



VEGAPULS 64 radar level sensor proves its prowess in the LNG/LPG process chain

A demanding medium

Before LNG/LPG can be used as an energy source or used in production for the chemical or petrochemical industry, it must be put through a whole series of process steps. These are to remove unwanted elements, such as sulfur and mercury, along with refining it to ensure the quality and calorific requirements are met; prior to compression, transport and subsequent use. Through all these process steps, reliable level measurements are critical for the safe and smooth operation of the plant.

There are physical properties of LNG/LPG which can also vary depending on the composition of the medium; this can be due to supplier, its origin, refined state, as well as variations on storage and ambient conditions. Due to this, many measuring principles struggle to deliver a reliable, precise measurement without recalibration. Mechanical measuring methods are known to be prone to malfunction and require a lot of maintenance. For these reasons, a contactless radar technology is clearly the measuring method of choice. However, LNG/LPG also has a low density and a very small dielectric constant (which affects its reflectivity to microwave-based radar measurement systems). In the past, this has meant special installations like stilling tubes and specific configurations of radar were required to function reliably. They also need to be able to deal with internal fittings, isolation valves, poor reflections and sometimes turbulent surfaces, and these have even presented some reliability problems for radar in the past.



The radar sensor for liquids VEGAPULS 64 (flange version) is ideally suited for poorly reflecting media, i.e. liquids with small DK values.

Poorly reflective media

Using a level radar with a signal frequency like VEGAPULS 64 with 80 GHz technology, it focuses the radar beam more than three times narrower and more concentrated than previous radar level sensors. This makes it particularly well suited for poorly reflective media, i.e. compressed gases/liquids with small dielectric values typical in this industry. The more concentrated signal ensures it gets a good reflection, while superior sensor sensitivity can discern the smallest reflection from a distance, even if there is some surface turbulence.

The outstanding focusing makes the measurement more reliable and accurate and the level transmitter less expensive to plan and implement. To assist with this, it is available with a range of different antenna systems and sizes. Currently, the connection sizes (with beam angles in brackets) on offer range from ¾" (14°), 1½" (7°), DN50/2" (6°) and DN80(3°).

When it comes to any problematic internal fixtures, the focusing advantage also has a positive benefit. The most obvious: the narrow measuring beam can simply avoid any internal tank components and installations, but it doesn't end there...



VEGAPULS 64 measures the level in a cooling system on board a gas tanker.

The isolation valve challenge

Typical for the industry is the strict requirement that every sensor be separated from the process by means of a valve fitting, without interrupting the process, i.e. without shutting down the production equipment, or part of it. This requirement is absolutely mandatory for most liquid gas tanks.

For a radar level sensor, this means that it has to be mounted on a ball valve. The purpose of this is to guarantee that the sensor can be separated from the process even during ongoing operation. Until now, installing a radar sensor on a ball valve was not recommended, as the ball valve itself causes large interfering reflections in the close range. This is due to reflections at internal valve sealing and seating points as well as from process connections like flanges and gaskets. These small, near range signals are generated inside the throat of the ball valve, they consequently multiply and feedback interfering signals, which usually directly impede the measuring path of the sensor. In the past, reliable measurement with radar through a ball valve was often impossible, or severely restricted, especially in liquids with small dielectric values.

With VEGAPULS 64, the influence of the ball valve is much smaller again because of the considerably better signal focusing of the sensor. As a result, the ball valve generates no disturbing echoes, interfering signals in the close range are thus avoided and a reliable measurement is assured. Another benefit for the user: the sensor can be installed onto existing shut-off devices and on longer nozzles, which also keeps the costs of retrofitting to a minimum.



VEGA sensors can reliably and accurately detect even the lowest levels of LNG at the bottom of a tank.

Better utilization of tank volume

VEGAPULS 64 also has a positive effect when measuring liquids with small dielectric constants at low levels close to the bottom of a tank. Radar signals are of course reflected at the surface of the medium. However, in the case of liquids with small dielectric constants, some of the signals penetrate through the medium and are then reflected by the underlying, highly reflective metal tank bottom. Two signals are thus detected: the weaker actual liquid level and the stronger one from the tank bottom. The smaller the dielectric constant of the medium and the lower the level, the larger the signals from the bottom of the tank become. This can result in the unit either having inaccurate readings or prematurely 'jumping down' to zero level before it is empty.

Thanks to the significantly shorter wavelength of the 80 GHz signals from VEGAPULS 64, the signals that reflect back are much higher in strength - and any that do pass through the surface into the medium are strongly attenuated (much more than with previous radar sensors). As a result, any unwanted reflections from the bottom of the vessel are significantly weaker. Even at low levels, this means the liquid level signal reflected back remains stronger than the unwanted signal from the bottom. This means, even at the very lowest levels, the liquid surface can be detected reliably and accurately, allowing the tank volume to be even better utilized.

Conclusion: VEGAPULS 64 offers a reliable, contactless level measurement that can be easily retro fitted and isolated, needs minimal engineering and enables better performance in LPG and LNG processing, shipping and storage.

Products

