NEW

PiloTREK w–200

NON-CONTACT, 80 GHz (W-BAND) RADAR FOR LIQUIDS

5 YEARS WARRANTY

NIVELCO

LEVEL TRANSMITTERS

FEATURES

- 2-wire 80 GHz *(W-band)* radar
- Measuring range up to 30 m *(98.5 ft)* for liquids
- Accuracy of ±2 mm *(0.078")*
- Easy to install due to small antenna diameter
- 1", 1½" encapsulated horn antenna
- Integrated design with IP68 protection
- User-friendly threshold management
- Ex variant *(pending)*
- 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 up to 30 m *(98.5 ft)*
- Storage tanks, chemical tanks, open pits, sumps, wells

AREAS OF APPLICATION

- Water and wastewater industry
- Energy industry / Plant utilities
- Food & Beverage
- Pharmaceutical industry
- Chemical industry
- Marine applications

The new **PiloTREK W–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. 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 introduced in connection with ultrasonic devices. 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 PACT*ware* software.

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.

Informative ε_r values			
Butane	1.4	Grain	3…5
Cement	1.5…10	Cooking oil	3.9
LPG	1.6…1.9	Limestone	6.1…9.1
Kerosene	1.8…2.1	Acetone	21
Crude oil	2.1	Ethanol	24
Diesel	2.1	Methanol	33.1
Gasoline	2.3	Glycol	37
Asphalt	2.6	Nitrobenzene	40
Clinker	2.7	Water	80
Resin	2.4…3.6	Sulphuric acid (T = 20 °C)	84

The **PiloTREK W–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.

TECHNICAL DATA

PiloTREK WP□–2□□–□		
Measured values		Distance; calculated values: level, volume, mass, flow
Signal frequency		77…81 GHz (W-band)
Measuring range*		0…30 m (0…98.5 feet)
Minimum beam angle*		7°
Lowest ε_r of medium*		1.9
Resolution		1 mm (.039")
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	HART® interface, loop resistance ≥250 Ω
	Relay *(optional)*	SPDT 30 V / 1 A DC; 48 V / 0.5 A AC
	Service interface	SAT–504–3 compatible; galvanically isolated; 3.3 V LVDS; max. 100 mA
Measuring frequency		~1 s
Antenna diameter*		1" (25.4 mm), 1½" (38.1 mm)
Antenna material*		PP, PVDF
Process temperature		–40…+80 °C (–40…+176 °F)
Ambient temperature		
Process pressure		–1…3 bar (–14.5…43.5 psi)
Process connection		1", 1½" BSP / NPT
Ingress protection		IP68
Electrical connection		4 x 0.5 mm² shielded Ø6 mm cable x 5 m (up to 30 m); For relay option: 7 x 0.5 mm² shielded cable [4× AWG22 shielded Ø0.24" cable x 16.4 ft (up to 98.5 ft); For relay option: 7× AWG22 shielded cable]
Electrical protection		Overvoltage Class 1; (Class III [SELV])
Housing material*		Plastic (PP / PVDF)

*depending on order code

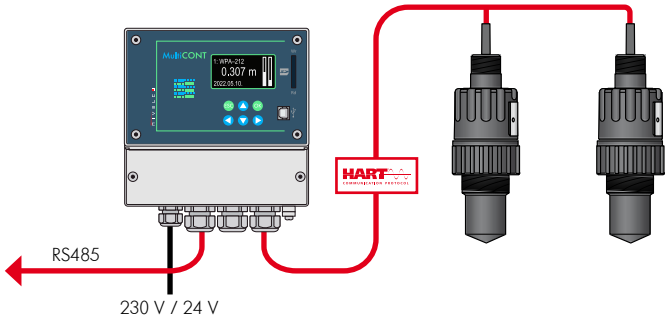
TYPE-DEPENDENT DATA

	WP□–212–□ WP□–213–□	WP□–214–□ WP□–215–□	WP□–224–□ WP□–225–□
Dead zone[1]	0 m		
Maximum measuring range[2]	10 m (33 feet)		20 m (66 feet)
Accuracy[3]	±5 mm (.197")		±2 mm (.078")
Beam angle *(–3 dB)*	12°	7°	
Antenna insertion length[4]	56 mm (2.2")	70 mm (2.75")	
Lower process connection	1" BSP / NPT	1½" BSP / NPT	
Upper process connection	1" BSP		

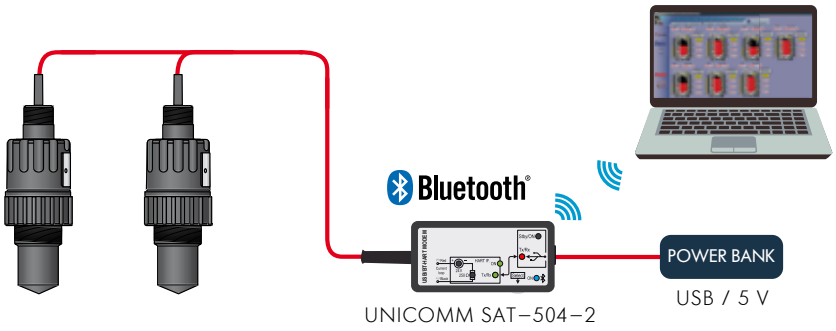
[1] Measured from the tip of the antenna.
[2] May be limited in the case of low dielectric constant or non-perpendicular or non-planar media.
[3] In the case of an ideal reflecting surface.
[4] Measured from the sealing plane of the process connection.

HART® MULTIDROP LOOP

MultiCONT multichannel process controllers process and display measurement data 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 computer via RS485 and displayed in **NIVISON**.



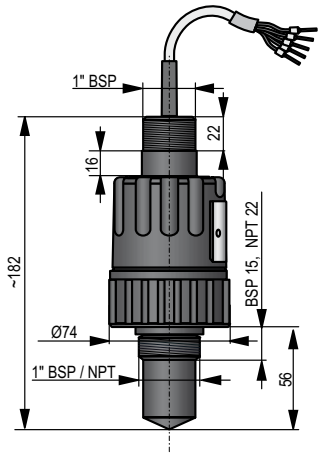
Bluetooth® CONNECTIVITY



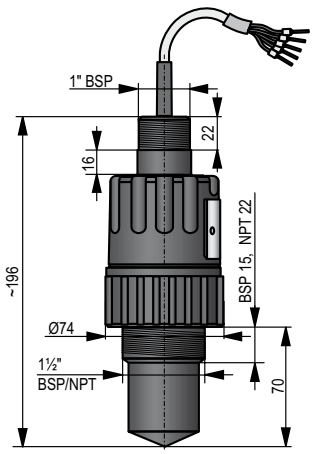
UNICOMM SAT–504–2

Instruments with HART® connectivity can be linked to a PC via Bluetooth® using a **UNICOMM** HART®–USB/Bluetooth® modem (SAT–504). The USB power bank connected to the **UNICOMM** modem can power the entire setup.

DIMENSIONS



WP□–212–□, WP□–213–□



WP□–2□4–□, WP□–2□5–□

ORDER CODES (NOT ALL COMBINATIONS AVAILABLE)

Advanced 80 GHz radar level transmitters

PiloTREK W P ■ – 2 ■ ■ – ■

Integrated type

Antenna / Housing material	Code
PP / PP	A
PVDF / PVDF [1]	B

80 GHz

Measurement distance	Code
10 m	1
20 m	2
30 m [1]	3

Process connection – lower / upper	Code
1" BSP / 1" BSP [2]	2
1" NPT / 1" BSP [2]	3
1½" BSP / 1" BSP [3]	4
1½" NPT / 1" BSP [3]	5
2" BSP / 1" BSP [1, 4]	6
2" NPT / 1" BSP [1, 4]	7
Ø75 mm / 1" BSP [1, 5]	8

Output / Ex		Code
4…20 mA + HART®		4
	Ex ia [1]	8
	+ Relay	H

[1] *Under development*
[2] *10 m (33 ft) measuring range*
[3] *10 m or 20 m (33 ft or 66 ft) measuring range*
[4] *20 m (66 ft) measuring range*
[5] *30 m (98.5 ft) measuring range*

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