Level and pressure instrumentation for energy production

Application examples and products
**Instrumentation for energy production**

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

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

- Belt transfer station | Level measurement
- Conveyor belts for coal | Throughput measurement
- Coal stockpile | Level measurement and point level detection
- Oil feed tank | Level measurement
- Absorber | Level measurement
- Adipic acid mixing tank | Level measurement and point level detection
- Fly ash silo, ash bunker | Level measurement and point level detection
- Silo for filter dust | Level measurement and point level detection
- Lime milk storage tank | Level measurement and point level detection
- Reversing conveyor | Level measurement
- Ammonia feed tank | Level measurement
- Wastewater basin | Level measurement
- Steam drum | Level measurement and point level detection
- Heating condenser | Level measurement
- Cooling water intake | Level measurement
- Cooling water pumps | Point level detection
- Fuel oil storage tanks | Level measurement
- Fire water storage tanks | Level measurement
- Raw water basin level measurement | Level measurement
- Feed water receiving tank | Point level detection
- Water vapour line | Flow rate measurement
### Continuous level measurement

<table>
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<tr>
<th>Instrument type</th>
<th>Measuring range</th>
<th>Process fitting</th>
<th>Process temperature</th>
<th>Process pressure</th>
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<tr>
<td>VEGAFLEX 81</td>
<td>up to 75 m</td>
<td>Thread from G¼, ¼ NPT, flanges from DN 25, 1”</td>
<td>-60 ... +200 °C</td>
<td>-1 ... +40 bar (100 ... +4000 kPa)</td>
</tr>
<tr>
<td>VEGAPULS 62</td>
<td>up to 35 m</td>
<td>Thread from G1½, ½ NPT, flanges from DN 50, 2”</td>
<td>-196 ... +450 °C</td>
<td>-1 ... +160 bar (100 ... +16000 kPa)</td>
</tr>
<tr>
<td>VEGAPULS 64</td>
<td>up to 30 m</td>
<td>Thread from G¼, flanges from DN 50, 2”, mounting strap</td>
<td>-40 ... +200 °C</td>
<td>-1 ... +20 bar (100 ... +2000 kPa)</td>
</tr>
<tr>
<td>VEGAPULS 67</td>
<td>up to 15 m</td>
<td>Mounting strap, compression flange from DN 80, 3”</td>
<td>-40 ... +80 °C</td>
<td>-1 ... +2 bar (100 ... +200 kPa)</td>
</tr>
<tr>
<td>VEGAPULS 69</td>
<td>up to 120 m</td>
<td>Mounting strap, compression flange from DN 80, 3”, adapter flanges from DN 100, 4”</td>
<td>-40 ... +200 °C</td>
<td>-1 ... +3 bar (100 ... +300 kPa)</td>
</tr>
</tbody>
</table>

### Point level detection

<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>
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<tr>
<td>VEGACAP 65</td>
<td>up to 32 m</td>
<td>Thread from G1, 1 NPT, flanges from DN 50, 2”</td>
<td>-50 ... +200 °C</td>
<td>-1 ... +64 bar (100 ... +6400 kPa)</td>
</tr>
<tr>
<td>VEGAMIP 61</td>
<td>up to 100 m</td>
<td>Thread G1½, ½ NPT, flanges, clamp, mounting strap</td>
<td>-40 ... +80 °C</td>
<td>-1 ... +4 bar (100 ... +400 kPa)</td>
</tr>
<tr>
<td>VEGASWING 63</td>
<td>up to 6 m</td>
<td>Thread from G¼, ¼ NPT, flanges from DN 25, 1”</td>
<td>-50 ... +250 °C</td>
<td>-1 ... +64 bar (100 ... +6400 kPa)</td>
</tr>
<tr>
<td>VEGASWING 66</td>
<td>up to 3 m</td>
<td>Thread from G1, 1 NPT, flanges from DN 50, 2”</td>
<td>-196 ... +450 °C</td>
<td>-1 ... +160 bar (100 ... +16000 kPa)</td>
</tr>
<tr>
<td>MINITRAC 31</td>
<td>Density measurement</td>
<td>Mounting from outside on pipeline or on vessel</td>
<td>any (with optional cooling)</td>
<td>any</td>
</tr>
</tbody>
</table>

### Pressure measurement

<table>
<thead>
<tr>
<th>Instrument type</th>
<th>Deviation</th>
<th>Measuring range</th>
</tr>
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<tr>
<td>VEGABAR 82</td>
<td>0.2 %</td>
<td>Thread G½, ½ NPT, flanges from DN 15, 1½”</td>
</tr>
<tr>
<td>VEGABAR 83</td>
<td>0.2 %</td>
<td>Thread from G½, ½ NPT, flanges from DN 25, 1”</td>
</tr>
<tr>
<td>VEGADIF 65</td>
<td>0.15 %</td>
<td>¼-18 NPT, RC ¼, optional with chemical seal assembly, metallic of 316L, Alloy</td>
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Robust and precise instrumentation
VEGA is an experienced supplier of instrumentation for power generation plants. For decades the company has been delivering level and pressure sensors for use in energy production around the world.

VEGA instrumentation delivers accurate measurement data as the basis for automatic control of the various process steps. All sensors are based on state-of-the-art technology and optimized and certified for use in the energy sector.

Reliable measurement
Quality pays off: the robust sensors reduce operating costs and ensure the highest level of safety in all processes.

Fast delivery
Whether initial delivery or repair: VEGA instruments arrive at your facility within a few days. This considerably reduces the expense of keeping sensors and replacement parts on hand.

Simple integration
VEGA sensors are easy to integrate into existing systems. Fast mounting, setup and adjustment make installation really simple.
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.
Level measurement and point level detection in the coal surge bin

In a typical coal power plant, lignite (soft coal) and anthracite (hard coal) are stored temporarily in bins up to 30 meters high. To ensure that the coal belts are continuously loaded without interruption, a robust and reliable level measuring system is required. Additional point level detectors are used to prevent any overfilling of the bins.

VEGAPULS 69
Non-contact level measurement with radar in the coal surge bin

- Accurate measurement, even in the discharge hopper thanks to small beam angle
- High measurement certainty despite extreme dust generation and buildup
- High operational reliability ensured through noise immunity

VEGACAP 65
Capacitive sensor for point level detection in the coal surge bin

- Shortenable probes for high flexibility
- Very long service life and low maintenance requirements through robust design
- Reliable switching point ensured through large sensing weight
Quantity measurement on the feed belt to the coal mill

To fuel the power plant boilers, chain conveyors must first bring raw coal from the bunkers. Feed belts (distributors) then transport the coal to the coal mill, where it is ground into dust and blown into the boiler. In order to ensure the fuel supply to the boiler in periods of full load, and especially low load, three redundant measuring systems are employed per feed belt.

VEGAPULS 67

Non-contact level measurement with radar for monitoring the feed belts to the coal mill

- Non-contact, maintenance-free measurement
- Reliable measurement even with small measuring ranges
- High measurement certainty in spite of intense dust generation
- High operational reliability even on high belt speeds
Combustion air flow measurement

To ensure an optimum combustion process in a coal-fired power plant, the amount of air flowing in the pipes leading to the furnace must be carefully monitored. A Venturi section of the air pipe is a defined constriction in which the pressure drops a few millibars proportional to flow rate. Differential pressure transmitter measures the pressure drop across the measuring section very accurately and calculates the air flow rate.

VEGADIF 65
Differential pressure transmitter for flow measurement of combustion air

- High operational reliability through integrated overload diaphragm
- Universally applicable thanks to wide selection of measuring ranges and process fittings
- Measurement of extremely low differential pressures with high-precision instrument, even at high temperatures
Level measurement in the wet deslagger

In a coal fired power station, either hard coal or brown coal is burned as the main energy source. Most plants have a so-called “wet deslagger” for removing the bottom ash (slag) from the combustion chamber. Level control in the wet deslagger fulfills two important functions: First and foremost, it controls the water level, which cools and removes the hot slag. Secondly, it maintains a hermetic seal on the furnace chamber – a reliable level measurement avoids unwanted air that would otherwise get sucked into the combustion chamber.

VEGAPULS 64
Continuous level measurement with radar in the wet deslagger

- Wear and maintenance-free through non-contact measurement
- High accuracy also with small measuring ranges
- Long service life through high chemical resistance
Density measurement in lime milk

In today’s power plants, the wet process with lime washing has established itself as the primary method for flue gas desulfurization. The flue gas enters the scrubbing tower (absorber) and cools down further. Here the lime milk (gypsum suspension) is sprayed into the flue gas to wash out the SO₂ gas component. The sulphur dioxide is converted into calcium sulphite, which then falls into the absorber sump. To ensure effective flue gas desulfurization, the lime milk (gypsum suspension) must always have a certain density. Radiation-based measurement is used to ensure this.

**MINITRAC 31**
Radiation-based density measurement ensures efficient desulfurization

- Non-contact density measurement from the outside, right through the pipeline
- High system availability ensured through wear and maintenance-free operation
- Accurate measuring result, approval according to SIL2

**VEGASOURCE 31**
The source container serves as a receptacle and shield for the radioactive source

- Focuses the radiation
- Protects the surroundings from gamma radiation
- Minimal space requirements and simple mounting

Reliable
Maximum safety through approvals according to SIL.

Cost effective
Reliable density measurement ensures high plant availability

User friendly
Maintenance-free through non-contact measurement

Lime milk pipeline
Level measurement in the wet gypsum storage hall

The gypsum extracted from the exhaust gases in the flue gas desulphurisation unit is stored in the wet gypsum storage hall ready for further transport. Level sensors are needed to determine the stockpile height of the gypsum and quantity of the stock to optimise transportation management.

VEGAPULS 69
Non-contact level measurement with radar in the wet gypsum storage hall

- High plant availability thanks to wear and maintenance-free measuring instrument
- Unaffected by steam, dust and noise
- Easy mounting and setup
Pressure measurement at the absorber pump

Before the flue gas enters the absorber (scrubbing tower), its pollutant content (sulphur) is measured. If the degree of pollution of the flue gas requires it, the absorber pumps are switched on and a quantity of lime milk corresponding to the pollutant content is blown in. To monitor the absorber pumps, pressure transmitters are installed in the pipelines immediately upstream and downstream of the pumps.

VEGABAR 82
Monitoring of the absorber pump with pressure transmitters

- High plant availability through maximum overload and vacuum resistance
- Very high abrasion resistance thanks to ceramic measuring cell
- High chemical resistance, even with the smallest measuring ranges
Level measurement and point level detection in the lime silo

For flue gas desulfurization a continuous production of the lime milk is required, the lime is kept on hand in sufficient quantities in large silos. Lime tends to readily adhere to more or less anything, depending on its type and consistency, interfering with equipment like the operation of instruments. A robust, non-susceptible level measurement is therefore absolutely necessary for reliable lime logistics and stocking. That’s why a non-contact measuring instrument that also works well in the very dusty environment is essential here.

VEGAPULS 69
Non-contact level measurement with radar in the lime silo

- Non-contact, maintenance-free measurement
- High measurement certainty despite extreme dust generation
- High operational reliability, even when water condenses on instrument

VEGAMIP 61
Non-contact point level detection with radar in the lime silo

- Non-contact, maintenance-free measurement
- Very long service life and low maintenance requirements through robust design
- Simple measurement from outside the container
Pressure measurement in the steam line

The pressure in the steam loop has to be monitored at various points in the process. Reliable measurement is required especially at the inlets of the various pressure stages of the turbine. Pressure transmitters detect even the smallest changes in the steam loop in any state of operation.

VEGABAR 83
Pressure transmitter for pressure monitoring in the steam line

- Direct connection to process, even at high temperatures
- High accuracy, even in high-pressure applications
- Remote electronics ensures high operational reliability
Cooling tower basin level measurement

At the bottom of the cooling tower there are nozzles for atomizing and cooling incoming hot water. As the heated water is sprayed up inside the cooling tower, it warms the air, which expands, flows upward creating updraft which pulls fresh cold air up through the slatted bottom. Draft eliminators inside the cooling tower cause the cooled water to form droplets and rain back down into the cooling tower basin. The water level in the cooling tower basin must be monitored continuously to optimise use of the circulation pumps and the cooling process.

VEGAFLEX 81

Level measurement with guided radar in the cooling tower basin

- Simple, maintenance-free measurement
- High measurement certainty, even in extremely wet conditions, independent of pressure fluctuations
- Proven measuring principle ensures high operational reliability
Condensate detection in the water-steam cycle
To warm up the water for the boiler, steam is bled from the power plant turbine and delivered into a preheater. As the steam cools and condenses, it is removed from the preheater with pumps. Any condensate gathering in steam pipes has to be reliably detected to prevent it from entering the turbine. Vibrating level switches, mounted at low points in the system, reliably detect any water accumulation.

VEGASWING 66
Vibrating level switch for point level detection in the steam line
- High security through self-monitoring of sensor and electronics at extreme process temperatures and pressures
- Fast and reliable function test via the press of a button
- Flexible and trustworthy in applications up to SIL3

Reliable
Optimum protection of the turbine against condensation

Cost effective
Simple mounting and dependable function

User friendly
Function test via test button
Level measurement and point level detection in storage tanks for acids

The raw water, which is usually extracted from a river, cannot be fed untreated directly into the turbine circuit of the plant. It has to be treated first. To neutralize the water, either sodium hydroxide (NaOH) or hydrochloric acid (HCl) is added. Level sensors supply the measurement data required to ensure a high availability of these chemicals and others used to treat the feed water.

VEGAPULS 63
Radar level measurement in storage tanks for acids
- High acid resistance through optimized antenna design
- Reliable technology ensures high measurement certainty
- Very high operational reliability and long service life thanks to non-contact measuring method

VEGASWING 63
Vibrating level switch as overfill protection in storage tanks for acids
- Product-independent switching point ensures millimetre-exact detection of the limit level
- Minimal costs for maintenance and servicing
- Available in different materials, includes Ex, WHG and SIL2 approvals