



Summary

Invensys Foxboro Eckardt™ 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 Invensys Foxboro Eckardt 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.

Foxboro Eckardt LevelWave Series LevelWave LR01 Free-Space Radar (FMCW)

FEATURES / BENEFITS LevelWave LR01 Free-Space Radar (FMCW)

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)
- $-60\text{...}250^{\circ}\text{C}$ ($-76\text{...}482^{\circ}\text{F}$)
- Remote version available
- Empty tank spectrum (ETS) function eliminates false reflections caused by tank internals



DESCRIPTION

The LevelWave LR01 is designed to perform continuous level measurement in a wide range of industries and applications. Foxboro Eckardt 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.

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.

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.

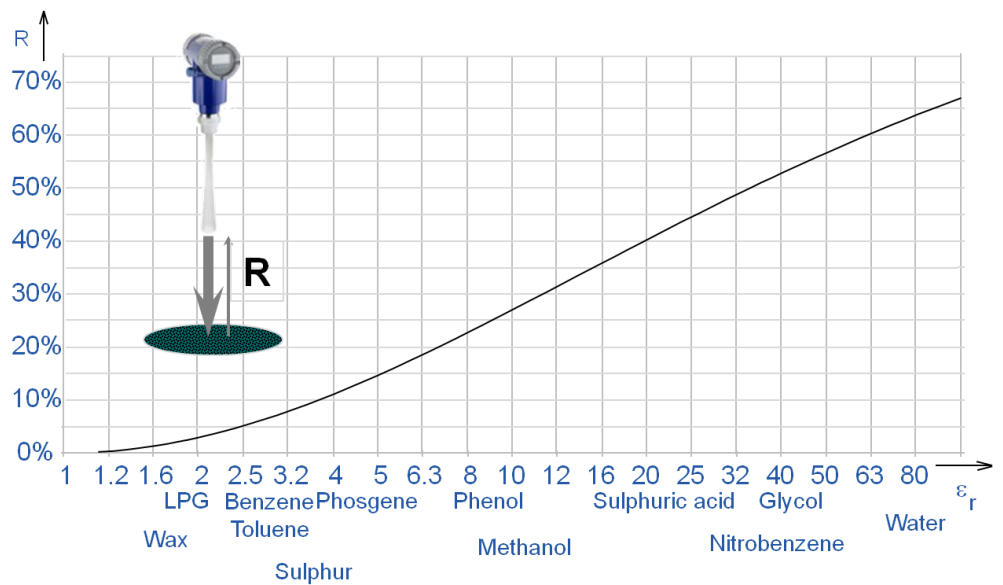
For further signal processing the difference Δf is calculated from the actual transmit frequency and the receive frequency.

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.

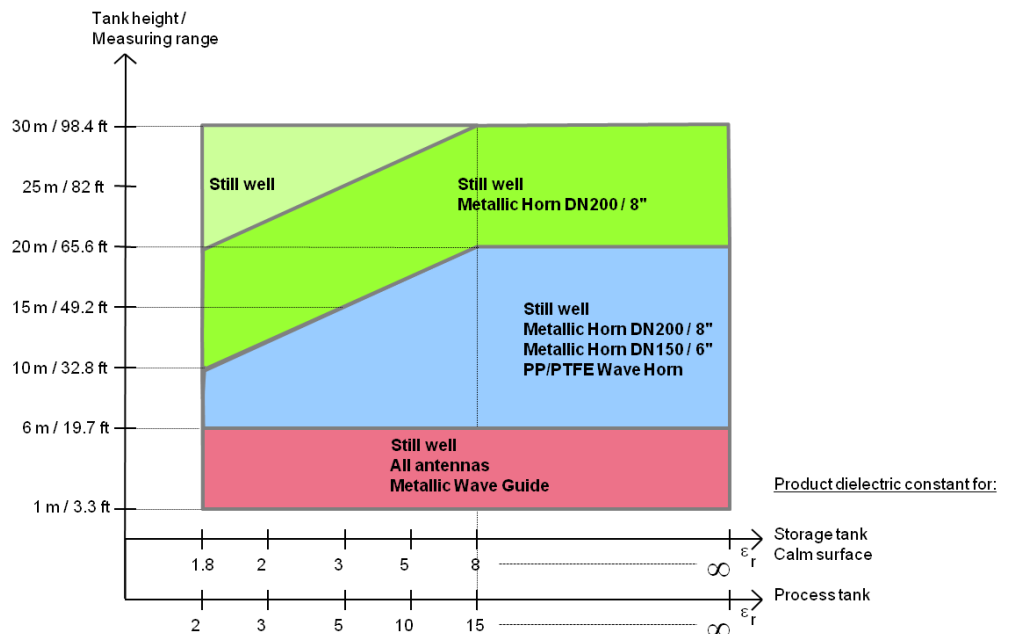
The level results from the difference between tank height and distance.

DIELECTRIC CONSTANT AND REFLECTIVITY 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.





FUNCTIONAL SPECIFICATION

- ① Higher temperature on request
- ② Higher pressure on request

Antenna type, process connection, temperature and process pressure

For more data on pressure ratings, refer to Technical Data chapter in the handbook

| Antenna type | Process connection | Seal | Process connection temperature | | Process pressure | |
|--------------------------|------------------------|-----------------------------|--------------------------------|-----------------|------------------|------------------|
| | | | [°C] | [°F] | [barg] | [psig] |
| PP Wave Horn | G 1½; 1½ 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 | -14.5...580 ② |
| | | Metaglas® with Kalrez® 6375 | -20...+250 ① | -4...+482 ① | -1...40 ② | -14.5...580 ② |
| | | Metaglas® with PFA | -60...+130 ① | -76...+266 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)

FOXBORO ECKARDT DELIVERY

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

For Quote Support please email quotes@foxboro-eckardt.de

For Product Support please email productsupport@foxboro-eckardt.de or make an enquiry [here](#) for further information.

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 [here](#)

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 productsupport@foxboro-eckardt.de



LevelWave Series including compact, remote and weather proof protection options

i n v e n s y s[™]

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