

NEW

PiLoTREK WE-200

COMPACT 80 GHZ (W-BAND) RADAR
FOR LIQUIDS & SOLIDS



5 YEARS WARRANTY

PIVELLO

LEVEL TRANSMITTERS



WES-212-4



WES-214-4

FEATURES

- 2-wire 80 GHz (W-band) radar
- Measuring range up to 30 m (98.5 ft)
Accuracy of ±2 mm (±0.078")
- Easy to install due to small antenna diameter
- Plug-in graphic display module
- Horn and plastic encapsulated antennas
- IP67 protection
- User-friendly threshold management
- Configuration via Bluetooth® with Mobile EView app*
- Ex variant*
- Measurement through a plastic tank roof
- For material prone to vapor formation
- For measuring liquids with a gas blanket
- It can also be used in a vacuum
- Open-channel flow measurement

APPLICATIONS

- For measuring the level of liquids, emulsions, and other media
- For large-particle bulk solids
- Storage tanks, chemical tanks, open pits, sumps, wells

AREAS OF APPLICATION

- Water and Wastewater Industry
- Energy Industry / Plant Utilities
- Food & Beverage
- Chemical & pharmaceutical Industry
- Agriculture
- Construction materials
- Heavy Industry
- Packaging Industry

* Under development

The new **PiloTREK WE-200** non-contact radar level transmitters use the most advanced industrial measurement technology, the 80 GHz FMCW radar. The most fundamental advantage of 80 GHz radars compared to lower frequencies (5...12 GHz and 25 GHz) is the smaller antenna size, better focusability, and narrow beam angle.

It uses the latest technology for measuring liquids, masses, emulsions, and other chemicals widely used in, for example, the water industry, food industry, energy industry, pharmaceutical industry, and chemical industry, which provides measurement results with millimeter accuracy.

It is also excellent for measuring substances prone to vapor formation and liquids with gas blanket or large-particle bulk solids. In addition to the level, volume, and weight measurement functions, this product family also inherits the open-channel flow measurement functions and the threshold functions to eliminate false and interfering echoes. Since no medium is required for millimeter waves to propagate, it can also be used in a vacuum.

The device can also be operated with HART® compliant NIVELCO **EView2**, **MultiCONT** universal process controller, and **PACTware** software, or programmed via Bluetooth® communication with the new **Mobile EView*** app.

OPERATING PRINCIPLE

The reflection of the millimeter-waves is highly dependent on the dielectric constant of the medium. Therefore, the measured medium's dielectric constant (ϵ_r) must be over 1.9 for millimeter-wave level measurement. The measurement principle of a level transmitter with a millimeter-waves signal is based on measuring the reflection's time of flight.

The speed of propagation of millimeter-waves signals in the air, gases, and vacuum is almost constant regardless of temperature and medium pressure, so the measured distance does not depend on the physical parameters of the intermediate medium.

The **PiloTREK WE-200** level transmitter is a continuous-wave frequency modulated radar (FMCW) operating at 80 GHz (W-band). The most obvious advantages of 80 GHz radars over lower frequency (5...12 & 25 GHz) radars are smaller antenna size, better focus, and smaller beam angle. A portion of the millimeter-wave continuous wave energy radiated by the level transmitter antenna is reflected from the measured surface, depending on the material to be measured. The distance of the reflecting surface is calculated with high accuracy by the electronics from the frequency shift of the reflected signal and converted into a distance, level, or volume signal by the electronics.

Informative ϵ_r values			
Butane (C ₄ H ₁₀)	1.4	Ethers	4.4
LP gas	1.6...1.9	Acetic acid (CH ₃ COOH)	6.2
Kerosene		Limestone	6.1...9.1
Crude Oil	2.1	Ammonia (NH ₃)	17...26
Diesel Oil		Acetone (C ₃ H ₆ O)	21
Benzol (C ₆ H ₆)	2.2	Ethyl alcohol (C ₂ H ₅ OH)	24
Gasoline	2.3	Methyl alcohol (CH ₃ OH)	33.1
Bitumen	2.6	Glycol (C ₂ H ₄ O ₂)	37
Carbon disulfide (CS ₂)		Nitrobenzene (C ₆ H ₅ NO ₂)	40
Clinker	2.7	Glycerin (C ₃ H ₈ O ₃)	41.1
Resin	2.4...3.6	Water (H ₂ O)	80
Cereal Grain	3...5	Sulfuric acid (H ₂ SO ₄) (T = 20 °C [+68 °F])	84

TECHNICAL DATA

		WE□-2□□-□	
		Plastic housing	Metal housing
Measured values		Distance; calculated values: level, volume, mass, flow	
Signal frequency		77...81 GHz (W-band)	
Measuring range ⁽¹⁾		0...30 m (0...98.5 ft)	
Minimum beam angle ⁽¹⁾		7°	
Lowest ϵ_r of medium		1.9	
Resolution		0.1 mm (0.0039")	
Supply voltage		12...36 V DC	
Output	Analog	4...20 mA (3.9...20.5 mA); $R_{tmax} = (U_s - 12 V) / 0.02 A$	
	Digital	Bluetooth® (under development), HART® interface, loop resistance $\geq 250 \Omega$	
	Relay (optional)	SPDT 30 V / 1 A DC; 42 V / 0,5 A AC	
	Service interface	SAT-506-0 compatible	
	Display	SAP-300 graphic display unit	
Measuring frequency		~1 s	
Antenna diameter ⁽¹⁾		1" (25.4 mm); 1½" (38.1 mm)	
Antenna material ⁽¹⁾		1.4571 stainless steel, or plastic antenna enclosure (PP / PVDF / PTFE)	
Process temperature		-40...+80 °C (-40...+176 °F)	
Ambient temperature			
Process pressure		PP, PVDF, PTFE antennas: -1...3 bar (-14.5...43.5 psi); Stainless steel antennas: -1...40 bar (-14.5...580 psi)	
Process connection		1", 1½" BSP / NPT	
Ingress protection		IP67	
Electrical connection		2x M20x1.5 plastic cable glands + 2x internally threaded ½" NPT connection for protective pipes, cable outer diameter: $\varnothing 7...13$ mm (0.3...0.5"), wire cross section: maximum 1.5 mm ² (AWG15)	
Electrical protection		Overvoltage Class I; (Class III [SELV])	
Housing material ⁽¹⁾		Plastic (PBT)	Painted aluminum or stainless steel
Weight		1...1.6 kg (2.2...3.5 lb)	Aluminum: 2...2.6 kg (4.4...5.7 lb); stainless steel: 3.3...3.9 kg (7.9...8.6 lb)

⁽¹⁾ Depending on order code

TYPE-DEPENDENT DATA

	WE□-212-□ WE□-213-□	WE□-214-□ WE□-215-□	WE□-224-□ WE□-225-□
Dead zone ⁽²⁾	0 m (0 ft)		
Maximum measuring range ⁽³⁾	10 m (33 ft)		20 m (66 ft)
Accuracy ⁽⁴⁾	± 5 mm (± 0.197 "		± 2 mm (± 0.078 "
Beam angle (-3 dB)	12°		7°
Antenna insertion length ⁽⁵⁾	80 mm (3.15")		92 mm (3.62")
Process connection	1" BSP / NPT		1½" BSP / NPT

⁽²⁾ Measured from the tip of the antenna.

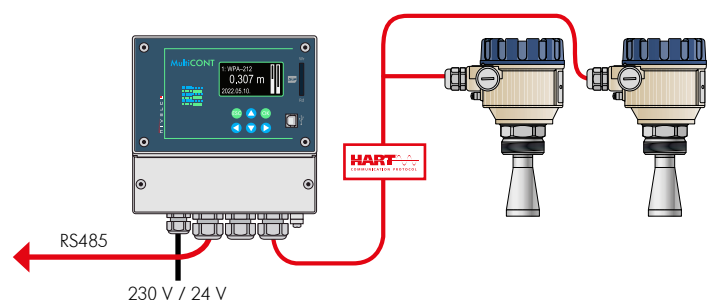
⁽⁴⁾ In the case of an ideal reflecting surface.

⁽³⁾ May be limited in the case of low dielectric constant or non-perpendicular or non-planar media.

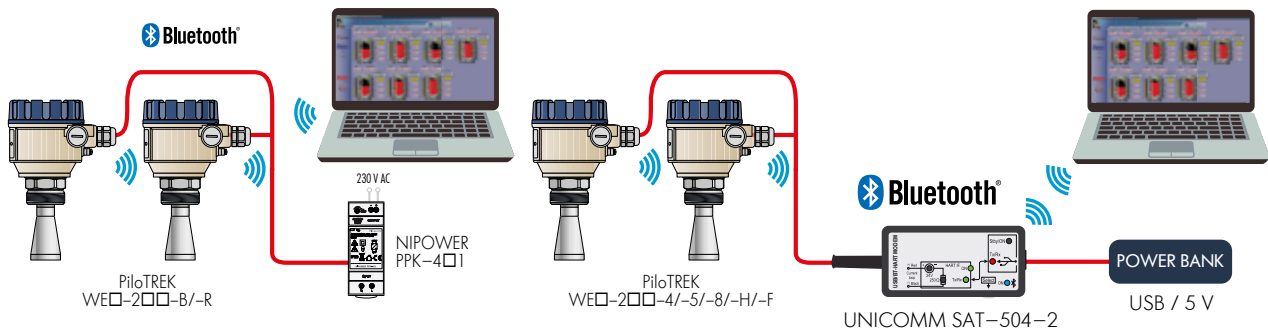
⁽⁵⁾ Measured from the sealing plane of the process connection.

HART® MULTIDROP LOOP

MultiCONT multichannel process controllers process and display measurement data (e.g.: level, temperature, pressure) supplied by NIVELCO's HART® equipped transmitters in a Multidrop loop. Connected transmitters can be programmed through MultiCONT, and it can also perform data logging tasks. Processed data may be sent to a PC via RS485 and displayed in NIVISON. The MultiCONT process controller can be used to implement functions such as measurement configuration and optimization, as well as to display an installation-specific echo map.

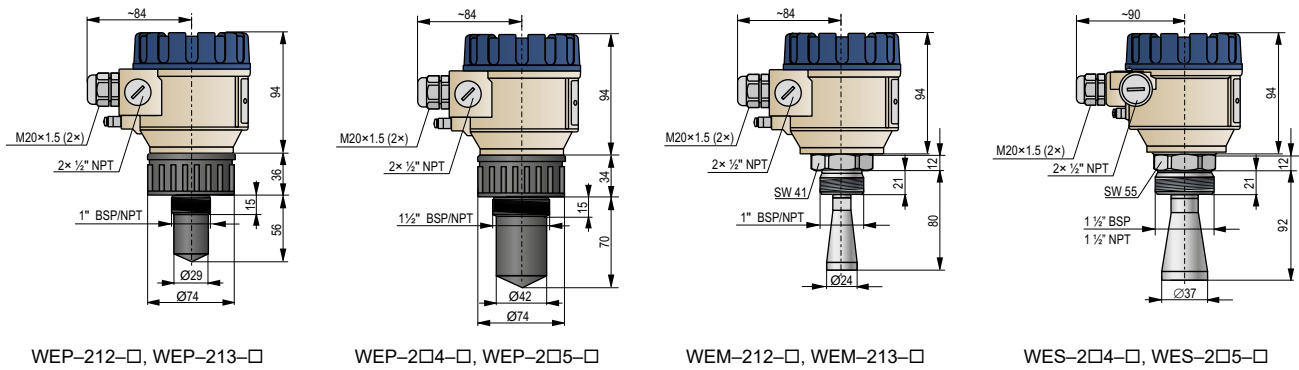


Bluetooth® CONNECTIVITY



PilotREK WE-200 level transmitter can be connected to a PC or cell phone via Bluetooth® wireless technology. WE□-2□□-B/-R devices can be connected directly, and WE□-2□□-4/-5/-8/-H/-F devices can be connected using a UNICOMM SAT-504-2 modem.

DIMENSIONS



ORDER CODES (NOT ALL COMBINATIONS AVAILABLE)

Advanced 80 GHz Radar Level Transmitters

PilotREK W ■ ■ - 2 ■ ■ - ■

Version	Code	Antenna / Housing	Code	Measurement range	Code	Process connection	Code	Output / Certificates	Code	
Transmitter	E	PP / Plastic, PBT, fiberglass-reinforced	P	10 m (33 ft)	1	1" BSP ⁽³⁾	2	4...20 mA + HART®	4	
Transmitter with LCD display	G	1.4571 / Plastic, PBT, fiberglass-reinforced	M	20 m (66 ft)	2	1" NPT ⁽³⁾	3		Ex ta D ⁽¹⁾	5
		1.4571 / Aluminum (powder-coated)	S	30 m (98 ft) ⁽¹⁾	3	1 1/2" BSP ⁽⁴⁾	4		Ex ia G ⁽¹⁾	8
		1.4571 / Stainless steel ⁽¹⁾	K			1 1/2" NPT ⁽⁴⁾	5		+ Bluetooth®	B
		PVDF / Plastic, fiberglass reinforced	V			Ø75 mm (2 1/2") ^(1, 5)	8		+ Relay	H
		PVDF / Aluminum (powder-coated)	B						+ Relay / Ex ta D ⁽¹⁾	F
		PTFE / Plastic, fiberglass reinforced ⁽²⁾	F						+ Relay + Bluetooth®	R

⁽¹⁾ Under development. ⁽²⁾ Up to 20 m (66 ft) measuring range.

⁽³⁾ Only for 10 m (33 ft) measuring range. ⁽⁴⁾ Only for 10 m (33 ft) or 20 m (66 ft) measuring range.

⁽⁵⁾ Prepared for flange (only 30 m [98 ft] and encapsulated types, flanges available from size DN80 should be ordered separately).

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