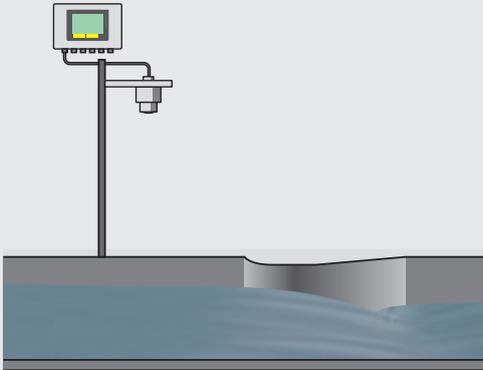
#### Reliable measurement over the entire measuring range

Stormwater overflow chambers protect sewage treatment plants from capacity overload during periods of heavy rain. If the rainwater overflow basin is unable to hold the accumulating water, part of it is discharged into a river. Due to legal regulations, the impoundment and discharge events must be measured and recorded. Thanks to the high accuracy of the radar sensors, the impounded and discharged water quantities can be measured with just one sensor.



- Exact measurement of the discharged water quantity
- Low sensor height allows a larger impoundment volume
- Safe operation/ adjustment with smartphone – climbing into sewer unnecessary

# OPEN CHANNEL FLOW



## Unaffected by environmental conditions



Wastewater is often transported to the sewage treatment plant in open channels. The flow rate is measured on flumes and weirs around the plant. The water quantities measured at the inlet and outlet of the sewage treatment plant is used for calculating wastewater charges and consents. The high accuracy of radar sensors, completely unaffected by solar radiation and temperature fluctuations, enables accurate measurement.

- High system availability through maintenance-free measurement
- Flow-proportional output signal by means of integrated flow curves
- Quick setup and commissioning of the controller via application wizards

## Chemical tanks



### Reliable measurement through 80 GHz technology

Level measurement is used for inventory monitoring in chemical storage tanks. Different chemical mixtures do not affect the accuracy or measurement performance in any way. This ensures reliable measurement regardless of medium, process or ambient conditions. With plastic vessels, the medium can be measured right through the vessel top.



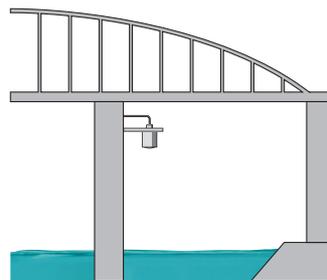
- Simple mounting of the sensor
- No contact with the medium
- Unaffected by changing media
- Approval as overfill protection according to WHG (Water Resources Act in Germany)

## River level



### Unaffected by environmental conditions

Reliable monitoring of river levels is a critical prerequisite for reacting quickly and correctly in the event of a flood. Radar sensors monitor river levels without being affected by temperature fluctuations, for example, by solar radiation. Their accuracy is also completely independent of the measuring range. Even at a distance of 30 meters from the water surface, a radar transmitter still delivers level readings accurate to the millimetre.



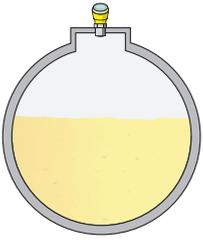
- Long service life through use of highly resistant materials
- Simple mounting
- Secure wireless setup with a smartphone

## Fuel tank



### Maximum utilization of the entire tank volume

Emergency generators are an important precautionary measure to keep complex systems operating during a power failure. Fuel for the generators is often stored in a main tank and in day tanks. To ensure that there is always enough fuel on hand, the levels in the tanks are monitored continuously.



- Exact measuring results, even in media with poor reflective properties
- Simple installation and setup
- Maintenance-free non-contact measurement

## Lime silo



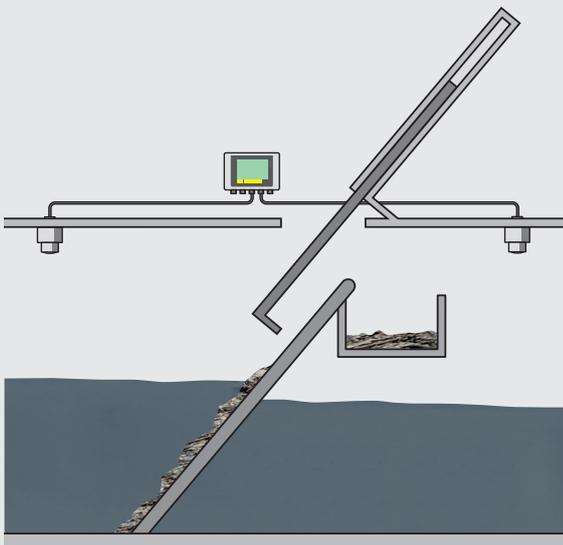
### Unaffected by dust and buildup

In the wastewater industry, lime is used to stabilize the pH value. Stored in large silos, it is added to wastewater as a solid or as an aqueous suspension. Radar sensors deliver reliable readings without effect from ambient conditions such as dust generation. Their narrow signal focusing also allows them to measure reliably even when buildup collects on the vessel walls or on the sensor itself.



- Reliable measurement even during filling
- Measurement of the entire container volume
- Independent of angle of repose of the material surface

## RAKE CONTROL



### Unaffected by environmental conditions



Mechanical pre-cleaning removes floating matter with rakes or sieves. Measurement of the water level difference between the front and the back of the screen is used to determine the degree of contamination and control the cleaning of the screen. Radar sensors provide reliable measurement data even when exposed to the elements, e.g. intense solar radiation. Even small wastewater treatment facilities are no problem for the radar sensor, as there is no dead zone restricting its measuring range.

- High system availability through maintenance-free measurement
- Non-sensitive to condensate and buildup
- Controller for level and difference measurement

# VEGAPULS compact version

	VEGAPULS 11	VEGAPULS 21	VEGAPULS 31
			
Application liquids	√	√	√
Application bulk solids	√	√	√
Measuring range	8 m	15 m	15 m
Antenna	Integrated plastic horn antenna made of PVDF	Integrated plastic horn antenna made of PVDF	Integrated plastic horn antenna made of PVDF
Process fitting	Threads G1½, 1½ NPT	Threads G1½, 1½ NPT	Threads G1½, 1½ NPT
Mounting connection	–	–	–
Process temperature	-40 ... +60 °C	-40 ... +80 °C	-40 ... +80 °C
Process pressure	-1 ... +3 bar (-100 ... +300 kPa)	-1 ... +3 bar (-100 ... +300 kPa)	-1 ... +3 bar (-100 ... +300 kPa)
Accuracy	±5 mm	±2 mm	+/- 2 mm
Frequency range	W-band, 80 GHz	W-band, 80 GHz	W-band, 80 GHz
Beam angle	8°	8°	8°
Signal output: 4 ... 20 mA	√	√	√
4 ... 20 mA/HART	–	√	√
Modbus	–	–	–
SDI-12	–	–	–
Integrated on-site display	–	–	√
Wireless operation	√	√	√
Explosion protection	–	√	√
Protection class	IP66/IP67, Type 4X	IP66/IP67, Type 4X	IP66/IP67, Type 4X

# VEGAPULS **cable version**

VEGAPULS C 11	VEGAPULS C 21	VEGAPULS C 22	VEGAPULS C 23
			
√	√	√	√
√	√	√	√
8 m	15 m	15 m	30 m
Integrated plastic horn antenna made of PVDF	Integrated plastic horn antenna made of PVDF	Integrated plastic horn antenna made of PVDF	Integrated plastic horn antenna made of PVDF
Threads G1½, 1½ NPT	Threads G1½, 1½ NPT	Threads G1½, 1½ NPT	–
Threads G1, 1 NPT	Threads G1, 1 NPT	Adapter for ceiling mounting	Threads G1, 1 NPT
-40 ... +60 °C	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
-1 ... +3 bar (-100 ... +300 kPa)	-1 ... +3 bar (-100 ... +300 kPa)	-1 ... +3 bar (-100 ... +300 kPa)	-1 ... +3 bar (-100 ... +300 kPa)
±5 mm	±2 mm	±2 mm	±2 mm
W-band, 80 GHz	W-band, 80 GHz	W-band, 80 GHz	W-band, 80 GHz
8°	8°	8°	4°
√	√	√	√
–	√	√	√
–	√	√	√
–	√	√	√
–	–	–	–
√	√	√	√
–	√	√	√
IP66/IP68, Type 6P	IP66/IP68, Type 6P	IP66/IP68, Type 6P	IP66/IP68, Type 6P

# VEGAMET controllers

	VEGAMET 841/842	VEGAMET 861/862
		
Measured value display	√	√
Point level alarms	√	√
Pump control	√	√
Flow measurement in open channels	√	√
Data logger	–	√
Input	VEGAMET 841: 1x 4 ... 20 mA sensor input  VEGAMET 842: 2x 4 ... 20 mA sensor input	VEGAMET 861: 1x 4 ... 20 mA/HART sensor input 2x digital input  VEGAMET 862: 2x 4 ... 20 mA/HART sensor input 4x digital input
Hysteresis adjustable	√	√
Output	1/2x 0/4 ... 20 mA current output 3x operating relay 1x fail safe relay (instead of an operating relay)	1/3x 0/4 ... 20 mA current output 4/6x operating relay 1x fail safe relay (instead of an operating relay)
Operating voltage	24 ... 65 V DC 100 ... 230 V AC, 50/60Hz	24 ... 65 V DC 100 ... 230 V AC, 50/60Hz
Mounting	Wall/pipe mounting in the field	Wall/pipe mounting in the field
Display	LCD matrix display, black and white backlight with colour change according to status	LCD matrix display, black and white backlight with colour change according to status
Adjustment	On-site adjustment with 4 keys, smartphone/tablet/PC via Bluetooth	On-site adjustment with 4 keys, smartphone/tablet/PC via Bluetooth
Approvals	ATEX, IEC, cULus, NEPSI, EAC, INMETRO, TIIS, KOSHA/KTL, SEPRO, CCOE, IA, WHG	ATEX, IEC, cULus, NEPSI, EAC, INMETRO, TIIS, KOSHA/KTL, SEPRO, CCOE, IA, WHG
Explosion protection	√	√

# INTERCONNECTED SOLUTIONS

## Wireless operation

With Bluetooth, VEGA is looking far into the future. But even today, radio technology is already making processes more and more flexible. Wireless communication provides better accessibility: In clean rooms, in harsh industrial environments and in hazardous areas. It allows setup, display and diagnostics from a distance of up to 25 metres, thus saving time and avoiding hazardous situations. Simply via VEGA Tools app – on any available smartphone or tablet.

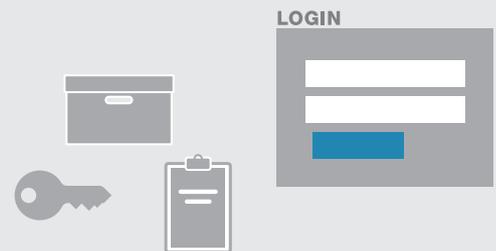


## myVEGA

With myVEGA as your personal information platform you have access to many useful online functions relating to VEGA products.

## The advantages of myVEGA

- Configurator for the entire VEGA product range
- 2D/3D drawings of configured instruments
- Access to product data, operating instructions, certificates and software
- Manage offers and order data, and also track shipments
- Save, manage and synchronize access codes for VEGA sensors



Register at  
[www.vega.com/myvega](http://www.vega.com/myvega)

# OUR SERVICE FOR YOU!

**From initial planning to setup or installation advice – we are here for you. Would you like to talk with one of our experts and work out together which sensor best suits your needs? Just get in touch! We're always happy to help and advise, so you can select the right instrument for the job!**

## Training with added value

Our seminars are designed to deliver our technical knowledge and experience to you in the most effective way possible. We can host training sessions at our facilities or come to your location.

## 24-hour service hotline

You can reach our technical support anytime there's an emergency – 24 hours a day.

## Delivery with SPEED

Because time is money, we have a delivery concept called "SPEED". It ensures that our sensors are delivered to you within a few days.

## CONSULTATION

Would you like to receive expert consultation?  
Just give us a call.

### Consultation on products and applications

Mon–Fri from 8:00 AM to 4:00 PM

+49 7836 50-0

## ONLINE

Find the full range of our solutions quickly and conveniently online. User-friendly search functions guide you to the right product with just a few clicks.

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