

# Level and pressure instrumentation for renewable energies



Application examples and products



## Measurement technology for renewable energies





This brochure presents examples of applied level and pressure measurement technology. Here, you'll learn which sensors fit which measuring tasks.

■ <b>Dam of the hydroelectric power plant</b>	Flow measurement	■ <b>Wood pellet storage silo</b>	Level measurement and point level detection
■ <b>Water inlet at the reservoir</b>	Level measurement and point level detection	■ <b>Compact slurry tanks in biogas plants</b>	Level measurement
■ <b>Turbine building hydroelectric power plant</b>	Level measurement and point level detection	■ <b>Slurry tanks in biogas plants</b>	Pressure measurement and point level detection
■ <b>Reservoir at pumped storage power plants</b>	Level measurement	■ <b>Raw material silo in the ethanol plant</b>	Level measurement and point level detection
■ <b>Expansion tank in a thermal solar plant</b>	Level and pressure measurement	■ <b>Fermentation in the ethanol plant</b>	Pressure and level measurement, point level detection
■ <b>Gearbox oil tank in a wind turbine</b>	Point level detection	■ <b>Storage tank in the ethanol plant</b>	Level measurement and point level detection







All applications can be found at  
[www.vega.com/energy](http://www.vega.com/energy)

# All sensors at a glance




## Continuous level measurement

Instrument type	Measuring range	Process fitting	Process temperature	Process pressure
<b>VEGAFLEX 81</b> TDR sensor for continuous level and interface measurement of liquids 	up to 75 m	Thread from G¾, ¾ NPT, flanges from DN 25, 1"	-60 ... +200 °C	-1 ... +40 bar (-100 ... +4000 kPa)
<b>VEGAPULS WL 61</b> Radar sensor for continuous level measurement of water and waste water 	up to 15 m	Thread G1½, mounting strap, compression flanges from DN 80, 3"	-40 ... +80 °C	-1 ... +2 bar (-100 ... +200 kPa)
<b>VEGAPULS 62</b> Radar sensor for continuous level measurement of liquids 	up to 35 m	Thread from G1½, 1½ NPT, flanges from DN 50, 2"	-196 ... +450 °C	-1 ... +160 bar (-100 ... +16000 kPa)
<b>VEGAPULS 69</b> Radar sensor for continuous level measurement of bulk solids 	up to 120 m	Mounting strap, compression flange from DN 80, 3", flanges from DN 80, 3", adapter flanges from DN 100, 4"	-40 ... +200 °C	-1 ... +3 bar (-100 ... +300 kPa)

## Point level detection

Instrument type	Measuring range	Process fitting	Process temperature	Process pressure
<b>VEGACAP 64</b> Capacitive rod electrode for level detection of adhesive products 	up to 4 m	Thread from G¾, ¾ NPT, flanges from DN 25, 1"	-50 ... +200 °C	-1 ... +64 bar (-100 ... +6400 kPa)
<b>VEGAMIP 61</b> Microwave barrier for level detection in bulk solids and liquids 	up to 100 m	Thread from G1½, 1½ NPT, flanges, clamp, mounting strap	-40 ... +80 °C +450 °C with mounting adapter	-1 ... +4 bar (-100 ... +400 kPa)
<b>VEGASWING 61</b> Vibrating level switch for liquids 	up to 6 m	Thread from G¾, ¾ NPT, flanges from DN 25, 1"	-50 ... +250 °C	-1 ... +64 bar (-100 ... +6400 kPa)
<b>VEGASWING 63</b> Vibrating level switch with tube extension for liquids 	up to 6 m	Thread from G¾, ¾ NPT, flanges from DN 25, 1"	-50 ... +250 °C	-1 ... +64 bar (-100 ... +6400 kPa)
<b>VEGAVIB 62</b> Vibrating level switch with suspension cable for granular bulk solids 	Bulk solids from 20 g/l	Thread from G1, 1 NPT, flanges from DN 32, 1½"	-40 ... +150 °C	-1 ... +6 bar (-100 ... +600 kPa)
<b>VEGAVIB 63</b> Vibrating level switch with tube extension for granular bulk solids 	Bulk solids from 20 g/l	Thread from G1, 1 NPT, flanges from DN 32, 1½"	-50 ... +250 °C	-1 ... +16 bar (-100 ... +1600 kPa)

## Pressure measurement

Instrument type	Deviation	Process fitting	Process temperature	Measuring range
<b>VEGABAR 81</b> Pressure transmitter with chemical seal 	0.2 %	Thread from G½, ½ NPT, flanges from DN 25, 1"	-90 ... +400 °C	-1 ... +1000 bar (-100 ... +100000 kPa)
<b>VEGABAR 82</b> Pressure transmitter with ceramic measuring cell 	0.2 % 0.1 % 0.05 %	Thread G½, ½ NPT, flanges from DN 15, 1½"	-40 ... +150 °C	-1 ... +100 bar (-100 ... +10000 kPa)
<b>VEGAWELL 52</b> Pressure transmitter with ceramic measuring cell 	0.1 % 0.2 %	Straining clamp, thread, suspension cable, threaded fitting of 316L, PVDF, Duplex, Titanium	-20 ... +80 °C	0 ... +60 bar (0 ... +6000 kPa)



## Renewable energies

### **Proven and precise instrumentation**

VEGA is the experienced supplier of level and pressure sensors for renewable energy applications.

VEGA sensors deliver precise measurement data as the basis for automatic control of processes in your facility. All sensors are based on state-of-the-art technology and optimised and certified for use in the renewable energy sector.



### **Cost effective technology**

Quality pays off: the robust sensors reduce operating and maintenance costs as well as downtime.



### **Reliable measurement**

Instrumentation from VEGA is reliable and accurate under all measuring conditions. The wide range of available sensors covers virtually all process conditions and operating environments found in today's industries.



### **Fast delivery**

Whether initial delivery or repair: VEGA instruments arrive at your facility within a few days. This significantly reduces stocking costs and keeps your plant running continuously.



## plics® – easy is better

### Instrument platform plics®

The plics® idea is simple: Each instrument is assembled from prefabricated components once the order is received. This modular design allows full flexibility when selecting the required sensor features. You receive your customised, user-friendly instrument within an amazingly short time. The best part: these instruments are more cost-effective and advantageous in every way – throughout their entire life cycle.



### Display and adjustment

The display and adjustment module PLICSCOM is used for measured value indication, adjustment and diagnosis directly on the sensor. Its simple menu structure enables quick setup. Status messages are displayed in plain text. The optional Bluetooth feature allows wireless operation.



### Connection

The VEGACONNECT connects your instrument to a PC via the USB interface. PLICSCOM with Bluetooth enables data transfer with wireless technology. The instruments are configured with the tried and trusted adjustment software PACTware and the appropriate DTM or with an app on a smartphone or tablet PC. For EDD-based systems we also offer graphics-driven EDDs.

### Asset management and maintenance

The integrated self-monitoring function of plics® instruments permanently informs the user on the status of the instruments. Status messages allow proactive and cost-effective maintenance. All diagnostic data can be called up easily and quickly in plain text via the built-in memory functions.





## Dam of the hydroelectric power plant

### Reliable

Reliable flow measurement allows reliable detection of leaks in the dam

### Cost effective

Sensor with high protection rating for long service life, even under extremely humid conditions

### User friendly

Easy setup via external display and adjustment unit

### Flow measurement at the dam

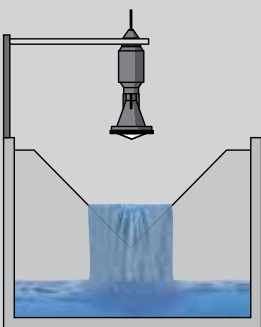
The seepage water in the dam of the hydroelectric plant is collected in pipes or channels. The quantity of seepage water provides information on the condition of the dam (another indicator of the condition of the dam is the clouding of the seepage water which is also assessed). The quantity of water flowing in an open channel is measured via water head height as it passes through a 'V' notch, flume or weir structure, which is then calculated into flow rate.



### VEGAPULS WL 61

Non-contact flow measurement with radar at the dam of the hydroelectric power plant

- Non-contact, high accuracy flow measurement
- Unaffected by environmental influences
- Simple mounting and setup reduces installation costs





## Water inlet at the reservoir

### Reliable

Reliable level switch protects the tunnel system from rocks and sand

### Cost effective

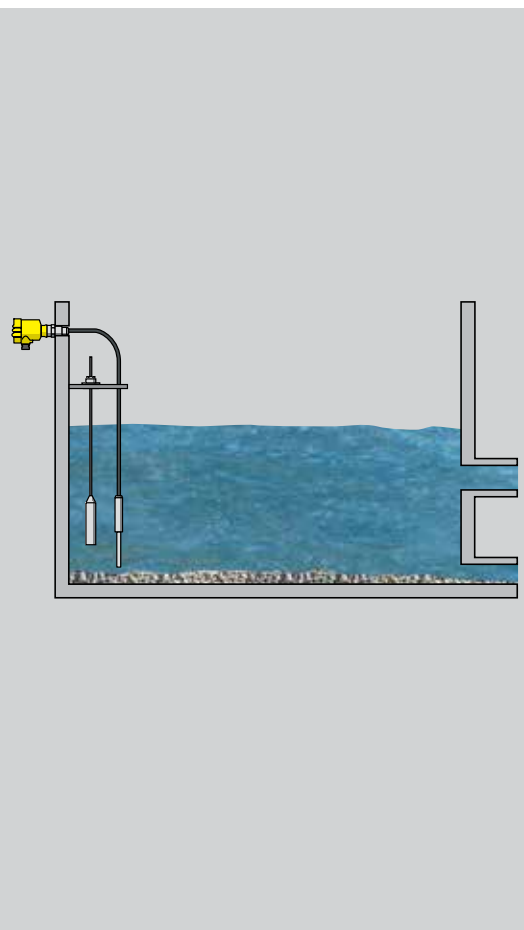
Flushing only on demand

### User friendly

Automatic operation

### Level measurement and point level detection of stones and sand in the water basin

If the natural flow of water into a reservoir is not sufficient for optimal energy production, additional water is fed into the reservoir via ducts or tunnels from water catchments that can be up to several kilometres distant. Coarse debris is held back by massive grids at the main water inlet. Smaller stones, grit and sand can accumulate in the transfer basin in front of the tunnel. Constant monitoring of the level of stones and sand in the basin ensures that no debris gets into the tunnel system.



### VEGA VIB 62

Point level detection with vibrating level switch for on-demand cleaning of the basin of stones and sand

- Reliable level measurement, unaffected by debris
- Robust design ensures dependable function
- Maintenance-free operation reduces maintenance costs



### VEGA WELL 52

Hydrostatic level measurement for determining the level in the water basin

- High availability thanks to non-wearing ceramic measuring cell
- Simple mounting and setup reduces installation costs
- High resistance to abrasion from foreign bodies



## Turbine building hydroelectric power plant

### Reliable

Protection against flooding of the turbine building with high reliability water level detection of the seepage shaft

### Cost effective

Optimal operation and monitoring of the pumps

### User friendly

Easy installation, even in tight spaces

### Level and point level detection in the seepage water shaft

At the lowest point of the hydroelectric power station, cooling water from the generators and any leakage water from the Kaplan or Francis turbines is collected in a seepage water shaft, pit or sump. To prevent a flooding of the shaft and thus of the turbine building, with disastrous results for equipment, the sensors are often installed redundantly. As additional protection, the maximum water level is monitored with a point level switch.



#### VEGAWELL 52

Hydrostatic level measurement for monitoring the water level in the seepage shaft

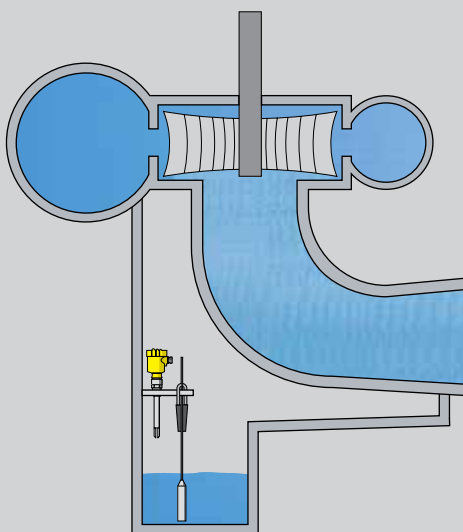
- High-resistance ceramic measuring cell ensures high availability
- Excellent long-term stability reduces the need for maintenance
- Simple mounting and setup reduces installation costs



#### VEGASWING 63

Level detection with vibrating level switch as overflow protection in the seepage water shaft

- High switching reliability through continuous self-monitoring
- Low maintenance costs thanks to wear-free measuring principle
- Simple setup and commissioning through adjustment-free sensor design







## Reservoir at pumped storage power plants

### Reliable

Ensures reliable efficient, optimal operation of the hydroelectric plant

### Cost effective

Maintenance-free measurement

### User friendly

Simple installation on existing structures

### Reservoir level measurement

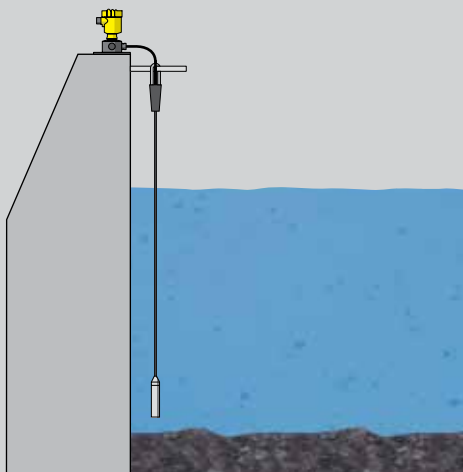
Pumped storage power plants store a large amount of energy and feed it into the grid very quickly when necessary. One important parameter is the height of the water level in the reservoir. It allows calculations to be made about the amount of energy available and the existing storage volume in pump operation mode. High reliability is required from the measurement technology deployed, because the sensors are often mounted at very remote locations.



### VEGAWELL 52

Hydrostatic level measurement for monitoring the water level in the reservoir

- Robust submersible pressure sensor design ensures high availability
- Wear-free ceramic measuring cell minimizes maintenance costs
- Simple mounting and setup





## Expansion tank in a thermal solar plant

### Reliable

Highly overload-resistant measuring systems

### Cost effective

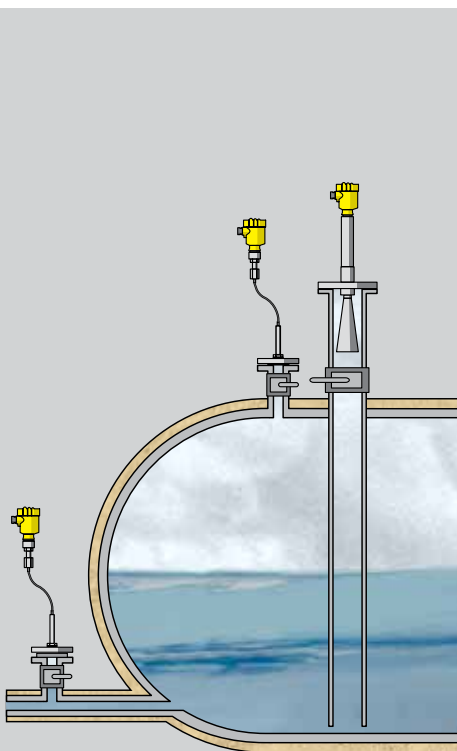
Accurate level measurement for optimal utilization of the container volumes

### User friendly

Easy instrument selection: one sensor version fits all tank sizes

### Level and pressure measurement in the expansion tank for heat transfer fluid (HTF)

The solar heat captured in the mirror system of a thermal solar plant is transported via a heat transfer fluid (HTF) to the steam generator at the central turbine. The HTF normally has a temperature between 300 °C and 400 °C. There are different containers for the fluid across the plant and the varying temperatures cause volume changes to the HTF that need to be accurately measured to operate the plant safely and profitably.



### VEGAPULS 62

Non-contact level measurement with radar in the expansion vessel for heat transfer fluid

- Reliable function, even at high temperatures
- High-resistance materials guarantee long service life
- Wear-free operation ensured through non-contact measuring method



### VEGABAR 81

Pressure measurement in the thermal solar plant pipeline systems

- Highly resistant to overloading due to pressure surges
- Long service life thanks to seal-free measuring cells
- Wear and maintenance-free due to high-resistance diaphragm materials



## Gearbox oil tank in a wind turbine

### Reliable

Media-independent switching point

### Cost effective

Protection against wear through continuous oil lubrication

### User friendly

Compact dimensions allow easy integration into any system

### Oil tank point level detection in the rotor gearbox

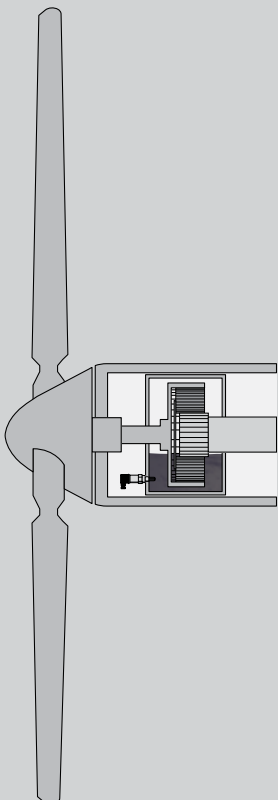
In wind turbines, efficiency has top priority: the higher the availability of a turbine, the higher the profitability and the faster the investment pays off. Wind power is transferred from the turbine to the generator via a rotor gearbox. Full lubrication of all moving parts ensures a long service life and high availability of the wind turbine, thus making it essential for the oil level in the rotor gearbox to be constantly and reliably monitored.



### VEGASWING 51

Dry run protection with vibrating level switch in the oil tank of a rotor gearbox

- Media-independent switching point guarantees high dependability
- Fast setup and commissioning, because adjustment requires no medium
- Compact instrument dimensions allow easy installation





## Wood pellet storage silo

### Reliable

Highly dependable and accurate level measurement, even during filling

### Cost effective

By optimising silo volumes, it results in better utilization of production capacity

### User friendly

Simple mounting, installation from top

### Level measurement and point level detection in a corrugated metal silo

The finished pellets are stored ready for delivery in corrugated metal silos up to and over 30 m high. Larger storage volumes allow the supplier to better respond to the increased demand during the heating season and utilize the production equipment continuously throughout the year. For optimal planning of material logistics, a reliable measurement of silo contents is a must.



#### VEGAPULS 69

Non-contact level measurement with radar in the pellet silo

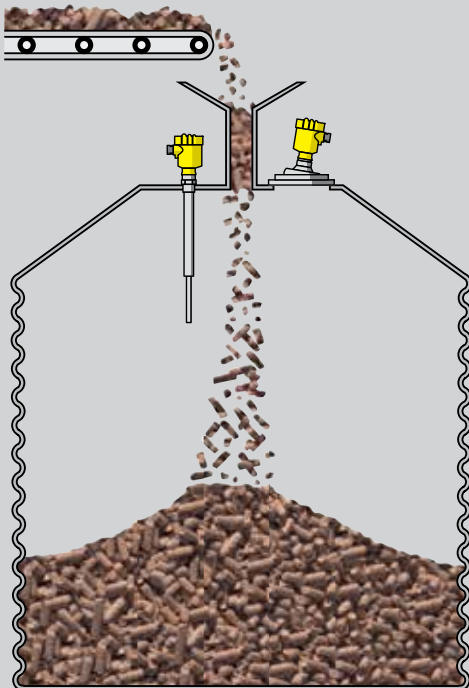
- Wear-free thanks to non-contact measurement
- Easy mounting and setup due to top installation
- Good focusing of the radar beam enables sure measurement even during filling



#### VEGAVIB 63

Point level detection with vibrating level switch in the storage silo

- Reliable level signal under all operating conditions
- Wear and maintenance-free
- Easy to install and adjustment-free





## Compact slurry tanks in biogas plants

### Reliable

Trouble-free operation of the fermenter with technology

### Cost effective

Long service life ensured through non-contact measuring method

### User friendly

Easy installation and retrofit, through external vessel mounting

### Level measurement in energy production from waste

Biogas plants convert a mixture of organic waste and renewable raw materials into valuable energy through fermentation using a largely CO<sub>2</sub> neutral process. Optimal consumption of the resources and maintenance-free operation require the use of highly reliable measurement technology. In all production steps – from the delivery of raw materials and waste to the removal of residues – the levels must be closely and accurately monitored.



### VEGAPULS WL 61

Non-contact level measurement with radar in the slurry tank of a biogas plant

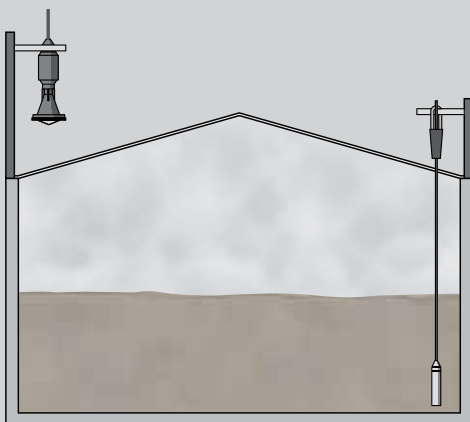
- Radar measurement is completely independent of ambient conditions
- Non-contact measurement allows maintenance-free operation
- Simple mounting reduces installation costs



### VEGAWELL 52

Hydrostatic level measurement with submersible pressure transmitter

- High durability ensures long service life
- Hydrostatic measurement independent of surface foam
- Simple setup and commissioning reduces costs





## Slurry tanks in biogas plants

### Reliable

Reliable operation of the fermenter through overflow protection

### Cost effective

Universally applicable and modular sensors throughout the biogas plant, thus very cost-effective spare parts stocking

### User friendly

Maintenance-free operation with technologies not affected by buildup

### Point level and pressure measurement in energy production in slurry tanks

Semi-liquid manure, or slurry, in biogas plants is often stored in closed, large-volume slurry tanks. Through fermentation, a valuable energy carrier is extracted from the mixture of organic waste and renewable raw materials. Level and pressure are monitored in the tank, as well as in the delivery and removal systems handling the raw materials and waste.



#### VEGACAP 64

Point level detection with capacitive level switch for full and empty alarm in the slurry tank

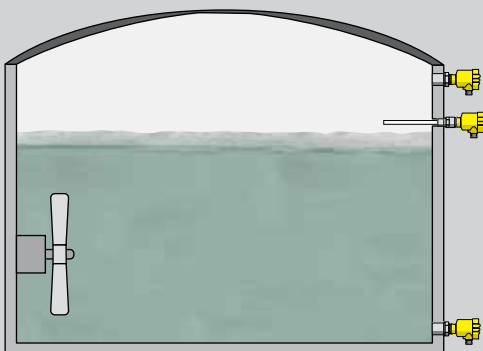
- Non-sensitive to product buildup, even under conditions of extreme fouling
- Robust, maintenance-free sensor design
- Adjustment-free setup and commissioning minimizes costs



#### VEGABAR 82

High-precision pressure measurement in the fermenter

- Different measuring cells allow targeted application solutions
- High chemical and mechanical resistance thanks to ceramic measuring cell
- Wide array of process fittings ensures easy integration into existing systems





## Raw material silo in the ethanol plant

### Reliable

Reliable level measurement for trouble-free operation of the raw material stocks

### Cost effective

Complete utilising of the silo without mechanical overload

### User friendly

Easy installation in the container roof with exact alignment for optimum measurement accuracy

### Level measurement and point level detection in the grain silo

Ethanol is an additive used in gasoline. Through the use of renewable resources, the CO<sub>2</sub> emission of fuels is significantly improved and the consumption of crude oil reduced. In modern ethanol plants, raw materials such as grain, sugar cane or sugar beet are processed into alcohol and ethanol. The resulting by-products and residues are also completely utilized. The different types of grain used for ethanol production are stored in silos more than 20 m high. Reliable silo level measurement is essential to ensure continuous production supply is maintained.



### VEGAPULS 69

Level measurement with radar in the grain silo

- Reliable measurement, even with changing media
- Easy mounting and setup thanks to installation from above
- Trustworthy measurement data even during filling



### VEGAVIB 62

Point level detection with vibrating level switch

- Wear and maintenance-free
- Easy to install and adjustment-free
- Reliable point level detection, even with changing media





## Fermentation in the ethanol plant

### Reliable

Accurate readings under all process conditions in the fermenter

### Cost effective

Level and pressure measurement using electronic differential pressure provides all relevant measurement data

### User friendly

Simple mounting and setup

### Level, switching and pressure measurement in the conversion process for alcohol production

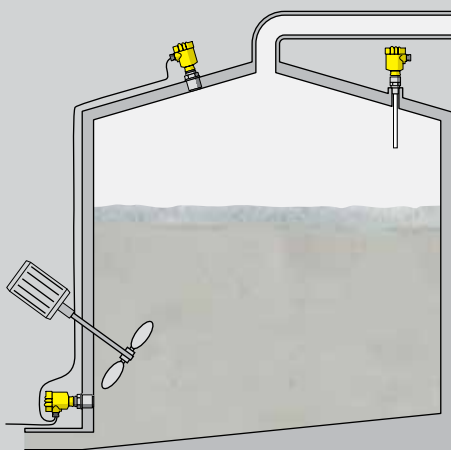
The heart of the ethanol plant is the fermentation process. This is where the sugars in the mash are converted into alcohol, which, in the subsequent distillation process, is then concentrated to a strength of 99.9 %. The CO<sub>2</sub> gas given off by the fermentation is captured and used for carbonation in the beverage industry. To keep the fermenter vessel operating in its optimal range, reliable monitoring of the process parameters including the vessel level and overall pressure is required.



### VEGABAR 82

Measurement of the level and gauge pressure during mash fermentation with electronic differential pressure

- High abrasion resistance thanks to ceramic materials
- Different measuring cells enable application oriented selection
- Easy cleaning thanks to front-flush measuring cells



### VEGACAP 64

Capacitive point level detection of the mash in the fermentation process

- Reliable foam detection, regardless of consistency
- Unaffected by buildup, even with product deposits and thick foam
- Adjustment-free setup and commissioning minimizes costs





## Storage tank in the ethanol plant

### Reliable

Reliable level measurement ensures safe operation of the ethanol depot

### Cost effective

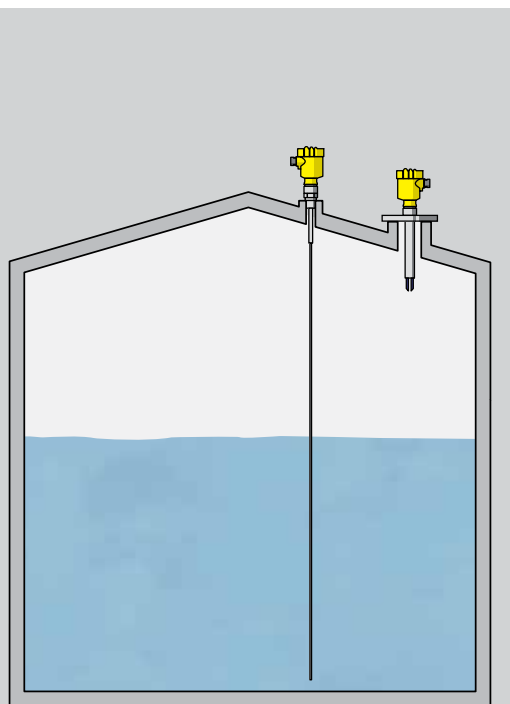
High-precision measurement allows optimal utilization of the tank volume

### User friendly

Installation from top, offers easy mounting and simple adjustment, even when tank is full

### Level measurement and point level detection in the ethanol storage tank

After going through all process steps, the bioethanol is stored in a tank ready for delivery to the consumer. Accurate measurement of the tank contents is an important prerequisite for fiscal inventory, reliable logistics planning and ensures a sufficient supply for customers. Since the tanks can often not be emptied after an initial filling, maintenance-free operation and setup without product are crucial considerations for the measurement technology.



### VEGAFLEX 81

Level measurement with guided radar in the bioethanol storage tanks

- High accuracy, unaffected by medium and vapours
- Simple mounting from above greatly facilitates retrofitting
- High reliability through device accreditation to SIL2



### VEGASWING 63

Level detection with vibrating level switch as overfill protection in the bioethanol storage tanks

- Adjustment-free setup and maintenance-free operation
- Simple function test via keystroke
- Reliable point level measurement in compliance with SIL2 and WHG



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