Pulse Radar for Level
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Leadership in Pulse Radar Technology

When it comes to measuring the level of process and storage materials, the VEGAPULS 60 series of through-air radar devices represents the most advanced technology available. The VEGAPULS overcomes difficult environmental conditions, offering superior measurement reliability and accuracy. With the most complete line of radar sensors on the market, VEGA sets a new standard for radar in continuous level measurement.

Advanced Design & Development
As the inventors of pulse measurement technology, two-wire, loop-powered radar, and the first through-air radar gauge for solids applications, VEGA has a strong tradition of product development and innovation. The flexibility of VEGA's plics® technology provides a variety of antenna styles and two different emitting frequencies, chosen based on application requirements. This platform for all VEGA-designed instruments makes plics measurement technologies easy to use. With sensors that offer reliable measurement using through-air radar, and construction based on the of plics principle, VEGA continues to lead the way in solving difficult and important applications.

Why Use Pulse Radar?
Pulse radar is an ideal replacement technology for pressure transmitters and DP cells that constantly require zero-point recalibration. By utilizing electromagnetic microwave pulses, VEGAPULS radar instrumentation is able to provide accuracy up to 2 mm! In addition, the instruments will not need recalibration after initial configuration and will not experience zero point drift or fluctuations due to change in specific gravity, temperature, or pressure. This translates into less time spent on setup, maintenance, and troubleshooting, as well as a worry-free installation that will perform beyond expectation.

Certifications
Pulse radar instrumentation is designed for certification compliance with the following programs:

- ATEX Standard
- CSA
- FM Standard
- GOST-R Standard
- SIL2
- IECEx
- WHG
- 3A
- FDA
- ABS
Radar technology is non-contact, making it ideal for many continuous level measurement applications. The VEGAPULS quickly evaluates signals and dynamically suppresses false echoes to ensure the accuracy of its level reporting. A large measurement memory and the ability to account for signal attenuation due to buildup supports the reliability of the technology.

**Pulse**

The sensor transmits energy in the form of microwave pulses. These pulses are directed toward the level surface, which reflects the energy back to the antenna.

**Target**

The amount of energy that returns to the antenna depends on the reflective properties of the material being measured. Reflectivity is determined by two characteristics: conductivity and dielectric constant (DK).

**Return Time to Antenna**

The transit time of the microwave pulse that returns to the antenna is measured and used to calculate the distance.

**Effect of Frequency**

VEGA radar instruments operate in one of two frequency bands: C-band or K-band. C-band instruments operate in a range of approximately 6 GHz. This low frequency range allows for a very powerful measurement when extreme process conditions are present. K-band instruments operate in a frequency range of approximately 26 GHz. The higher frequency range allows the instrument to have a more focused beam angle and smaller process connection sizes. It is perfect for applications and vessels with moderate process conditions. The choice between these frequencies gives VEGA the ability to customize a radar system to each application.
K-Band Models & Versions

VEGAPULS 61

Pulse radar sensor for level measurement of liquids
- SIL2 qualified; standard version
- Output signals include 4 … 20 mA/HART, Profibus PA, or Foundation Fieldbus
- Process connections include 1.5” NPT, plastic flanges, or mounting loop

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring Range</td>
<td>0 … 115 ft (0 … 35 m)</td>
</tr>
<tr>
<td>Process Temperature</td>
<td>-40 … +176°F (-40 … +80°C)</td>
</tr>
<tr>
<td>Process Pressure</td>
<td>-14 … +29 psi (-1 … +2 bar)</td>
</tr>
<tr>
<td>Antenna Type(s)</td>
<td>PVDF encapsulated</td>
</tr>
<tr>
<td>Measuring Precision</td>
<td>± 2 mm</td>
</tr>
</tbody>
</table>

VEGAPULS 62

Pulse radar sensor for level measurement of liquids under difficult conditions
- SIL2 qualified; standard version
- Output signals include 4 … 20 mA/HART, Profibus PA, or Foundation Fieldbus
- Process connections include NPT or ANSI flange

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>Measuring Range</td>
<td>0 … 115 ft (0 … 35 m)</td>
</tr>
<tr>
<td>Process Temperature</td>
<td>-328 … +842°F (-200 … +450°C)</td>
</tr>
<tr>
<td>Process Pressure</td>
<td>-14 … +2,320 psi (-1 … +160 bar)</td>
</tr>
<tr>
<td>Antenna Type(s)</td>
<td>Horn, parabolic, integral stilling well</td>
</tr>
<tr>
<td>Measuring Precision</td>
<td>± 2 mm</td>
</tr>
</tbody>
</table>
### VEGAPULS 63

**Pulse radar sensor for level measurement of liquids under sanitary or corrosive conditions**

- SIL2 qualified; standard version
- Output signals include 4 … 20 mA/HART, Profibus PA, or Foundation Fieldbus
- Process connections include ANSI flange or sanitary tri-clamp

<table>
<thead>
<tr>
<th>Measuring Range</th>
<th>0 … 115 ft (0 … 35 m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Temperature</td>
<td>-328 … +392°F (-200 … +200°C)</td>
</tr>
<tr>
<td>Process Pressure</td>
<td>-14 … +232 psi (-1 … +16 bar)</td>
</tr>
<tr>
<td>Antenna Type(s)</td>
<td>TFM-PTFE, PFA encapsulated, PVDF</td>
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<tr>
<td>Measuring Precision</td>
<td>± 2 mm</td>
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</tbody>
</table>

### VEGAPULS 67

**Pulse radar sensor for level measurement of bulk solids**

- SIL2 qualified; standard version
- Output signals include 4 … 20 mA/HART, Profibus PA, or Foundation Fieldbus
- Process connections include plastic flange or mounting loop

<table>
<thead>
<tr>
<th>Measuring Range</th>
<th>0 … 50 ft (0 … 15 m)</th>
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<tr>
<td>Process Temperature</td>
<td>-40 … +176°F (-40 … +80°C)</td>
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<tr>
<td>Process Pressure</td>
<td>-14 … +29 psi (-1 … +2 bar)</td>
</tr>
<tr>
<td>Antenna Type(s)</td>
<td>PVDF encapsulated</td>
</tr>
<tr>
<td>Measuring Precision</td>
<td>± 2 mm</td>
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</tbody>
</table>

### VEGAPULS 68

**Pulse radar sensor for level measurement of bulk solids**

- SIL2 qualified; standard version
- Output signals include 4 … 20 mA/HART, Profibus PA, or Foundation Fieldbus
- Process connections include ANSI flange, ANSI swivel flange, or NPT

<table>
<thead>
<tr>
<th>Measuring Range</th>
<th>0 … 246 ft (0 … 75 m)</th>
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<tbody>
<tr>
<td>Process Temperature</td>
<td>-328 … +842°F (-200 … +450°C)</td>
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<tr>
<td>Process Pressure</td>
<td>-14 … +2,320 psi (-1 … +160 bar)</td>
</tr>
<tr>
<td>Antenna Type(s)</td>
<td>Horn, parabolic</td>
</tr>
<tr>
<td>Measuring Precision</td>
<td>± 2 mm</td>
</tr>
</tbody>
</table>
C-Band Models & Versions

VEGAPULS 65

Pulse radar sensor for level measurement of liquids with foam
- SIL2 qualified; standard version
- Output signals include 4 … 20 mA/HART, Profibus PA, or Foundation Fieldbus
- Process connections include 1.5" NPT or ANSI flange

<table>
<thead>
<tr>
<th>Measuring Range:</th>
<th>0 … 115 ft (0 … 35 m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Temperature:</td>
<td>-40 … +302°F (-40 … +150°C)</td>
</tr>
<tr>
<td>Process Pressure:</td>
<td>-14 … +232 psi (-1 … +16 bar)</td>
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<tr>
<td>Antenna Type(s):</td>
<td>PVDF/PTFE rod</td>
</tr>
<tr>
<td>Measuring Precision:</td>
<td>± 8 mm</td>
</tr>
</tbody>
</table>

VEGAPULS 66

Pulse radar sensor for level measurement of liquids with strongly agitated media
- SIL2 qualified; standard version
- Output signals include 4 … 20 mA/HART, Profibus PA, or Foundation Fieldbus
- Process connections include ANSI flange

<table>
<thead>
<tr>
<th>Measuring Range:</th>
<th>0 … 115 ft (0 … 35 m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Temperature:</td>
<td>-76 … +752°F (-60 … +400°C)</td>
</tr>
<tr>
<td>Process Pressure:</td>
<td>-14 … +2,320 psi (-1 … +160 bar)</td>
</tr>
<tr>
<td>Antenna Type(s):</td>
<td>Horn, integral stilling well</td>
</tr>
<tr>
<td>Measuring Precision:</td>
<td>± 8 mm</td>
</tr>
</tbody>
</table>
Pulse Radar in the plics System

Indicating & Adjustment Module
- PLICSCOM
- VEGACONNECT

Electronics
- 4 ... 20 mA/HART
- Profibus PA
- Foundation Fieldbus

Housings
- Plastic
- Stainless Steel
- Aluminum
- Plastic Dual Chamber
- Stainless Steel Dual Chamber
- Aluminum Dual Chamber

Process Fittings
- Thread
- Flange
- Sanitary
- Custom Design

Sensors
- Horn Antenna
- Encapsulated PVDF Antenna
- Parabolic Antenna
- Encapsulated PTFE, PFA, or PVDF Antenna
- Horn Antenna (842°F)
- Horn Antenna (482°F)
Trend-setting measurement technology evolves to meet the needs of people who use it. That is why we developed plics—the world's first modular product system for instrumentation. The modularity allows for easy component selection to meet individual application requirements. Because every one of our sensors is custom built from plics, the system fulfills the requirements of any industry and its specific applications.

Simpler Planning with plics
The choice and combination of sensors, process fittings, electronics, and housings simplifies instrument selection and engineering. With plics, cost reduction starts right at the planning stage.

Clear Advantages in Plant Construction
Short delivery times, simple wiring, and fast setup and commissioning save the plant builder significant time and costs. The configuration, wiring, and setup of VEGA instruments are always the same, so a single experience with the process is repeated with any plics measuring principle and application at any time.

Assistance for the User
plics gives a convincing performance in daily use because of its high operational reliability, simplified servicing, and reduced spare part stocking through the use of many identical components. The consistency of technology and operation simplifies and accelerates work with different plics instruments.

plics Advantages for Pulse Radar
As a plics device, a VEGA pulse radar sensor utilizes all the advantages of the modular system:

- Two-wire/Loop-powered
- Top mounted for non-contact measurement of the process material
- FCC approved for Part 15 use
- Flexible mounting includes NPT, ANSI flange, and sanitary connections
- Easy-to-use programming module or computer software makes setup simple and fast
- No recalibration
- Low maintenance due to no moving parts or contact with the process material
- Hazardous area approval available
K-band radar utilize small antenna systems that have narrow beam angles. High accuracy and mounting flexibility make the K-band VEGAPULS ideal for vessels with easy to moderate process conditions. For long range measurements, measurement of low DK products, or measurement with difficult process conditions such as foam, the high-sensitivity version of the K-band electronics is ideal.

Aggressive Products
Extremely toxic intermediate products often result from chemical reactions and need to be stored under very strict safety conditions. The non-contact radar measuring principle makes it ideal for measuring chemically toxic materials. The VEGAPULS 60 series offers numerous options for measurement under aggressive conditions, including all plastic chemically resistant parts, corrosion-resistant metal alloys, and high temperature and pressure designs.

• Construction materials provide the ability to measure in extreme pressure and temperature ranges
• Ceramic process separation offers optimal resistance to chemical diffusion

Liquid Gas Measurement
Low dielectric liquefied gases found in petrochemical plants often require a stilling well to make the measurement. A stilling well focuses the radar signal of a VEGAPULS, allowing it to see a good reflection from a low dielectric constant (DK) material. Optional isolation ball valves are possible with stilling wells and through-air radar.

• Focused signal reliably measures products with low dielectric values
• Multiple radar devices achieve redundancy with no risk of crosstalk
Food Mixing and Preparation Vessels

The VEGAPULS 63 radar sensor is ideal for reliable level measurement of food products. The non-contact measurement is not affected by density changes in the process. The front-flush antenna allows optimal CIP and SIP cleaning, is insensitive to high-pressure water jets, and is not affected by thermal shock.

- Non-contact measurement is unaffected by pressure and temperature fluctuations
- Absolute front-flush antenna withstands food industry cleaning practices
- Available with sanitary tri-clamp connection

Tank Farm Level Measurement

The radar sensor VEGAPULS 62 is ideal for level measurement, in all size storage vessels. Small and light, the sensor mounts easily in an existing mounting boss or integrates into a manway. With an accuracy of 2 mm, the sensor is ideal for tank inventory management and integrates easily with control systems.

- Easy setup reduces commissioning time
- Mounting options allow for protection against overfill in floating roof vessels

“Radar is a versatile technology designed to measure in the most challenging applications. Success comes by selecting the right VEGAPULS for the process conditions.”
C-Band radar is a low frequency radar. C-Band radar is ideal for measurements in harsh process conditions with severe agitation or mixing. It is also used for storage applications and vessels where foam may be present.

**Distillation Column**

In the past, displacer systems in bridles have been used for level measurement in distillation columns. This system is maintenance-intensive. Non-contact radar sensors like the VEGAPULS 66 commonly replace displacers. Existing bypass tubes can usually be used for the measurement, so no mechanical modifications to the vessel are necessary.

- Resistant materials allow for operation under extreme process pressures and temperatures
- Mounting options retrofit to existing bypass tubes

**Digester Towers**

Methane gas is created in the waste digestion process. Thus, a measurement must be made under changing gas concentrations and fluctuating pressure conditions.

The non-contact VEGAPULS 66 radar sensor is the ideal solution for this measurement. Completely independent of the process conditions and density of the waste water sludge, it reliably detects the surface of the product. The low C-band frequency makes the measurement, even during periods of sudden foam generation that can occur in the digester.

- Reduces maintenance needs by operating without moving parts or contact with the process material
“For hazardous areas, a variety of housings are available: intrinsically safe supply, integrated barrier for pressure resistance, or encapsulated Ex-d version.”

Service Tanks on Ships
Cavities and inaccessible places on ships that are used as tanks for drinking water, fuel, and ballast are reliably and precisely measured by a sounding tube and through-air radar sensor. The microwave pulses of the VEGAPULS 66 radar are guided through the tube and are unaffected by vessel obstructions and sidewalls.

- Swiveling holder provides easy sounding
- Non-contact measurement is independent of product characteristics and vessel form

Gravel and Grit Mining
Due to the high mechanical forces and abrasion in certain mining applications, level measurement techniques that contact the medium are unsuitable. The VEGAPULS 68 non-contact radar was specifically developed for such applications. Unaffected by dust, abrasion, condensation, product moisture, and filling noise, the instrument reliably measures in silos and bunkers up to 246 feet (75 m) high.

- Easy setup reduces installation time
- Reliable radar technology measures through dust and during filling
“With VEGA technology, any user can set up a measuring point exactly as the system requires. Remote parameter adjustment with a control system is just as easy and flexible as setup at the sensor.”
PLICSCOM – Multi-Function Ability
The PLICSCOM indicating and adjustment module plugs into any plics instrument on-demand. It functions as a measured value indicator on the instrument and as a local adjustment device. The structure of the adjustment menu is clearly organized and makes setup and commissioning easy. In addition, the status messages are displayed directly on the screen. When an instrument is exchanged, PLICSCOM ensures fast availability of the measuring point — all sensor data is saved by pressing a key on the PLICSCOM and later copied into the replacement sensor.

External Indicating and Adjustment
An external indicating and adjustment unit with integrated PLICSCOM can be connected to the sensor with a standard cable up to 50 meters long. It allows setup of the measuring point, even in difficult to access locations, and requires no external power.

PC Adjustment with VEGACONNECT
For increased setup versatility, the mobile VEGACONNECT easily connects VEGA instruments to any PC through the USB interface. The parameter adjustment of these instruments is accomplished by PACTware adjustment software and a DTM. VEGACONNECT also acts as a universal HART modem for sensors of other manufacturers.

Setup with a HART Handheld
A HART Handheld is an additional tool that enables on-site sensor parameter adjustment. To access the HART parameters of a sensor, it connects to the sensor cable through a minimum working resistance of 220 ohms.