Level and pressure instrumentation for the paper industry

Application examples and products

Looking Forward VEGA

Measurement technology for the paper industry

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

■ **Wood chip silo**	Level measurement	■ **Deaerator**	Level measurement
■ **Digester**	Point level detection and pressure measurement	■ **Headbox**	Pressure measurement
■ **Pipeline in the liquor recovery process**	Density measurement	■ **Drying cylinder**	Differential pressure measurement
■ **Pulper**	Level measurement and blockage detection	■ **Storage tank for wet strength agent**	Level measurement and point level detection
■ **Pressure screen**	Pressure measurement	■ **Starch silo**	Level measurement and point level detection
■ **Bleaching tower**	Level measurement and point level detection	■ **Storage tanks for chemicals and auxiliary substances**	Level and pressure measurement, point level detection

More applications can be found at

www.vega.com/paper-industry

■ **Storage towers**	Level measurement	■ **Batching tank for coatings**	Level measurement
■ **Water separator**	Level and pressure measurement	■ **Ash silo**	Level measurement and point level detection
■ **Vacuum system**	Level and pressure measurement	■ **Pumps for wet strength agent**	Point level detection and pressure measurement
■ **Hydraulic oil station**	Level and flow measurement	■ **Refiner**	Pressure measurement

All sensors at a glance

Continuous level measurement

Instrument type		Measuring range	Process fitting	Process temperature	Process pressure
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)
VEGASON 62 Ultrasonic sensor for continuous level measurement		up to 8 m	Thread G2, 2 NPT	-40 … +80 °C	-0.2 … +2 bar (-20 … +200 kPa)

Point level detection

Instrument type		Measuring range	Process fitting	Process temperature	Process pressure
VEGACAP 64 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)
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 61 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)
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)
MINITRAC 31 Radiation-based sensor for density measurement		Density measurement	Mounting from outside on pipelines 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 from G½, ½ NPT, flanges from DN 25, 1"	-90 … +400 °C	-1 … +1000 bar (-100 … +100000 kPa)
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)

Signal processing

Instrument type		Sensors	Mounting	Voltage loss	Voltage supply
VEGADIS 82 External display and adjustment unit for 4 … 20 mA/HART sensors		Sensors with HART protocol	Tube, panel, wall mounting or carrier rail	Standard < 1.7 V, with lighting < 3.2 V	Via 4 … 20 mA current loop

Paper industry

Trendsetting measurement technology

The range of products and services from VEGA for measurement of level, point level and pressure is setting the standard in the paper industry. VEGA is a world leader in radar level measurement and another core technology from VEGA is the unique CERTEC® ceramic measuring cell for process pressure and hydrostatic level measurement.

Productivity under extreme conditions

Manufacturing equipment in the paper industry has to have high operational availability. So besides being highly accurate, the measurement technology used also has to be robust, have long-term stability and be easy to service. This is no problem for VEGA instruments, as they are designed specifically for the harsh operating conditions of the paper industry, such as pressure surges, abrasion, strong vibration and buildup.

Specific solutions for the paper industry

VEGA delivers the exact solutions needed for paper manufacturing. Whether for storage towers, cleaners, pressurized screens, stand-pipes of MC pumps or the headbox – the wide range of physical measuring technologies can solve almost any measurement challenge.

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 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

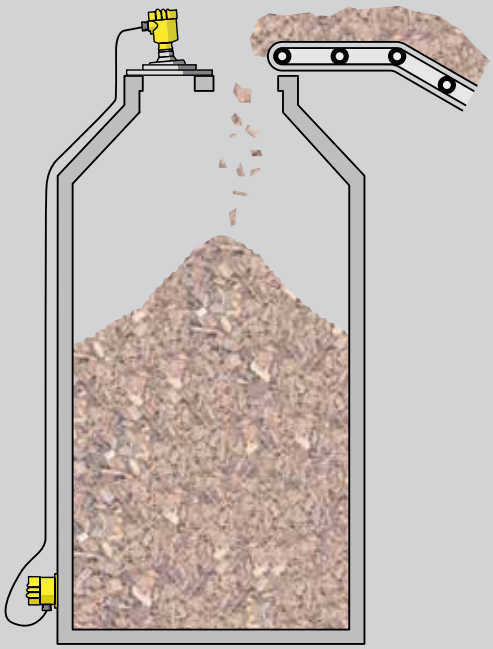
The integrated self-monitoring function of plics® instruments permanently informs the user on the status of the instruments. Status messages allow proactive and cost-effective maintenance. All diagnostic data can be called up easily and quickly in plain text via the built-in memory functions.

Wood chip silo

Reliable
Reliable continuous measurement, even during filling

Cost effective
Optimal container volume utilization

User friendly
Volume display and sensor adjustment in a convenient location



Wood chip silo level measurement

The wood chips are transferred via conveyor belts to storage silos up to 25 m high and stored there temporarily for further processing. The silos are filled and emptied in batches. During the process, large amounts of dust are generated, material cones and bridges form, which collapse during emptying. Reliable level measurement is needed here to ensure supplies for downstream processes and facilitate logistics planning.

VEGAPULS 69

Level measurement with radar in the wood chip silo

- Reliable function despite heavy dust from dry wood chips
- Precise alignment with the angle of repose by means of swivelling holder
- With a tightly focused measurement signal, it is unaffected by vessel internals

VEGADIS 82

Measured value display and sensor adjustment

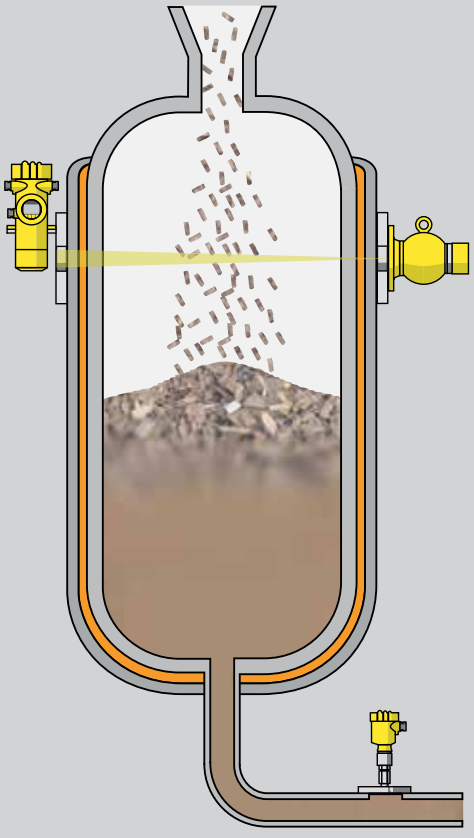
- Measured value display and sensor adjustment in a readily accessible location
- Easy-to-read display with plain text and graphics
- Simple operation via four keys and clearly structured menu

Digester

Reliable
Reliable operation despite extreme process conditions

Cost effective
Measuring system can be installed without invasive work on the vessel wall and insulation

User friendly
Simple retro installation



Level detection and pressure measurement in the digester

In the digester, the action of chemical dissolution removes the lignin binder, thereby exposing and freeing the cellulose fibres. During the cooking process according to the alkaline sulphate method, the fibres are fed into the digester by means of steam pressure. To enable fully automatic operation of the digester, a point level detection of the filling is required. The vessel pressure also needs to be carefully monitored throughout this process.

MINITRAC 31

Radiation-based detection of maximum level for controlling the filling process

- Enables automated operation of the digester
- Non-contact measurement right through the vessel wall
- Maintenance-free operation

VEGABAR 81

Pressure transmitter for pressure measurement in the digester

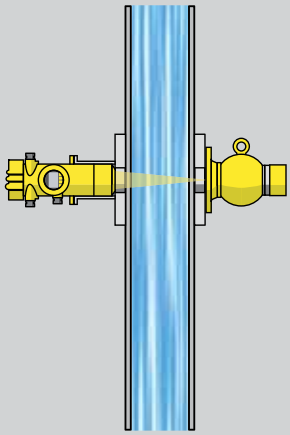
- Pressure measurement in aggressive media and high temperatures
- Long-term chemical resistance
- Resistant to pressure surges during emptying

Pipeline in the liquor recovery process

Reliable
Reliable operation despite extreme process conditions

Cost effective
Density measurement from the outside, without invasive changes to the pipe

User friendly
Optimized for the application, long-term maintenance-free measurement



Density measurement in liquor recovery

The black liquor resulting from pulp cooking is regenerated and fed back into the digester. Liquor regeneration comprises several process steps. The processes take place at high temperatures and pressures; the media are aggressive and sometimes abrasive. Density measurement of the liquor in the pipelines is required for eco-friendly and energy-efficient process control.

MINITRAC 31

Density measurement with radiation for energy-efficient liquor regeneration

- Enables automation of liquor regeneration process
- Non-contact measurement right through the vessel wall
- Maintenance-free operation

VEGASOURCE 31

The source holder serves as a housing for the radiation capsule and protects it from external influences

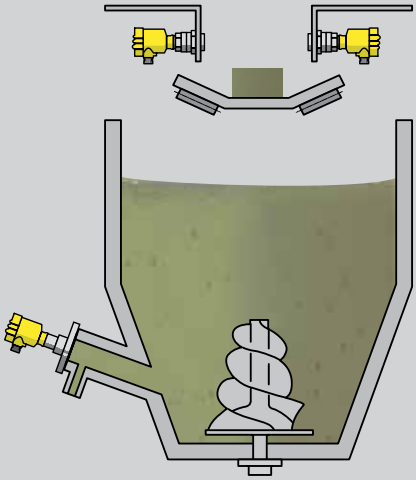
- Minimal space requirements and simple mounting
- Operational reliability and safety with pneumatic shutter on the source holder
- Optimum shielding allows use without a restricted access area

Pulper

Reliable
Prevents jamming, thus ensuring a smooth automated process

Cost effective
Enables optimal ratio of pulp/waste paper to process water

User friendly
Wear and maintenance-free thanks to non-contact measurement



Level measurement and blockage detection in the pulper and conveyor belt monitoring

Waste paper or pulp bales are transported on a conveyor belt to the pulper, where they are broken down by adding process water. A stirrer speeds up to separate fibers. Difficult process conditions exist in the pulper: falling bales cause severe pressure shocks, the stirrer creates vortexes. Besides that, foreign substances like wire, glass or sand enter the process along with the waste paper and have an extremely abrasive effect on the interior of the vessel. To ensure an automatic process flow, the level measuring system must establish the ratio of waste paper/pulp to process water. In addition, a possible jamming of the bales on the conveyor belt must be detected.

VEGAMIP 61

Microwave barrier for measurement of the loading height

- Non-contact measurement, therefore wear-free
- Reliable measurement of loading height
- Maintenance-free detection system, no cleaning required

VEGABAR 82

Hydrostatic level measurement in the pulper

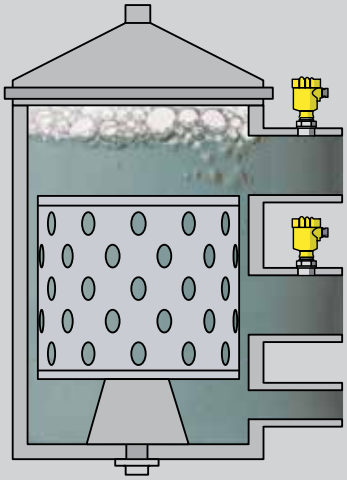
- Highly resistant to overload from pressure surges
- Very highly abrasion resistant
- Wear-free ceramic measuring cell for a long service life

Pressure screen

Reliable
Reliable measurement despite strong vibration

Cost effective
High abrasion resistance guarantees long operation

User friendly
Self-cleaning and maintenance-free thanks to front-flush mounting



Pressure measurement in the pressure screen

Pressure screens are used to filter out impurities and separate fibres in stock preparation. A rotating screen basket inside the filter does the actual filtering. Pressure screens have an inlet for the suspension, an outlet for accepted stock and a discharge for rejected stock and contaminants. The process conditions are characterized by pressure surges as well as abrasion and contaminants in the stock. Efficient screening requires a controlled pressure difference between inlet and outlet, which therefore requires continuous, reliable measurement.

VEGABAR 82

Pressure transmitter for pressure measurement in the pressure screen

- Front-flush installation with self-cleaning effect
- High abrasion resistant ceramic for a long service life
- Highly resistant to overload from pressure surges

Bleaching tower

Reliable
High operational reliability by reliable measurement, even with high pulp densities

Cost effective
Maximum utilization of bleaching tower volume

User friendly
Minimal servicing thanks to non-contact, maintenance-free measurement

Level measurement and point level detection in the bleaching tower

In order to achieve the desired degree of whiteness, the pulp must be bleached. For this it is filled into the 25 meter high bleaching tower. The bleaching process runs continuously at temperatures up to 95 °C, with using chemicals such as oxygen, ozone or peroxide. The bleached pulp is discharged via screw conveyors. Due to its size, the bleaching tower is never emptied. Continuous level measurement enables a smooth process flow.

VEGAPULS 69

Non-contact level measurement with radar in the bleaching tower

- Rinsing air connection on the sensor prevents buildup
- Reliable measurement, even with fluctuating pulp density
- Wear and maintenance-free

VEGABAR 82

Hydrostatic level measurement for controlling stock discharge

- Front-flush installation in the ball valve fitting
- Robust ceramic for long-term use
- High measurement accuracy, even with small measuring ranges

VEGACAP 64

Capacitive level detection as protection against overfilling

- Reliable function despite adhesive medium
- High-quality materials ensure good chemical resistance
- Maintenance-free

Deaerator

Reliable
Dry run protection for the headbox pump

Cost effective
Low-cost solution through use of electronic differential pressure

User friendly
Easy mounting without mounting brackets and capillary tubes

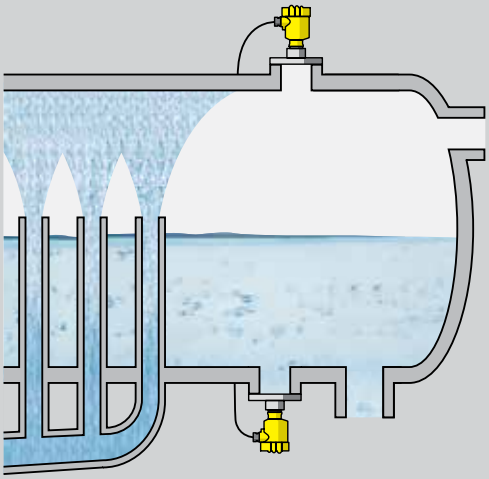
Level measurement in the deaerator

The approach flow system connects the stock preparation facility with the paper machine. Here, the pulp for the paper machine is diluted to the required consistency. Additionally, the approach flow system ensures a smooth flow of stock. A particularly important element is the stock deaerator upstream of the headbox. It removes any entrained air under vacuum to ensure a constant, smoothly running process. For effective performance, the stock deaerator always has to be filled to a predefined, millimetre-exact level.

VEGABAR 82

Electronic differential pressure measurement for determining the level in the deaerator

- Front-flush installation in the deaerator
- High measurement accuracy, even with very small measuring ranges
- Measurement unaffected by temperature fluctuations



Headbox

Reliable
Highly accurate measured values, precise control input for the headbox pump

Cost effective
No flushing pipes needed

User friendly
High protection class IP 68 for easy cleaning

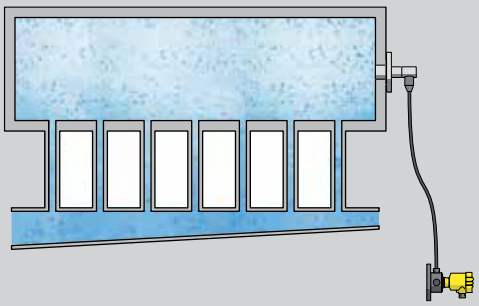
Pressure measurement in the headbox

The paper suspension is pumped into the headbox of the paper machine. Via the hydraulically pressurized headbox it passes through a tapered cross-flow distributor and manifold, through the rectangular discharge opening, or slice, onto the screen. The outflow speed of the suspension is adjusted to match the speed of the screen by adjusting the pressure of the headbox feed pump. This means an accurate pressure measurement, with minimal turbulence created in the headbox is vital at this part of the process.

VEGABAR 82

Process pressure measurement in the headbox for speed control of the stock pump

- Absolutely front-flush installation in the wall of the headbox
- No effect on the application of slurry to the sieve
- CERTEC® measuring cell guarantees a high accuracy



Drying cylinder

Reliable
Reliable measurement ensures continuous, trouble-free operation of the facility

Cost effective
Low-cost measurement system via electronic differential pressure

User friendly
Simple installation, as capillaries and impulse lines are not necessary

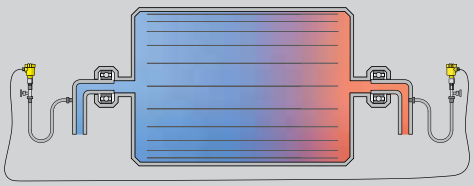
Differential pressure measurement in the drying cylinder

The residual moisture content of the paper web is removed by steam-heated cylinders in the drying section of the paper machine. The drying process removes heat from the steam, which then forms a thin layer of condensate on the inner walls of the cylinder. This layer influences the transfer of heat to the paper and has to be skimmed off continuously by siphoning. The correct level of heat transfer from the drying cylinder to the paper is monitored by pressure measurements both at the inlet and at the outlet.

VEGABAR 82

Electronic differential pressure measurement at the inlet/outlet of the drying cylinder

- Long-term stability through use of dry CERTEC® measuring cell
- Direct pressure measurement without differential pressure lines

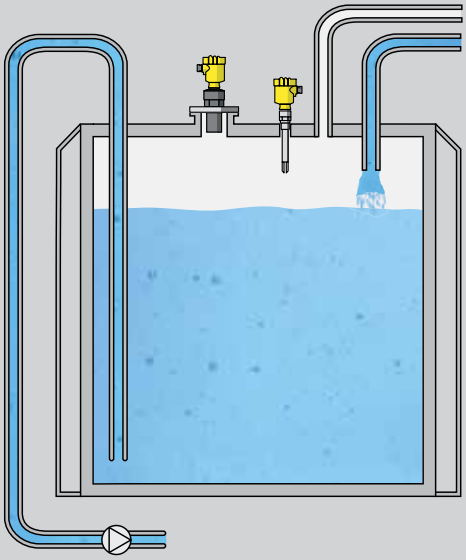


Storage tank for wet strength agent

Reliable
Reliable filling with overfill protection and leak sensors

Cost effective
Maximum utilization of the container volume thanks to continuous level measurement

User friendly
Direct reading of the measured value at the additive station



Level measurement and point level detection in the storage tank for wet strength agent

Wet strength agents are polymeric additives that increase the water resistance particularly of hygienic and specialty papers. These are applied in the paper machine via a size press or spraying device. Because of their high pH value, these substances are stored in double-walled GRP (glass reinforced plastic) tanks. For safety and operational reasons, multiple level measurements are needed in these tanks.

VEGASON 62

Level measurement with ultrasound in the wet strength agent storage tank

- Non-contact, maintenance-free level measurement
- Highly resistant materials for long operational life
- Reliable function, independent of medium properties

VEGASWING 63

Vibrating level switch as overfill protection in the storage tank

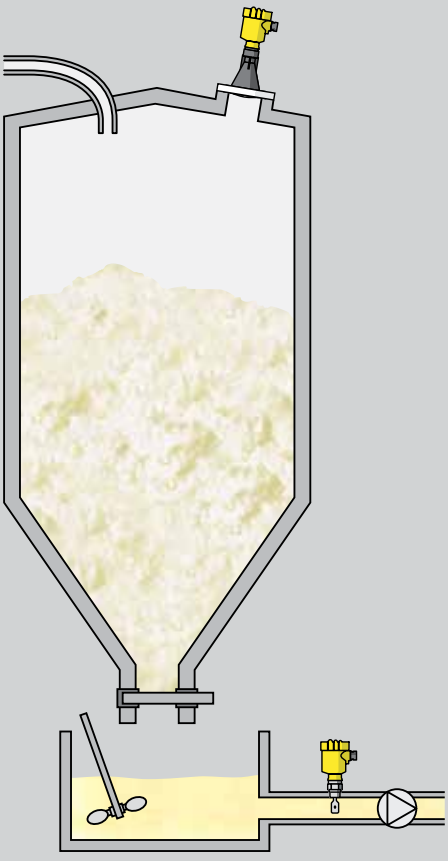
- Simple function test via keystroke
- WHG-approved instrument provides legal certainty

Starch silo

Reliable
Reliable function even during filling

Cost effective
Dry run protection prevents failures or damage to the eccentric pumps

User friendly
Easy alignment via optional adjustable sealing gaskets



Level measurement in starch silos and dry run protection for starch liquefaction vessels

Starch is an important additive to increase the strength of the paper. The raw starch is stored in tall, narrow silos. Filling is carried out pneumatically, generating large amounts of dust. They are discharged into the starch slurry production system beneath the silo and the resulting slurry is pumped into the starch cookers by eccentric pumps. For optimal control of the silo filling process, a reliable level measurement is required. To prevent the eccentric pump from running dry, an in-line switch is needed upstream of the pump.

VEGAPULS 69

Level measurement with radar in the starch silo

- Maintenance-free operation through non-contact measuring method
- Precise alignment and measurement even in high, narrow silos
- Reliable measurement despite dust

VEGASWING 61

Vibrating level switch as a universal dry run protection for eccentric pumps

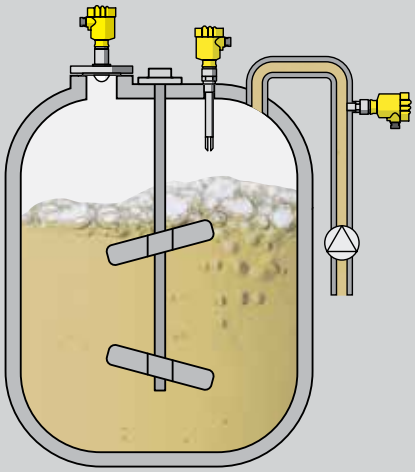
- Small process fittings, short fork also suitable for small pipe diameters
- Easy setup and commissioning because adjustment-free
- Reliable measurement thanks to product-independent switching point

Storage tanks for chemicals and auxiliary substances

Reliable
Reliable, product-independent measurement

Cost effective
Optimal utilization of the container volume

User friendly
Simple installation and setup



Level, switching and pressure measurement in storage tanks

The targeted addition of chemicals and auxiliary substances influences the properties and quality of the paper. Common additives are hydrogen peroxide as well as alkalis, acids and fillers. These chemicals and additives are sometimes aggressive, produce vapours and are at temperatures of up to 95 °C. This means they are often stored in stainless steel or glass fibre reinforced plastic containers. Level and pressure measurements are essential for the safe filling and emptying of the storage tanks and for dry run protection of pumps.

VEGAPULS 64

Non-contact level measurement with radar in storage tanks

- Wear and maintenance-free through non-contact measurement
- Suitable for all media and container types
- High chemical resistance via PTFE-encapsulated antenna system

VEGABAR 83

Pressure measurement as dry run protection for the chemical pumps

- Chemically resistant process diaphragm
- Small, front-flush process fitting
- Reliable measurement of high pressures

VEGASWING 63

Vibrating level switch as overfill protection in the storage tank

- Overfilling of the container is reliably prevented
- WHG-approved instrument ensures legal certainty
- Simple WHG (function) test via keystroke

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VEGA Grieshaber KG
Am Hohenstein 113
77761 Schiltach
Germany

Phone +49 7836 50-0
Fax +49 7836 50-201
E-mail info.de@vega.com
www.vega.com

Looking Forward