Level and pressure instrumentation for refining and petrochemical

Application examples and products

Looking Forward VEGA

Measurement technology for refining and petrochemical

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

1	**Fixed roof storage tanks**	Level measurement and point level detection	7	**Coke silo**	Level measurement and point level detection
2	**Primary desalter**	Interface and density measurement	8	**Alky settler**	Density measurement
3	**Secondary desalter**	Interface measurement	9	**Compressor knockout drum**	Level measurement
4	**Column trays**	Level measurement and point level detection	10	**Sour water stripper**	Interface measurement
5	**Distillation column**	Level and pressure measurement	11	**LPG and LNG spherical tank**	Level and pressure measurement
6	**Coke drums**	Density and level measurement, point level detection	12	**Steam drum**	Level measurement and point level detection

All applications can be found at

www.vega.com/refining-petrochemical

All sensors at a glance

Continuous level measurement

Instrument type		Measuring range	Process fitting	Process temperature	Process pressure
VEGAFLEX 81 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)
VEGAFLEX 86 TDR sensor for continuous level and interface measurement of liquids		up to 75 m	Thread from G¾, ¾ NPT, flanges from DN 25, 1"	-196 … +450 °C	-1 … +400 bar (-100 … +40000 kPa)
VEGAPULS 62 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)
VEGAPULS 64 Radar sensor for continuous level measurement of liquids		up to 30 m	Thread from G¾, ¾ NPT, flanges from DN 50, 2", mounting strap	-40 … +200 °C	-1 … +20 bar (-100 … +2000 kPa)
VEGAPULS 69 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)
FIBERTRAC 31 Radiation-based sensor for continuous level measurement		up to 7 m	Mounting from outside on the vessel	any (with optional cooling)	any

Point level detection

Instrument type		Measuring range	Process fitting	Process temperature	Process pressure
VEGAMIP 61 Microwave barrier for level detection in bulk solids and liquids		up to 100 m	Thread G1½, 1½ NPT, flanges, clamp, mounting strap	-40 … +80 °C +450 °C with mounting adapter	-1 … +4 bar (-100 … +400 kPa)
VEGASWING 63 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)
VEGASWING 66 Vibrating level switch for liquids under extreme process temperatures and pressures		up to 3 m	Thread from G1, 1 NPT, flanges from DN 50, 2"	-196 … +450 °C	-1 … +160 bar (-100 … +16000 kPa)
MINITRAC 31 Radiation-based sensor for density measurement		Density measurement	Mounting from outside on pipeline or on vessel	any (with optional cooling)	any

Pressure measurement

Instrument type		Deviation	Process fitting	Process temperature	Measuring range
VEGABAR 81 Pressure transmitter with chemical seal		0.2 %	Thread G½, ½ NPT, flanges from DN 25, 1"	-90 … +400 °C	-1 … +1000 bar (-100 … +100000 kPa)
VEGABAR 83 Pressure transmitter with metallic measuring cell		0.2 % 0.1 % 0.075 %	Thread from G½, ½ NPT, flanges from DN 25, 1"	-40 … +200 °C	-1 … +1000 bar (-100 … +100000 kPa)

Refining and petrochemical

Modern, service-proven instrumentation

Refineries put very high demands on the reliability and availability of the production equipment. Extreme process conditions such as temperature, pressure or corrosion make selecting the right sensor a real challenge. Maintenance-free instrumentation with a long service life is a requirement for maintaining shutdown intervals of several years without premature production stoppages. VEGA offers measurement technology that meets these requirements perfectly.

Reliable measurement

In addition to Ex requirements, functional safety (SIL) is playing an increasingly important role. Measurement technology for a process vessel must always take the safety instrumented system into consideration. VEGA offers qualified sensors that fulfil this requirement.

Fast and simple

Even though they are all manufactured according to customer specifications, VEGA sensors are usually delivered within a few days. Users appreciate the simple, clear setup procedure, which can also be carried out via Bluetooth and smartphone or tablet PC.

More Information

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 instrumens 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.

Fixed roof storage tanks

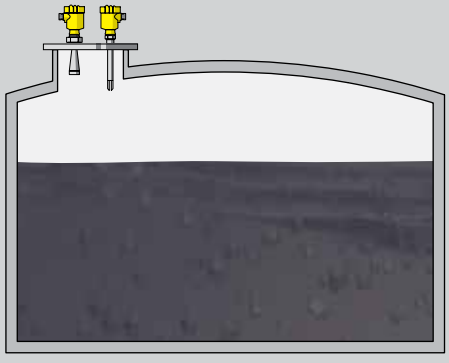
Reliable
Redundant measurement ensures a high degree of safety

Cost effective
Self-monitoring reduces maintenance costs

User friendly
Easy installation and setup

Level measurement and point level detection of fixed roof storage tanks

Level measurement of crude and bulk liquids storage tanks in a refinery is necessary for inventory management and overspill protection. Multiple measurement devices can fit into a single process fitting.



VEGAPULS 62

Level measurement with radar in fixed roof storage tanks

- Simple retrofit capability utilizes existing process fittings
- Exact measuring results independent of temperature, gas or steam
- Use of optional PLV (Positive Level Verification) system fulfils API 2350 requirements

VEGASWING 63

Vibrating level switch for overfill protection in fixed roof storage tanks

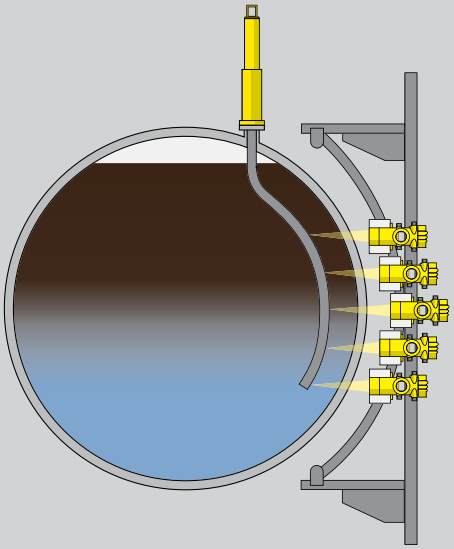
- High level switch provides redundancy
- By simply pushing a button, you can meet the legal requirements of the periodic test in seconds
- Unaffected by media properties ensures reliable measurement

Primary desalter

Reliable
High measuring precision, independent of process conditions

Cost effective
External mounting to the vessel, easily retrofitted

User friendly
Simple air and water calibration for fast commissioning time



Interface tracking in the primary desalter

It is important that a desalter unit runs efficiently to prevent corrosion to downstream equipment. When the crude oil mixes with the emulsifying chemicals and water, the resulting emulsion layer makes it difficult for standard level measurement technologies to reliably track the interface. Radiation-based measuring instruments are not affected by this and allow to track the interface even with thick emulsion layers present in the tank to make sure that the desalting process can be controlled efficiently at maximum throughput.

MINITRAC 31

Multi-point density array for multi-phase interface and emulsion control

- Reliably tracks emulsion layer to keep the process stream efficient
- Optimises use of emulsifiers and other treatment chemicals
- Remains online even when replacing a detector to eliminate downtime
- Allows operator to maintain high throughput even when switching between light to heavy feedstock

Secondary desalter

Reliable
Unaffected by changing crude density

Cost effective
Low maintenance costs

User friendly
Fast and easy setup

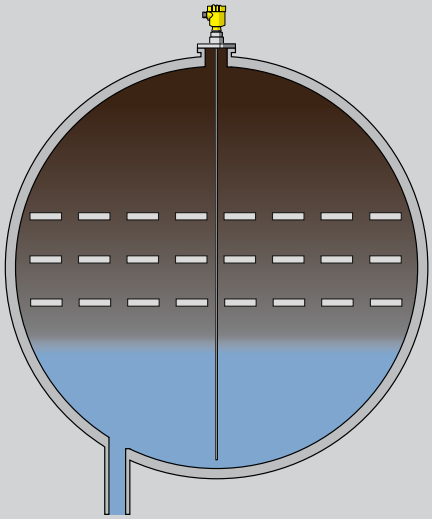
Interface measurement in the secondary desalter

To maximize efficiency of the electrostatic grid as it removes contaminants within second and third stage desalters, a crucial point of control is to maintain the oil and water interface just below this grid. Reliable measurement of this level protects the grid from shorting out on the water as well as increasing efficiency of the unit, which ensures the quality of the feed moving into the next process unit.

VEGAFLEX 81

Guided wave radar sensor for continuous interface measurement

- Simple setup expedites installation
- Unaffected by viscous process properties
- Rigid rod probe prevents interference with electrostatic grid

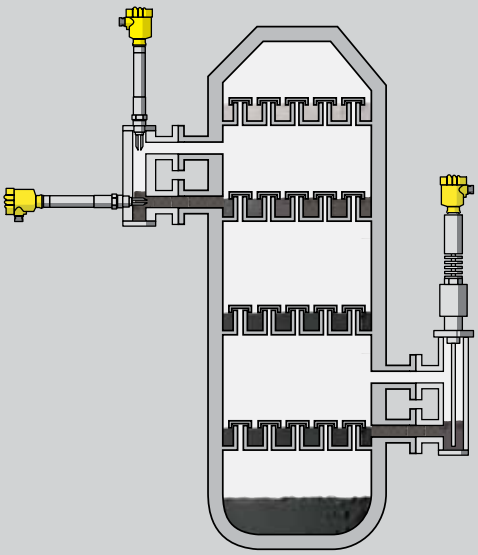


Column trays

Reliable
Unaffected by process conditions

Cost effective
Low maintenance costs, because no moving parts

User friendly
Overfill protection increases plant safety



Level measurement and point level detection of column trays

Accurate level control of the distillation unit ensures product quality of the hydrocarbon at the different cuts, but this is made difficult due to hot liquids flashing, buildup and high temperature. Even through process changes reliable level measurement and point level detection are required.

VEGAFLEX 86

Level measurement with guided wave radar of column trays

- Non-moving parts are immune to mechanical failure
- Low maintenance requirements reduce downtime and costs
- Single rod probe prevents plugging and results in a reliable measurement

VEGASWING 66

Vibrating level switch for detection of minimum and maximum level

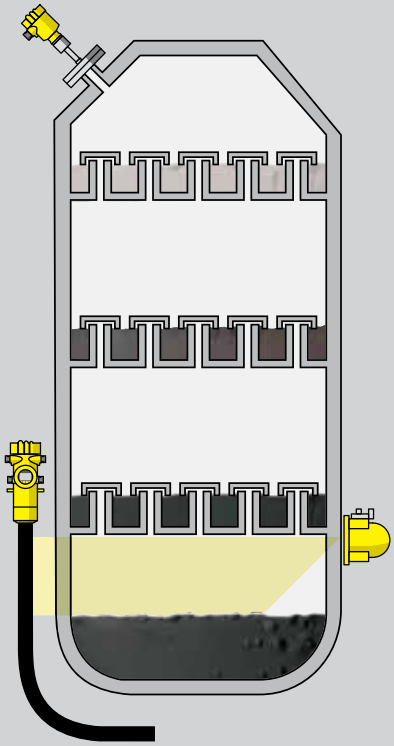
- Reliable measurement unaffected by high temperature and pressure
- Test function during operation provides higher plant
- availability
- Redundancy increases plant safety and availability

Distillation column

Reliable
Precise measurement results even in extreme environments

Cost effective
Easy mounting reduces installation and maintenance costs

User friendly
Simple calibration even during running process



Level and pressure measurement in the distillation unit

The heavy, highly viscous process material and extreme temperature are located in the bottom part of the distillation. For level control of residual feeds, a non-contact measurement is essential for reliability. Monitoring head space pressure at the upper end of refinery columns is important to ensure that the process is operating under ideal conditions.

FIBERTRAC 31

Radiation-based sensor for continuous level measurement

- Non-contact measurement principle allows safe and reliable level measurement
- Lightweight design reduces mounting hardware and structural requirements
- Easy proof test verifies operation without costly process downtime

VEGABAR 81

Measurement of head pressure with pressure transmitter in the distillation column

- Reliable head pressure measurement, even with vacuum or overpressure
- Measurement result unaffected by temperature variations during the start-up and shutdown of the column
- Durable pressure transmitter can withstand temperatures of up to 400 °C

Coke drums

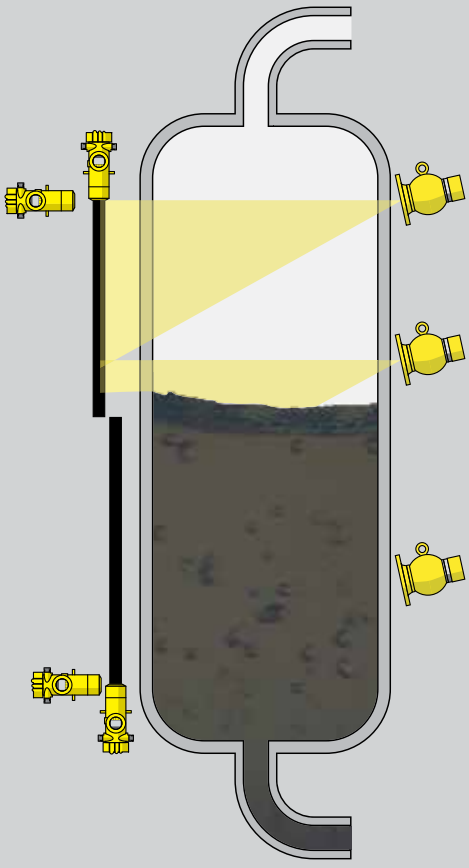
Reliable
Safe measurement even under extreme conditions

Cost effective
Reduced need of foam agents thanks to continuous foam monitoring

User friendly
Easy installation

Density, level measurement and point level detection in coke drums

Delayed coking units are a critical step in the refining process – this is where downtime, inefficiency, and overfill are not an option. They generate extreme heat during operation and are very large vessels. By monitoring upper vapour phase density, operators can reduce antifoam carry-over and improve continuous productivity with accurate level measurement.



FIBERTRAC 31

Radiation-based sensor for continuous level measurement in coke drums

- Lightweight construction eliminates need for cranes or special rigging for mounting
- Long detector length minimizes the need for additional platform construction
- RS485 gauge to gauge communication network offers extensive diagnostics and reduced troubleshooting time

MINITRAC 31

Radiation-based density and point level measurement in coke drums

- Non-contact measurement unaffected by fluid viscosity, deflection or refractive properties
- Monitors anti-foam injection effectiveness
- RS485 gauge to gauge communication network offers extensive diagnostics and reduced troubleshooting time
- Re-zeroing of the system with each cycle improves accuracy

Coke silo

Reliable
Long measurement sensor lifespan because no contact with medium

Cost effective
Wear and maintenance-free

User friendly
Easy installation and setup

Level measurement and point level detection in coke silos

Coke is often stored in very tall silos. Coke product is also susceptible to plugging the chute as the vessel empties. To accurately measure and monitor the level in these silos, especially during fill/empty stages, the instrumentation must be able to perform reliably, even under these conditions.

VEGAPULS 69

Radar sensor for continuous level measurement in coke silos

- Reliable measurement unaffected by buildup
- Radar principle is unaffected by temperature, gas and dust
- Non-contact measurement is wear and maintenance-free

VEGAMIP 61

Microwave barrier system for plugged chute detection of coke silo

- Non-contact measurement ensures maintenance-free service in abrasive media
- Reliable measurement, immune to dust and buildup
- Simple adjustment saves time and costs for setup

Alky settler

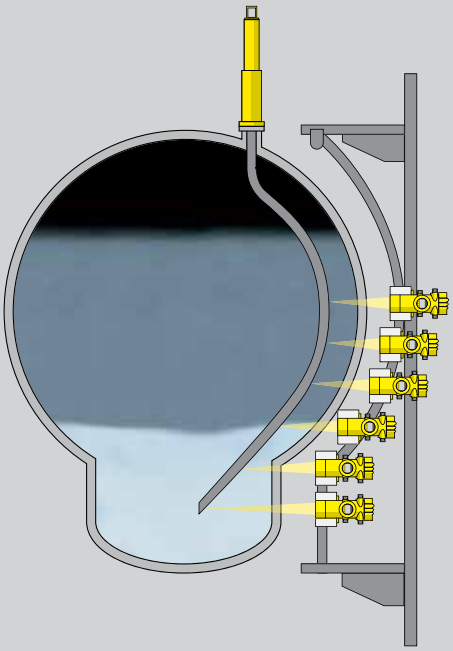
Reliable
Measurement across the span of the vessel with multiple sensors increases the availability

Cost effective
Air/water calibration reduces commissioning time

User friendly
Non-invasive measurement ensures easy and safe maintenance

Multi-point interface tracking in the settler

In an alkylation unit the acid settler is fed from the reactor vessel which is used to remove acid for recycling back into the reactor. The layers created in the separation process form interfaces that must be tracked to manage the output of the material from the unit. Reporting density on a horizontal plane enables accurate control of the process and maximizes throughput, therefore controlling the acid levels for optimal processing.



MINITRAC 31

Multi-point density array for emulsion interface control

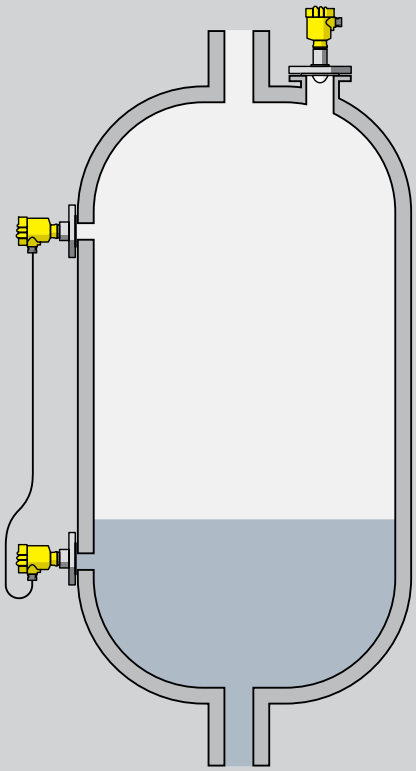
- Customizable detector system tracks multiple interfaces
- Non-contact measurement is unaffected by high process temperatures
- Online tracking increases production efficiency

Compressor knockout drum

Reliable
Diverse technologies with comparative output can provide redundant level measurement

Cost effective
Materials with high chemical resistance reduce maintenance costs

User friendly
Easy installation and setup



Level measurement in the compressor knockout drum

The vapour liquid separation that occurs in a knockout drum protects the waste or cooling stream from process vapours and compressors from water. This crucial measurement point means it requires constant, reliable level monitoring without being influenced by the high volume of vapour inside the vessel. A reliable instrument ensures that there is no water carry-over into the compressor, avoiding the extremely expensive downtime that results from an upset.

VEGAPULS 64

Level measurement with radar in the compressor knockout drum

- Reliable measurement, unaffected by vapour presence
- Easy installation directly in the drum
- Unaffected by changing density

VEGABAR 83

Electronic differential pressure system for measurement redundancy in the compressor knockout drum

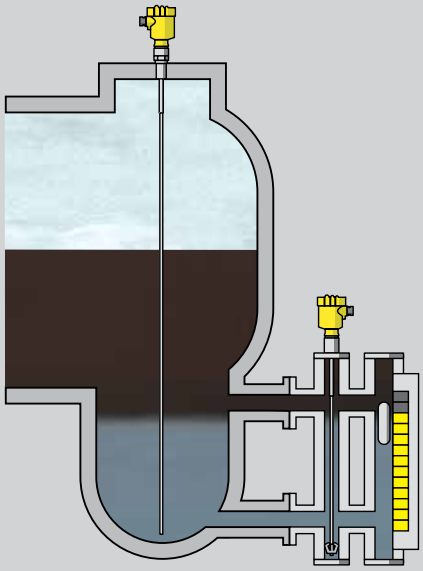
- No additional temperature influences because no liquid capillary connection required
- Very good reproducibility and long-term stability
- High resistance diaphragm materials
- Easy installation because no insulation for capillary needed

Sour water stripper

Reliable
Redundant level monitoring

Cost effective
Low maintenance costs

User friendly
Easy mounting on standard tanks



Interface measurement in the sour water stripper

Safe and reliable measurement of the separation layers in the sour water stripper is extremely important in preventing sour water from accidentally getting into other parts of the plant. Sour water is highly corrosive and can cause serious damage over time, leading to safety problems in other process vessels and pipes. The sour water discharged from the stripper is delivered to the desulphurisation plant for further processing.

VEGAFLEX 81

Continuous interface measurement with guided radar

- No maintenance necessary because there are no moving parts
- Simultaneous detection of the total level of liquid and the interface
- Reliable measurement results independent of fluctuations in density

VEGAFLEX 81 in a bypass with magnetic level indicator

A combination of guided radar sensor and magnetic level indicator for reliable monitoring of the separation layer

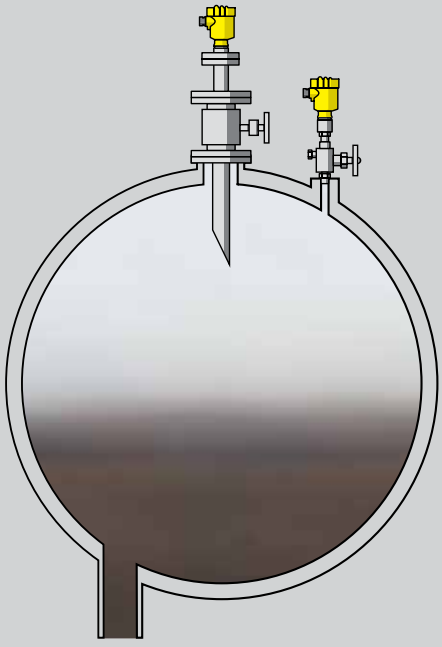
- Easy mounting on existing tank connections
- Delivery of a complete measuring point already calibrated at the factory

LPG and LNG spherical tank

Reliable
High measuring accuracy despite low dielectric constants

Cost effective
Maintenance-free operation

User friendly
Sensor replacement even during operation thanks to cut-off valve



Level and pressure monitoring in liquid gas tanks

LPG tanks are usually only accessible for service and maintenance work every few years during shut-down periods. In addition, the containers are mostly installed underground or covered with earth. The solution is a process independent measuring system that delivers safe and reliable readings despite low dielectric constants and low temperatures.

VEGAPULS 64

Level measurement with radar in spherical tanks

- Maintenance-free operation thanks to non-contact measuring principle
- High measuring accuracy even with low dielectric constants
- Very narrow signal focusing even in large measuring ranges
- The sensor is simple and easy to replace thanks to cut-off valve and isolation from process

VEGABAR 83

Pressure transmitter for pressure monitoring in spherical tanks

- Universally applicable, fully welded measuring cells for direct connection to process
- A variety of process fittings always enables an appropriate adaptation to the container
- SIL conformity in accordance with IEC 61508, in a single-channel architecture up to SIL2 and in a multi-channel architecture up to SIL3
- Extremely robust measuring cells of Alloy, for higher safety during operation

Steam drum

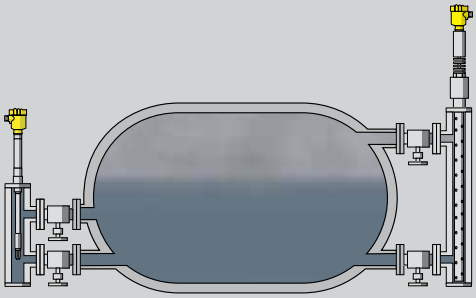
Reliable
High measuring accuracy independent of temperature and pressure

Cost effective
Low maintenance costs

User friendly
Simple installation

Level measurement and limiting device in the steam drum

High pressure steam is critical for the operation of the refinery. For the production and reliable supply of steam, accurate level measurement is required that allows efficient operation of the steam boiler. In addition to level measurement, high and low water limit detectors are also extremely important. As safety devices, they ensure that the water level neither exceeds the upper limit nor falls below the lower limit.



VEGAFLEX 86

Level measurement with guided radar in the steam drum

- Precise measurement thanks to automatic real-time correction, even under changing steam conditions
- Flexible mounting options for easy replacement of displacers or direct installation in the tank
- Meets the high safety standards of SIL2/3 according to IEC 61508 and the certification according to EN 12952-11 and EN 12953-9 for steam boilers

VEGASWING 66

Vibrating level switch for point level detection in the steam drum

- Simple installation without medium saves time and money
- Precise, reliable function through product-independent switching point
- Reliable measurement unaffected by high temperatures and pressures
- Meets the high safety standards of SIL2/3 according to IEC 61508 and the certification according to EN 12952-11 and EN 12953-9 for steam boilers

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Looking Forward