

Foxboro® LevelWave Series

LevelWave LR01 Free-Space Radar (FMCW)



Free-Space Radar Technology—How does it work?

Unaffected by temperature, pressure, density and corrosive media

Electromagnetic pulses are emitted through the antenna. These pulses are reflected back at the product surface. The distance is calculated by measuring frequency shift. This technology makes this device perfect for storage tanks, with easy and fast installation because there is no probe. This makes the LR01 free-space device suitable for applications that are corrosive, highly viscous, sticky, or media with heavy deposition levels.

LevelWave LR01 Series Description

The LevelWave LR01 is designed to perform continuous level measurement in a wide range of industries and applications. Foxboro is known for more than 50 years of experience in level measurement as a leading supplier of extremely robust, durable and reliable level measurements. Unaffected by changes in temperature, specific gravity, pressure and with no need to recalibrate, offering a highly available measurement at low maintenance cost. With the LevelWave LR01 you achieve a highly modular system which is designed for the requirements of the modern industry.

Summary

Foxboro LevelWave Series Models LR01 and LG01 Radar level measurement devices offer accurate reliable level measurement for the widest choice of installation and application.

Business Value

The Foxboro LevelWave Series Models LR01 and LG01 radar level measurement devices have unique advantages that will save customers cost, time and resource. The modular design makes installation very easy with a click in solution, this reduces downtime in the field and plant. Adaptable side or top mounting and easily accessed external display enables effortless operation. Every single device is rigorously factory tested which ensures the best quality instrument every time.

LevelWave Series

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Features / Benefits

The perfect solution for non-contact measurement

- 10 GHz FMCW level meter
- Measurement range up to 30 m (98 ft.)
- Difficult/sticky/heavy deposition/viscous media
- Unique PP or PTFE Wave horn antenna for corrosive media
- Metaglas® dual seal process system on all Wave Guides and Metallic Horn antennas
- Wave Horn corrosion proof antennas gasket free
- Flange temperature $\leq +250^{\circ}\text{C}$ / $+428^{\circ}\text{F}$ up to 40 bar / 580 psig
- Installations with limited head space/taller applications
- 500 times more signals than a common pulse burst radar
- optional purging, cooling or heating for the metallic horn antenna
- Side mounting (S-/L-bend)
- Non-contact measurement and measurements down to 1.1 DK
- Full vacuum to 40 bar (580 psi)
- $-60...250^{\circ}\text{C}$ ($-76...482^{\circ}\text{F}$)
- Remote version available
- Empty tank spectrum (ETS) function eliminates false reflections caused by tank internals

Frequency Modulated Continuous Wave (FMCW) Radar Principle

FMCW-radar uses a high frequency signal (10 GHz $\pm 0,5$ GHz) which transmit frequency increasing linearly 1 GHz within approx. 7 ms during the measurement.

The signal is emitted, reflected on the product surface and received time-delayed.

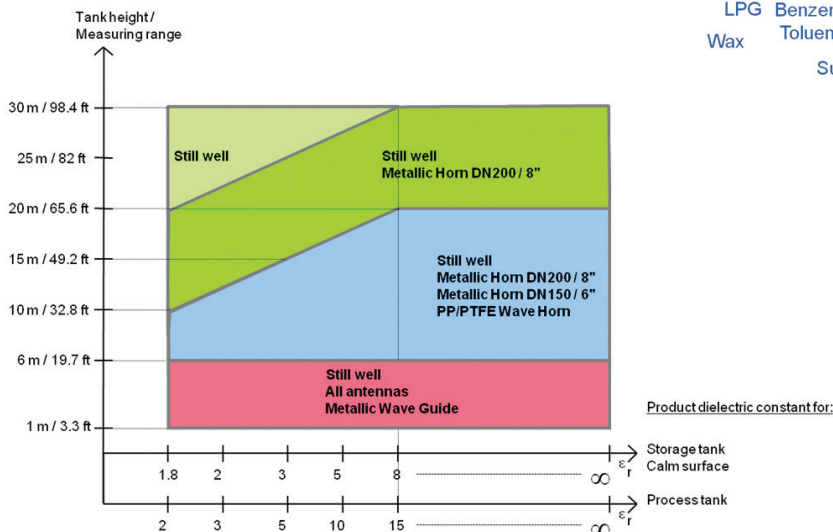
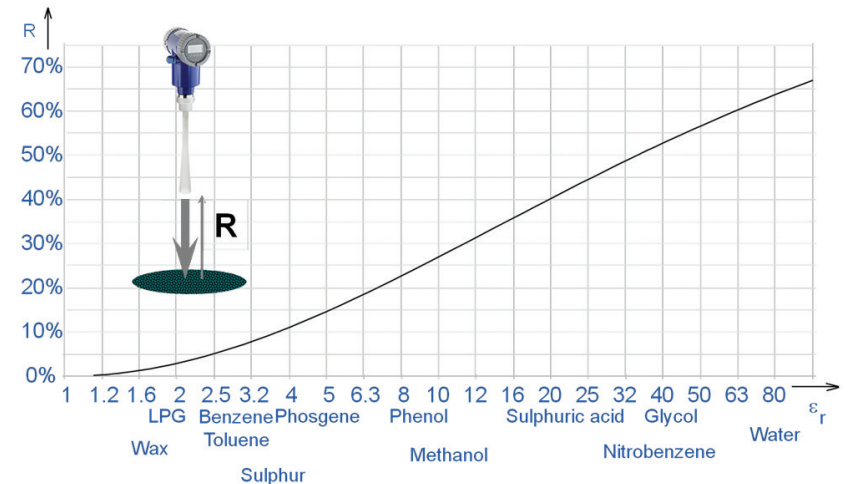
For further signal processing the difference Δf is calculated from the actual transmit frequency and the receive frequency.

The difference Δf is directly proportional to the distance.

The frequency difference is transformed via a fast Fourier transformation (FFT) and the distance is calculated.

The level results from the difference between tank height and distance.

Dielectric Constant and Reflectivity - Guided Free-Space Radar (FSR)



Antenna Selection Guide

Antenna depends on: measuring range, dielectric constant (DK), media surface for example: foam, dust, agitator, distance, type of adaptation, size of antenna.

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Specifications

Antenna type, process connection, temperature and process pressure.	Antenna Type	Process Connection	Seal	Process Connection Temperature		Process Pressure	
				[°C]	[°F]	[barg]	[psig]
For more data on pressure ratings, refer to Technical Data chapter in the handbook. ① Higher temperature on request ② Higher pressure on request	PP Wave Horn	G 1 1/2; 1 1/2 NPT	-	-20...+100	-4...+212	-1...16	-14.5...232
	PTFE Wave Horn	Flange with PTFE plate	-	-50...+150	-58...+302	-1...40	-14.5...580
	Metallic Horn Wave Guide	Flange	Metaglas® with FKM/FPM	-40...+200 ①	-40...+392 ①	-1...40 ②	-40...+572 ②
			Metaglas® with Kalrez® 6375	-20...+250 ①	-4...+482 ①	-1...40 ②	-4...+572 ②
			Metaglas® with PFA	-50...+150 ①	-58...+302 ①	-1...40 ②	-14.5...580 ②
Metaglas® with EPDM			-50...+130 ①	-58...+266 ①	-1...40 ②	-14.5...580 ②	

Network

General information.

For more detailed information refer to Network configuration in the handbook

The device uses the HART® communication protocol. This protocol agrees with the HART® Communication Foundation standard. The device can be connected point-to-point. It can also operate in a multi-drop network of up to 15 devices.

The device output is factory-set to communicate point-to-point. To change the communication mode from point-to-point to multi-drop, refer to "Network configuration" in the handbook.

Technical Data

- One converter for all applications
- Measuring: distance, level, volume
- Power supply: 12...36 VDC with 4...20 mA HART®
- Frequency: X-band (10 GHz ±0,5 GHz)
- Measuring principle: FMCW (Frequency Modulated Continuous Wave)
- Measuring range: 30 m / 98 ft
- Process temperature: -60...250 °C (-76...482 °F)
- Ambient temperature: -40...80 °C (-40...175 °F)
- Operating pressure: 0...40 bar (0...580 psi)
- Standard materials: PP / PTFE / 316 Stainless Steel
- Accuracy: ±0.1% or ±10 mm (±0.4")
±0.05% or ±5 mm (±0.2") with a 2 point Calibration
- Repeatability: ±1 mm (±0.04")
- Min. ε_r value: Direct mode: 1.8
- Approvals: ATEX / IECEx (Ex ia, Ex d), cFMus, NEPSI and INMETRO GOST- TR (pending), SIL, EMC, NAMUR, CRN, NACE
- Safety: SIL 2 according to IEC 61508 (high & low demand)
- IP rating: Housing IP 66/67 / NEMA 4X
- Languages: 9 Languages in 3 Blocks (English, French, German, Italian, Spanish, Portuguese, Chinese, Japanese, Russian)
- Optional: Local display + keypad Remote converter FF, PROFIBUS PA (pending)

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Foxboro Delivery

All LevelWave devices are shipped from our Centre of Excellence for Level based in Stuttgart, Germany. Lead time on request.

For Technical Support systems.support@schneider-electric.com

How To Order

For the full range of order codes please go to the LevelWave Product Specification Sheets. All Product Specification Sheets (PSS) can be found on our website under downloads. See Guided Wave LG01 LevelWave see section 5.1 for full list of model order codes. Free-Space LR01 LevelWave see section 5.1 for full list of model order codes.

If you have any queries about which codes to use please email systems.support@schneider-electric.com.



LevelWave Series including compact, remote and weather proof protection options

Foxboro
 38 Neponset Ave., Foxboro Massachusetts 02035 USA
 Toll free within USA: 1-866-746-6477
 Global: +1-508-549-2424
www.fielddevices.Foxboro.com

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