Continuous level measurement

The radar sensor for liquids
VEGAPULS 64

Looking Forward VEGA

The radar sensor for all applications in liquids

Setting new standards with 80 GHz

VEGA, for more than 20 years the market leader in radar level measurement, is ushering in a new age of radar instrumentation: VEGAPULS 64 is the first radar level sensor for liquids that operates at a frequency of 80 GHz. This delivers superior focusing of the radar beam. This means this level sensor can deliver reliable measurements even in vessels with internal installations such as heating coils and agitators. The narrow radar beam avoids these obstacles altogether and buildup on the vessel wall has no effect on performance either.

The larger the dynamic range of a radar sensor, the wider its range of application and the higher its measurement certainty. This is where VEGAPULS 64 establishes a leading position in the world market. It is able to measure poorly reflective media with significantly better performance than previous radar sensors; for example, the sensor is able to measure poorly reflective liquids down virtually to the vessel bottom. Even with surface foam, extremely turbulent product surfaces, condensation or buildup on the antenna, VEGAPULS 64 maintains its accuracy and reliability.

With the smallest antenna of its kind, VEGAPULS 64 is unbeatable for use in small storage or process vessels. Its versatility also makes it ideal for general use across widely different industrial sectors.

Small process fittings enable easy integration even into small tanks

Smallest antenna in the world, process fittings down to ¾" thread

Plastic antenna for simple process environments

Expert tip:

New sensor, new technology – and zero training required!

Anyone who has previously used radar sensors from VEGA doesn't have to learn anything new for this 80 GHz sensor: The menu, the setup functions – everything stays the same. The only differences are the advantages this 80 GHz technology provides to make level measurement even easier and more versatile.

High dynamic range: reliable measurement even with foam on the surface

Trustworthy measuring results even with condensation and buildup

Highly resistant encapsulated PTFE antenna for long service life in the chemical sectors

Hygienic version for the pharmaceutical and food industries

Very good focusing for vessels with many internal installations (only 3° beam angle)

Practical application: Chemical industry

Hardly any other industry places such diverse, stringent demands on instrumentation like the chemical industry does. The application spectrum ranges from simple storage containers of differing capacities, to complex reaction vessels with multistage agitators and heating coils. Radar technology is clearly superior solution to other measuring methods, especially in reactors where the product characteristics and process conditions are constantly changing.

The advantages with VEGAPULS 64

- Excellent signal focusing allows use even in confined spaces
- High measurement certainty due to low number of interfering reflections from internals
- Highly chemically resistant materials ensure long service life of the sensors
- Simple setup and diagnostics also via smartphone or tablet

Other application areas

- Storage vessels for widely different liquids, from aggressive to volatile
- Small transport containers for chemical additives
- Pilot systems with small dimensions and a variety of media

Level in the focus

Good focusing delivers security

To reliably detect the level in a vessel, the reflection signal from the medium must be clearly distinguishable from the noise. Two factors determine the beam angle of a radar beam – and thus its focusing – they are: the transmission frequency and the effective antenna size. If the antenna size remains the same, better focusing is achieved by using a higher frequency.

The solution

VEGAPULS 64 operates with a transmission frequency of 80 GHz. With an 80-mm antenna, this results in a beam angle of only 3°. The radar sensor receives only distinct, definitive reflections from the product surface. This makes the measurement more accurate and reliable.

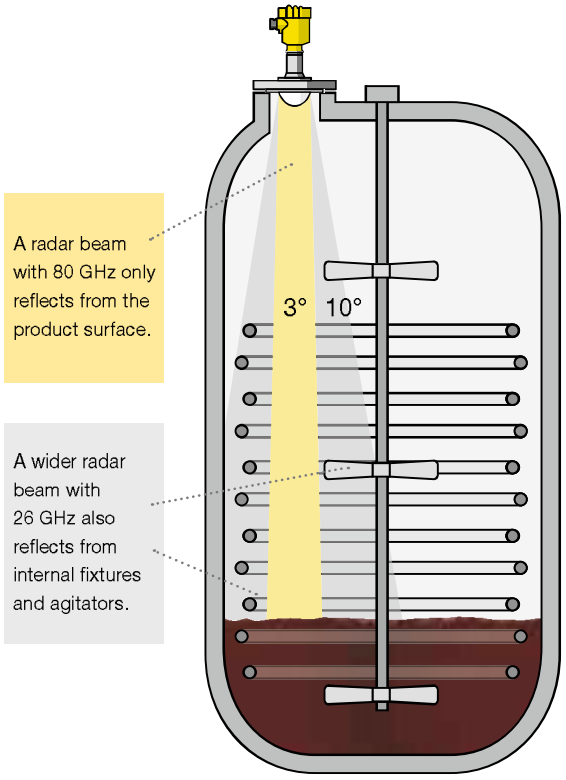
By comparison: a conventional radar sensor with 26 GHz transmission frequency and an antenna of the same size has a beam angle of approximately 10°. Due to the considerably wider signal beam, agitators, fittings or buildup on the vessel wall cause interference that can affect the measuring result.

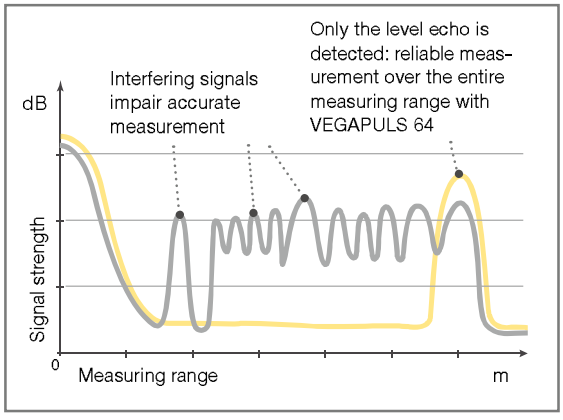
The benefits

- Considerably easier setup and commissioning, even with complex vessel internals
- Increased measurement certainty over the entire measuring range through better focusing
- High accuracy, even when the sensor is mounted close to the tank wall

Expert tip:

For maximum measurement certainty, the largest possible antenna system should be chosen during installation. This ensures both optimal focusing and maximum signal strength.





Practical application: Pharmaceutical industry

Equipment for the production of pharmaceutical and cosmetic products is generally quite smaller than that used in traditional chemical production. Because the product ingredients are often very expensive, particularly high requirements are applied to the sensor technology used for precise content measurement. Until now, the small measuring ranges, widely different media and tight space conditions limited the use of radar technology to just a few individual applications. The new VEGAPULS 64 is practically tailor made for these small reactors and filling systems.

The advantages with VEGAPULS 64

- Process fittings down to ¾" allow use even on very small mounting sockets
- Hygienic versions in compliance with all current standards allow use in sterile areas
- The high accuracy of +/-2 mm fulfils the stringent demands of the pharmaceutical industry
- Non-contact measurement can be used for highly viscous media and pastes

Other application areas

- Agitator and mixer vessels of different sizes
- Small storage containers for base and finished products
- Filling systems for pharmaceutical and cosmetic products

Small but mighty

Small process fittings extend the area of application for radar

Previous radar sensors required process fittings with a minimum size of 1½" to achieve adequate signal focusing. For that reason it was virtually impossible to use radar sensors on very small containers with their typically small mounting sockets. The process fittings on existing equipment that are actually of a sufficient size, are often already occupied by filling pipes or other sensors, modification here is virtually impossible in practice.

The solution

VEGAPULS 64 operates with a transmission frequency of 80 GHz. This corresponds to a factor of 3 compared to the technologies used until now. For that reason, the antenna system and the process fitting can have correspondingly smaller dimensions.

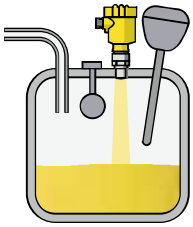
That makes radar measurement technology more interesting for a much wider range of applications. Existing vessels with small process fittings can be equipped with radar sensors without first carrying out costly modifications.

The benefits

- Easy retrofitting of existing facilities, without modification
- Threaded, flange and hygienic fittings for widely different areas of industry

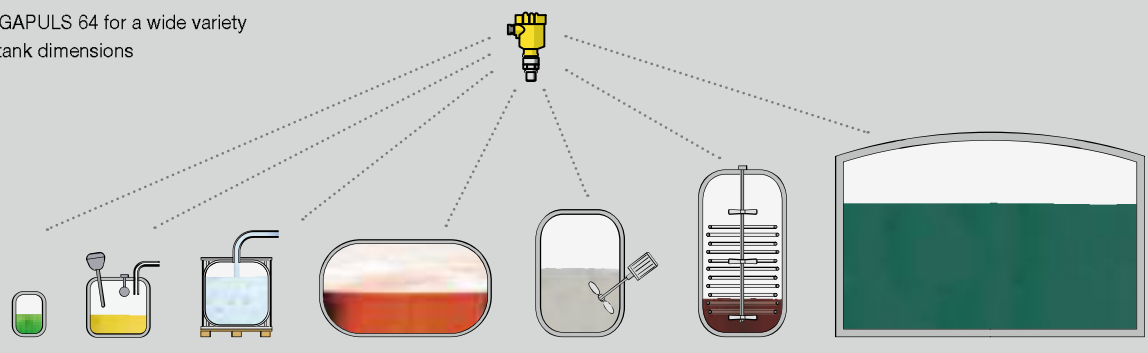
Expert tip:

As an alternative to installation on a process fitting, measurement right through an inspection glass or viewing window is also possible in some applications. Lightly slanted windows are ideal for this purpose as they do not cause interfering reflections.



With its compact design and process fittings down to ¾" thread, VEGAPULS 64 can be used very effectively on small tanks and containers.

VEGAPULS 64 for a wide variety of tank dimensions



Practical application: Food industry

All the liquid or pasty foods that we consume every day are stored, mixed and processed in containers of different sizes. Especially in small tanks with agitators, strong condensation or buildup often forms on the sensors. After each manufacturing batch process, the tanks have to be thoroughly cleaned and sterilized. To allow optimal cleaning, all components must be certified in accordance with the required hygienic standards.

The advantages with VEGAPULS 64

- Largely unaffected by product deposits and condensation on the sensor
- Hygienic versions available, for example according to 3A, EHEDG
- Suitable for small process fittings down to ¾" thread
- Precise measurement, unaffected by changes in density and temperature
- The particularly good signal focusing allows use even in very high, slender vessels

Other application areas

- Small storage containers in filling systems
- High containers for storage of fruit juices, milk or beer
- Storage containers with changing pressure conditions, for example in the production of sparkling wine
- Mixing tanks for yogurt, sauces or soups

Messy conditions – so what?

Always reliable measurement, even with buildup and deposits

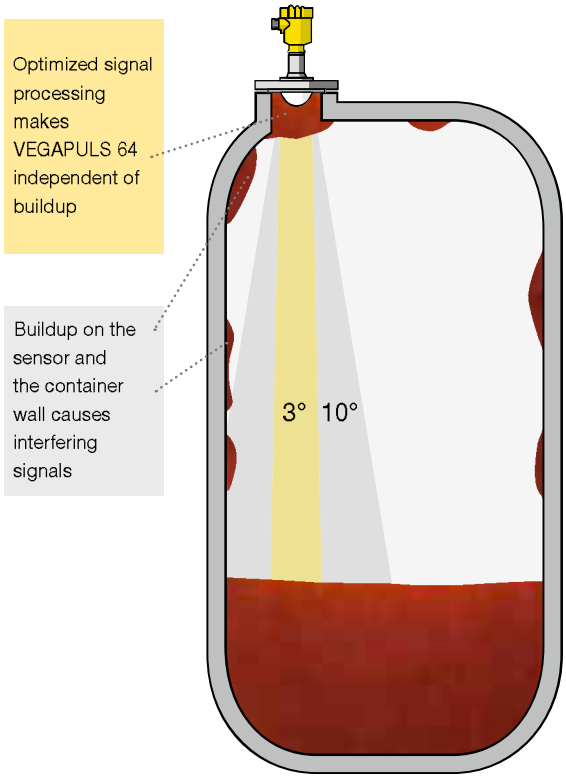
With many conventional sensors, buildup or condensation on the process fitting reduces the reliability of the measuring results. Especially in small containers, performance compromises often had to be made.

Expert tip:

Extreme product buildup due to condensation or crystallization on the sensor can be significantly reduced if the flange is provided with insulation. Thermal bridges are thus avoided and deposits kept to a minimum.

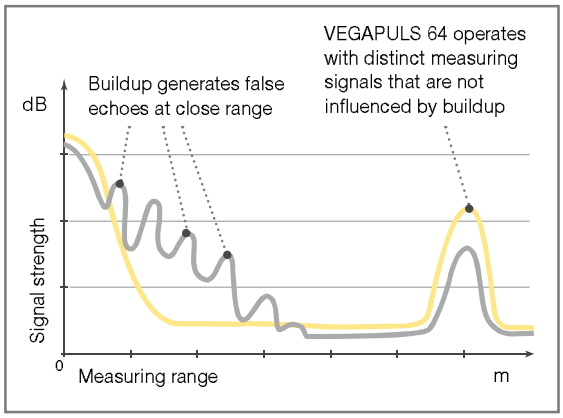
The solution

The antenna system of VEGAPULS 64 is encapsulated in PTFE or PEEK, so there are no cavities or crevices in which product can accumulate. The surface of the material is very finely processed with diamond tools, which also considerably reduces product adhesion. In addition, special software algorithms filter out interference caused by buildup on the antenna system. Thanks to the high dynamic range of the sensor, signal attenuation caused by product deposits is largely compensated. This allows the level to be reliably detected even with contamination on the sensor.



The benefits

- High measurement certainty, even with product deposits collecting during operation
- Measurement independent of condensation and system quickly available after cleaning cycles
- Non-contact measurement enables maintenance-free operation



Practical application: Oil and gas industry

From volatile gases to sticky tar – the products in the petroleum processing industry are many and varied. Likewise the processes and process vessels: whether in storage tanks for crude oil and finished products or in distillation columns, the product levels in the various process steps have to be reliably measured. In addition to complying with the usual explosion protection guidelines, the sensors also have to meet high requirements on reliability of measurement.

The advantages with VEGAPULS 64

- Reliable measurement of all media in the petrochemical industry
- Unaffected by buildup and condensation formation
- Precise measurement, right down to the container bottom
- Universally applicable for all measuring ranges required

Other application areas

- Large tanks with large volume and high accuracy requirements
- Pressure vessels of different sizes for liquefied gases
- Non-contact measurement of aggressive by-products
- Process vessels in various stages of oil and gas production

Measurement certainty in all media

Wide dynamic range ensures universal use

Radar level sensors are particularly well suited for non-contact measurement of hydrocarbons because they measure the level independently of temperature, pressure and density. However, the radar signals are reflected very weakly by the relatively low dielectric constants of the different hydrocarbon products. To measure the level of any medium with certainty, the sensors used must be able to detect even the smallest reflected signals reliably. One fundamental contribution to this reliability is the dynamic range of a sensor.

The solution

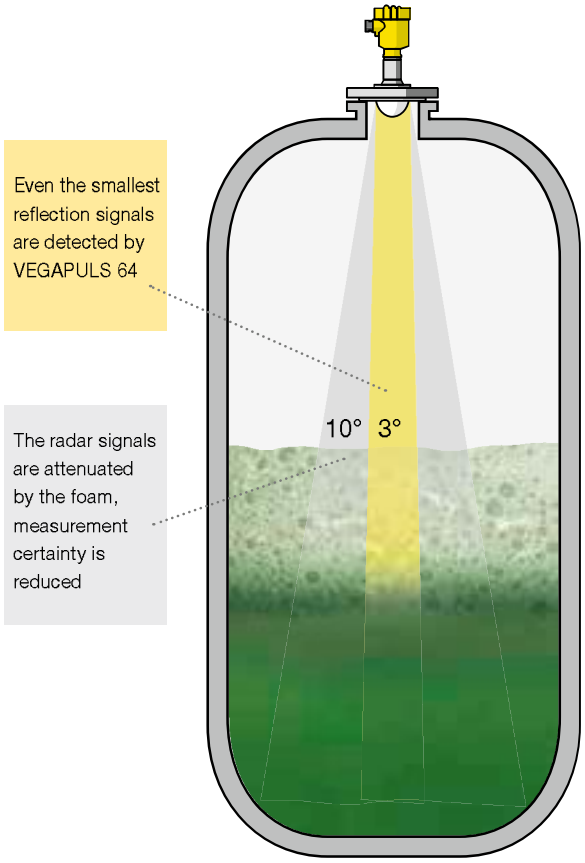
With a dynamic range of 120 dB, VEGAPULS 64 sets new standards for the detection of even the lowest reflected signals. Especially when measuring the level of hydrocarbons that have poor reflective properties, the high dynamics delivers a significantly increased measurement certainty. This means virtually all media in the petrochemical industry, from crude oil to liquefied gases, can be measured reliably. What is more, the excellent signal focusing enables simple deployment, even when there are heating pipes and other internal vessel structures.

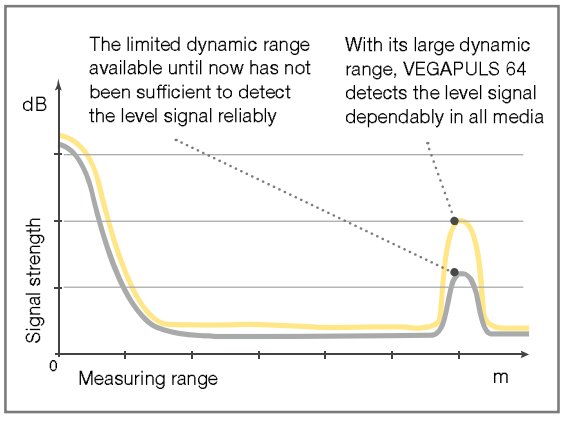
The benefits

- Reliable level measurement results with all media thanks to high dynamic range
- Virtually unaffected by foam and condensate
- Simple standardization through universal sensor configuration

Expert tip:

A large dynamic range is advantageous particularly in applications with strong foaming. It compensates for the additional signal attenuation caused by the foam surfaces.





Sensor version and area of application	Process fitting and beam angle
 **VEGAPULS 64 in threaded version** Threaded version for mounting on ¾" and 1½" threaded socket or corresponding adapter fittings. Ideal for small and medium-sized containers such as storage tanks, filling systems or small process vessels.	Thread G¾, ¾ NPT **Beam angle 14°** Thread G1½, 1½ NPT **Beam angle 7°**
 **VEGAPULS 64 in flange version** Flange version, particularly suitable for use with extremely aggressive media. Typical application in storage and process vessels in the chemical and petrochemical industries that have agitators and other internals.	Flanges from DN 50, 2" **Beam angle 6°** Flanges from DN 80, 3" **Beam angle 3°**
 **VEGAPULS 64 with hygienic fittings** Applications in food and pharmaceutical sectors with high demands on hygiene and cleanability of the process fittings. A wide variety of process fittings is available, from Clamp and screwed pipe connections to NEUMO BioControl®.	Clamp from 2" Slotted nut DRD connection NEUMO BioControl® and others **Beam angle ≤6°**
 **VEGAPULS 64 with plastic antenna** Plastic antenna system for applications with lower demands on pressure and temperature ranges. Suitable for storage containers of different sizes, containers with many internal structures or narrow open shafts.	Compression flange DN 80 Adapter flanges from DN 100 Mounting strap **Beam angle 3°**

General technical data

Transmission frequency:	**80 GHz**
Measuring range:	**30 m**
Accuracy:	**+/- 2 mm**
Measurement cycle:	**< 500 ms**

Process temperature	Process pressure	Media-contacting materials	Approvals
-40 ... +200 °C	-1 ... +20 bar	Process fittings: 316L Antenna: PEEK Seal: FKM, FFKM	ATEX, IEC FM, CSA Ship approvals
-40 ... +200 °C	-1 ... +16 bar	Antenna: PTFE, PFA	ATEX, IEC FM, CSA FDA, EC 1935/2004 Ship approvals
-40 ... +200 °C Dependent on process fitting	-1 ... +16 bar Dependent on process fitting	Antenna: PTFE Seal: FKM, EPDM	ATEX, IEC FM, CSA 3A, EHEDG FDA, EC 1935/2004
-40 ... +80 °C	-1 ... +2 bar	Antenna: PP Adapter flange: PPGF 30 Seal: FKM, EPDM Mounting strap: 316L	ATEX, IEC FM, CSA Ship approvals

PLICSCOM now with Bluetooth!

The innovative PLICSCOM display and adjustment module is mounted directly on the sensor for measured value indication, adjustment and diagnostics. This new optional Bluetooth feature allows any transmitter to be adjusted wirelessly from a distance of approximately 25 meters.

Instrument adjustment with smartphone or tablet

Your smartphone or tablet gives you convenient access to the setup and adjustment functions of the sensor. All functions are integrated in the VEGA Tools App. The menu structure is identical to PACTware/DTM.

Measured value display and diagnostics via smartphone or tablet

Need a quick look at the measured value display or the asset management information? Wireless data transmission via Bluetooth makes it possible! The VEGA Tools App gives you access to all the operational data: measured value, event memory and sensor status display, echo curve and Bluetooth range information.

On-site adjustment with magnetic pen

A smart solution: with the help of a magnetic pen, the sensor can also be adjusted through closed lid! The ideal solution for use in hazardous areas or in harsh, dirty measuring environments, as the sensor remains protected and can even be operated when wearing gloves.

Wireless instrument adjustment with a PC

State of the art: the sensors are configured with the proven adjustment software PACTware and DTM via a Bluetooth USB adapter!

Instrumentation for the measurement of liquids

+ Measuring the level

The level is detected and converted into a level-proportional signal, which is either displayed directly or further processed in a control system. VEGAPULS 64 is optimized for the measurement of liquids and offers the ultimate in safety, reliability and accuracy.

+ Detecting point level and controlling processes

The level is detected at a defined point, triggering a switching command. The switching command can be used to open or close filling and discharge openings or integrated into a process control system for further processing.

As a complement to continuous level measurement, point level sensors provide additional security as an independent measuring system.

+ Analysis and visualization, display and adjustment

The further processing of the sensor readings is as individual as the measuring point itself. VEGA offers a wide range of signal conditioning instruments with different functions, from simple local display to Ethernet connection to data transmission via radio link.

VEGA Inventory System enables further use of data for optimal raw material logistics, from supplier to production facility.

= Process instrumentation from VEGA

Adjustment with a PC

- Connection of plics® instrument and PC via the optional interface converter VEGACONNECT
- Sensor set up with the proven DTM/FDT technology and PACTware
- Graphics-supported EDDs for EDD-based systems

Measurement certainty

- Advanced microelectronics and over 50 years of application experience
- Spring-loaded terminals provide sturdy connection reliability, even with strong vibration

Display and adjustment

- Display and adjustment module PLICSCOM for measured value indication, setup and diagnosis
- Usable on any plics® sensor, regardless of the measuring principle or the instrument generation
- Optional Bluetooth interface for wireless adjustment of the sensor

The instrume

Display and adjustment module

- PLICSCOM
- VEGACONNECT
- PLICSLED

plics® – simplicity with system

Every measuring instrument is assembled from prefabricated components. This modular design allows full flexibility when selecting the required sensor features.

More information on plics®

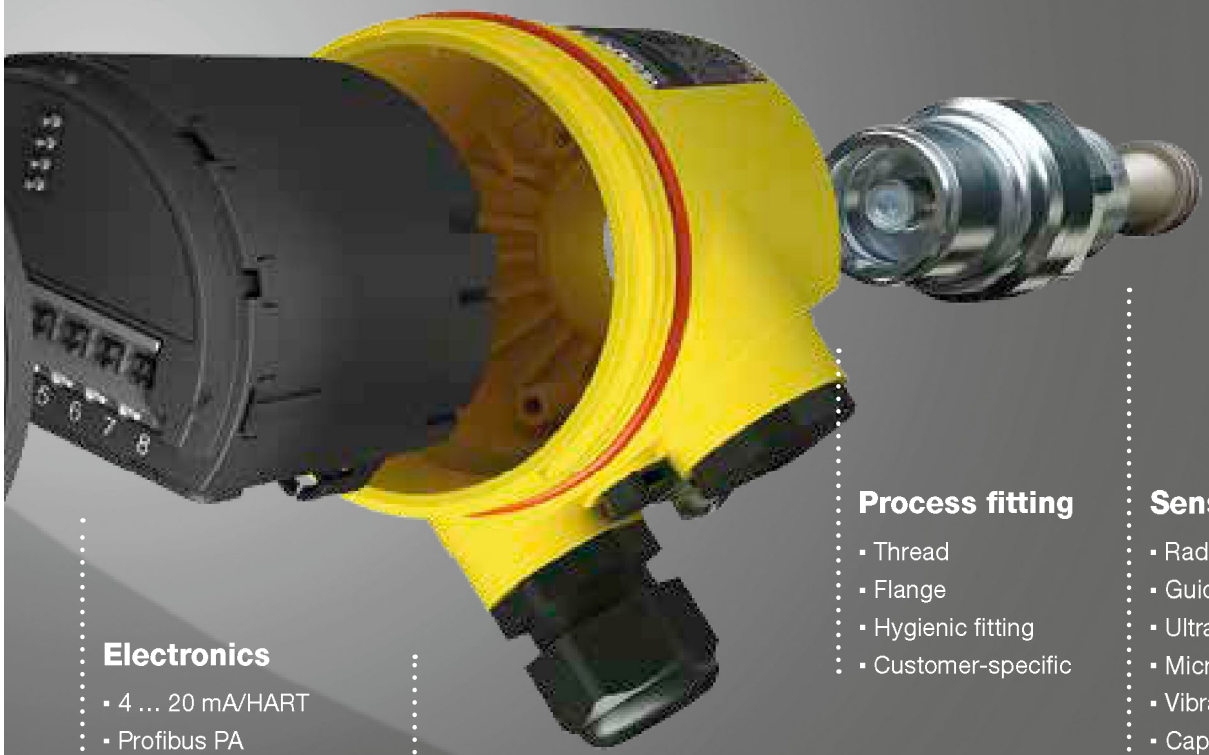
Serial number and data matrix code

- Retrieval of technical documents, certificates and instrument settings using the serial number on the VEGA website
- Access to the instrument-specific documentation of the sensor via VEGA Tools App and scanning of the data matrix code on the type label

Diagnosis

- Integrated self-monitoring provides continuous information on the status of the instrument
- Asset management reports according to NE 107 and status messages in plain text
- Measured value and event memory with date and time information

nt platform plics®



Electronics

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

Housing

- Plastic
- Stainless steel
- Aluminium
- Plastic double chamber
- Stainless steel double chamber
- Aluminium double chamber

Process fitting

- Thread
- Flange
- Hygienic fitting
- Customer-specific

Sensor

- Radar
- Guided radar
- Ultrasonic
- Microwave barrier
- Vibration
- Capacitive
- Process pressure
- Hydrostatic pressure
- Differential pressure

52552-EN-160218

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

VEGA