Автоматизация

MicroTREK

РЕФЛЕКСНЫЙ МИКРОВОЛНОВОЙ ПРЕОБРАЗОВАТЕЛЬ УРОВНЯ



Our newly developed MicroTREK HT–700 guided microwave level transmitter is designed for the continuous level measurement of conductive and non-conductive liquids, pulps, and solids. The measuring speed of the new MicroTREK HT–700 is almost ten times that of its predecessor, the HT–700's measuring dead zone is significantly smaller, and its maximum measuring distance is longer! Furthermore, the power supply range of the device has been expanded.

OPERATING PRINCIPLE

Its level gauge operates based on measuring the travel time of impulse reflections (TDR - Time Domain Reflectometry). The electronic module generates microwave impulses in the sensor, which travel at the speed of light. Part of the impulse energy is reflected from the surface depending on the material. The reflected signal's travel time is measured and processed by the module's electronics, and then it is converted to a volume-proportional level-proportional signal. Reflections depend heavily on the medium's dielectric constant (\mathcal{E}_r), which must be at least 1.4 for successful measurement. The propagation speed of microwave impulses in a vacuum, air, and other gases is virtually the same; distance measurement is therefore independent of the medium within the given limits.

FEATURES

- Measuring range up to 30 m (98.5 ft)
- \blacksquare Tracking speed: 900 m/h (= 25 cm/s) (2950 ft/h [= 10 inch/s])
- Accuracy: ±5 mm (±0.4")
- Measurement is independent of medium's dielectric constant, temperature, pressure and density
- Rod, cable, or coaxial probe
- Segmented rod probe version
- Lowest $\varepsilon_r \ge 1.4$
- 2-wire version
- Graphic display
- Advanced threshold management
- False echo suppression
- Probe Correction Table (SCT)
- 4...20 mA + HART® output + relay (optional)
- Highest process pressure: 40 bar (580 psi)
- IP67 protection
- 5 years warranty

CERTIFICATES

- ATEX (Ex ia G)
- ATEX (Ex ia D)
- ATEX (Ex ta/tb D)
- IEC Ex (Ex ia G)
- IEC Ex (Ex ia D)

- INMETRO (Ex ia G)
- INMETRO (Ex ia D)
- UKCA Ex (Ex ia G)
- UKCA Ex (Ex ia D)
- UKCA Ex (Ex ta/tb D)





HTK-700

APPLICATIONS

Mono cable / Mono rod Mono segmented rod	Twin cable	Twin rod	Coaxial pipe
 Cement, limestone, fly ash, alumina, soot All high-viscosity liquids Mineral powders Clean and contaminated liquids For stilling wells (calibration required) With plastic-coated probe for aggressive substances Slightly conductive foams High-temperature applications Bypass applications 	 Tank parks with solvents, oil and fuels Water storage tanks Plastic granules For products with low dielectric constant (ε_r > 1.8) For any liquids, light granules For narrow tanks Where minimum dead zone is needed Mounting close to tank wall is possible 	 Plastic granules Coated tanks Clean and contaminated liquids Fine powders Where minimum dead zone is needed For narrow tanks For mediums with low dielectric constant and slightly moving products 	 Small vessels and tanks up to 6 m (20 ft) tall Solvents, liquefied gases LPG, LNG For clean liquids with low dielectric constant Agitated or flowing liquids – the probe acts as a stilling well Liquid or vapor spray near the probe Can be heated Contact possible with metallic object or tank wall Where no dead zone allowed

TECHNICAL DATA

Features	Version	Plastic housing	Aluminum housing	Stainless steel housing		
Measured	values	Disto	Distance, level; calculated values: volume, weight			
Measurin	ig range	Depending on	Depending on probe version and dielectric constant (ϵr) of the medium			
Probe ver	rsions	Mono cable, twin cable, mono	rod, twin rod, coaxial pipe, segmented o	coaxial pipe and segmented rod		
Accuracy	Linearity error ⁽¹⁾	,	0.2"), if probe length \geq 10 m (32 ft): \pm 0.05° \pm 0.75"), if probe length \geq 10 m (32 ft): \pm 0.2°	, 0		
	Resolution		1 mm (0.04")			
Lowest $\epsilon_{ m r}$	of medium		1.4 (depending on probe version)			
Supply vo	oltage	12 ⁽³⁾ 36 V DC, nominal 24	4 V DC, Ex version: 12 ⁽³⁾ 30 V DC, trans	sient overvoltage protection		
	Communication		420 mA + HART®			
Output	Display (optional) ⁽²⁾	SAP—300 graphical display unit				
	Relay (optional)	SPDT 30 V / 1 A DC; 48 V / 0.5 A AC				
Dracass to	emperature	-30+90 °C (−22+194 °F); high-temperature version: −30+200 °C (−22+392 °F)				
1100633 16	emperatore	For	plastic-coated probes, see "Probe Prope	rties"		
Highest p	rocess pressure	40 bar (580 psi); with plastic lined	flange: max. 25 bar (363 psi); with coaxia	l pipe probe: max. 16 bar (232 psi)		
Ambient t	remperature	−30+65 °C	(–22+149 °F), with display: $-20+65$	°C (-4+149 °F)		
Process c	onnection	Threaded, t	langed or sanitary connections (as per c	order code)		
Ingress pr	rotection		IP67			
Electrical	connection		+ Two internally threaded ½" NPT cons \varnothing 12 mm (00.2300.47"), wire cross section			
Electrical	protection	Class III				
Housing r	material	Plastic (PBT)	Powder-coated aluminum	Stainless steel (KO35)		
Seal		FP <i>N</i>	M (Viton $^{ ext{@}}$), optional: FFKM (Kalrez $^{ ext{@}}$), EPC	DM		
Explosion	protection	-	See "Ex In	formation"		
Weight (ł	nead unit)	1.3 kg (2.86 lb)	2.2 kg (4.85 lb)	3.9 kg (8.6 lb)		

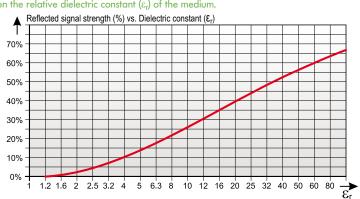
Ex INFORMATION

		H□□-7□□-8 Ex / H□□-9□□-8 Ex		H□□-7□□-5 Ex	H□□-7□□-6 Ex	H□□-7□□-9 Ex
		Probe without coating	Coated probe	H□□-9□□-5 Ex	H□□-9□□-6 Ex	H□□−9□□−9 Ex
Protection		Ex ia		Ex tD	Ex iaD	Ex ta D
Ex marking ⁽⁴⁾	ATEX	© II 1 G Ex ia IIC T6T3 Ga	© II 1 G Ex ia IIB T6T3 Ga		© II 1 D Ex ia IIIC T85°CT180°C Da	© II 1D Ex ta IIIC T105°C Da
	IEC Ex ⁽⁵⁾	Ex ia IIC T6T3 Ga	Ex ia IIB T6T3 Ga	Ex ta/tb IIIC T85°CT180°C Da/Db	Ex ia IIIC T85°CT180°C Da	Ex ta IIIC T105°C Da
Intrinsic safety data		$\begin{aligned} \textbf{C}_i \leq \textbf{10 nF, L}_i \leq \textbf{10 } \mu \textbf{H, U}_i \leq \textbf{30 V,} \\ \textbf{I}_i \leq \textbf{100 mA, P}_i \leq \textbf{0.75 W} \end{aligned}$	$C_i \leq 10 \text{ nF, } L_i \leq 10 \mu\text{H, } U_i \leq 30 \text{ V, } I_i \leq 140 \text{ mA, } P_i \leq 1 \text{ W}$			
Supply voltage			12 ⁽⁶⁾ 30 V DC			
Electrical connection		2× M20×1.5 metal ca	able glands, cable outer diameter: Ø6Ø12 mm (00.2300.47"), wire cross section: maximum 1.5 mm² (AWG16)			
Ambient temperature			−30+65 °C (−22.	+149 °F), with display: -20+6	5 °C (−4+149 °F)	

MEASURABILITY OF THE MEDIUM

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

		Informative \mathcal{E}_r values	
Butane	1.4	Grain	35
Cement	1.510	Cooking oil	3.9
LPG	1.61.9	Limestone	6.19.1
Kerosene	1.82.1	Acetone	21
Crude oil	2.1	Ethanol	24
Diesel oil	2.1	Methanol	33.1
Gasoline	2.3	Glycol	37
Asphalt	2.6	Nitrobenzene	40
Clinker	2.7	Water	80
Resin	2.43.6	Sulphuric acid (T = $+20$ °C [$+68$ °F])	84



⁽¹⁾ Under reference conditions and constant temperature
(2) The use of SAP-300 graphic displays is limited in hazardous environment. For further information, see "Ex Information."
(3) In an industrial environment, reliable operation can be guaranteed with a terminal voltage >13 V.

⁽⁵⁾ IEC Ex compliance is optional; must be requested in the order.

 $^{^{(4)}}$ In IIC environment SAP-300 graphic display must not be used! $^{(6)}$ In an industrial environment, reliable operation can be guaranteed with a terminal voltage >13 V.

PROBES

Reliable measurement with microwaves depends on selecting the appropriate probes and taking the medium's properties and other vessel conditions into consideration

	Max.	Dead zo	ne ⁽¹⁾		
Probe types	measuring range	Upper (t) / lower (b) Upper (t) / lower (b) $\epsilon_{\rm r} = 80$ $\epsilon_{\rm r} = 2.4$		Process connection	\mathcal{E}_{r} min.
Mono cable Ø4 mm (00.15")	20 (00 5 (1)			1"; 1½"	
Mono cable Ø8 mm (00.3")	30 m (98.5 ft)	050 400	250 (100	11/2"	
Mono rod Ø8 mm (00.3")	3 m (10 ft)	250 mm / 20 mm (9.84" / 0.75")	350 mm / 100 mm (13.8" / 4")	1"	2.1
Mono / segmented rod Ø14 mm (00.55")	6 m (20 ft)				
Twin cable Ø4 mm (00.15")	30 m (98.5 ft)	150 mm / 20 mm	300 mm / 100 mm	1 1/2"	1.8
Twin rod Ø8 mm (00.3")	3 m (10 ft)	(6" / 0.75")	(12" / 4")		1.0
Coaxial pipe Ø28 mm (Ø1.1")		0 / 10	0 / 100	1"; 1½"	1.4
Segmented coaxial pipe Ø14 mm (00.55")	6 m (20 ft)	(0" / 0.4")	0 mm / 10 mm (0" / 0.4") 0 mm / 100 mm (0" / 4")	1½"	1.6
Coated cable Ø6 mm (00.225")	30 m (98.5 ft)	250 mm / 20 mm	350 mm / 100 mm	1"; 1½" TriClamp; DN40 Milch, DN50	2.4
Coated cable Ø12 / 16 mm (00.45 / 0.65")	3 m (10 ff)	(9.84" / 0.75")	(13.8" / 4")	DN50	2.4

⁽¹⁾ The unmeasurable upper and lower part of the tank, the lower dead zone is extended with the length of the counterweight (cable versions only).

PROBE PROPERTIES

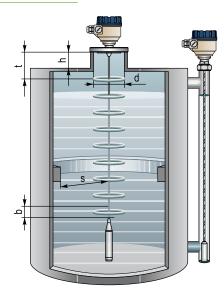
Туре	H□K, H□L H□V, H□W	H□R, H□P	H□S, H□Z	H□N,	H□T, H□U	H□D, H□E	H□A, H□B H□C, H□H
Probe	Ø4 mm (Ø0.15") cable	Rod	Rod / segmented rod	Ø8 mm <i>(Ø0.3")</i> cable	Ø8 mm <i>(Ø0.3")</i> twin cable	Twin rod	Coaxial
Maximum measuring distance	30 m (98.5 ft)	3 m (10 ff)	6 m (20 ft)	30 г	n (98.5 ft)	3 m (10 ft)	6 m (20 ft)
Min. meas. dist. ($\varepsilon_{\rm r}=80$ / $\varepsilon_{\rm r}=2.4$)		250 mm /	350 mm (9.84" / 13.8")		150 mm / 300	mm (6" / 11.8")	0 m
Lowest ϵ_{r} of medium			2.1		1.8	3	1.4
Sensing space around the probe		Ø6	00 mm (23.6")		Ø200 m	m (7.87")	Ø0 mm
Process connection	1" BSP / NPT	1" BSP		1½" BSI	p		1" BSP / NPT
Trocess connection	1½" BSP / NPT	1" NPT		1½" NP	Т		1½" BSP / NPT
Probe material	1.4401		1.4571	1.4	1401	1.	4571
Probe nominal \varnothing	4 mm (0.15")	8 mm (0.3")	14 mm (0.55")	8 mm (0.3")	4 mm (0.15")	8 mm (0.3")	28 mm (1.1")
Weight	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 ⁽²⁾			-		PFA, welded on the cable	PTFE-GF25	PTFE
Dimensions	025 00 00 00 00 00 00 00 00 00 00 00 00 00	08	014	040 040 M12	040 040 88	039	028
Weight dimensions	Ø25 × 100 mm (Ø1 x 4")		-	Ø40 × 260 mm (Ø1.5 x 10")	Ø40 × 80 mm (Ø1.5 x 3")		-
Weight material	1.4571		-	1.4	1571		-

 $^{^{(2)}}$ There is no separator below 1.5 m (5 ft) length

COATED PROBE PROPERTIES

Туре	H□F, H□G	Н□Х	H□Y	Н□М	H□Q	Н□О	H□I
Probe	Ø4 mm (Ø0.15") FEP-coated cable			Ø4 mm <i>(Ø0.15")</i> fully FEP/PFA-coated cable	Fully PFA	-coated rod	Fully PP-coated rod
Maximum measuring distance		30 m	n (98.5 ft)			3 m (10 ft)	
Min. measuring distance ($\epsilon_{r}=80$ / $\epsilon_{r}=2.4$)			25	0 mm / 350 mm (9.84" / 13.	8")		
Minimum ϵ_r of medium				2.1			
Minimal sensory distance from sensor				Ø600 mm (23.6")			
Process connection	1" BSP; 1" NPT	1½" TriClamp	DN40 Milch	DN50 PN25 f	lange	1½" TriClamp	DN50 PN25
Highest medium temperature	+	+200 °C (+392 °F)		+1	50 °C (+302 °F)		+60 °C (+140 °F)
Probe material		1.4	4401			1.4571	
Probe coating		FEP		FEP / PFA	1	PFA	PP
Probe nominal \varnothing		6 mr	m (0.24")		12 mm (0.48")		16 mm (0.63")
Fillet coating		-			PFA PI		
Weight material		1.4571		1.4571 + PFA coating		-	
Weight dimensions		Ø25 x 10	0 mm (Ø1 x 4")			-	
Weight		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	025 S	TriClamp 11/2* 025 M8	Mich DN40	DN50	DN50	138 050 012	DNS0

INSTALLATION



WIRING



Except the plastic coated and the coax types the probes can be removed from the head unit by the user.

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

Mono Probe s > 300 mm (11.8") $h \le d$

Twin Probe s > 100 mm (3.9") t = upper dead zone Coaxial Probe s = 0 mm b = lower dead zone

SETUP, PROGRAMMING

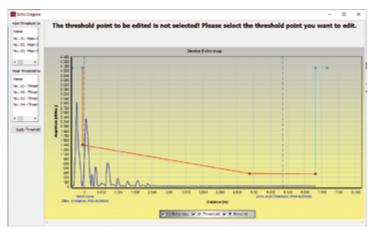
with SAP-300 display unit

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 textbased menu system of the SAP-300. The large LCD dot-matrix display displays the measured values in numerical and bar graph form.



with EView2 software

The EView2 configuration software can be downloaded free of charge. All usermodifiable 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.

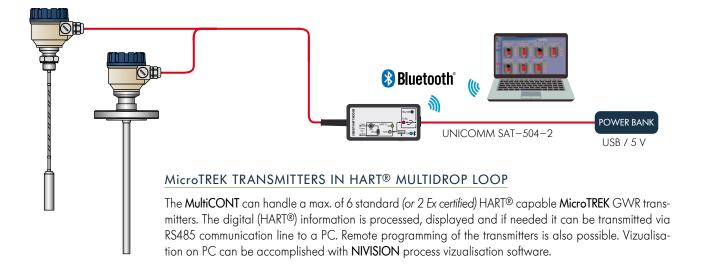


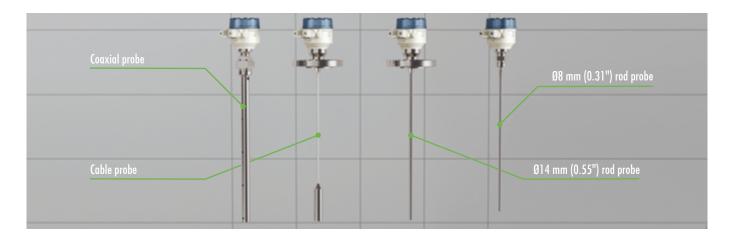


 $H\Box S / H\Box Z - 700 / 800$ with segmented probe

MicroTREK TRANSMITTERS IN SYSTEM WITH A PC

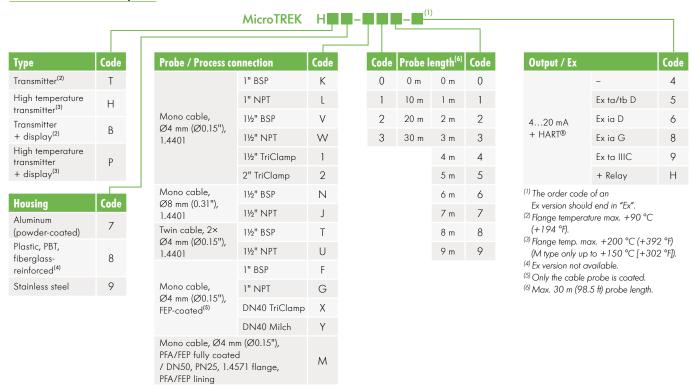
Instruments with HART® output can be connected to a PC interfaced by a UNICOMM HART®-USB modem, or can be connected wire-lessly with the SAT-504 HART®-Bluetooth® modem. Max. 15 normal instruments can be connected to a single HART® loop. All measured values can be visualized and/or the instruments can be remote programmed via digital HART® communication. Applicable software: EView2 configuration software or NIVISION process visualization software.



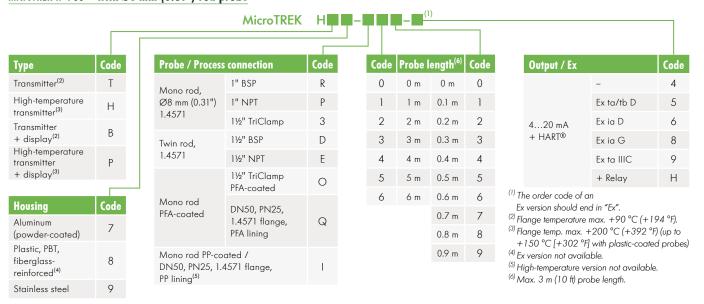


ORDER CODES (NOT ALL COMBINATIONS AVAILABLE)

MicroTREK H-700 - cable probe



MicroTREK H-700 - with Ø8 mm (0.31") rod probe













hta7s22en02b // NIVELCO reserves the right to change technical data without notice!

MicroTREK H-700 - Ø14 mm rod (0.55") or coaxial probe

Туре	Code
Transmitter ⁽²⁾	T
High-temperature transmitter ⁽³⁾	Н
Transmitter + display ⁽²⁾	В
High-temperature transmitter	Р

Housing	Code
Aluminum (powder-coated)	7
Plastic, PBT, fiberglass- reinforced ⁽⁴⁾	8
Stainless steel	9

+ display⁽³⁾

Probe / Process	Code	
Mono rod ⁽⁵⁾ , Ø14 mm (0.55"), 1.4571	1½" BSP	S
	1½" NPT	Z
	2" TriClamp	4
	1" BSP	Α
	1" NPT	В
Coaxial	11/2" BSP	С
probe ⁽⁵⁾ , 1.4571	1½" NPT	Н
	1½" TriClamp	5
	2" TriClamp	6

MicroTREK

Code	Probe I	ength ⁽⁶⁾	Code
0	0 m	0 m	0
1	1 m	0.1 m	1
2	2 m	0.2 m	2
3	3 m	0.3 m	3
4	4 m	0.4 m	4
5	5 m	0.5 m	5
6	6 m	0.6 m	6
		0.7 m	7
		0.8 m	8
		0.9 m	9

Output / Ex		Code
	-	4
	Ex ta/tb D	5
420 mA	Ex ia D	6
+ HART®	Ex ia G	8
	Ex ta IIIC	9
	+ Relay	Н

⁽¹⁾ The order code of an Ex version should end in "Ex".

 $^{(2)}$ Flange temperature max. +90 °C (+194°F).

 $^{(3)}$ Flange temp. max. +200 $^{\circ}$ C (+392 °F).

⁽⁴⁾ Ex version not available.

 $^{(5)}$ Can be ordered with segmented probe which must be specified in the text of the order. The length of the probe section is 1 m (3.3 ft).

(6) Max. 6 m (20 ft) probe length.

ACCESSORIES

Plug-in graphical display module	SAP-300-0
HART®-USB modem for remote programming with PC	UNICOMM SAT-304-0
HART®-USB/RS485 modem for remote programming with PC, DIN rail mountable	UNICOMM SAK-305-□
HART®-USB/Bluetooth® modem for remote programming	UNICOMM SAT-504-□
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





MFT-601

PROCESS CONNECTIONS(7)

DIN and ANSI flanges	MFT-
DN40 Pipe coupling (DIN 11851)	
EPDM FFKM seals	

⁽⁷⁾The above process connections and special seals are ordered separately and must be specified in the text part of the order



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