Level Measurement 101: Guided Wave Radar Keeps It Simple

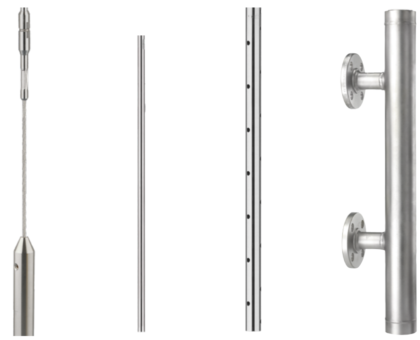
Guided wave radar is the ideal technology to measure level in liquids or bulk solids across a number of industries in a variety of process conditions. These sensors are unaffected by changing pressure, temperature, or a product's specific gravity. And unlike other technologies, foam, dust, and vapor will not trigger inaccurate readings or errors, either. Guided wave radar provides accurate, reliable level measurement without ongoing maintenance or recalibration. And with no moving parts, it's the ideal solution for retrofitting mechanical technology.

How it works

Guided wave radar level measurement comes from time domain reflectometry. This technology has allowed people to find breaks in underground or in-wall cables for decades. It works like this: a low amplitude, high-frequency microwave pulse is sent into a transmission line or cable, and the device calculates distance by measuring the time it takes for the pulse to reach the break in the line and return.

The same principle applies for a guided wave radar sensor. A probe is mounted onto the tank, vessel, or pipe where a measurement is needed. A microwave pulse is "guided" downward by the probe where a portion of the pulse will be reflected by the solid or liquid material being held in the tank. The amount of time it takes for the pulse to be transmitted and returned determines the level inside the vessel being measured. Conductive materials reflect a large proportion of the transmitted energy while non-conductive materials reflect a small portion. The reflective properties of what's being measured can determine the effectiveness of this type of measurement. Since its invention, guided wave radar has been used to measure level in industries ranging from food and beverage to chemical and refining.

Types of probes



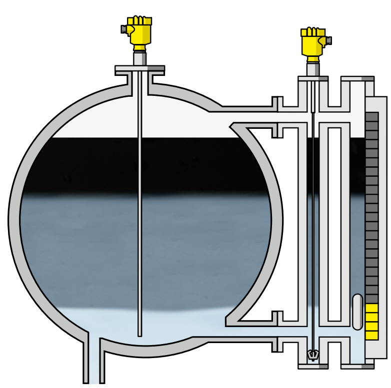
Cable Rod Coaxial Bridle

Guided wave radars use a number of different probes to make their measurements. Each different probe has its own purpose and advantages. Some are better for making measurements in liquids or solids. Others work better with lower reflectivity materials, thick foam, excessive buildup, or corrosive and abrasive materials. These probes commonly come in customizable lengths, so finding the right length for differently sized vessels is relatively easy.

Advantages

Setup and configuration for guided wave radars are about as simple as they come. VEGA guided wave radars are ready out of the box, configured at the factory for the probe's operating span. Users only need to install the sensor and go through the guided setup procedure to begin receiving accurate measurements within 2 mm. Guided wave radars need no additional calibration. Other technologies require users to empty the tank to show the sensor different levels like 0%, 50%, and 100%. This can be time consuming and expensive. Lastly, guided wave radar has no moving parts. Pressure sensors, floats, and displacers all have mechanical parts that can wear out, which means additional maintenance and another calibration. All of this means less time and money spent on setup, maintenance, and troubleshooting.

Unlike other sensors, guided wave radar feels right at home in tight spaces like pipes, stilling wells, small chambers, and bypass tubes. The very nature of their guided signal allows an accurate measurement where other sensors cannot go. These sensors can measure in a number of process conditions and still make accurate measurements regardless of the environment. This means guided wave radar sensors won't fail with changes in temperature, pressure, or specific gravity. These sensors are also immune to dust, excessive foam, buildup, and noise, making them an ideal sensor across a number of industries.



Guided wave radar is also the ideal choice for measuring interface simply because of how it works. The emitted microwave pulses are constantly traveling down and up the length of the probe. Most of the energy bounces back near the surface of what is being measured, and a level is calculated. Since the remaining energy continues to flow down the probe and through the liquid, the sensor will receive a second level reading, giving the user a measurement of the interface point. All that's needed is an additional calculation for the amount of time it takes for a pulse to travel through the different liquids.

Common Applications

Guided wave radars are used across a number of industries and applications ranging from oil and gas refining to food and beverage production. They're most commonly used for level measurement of solids, and level measurement and interface of liquids. They make accurate measurements in an assortment of challenging environments, including one or more of the following: high pressure, extreme temperatures, low dielectric constant, aggressive liquids, steam, excessive buildup, foam, dust, noise, and condensation.

Limitations

Guided wave radar is a great fit for a multitude of applications, which is why it's commonly used in a number of industries. However, it's just not the right fit for every application. In vessels with mixers, heating coils, or any other obstructions, a cable or rod will not be able to drop into the tank free and clear, preventing the sensor from getting an accurate reading. These devices also need to be in contact with the material to get a measurement, and if that's a problem, then another type of sensor will need to be used.

Conclusion

Guided wave radar is an economical solution to level measurement across industries for both liquids and solids. Dust, heavy foam, and other common problems have no effect on guided wave radar. These sensors have no moving parts, and they're ready to go out of the box, making them ideal for retrofitting older mechanical technologies.

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