FEATURES

- 2-wire 80 GHz *(W-band)* radar
- Measuring range up to 30 m for liquids
- Accuracy of ±2 mm
- Easy to install due to small antenna diameter
- 1", 1½" encapsulated horn antenna
- Integrated design with IP68 protection
- User-friendly threshold management
- Configuration via Bluetooth® with MobileEView app
- PACTware™ compatible
- Ex variant

APPLICATIONS

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

CERTIFICATES

- ATEX (Ex ia GD)
- IECEx (Ex ia GD)

AREAS OF APPLICATION

- Water and wastewater industry
- Energy industry / Plant utilities
- Food & Beverage
- Pharmaceutical industry
- Chemical industry
- Marine applications
- Agriculture
- Construction materials
- Heavy industry
- Packaging industry

WPA–212–4

The new **PiloTREK WP–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 **MobileEView** 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 WP–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_4H_{10})	1.4	Ethers	4.4
LP gas	1.6…1.9	Acetic acid (CH_3COOH)	6.2
Kerosene	2.1	Limestone	6.1…9.1
Crude Oil		Ammonia (NH_3)	17…26
Diesel Oil		Acetone (C_3H_6O)	21
Benzol (C_6H_6)	2.2	Ethyl alcohol (C_2H_5OH)	24
Gasoline	2.3	Methyl alcohol (CH_3OH)	33.1
Bitumen	2.6	Glycol ($C_2H_6O_2$)	37
Carbon disulfide (CS_2)		Nitrobenzene ($C_6H_5NO_2$)	40
Clinker	2.7	Glycerin ($C_3H_8O_3$)	41.1
Resin	2.4…3.6	Water (H_2O)	80
Cereal Grain	3…5	Sulphuric acid (H_2SO_4) (T = 20 °C [+68 °F])	84

TECHNICAL DATA

		PVDF housing WPB/WPT–2□□–□	PP housing WPA–2□□–□
Measured values		Distance; calculated values: level, volume, mass, flow	
Signal frequency		77…81 GHz (W-band)	
Measuring range[1]		0…30 m	
Minimum beam angle[1]		7°	
Lowest ε_r of medium		1.9	
Resolution		0.1 mm	
Supply voltage		12…36 V DC	
Output	Analog	4…20 mA (3.9…20.5 mA); $R_{Lmax} = (U_s - 12\ V) / 0.02\ A$	
	Digital	Bluetooth® (optional), HART® interface, loop resistance ≥250 Ω	
	Relay *(optional)*	SPDT 30 V / 1 A DC; 42 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]		1" (25.4 mm), 1½" (38.1 mm)	
Antenna material[1]		Encapsulated horn antenna (PP / PVDF / PTFE)	
Process temperature		–40…+80 °C	–30…+80 °C
Ambient temperature			
Process pressure		–1…3 bar	
Process connection		1", 1½" BSP / NPT	
Ingress protection		IP66 / IP68	
Electrical connection		4 × 0.5 mm² shielded Ø6 mm cable × 5 m (up to 30 m); For relay option: 7 × 0.5 mm² shielded cable	
Electrical protection		Overvoltage Class 1; (Class III [SELV])	
Housing material[1]		Plastic (PP / PVDF)	

[1] Depending on order code.

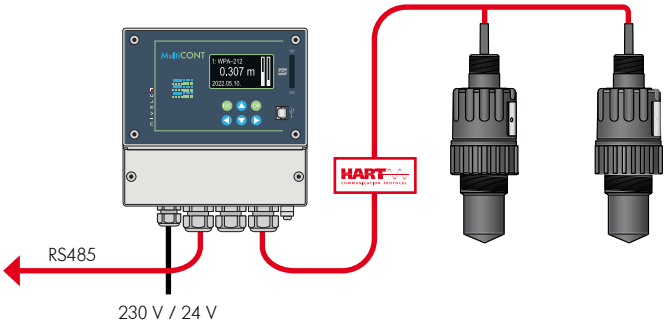
TYPE-DEPENDENT DATA

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

[2] Measured from the tip of the antenna.
[3] 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 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. MultiCONT** provides the means to optimize and configure measurements and display the echo maps of the particular installations.



PiloTREK WP–200 80 GHz Integrated — 5 years

2-wire integrated pulse burst radar level transmitter with PP or PVDF sensor, ingress protection: IP68

Version

W □■ – 2 ■■ – ■		
P		Integrated transmitter

Antenna / Housing

W P □ – 2 ■■ – ■		
A		PP / PP
B		PVDF / PVDF
T		PTFE / PVDF

Measurement range

W P ■ – 2 □■ – ■		
1		10 m
2		20 m
3	*	30 m

Process connection lower / upper

W P ■ – 2 ■□ – ■		
2		1" BSP / 1" BSP (only for 10 m measuring range)
3		1" NPT / 1" BSP (only for 10 m measuring range)
4		1½" BSP / 1" BSP (only for 10 m or 20 m measuring range)
5		1½" NPT / 1" BSP (only for 10 m or 20 m measuring range)
6	*	2" BSP / 1" BSP (only for 20 m measuring range)
7	*	2" NPT / 1" BSP (only for 20 m measuring range)
8	*	Ø75 mm (2½") / 1" BSP (only for 30 m measuring range)

Output / Certificates

W P ■ – 2 ■■ – □		
4		4...20 mA + HART®
5	*	4...20 mA + HART® / Ex ta D
8		4...20 mA + HART® / Ex ia GD
H		4...20 mA + HART® + relay
F	*	4...20 mA + HART® + relay / Ex ta D
B		4...20 mA + HART® + Bluetooth®
C	*	4...20 mA + HART® + Bluetooth® / Ex ta D
E		4...20 mA + HART® + Bluetooth® / Ex ia GD
R		4...20 mA + HART® + relay + Bluetooth®
J	*	4...20 mA + HART® + relay + Bluetooth® / Ex ta D

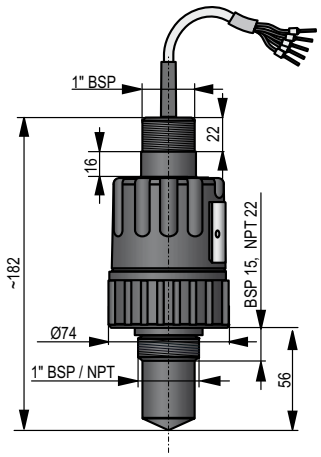
* Under development

Cable

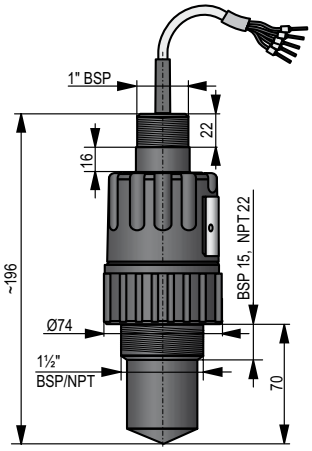
Maximum length 30 m; sold by the meter over the standard 5 m

Accessories sold separately; see relevant page for details

S F A – 3 ■■ – 0	Flanges
S A T – 3 0 4 – 0	HART®-USB modem
S A T – 5 0 4 – ■	HART®-USB/Bluetooth® modem
S A K – 3 0 5 – 2	HART®-USB/RS485 modem
S A K – 3 0 5 – 6	HART®-USB/RS485 modem / Ex ia G
S A A – 1 0 ■ – ■	Mounting brackets



WP□–212–□, WP□–213–□



WP□–2□4–□, WP□–2□5–□

NIV24
WPA–212–4
WPA–214–4
WPA–224–4

NEW

Compact Non-Contact Microwave Level Transmitters

FEATURES

- 2-wire 80 GHz *(W-band)* radar
- Measuring range up to 30 m for liquids
- Accuracy of ±2 mm
- 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 MobileEView app
- PACTware™ compatible
- NIFLANGE weldable stainless steel flange variants
- Ex variant

APPLICATIONS

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

CERTIFICATES

- ATEX (Ex ia GD)
- IECEx (Ex ia GD)

AREAS OF APPLICATION

- Water and wastewater industry
- Energy industry / Plant utilities
- Food & Beverage
- Chemical & pharmaceutical industry
- Agriculture
- Construction materials
- Heavy industry
- Packaging industry

WES–212–4

WES–214–4

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 **MobileEView** 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_4H_{10})	1.4	Ethers	4.4
LP gas	1.6…1.9	Acetic acid (CH_3COOH)	6.2
Kerosene	2.1	Limestone	6.1…9.1
Crude Oil		Ammonia (NH_3)	17…26
Diesel Oil		Acetone (C_3H_6O)	21
Benzol (C_6H_6)	2.2	Ethyl alcohol (C_2H_5OH)	24
Gasoline	2.3	Methyl alcohol (CH_3OH)	33.1
Bitumen	2.6	Glycol ($C_2H_6O_2$)	37
Carbon disulfide (CS_2)		Nitrobenzene ($C_6H_5NO_2$)	40
Clinker	2.7	Glycerin ($C_3H_8O_3$)	41.1
Resin	2.4…3.6	Water (H_2O)	80
Cereal Grain	3…5	Sulfuric acid (H_2SO_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	
Minimum beam angle[1]		7°	
Lowest ε_r of medium		1.9	
Resolution		0.1 mm	
Supply voltage		12…36 V DC	
Output	Analog	4…20 mA (3.9…20.5 mA); $R_{Lmax} = (U_s - 12\ V) / 0.02\ A$	
	Digital	Bluetooth® (optional), HART® interface, loop resistance ≥250 Ω	
	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, PP (W□P) sensor: –30…+80 °C	–40…+80 °C
Ambient temperature			
Process pressure		PP, PVDF, PTFE antennas: –1…3 bar (–0.1…0.3 MPa); Stainless steel antennas: –1…40 bar (–0.1…4.0 MPa)	
Process connection		1", 1½" BSP / NPT, prepared for welded flange	
Ingress protection		IP66 / IP67	
Electrical connection		2× M20×1.5 plastic cable glands + 2× internally threaded ½" NPT connection for protective pipes, cable outer diameter: Ø7…13 mm, wire cross section: maximum 1.5 mm^2	
Electrical protection		Overvoltage Class 1; (Class III [SELV])	
Housing material[1]		Plastic (PBT)	Painted aluminum or stainless steel
Weight		1…1.6 kg	Aluminum: 2…2.6 kg; stainless steel: 3.3…3.9 kg

[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		
Maximum measuring range[3]	10 m		20 m
Accuracy[4]	±5 mm		±2 mm
Beam angle *(–3 dB)*	12°	7°	
Antenna insertion length[5]	80 mm	92 mm	
Process connection	1" BSP / NPT	1½" BSP / NPT	

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

PiloTREK WE–200 80 GHz Compact — 5 years

2-wire compact radar level transmitter with stainless steel horn antenna or plastic encapsulated antenna

Version

W □■ – 2 ■■ – ■

E		Transmitter
G		Transmitter with plug-in display

Antenna / Housing

W ■□ – 2 ■■ – ■

P		PP / Fiberglass-reinforced plastic (PBT)
M		1.4571 / Fiberglass-reinforced plastic (PBT)
S		1.4571 / Painted aluminum
V		PVDF / Fiberglass-reinforced plastic (PBT)
B		PVDF / Painted aluminum
F		PTFE / Fiberglass-reinforced plastic (PBT) (up to 20 m measuring range)

Antenna type

W ■■ – □■■ – ■

2		Horn

Measurement range

W ■■ – 2 □■ – ■

1		10 m
2		20 m
3	*	30 m

Process connection

W ■■ – 2 ■□ – ■

2		1" BSP (only for 10 m measuring range)
3		1" NPT (only for 10 m measuring range)
4		1½" BSP (only for 10 m or 20 m measuring range)
5		1½" NPT (only for 10 m or 20 m measuring range)
8	*	Ø75 mm (2½") prepared for flange (only 30 m and encapsulated types, flanges available from size DN80 should be ordered separately)
S		Prepared for welded flange (only for 10 and 20 m ranges, with ½" stainless steel antenna, flange type MF□–□□□–L to be ordered separately)

Output / Certificates

W ■■ – 2 ■■ – □

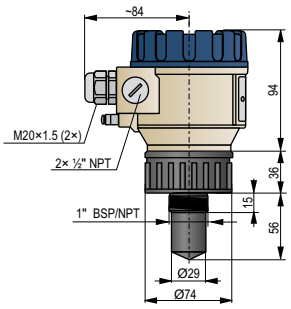
4		4...20 mA + HART®
5	*	4...20 mA + HART® / Ex ta D
8		4...20 mA + HART® / Ex ia GD
B		4...20 mA + HART® + Bluetooth®
E		4...20 mA + HART® + Bluetooth® / Ex ia GD
H		4...20 mA + HART® + relay
F	*	4...20 mA + HART® + relay / Ex ta D
R		4...20 mA + HART® + Bluetooth® + relay

* Under development

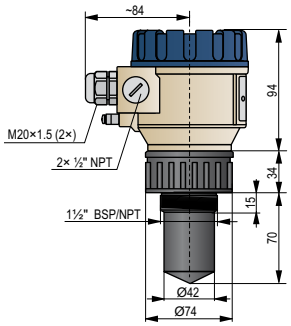
Need of IEC Ex is to be specified in the text part of the order

Accessories sold separately; see relevant page for details

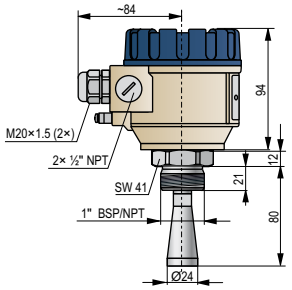
SAP – 300 – 0	Graphic plug-in display module
SAT – 304 – 0	HART®-USB modem
SAT – 504 – ■	HART®-USB/Bluetooth® modem
SAK – 305 – 2	HART®-USB/RS485 modem
SAK – 305 – 6	HART®-USB/RS485 modem / Ex ia G



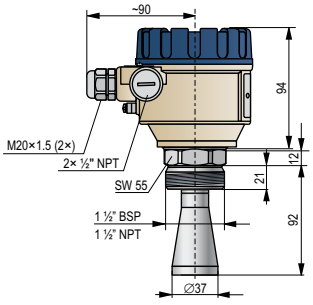
WEP–212–□, WEP–213–□



WEP–2□4–□, WEP–2□5–□



WEM–212–□, WEM–213–□



WES–2□4–□, WES–2□5–□

NIV24
WEP–214–4