

Level and pressure instrumentation for energy production



Application examples and products



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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.

<p>1 Coal surge bin</p> <p>2 Feed belt to the coal mill</p> <p>3 Combustion air pipe</p> <p>4 Wet deslagger</p> <p>5 Lime milk pipeline</p> <p>6 Wet gypsum storage hall</p>	<p>Level measurement and point level detection</p> <p>Quantity measurement</p> <p>Quantity measurement</p> <p>Level measurement</p> <p>Density measurement</p> <p>Level measurement</p>	<p>7 Absorber pump</p> <p>8 Lime silo</p> <p>9 Turbine steam line</p> <p>10 Cooling tower basin</p> <p>11 Steam line</p> <p>12 Storage tanks for acids</p>	<p>Pressure measurement</p> <p>Level measurement and point level detection</p> <p>Pressure measurement</p> <p>Level measurement</p> <p>Point level detection</p> <p>Level measurement and point level detection</p>
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More applications can be found at

www.vega.com/energy






<ul style="list-style-type: none"> ■ Belt transfer station ■ Conveyor belts for coal ■ Coal stockpile ■ Oil feed tank ■ Absorber ■ Adipic acid mixing tank ■ Fly ash silo, ash bunker ■ Silo for filter dust ■ Lime milk storage tank ■ Reversing conveyor 	<p>Level measurement</p> <p>Throughput measurement</p> <p>Level measurement and point level detection</p> <p>Level measurement</p> <p>Level measurement</p> <p>Level measurement and point level detection</p> <p>Level measurement and point level detection</p> <p>Level measurement and point level detection</p> <p>Level measurement and point level detection</p> <p>Level measurement</p>	<ul style="list-style-type: none"> ■ Ammonia feed tank ■ Wastewater basin ■ Steam drum ■ Heating condenser ■ Cooling water intake ■ Cooling water pumps ■ Fuel oil storage tanks ■ Fire water storage tanks ■ Raw water basin level measurement ■ Feed water receiving tank ■ Water vapour line 	<p>Level measurement</p> <p>Level measurement</p> <p>Level measurement and point level detection</p> <p>Level measurement</p> <p>Level measurement</p> <p>Point level detection</p> <p>Level measurement</p> <p>Level measurement</p> <p>Level measurement</p> <p>Point level detection</p> <p>Flow rate measurement</p>
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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, ¼ NPT, flanges from DN 25, 1"	-60 ... +200 °C	-1 ... +40 bar (-100 ... +4000 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, flanges from DN 50, 2", mounting strap	-40 ... +200 °C	-1 ... +20 bar (-100 ... +2000 kPa)
VEGAPULS 67 Radar sensor for continuous level measurement of bulk solids 	up to 15 m	Mounting strap, compression flange from DN 80, 3"	-40 ... +80 °C	-1 ... +2 bar (-100 ... +200 kPa)
VEGAPULS 69 Radar sensor for continuous level measurement of bulk solids 	up to 120 m	Mounting strap, compression flange 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
VEGACAP 65 Capacitive cable electrode for level detection 	up to 32 m	Thread from G1, 1 NPT, flanges from DN 50, 2"	-50 ... +200 °C	-1 ... +64 bar (-100 ... +6400 kPa)
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 liquids 	up to 6 m	Thread from G¾, ¼ 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 82 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)
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)
VEGADIF 65 Pressure transmitter with metallic measuring diaphragm 	0.15 % 0.075 %	¼-18 NPT, RC ¼, optional with chemical seal assembly, metallic of 316L, Alloy	-40 ... +120 °C	from -10 ... +10 mbar (-1 ... +1 kPa) up to -40 ... +40 bar (-4000 ... +4000 kPa)



Energy production



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.



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.





Coal surge bin

Reliable

Dependable measurement even during filling

Cost effective

Efficient use of the entire container capacity

User friendly

Simple mounting and setup

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

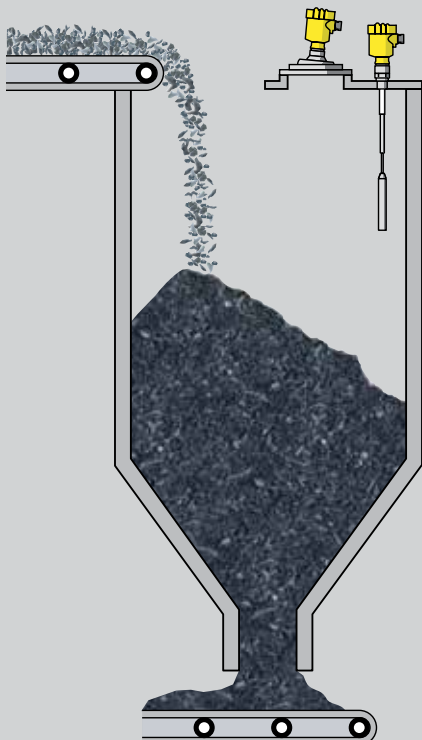
- Accurate measurement, even in the discharge hopper thanks to small beam angle
- High measurement certainty despite extreme dust generation and buildup
- High operational reliability ensured through noise immunity



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





Feed belt to the coal mill

Reliable

Reliable monitoring of chain conveyor loading

Cost effective

Optimal plant operation

User friendly

Simple installation without mounting system

Quantity measurement on the feed belt to the coal mill

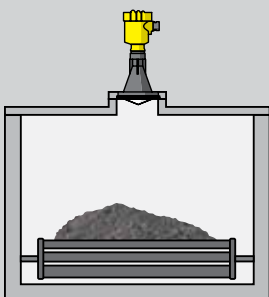
To fuel the power plant boilers, chain conveyors must first bring raw coal from the bunkers. Feed belts (distributors) then transport the coal to the coal mill, where it is ground into dust and blown into the boiler. In order to ensure the fuel supply to the boiler in periods of full load, and especially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

Reliable

Reliable flow measurement of combustion air

Cost effective

Exact volume control possible for optimal combustion process

User friendly

Easy setup

Combustion air flow measurement

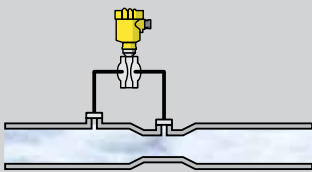
To ensure an optimum combustion process in a coal-fired power plant, the amount of air flowing in the pipes leading to the furnace must be carefully monitored. A Venturi section of the air pipe is a defined constriction in which the pressure drops a few millibars proportional to flow rate. Differential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





Wet deslagger

Reliable

Reliable water level measurement ensures optimal operation of the process

Cost effective

Maintenance-free measurement with high accuracy

User friendly

Simple mounting and setup

Level measurement in the wet deslagger

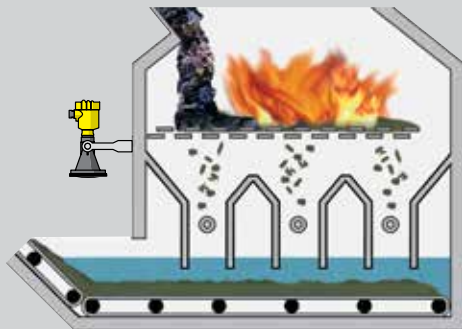
In a coal fired power station, either hard coal or brown coal is burned as the main energy source. Most plants have a so-called “wet deslagger” for removing the bottom ash (slag) from the combustion chamber. Level control in the wet deslagger fulfils two important functions: First and foremost, it controls 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





Lime milk pipeline

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

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 SO_2 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

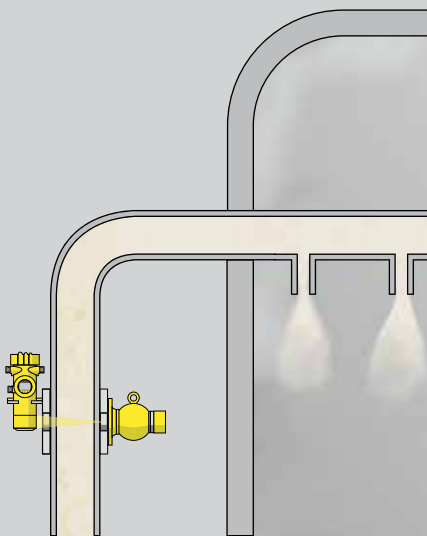
- Non-contact density measurement from the outside, right through the pipeline
- High system availability ensured through wear and maintenance-free operation
- Accurate measuring result, approval according to SIL2



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





Wet gypsum storage hall

Reliable

Reliable function under all operating conditions

Cost effective

Simple installation on existing infrastructure

User friendly

Maintenance-free operation

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





Absorber pump

Reliable

Ceramic measuring cell is resistant to abrasion

Cost effective

Optimal operation of the pumps

User friendly

Reliable, low-maintenance operation

Pressure measurement at the absorber pump

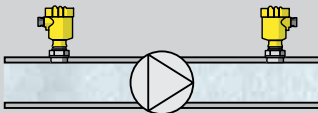
Before the flue gas enters the absorber (scrubbing tower), its pollutant content (sulphur) is measured. If the degree of pollution of the flue gas requires it, the absorber pumps are switched on and a quantity of lime milk corresponding to the pollutant content is blown in. To monitor the absorber pumps,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





Lime silo

Reliable

Reliable measurement even during filling

Cost effective

Accurate measurement of the entire container volume

User friendly

Simple mounting and setup

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

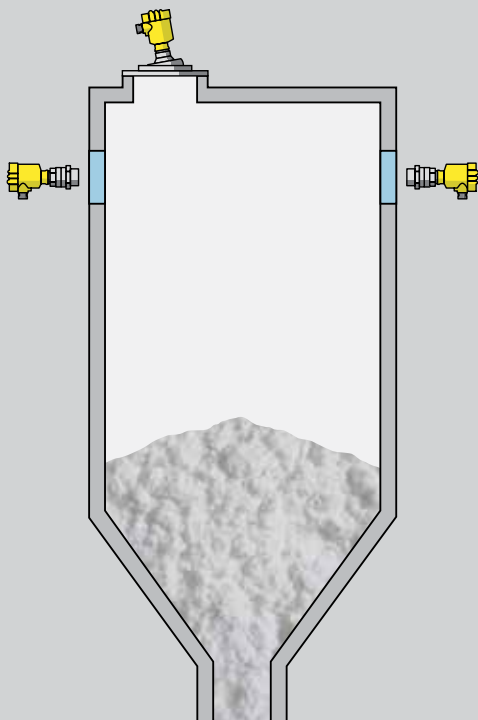
- Non-contact, maintenance-free measurement
- High measurement certainty despite extreme dust generation
- High operational reliability, even when water condenses on instrument



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





Turbine steam line

Reliable

Reliable operation under all operating conditions

Cost effective

Optimal plant operation

User friendly

Simple installation and adjustment

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

Reliable

Reliable operation under all operating conditions

Cost effective

Maintenance-free operation of the plant

User friendly

Simple mounting and setup

Cooling tower basin level measurement

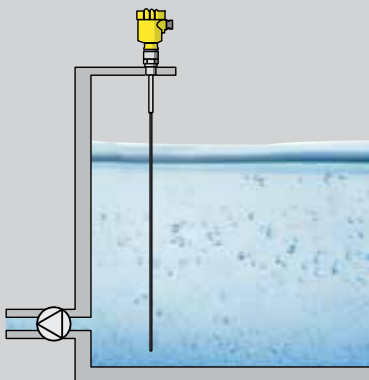
At the bottom of the cooling tower there are nozzles for atomizing and cooling incoming hot water. As the heated water is sprayed up inside the cooling tower, it warms the air, which expands, flows upward creating updraft which pulls fresh cold air up through the slatted bottom. Draft eliminators inside 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





Steam line

Reliable

Optimum protection of the turbine against condensation

Cost effective

Simple mounting and dependable function

User friendly

Function test via test button

Condensate detection in the water-steam cycle

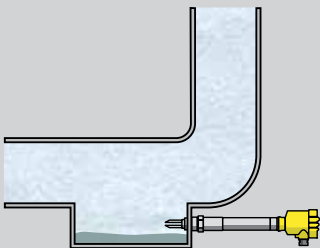
To warm up the water for the boiler, steam is bled from the power plant turbine and delivered into a preheater. As the steam cools and condenses, it is removed from the preheater with pumps. Any condensate gathering in steam pipes has to be reliably detected to prevent it from entering the turbine. Vibrating 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





Storage tanks for acids

Reliable

High operational reliability through the use of chemically resistant materials

Cost effective

Yearly WHG test can be carried out by pressing a button

User friendly

Reliable, maintenance-free measurement

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 overflow 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



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Looking Forward **VEGA**