Level, Pressure, and Density
Instrumentation for the Petrochemical Industry

Application Examples and Products
Measurement technology for the petrochemical industry

This brochure presents examples of applied level, pressure, and density measurement technology. Here, you’ll learn which sensors fit which measuring tasks and the benefits those sensors deliver in application.

1 Ethylene and Propylene Storage  Level Measurement
2 Distillation Columns  Level and Pressure Measurement
3 NGL and LPG Spheres  Level and Pressure Measurement
4 Gas Phase Reactors  Level and Density Measurement
5 Purge Bin  Level Measurement
6 High Pressure Separator  Level Measurement
7 Low Pressure Separator  Level Measurement
8 Steam Drums  Level Measurement

Solutions for a demanding industry

VEGA offers a wide range of sensors for typical applications in the petrochemical industry: from the delivery of crude oil via pipeline or ship to the storage of finished products. Measuring instruments from VEGA deliver reliable data on the volume, level, and pressure of all types of media.
### Continuous Level Measurement

<table>
<thead>
<tr>
<th>Instrument Type</th>
<th>Measuring Range</th>
<th>Process Fitting</th>
<th>Process Temperature</th>
<th>Process Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VEGAPULS 64</strong></td>
<td>up to 98 ft (30 m)</td>
<td>Threads from ¾ NPT, G¾, Flanges from 2&quot;, DN50</td>
<td>-40 ... +392°F (-40 ... +200°C)</td>
<td>-14.5 ... +290 psi (-1 ... +20 bar)</td>
</tr>
<tr>
<td><strong>VEGAFLEX 81</strong></td>
<td>up to 246 ft (75 m)</td>
<td>Threads from ¾ NPT, G¾, Flanges from 1&quot;, DN25</td>
<td>-40 ... +392°F (-40 ... +200°C)</td>
<td>-14.5 ... +580 psi (-1 ... +40 bar)</td>
</tr>
<tr>
<td><strong>VEGAFLEX 86</strong></td>
<td>up to 246 ft (75 m)</td>
<td>Threads from ¾ NPT, G¾, Flanges from 1&quot;, DN25</td>
<td>-320 ... +842°F (-196 ... +450°C)</td>
<td>-14.5 ... +5,800 psi (-1 ... +400 bar)</td>
</tr>
<tr>
<td><strong>FiberTrac 31</strong></td>
<td>up to 23 ft (7 m) with single detector</td>
<td>Mounts external to the vessel</td>
<td>-4 ... +122°F (-20 ... +50°C)</td>
<td>Mounts external to the vessel</td>
</tr>
<tr>
<td><strong>SoliTrac 31</strong></td>
<td>up to 10 ft (3 m) with single detector</td>
<td>Mounts external to the vessel</td>
<td>-40 ... +140°F (-40 ... +60°C)</td>
<td>Mounts external to the vessel</td>
</tr>
<tr>
<td><strong>VEGAMAG 82</strong></td>
<td>up to 50 ft (15 m)</td>
<td>Threads from ½ NPT, G½, Flanges from 1&quot;, DN25</td>
<td>-320 ... +842°F (-196 ... +450°C)</td>
<td>-14.5 ... +5,800 psi (-1 ... +400 bar)</td>
</tr>
<tr>
<td><strong>VEGAPASS 81</strong></td>
<td>up to 13 ft (4 m)</td>
<td>Threads from ½ NPT, G½, Flanges from 1&quot;, DN25</td>
<td>-320 ... +842°F (-196 ... +450°C)</td>
<td>-14.5 ... +3,626 psi (-1 ... +250 bar)</td>
</tr>
</tbody>
</table>
### Point Level Detection

<table>
<thead>
<tr>
<th>Instrument Type</th>
<th>Insertion Length</th>
<th>Process Fitting</th>
<th>Process Temperature</th>
<th>Process Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEGASWING 66</td>
<td>up to 10 ft (3 m)</td>
<td>Threads from 1 NPT, G1, 1 ½&quot;, DN40</td>
<td>-321 ... +842°F (-196 ... +450°C)</td>
<td>-14.5 ... +2,320 psi (-1 ... +160 bar)</td>
</tr>
</tbody>
</table>

#### VEGASWING 66
Vibrating level switch for liquids in high temperatures/pressures

### Pressure Measurement

<table>
<thead>
<tr>
<th>Instrument Type</th>
<th>Deviation</th>
<th>Process Fitting</th>
<th>Process Temperature</th>
<th>Measuring Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEGABAR 83</td>
<td>0.075 ... 0.2%</td>
<td>Threads from ½ NPT, G ½, 1&quot;, DN25</td>
<td>-40 ... +392°F (-40 ... +200°C)</td>
<td>-14.5 ... +14,500 psi (-1 ... +1,000 bar)</td>
</tr>
</tbody>
</table>

#### VEGABAR 83
Pressure transmitter with METEC® measuring cell

### Density Measurement

<table>
<thead>
<tr>
<th>Instrument Type</th>
<th>Measuring Range</th>
<th>Process Fitting</th>
<th>Process Temperature</th>
<th>Process Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>MiniTrac 31</td>
<td>up to 40&quot; (1 m) of process material</td>
<td>Mounts external to the vessel</td>
<td>-40 ... +140°F (-40 ... +60°C)</td>
<td>Mounts external to the vessel</td>
</tr>
</tbody>
</table>

#### MiniTrac 31
Radiation-based density and point level measurement
Continuous Level Measurement for liquid Propylene and Ethylene

Reflux drums, storage tanks, and knockout drums all make for a challenging measurement when the process medium are liquefied gases. These applications can cause reliability and performance problems for specific gravity based measurement systems making guided wave radar uniquely qualified to handle these applications. Although challenging in that the dielectric values are very low, the VEGAFLEX guided wave radar is capable of measuring cryogenic liquids with a dielectric value as low as 1.4.

VEGAFLEX 86
Measure liquefied gases reliably with out any moving parts or concern for specific gravity changes

- Capable of measuring liquids with a dielectric value of 1.4
- Possible to replace existing displacers without replacing the chambers
- Measure cryogenic liquids as cold as -196°F

VEGAMAG 82
Local indication of level measurement

- Oversize chambers are available to mitigate any flashing that may occur
- Combining guided wave and point level technologies creates a redundant measurement system of greater security

VEGASWING 66
Point level switch for high pressures in low temperature environments

- Reliable point switching in high pressure low temperature environments
- High and low level alarming for liquids with densities as low as 0.42 specific gravity/cm³
Application: Distillation Column

Level Control of Column Trays

Accurate level control of the distillation tower ensures product quality, but is made difficult due to flashing and other extreme process characteristics. Technology that is immune to product density changes and buildup is necessary to produce an accurate measurement through changes in the process.

VEGAFLEX 81 and VEGAPASS 81
Guided wave radar sensor with bridle chamber for reliable tray measurement

- 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 monitoring high- and low-alarm in the distillation unit

- Reliable measurement unaffected by high temperature and pressure
- Test function during operation provides higher plant availability
- Redundancy increases plant safety and availability
Application: NGL & LPG Spheres

Level Monitoring of NGL & LPG Spheres

NGL and/or LPG tanks are usually only accessible for service and maintenance work every few years during shut-down periods. As a result, this measurement requires a very reliable level transmitter. The need for system isolation and low product dielectric constants require an instrument suitable for these process attributes.

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
- Reliable measurement independent of vapor
- Isolation valve provides the ability to remove the device without emptying the sphere and without affecting measurement reliability

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 vessel
- If additional technology is required for redundant measurement, the simple addition of a pressure transmitter at the tank bottom allows for level measurement via electronic differential pressure
- Extremely robust measuring cells of Alloy, for higher safety during operation

Reliable
High measuring accuracy, independent of vapor, pressure or dielectric constants

Cost-effective
Maintenance-free operation

Convenient
Isolate and remove the device without emptying the sphere
Application: Gas Phase Reactor

Level Measurement in the Disengaging Zone
To prevent carryover of material with unreacted gases, it is important to reliably measure the level in the disengaging zone of the reactor. If carryover occurs it is possible to foul downstream equipment and cause a unit shutdown. To prevent carryover, the level in the vessel is often kept lower at the expense of production capacity. Volatility in the vessel and varying densities in the bed prevent traditional differential pressure instruments from delivering a reliable measurement. Since product density in the bed does not influence level measurement, it is possible to increase the level of the bed while monitoring for potential carryover.

SoliTrac 31
Series of detectors builds profile of bed front in disengaging zone, measuring bed elevation.
- Linked detectors deliver individual readings over small spans and create overall level measurement inside the reactor
- Non-contact operation avoids buildup and reduces maintenance
- External mounting may not require process shutdown for installation

MiniTrac 31
Independent monitor for potential carry over separate from level system.
- Compact and lightweight detector
- Non-contact technology measures through vessel walls and obstructions
- Ideal for all process conditions
- Accurate detector monitors carryover and vapor density

Reliable
External components, not exposed to process conditions
Cost-effective
Increase in production with reduction of carryover induced shut downs
Convenient
Proven technology already used throughout industry
Solids measurement during degassing

During polymer production, entrained hydrocarbon gases can create difficult process conditions. Reliable level technology is a must at all points in the polymer production process. Utilizing an external measurement with a series of radiometric detectors provides the level information needed to control the process reliably and with little maintenance relative to differential pressure units and load cells.

FiberTrac 31

Single detector can be up to 23 feet in length maximizing the level span while reducing the number of detectors needed

- Multiple detectors can be connected together to measure the entire length of the vessel
- Detectors can be added or retrofitted while process is operational
- Proven technology that has been in use on purge bin for many years
Reliable measurement of LDPE Phase

Measurement of LDPE in the thick-walled High Pressure Separator (HPS) is a challenging application that requires absolute reliability. Continuous level systems are used to prevent shutdowns due to the level rising too high. Should LDPE escape with unreacted ethylene gas, it will foul process equipment. Level falling too low in the separator can allow the high pressure gas to “punch” through the LDPE creating a gas out condition, increasing energy costs to recycle gas up to correct pressures.

**SoliTrac 31**

Provides continuous level output to control level of LDPE phase in HPS

- Maximum sensitivity to reduce source sizing for thick walled vessel
- Measurement length of up to 10’
- Built in IO to process data from additional instruments

**MiniTrac 31**

Provides compensation for changing vapor densities in the process.

- Level output is corrected automatically.
- 4 … 20 mA output can be monitored independently of vapor density compensation function
- May also be used as a switch if LDPE elevation increases too high
- Sensitive instrument detects foam
**Application: Low Pressure Separator / Devolatizer**

**Reliable**
Complete external system not affected by process conditions

**Cost-effective**
Possible to mount external system during unit operation

**Convenient**
Lightweight and easy to mount

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**Reliable measurement of LDPE phase**

With changing product consistencies measurement of LDPE in the Low Pressure Separator (LPS) can be just as difficult as it is in the HPS. Similar to the HPS, it is critical to maintain the correct level inside the vessel to ensure the product level does not get so high that LDPE exits with vapor. Preventing the level from dropping too low is important to protect the extruder below the vessel. The level system allows for complete control of the process to ensure shut downs are not due to poor level control. The output provided is compensated for changing vapor densities and is not impacted by product density changes.

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**FiberTrac 31**

A flexible, contoured detector spans the vessel wall and measures into the separator’s conical end.

- Flexible detector conforms to vessel wall shape
- Lightweight design reduces hardware and equipment needs during installation
- Detector replacement is online, eliminating downtime for maintenance

**MiniTrac 31**

Utilization of density detectors allow the level output to be compensated for swinging vapor densities as well as buildup on the vessel wall.

- Compact and lightweight detector
- Non-contact technology measures through vessel walls and obstructions
- Ideal for all process conditions
Level Measurement and Point Level in the Steam Drum

High pressure steam is critical to the operation of the petrochemical plant. An accurate level measurement must be made to ensure the most efficient operation of the drum to provide reliable steam and also make certain the drum level does not fall below a minimal level which can create a very dangerous situation which could lead to major damage and possible injury to plant personnel.

VEGAFLEX 86
Guided wave radar with steam compensation for a reliable drum level control

- Accurate measurement due to the automatic run-time correction, even under changing steam conditions
- Flexible mounting options easily retrofit displacer bridles or installs directly in the vessel
- Meets high safety standard up to SIL 2/3 according to IEC 61508

VEGASWING 66
Vibrating level switch for high and low water limit

- Simple setup without product presence reduces time and cost
- Precise and reliable function through product-independent switching point
- Reliable measurement unaffected by high temperature and pressure
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 customized, user-friendly instrument within an amazingly short time. And the best part: these instruments are more cost-effective and advantageous in every way – and that throughout their entire life cycle.

Display and Adjustment

The display and adjustment module PLICSCOM is used for measured value indication, adjustment, and diagnosis of the sensor. Its menu structure is simple and allows for quick setup and commissioning. Status messages are displayed in plain text.

Connection

The mobile VEGACONNECT is used to connect your instrument to a PC via the USB interface. Parameterization of the instruments is carried out with the tried-and-true adjustment software PACTware and the appropriate DTM. For EDD-based adjustment we also offer graphics-driven EDDs.

Recognition of Maintenance Requirements

The integrated self-monitoring function of plics® instruments continuously reports 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.