PiloTREK WE–200

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

5 YEARS WARRANTY

NIVELCO

dTSLevel®

LEVEL TRANSMITTERS

DTSLEVEL – ELECTRÓNICA *REV. 00.01

The new PiloTREKWE–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 radar 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 to measure liquids, masses, emulsions and other chemicals widely used in the water, food, energy, pharmaceutical and chemical industries, providing measurement results with millimeter accuracy. It is also excellent for measuring substances that tend to vaporize and liquids with a gas blanket or for free flowing 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 PACT*ware*™ software, or programmed via Bluetooth® communication with the new MobileEView app.

FEATURES

- 2-wire 80 GHz *(W-band)* radar
- Accuracy of ± 2 mm
- Small antenna diameter for easy installation
- Plug-in graphic display module
- Horn and plastic encapsulated antennas
- Compact design with IP66/IP67 protection
- User-friendly threshold management
- Configuration via Bluetooth® with MobileEView app
- PACTware™ compatible
- NIFLANGE weldable stainless steel flange options
- High-temperature version
- 5 years warranty
- Ex version

APPLICATIONS

- For level measurement of liquids, emulsions and other media
- For free flowing solids
- Storage tanks, chemical tanks, open pits, sumps, wells
- Measurement through a plastic tank roof
- For materials that tend to vaporize
- 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) (in prep.)*
- INMETRO *(Ex iaGD)*, ANATEL
- FM Class I, Division 1 *(XP) (inprep.)*

AREAS OF APPLICATION

- Water and Wastewater Industry
- Energy/ Utilities
- Food & Beverage
- Chemical & Pharmaceutical
- Agriculture
- Construction Materials
- Heavy Industry
- Packaging Industry


WES–214–4


WGS–215–B


WEP–214–4

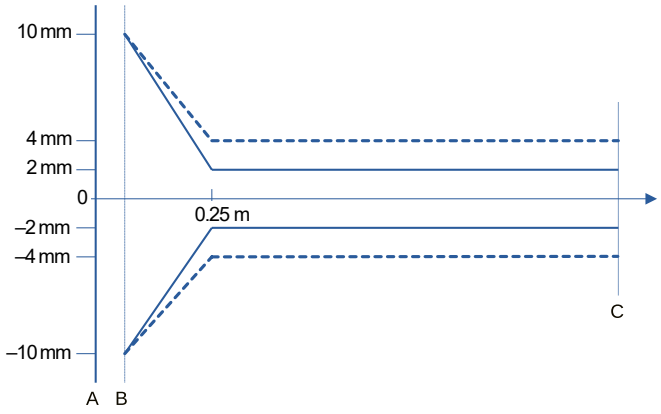

WGB–225–B


WGT–214–8Ex


WHS–214–B


WEK–224–E

LINEARITY ERROR



Legend:
- W□□–21□–□
- W□□–22□–□ / W□□–238–□

A – Plane of the device's process connection.

B – The minimummeasurement distance (X_m), belowwhich theradar cannot measure, dueto theinsertion length of theantenna.

C– Maximummeasurement distance (X_M).

OPERATING PRINCIPLE

The reflection of millimeter waves is highly dependent on the dielectric constant of the medium. Therefore, the dielectric constant (ε_r) of the medium to be measured must be greater than 1.9 for millimeter-wave level measurement.

Informative ε_r values							
Butane *(C_4H_{10})*	1.4	Ethers	4.4	Gasoline	2.3	Methyl alcohol *(CH_3OH)*	33.1
LPgas	1.6…1.9	Acetic acid *(CH_3COOH)*	6.2	Bitumen	2.6	Glycol *($C_2H_6O_2$)*	37
Kerosene	2.1	Limestone	6.1…9.1	Carbon disulfide *(CS_2)*		Nitrobenzene *($C_6H_5NO_2$)*	40
Crude Oil		Ammonia *(NH_3)*	17…26	Clinker	2.7	Glycerin *($C_3H_8O_3$)*	41.1
Diesel Oil		Acetone *(C_3H_6O)*	21	Resin	2.4…3.6	Water *(H_2O)*	80
Benzol *(C_6H_6)*	2.2	Ethyl alcohol *(C_2H_5OH)*	24	Cereal Grain	3…5	Sulfuric acid *(H_2SO_4) (T= 20 °C)*	84

The measurement principle of a level transmitter with a millimeter wave signal is based on measuring the reflection's time of flight. The propagation speed of millimeter wave signals in air, gases and vacuum is almost constant regardless of the temperature and pressure of the medium, so the measured distance is independent of the physical parameters of the intermediate medium. The PiloTREKWE–200 level transmitter is a frequency modulated continuous wave *(FMCW)* radar 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

		PiloTREKW□□–200		
Measured values		Distance; calculated values: level, volume, mass, flow		
Signal frequency		77…81 GHz (W-band)		
Measuring range[1]		0…30 m (0…98.5ft)		
Lowest ε_r of medium		1.9		
Resolution		0.1 mm (0.004")		
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® LE5.1 (optional), HART® interface (loop resistance ≥250 Ω)		
	Display	SAP–300– graphic display unit		
	Service interface	Compatible with SAT–506–0		
	Relay *(optional)*	SPDT 30 V / 1 A DC; 42 V / 0.5 A AC		
Measuring frequency		~1/s		
Antenna material[1]		1.4571 (316Ti) stainless steel, or plastic antenna enclosure (PP/ PVDF/ PTFE)		
Standard version	Process temperature	–40…+80 °C (–40…+176°F)		
	Ambient temperature	–40…+70 °C (–40…+158°F), with display –20…+70 °C (–4…+158°F)		
High-Temp. version	Process temperature	–40…+200 °C[2] (–40…+400°F)		
	Ambient temperature	–40…+60 °C (–40…+140°F), with display –20…+60 °C (–4…+140°F)		
Process pressure		PP, PVDF, PTFE antenna: –1…3 bar (–14.5…43.5psi); Stainless steel antenna: –1…40 bar (–14.5…580psi)		
Seal		EPDM for PP and stainless steel (1.4571) antenna, FPM (Viton®) for PVDF and PTFE antenna. Optional: EPDM, FFKM Perfluoroelastomer (Kalrez® 6375)		
Process connection		1", 1½" BSP/ NPT, TriClamp, prepared for welded flange (NIFLANGE)		
Ingress protection		IP66 / IP67		
Electrical connection		2× M20×1.5 cable glands + 2× internally threaded ½" NPT connection, cable outer diameter: Ø6…12 mm (Ø0.24…Ø0.47") (shielded cable is recommended), wire cross section: 0.5…1.5 mm² (20…16AWG)		
Electrical protection		Overvoltage Class 1; (Class III [SELV])		
Housing material[1]		Fiberglass-reinforced plastic (PBT)	Painted aluminum	Stainless steel 1.4571 (316Ti)
Weight		0.6…0.8 kg (1.3…1.8lb)	1.1…2 kg (2.4…4.4lb)	2.4…2.9 kg (5.3…6.4lb)

[1] *According to order code.*

[2] *High temperature version with metal housing and stainless steel or PTFE encapsulated antenna only.*

TYPE-DEPENDENT DATA

	W□□–212–□ W□□–213–□	W□□–214–□ W□□–215–□	W□□–224–□ W□□–225–□
Dead zone[1]	0 m		
Maximum measuring range[2]	10 m (33ft)		20 m (66ft)
Accuracy[3]	±4 mm (±0.157")		± 2 mm (±0.078")
Beam angle *(–3□dB)*	12°	7°	
Antenna insertion length[4]	80 mm (3.15")	92 mm (3.62")	
Process connection	1" BSP/ NPT	1½" BSP/ NPT	

[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 seal plane of the process connection.

Ex INFORMATION

Application group		IIC	IIIC
Standard version		WE□–2□□–8 Ex, WG□–2□□–8 Ex	
Ex marking (ATEX)		x II 1G Ex ia IIC T6 Ga	x II 1D Ex ia IIIC T85°C Da
Ex marking (INMETRO)		Ex ia IIC T6 Ga	Ex ia IIIC T85°C Da
High-temperature version		WH□–2□□–8 Ex, WJ□–2□□–8 Ex[5]	
Ex marking (ATEX)		x II 1G Ex ia IIC T6…T3 Ga	x II 1D Ex ia IIIC T85°C…T180°C Da
Ex marking (INMETRO)		Ex ia IIC T6…T3 Ga	Ex ia IIIC T85°C…T180°C Da
Ex power supply, intrinsically safety data[6]		U_i = 30 V, I_i = 100 mA, P_i = 0.75 W C_i ≤ 12 nF, L_i ≤ 250 µH	U_i = 30 V, I_i = 140 mA, P_i = 1 W C_i ≤ 12 nF, L_i ≤ 250 µH
Supply voltage		12…30 V DC	
Electrical connection	Cable entry	2× M20×1.5 cable glands + 2× internally threaded ½" NPT connection	
	Cable outer diameter	Ø6…12 mm (Ø0.25…0.5")	
	Wire cross-section	0.5…1.5 mm² (AWG20…15)	

[5] *Under development*
[6] In IIB applications, Ex power supply data for IIC can be used.

TEMPERATURE DATA FOR Ex CERTIFIED MODELS

	Standard version WE□–2□□ / 3□□–8 Ex, WG□–2□□ / 3□□–8 Ex	High-temperature version WH□–2□□–8 Ex / WH□–3□□–8 Ex, WJ□–2□□–8 Ex / WJ□–3□□–8 Ex			
Temperature data	Ex ia IIC, Ex ia IIIC	Ex ia IIC, Ex ia IIIC			
Temperature class	T6 T85°C	T6 T85°C	T5 T100°C	T4 T135°C	T3 T180°C
Highest process temperature	+80 °C (+176°F)		+100 °C (+158°F)	+135 °C (+275°F)	+180 °C (+356°F)
Highest surface temperature at the process connection	+70 °C (+158°F)			+135 °C (+275°F)	
Highest ambient temperature	+70 °C (+158°F)			+60 °C (+140°F)	

POLARIZATION

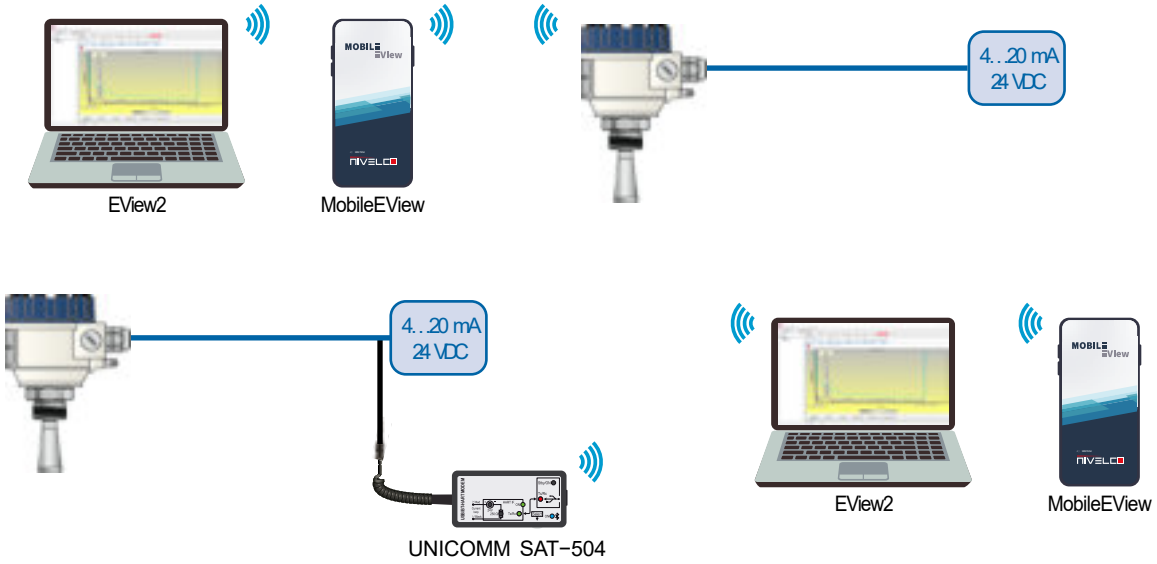
The PiloTREK W–200 80 GHz radar is much less sensitive to installation conditions, both in terms of polarization and clutter sensitivity, due to its narrow and nearly circular beamwidth.

BACKGROUND MAPPING

Thanks to its 80 GHz FMCW technology, it is much less sensitive to the presence of clutter than previous generation radars. It now has an easy-to-use, flexible threshold management *(EView2)* that allows echoes from clutter in the tank to be easily masked if necessary. The threshold curve is designed to mask unwanted echoes from the measurement. Echo peaks below the threshold are not included in the evaluation.

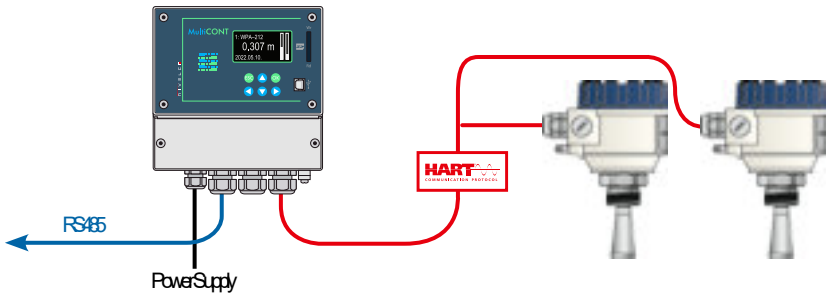
Bluetooth® CONNECTIVITY

The Bluetooth® option on the PiloTREKW–200 Series allows for convenient device setup and diagnostics via the NIVELCO MobileEViewapp for Android or iOS or the free EView2software download for laptops.

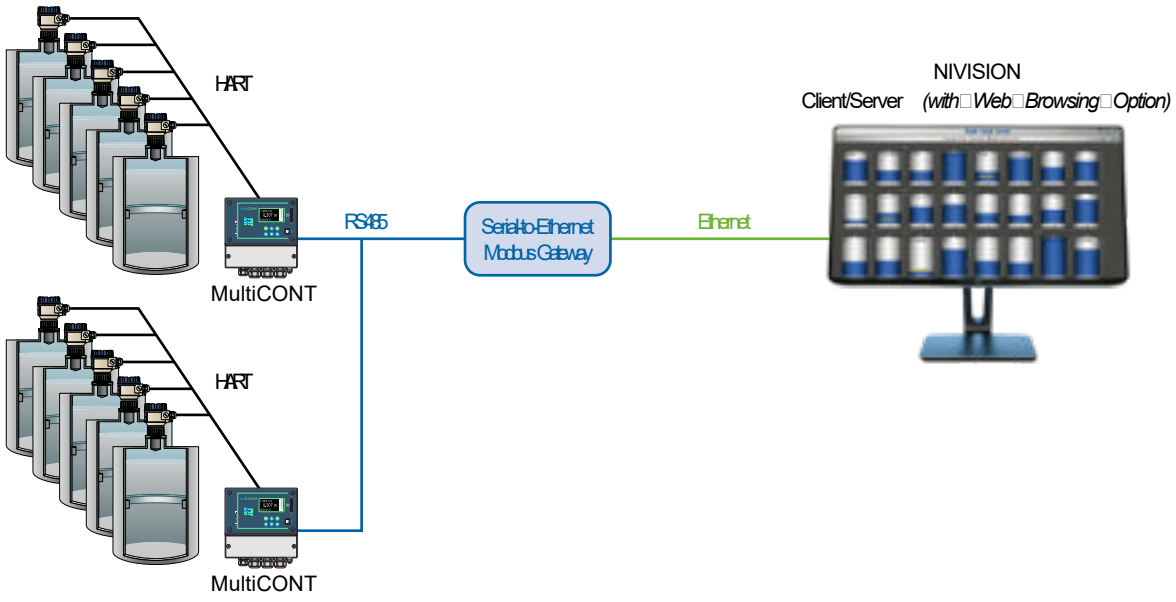


PiloTREK TRANSMITTERS IN HART® MULTIDROP LOOP

MultiCONT multi-channel remote controllers process, display, and transmit data from NIVELCO's HART®-equipped transmitters in a multidrop loop. Up to 15 of these connected transmitters can be programmed and maintained from MultiCONT, which supports data-logging tasks. MultiCONT provides programmable relay outputs, while 4…20 mA outputs are available through remote I/O modules.



MultiCONT can send measurement data via RS485 to PLCs, computers running third-party SCADA systems, or the NIVELCO NIVISON inventory monitoring system.



WIRING

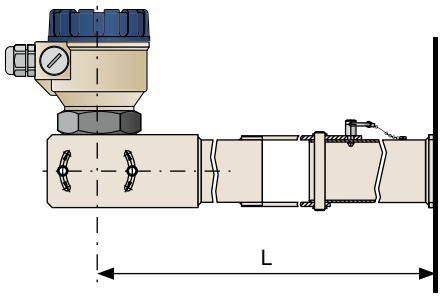
WJT–215–B

PROGRAMMING, ECHO MAP

All parameters can be programmed via the optional UNIDISPSAP–300plug-in display; measurementand output parameters can be set using a text-based menu system.Measured values are displayed as numbers and bar graphs on the dot-matrix screen. The echo map helps detect false reflections and optimizes measurementconfiguration.

MOUNTING

The device must be mounted far as possible from interfering objects inside the tank and from sourcesof interference, such as waves, vortices or strong vibrations. The antenna cover mustbe parallel to the measured surface within ± 2…3°.
Foroutdoor use, we recommend using an aluminum housing. In regions with extremely hot climates, we recommend protecting the device from direct sunlight to avoid exceeding the ambient temperature limits of the housing.



Mounting brackets for ultrasonic level transmitters. Material: Plastic/ Metal.	NIVOSONAR SAA
L = 200 mm (7")	SAA–107–☐
L = 500 mm (19")	SAA–108–☐
L = 700 mm (27")	SAA–109–☐
For 1" BSPthreaded process connection	SAA–10☐–0
For 2" BSPthreaded process connection	SAA–10☐–3
For 1½" BSPthreaded process connection	SAA–10☐–4
For 2" NPT threaded process connection	SAA–10☐–5
For 1½" NPT threaded process connection	SAA–10☐–6

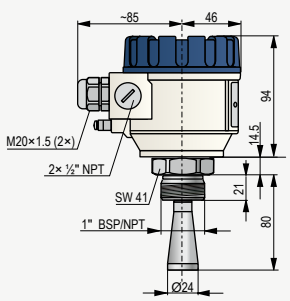
APPLICATIONS

DIMENSIONS*

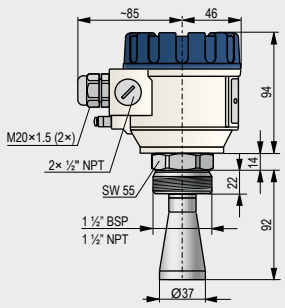
Plastichousing (W□M, W□P, W□V, W□F)

Stainless steel antenna

W□M–212–□/ –213–□

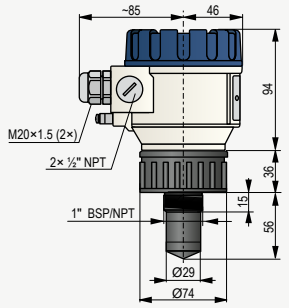


W□M–214–□/ –215–□

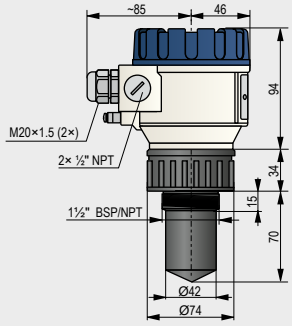


Encapsulated antenna

W□□–212–□/ –213–□



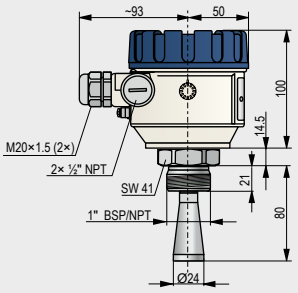
W□□–2□4–□ / –2□5–□



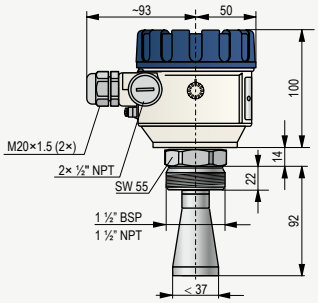
Aluminum housing (W□A, W□B, W□S, W□T)

Stainless steel antenna

W□S–212–□/ –213–□

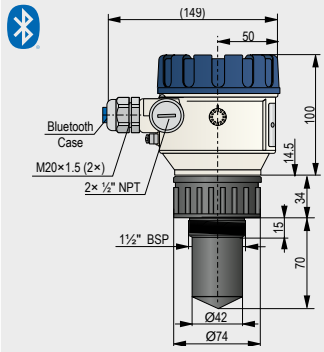


W□S–214–□/ –215–□



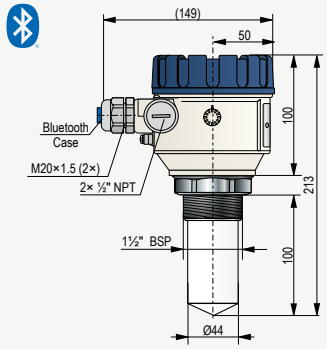
PTFEencapsulated antenna

W□T–224–B



PVDF encapsulated antenna

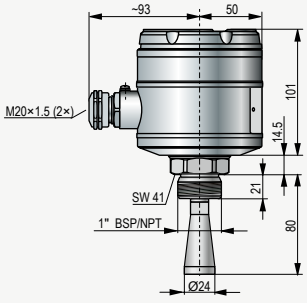
W□B–224–B



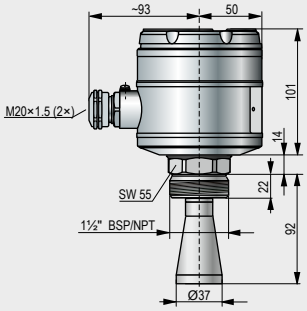
Stainless steel housing (W□K)

Stainless steel antenna

W□K–212–□/ –213–□

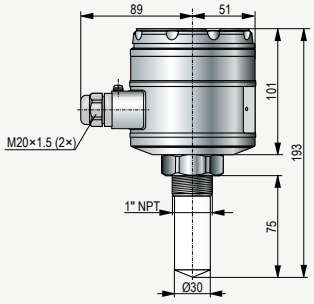


W□K–214–□/ –215–□

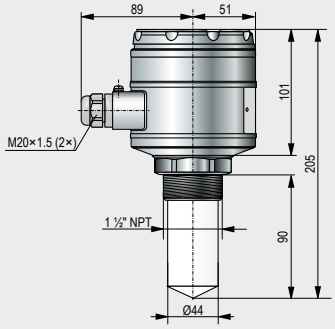


PTFEencapsulated antenna

W□L–213–□



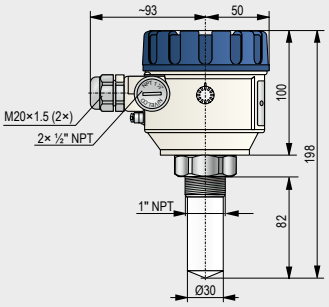
W□L–215–□



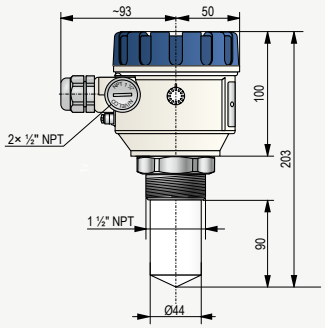
Aluminum housing

PTFEencapsulated antenna

W□T–213–□



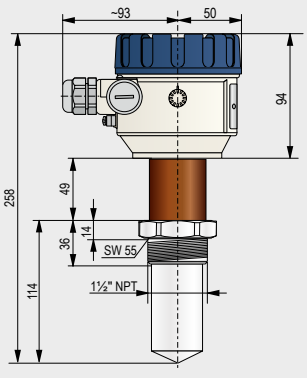
W□T–215–□



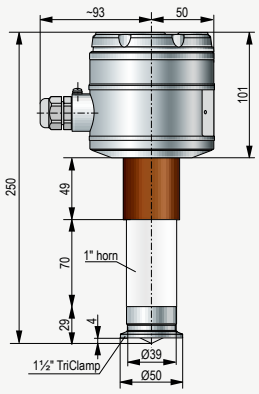
High-temperature version

PTFEencapsulated antenna

WHT–215–□



WHL–21C–□



Please note that not all versions of the units are shown in the Dimensions section. The dimensions are in millimetres.

ORDER CODES (NOT ALL COMBINATIONS AVAILABLE)

Advanced 80 GHz Radar Level Transmitters

PiloTREK W ■ ■ – 2 ■ ■ – ■ [1]

Version	Code
Transmitter	E
Transmitter with plug-in display	G
Transmitter, high temp. version [2]	H
Transmitter with plug-in display, high temp. version [2]	J

Antenna / Housing		Code
PP	Fiberglass-reinforced plastic (PBT)	P
	Painted aluminum	A
	Stainless steel	D
1.4571	Fiberglass-reinforced plastic (PBT)	M
	Painted aluminum	S
	Stainless steel	K
PVDF	Fiberglass-reinforced plastic (PBT)	V
	Painted aluminum	B
	Stainless steel	W
PTFE	Fiberglass-reinforced plastic (PBT) [3]	F
	Painted aluminum [3]	T
	Stainless steel [3]	L

Measurement range	Code
10 m (33 ft)	1
20 m (66 ft)	2
30 m (98.5 ft) [4]	3

Process connection	Code
1" BSP [5]	2
1" NPT [5]	3
1½" BSP [6]	4
1½" NPT [6]	5
1½" TriClamp [7]	C
2" TriClamp [7]	D
3" TriClamp [7]	E
4" TriClamp [7]	F
Ø75 mm (2½") [4][8]	8
Prepared for welded flange [9]	S

Output / Certificates		Code
4...20 mA + HART®	–	4
	Ex ta D [4]	5
	Ex ia GD	8
	+ Bluetooth®	B
	+ Bluetooth® / Ex ta D [4]	C
	+ Bluetooth® / Ex ia GD	E
	+ Relay	H
	+ Relay / Ex ta D [4]	F
	+ Relay + Bluetooth®	R
	+ Relay + Bluetooth® / Ex ta D [4]	J

[1] For explosion-proof devices, the article number is followed by "Ex" on the data plate.
[2] High temperature version with metal housing and stainless steel or PTFE encapsulated antenna only.
[3] Up to 20 m (66 ft) measuring range. [4] Under development. [5] Only for 10 m *(33 ft)* measuring range.
[6] Only for 10 m *(33 ft)* or 20 m *(66 ft)* measuring range. [7] Only for 1.4571 or PTFE antenna version, based on individual quote. [8] Prepared for flange, only 30 m (98.5 ft) and encapsulated types, flanges available from size DN80 should be ordered separately. [9] Only for 10 m *(33 ft)* or 20 m *(66 ft)* ranges, with ½" stainless steel antenna, flange type MF ♦–♦♦♦–L to be ordered separately.

ACCESSORIES

Graphic plug-in display module	UNIDISP SAP–300–0
HART®–USB/Bluetooth® modem for remote programming	UNICOMM SAT–504–☐
eLink module	UNICOMM SAT–506–☐
HART®–USB/RS485 modem for remote programming with PC, DIN rail mountable	UNICOMM SAK–305–☐
Multichannel process controller and display unit	MultiCONT PRW–2☐☐–☐
24 V DC power supply, DIN rail mountable	NIPOWER PPK–431–☐
Intrinsically safe isolator module, DIN rail mountable	UNICONT PGK–301–☐ Ex
EView2 configuration software for remote programming with PC	FREE download
MobileEView – free mobile application communicating with devices via Bluetooth®	Download on the App Store / GET IT ON Google Play
Smart Field Display & Data Logger	MonoCONT P☐F–☐1☐–☐
Mounting brackets for level transmitters	NIVOSONARSAA–10☐–☐

MonoCONT PDF–410–2

MultiCONT PRN–200

PROCESS CONNECTIONS [10]

Carbon steel, PTFE lined carbon steel, polipropylene (PP), and stainless steel, DIN, ANSI, and JIS flanges	NIFLANGE MFT–☐☐☐–☐
EPDM, FPM, FFKM available for all types	

[10] *The above process connections and special seals are ordered separately and must be specified in the text part of the order.*

dtsinstruments.com

#NivelcoDevices

dTS Instruments SL
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