



Continuous level measurement

The radar sensor for bulk solids VEGAPULS 69

VEGAPULS 69 – the sequel to an ongoing success story

Equipped for the future!

For more than 20 years, VEGA has been market leader in radar level measurement. The physical characteristics of this measuring principle and the outstanding technical execution of the sensors themselves offer many advantages for across widely different industries.

As a result, previous measuring principles – such as electromechanical or ultrasonic sounding – are increasingly being replaced by modern radar technology. Higher frequency ranges and new instrument designs are extending its capabilities and providing solutions for an even broader range of applications.

Now, ten years after the first VEGA radar sensor designed for bulk solids came to the market, VEGA is introducing a new, more powerful bulk solids radar sensor: VEGAPULS 69. This instrument offers the ultimate in safety, reliability and accuracy for an extremely wide application spectrum.



The radar sensor for all applications with bulk solids

Electronics & Software

- Dynamic echo tracking
- Automatic false echo analysis
- Fast signal processing and high update rate
- Extensive Asset Management functions

- Frequency 79 GHz
- Dynamic range 120 dB
- Measuring range up to 120 m
- Accuracy ± 5 mm

Air purge connection

- Included as standard feature
- Efficient cleaning
- Low air consumption
- For extreme applications

Swivelling mounting

- Easily adjustable (up to $\pm 10^\circ$)
- High-quality material
- Smartphone App for easy sensor alignment

Lens antenna



- Insensitive to buildup and dirt
- Sealed antenna system
- No protrusion into the vessel
- No wear
- 4° beam width

Material: PEEK

- High temperature resistance
- Excellent mechanical performance
- High chemical resistance
- FDA approval



VEGAPULS 69: One sensor – two versions

Features	Lightweight plastic antenna 	High-quality, swivelling stainless steel flange 
Frequency	79 GHz	
Measuring range	up to 120 m (394 ft)	
Deviation	± 5 mm	
Response time	≤ 1 s	
Approvals	Ex approvals, open air approval acc. to EN 302729-1/2	
Process fitting	Mounting strap, adapter flanges from DN 100 Compression flanges from DN 80	Flanges from DN 80 Flanges from DN 100 with swivel holder
Process pressure	-1 ... +2 bar (-100 ... +200 kPa)	-1 ... +3 bar (-100 ... +300 kPa)
Process temperature	-40 ... +80 °C (-40 ... +176 °F)	-40 ... +200 °C (-40 ... +392 °F)

PC adjustment

- plics® instrument and PC are simply connected together via the optional interface converter VEGACONNECT
- Parameters are set using the proven DTM/FDT technology and PACTware
- Graphics-supported EDDs are available for EDD-based adjustment

Display and adjustment

- The display and adjustment module PLICSCOM is used for measured value indication, setup and diagnosis
- It can be used on any plics® sensor, regardless of the measuring principle or instrument generation
- Simple menus in plain text with a display that rotates in 90° increments allows easy, convenient reading and adjustment

Measurement certainty

- Advanced microelectronics, as well as application experience gained over 50 years, guarantee a high certainty of measurement
- An integrated real-time clock and memory for 100,000 readings and 500 status messages or parameter changes enable comprehensive diagnosis
- Spring-loaded terminals provide maximum connection reliability, even when subjected to severe vibration or large temperature fluctuations

The instrument



Display and adjustment module

- PLICSCOM
- VEGACONNECT
- PLICSLED

plics® – simplicity with system

Every measuring instrument is assembled from prefabricated components. This modular design allows full flexibility when selecting the required sensor features.

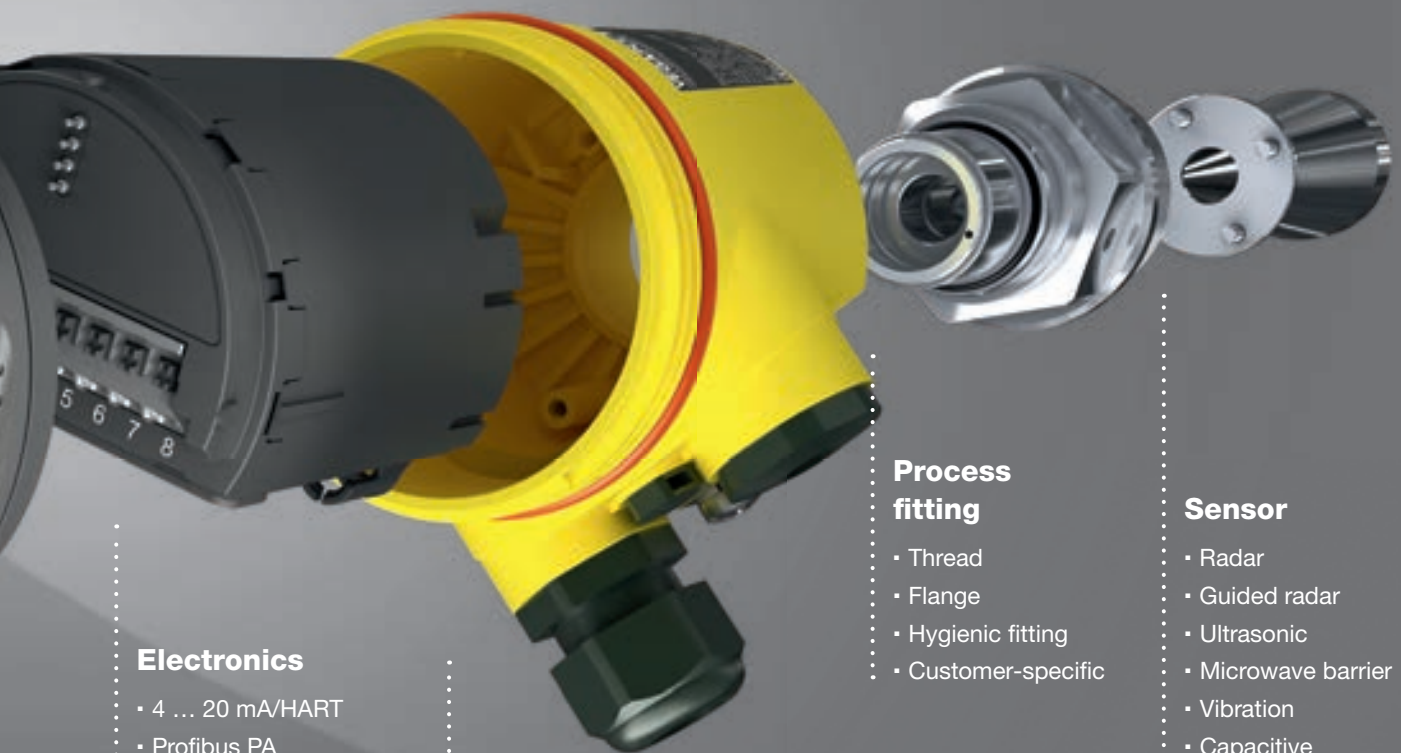
Serial number and data matrix code

- Technical documents, certificates, and instrument settings can be retrieved from the VEGA website at any time, just input the sensor serial number
- It's even easier with the VEGA App: Scan the data matrix code and you get instant access to all the device-specific documentation of your sensor

Diagnosis

- The integrated self-monitoring function of a plics® instrument provides continuous information on its operational status
- Asset Management messages according to NE 107 and status information in plain text allow proactive and cost-effective maintenance
- The date and time stamped measured value and event memory supports the comprehensive diagnostics

platform plics®



Electronics

- 4 ... 20 mA/HART
- Profibus PA
- Foundation Fieldbus
- Level switch

Housing

- Plastic
- Stainless steel
- Aluminium
- Plastic double chamber
- Stainless steel double chamber
- Aluminium double chamber

Process fitting

- Thread
- Flange
- Hygienic fitting
- Customer-specific

Sensor

- Radar
- Guided radar
- Ultrasonic
- Microwave barrier
- Vibration
- Capacitive
- Process pressure
- Hydrostatic pressure
- Differential pressure



Practical application: Grain storage

The application

Typical grain bins are tall and narrow, and often segmented. This makes reliable level measurement inside them difficult.

The advantages of VEGAPULS 69

- With a beam width of 4°, signal focusing is especially optimized for high, narrow silos
- Non contact, no moving parts
- Narrow focusing ensures freedom from noise and thus an accurate, reliable measurement
- Due to enhanced focusing, the product can be measured right down into the extraction funnel, which improves silo utilization

Other application possibilities

The radar sensor VEGAPULS 69 also lends itself well to level measurement in containers with complex shapes and internal fixtures:

- High silos
- Segmented containers
- Containers with mixing systems
- Silos with reinforcing struts
- Mounting close to the vessel wall

Example: Feed silo

Until now, measurement in tall, narrow silos was very difficult. The particularly good signal focusing of VEGAPULS 69 now allows measurement in a more than 15 m high feedstuff silo with a cross-sectional area of only 1 m². VEGAPULS 69 reliably detects the level of the medium.

VEGA Tools App
for Android in the
Google Play Store



VEGA Tools App
for iPhone in the
Apple App Store



Focusing on the essentials

Why is focusing so important?

A radar sensor can only measure the level correctly if a proper level echo is present. This is especially true for solids: if the noise, (i.e. the jumble of interfering signals) is as strong as the level echo itself, a consistent performance from a non-contact sensor is very difficult to achieve. For this reason, good focusing is a critical factor for accurate and reliable measurement.

The theory

The beam angle of the emitted radar energy – and thus also the focusing – is dependent on two factors: transmission frequency and effective antenna aperture. This means that, with an antenna of the same size, considerably better focusing is achieved with a higher frequency.

The solution

VEGAPULS 69 operates with a transmission frequency of 79 GHz and an antenna aperture of 75 mm. A beam angle of just 4° is achieved with this, making measurement more certain and reliable. The focused 79 GHz beam simply avoids any internal installations and buildup on the vessel wall.

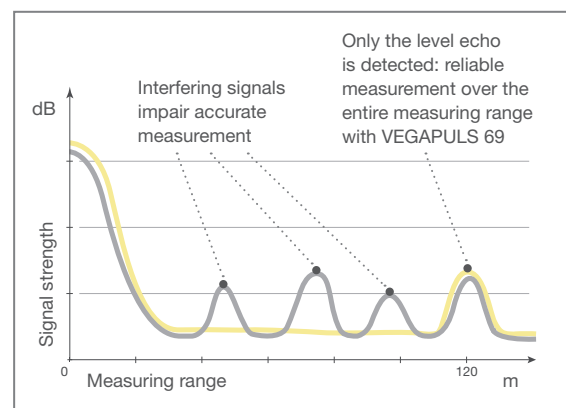
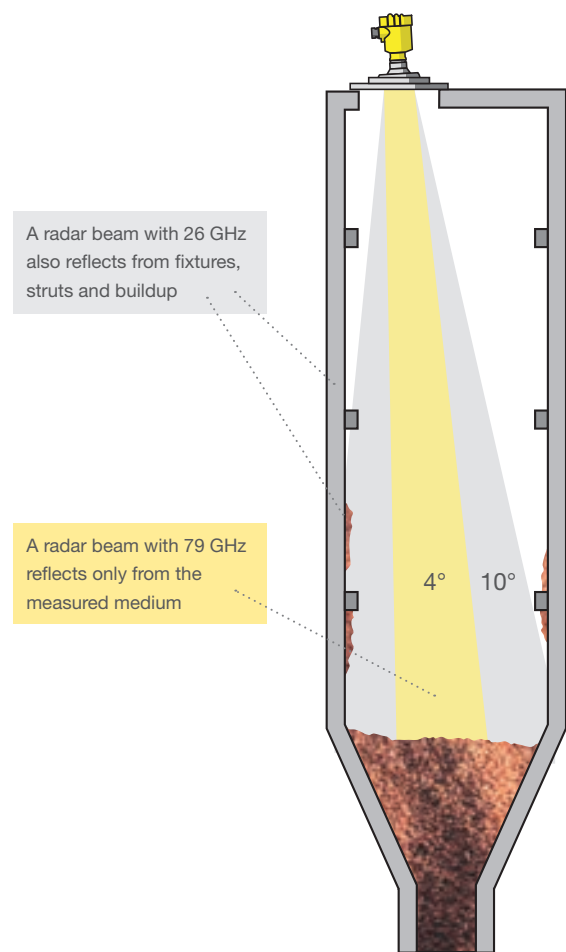
By comparison: A radar sensor with a transmission frequency of 26 GHz and an antenna of the same size has an aperture angle of approximately 10°. The wider beam generates more false echoes as it strikes the internal fixtures and buildup on the vessel wall; this makes a precise measurement more difficult.

The benefits

- Setup and commissioning is considerably easier and more user-friendly, due to better focusing
- Improved focusing means higher measurement certainty over the entire measuring range

Expert tip:

VEGA offers a clever solution for optimally aligning of the sensor on the silo. With the VEGA App and a smartphone, the sensor can be aligned quickly and efficiently.





Practical application: Plastic powder

The application

Plastics are stored in the form of granules and powders in tall, narrow silos. Due to their poor reflective properties to radar, plastics are very difficult to measure – a large part of the microwave signal is simply absorbed by the medium.

The advantages of VEGAPULS 69

Its high dynamic range allows the measurement of plastics:

- Deployable in a wide range of applications
- Reliable measurement of solids with poor reflective properties
- High reliability and accuracy

Other application possibilities

The new radar sensor VEGAPULS 69 is suitable for many products with poor reflective properties:

- Dry wood chips
- Bran, chaff
- Fumed silica
- Very light fly ash

Example: Storage container for plastic powder

In this application, VEGAPULS 69 really shows its strengths. Plastic powder is stored in a 20 m high, very narrow silo. The swivel mounting flange and the VEGA App for sensor alignment make installation a breeze. Thanks to its high dynamics, VEGAPULS 69 reliably detects the level under all application conditions.



Detecting very small signals reliably

Why is the dynamic range of a radar device important?

The dynamic range of a radar sensor defines which applications the sensor can be successfully used in. The reflective properties of various bulk solids differ greatly. A large dynamic range ensures that even the smallest signals and therefore the widest range of products can be measured.

The theory

The dynamic range of a sensor indicates the difference between the largest and smallest signal that can be measured. Since the transmitting power cannot be increased, the electronics has to detect and evaluate ever smaller signals.

The solution

VEGAPULS 69 sets new standards. Because of its large dynamic range, it can measure even the tiniest of reflected signals. This ensures even better measurement certainty and reliability for media with good reflective properties – such as coal, ore or rocks.

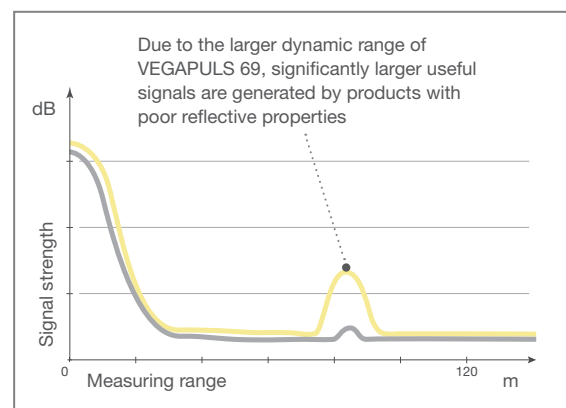
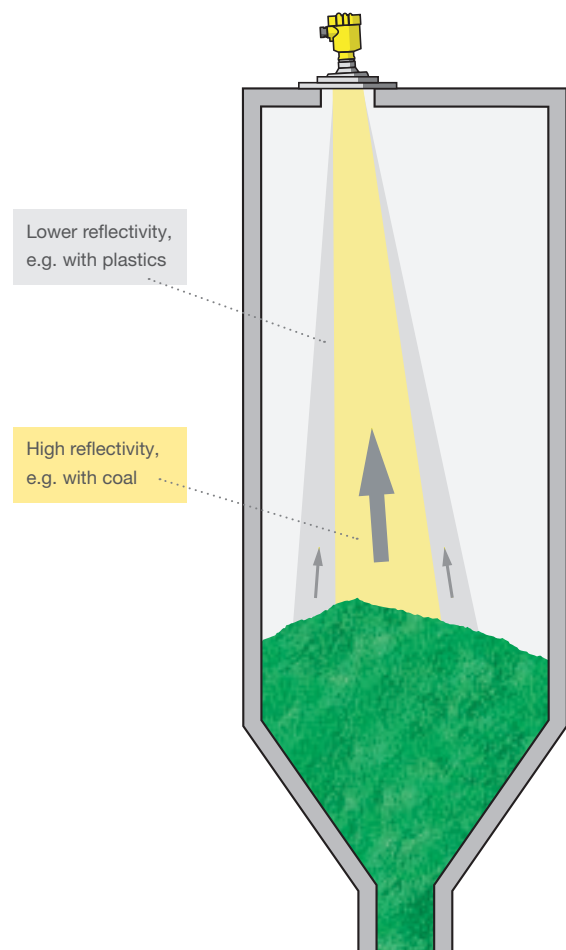
When it comes to the measurement of media with poor reflective properties, such as plastic powders or dry wood chips, this new technology comes into its own, with significantly improved signal differentiation.

The benefits

- Broader range of applications for all bulk solids, regardless of their reflective properties
- Universal measuring method thanks to the large dynamic range

Expert tip:

When selecting a sensor for bulk solids applications, it makes sense to opt for a sensor with the largest possible dynamic range. Such a sensor always ensures maximum reliability, regardless of the measuring range and the type of application.





Practical application: Cement

The application

For level measurement in cement production, sensors with widely different measuring ranges are required. Raw flour, clinker and finished cement are stored in silos of many different heights.

The advantages of VEGAPULS 69

Universal use in all applications in the cement industry:

- Application spectrum extends from short to very long measuring ranges
- Unaffected by dust and strong air currents
- Can be used across a wide range of temperatures

Other application possibilities

Beside typical level measurement in silos, the high-performance VEGAPULS 69 sensor offers additional possibilities:

- Distance measurement on conveyors or anti-collision protection
- Level measurement in open dumps
- Monitoring of rock crushers in quarries

Example: Cement silo

A radar sensor measures the level in a 35 m high cement silo. Due to the good focusing and wide dynamic range of the sensor, an absolutely reliable measurement is possible in all phases of operation. The sensor measures the level reliably and accurately without effect from the dust deposits and very high product temperatures.



Performance reserves included

Is there such a thing as a universal sensor for bulk solids?

Radar sensors are used in widely different applications, ranging from small bulk solids containers to large warehouses. Up to now, meeting the different application requirements meant that different sensor versions had to be used. Is this still necessary?

The theory

The larger the measuring range, the larger the radiated area. But at the same time, the reflected signals are weaker. These issues make strong focusing and a high dynamic range all the more important.

The solution

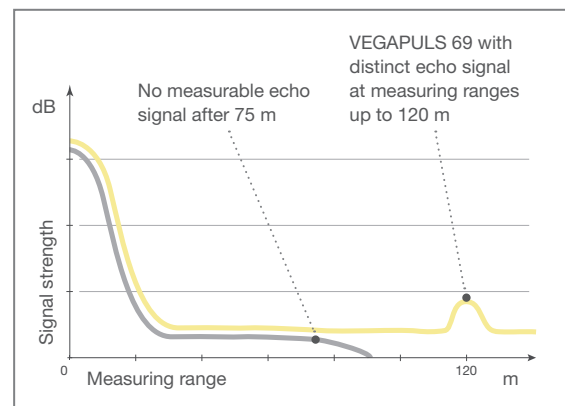
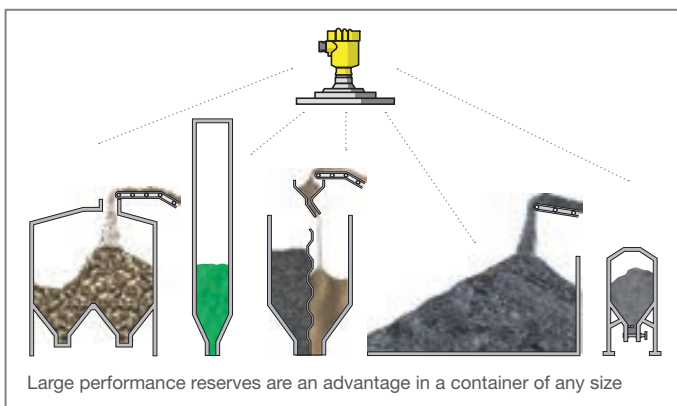
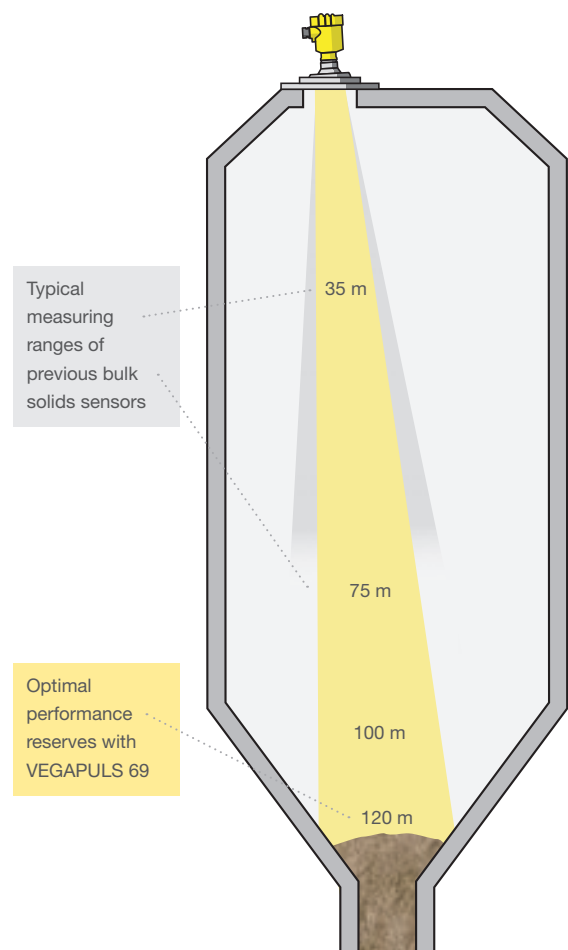
The measuring range is an indication of the performance capability of the entire system. Due to its particularly good signal focusing and high dynamic range, VEGAPULS 69 can detect poorly reflecting bulk solids reliably, even at a distance of 120 m. That's with a cycle time of less than one second and an accuracy of ± 5 mm. This system is also designed to achieve the very same performance even over very small measuring ranges.

The benefits

- High performance over small measuring ranges
- Ideal for very high tanks or silos
- Up to 120 m for level or distance measurement

Expert tip:

With its simple mounting bracket for easy installation, the VEGAPULS 69 with its plastic antenna is perfectly suited for distance measurement.



The perfect package for measurement of bulk solids

+ Level measurement for effective production



The level is measured and converted into a level proportional signal, which can be either displayed directly or further processed in a control system.

VEGAPULS 69 is optimized for bulk solids level measurement and offers the ultimate in safety, reliability and accuracy.

+ Point level detection and control of processes



The levels are detected at a defined point and converted into a switching command. The switching command can be used to stop or start conveyor belts, pumps and pneumatic conveyors or integrated into a process control system for further processing.

Alongside continuous level measuring instruments, point level sensors provide additional security as an independent protection system.

The vibrating level switches VEGAVIB, VEGAWAVE and VEGACAP cover all applications with bulk solids.

+ Display, visualisation, analysis and adjustment



The further processing of the sensor readings is as individual as the measuring point itself. From a simple local display to the complex processing and analysis over Ethernet, or to the transmission of data via a radio link – VEGA offers a wide range of signal conditioning instruments and related services to meet any need.

The web based VEGA Inventory System enables easy optimization of raw material logistics, from supplier to production facility.

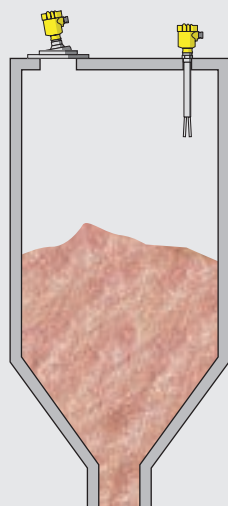
= Process instrumentation from VEGA

Practical application: Level measurement and point level detection

Measurement of fly ash in power plants

VEGAPULS 69 for
level measurement

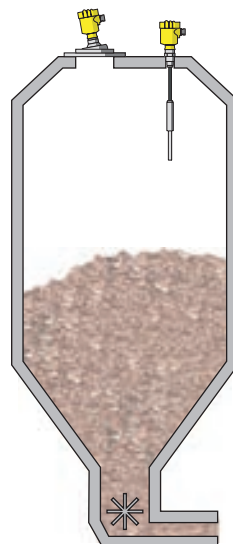
- Reliable measurement, even with changing material consistency
- Suitable for very large measuring ranges



Measurement of wood chips

VEGAPULS 69 for
level measurement

- Reliable, even with fluctuating moisture content and strong steam generation
- Integrated air purge for periodic cleaning of heavy buildup



Measurement of building materials such as sand, gravel and rocks

VEGAPULS 69 for
level measurement

- Maintenance and wear-free non-contact measurement
- Reliable measurement method unaffected by dust and noise



VEGAWAVE 63 for
point level detection

- Dependable full alarm even with very low bulk density
- Not affected by dust deposits on the sensor element

VEGAVIB 62 for
point level detection

- Suitable for a wide range of material consistencies
- Rod version avoids jamming by larger pieces of wood

VEGACAP 65 for
point level detection

- Robust sensor design ensures long service life
- High reliability, irrespective of buildup and soiling



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Looking Forward **VEGA**