Technologies, Solutions, and Applications

Magnetic Level Indication and Bridle Measurements
Contents

Leadership in Magnetic Level Indicators and Bridles 3
How We Earn Your Business 4
Magnetic Level Indicator Models & Versions 5
Bridle Models and Versions 6
Principle of Operation 7
Application Areas 8
Setup and Adjustment 10
Associated Technologies 11
VEGA is dedicated to offering complete magnetic level indication and engineered bridle solutions for level measurement and visualization. For the added assurance of redundant monitoring, VEGA offers a complete line of magnetic level indicators (MLIs) and bridle combination units using pulse radar and guided wave radar technology.

**Advanced Design & Development**

Each VEGA solution is treated as custom in order to best serve each application. VEGA provides complete engineering and design services to users with unique specifications and application requirements. Each MLI/bridle system is engineered and manufactured to ASME B31.1/31.3 standards as well as the end user’s specific pipe requirements. VEGA provides an array of test procedures ranging from dye penetration to x-ray, as well as qualifications such as Material Test Reports (MTR) and Positive Material Identification Certificates (PMI).

Additional design features can be integrated into the VEGA MLI and bridle products, including:

- Steam and electric heat tracing
- Insulation for high temperature and cryogenic applications
- Multiple switching technologies such as the VEGASWING vibration switch for liquid detection

**Benefits of the VEGAPASS and VEGAMAG**

- High visibility flag system does not fog or leak, which are problems associated with older sight glass and electromechanical displacer technologies
- Flexible mounting configurations achieve redundant 4...20 mA and visual monitoring without adding additional process connections
- Real time clock in the sensor enhances diagnostic capabilities and process insight
- New features, such as automatic run time correction for measurement in high temperature steam environments and seals for ammonia measurement, answer industry-specific demands

**Looking Forward**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ohmart Founded</td>
<td>VEGA Founded</td>
<td>First VEGAPULS Radar</td>
<td>First VEGAFLEX GWR</td>
<td>MLI/Bridle Systems</td>
</tr>
</tbody>
</table>
How We Earn Your Business

You are the center of our commitment to value and service. We hold our customers in the highest regard. Every action and interaction undertaken by a VEGA employee is to ensure that the customer gets the most out of their experience. Service is our top priority.

**Performance Guarantee**
To demonstrate our commitment to specifying the right instrument for each application, VEGA Americas offers a Performance Guarantee — if our recommended solution does not perform exactly as expected, we’ll make it right.

**24 Hour Support**
The VEGA Field Service team is trained to provide telephone, email, or on-site customer service. Whether starting up, configuring, or troubleshooting the system, VEGA Field Service provides necessary steps to ensure the measuring device and its outputs run efficiently. Through service and training, VEGA supports all users throughout the life of the installed solutions.

**The Right Instrument for Every Application**
VEGA is committed to supplying instruments that work in all applications, not just those with ideal conditions. All new instruments are tested in extreme heat, dust, chemical, moisture, and cold environments before they are released. VEGA’s goal is to enable customers to achieve operational efficiency with every measured process.
Magnetic Level Indicator
Models & Versions

VEGAMAG 81

Standard magnetic level indicator
• An ideal replacement for existing process sight gauge systems
• Wide stainless steel flag design provides better visibility of the process liquid levels

Measuring Range: Up to 50 ft (15 m); Consult factory for lengths over 50 ft
Process Temperature: -320° ... 1,000°F (-195° ... 538°C)
Measuring Precision: ± 0.2” (±5 mm)

VEGAMAG 82

Combination measuring system — magnetic level indicator paired with bridle and guided wave radar
• SIL2 qualified VEGAFLEX or VEGAPULS; standard version
• Output signals include 4 … 20 mA/HART, Profibus PA, Foundation Fieldbus, or Modbus
• Used for any application that requires visual and electronic level monitoring
• Mount to most standard tank process connections as well as applications where interface measurements are needed

Measuring Range: Up to 50 ft (15 m); Consult factory for lengths over 50 ft
Process Temperature: -320° ... 842°F (-195° ... 450°C)
Measuring Precision: ± 0.1” (±3 mm)

VEGAMAG 83

Single-chamber measuring system with magnetic level indication and non-contact radar measurement
• SIL2 qualified VEGAPULS; standard version
• Output signals include 4 … 20 mA/HART, Profibus PA, Foundation Fieldbus, Modbus
• Used for processes with low dielectric constant values, flashing, foaming, or in light hydrocarbons
• Compact design provides a smaller installation envelope and lighter weights

Measuring Range: Up to 50 ft (15 m); Consult factory for lengths over 50 ft
Process Temperature: -320° ... 842°F (-195° ... 450°C)
Measuring Precision: ± 0.4” (±10 mm)
Bridle Models & Versions

VEGAPASS 81

Bridle chamber
- SIL2 qualified VEGAFLEX or VEGAPULS; standard version
- Ideal for installations when mounting on the top of a vessel is not possible
- Manufactured to meet a wide range of pipe specifications
- Unaffected by specific gravity, temperature, or pressure

| Measuring Range: | Up to 50 ft (15 m); Consult factory for lengths over 50 ft |
| Process Temperature: | -320° … 842°F (-195° … 450°C) |

VEGAPASS 81 (In-Tank Measurements)

Integral stilling well
- SIL2 qualified VEGAFLEX or VEGAPULS; standard version
- Unaffected by specific gravity, temperature, or pressure
- Slotted design to promote liquid flow; ideal for interface measurements
- Manufactured to meet a wide range of pipe specifications

| Measuring Range: | Up to 50 ft (15 m); Consult factory for lengths over 50 ft |
| Process Temperature: | -320° … 842°F (-195° … 450°C) |
Principle of Operation

Magnetic level indicators and bridles are installed to the process vessel using existing process connections or new connections that have been added for chambers.

Why Use MLI Technology?
The VEGAMAG 80 Series of MLIs are externally mounted chambers with visual indicators that are completely isolated from the process liquid. The VEGA MLI indicator is easily viewed from as far as 200 feet away due to the high contrast, wide yellow and black flags, which indicate liquid level position and vapor space, respectively.

Why Use Bridle Technology?
VEGA’s non-mechanical bridle system provides a direct reading of the liquid level using the radar energy contained within a metallic chamber. It is unaffected by specific gravity, temperature, or pressure conditions that often cause problems with other mechanical devices that rely on a stable liquid density. The VEGAPASS can be easily isolated to allow maintenance without disruption to the process.

Certifications
VEGA pulse radar and guided wave radar instrumentation used in conjunction with a bridle is designed for certification compliance with the following programs:

- ATEX Standard
- CSA
- FM Standard
- GOST-R Standard
- SIL2
- IECEx
- WHG
- FDA
- ABS
- NACE
- CRN

The Guided Wave Principle of Operation in a Bridle

Pulse
In the external bridle, a VEGAFLEX or VEGAPULS emits a microwave pulse that travels down to the process surface.

Return Time
The microwave pulses are reflected from a solid or liquid material. The transit time of the microwave pulse returning to the electronics is measured and used to calculate the distance to the process medium.

Magnetic Level Indication
As the process liquid fills the second chamber, the liquid lifts the float. This causes the series of flags to rotate from black to yellow, giving a visual indication of the liquid level inside the vessel.
Application Areas

A VEGAMAG Series magnetic level indicator offers visual indication on standard and complex liquid applications in many industries. Paired with a guided wave or non-contact radar, the system provides a continuous signal directly to the control room. A VEGAPASS Series bridle also provides continuous monitoring, and is an excellent retrofit for unreliable sight glass gauges and displacer systems.

Distillation Columns

Redundant monitoring is critical in such applications, which can require control and/or monitoring by multiple technologies. With the VEGAMAG 82, the operator has visual indication from the magnetic level indicator and a separate 4...20 mA signal from a redundant VEGAFLEX guided wave radar, which is installed in a parallel bridle attached to the MLI. The VEGAMAG 82’s ability to operate in high temperature and high pressure environments makes it a perfect solution for such refining applications.

• MLI and guided wave radar provide redundancy
• Robust material options are resistant to extreme process conditions

Hydrocracking

A number of refinery processes have unstable liquid surfaces and weak dielectric properties. Guided wave radar may have difficulty tracking the liquid level reliably due to energy loss into the process liquid. The VEGAMAG 83 solves this problem by using a non-contact VEGAPULS radar instrument in the same chamber as the magnetic float. By using this unique design, the radar is able to track the metallic float top rather than the liquid surface.

• Through-air radar is suitable for long measurement spans
• Tracking level of float-top eliminates problems associated with low dielectric values
“The VEGAMAG and VEGAPASS 60 series of products are excellent retrofit technology for outdated and high maintenance displacer transmitters as well as leaky visual sight glass systems.”

**Sight Glass Replacement**

Retrofit opportunities are available as the chemical and petrochemical industries slowly remove the older and sometimes leak-prone sight glass gauge units, popular 20 to 30 years ago. The VEGAMAG 82 directly replaces almost any type of existing process gauge using the existing vessel connections. The benefit to the customer is that less maintenance is needed on a magnetic level gauge, and they now may add a VEGAFLEX guided wave radar to provide continuous control where only a visual indicator was before.

- Guided wave radar measures accurately during a fully flooded chamber or vapor layer
- MLI technology eliminates risk of leaks often associated with sight glass systems

**Displacer Replacement**

As with process and sight gauges, a large number of displacer level gauges require a significant amount of maintenance to keep them operational. The VEGAPASS 81 is a perfect technology to retrofit to the existing vessel connections. Unlike the displacer technology that is subject to mechanical failure, the VEGAPASS 81 uses a VEGAFLEX guided wave radar housed inside of a bridle or chamber for monitoring the liquid level. Replacing the old mechanical device with guided wave radar greatly reduces maintenance and potential downtime.

- Non-moving parts are immune to mechanical failure
- Low maintenance requirements reduce downtime and costs
Setup and Adjustment

Local Setup and Adjustment
The PLICSCOM indicating and adjustment module plugs into any plics instrument. It functions as a measured value indicator on the instrument and as a local adjustment device. The structure of the adjustment menu is clearly organized and makes setup and commissioning easy. In addition, status messages are displayed directly on the screen. When an instrument is exchanged, PLICSCOM ensures fast availability of the measuring point — all sensor data is saved by pressing a key on the PLICSCOM and later copied into the replacement sensor.

Current Standards for Data Transmission
VEGA offers proven, reliable solutions, including 4 … 20 mA/HART measurement data transmission, fieldbus technologies like Profibus PA, Foundation Fieldbus, or Modbus — RTu, ASCII, and Levelmaster protocols, and wireless transmission. For level detection, the selection includes contactless switch, relay, transistor, mA step change, and NAMUR signal.

Setup and Adjustment through a PC, Control System, or Handheld Device
FDT/DTM technology is an innovative, manufacturer-independent description technology for field instruments. Complex field instruments operate with PCs using PACTware® as easily as with the current engineering and operating environments of control systems. With DTM, the sensors are easily configurable and important adjustments can be carried out quickly.

VEGA supports all main standards for uniform, centralized field instrument operation. If the instruments are integrated in primary management or control systems, the field instruments are accessible for adjustment, servicing, and diagnostic purposes through the existing infrastructure. Both DTM and EDD description technologies are supported.
Associated Technologies

VEGAPULS Through-air Radar

Pulse radar sensor for level measurement
- SIL2 qualified; standard version
- Output signals include 4…20 mA/HART, Profibus PA, Foundation Fieldbus, or Modbus
- Completely non-contact radar transmitter can be used with ball-valve isolation

| Measuring Range: | 0 … 115 ft (0 … 35 m) |
| Process Temperature: | -320 °F … +842 °F (-195 °C … +450 °C) |
| Process Pressure: | -14 … +2,320 psi (-1 … +160 bar) |

VEGAFLEX Guided Wave Radar

Guided wave radar sensor for level measurement
- SIL2 qualified; standard version
- Output signals include 4…20 mA/HART, Profibus PA, Foundation Fieldbus, or Modbus
- Ideal retrofit of displacer technology

| Probe: | Cable, rod |
| Measuring Range: | Cable: 0 … 104 ft (0 … 32 m)  
Rod: 0 … 13 ft (0 … 4 m) |
| Process Temperature: | -320 °F … +842 °F (-195 °C … +450 °C) |
| Process Pressure: | -14 … +5,800 psi (-1 … +400 bar) |

VEGAFLEX Probe Configurations

Rod
Cable with centering weight

VEGAFLEX Spacers

Stainless steel spacer
Plastic spacer