

PiLoTREK

WT-300

2-wire 80 GHz

Compact Non-Contact Radar for Bulk Solids

User's Manual

1st Edition



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	IECEX, Certificate No.: IECEX BKI 26.0003X	wts300en26h02-b

Document Name	QR code
PiloTREK WT-300 – User's Manual (this document)	
PiloTREK – Programming Guide	

BASIC CONCEPTS AND ELEMENTS

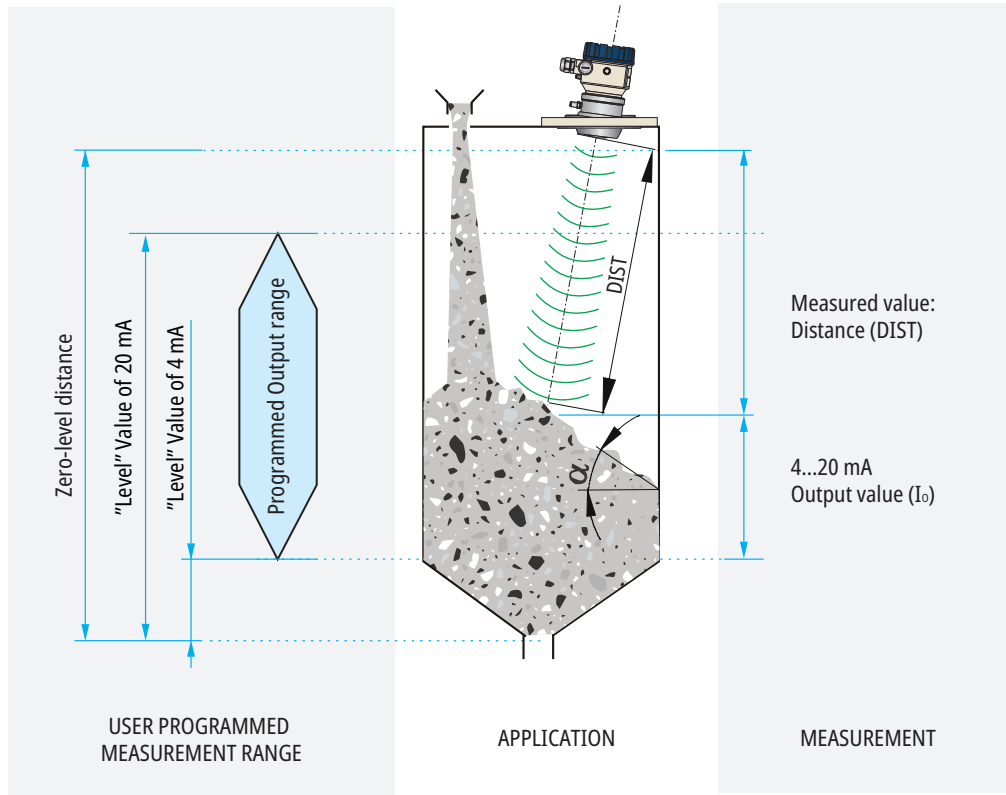


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Thank you for purchasing a NIVELCO product.

1. INTRODUCTION

Application

The new **PiLoTREK WT-300** non-contact radar level transmitters utilize 80 GHz FMCW radar technology—*the most advanced in industrial measurement*—for bulk solids in food processing, agriculture, construction materials, chemicals, and mining. They deliver millimeter accuracy across light powders to large-particle solids. Beyond level, volume, and weight measurement, the family includes threshold functions to eliminate false echoes. Compatible with HART®-enabled NIVELCO EView2, MultiCONT controller, and PACTware™ software, or programmable via Bluetooth® with the MobileEView app.

Operating principle

The **PiLoTREK WT-300** level transmitter is a frequency-modulated continuous wave (FMCW) radar operating at 80 GHz (W-band). Depending on the measured medium, part of the energy of the frequency-modulated wave emitted by the antenna of the level transmitter is reflected from the measured surface.

The electronics module calculates the distance of the reflecting surface from the frequency shift proportional to the flight time of the reflected signal with high accuracy and converts it into a signal proportional to distance, level, or volume. The propagation speed of the millimeter-wave signal in air, gases, and vacuum is virtually the same regardless of temperature and pressure, so these factors do not significantly affect the accuracy of the measurement.

The signal strength of the reflected millimeter waves depends largely on the measured medium's dielectric constant (DK = relative dielectric constant ϵ_r). Therefore, the maximum measuring distance achieved may decrease accordingly.

2. ORDER CODE (Not all combinations are available.)

PiLoTREK **W** — **3** — ⁽¹⁾

Version	Code
Transmitter	T
Transmitter with plug-in display	B
Transmitter, high-temperature version ⁽²⁾	K
Transmitter with plug-in display, high-temperature version ⁽²⁾	L
Transmitter with air purge	C
Transmitter with plug-in display and air purge	D
Transmitter with air purge, high-temperature version ⁽²⁾	M
Transmitter with plug-in display and air purge, high-temperature version ⁽²⁾	N

Antenna / Housing	Code
PTFE / Fiberglass-reinforced plastic (PBT)	F
PTFE / Painted aluminum	T
PTFE / Stainless steel	L

Measurement Range	Code
30 m (98.5 ft)	3
60 m (197 ft)	6

Process Connection / Material	Code	Process Connection / Material	Code
3" BSP	M	DIN flanges: Polypropylene (PP)	
3" NPT	N	DN100 (as per PN16)	A
DIN flanges: stainless steel (1.4571/1.4404, 316Ti equivalent)		DN125 (as per PN16)	B
		DN150 (as per PN16)	C
DN100 PN16	1	FF ANSI flanges: Polypropylene (PP)	
DN125 PN16	2	4" FF (as per 150 psi)	D
DN150 PN16	3	5" FF (as per 150 psi)	E
		6" FF (as per 150 psi)	F
RF ANSI flanges: stainless steel (1.4571/1.4404, 316Ti equivalent)		JIS flanges: Polypropylene (PP)	
4" RF 150 psi	4	JIS 100A (as per 10K)	G
5" RF 150 psi	5	JIS 125A (as per 10K)	G
6" RF 150 psi	6	JIS 150A (as per 10K)	J
JIS flanges: stainless steel (1.4571/1.4404, 316Ti equivalent)		Prepared for tiltable flange ⁽³⁾	
		Ø100 mm (Ø3.94")	U
JIS 10K 100A	7		
JIS 10K 125A	8		
JIS 10K 150A	9		

Output / Certificates	Code
-	4
Ex ta D ⁽⁴⁾	5
Ex ia GD ⁽⁴⁾	8
Bluetooth®	B
Bluetooth® / Ex ta D ⁽⁴⁾	C
Bluetooth® / Ex ia GD ⁽⁴⁾	E
Relay	H
Relay/ Ex ta D ⁽⁴⁾	F
Relay + Bluetooth®	R
Relay + Bluetooth® / Ex ta D ⁽⁴⁾	J

4...20 mA + HART®

Available Accessories	Order Code
Display unit	SAP-300-0
HART®-USB/Bluetooth® modem	SAT-504-□
eLink Module	SAT-506-□
HART®-USB/RS485 modem	SAK-305-2
HART®-USB/RS485 modem / Ex ia G	SAK-305-6

Process Connections ⁽⁵⁾	Order Code
DIN and ANSI flanges	MFT-□□□-□
DN40 Milch connection (DIN 11851)	
Seals ⁽⁵⁾	
EPDM	
FFKM	

⁽¹⁾ For explosion-proof devices, the article number is followed by "Ex" on the data plate.

⁽²⁾ High-temperature version only with metal housing and stainless steel flange, under development.

⁽³⁾ Flange type MF□-□□□-W from size NPS 4" (DN100) to be ordered separately.

⁽⁴⁾ Under development.

⁽⁵⁾ The requirement for the above-mentioned process connections and seals must be specified in the order.

3. TECHNICAL DATA

3.1 General Technical Data

PiloTREK W□□-3□□-□		
Measured values		Distance; calculated values: level, volume, mass, flow
Signal frequency		77...81 GHz (W-band)
Measurement range ⁽¹⁾		0...60 m (0...197 ft)
Lowest ϵ_r of medium		ϵ_r min. 1.4
Resolution		0.1 mm (0.004")
Supply voltage		12...36 V DC
Output ⁽¹⁾	Analog	4...20 mA; (3.9...20.5 mA); $R_{Lmax} = (U_S - 12 \text{ V}) / 0.02 \text{ A}$
	Digital	Bluetooth® LE 6.0 (optional), HART® interface, HART® loop resistor $\geq 250 \Omega$
	Display(optional)	SAP-300-0 graphic display unit
	Service interface	Compatible with SAT-506-0 eLink Module
	Relay (optional)	SPDT, 30 V / 1 A DC; 42 V / 0.5 A AC
Measuring frequency		~ 1/s
Antenna material		Aluminum / PTFE
Process temperature		-40...+80 °C (-40...+176 °F), High-temperature version ⁽²⁾ : -40...+200 °C (-40...+400 °F)
Ambient temperature		-40...+70 °C (-40...+158 °F); with display: -20...+70 °C (-4...+158 °F)
Seal		FPM (Viton®), Optional: EPDM, FFKM Perfluoroelastomer (Kalrez® 6375)
Process pressure		-1...3 bar (-14.5...43.5 psi)
Maximum pressure of the pneumatic system		10 bar (145 psi)
Process connection		3" BSP/NPT, DIN, ANSI, JIS flanges, prepared for tiltable flange (NIFLANGE)
Ingress protection		IP66 / IP67 (NEMA 4 / 6 equivalent)
Electrical connection		2× M20×1.5 cable glands + 2× internally threaded ½" NPT connection, cable outer diameter: Ø6...12 mm (Ø0.24...0.47"); recommended: shielded cable, wire cross section: 0.5...1.5 mm² (20...16 AWG)
Electrical protection		Overvoltage Class 1; (Class III [SELV])
Housing material ⁽¹⁾		Painted aluminum 1.4571/1.4404 (316Ti/316L) stainless steel
Weight		1.5...2.5 kg (3.3...5.5 lbs) 2.5...3.5 kg (5.5...7.7 lbs)

⁽¹⁾ According to order code.

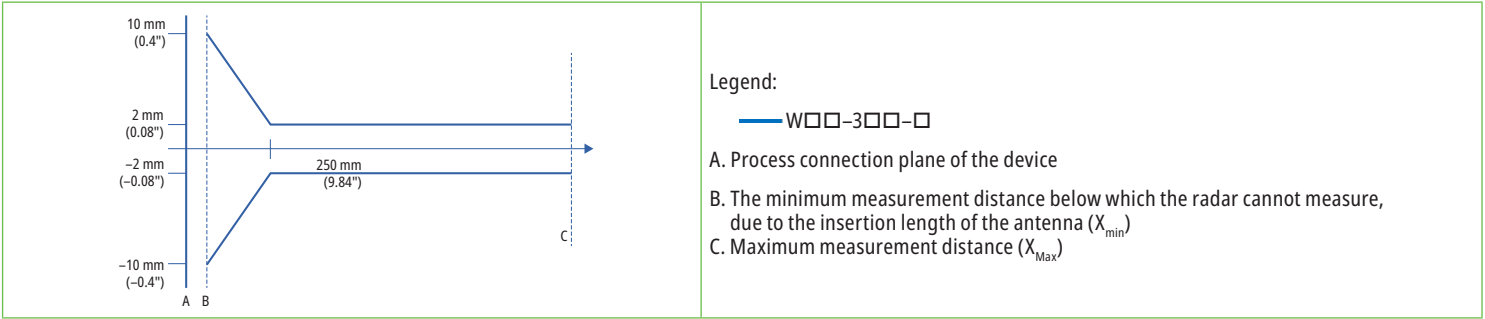
⁽²⁾ High-temperature version only with metal housing and stainless steel flange, under development.

3.2 Type-Specific Data

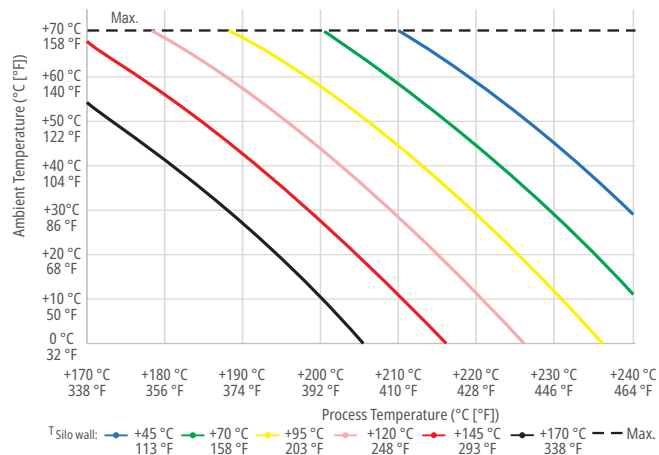
	W□□-33□-□	W□□-36□-□
Dead zone ⁽¹⁾	0 m (0 ft)	
Max. measurement range ⁽²⁾	30 m (98.5 ft)	60 m (197 ft)
Accuracy ⁽³⁾	±2 mm (±0.08")	
Beam angle (-3 dB)	3°	
Antenna insertion length ⁽⁴⁾	17 mm (0.67")	

⁽¹⁾ 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⁾ With an ideal reflecting surface.
⁽⁴⁾ Measured from the seal plane of the process connection.

3.3 Linearity Error

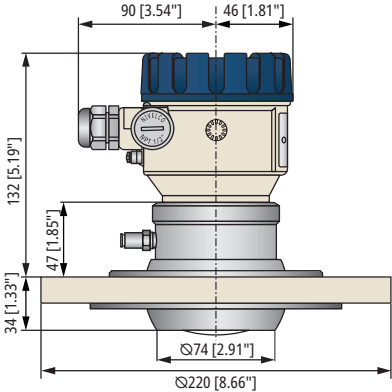
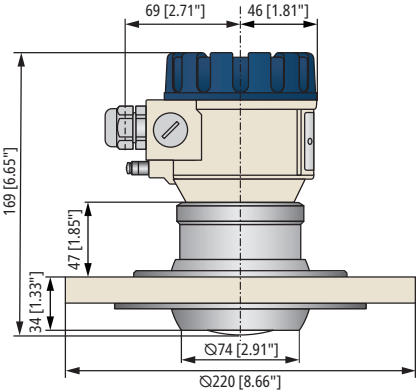


3.4 Temperature Limits for high-temperature transmitters



The ambient temperature around the PiloTREK electronics housing must be controlled, for example by appropriate thermal insulation of the process or other suitable methods. The " $T_{\text{silo-wall}}$ " parameter indicates the temperature of the outer surface of the thermal insulation immediately surrounding the PiloTREK. This value directly affects the maximum permissible process temperature.

3.5 Dimensions

Aluminum housing W□T-3□□-□	Plastic housing W□F-3□□-□
 Technical drawing of the Aluminum housing (W□T-3□□-□) showing dimensions in mm and inches. The drawing is a front view of the device mounted on a base plate. The dimensions are as follows: - Top width: 90 [3.54"] - Top width (inner): 46 [1.81"] - Height from base to top of housing: 132 [5.19"] - Height from base to top of mounting bracket: 47 [1.85"] - Height from base to top of mounting bracket (inner): 34 [1.33"] - Base diameter: Ø74 [2.91"] - Base diameter (outer): Ø220 [8.66"]	 Technical drawing of the Plastic housing (W□F-3□□-□) showing dimensions in mm and inches. The drawing is a front view of the device mounted on a base plate. The dimensions are as follows: - Top width: 69 [2.71"] - Top width (inner): 46 [1.81"] - Height from base to top of housing: 169 [6.65"] - Height from base to top of mounting bracket: 47 [1.85"] - Height from base to top of mounting bracket (inner): 34 [1.33"] - Base diameter: Ø74 [2.91"] - Base diameter (outer): Ø220 [8.66"]

3.6 Explosion Protection, Designation, Limit Values

3.6.1 IECEx Intrinsically Safe Protection (Ex ia) – IECEx Certificate No.: IECEx BKI 26.0003X

Application group		IIC	IIIC
Standard version		WT□– / WB□– / WC□– / WD□–3□□–8 / E Ex	
Ex marking (IECEx)		Ex ia IIC T6 Ga	Ex ia IIIC T85°C Da
High-temperature version		WK□– / WL□– / WM□– / WN□–3□□–8 / E Ex	
Ex marking (IECEx)		Ex ia IIC T6...T3 Ga	Ex ia IIIC T85°C...T200°C Da
Ex power supply, intrinsically safety data ⁽¹⁾		U _i = 30 V, I _i = 100 mA, P _i = 0,75 W C _i ≤ 13 nF, L _i ≤ 265 μH	U _i = 30 V, I _i = 140 mA, P _i = 1 W C _i ≤ 13 nF, L _i ≤ 265 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 mm ² (AWG20...15)	
Temperature limit data		See tables in Chapter 3.6.4.	

⁽¹⁾ In IIB applications, Ex power supply data for IIIC can be used.

3.6.2 Temperature Limit Data for IECEx (EX IA) Approved Models

Temperature data	Standard version WT□– / WB□–3□□–8 / E Ex, WC□– / WD□–3□□–8 / E Ex	High-temperature version WK□– / WL□–3□□–8 / E Ex, WM□– / WN□–3□□–8 / E Ex			
	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 T200°C
Maximum process temperature	+80 °C (+176 °F)	+80 °C (+176 °F)	+95 °C (+203 °F)	+130 °C (+266 °F)	+200 °C (+392 °F)
Maximum surface temperature at the process connection	+70 °C (+158 °F)	+70 °C (+158 °F)	+95 °C (+203 °F)	+130 °C (+266 °F)	+180 °C (+356 °F)
Maximum ambient temperature	+70 °C (+158 °F)	+70 °C (+158 °F)	+70 °C (+158 °F)	+60 °C (+140 °F)	

3.7 Accessories

- Warranty card
- User's Manual
- EU Declaration of Conformity
- SAP-300 display unit (if ordered)
- End plug for the pneumatic system

3.8 Conditions for Safe Operation

Compliance with technological process conditions

- If the device is installed in a place subject to overvoltage, the device must be equipped with overvoltage protection of at least overvoltage Class II.
- The device must be connected to the earth of the EP network via its earth screw.
- For Bluetooth® devices with a metal housing, the antenna is routed through the cable gland. Changing the position of the cable gland is prohibited.



The cable extending from the device must be fixed and relieved of any tension.
The device may only be powered from a Category 1 (SELV/PELV) power supply unit.

Compliance with local rules and regulations

The PiloTREK WT-300 is a Level Probing Radar (LPR) and must be mounted in a fixed, antenna-down position. In addition, the following two restrictions on antenna placement and height from the ground must be observed:

- A separation distance of 4 km (2.48 miles) from radio astronomy sites operating in the frequency band 75...85 GHz, unless specifically authorized by the relevant national regulatory authority.
- At a distance between 4 and 40 km (2.48 and 24.8 miles) from any radio astronomy site, the height of the radar above ground level must not exceed 15 m (49.2 ft).

Compliance with Ex requirements

- Intrinsically safe devices can only be operated from circuits that comply with the technical specifications, certified and approved as [Ex ia IIC] or [Ex ia 11B] protection.
- The aluminum alloy content in the device housing exceeds the limit, so in explosive (Ex) environments, the equipment must be protected against impact and friction effects.
- The housing of the device is made of a material capable of accumulating static charge. The presence of electrostatic charge poses a risk of spark generation and ignition, so electrostatic charging must be completely prevented in explosive (Ex) environments.
 - The device may only be installed in an environment free from direct air flows that may cause charge transfer or other electrostatic charging effects. Except for Group III applications, where the dust conductivity is greater than $>10^{-9}$ S (at 50±5% relative humidity) or $>10^{-11}$ S (at 30±5% relative humidity).
 - Increased caution is required during maintenance when explosive residues may be present in the process tank. Devices used in explosive (Ex) environments may only be handled using a water-moistened or antistatic wipe.

3.9 Maintenance, Repair, and Storage Conditions

The PilotREK WT-300 does not require regular maintenance. However, there may be cases where the sensor head needs to be cleaned of material deposits. Clean the device carefully, without scratching or pressing the radiating surface.

All repairs, whether covered by warranty or not, must be carried out by NIVELCO.

The warranty terms are detailed in the warranty card. For repairs, the user must clean and disinfect the device, neutralize any chemical residues, and complete the [Returned Equipment Handling Form](#), which is available for download on our website. On the form, the user must declare the defect, provide the reason for return, and confirm that the device is clean and free of hazardous substances.

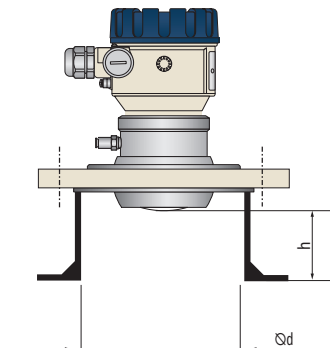
3.10 Firmware Update

The device firmware is continuously improved based on user feedback and application needs. If you want to update the firmware, use the built-in update communication port to upgrade to the latest version. To update, you need the NiFlash Light program; contact your local NIVELCO partner. In addition, the SAT-506-0 eLink communication adapter is required to upgrade the firmware.

4. INSTALLATION AND COMMISSIONING

4.1 Mounting

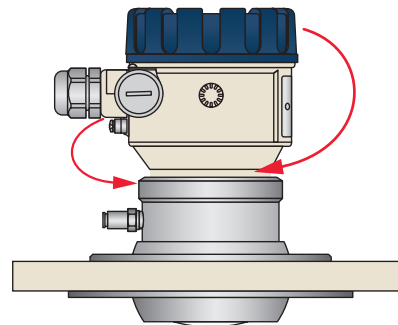
Flange



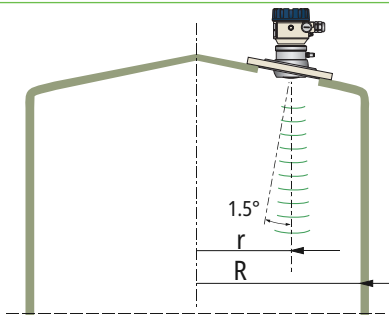
$h \leq \text{Ø}d$, where
 h = nozzle height
 $\text{Ø}d$ = nozzle diameter

Consult NIVELCO if the above condition cannot be met.

Rotating enclosure



The enclosure can be rotated a full 360° to the desired position.



PLACEMENT

To determine the ideal installation position of the PiloTREK level transmitter, various considerations should be made. The transmitter should not be installed in the center of the tank/silo when the tank roof is dome shaped or conical. The ideal position for the PiloTREK is on the $r = (0.3...0.5) R$ (in case of cylindrical tank).

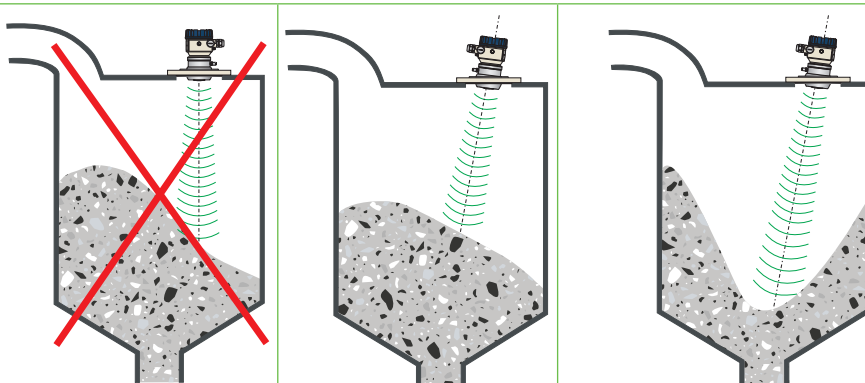
Make sure the transmitter's 3° conical beam does not hit the tank/silo wall. In this case, the transmitter is mounted too close to the wall and should be tilted tilted (See section "Aiming the Sensor").

To avoid overheating the instrument should be protected against direct sunshine.

AIMING THE SENSOR

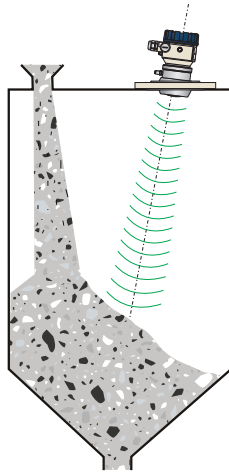
When the material to be measured is being filled or emptied, because of the formation of an angle of repose, the vertically installed transmitter will experience a weak signal. This can be eliminated in most cases by tilting the unit, so the aiming device is a very important part of these transmitters. The proper aiming can be set and checked while the transmitter is being used, preferably when the silo/tank is almost empty. Usually, it is best that the transmitter points to the middle of the bottom of the silo/tank.

Aiming should also be checked when the silo/tank is full, because the echo can be adversely weak even when coming from a nearby surface. This usually happens when the angle of repose is big. In this case, an optimal solution must be found in which the echo coming from any distance is acceptable. The SERVICE PARAMETERS that can be reached during programming provide help for set-up. That means that the aiming adjustment and the programming should be done at the same time. The strength of the echoes can be checked in the Echo Map window of the EView software or in the Echo menu of the MultiCONT device.



GRAVITY FILLING

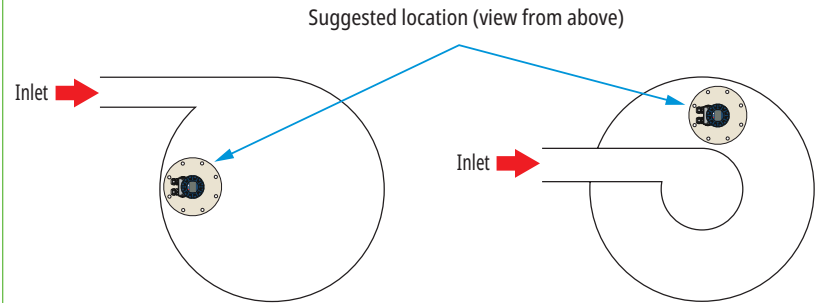
Select a location that is as far away from the filling point(s) as possible.



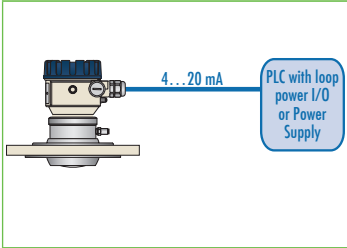
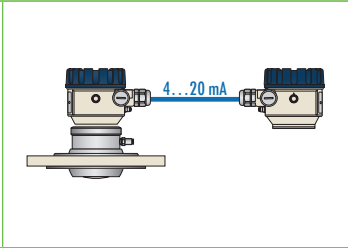
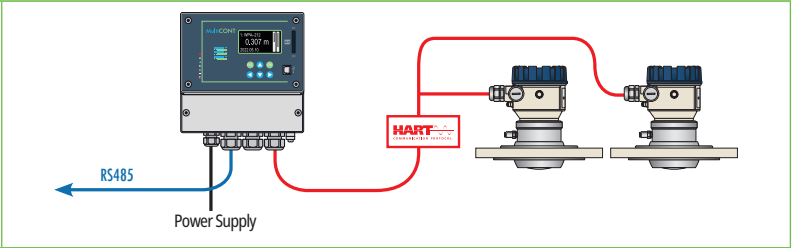
PNEUMATIC FILLING

Select a location where the speed of the inflowing material is the smallest.

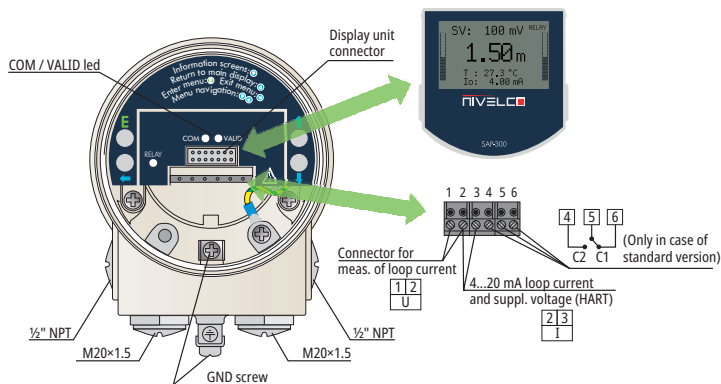
Ex type units are not allowed to be installed in the dust path of the pneumatic filling.



4.2 Wiring

Standalone transmitter	Connected to MonoCONT	Connected to MultiCONT (HART® Multidrop)
		
See Chapter 4.3.1.	See MonoCONT User's and programming manual	See MultiCONT User's and programming manual

4.2.1 Standalone Transmitter Wiring



If the transmitter is equipped with a display unit, gently unplug it by pulling it upwards using two fingers from the sides.

1. Insert the cable through the cable gland or conduit into the housing.
2. Unplug/remove black screw terminal (1-6) for easier wire connection.

3. Check the polarity before inserting the wires into the terminal ports 2 and 3:

Minus (–) to Terminal 2
Plus (+) to Terminal 3

DO NOT perform an insulation test with a test voltage of 500 V AC due to the internal electronic overvoltage protection.

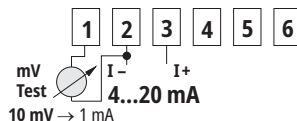


4. Be sure to tighten the cable gland or conduit, as well as the device cover, to prevent humid air, water, and dust from entering the enclosure.

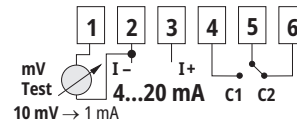
LED states:

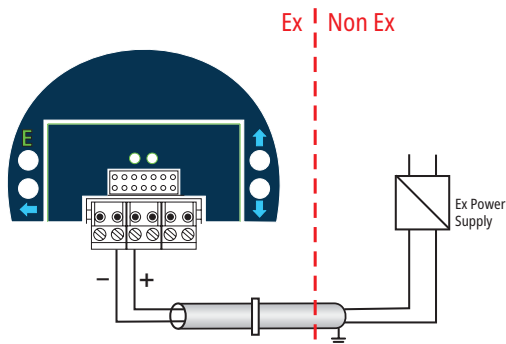
- **ECHO-LED**
 - **ON**, if the device receives a suitable echo.
 - **BLINKS** when the device is searching for an echo.
- **COM-LED**
 - **FLASHES UP ONCE** if there has been a HART message exchange,
 - **ON**, if the device is in remote programming mode.
 - **BLINKS for 4 seconds** after the device is switched on: service communication connection can be established during this time. If it continues to blink, it indicates a firmware error.
- **RELAY LED (optional)**
 - **ON**, when CC-C2 is energized.
 - **OFF**, when CC-C1 is energized.

Model with 2-wire Loop power



Model with 2-wire Loop power and NO/NC Relay output





In non-hazardous areas, the device must be powered through a galvanically isolated power supply.

For devices used in hazardous areas, the requirements in section "[3.8 Conditions for safe operation](#)" must be observed when selecting the power supply.

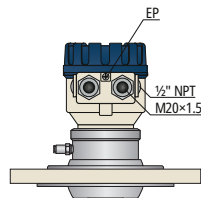
Connecting (grounding) to an equipotential network (EPH)

Earthing connector (EP) on the side of the device housing, maximum conductor cross-section: 4 mm² (AWG12).

The instrument housing must be earthed to a $R < 1 \Omega$ resistive earth.

The shield of the measuring cable must be grounded in the instrument room.

The measuring cable should not be routed near high-power cables, as shielding does not protect against switching harmonics.



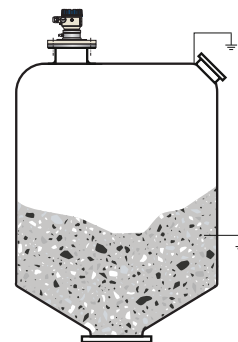
Electrostatic Discharge (E.S.D.)



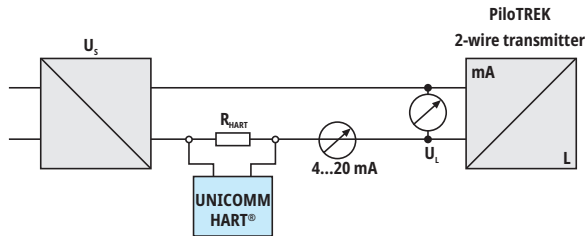
The device is protected against 4 kV E.S.D.

Warning! The internal protection of the instrument against ESD cannot protect the entire measuring system against electrostatic discharge.

In all cases, it is the user's responsibility to ensure the grounding of the tank and the measured material.



Designing a measuring network



Power supply

Nominal voltage	24 V DC
Maximum voltage (U_{in}):	36 V DC
Minimum voltage (U_{in}):	Depends on the load impedance. (See diagram)
Loop resistance, R_{Loop}	$R_{HART} + R_{cable} + R_{ammeter}$
Minimum R_{HART}	0 Ω
Maximum R_{HART}	750 Ω
R_{HART} resistance for HART® communication	250 Ω (recommended)

Line "A": minimum voltage at the input terminals of the device

Line "B": minimum supply voltage (voltage across the device and the 250 Ω loop resistor)

Example for calculating the supply voltage:

The required minimum supply voltage at $I_{min} = 4\text{ mA}$:

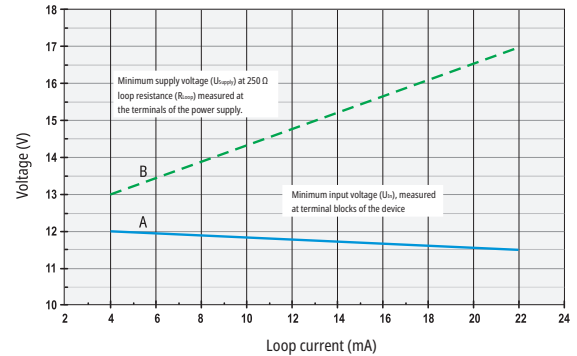
$$U_{Supply\ min.} = U_{IN\ min.} + (I_{min} * R_{Loop}) = 11.5\text{ V} + (4\text{ mA} * 0.25\text{ k}\Omega) = 12.5\text{ V}$$

the required minimum supply voltage at $I_{max} = 22\text{ mA}$:

$$U_{Supply\ min.} = U_{IN\ min.} + (I_{min} * R_{Loop}) = 11.5\text{ V} + (22\text{ mA} * 0.25\text{ k}\Omega) = 18.5\text{ V}$$

Therefore, in the case of a loop resistance of 250 Ω , the 17 V supply voltage is just sufficient for the whole 4...20 mA in the measurement range.

In hazardous areas, the data and requirements for designing the network may be different. When designing the measurement network, take into account the data and requirements in "[3.6. Explosion Protection, Designation, Limit Values](#)" and "[3.8. Conditions for safe operation](#)".



4.3 Device Setup and Service Options

- UNIDISP SAP-300 Plug-in graphic display unit and 4-key menu-driven programming (if equipped)
- [MobileEView](#) App for iOS or Android device (if PiloTREK is equipped with Bluetooth® connectivity).
 - Download the free MobileEView App to your iOS or Android device.
 - Bluetooth® operation mode (on/off/time-out, etc.) can be selected based on security policy.
- [MonoCONT](#) and [MultiCONT](#) remote display/controllers.
- Via HART®:
 - [EView2](#) free download SW for Windows devices using a HART® modem. Ex.; [UNICOMM SAT-504-□](#).
 - Via PACTware.
 - 3rd party HART® modem.



4.4 BUS (HART®) Communication

the output of the device can be used as:

- Current loop and HART®.
- Multidrop, HART® protocol.

MonoCONT and MultiCONT remote display/controllers support both modes. By the Rosemount Standard, HART® communication can be used between the PiloTREK as a “slave” and the HART® master as a point-to-point connection.

Communication can be implemented in two modes.

If the device is set to current transmission (4...20 mA, “0” HART short address) only one device can be used in the HART communication loop.

In a multidrop operation (4 mA), several devices (up to 15) can be connected in a HART communication loop. The device's short address must be different from 0.

4.5 Commissioning and Setting Up

The factory default settings are suitable for checking functionality and for simple measurement tasks, but the device's full potential can only be utilized with correct programming tailored to the requirements of the process. Therefore, to get to know the operational characteristics thoroughly and solve complex measuring tasks, it is necessary to read the chapters about programming.

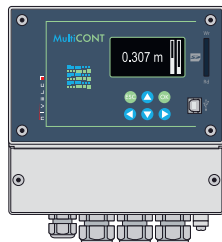
5. USER INTERFACE OPTIONS / PROGRAMMING

Transmitters with Local display via display and 4 push buttons



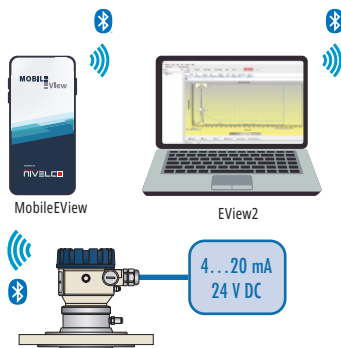
1. Insert display and power up transmitter.
2. Press **E** button to enter menu
3. See 5.1 **Local display / menu handling** for more information

via MultiCONT field controller



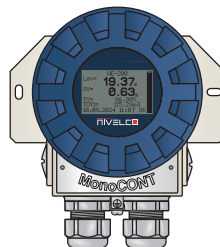
1. See MultiCONT Programming Manual for wiring and handling
2. See PilotREK Programming Manual for configuration

Transmitters with Bluetooth via Mobile EView App or EView2 (PC)



1. Install "MobileEView" App on iOS or Android devices or download [EView2 software](#) for Windows devices
2. Power up transmitter and connect from software

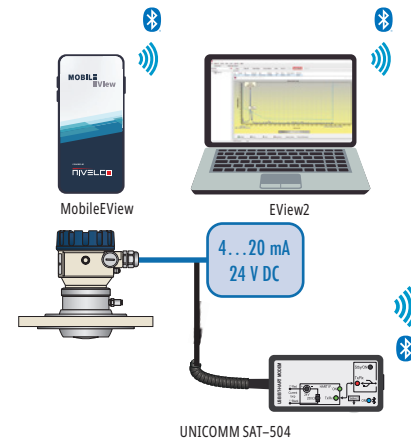
via MonoCONT field display



1. See MonoCONT Programming Manual for wiring and handling
2. See PilotREK Programming Manual for configuration

Transmitters with HART

using HART Modem (SAT-504-□) and EView2 (PC) or MobileEView



1. Connect HART modem to current loop using 250 Ω HART resistor.
2. Connect Laptop to HART modem using USB cable or via Bluetooth if modem has Bluetooth option
3. Download [EView2 software](#) for Windows devices
4. Power up transmitter and connect from software

Transmitters with MODBUS interface via MODBUS master

1. See MODBUS Programming Manual for the supported protocol
2. [PilotREK User's and Programming Manual on the NIVELCO website for configuration](#)

5.1 Local Display / Menu Handling

5.1.1 SAP-300 Display Unit (Optional)

PiloTREK WT-300 type compact radar transmitters can be equipped with an SAP-300 display unit. The display shows the actual measurement value and status information by default. The display can also be used to program most of PiloTREK's parameters with the four buttons.

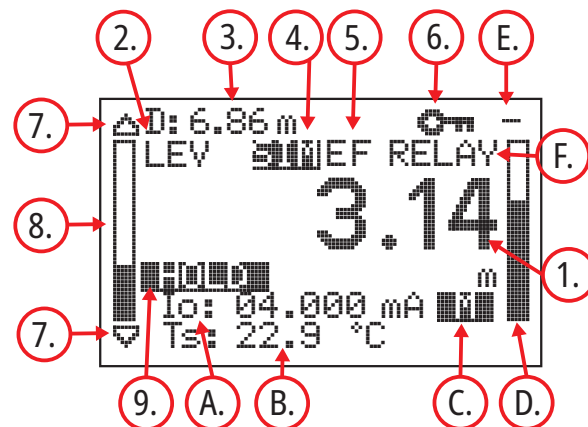


SAP-300 display unit – Technical data		Warning!
Display	64 × 128 dot matrix LCD	⚠ Do not expose the SAP-300 to prolonged heat or direct sunlight, as the display may be damaged.
Operating temperature:	–20...+65 °C (–4...+149 °F)	

Do not leave the SAP-300 in the PiloTREK, if it is not possible to protect the PiloTREK from sunlight or if the PiloTREK is to be used outside the operating temperature range of the SAP-300.

5.1.1. Elements of The Display

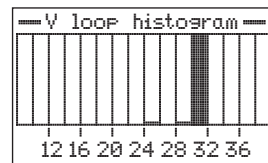
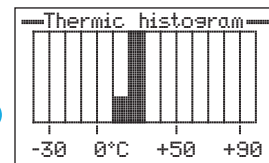
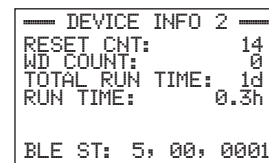
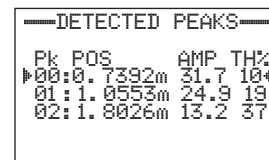
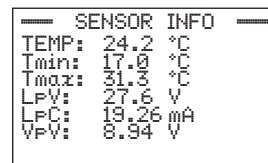
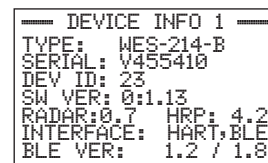
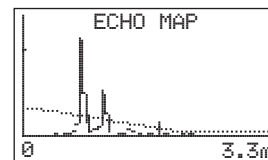
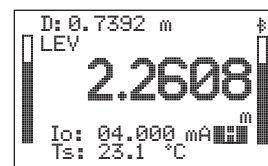
1	Measured Primary Value (PV), with unit indication below (5 digit)		
2	Measured quantity (PV mode): LEV – Level, VOL – Volume, FLOW – Flow, ...		
3	Raw value for PV calculation: ' D: ' – Distance, ' L: ' – Level, ' H: ' – Flow height		
4	SIM – indicator: Simulation mode active. Warning! PV is simulated, not measured.		
5	Empty/Full marker: ' E ' – Tank Empty, ' F ' – Tank Full		
6	Menu locked by: ' KEY ' – Security code, ' REM ' – Remote access active		
7	Trend indicator: ' ▲ ' – slow increase, ' ▲ ' – fast increase, ' ▽ ' – slow decrease, ' ▼ ' – fast decrease		
8/D	Bar-graph: <i>left</i> – Level % (full range), <i>right</i> – Output % of 4...20 mA output range		
9	Output status indicator: ' OCT ' – Output Conversion Table active		
	'SPEED' – Level change speed exceeds limit, output holding last valid value		
	'HOLD' – Echo loss, output holding last valid value		
	'F/E' – Echo loss, output continuing last valid trend		
A	Output current value	B	Transmitter temperature
C	Output mode: ' M ' – Manual, ' H ' – HART multi-drop, ' E ' – Error current		
E	Bluetooth status: ' BT ' – Enabled, ' BT ' – Connected, ' - ' – Disabled, ' X ' – Error		
F	' RELAY ' – Relay On (C2 state)		



5.1.3 Info Screens

You can switch between info screens using the   and  buttons.

- Value display: single display mode
- Echo map: dotted line indicates threshold level
- Peak list: Peak no., Position, Amplitude [dB], Threshold relative to peak amplitude
- Device info 1: Type and version info
- Device info 2: Run time info (only for advanced diagnostic purposes)
- Sensor Info: (TEMP) Electronics temperature, (LpV) Loop voltage, (LpC) Loop current, (VpV) Internal buffer voltage.
- Histogram: Thermic histogram, Loop voltage histogram



5.1.4 Menu Handling

Navigating in the menu	Button	Value input	Checkbox setting
Entering the selected menu		Accepting the setting	Accepting the setting
Selecting a menu item		Modifying digit value	Selecting an item
Going back to the previous menu		Next digit	Switching checked/unchecked

Menu properties

Enter the main menu from any info screen by pressing the button.

Menu TOP row: left – **MENU TITLE**, right – or indicates that menu can be scrolled in given direction.

Menu BOTTOM row: left – **<Menu ID>** (M-ID), right – **Parameter-ID** (P-ID), only if relevant

Changes take effect only after you exit the menu. Until then, the transmitter continues to operate with the previous settings.

After 30 seconds of inactivity (or if SAP-300 is unplugged) PiloTREK will automatically exit the menu, discarding all changes.

Local display access and remote programming (**REM**) through Bluetooth, HART or MODBUS block each other. Whichever is first will have priority.

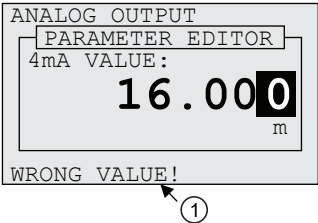
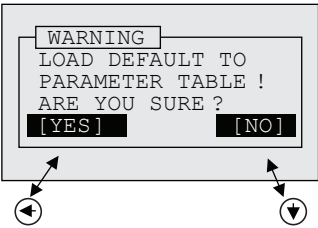
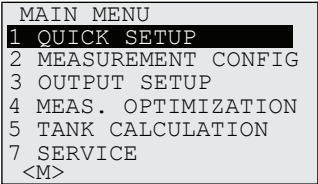
Dialog BOX: or buttons perform the function displayed on the screen, e.g., [Yes], [No].

Value input – special key combinations (press simultaneously)

+ → Return to original value.

+ → Set to default value.

+ → Set to actually measured value. (Supported only at some parameters.)

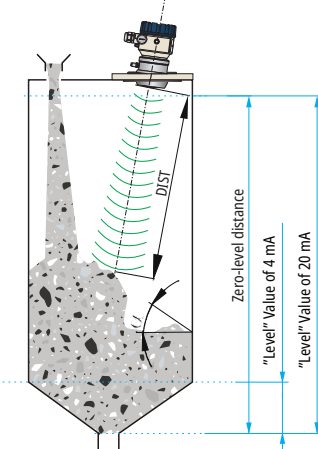


6. PiloTREK SETTINGS

6.1 Quick Setup

Local display menu	M-ID	EView2	MonoCONT	P-ID	MultiCONT	MODBUS
QUICKSET	Q	—	—	—	—	—

PiloTREK W-300 models with integrated display (WB/L/D/N□-3□□-□) offer a built-in Quick Setup feature for simple LEVEL measurement applications. Quick Setup guides you sequentially through the following basic settings. Press  button for 3 seconds to exit Quick Setup any time
[See the PiloTREK User's and Programming Manual on the NIVELCO website for more information.](#)

#		Description	
0	REGION	Defines RF compliance and the unit system (Metric/Imperial) to be used. For USA select "US / Imperial".	
1	ZERO-LEVEL DISTANCE	Defines the zero point for level measurement. Enter the distance between the sealing plane of the process connection and the designated zero level.	
2	PV VALUE OF 4 mA	Defines the LEVEL value assigned to 4 mA current output, by default the zero-level.	
3	PV VALUE OF 20 mA	Defines the LEVEL value assigned to 20 mA current output, by default the maximum measurable level. The analog output automatically scales the set level range to the 4...20 mA current output range.	
4	ERROR MODE	Defines the behavior of the current output in case of "No echo error", i.e. while no up-to-date LEVEL value is available. <u>Options:</u> - HOLD Keeps last valid value on output (default). Recommended setting. - 3.8 mA Outputs "Low error current". - 22 mA Outputs "High error current". "Error current" setting is recommended only if recognized distinctly from 4 mA/20 mA Zero- or Max-level.	
5	DAMPING TIME	Delay, in seconds, for the output to reach a new value. Larger values smooth output, e.g. to hide waving, smaller values allow faster reaction to sudden changes. Default is 40 s.	



[PilotREK – Programming Guide](#)

wtS300en26h01

May 2026

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