113GHz

The right answer for any application

Endress+Hauser

People for Process Automation

Level expertise to optimize your process

Reduce your total cost of ownership and thereby gain maximum profit. According to this principle, we work for our customers: Every application requires an individual answer. That is exactly why we offer the complete portfolio, so that we do not have to enter into any compromises.

Engineering expertise As pioneers in level instrumentation for more than 60 years, we have invented new measuring principles and have continuously worked to optimize process automation. Our Liquiphant® level switches, Micropilot® radars and Levelflex guided radar devices are just three of our innovative products that have set new standards across the process industry.

Customer focus Whether its level, interface measurement or point level detection using capacitance, ultrasonics or radar measurement: We offer the complete instrumentation portfolio to provide the best individual answer to any measurement task. Our experts are always on hand to offer personal consultation to ensure you get the ideal solution.

The right answer for any application

Radar level measurement solves a series of challenges in different applications. The key to achieving the ideal solution is choice: We offer a range of frequencies to match specific application needs.

"From the sum of 113GHz, we respond to any of your applications with the appropriate radar frequency. We offer a complete portfolio of radar instruments and optimize your processes individually. On a personal note, we tune into your wavelength to understand what exactly it is that you need for your specific processes."

Dietmar Haag, Level Product Manager

Advantages of 1GHz
- Guided radar is suitable for applications involving foam and low dielectric constant values.
- Enables interface measurement, gas phase compensation and is ideal for use in bypass applications.

Advantages of 6GHz
- Works reliably even in applications with turbulence and heavy condensation.
- Ideal for stilling well applications.

Advantages of 26GHz
- Good beam angle for most applications.
- Suitable for 90% of applications.
- Good in applications with turbulence.

Advantages of 80GHz
- Highly focused 3° beam angle.
- Large measuring range up to 125m (410ft).
- Highest accuracy: ±0.5mm (0.02inch) (NMR81).

Our radar portfolio

Levelflex guided radar devices with 1GHz frequency

1GHz guided radar has advantages in applications where foam, low dielectric constants, gas phases and bypasses create challenges. It is also good for interface measurement.

The Levelflex portfolio

Liquids Solids

1

Levelflex FMP50
For all basic level applications in liquids
- Temperature: -20 to +80°C (-4 to +176°F)
- Pressure: Up to +6bar (up to 87psi)
- Measuring range: Rod up to 4m (13ft), rope up to 12m (40ft)

2

Levelflex FMP51
The standard sensor for highest demands in liquid level measurement
- Temperature: -40 to +200°C (-40 to +392°F)
- Pressure: Up to +40bar (up to +580psi)
- Measuring range: Rod up to 10m (33ft), rope up to 45m (148ft), coax 6m (20ft)

3

Levelflex FMP52
Coated probe for use in aggressive liquids
- Temperature: -50 to +200°C (-58 to +392°F)
- Pressure: Up to +40bar (up to +580psi)
- Measuring range: Rod up to 4m (13ft), rope up to 45m (148ft)

4

Levelflex FMP53
For the highest hygienic requirements in the food and life sciences industry
- Temperature: -20 to +150°C (-4 to +302°F)
- Pressure: Up to +16bar (up to +232psi)
- Measuring range: Rod up to 6m (20ft)

5

Levelflex FMP54
For high temperature and high pressure applications in the oil & gas, chemical and power industry
- Temperature: -196 to +450°C (-320 to +842°F)
- Pressure: Up to +400bar (up to +5,800psi)
- Measuring range: Rod up to 10m (33ft), rope up to 45m (148ft), coax up to 6m (20ft)

6

Levelflex FMP55
The multiparameter device is the innovation in interface measurement
- Temperature: -50 to +200°C (-58 to +392°F)
- Pressure: Up to +40bar (up to +580psi)
- Measuring range: Rod up to 4m (13t), rope up to 10m (33ft), coax up to 6m (20ft)

7

Levelflex FMP56
Cost-effective device for all bulk solids level applications
- Temperature: -40 to +120°C (-40 to +248°F)
- Pressure: Up to +16bar (up to +232psi)
- Measuring range: Up to 12m (40ft)

8

Levelflex FMP57
The sensor for highest demands for level measurement in bulk solids
- Temperature: -40 to +185°C (-40 to +365°F)
- Pressure: Up to +16bar (up to +232psi)
- Measuring range: Rod up to 4m (13ft), rope up to 45m (148ft)

Micropilot radar devices with 6GHz frequency

6GHz radar devices work very well in applications with heavy condensation, turbulence and where stilling wells are used.

The Micropilot 6GHz portfolio

Liquids

1

Micropilot FMR53
For simple level measurement applications in liquids
- Temperature: -40 to +150°C (–40 to +302°F)
- Pressure range: -1 to +40bar (–14.5 to +580psi)
- Measuring range: Up to20m (65ft)

2

Micropilot FMR54
For level measurement in liquids where strong steam or ammonia can occur and stilling well applications.
- Temperature: -60 to +400°C (-76 to +752°F)
- Pressure: -1 to +160bar (-14.5 to +2,320psi)
- Measuring range: Up to 20m (65ft)

3

Micropilot NMR84
Drip-off planar antenna with 6GHz FMCW for custody transfer stilling well applications with NMi and PTB approvals
- Temperature: -40 to +150°C (-40 to +302°F)
- Pressure: Vacuum to +25bar (Vacuum to +362psi)
- Measuring range: Up to 40m (131ft)

4 5

Micropilot FMR530/533
6GHz high accuracy pulse radar for custody transfer applications with NMi and PTB approvals
- Temperature: -40 to +200°C (-40 to +392°F)
- Pressure: Vacuum to +64bar (vacuum to +928psi)
- Measuring range: 25 to 40m (82 to 131ft)

6

Micropilot FMR532
6GHz high accuracy pulse radar for custody transfer applications in stilling wells with NMi and PTB approvals
- Temperature: -40 to +200°C (-40 to +392°F)
- Pressure: Vacuum to +64bar (vacuum to +928psi)
- Measuring range: 25 to 40m (82 to 131ft)

Which is the right measuring device for your application?
Check out our digital selection guide: www.yourlevelexperts.com

Micropilot radar devices with 26GHz frequency

Our 26GHz radar devices span every industry. These devices have proven themselves time and time again in demanding process conditions such as experienced in reactors and mixing tanks where high process temperatures or turbulence are present. It is a cost-effective solution for the water & wastewater industry and for utilities across all industries.

The Micropilot 26GHz portfolio

Liquids

Solids

1

Micropilot FMR10/FMR20
Basic model for level liquid applications
- Temperature: -40 up to +80°C (-40 up to +176°F)
- Pressure: -1 to +3bar (-14.5 to +43psi)
- Measuring range: Up to 20m (66ft)

2

Micropilot FMR50
Radar for liquid level applications
- Temperature: -40 to +130°C (-40 to +266°F)
- Pressure: -1 to +3bar (-14.5 to +43.5psi)
- Measuring range: Up to 30m (98ft), 40m (131ft) with advanced dynamics

3

Micropilot FMR51
The standard sensor for highest demands in liquid level measurement
- Temperature: -196 to +450°C (-321 to +842°F)
- Pressure: -1 to +160bar (-14.5 to +2,320psi)
- Measuring range: Up to 40m (131ft), 70m (229ft) with advanced dynamics

4

Micropilot FMR52
For level measurement in aggressive liquids or applications with hygiene requirements
- Temperature: -40 to +200°C (-40 to +392°F)
- Pressure: -1 to +16bar (-14.5 to +232psi)
- Measuring range: Up to 40m (131ft), 60m (197ft) with advanced dynamics

5

Micropilot FMR540
26GHz high accuracy pulse radar for custody transfer applications with NMi and PTB approvals
- Temperature: -40 to +200°C (-40 to +392°F)
- Pressure: Vacuum to +16bar (vacuum to +232psi)
- Measuring range: Up to 40m (131ft)

6

Micropilot FMR56
Cost-effective radar for level measurement in solids
- Temperature: -40 to +80°C (-40 to +176°F)
- Pressure: Up to +3bar (up to +43.5psi)
- Measuring range: Up to 30m (98ft)

7

Micropilot FMR57
Meets the highest demands in bulk solids level measurement
- Temperature: -40 to +400°C (-40 to 752°F)
- Pressure: Up to +16bar (up to +232psi)
- Measuring range: Up to 70m (230ft)

Micropilot radar devices with 80GHz frequency

80GHz radar devices give you several advantages. A 3° beam angle means reduced engineering and installation costs, particularly for tanks with internal obstructions such as baffles. Smaller antennas can mount on smaller process connections. The accuracy is very high with up to 0.5mm (0.020 inch) for example in tank gauging and it allows installation on tall solids silos up to 125m (410ft).

The Micropilot 80GHz portfolio

Liquids

Solids

1

Micropilot FMR60
The standard sensor for highest demands in liquid level measurement with 80GHz technology
- Temperature: –40 to +130°C (–40 to +266°F
- Pressure: Vacuum to +16bar (Vacuum to +232psi)
- Measuring range: Up to 50m (164ft)

2

Micropilot FMR62
For 80GHz level measurement in aggressive liquids or applications with hygiene requirements
- Temperature: -40 to +200°C (-40 to +392°F)
- Pressure: Vacuum to +25bar (Vacuum to +362psi
- Measuring range: Up to 80m (262ft)

3

Micropilot NMR81
Drip-off lens antenna with 80GHz transmitting FMCW for free-space custody transfer applications with NMi and PTB approvals
- Temperature: -40 to +200°C (-40 to +392°F)
- Pressure: Vacuum to +16bar (Vacuum to +232psi)
- Measuring range: Up to 70m (230ft)

4

Micropilot FMR67
The standard sensor for highest demands in bulk solids level measurement with 80GHz technology
- Temperature: -40 to +200°C (-40 to +392°F)
- Pressure: Vacuum to +16bar (Vacuum to +232psi)
- Measuring range: Up to 125m (410ft)

Which is the right measuring device for your application?
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Make your processes safer and more efficient

Micropilot FMR6x is the first 80GHz radar instrument developed according to IEC 61508. Featuring Heartbeat Technology, Micropilot FMR6x enables easy integration of diagnostics, verification and monitoring functions into your control system.

6GHz
6" antenna
beam angle of 23°

26GHz
3" antenna
beam angle of 10°

80GHz
3" antenna
beam angle of 3°

Advantages of the small, focused signal beam of 80GHz

- Reduced tank wall effects.
- Less interference from tank obstacles.
- Allows installations in tall nozzles without antenna extension.
- Installations through ball valves.

This results in

- Longer measuring ranges and media with lower dielectric constant values can be measured as less energy is lost at obstacles.
- The possibility of installation in tanks or silos with complex geometries, tank obstacles and nozzles.
- Easier commissioning in terms of false echo suppression.

Advantages of the 80GHz technology

- Reliable measurement due to improved focusing and smaller beam angle, particularly in tanks with many baffles.
- Compact design facilitates the installation in small tanks and with small process connections starting from G¾".
- Increased accuracy up to ±1mm (0.04inch).
- Large measuring range up to 125m (410ft).

3D

Do you want to see the FMR62 in augmented reality? Just use the App 3DQR.

Micropilot FMR6x

Increase the safety in your plants
- Hardware and software developed according to IEC 61508 for applications up to SIL2/3.
- Consistent implementation of industry standards.
- Radars featuring numerous international hazardous area (Ex) approvals.
- Devices designed with process safety in mind with features such as gastight feedthrough for housings to protect personnel and prevent electronic damage.
- Heartbeat Technology: an innovative smart sensor diagnostics and self-test concept.

Save costs in planning, commissioning and maintenance
- Reduction of engineering effort via easier integration of the 80GHz radar into the process.
- Heartbeat Technology supports cost-effective and safe operation over the entire plant life cycle.
- Integrated HistoROM® data memory and management modules in the radar enables fast and easy commissioning, maintenance and diagnostics.
- Intuitive, menu-guided operating wizards (at the instrument, via remote display or at the control system) reduces setup and field maintenance costs.

Increase the availability and productivity in your plant
- Reliable, stable measurement across the entire measuring range due to improved focus of the radar signal and dynamic algorithms.
- Large measuring ranges up to 125m (410ft).
- Increased accuracy of ±1mm (0.040inch) due to improved signal focus and dynamic self-learning algorithms.
- Installation possible in small tanks and with small process connections due to the radar's compact footprint.
- Easier and faster commissioning thanks to an interactive and intuitive commissioning wizard plus advanced signal conditioning to enable accurate measurement even in silos with obstructions.
- Reduced maintenance due to innovative antenna design that is resistant to sticky buildup and condensation.
- Highest reliability and measurement repeatability due to multi-echo tracking algorithms.

Developed according to IEC 61508

What does it mean for you?
- Systematic instrument failures are prevented by a development process certified by TÜV (the German official testing institute).
- The instruments can be used in SIL2 applications and also SIL3 applications with homogenous redundancy.
- IEC 61508 defines standards for suppliers to follow during product development – this ensures you can integrate instruments of guaranteed quality and reliability into your process with minimal certification or testing efforts.

Taking the pulse of your measurement

You would like to increase your plant availability and reduce costs? With Heartbeat Technology® Endress+Hauser offers the broadest range of devices with a trend-setting diagnosis and verification concept for this purpose.

Heartbeat Technology permits cost-effective and safe plant operation during the entire life cycle by combining diagnosis, verification and monitoring functions in an expedient manner.

You can find Heartbeat Technology in all of our guided radar and most of our radar devices:

- Levelflex FMP5x series
- Micropilot FMR5x series
- Micropilot FMR6x series

Heartbeat Technology

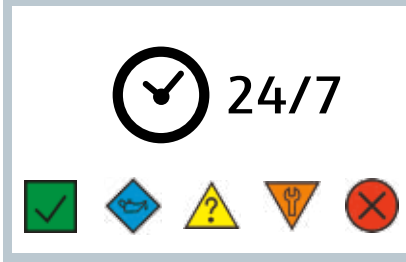
Instruments with Heartbeat Technology excel by permanent process diagnosis and extensive in-situ diagnosis functions. Verification without any dismantling of the device or process interruption. In this way, you significantly reduce your verification efforts. The functionalities in the area of monitoring facilitate predictive maintenance thus optimizing your process and maintenance strategy.

Heartbeat Technology provides easier and better control of your measuring point. You may rest assured while your process runs reliably and safely. Verification efforts are significantly reduced. You save money and discover potential for further process optimization in trend recognition.

You are always taking the pulse of your measurement!

Heartbeat Technology: Easier and better control of your measuring points

Heartbeat Technology

Heartbeat Diagnostics	Heartbeat Verification	Heartbeat Monitoring
		
Permanent process and device diagnostics	Documented in-situ verification	Information for predictive maintenance
Increased plant availability and ...		
... safe processes	... reduced verification effort	... optimization of process and maintenance strategy

- Unambiguous and standardized **diagnosis messages** with clear **instructions for action** facilitate economically efficient and state-oriented maintenance.
- **Permanent self-diagnosis** of the instrument facilitates safe plant operation with extended verification cycles.

- The measuring point may be **verified and documented in-situ** at any time.
- An easy, guided verification procedure always achieves **unambiguously documented verification results.**
- The automatically generated **verification protocol** supports the evidence required for regulations, laws and standards.

- The provision of **instrument and process data** facilitates trend recognition for **predictive maintenance.**
- The combination of instrument and process parameters facilitates the analysis for **targeted process optimization.**

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