

FOR LIQUIDS AND SOLIDS

# MicroTREK

GUIDED MICROWAVE LEVEL TRANSMITTERS



3 YEARS WARRANTY @ NIVELCO – WHERE ELSE?

# NIVELCO

LEVEL TRANSMITTERS



## MicroTREK LEVEL TRANSMITTERS FOR LIQUIDS AND SOLIDS

### MAIN FEATURES

- Measuring range up to 24 m (80 feet)
- Accuracy:  $\pm 5$  mm (0.2 inch)
- Measurement is independent of dielectric constant, temperature, pressure and density variations
- Rod, cable and coaxial probes
- Segmented rod probe version
- Minimum  $\epsilon_r \geq 1.4$
- 2-wire version
- Graphic display
- 4-20 mA + HART output
- Medium temperature range:  $-30$  °C... $+200$  °C ( $-22$  °F... $+392$  °F)
- Maximum process pressure: 40 bar (580 psig)
- IP67 protection



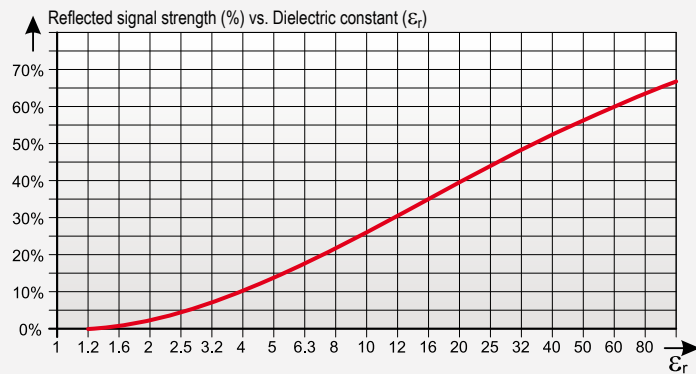
### GENERAL DESCRIPTION

The **MicroTREK** Guided Wave Radar level transmitter is designed for continuous level measuring of conductive or non-conductive liquids, pulps and solids. **MicroTREK** level gauge operates based on the well-known TDR (Time Domain Reflectometry) principle. Micropulses are sent along a probe guide at the speed of light. As soon as the impulse reaches the surface of the medium, it is reflected back to the electronic module. Level distance is directly proportional to the flight time of the impulse.

The reflected signal is dependent on the dielectric constant of the material, the feasibility of the measurement is  $\epsilon_r \geq 1.4$ .

The TDR technology is unaffected by the properties of the medium as well as that of the space above it. Measurement is also unaffected by the change in the physical properties of the materials such as temperature, pressure, dielectric constant.

The measurability of the medium and the reflected signal strength depends on the relative dielectric constant of the medium.



Informative $\epsilon_r$ values			
Butane	1.4	Diesel oil	4
Cement	1.5-10	Grain	3-5
LPG	1.6-1.9	Limestone	6.1-9.1
Kerosene	2.1	Sulphuric acid	20
Crude oil	2.1	Acetone	21
Whiting	2.2-2.5	Ethanol	24
Benzene	2.3	Methanol	33,1
Asphalt	2.6	Glycol	37
Clinker	2.7	Nitrobenzene	40
Resin	3.6	Water	80

### APPLICATIONS

Mono cable / Mono rod Mono segmented rod	Twin cable	Twin rod	Coaxial Pipe
<ul style="list-style-type: none"> <li>■ Cement, limestone, fly ash, alumina, carbon black</li> <li>■ All high-viscosity liquids</li> <li>■ Mineral powders</li> <li>■ Clean and contaminated liquids</li> <li>■ For stilling wells (calibration required)</li> <li>■ Aggressive mediums with plastic coated probes</li> <li>■ Slightly conductive foams</li> <li>■ High temperature applications</li> <li>■ Bypass applications</li> </ul>	<ul style="list-style-type: none"> <li>■ Tank parks with solvents, oil or fuels</li> <li>■ Water storage tanks</li> <li>■ Plastic granules</li> <li>■ For products with low dielectric constant (<math>\epsilon_r &gt; 1.8</math>)</li> <li>■ For any liquids, light granules</li> <li>■ For narrow tanks</li> <li>■ Where minimum dead-zone is needed</li> <li>■ Mounting close to tank wall is possible</li> </ul>	<ul style="list-style-type: none"> <li>■ Plastic granule vessels</li> <li>■ Coated tanks</li> <li>■ Clean and contaminated liquids</li> <li>■ Fine powders</li> <li>■ Where minimum dead-zone is needed</li> <li>■ For narrow tanks</li> <li>■ For mediums with low dielectric constant and slightly moving products</li> </ul>	<ul style="list-style-type: none"> <li>■ Small vessels or tanks with max. 6 m (20 feet) height</li> <li>■ Solvents, liquefied gases</li> <li>■ LPG, LNG</li> <li>■ For clean liquids with low dielectric constant</li> <li>■ Agitated or flowing liquids – the probe acts as a stilling well</li> <li>■ Liquid or vapour spray near the probe</li> <li>■ Can be heated</li> <li>■ Contact possible with metallic object or tank wall</li> <li>■ Where no dead-zone allowed</li> </ul>

## TECHNICAL DATA

Version	Plastic housing	Metal housing	High temperature version
Measured values	Distance, level; calculated values: volume, mass		
Measuring range	Depends on the probe type and dielectric constant ( $\epsilon_r$ ) of the measured medium		
Probe types	Mono cable, twin cable, mono rod, twin rod, coaxial pipe and segmented rod		
Accuracy	Linearity error (1)		
	Resolution		
Minimal $\epsilon_r$ of the medium	1.4 (depending on the probe type)		
Power supply	18 V ... 35 V DC		
Output	Digital communication		
	Display		
Medium temperature	-30 °C ... +90 °C (-22 °F...+194 °F)		-30 °C ... +200 °C (-22 °F...+392 °F)
	With plastic coated probes see: Technical data of the coated probes		
Maximal medium pressure	4 MPa (40 bar g/ 580 psi g); with plastic lined flange: max. 2.5 MPa (25 bar g/ 363 psi g); with coaxial pipe probe: max. 1.6 MPa (16 bar g/ 232 psi g)		
Ambient temperature	-20 °C ... +60 °C (-4 °F ... +140 °F)	-30 °C ... +60 °C (-22 °F...+140 °F), with display: -20 °C...+60 °C (-4 °F...+140 °F)	
Process connection	Threaded, Flanged or Sanitary connections (as per order codes)		
Ingress protection	IP 67		
Electrical connection	2x M20x1.5 cable glands + internal thread for 2x 1/2" NPT cable protective pipe, cable outer diameter: $\varnothing$ 7 ... $\varnothing$ 13 mm (0.3 ... 0.5 inch), wire cross section: max.1.5 mm <sup>2</sup> (AWG 15)		
Electrical protection	Class III.		
Housing material	Plastic (PBT)	Paint coated aluminium	
Sealing	FPM (Viton®), optional: FFKM (Kalrez®), EPDM		
Explosion protection	— see: Special data for Ex certified models		
Mass (head unit)	1.5 kg (3.3 lb)	2 kg (4.4 lb)	2.5 kg (5.5 lb)

(1) Under reference conditions and stabilized temperature

## SPECIAL DATA FOR Ex CERTIFIED MODELS

Type	H□□-4□□-8 Ex		H□□-4□□-6 Ex
	Probe without coating	Coated probe	
Protection type	ia		iaD
Ex marking	ATEX	⊕ II 1 G Ex ia IIC T6...T3	⊕ II 1 D iaD A20/A21 IP65 T100°C
	IEC Ex	Ex ia IIC T6...T3 Ga	Ex ia IIB T6...T3 Da
Intrinsically safe data	U <sub>i</sub> = 30 V, I <sub>i</sub> = 150 mA, P <sub>i</sub> = 1 W, C <sub>i</sub> = 10 nF, L <sub>i</sub> = 10 μH		
Power supply	18 V... 28 V DC		
Electrical connection	2x M20x1.5 metal cable glands, cable outer diameter: $\varnothing$ 7... $\varnothing$ 13 mm (0.3...0.5 inch), wire cross section: max.1.5 mm <sup>2</sup> (AWG 15)		
Ambient temperature	-30 °C ... +60 °C (-22 °F...+140 °F), with display: -20 °C...+60 °C (-4 °F...+140 °F)		

## PROBE SELECTION

Reliable microwave measurement depends on the correct selection of probes taking into consideration the properties of the medium and other vessel conditions.

Probe type	Max. measuring range	Dead-zone (2)		Process connection	$\epsilon_r$ min.	
		Upper (t) / lower (b) $\epsilon_r = 80$	Upper (t) / lower (b) $\epsilon_r = 2.4$			
Mono cable $\varnothing$ 4 mm (0.15 inch)	24 m (80 feet)	300 / 20 mm (12 / 0.75 inch)	400 / 100 mm (16 / 4 inch)	1"; 1 1/2"	2.1	
Mono cable $\varnothing$ 8 mm (0.3 inch)				1 1/2"		
Mono rod $\varnothing$ 8 mm (0.3 inch)				1"		
Mono / segmented rod $\varnothing$ 14 mm (0.55 inch)	6 m (20 feet)	150 / 20 mm (6 / 0.75 inch)	300 / 100 mm (12 / 4 inch)	1 1/2"		1.8
Twin cable $\varnothing$ 4 mm (0.15 inch)	24 m (80 feet)					
Twin rod $\varnothing$ 8 mm (0.3 inch)	3 m (10 feet)	0 / 10 mm (0 / 0.4 inch)		0 / 100 mm (0 / 4 inch)	1"; 1 1/2"	1.4
Coaxial pipe $\varnothing$ 28 mm (1.1 inch)	6 m (20 feet)	300 / 20 mm (12 / 0.75 inch)		400 / 100 mm (16 / 4 inch)	1"; 1 1/2" TriClamp; DN40 MILCH, DN50	
Coated cable $\varnothing$ 6 mm (0.225 inch)	24 m (80 feet)	300 / 20 mm (12 / 0.75 inch)		400 / 100 mm (16 / 4 inch)	DN50	2.4
Coated rod $\varnothing$ 12 / 16 mm (0.45 / 0.65 inch)	3 m (10 feet)					

(2) The unmeasurable upper and lower part of the tank, the lower dead-zone is extended with the length of the counterweight (cable versions only)

## TECHNICAL DATA OF THE PROBES

Type	HOK, HOL HOV, HOW	HOR, HOP	HOS, HOZ	HON, HOJ	HOT, HOU	HOD, HOE	HOA, HOB HOC, HOH
Denomin.	Cable	Rod	Rod / Seg- mented rod	Cable	Twin cable	Twin rod	Coaxial
Max. meas. dist.	24 m (80 feet)	3 m (10 feet)	6 m (20 feet)	24 m (80 feet)		3 m (10 feet)	6 m (20 feet)
Min. meas. dist. ( $\epsilon_r=80 / \epsilon_r=2.4$ )	0.3 m / 0.4 m (1 feet / 1.3 feet)			0.15 m / 0.3 m (0.5 feet / 1 feet)		0 m (0 feet)	
Minimal medium $\epsilon_r$	2.1			1.8		1.4	
Sensing space around the probe	$\varnothing$ 600 mm (2 feet)			$\varnothing$ 200 mm (0.65 feet)		0 mm (0 feet)	
Process connection	1" BSP; 1"NPT 1 1/2" BSP; 1 1/2" NPT	1" BSP 1"NPT		1 1/2" BSP 1 1/2" NPT		1" BSP; 1"NPT 1 1/2" BSP; 1 1/2" NPT	
Probe material	1.4401	1.4571		1.4401		1.4571	
Probe nominal $\varnothing$	4 mm (0.15 inch)	8 mm (0.3 inch)	14 mm (0.55 inch)	8 mm (0.3 inch)	4 mm (0.15 inch)	8 mm (0.3 inch)	28 mm (1.1 inch)
Mass	0.12 kg/m (0.08 lb/ft)	0.4 kg/m (0.25 lb/ft)	1.2 kg/m (0.8 lb/ft)	0.4 kg/m (0.25 lb/ft)	0.24 kg/m (0.16 lb/ft)	0.8 kg/m (0.5 lb/ft)	1.3 kg/m (0.85 lb/ft)
Separator material <sup>(3)</sup>			-		PFA, welded on the cable	PTFE-GF25	PTFE
Weight dimensions	$\varnothing$ 25x100 mm (1x4 inch)			$\varnothing$ 40x260 mm (1.5x10 inch)	$\varnothing$ 40x80 mm (1.5x3 inch)		-
Weight material	1.4571		-	1.4571			-
Dimensions (mm)							

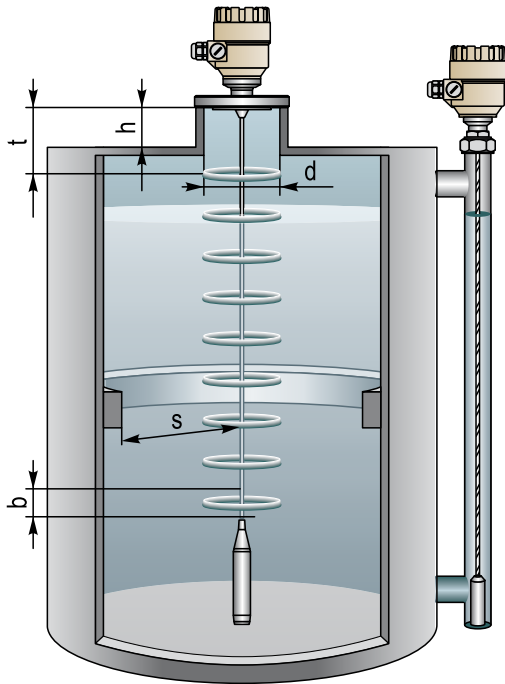
<sup>(3)</sup> There is no separator below 1.5 m (5 feet) length

## TECHNICAL DATA OF THE COATED PROBES

Type	HOF, HOG	HOX	HOY	HOM	HOQ	HOO	HOI
Denomin.	FEP coated cable				PFA coated rod		PP coated rod
Max. meas. dist.	24 m (80 feet)				3 m (10 feet)		
Min. meas. dist. ( $\epsilon_r=80 / \epsilon_r=2.4$ )	0.3 m / 0.4 m (1 feet / 1.3 feet)						
Minimal medium $\epsilon_r$	2.4						
Sensing space around the probe	$\varnothing$ 600 mm (2 feet)						
Process connection	1" BSP; 1"NPT	1 1/2" TriClamp	DN 40 MILCH	DN 50 PN25 flange	1 1/2" TriClamp	DN 50 PN25	
Max. medium temp.	+150 °C (302 °F)						+60 °C (140 °F)
Probe material	1.4401				1.4571		
Probe coat. material	FEP				PFA		PP
Probe nominal $\varnothing$	$\varnothing$ 6 mm (0.225")				12 mm (0.45")		16 mm (0.65")
Fillet coating mater.	-				PFA		PP
Weight material	1.4571			1.4571 + PFA coating		-	
Mass	0.16 kg/m (0.1 lb/ft)				0.5 kg/m (0.33 lb/ft)		0.6 kg/m (0.4 lb/ft)
Dimensions (mm)							



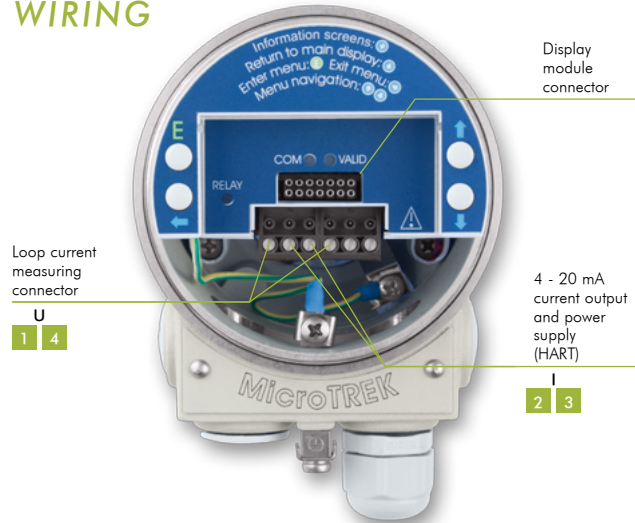
## INSTALLATION



$s$  = minimum distance from the internal disturbing objects.  
Objects that are parallel to probe do not disturb the measurement.

Mono probe	$s > 300 \text{ mm}$	$h \leq d$
Twin probe	$s > 100 \text{ mm}$	$t = \text{upper dead-zone}$
Coaxial probe	$s = 0 \text{ mm}$	$b = \text{lower dead-zone}$

## WIRING



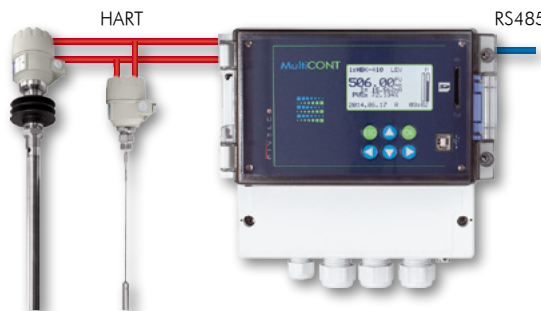
## SETUP, PROGRAMMING with SAP-300 display unit



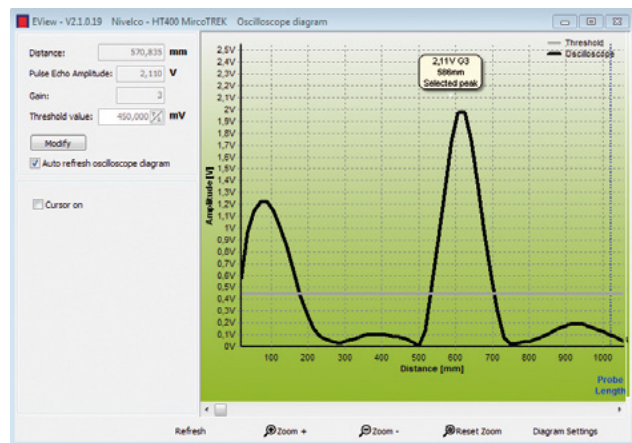
With the help of the **SAP-300** plug-in display a simplified programming can be accomplished which covers most of the applications. The basic parameters of measurement and output can be set using the text-based menu system of the **SAP-300**. The large LCD dot-matrix display displays the measured values in numerical and bar graph form.

## MicroTREK TRANSMITTERS IN HART MULTIDROP LOOP

The **MultiCONT** can handle a max. of 6 standard (or 2 Ex certified) HART capable **MicroTREK** GWR transmitters. The digital (HART) information is processed, displayed and if needed it can be transmitted via **RS485** communication line to a PC. Remote programming of the transmitters is also possible. Visualisation on PC can be accomplished with **NIVISION** process visualisation software.



## With EView2 software



The **EView2** configuration software can be downloaded free of charge. All user-modifiable parameters of the **MicroTREK** can be set and all values can be queried through **EView2**. Other features are: continuous "echo-map" reading, trend monitoring, data logging, data saving.

## MicroTREK TRANSMITTERS IN SYSTEM WITH A PC

The instruments with HART output can be connected to a PC using a **UNICOMM HART-USB** modem. Max. 15 normal instruments can be connected to a single HART loop. All measured values can be visualized and/or the instruments can be remote programmed via digital HART communication. Applicable software: **EView2** configuration software or **NIVISION** process visualization software.

## ORDER CODES (NOT ALL COMBINATIONS AVAILABLE)

### MicroTREK Guided Wave Radar level transmitters

MicroTREK H ■ ■ ■ - ■ ■ ■ ■ - (1)

Type	Code	Probe / Proc. conn.	Code	Code	Length	Code	Output / Ex	Code
Transmitter	T	Coaxial / 1" BSP	A	Coaxial, Rod, Twin rod			4 - 20 mA + HART	4
Transmitter + display	B	Coaxial / 1" NPT	B	0	0 m	0 m	4 - 20 mA + HART / Ex iaD	6
High temp. transmitter	H	Coaxial / 1 1/2" BSP	C	1	1 m	0.1 m	4 - 20 mA + HART / Ex ia	8
High temp.trans. + display	P	Coaxial / 1 1/2" NPT	H	2	2 m	0.2 m		
		Rod / 1" BSP	R	3	3 m	0.3 m		
		Rod / 1" NPT	P	4	4 m	0.4 m		
		Rod / 1 1/2" BSP (3)	S	5	5 m	0.5 m		
		Rod / 1 1/2" NPT (3)	Z	6	6 m	0.6 m		
		Twin rod / 1 1/2" BSP	D			0.7 m		
		Twin rod / 1 1/2" NPT	E			0.8 m		
		4 mm cable / 1" BSP	K			0.9 m		
		4 mm cable / 1" NPT	L	Cable				
		4 mm cable / 1 1/2" BSP	V	0	0 m	0 m		
		4 mm cable / 1 1/2" NPT	W	1	10 m	1 m		
		8 mm cable / 1 1/2" BSP	N	2	20 m	2 m		
		8 mm cable / 1 1/2" NPT	J			3 m		
		4 mm twin cable / 1 1/2" BSP	T			4 m		
		4 mm twin cable / 1 1/2" NPT	U			5 m		
		4 mm FEP coat. cable / 1" BSP	F			6 m		
		4 mm FEP coat. cable / 1" NPT	G			7 m		
		4 mm FEP coat. cable / DN 50 PN 25 flange	M			8 m		
		4 mm FEP coat. cable / 1 1/2" TriClamp	X			9 m		
		4 mm FEP coat. cable / DN 40 Milch	Y					
		PFA coated rod / DN 50 PN 25	Q					
		PFA coated rod / 1 1/2" TriClamp	O					
		PP coated rod / DN 50 PN 25	I					

Housing	Code
Aluminium	4
Plastic	5 (2)

(1) The order code of an Ex version should end in "Ex"  
 (2) Ex version not available  
 (3) Segmented probe version should be given in the text of the order

Accessories	Order Code
Plug-in graphical display module	SAP-300
Multichannel process controller and display unit	MultiCONT P-200
24V DC power supply, DIN rail	NIPOWER PPK-331
Intrinsically safe isolator module, DIN rail mountable	UNICONT PGK-301 Ex
HART- USB/RS485 modem for remote programming with PC, DIN rail	UNICOMM SAK-305
HART- USB modem for remote programming with PC	UNICOMM SAT-304
EView2 configuration software for remote programming with PC	Downloadable free of charge

