The yellow world of pressure measurement
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VEGA Grieshaber KG is a worldwide leading supplier of level, switching and pressure instrumentation. This strong position was achieved through consistent, targeted development of innovative and trendsetting products. In the area of pressure measurement, VEGA offers a wide variety of application-specific solutions for measuring process pressure, differential pressure and hydrostatic pressure.

Pressure instrumentation for all industries
Pressure transmitters from VEGA are hard at work in the chemical and pharmaceutical industry, in process and environmental engineering, in paper and ceramics manufacture, in mining and primary industries, in power generation, transport as well as in the food and water/waste water sectors. Applications in the marine and aerospace industries round out their wide range of uses.

Universally applicable
With its relative, absolute and differential pressure transmitters, VEGA has solutions for all pressure-related applications. Instruments with diverse performance features are available for liquids and gases, as well as abrasive and corrosive media:

- Product temperatures up to +400 °C
- Process pressures up to +1,000 bar
- High vacuum resistance
- Vacuum and pressure impact resistant
- Deployable at up to 600 m depth in water
- Vibration and shock resistant
All core technologies, like the ceramic-capacitive CERTEC measuring cell, are developed at VEGA’s own facilities and all instruments are manufactured there as well. At the centre of VEGA measurement technology is plics®. This modular product concept allows individual combinations of performance characteristics that empower plics® instruments to fulfil virtually any demand in the area of pressure measurement.

Consistently the best technology
VEGA develops all of its pressure transmitters itself. The assembly of circuit boards and the manufacturing of CERTEC® and METEC® measuring cells, are carried out at the VEGA plant. With plics® instruments, environmental concerns were also considered throughout the entire value-added chain: from the choice of raw materials to production and disposal.

Quality right from the start
In VEGA quality assurance, every individual measuring cell is checked for a helium tightness of < 10^{-8} mbar · l/s in the helium leak tester. This ensures that no leakages can occur, which can lead to a malfunction. In addition, every cell passes through a test run in the temperature range -20 ... +100 °C, eliminating any temperature-related malfunctions. Every production stage is checked and documented and the traceability of every pressure transmitter is guaranteed through its serial number.
Calibration of the pressure transmitters

Calibration is decisive for the measuring precision of the pressure transmitters. Highly involved calibration procedures on DKD-certified test equipment guarantee highest precision. The test benches as well as the test software are made at VEGA’s own facilities. This allows a fast and flexible reaction to customer-specific requirements. The calibration of every individual pressure transmitter is confirmed by an inspection certificate.

Measuring cell production in the clean room

In VEGA’s manufacturing process, the ceramic-capacitive CERTEC® measuring cells and the metallic METEC® measuring cells are produced under “clean room class 100” conditions. In this dust-free atmosphere, CERTEC® measuring cells are printed in thick film technology and fired. A glass solder bond joins the base element and the ceramic diaphragm together with a distance tolerance of max. +/-1 µm.
An overview of VEGA measurement technology

CERTEC® measuring cell

Ceramic-capacitive measuring cell of sapphire-ceramic® with absolutely front-flush diaphragm.
- Measuring range -1 ... +72 bar
- Temperature range -40 ... +150 °C
- Dry measuring cell
- Excellent long-term stability
- High overload and abrasion resistance

Applications include: the pharmaceutical industry, paper production and sewage treatment.

METEC® measuring cell

Metallic measuring cell with Hastelloy diaphragm and self-compensating temperature characteristics.
- Measuring range -1 ... +25 bar
- Temperature range -12 ... +200 °C
- Elastomer-free
- Absolutely vacuum resistant
- Good thermal shock reaction

Applications include: the food industry, corrosive chemical products and bitumen storage.

Differential pressure measuring cell

Piezoresistive metallic measuring cell with integrated overload diaphragm.
- Δp measuring range 0.01 ... 40 bar
- Temperature range -40 ... +120 °C
- Dynamic overload resistance up to +630 bar
- Chemical seal single side assembly (CSS)
- Chemical seal both side assembly (CSB)

Applications include: filter monitoring, flow measurement and pressurized vessels.
Piezoresistive metallic measuring cell with FDA compliant oil filling.
- Measuring range -1...+16 bar
- Temperature range -40 ... +150 °C
- Low pressure ranges possible
- Insensitive to condensed moisture
- Elastomer-free
- Vacuum resistant

Applications include: the food industry, water extraction and power plant technology.

Metallic thin film measuring cell in very compact design. Dry measuring cell with very high precision.
- Measuring range +25 ... +1,000 bar
- Temperature range -40 ... +105 °C
- Vacuum resistant
- Insensitive to condensed moisture
- Vibration and shock resistant

Applications include: hydraulics technology, engine test benches and gas compressor stations.

Chemical seal system for decoupling from high temperatures or aggressive media.
- Measuring range -1 ... +250 bar
- Temperature range -40 ... +400 °C
- Wetted parts e.g. of high-grade steel 316 L, Tantalum and Hastelloy
- Diaphragm coatings e.g. of PA, PP, ceramic or gold

Applications include: the pharmaceutical and food industry, chemical reactors and distillation columns.
# plcis® – easy is better

## Indicating and adjustment module
- Plicsom
- VEGACONNECT

## Electronics
- 4 ... 20 mA/HART
- Profibus PA
- Foundation Fieldbus
- Level switch

## Housings
- Plastic
- Stainless steel
- Aluminium
- Plastic double chamber
- Stainless steel double chamber
- Aluminium double chamber

## Process fittings
- Thread
- Flange
- Hygienic fitting
- Custom-designed

## Sensor types
- Radar
- Ultrasonic
- Guided microwave
- Capacitive
- Vibration
- Microwave barrier
- Process pressure
- Hydrostatic
- Differential pressure

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Hygienic standards

Explosion protection

Safety standards

Ship approvals

Hys
Trendsetting measurement technology orientates itself around the people who use it. That’s why we developed plics® – the world’s first modular product system for instrumentation. Every one of our sensors is custom built from plics® components and thus optimally fulfils the requirements of every industry and its specific applications.

Simpler planning with plics®
The free choice and combination of sensor, process fitting, electronics and housing simplifies instrument selection and engineering for use in machines and on plants. With plics®, cost reduction starts right at the planning stage.

Clear advantages in plant construction
Short delivery time, uncomplicated connection, fast setup and commissioning save the plant builder significant time and costs. The configuration of VEGA instruments, their wiring and their commissioning is always the same. Whoever knows this can work with any plics® measuring principle and application at any time.

Assistance for the user
plics® delivers a convincing performance in daily use due to its high operational reliability, simplified servicing and reduced spares stock through the use of many common parts. The consistency of technology and operation simplifies and accelerates working with different plics® instruments. Adjustment always follows the same menu-driven procedures and is carried out on PLICSCOM, alternatively using PC based adjustment software for set up on-plant, or via the control room.

Simple instrument adjustment via PC and control system with FDT/DTM technology
FDT/DTM technology is a manufacturer independent description technology for field instruments. Even the most complex field instruments can be operated as easily with mobile laptop computers and PCs as with the current engineering and operating environments of control systems. With DTMs the sensors are configurable down to the last detail and important adjustments can be carried out easily and quickly.

Configuration and parameter adjustment with PACTware
As a system-independent operating system for DTMs, PACTware is the first choice at VEGA and at many other field device manufacturers. As a free-of-charge, manufacturer independent configuration software, PACTware coordinates the data interchange with communication-capable field instruments. In practice this means: one single software with an all-encompassing user interface allows adjustment and operation of all plics® instruments.
Pressure measurement in mechanical engineering

Adapted and robust: VEGABAR 14 and VEGABAR 17
These compact sensor models are the ideal combination for applications in mechanical engineering, as they complement one another in their features. The ceramic-capacitive CERTEC® measuring cell in VEGABAR 14 and the metallic measuring cell in VEGABAR 17 offer a wide variety of potential solutions.

VEGABAR 14
- Ceramic-capacitive CERTEC® measuring cell
- Measuring range -1 ... +60 bar
- Temperature range -40 ... +100 °C
- Measurement deviation < 0.3 %
- Response time < 30 ms
- Output signal 4 ... 20 mA

Monitoring a chlorine/water pump
VEGABAR 14 with PVDF connection makes reliable pressure measurement possible in chlorinated water, seawater and brine.
- Acid and chloride resistant PVDF plastic
- Double seal for increased reliability
- Vacuum and pressure impact resistant

Compressed air monitoring
Monitoring of the compressed air tank and the pressure lines of tools and machinery with VEGABAR 14.
- Process fittings of 316 L
- Small compact design
- Highly overload-resistant ceramic measuring cell
VEGABAR 17

- Metallic measuring cell (piezoresistive or thin film)
- Measuring range -1 ... +1,000 bar
- Temperature range -40 ... +150 °C
- Measurement deviation < 0.5 %
- Response time < 10 ms
- Output signal 4 ... 20 mA

Technology highlight: Pressures up to 1,000 bar

The service-proven metallic thin film measuring cell can handle measuring tasks reliably up to +1,000 bar and, when equipped with a cooling element, can also operate in product temperatures up to +150 °C.

Feed pressure control in viscous media

VEGABAR 17 measures process pressure in hot or viscous media.

- Buildup resistant through front-flush diaphragm
- High temperature resistance up to +150 °C
- Compact design
- Front-flush process fittings from ½” thread

Measurement on the engine test bench

VEGABAR 17 measures dynamically and accurately the pressure of exhaust fumes, oil, fuel and combustion air on an engine test bench.

- Ex approval
- Vibration and impact resistant
- Process fittings from ¼” thread
Differential pressure measurement in process engineering

Universal and service proven: VEGADIF 65

Hardly any other measuring principle is as versatile as differential pressure technology. Along with regular and differential pressure measurement, level, flow and density measurement can also be realized with it. The basis for this precise and stable measurement is the metallic, highly overload resistant differential pressure measuring cell.

VEGADIF 65

- Piezoresistive differential pressure transmitter
- Δp measuring range 0.01 ... 40 bar
- Temperature range -40 ... +120 °C
- Measurement deviation < 0.075 %
- Output signal: 4 ... 20 mA, 4 ... 20 mA/HART, Profibus PA, Foundation Fieldbus

Monitoring of filtration systems

The effectiveness of a filtration system depends on the permeability of the filter. VEGADIF 65 detects the level of buildup in a filtration system with no difficulty, because it can measure even the smallest pressure difference between filter inlet and outlet.

- For liquid and gaseous media
- Front-flush chemical seal assemblies
- Chemical seal mounting as of measuring range 100 mbar

Density measurement in a fruit juice tank

The differential pressure transmitter VEGADIF 65 also enables the density measurement of fruit juice. A change of medium density causes a change of differential pressure, which is easily detected by the calibrated instrument.

- Hygienic, front-flush process fittings
- Independent of superimposed pressures
Technology highlight:
For use under the toughest conditions

VEGADIF can be supplied with remote electronics in a housing separate from the sensor. The housing with indicating and adjustment module is simply installed in a safe area. Expensive capillary fittings and impulse pipes in the field can thus be dispensed with.

Quantity measurement of combustion air

The throughput of combustion air can be measured with the VEGADIF 65 via the differential pressure drop across a measuring orifice.

- Δp measuring range 0 … 10 mbar
- Direct mounting on the effective DP flow element
- Overload resistant up to +630 bar
- Shut-off valves for impulse lines available as accessories

Level measurement in a reactor

The differential pressure transmitter VEGADIF 65 also measures the level reliably in pressurized vessels containing foam-generating products.

- Product temperature -40 … +400 °C
- Simple and reliable measurement
- Chemical seal coatings of PA, PP, ceramic or gold
Pressure measurement with ceramic-capacitive measuring cells

Versatile and robust: VEGABAR 52 and VEGABAR 54
The instrument models VEGABAR 52 and VEGABAR 54, with oil-free ceramic-capacitive CERTEC® measuring cell, are characterised by their high abrasion and pressure shock resistance, as well as their self-monitoring measuring cell. Both models can be delivered with any standardized, industry-specific process fitting.

VEGABAR 52
- Ceramic-capacitive CERTEC® measuring cell
- Measuring range -1 ... +72 bar
- Temperature range -40 ... +150 °C
- Measurement deviation < 0.075 %
- Output signal: 4 ... 20 mA, 4 ... 20 mA/HART, Profibus PA, Foundation Fieldbus

Monitoring sewage pumps
VEGABAR 52 measures the feed pressure in sewage pipes. The robust ceramic, front-flush measuring cell is resistant to abrasion from foreign objects, grit and mud.

- Insensitive to pressure and vacuum shocks
- Vibration proof and highly resistant to abrasion
- Buildup not possible due to front-flush diaphragm
- Self-monitoring ceramic measuring cell

Batch vessels in the pharmaceutical industry
Level and gauge pressure are measured by means of two VEGABAR 52 pressure transmitters.

- Absolutely front-flush diaphragm
- Vacuum and overload resistant
- Self-monitoring ceramic measuring cell
- Increased reliability through double seal
VEGABAR 54

- Ceramic-capacitive CERTEC® measuring cell
- Measuring range -1 ... +72 bar
- Temperature range -40 ... +120 °C
- Measurement deviation < 0.1 %
- Output signal: 4 ... 20 mA, 4 ... 20 mA/HART, Profibus PA, Foundation Fieldbus

Technology highlight:
CERTEC® measuring cell

The ceramic-capacitive CERTEC® measuring cell of SapphireCeramic® is one of the most mechanically robust and dynamically resilient pressure measuring cells in existence. Its extremely high purity, 99.9% Al₂O₃, guarantees high chemical and abrasive resistance.

Bleaching tower in the paper industry

Mounted with a ball valve fitting, the VEGABAR 54 with ceramic cell measures the level reliably to prevent the extraction pump from running dry.

- Installation and removal without emptying the vessel
- Front-flush installation in ball valve fitting
- Abrasion and pressure impact resistant

Vacuum monitoring in a distillation column

To raise product quality and save energy, distillation columns are frequently operated under high vacuum. VEGABAR 54 monitors the underpressure up to absolute vacuum.

- Measurement up to absolute vacuum
- Dry ceramic measuring cell
- Increased reliability through double seal
Pressure measurement with metallic measuring cells

Elastomer-free and completely welded: VEGABAR 53

VEGABAR 53 handles measurement tasks reliably in systems with high process pressures or in processes where an elastomer-free seal is required. In the pharmaceutical and food industry, there are versions available that can handle product temperatures and the necessary cleaning processes up to +150 °C and have an FDA compliant oil filling.

VEGABAR 53

- Metallic measuring cell (piezoresistive or thin film)
- Measuring range -1 ... +1,000 bar
- Temperature range -30 ... +150 °C
- Measurement deviation < 0.1 %
- Output signal: 4 ... 20 mA, 4 ... 20 mA/HART, Profibus PA, Foundation Fieldbus

Steam pressure measurement in a steam drum

Steam is produced in the vapour drum and introduced into the process. A VEGABAR 53 monitors the permissible steam pressure. By means of a siphon, steam pressure can be measured at temperatures above +200 °C.

- Maximum direct temperature up to +150 °C
- Fully welded measuring cell
- Diffusion and vacuum resistant

Pipeline pressure in a dairy

The high hygienic standard in milk processing makes frequent CIP and SIP cleaning cycles necessary. Extreme temperature fluctuations in the pipes can encourage condensate formation in the housing. VEGABAR 53 measures reliably even under these conditions.

- CIP and SIP capable metallic measuring cell
- Insensitive to condensed moisture
- Stainless steel housing in IP 66/IP 67 and IP 68
Monitoring hydraulic feed pumps and product pipelines

VEGABAR 53 reliably measures the control pressures of hydraulic pumps as well as the feed pressures of product pipelines.

- Measuring range up to +1,000 bar
- Particularly vibration and shock resistant
- Front-flush diaphragm of high resistance alloy 2.4711

Technology highlight: Piezo and thin film technology

Piezoresistive measuring cells can handle pressures up to +16 bar and product temperatures up to +150 °C, and therefore represent an ideal solution for the food industry, while metallic thin-film measuring cells cover measuring ranges up to +1,000 bar for the area of hydraulics applications.

Gas pressure measurement

The pressure in LNG tanks must be monitored continuously. The gas is cooled by refrigeration and transported at low temperature and pressures of typically -163 °C and +250 mbar. Tank pressure monitoring is carried out with a VEGABAR 53.

-Insensitive to condensed moisture
- Elastomer-free process fitting
- Shut-off valves available as accessories
Pressure measurement for hot and aggressive media

Versatile and hard-wearing: VEGABAR 51 and VEGABAR 55

The pressure transmitters VEGABAR 51 and VEGABAR 55 stand out due to their high application versatility. A wide variety of diaphragm materials and coatings make VEGABAR 51 the basic instrument for the chemical and petrochemical industry. VEGABAR 55, with its specially developed METEC® measuring cell, offers solutions for the pharmaceutical, chemistry and food industries.

VEGABAR 51

- Chemical seal system
- Measuring range -1 ... +250 bar
- Temperature range -40 ... +400 °C
- Measurement deviation < 0.1 %
- Output signal: 4 ... 20 mA, 4 ... 20 mA/HART, Profibus PA, Foundation Fieldbus

Process pressure in a reactor

For safety reasons, the excess pressure arising in the process must be monitored continuously. VEGABAR 51 is the versatile solution for all products.

- Application temperatures up to +400 °C
- High-resistance diaphragm materials
- Large selection of flange and hygienic connections

Flue gas measurement in waste incineration

The flue gas in a flue gas scrubber is hot and highly corrosive. VEGABAR 51 measures the pressure of the exhaust fumes reliably.

- Highly chemically resistant metallic diaphragm of e.g. tantalum
- Very small measuring ranges of 0 ... +400 mbar
- Wide variety of flange and tube versions
Level measurement in a dairy
Milk is stored in storage tanks at a temperature of approx. +4 °C. Extreme conditions occur inside the tanks during cleaning cycles, VEGABAR 55 is well suited to handle level measurement here.

- Very good thermal shock reaction
- Hygienic, front-flush process fittings (CIP and SIP capable)
- Insensitive to condensed moisture
- Numerous process fittings for the food industry

Level measurement in a bitumen tank
In asphalt mixing systems, bitumen is kept ready at temperatures between +150 °C and +200 °C. A VEGABAR 55 measures the level reliably here.

- Metallic METEC® measuring cell with self-compensating temperature characteristics
- Application temperatures up to +200 °C
- High resistance diaphragm of alloy C276
- Thread and flange versions

Technology highlight: Self-compensating temperature characteristics
The self-compensating temperature characteristics of VEGABAR 55 provides uncommonly high measuring precision. The instrument guarantees a maximum measurement error of < 1% in the temperature range of -12... +200 °C.

VEGABAR 55
- Metallic METEC® measuring cell
- Measuring range -1 ... +25 bar
- Temperature range -12 ... +200 °C
- Measurement deviation < 0.075 %
- Output signal: 4 ... 20 mA, 4 ... 20 mA/HART, Profibus PA, Foundation Fieldbus
Level and water level measurement in demanding applications

Solutions with a ceramic or metallic measuring cell

The suspension pressure transmitters VEGABAR 66 and VEGABAR 67 are the optimal solution for all critical level and water level measurements, such as in food vessels, highly ionized water or in sewers. VEGABAR 66 stands out due to its abrasion resistance and numerous plastic options. VEGABAR 67, with its gap-free tube version of stainless steel and metallic METEC® measuring cell, lends itself especially well to use in food vessels.

VEGABAR 66

- Ceramic-capacitive CERTEC® measuring cell
- Measuring range +0.1 ... +25 bar
- Temperature range -20 ... +100 °C
- Measurement deviation < 0.1 %
- Output signal: 4 ... 20 mA/HART, Profibus PA, Foundation Fieldbus

Level measurement in fully de-ionized water

VEGABAR 66 for level measurement in highly purified water: the sensor is protected from the highly ionized water by a PVDF body and ceramic measuring cell.

- High chemical stability through metal-free materials
- Application temperatures up to +80 °C
- Increased reliability through double seal

Level measurement in a sluice

To control a sluice, the level inside, in front and behind the sluice basin is measured with a VEGABAR 66.

- Absolutely front-flush diaphragm
- Insensitive to corrosion
- Self-monitoring ceramic measuring cell
VEGABAR 67

- Metallic METEC® measuring cell
- Measuring range +0.1 ... +25 bar
- Temperature range -12 ... +100 °C
- Measurement deviation < 0.1 %
- Output signal: 4 … 20 mA/HART, Profibus PA, Foundation Fieldbus

Level measurement in the sewage shaft

The maintenance-free suspension pressure transmitter VEGABAR 66 reliably detects the water level in a sewage shaft.

- Absolutely front-flush and abrasion resistant ceramic measuring cell
- Insensitive to condensed moisture
- No buildup and sticking of foreign material

Technology highlight: Condensation-proof measurement

The climate-compensated electronics module allows application of the measuring cell even under the extreme influence of condensation. Equipped with two absolute pressure measuring cells, the instrument itself is insensitive to environmental moisture and offers highest reliability.

Level measurement in yoghurt production

The level in the batch mixing tank is measured with a VEGABAR 67 suspension pressure transmitter.

- Rigid tube version of stainless steel with material certificate
- Elastomer and gap-free
- Cleaning temperature up to +120 °C
- High resistance diaphragm of alloy C276
Water level measurement with ceramic-capacitive measuring cells

Compact and reliable: VEGAWELL 52

With its multitude of cable and housing materials, the suspension pressure transmitter VEGAWELL 52 can take on virtually any task in water level measurement. The front-flush CERTEC® measuring cell is abrasion resistant and chemically stable in sewage and saltwater. The high pressure shock resistance protects the instrument from the effects of breaking waves and debris of the measured medium.

VEGAWELL 52

- Ceramic-capacitive CERTEC® measuring cell
- Measuring range 0 ... 600 mH₂O
- Temperature range -20 ... +80 °C
- Measurement deviation < 0.1%
- Output signal: 4 ... 20 mA, 4 ... 20 mA/HART + Pt100

Control of groundwater pumps

VEGAWELL 52 is insensitive to water shocks and is well protected against EMC radiation from high-performance pumps.

- Maintenance-free and reliable
- Front-flush diaphragm offers protection against deposits
- Long-term stability better than 0.1%/2 years
- Self-monitoring ceramic measuring cell

Ballast water measurement on ships

VEGAWELL 52 measures the contents of the ballast tanks to the millimetre and provides exact information for correcting the ship’s attitude.

- Resistant to overload from breaking waves
- Housing material 1.4462 (duplex) and double sealing protect against corrosion
- Resistant to abrasion from crustacea and sand
- Linearization for vessel shape
Flow rate measurement in a weir spillway
Overflow measurement in the weir is carried out with a VEGAWELL 52 suspension pressure transmitter.

- Simple adjustment and measured value indication with the indicating and adjustment module VEGADIS 62
- Pump control in conjunction with VEGAMET 391
- Long-term stable ceramic measuring cell
- Insensitive to abrasion

Level measurement in an oil tank
The hydrostatic pressure transmitter VEGAWELL 52 can also accurately measure the level of oils and fuels.

- Oil-proof elastomer seals and cable materials
- Simple adjustment and measured value indication with the indicating and adjustment module VEGADIS 62
- Self-monitoring ceramic measuring cell

Technology highlight:
Immersion probe 600 metres deep in water
The immersion probe of the suspension pressure transmitter VEGAWELL resists ambient pressures up to +60 bar and can therefore be immersed in water down to a depth of 600 m. Additionally, every VEGAWELL version is equipped with an integrated overvoltage protection system that protects the device from lightning strikes and electrical surges.