NEW

MicroTREK

GUIDED MICROWAVE LEVEL TRANSMITTERS
FOR LIQUIDS & SOLIDS

5 YEARS WARRANTY

NIVELCO

LEVEL TRANSMITTERS

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 (ε_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)
- 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 $\varepsilon_r \geq 1.4$
- 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

HTD–730

HTK–700

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)

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 ($\varepsilon_r > 1.8$) ■ 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		Distance, level; calculated values: volume, weight		
Measuring range		Depending on probe version and dielectric constant (Er) of the medium		
Probe versions		Mono cable, twin cable, mono rod, twin rod, coaxial pipe, segmented coaxial pipe and segmented rod		
Accuracy	Linearity error[1]	For liquids: ±5 mm (±0.2"), if probe length ≥10 m (32 ft): ±0.05% of the probe length. For solids: ±20 mm (±0.75"), if probe length ≥10 m (32 ft): ±0.2% of the probe length		
	Resolution	1 mm (0.04")		
Lowest ε_r of medium		1.4 (depending on probe version)		
Supply voltage		12[3]…36 V DC, nominal 24 V DC, Ex version: 12[3]…30 V DC, transient overvoltage protection		
Output	Communication	4…20 mA + HART®		
	Display (optional)[2]	SAP–300 graphical display unit		
	Relay (optional)	SPDT 30 V / 1 A DC; 48 V / 0.5 A AC		
Process temperature		–30…+90 °C (–22… +194 °F); high-temperature version: –30…+200 °C (–22…+392 °F)		
		For plastic-coated probes, see *"Probe Properties"*		
Highest process pressure		40 bar (580 psi); with plastic lined flange: max. 25 bar (363 psi); with coaxial pipe probe: max. 16 bar (232 psi)		
Ambient temperature		–30…+65 °C (–22…+149 °F), with display: –20…+65 °C (–4…+149 °F)		
Process connection		Threaded, flanged or sanitary connections (as per order code)		
Ingress protection		IP67		
Electrical connection		2× M20×1.5 cable glands + Two internally threaded ½" NPT connection for protective pipes, cable outer diameter: Ø6…Ø12 mm (Ø0.23…Ø0.47"), wire cross section: maximum 1.5 mm² (AWG15)		
Electrical protection		Class III		
Housing material		Plastic (PBT)	Painted aluminum	Stainless steel (KO35)
Seal		FPM (Viton®), optional: FFKM (Kalrez®), EPDM		
Explosion protection		—	See *"Ex Information"*	
Weight (head unit)		1.3 kg (2.86 lb)	2.2 kg (4.85 lb)	3.9 kg (8.6 lb)

[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.*

Ex INFORMATION

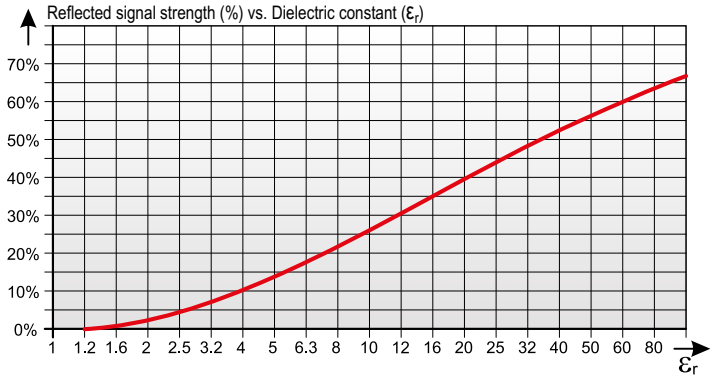
		H□□–7□□–8 Ex / H□□–9□□–8 Ex		H□□–7□□–6 Ex H□□–9□□–6 Ex	H□□–7□□–5 Ex H□□–9□□–5 Ex	H□□–7□□–9 Ex H□□–9□□–9 Ex
		Probe without coating	Coated probe			
Protection		Ex ia		Ex tD	Ex iaD	Ex ta D
Ex marking [4]	ATEX	⟨Ex⟩ II 1 G Ex ia IIC T6…T3 Ga	⟨Ex⟩ II 1 G Ex ia IIB T6…T3 Ga	⟨Ex⟩ II 1/2 D Ex ta/tb IIIC T85°C… T180°C Da/Db	⟨Ex⟩ II 1 D Ex ia IIIC T85°C…T180°C Da	⟨Ex⟩ II 1D Ex ta IIIC T105°C Da
	IEC Ex[5]	Ex ia IIC T6…T3 Ga	Ex ia IIB T6…T3 Ga	Ex ta/tb IIIC T85°C…T180°C Da/Db	Ex ia IIIC T85°C…T180°C Da	Ex ta IIIC T105°C Da
Intrinsic safety data		C_i ≤ 10 nF, L_i ≤ 10 µH, U_i ≤ 30 V, I_i ≤ 100 mA, P_i ≤ 0.75 W		C_i ≤ 10 nF, L_i ≤ 10 µH, U_i ≤ 30 V, I_i ≤ 140 mA, P_i ≤ 1 W		
Supply voltage		12[6]…30 V DC				
Electrical connection		2× M20×1.5 metal cable glands, cable outer diameter: Ø6…Ø12 mm (Ø0.23…Ø0.47"), wire cross section: maximum 1.5 mm² (AWG16)				
Ambient temperature		–30…+65 °C (–22…+149 °F), with display: –20…+65 °C (–4…+149 °F)				

[4] *In IIC environment SAP–300 graphic display must not be used!*
[5] *IEC Ex compliance is optional; must be requested in the order.*
[6] *In an industrial environment, reliable operation can be guaranteed with a terminal voltage >13 V.*

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 ε_r values			
Butane	1.4	Grain	3…5
Cement	1.5…10	Cooking oil	3.9
LPG	1.6…1.9	Limestone	6.1…9.1
Kerosene	1.8…2.1	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	2.4…3.6	Sulphuric acid (T = +20 °C [+68 °F])	84



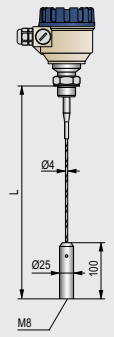
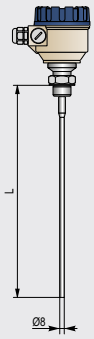
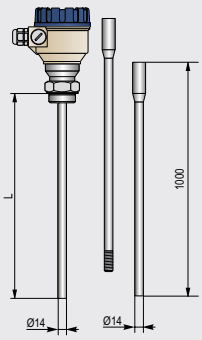
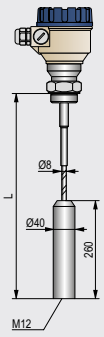
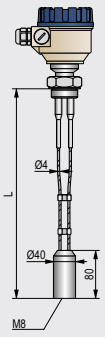
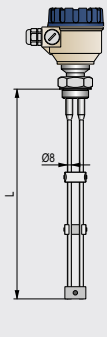
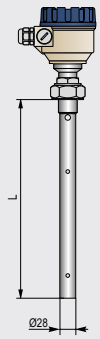
PROBES

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

Probe types	Max. measuring range	Dead zone[1]		Process connection	ε_r min.
		Upper (t) / lower (b) ε_r = 80	Upper (t) / lower (b) ε_r = 2.4		
Mono cable Ø4 mm (Ø0.15")	30 m (98.5 ft)	250 mm / 20 mm (9.84" / 0.75")	350 mm / 100 mm (13.8" / 4")	1"; 1½"	2.1
Mono cable Ø8 mm (Ø0.3")				1½"	
Mono rod Ø8 mm (Ø0.3")	3 m (10 ft)			1"	
Mono / segmented rod Ø14 mm (Ø0.55")	6 m (20 ft)			1½"	
Twin cable Ø4 mm (Ø0.15")	30 m (98.5 ft)	150 mm / 20 mm (6" / 0.75")	300 mm / 100 mm (12" / 4")		1.8
Twin rod Ø8 mm (Ø0.3")	3 m (10 ft)				
Coaxial pipe Ø28 mm (Ø1.1")	6 m (20 ft)	0 mm / 10 mm (0" / 0.4")	0 mm / 100 mm (0" / 4")	1"; 1½"	1.4
Segmented coaxial pipe Ø14 mm (Ø0.55")				1½"	1.6
Coated cable Ø6 mm (Ø0.225")	30 m (98.5 ft)	250 mm / 20 mm (9.84" / 0.75")	350 mm / 100 mm (13.8" / 4")	1"; 1½" TriClamp; DN40 Milch, DN50	2.4
Coated cable Ø12 / 16 mm (Ø0.45 / 0.65")	3 m (10 ft)			DN50	

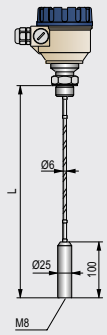
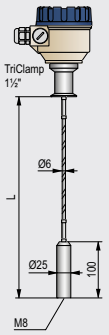
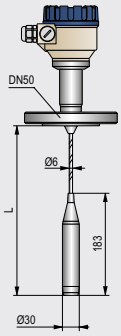
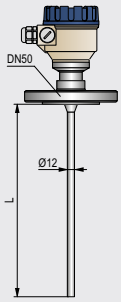
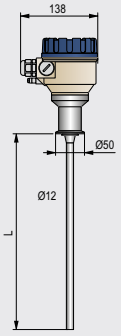
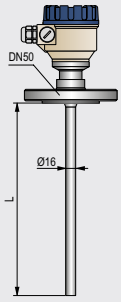
[1] *The unmeasurable upper and lower part of the tank, the lower dead zone is extended with the length of the counterweight (cable versions only).*

PROBE PROPERTIES

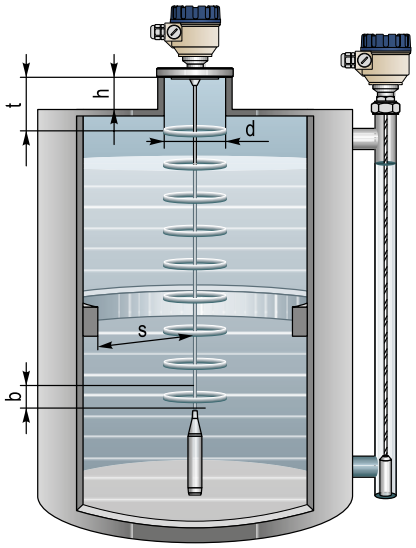
Type	H□K, H□L H□V, H□W	H□R, H□P	H□S, H□Z	H□N, H□J	H□T, H□U	H□D, H□E	H□A, H□B H□C, H□H
Probe	Ø4 mm (Ø0.15") cable	Rod	Rod / segmented rod	Ø8 mm (Ø0.3") cable	Ø4 mm (Ø0.15") twin cable	Twin rod	Coaxial
Maximum measuring distance	30 m (98.5 ft)	3 m (10 ft)	6 m (20 ft)	30 m (98.5 ft)		3 m (10 ft)	6 m (20 ft)
Min. meas. dist. (ε_r = 80 / ε_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		1.4
Sensing space around the probe	Ø600 mm (23.6")				Ø200 mm (7.87")		Ø0 mm
Process connection	1" BSP / NPT	1" BSP	1½" BSP				1" BSP / NPT
	1½" BSP / NPT	1" NPT	1½" NPT				1½" BSP / NPT
Probe material	1.4401	1.4571		1.4401		1.4571	
Probe nominal Ø	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							
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	–		1.4571		–	

[2] *There is no separator below 1.5 m (5 ft) length*

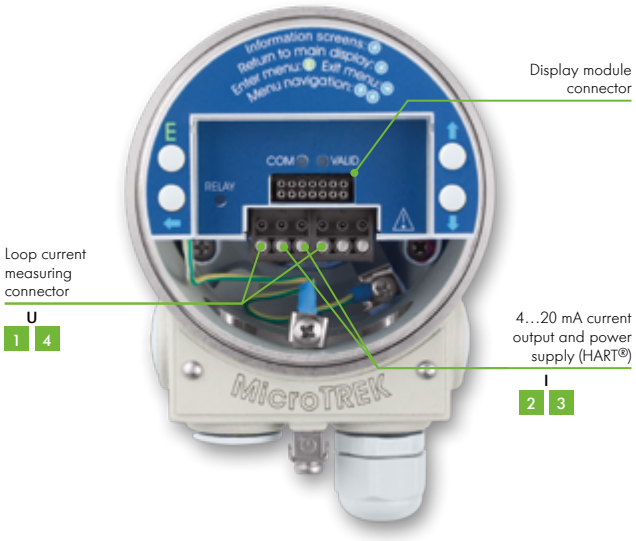
COATED PROBE PROPERTIES

	Type	H□F, H□G	H□X	H□Y	H□M	H□Q	H□O	H□I
	Probe	Ø4 mm (Ø0.15") FEP-coated cable			Ø4 mm (Ø0.15") fully FEP/PFA-coated cable	Fully PFA-coated rod		Fully PP-coated rod
Maximum measuring distance		30 m (98.5 ft)				3 m (10 ft)		
Min. measuring distance (ε_r = 80 / ε_r = 2.4)		250 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 flange		1½" TriClamp	DN50 PN25
Highest medium temperature		+200 °C (+392 °F)			+150 °C (+302 °F)			+60 °C (+140 °F)
Probe material		1.4401				1.4571		
Probe coating		FEP			FEP / PFA	PFA		PP
Probe nominal Ø		6 mm (0.24")				12 mm (0.48")		16 mm (0.63")
Fillet coating		–			PFA			PP
Weight material		1.4571			1.4571 + PFA coating	–		
Weight dimensions		Ø25 x 100 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								

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

SETUP, PROGRAMMING

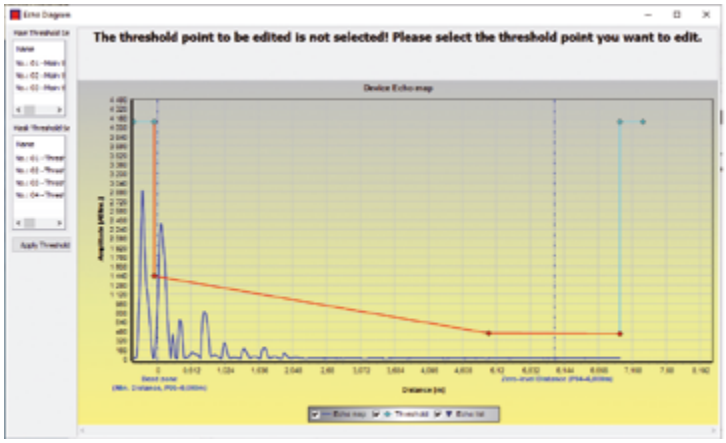
with SAP–300 display unit

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.

SAP–300
display

with EView2 software

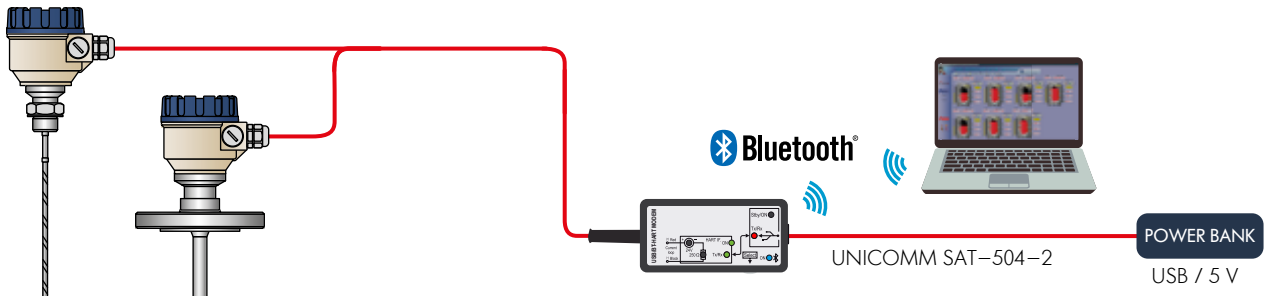
The **EView2** configuration software can be downloaded free of charge. All usermodifiable parameters of the **MicroTREK** can be set and all values can be queried through **EView2**. Other features are: continuous "echo-map" reading, trend monitoring, data logging, data saving.



H□S / H□Z–700 / 800
with segmented probe

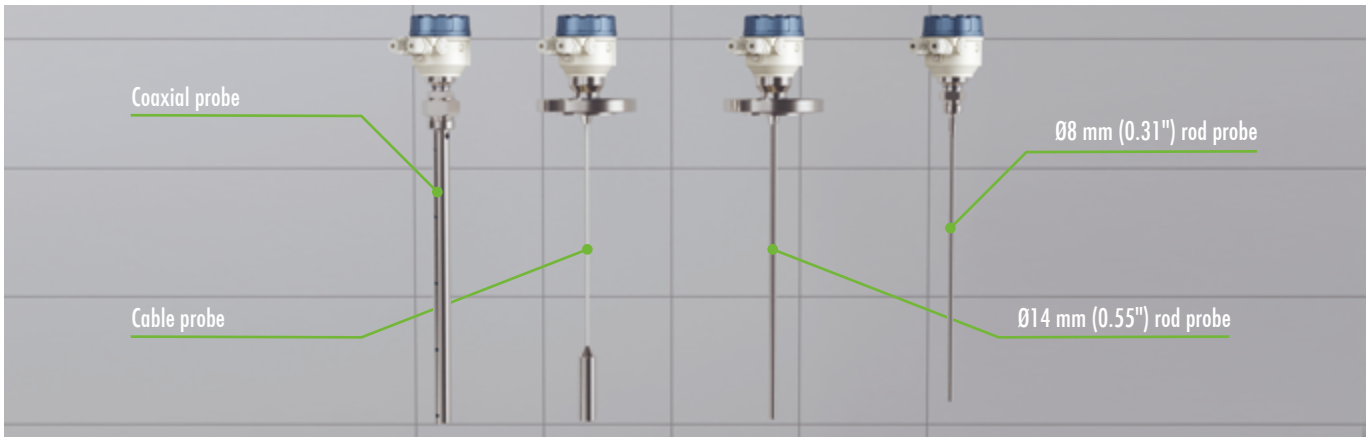
MicroTREK TRANSMITTERS IN SYSTEM WITH A PC

Instruments with HART® output can be connected to a PC interfaced by a **UNICOMM** HART®-USB modem, or can be connected wirelessly 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.



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. Vizualisation on PC can be accomplished with **NIVISION** process vizualisation software.



ORDER CODES (NOT ALL COMBINATIONS AVAILABLE)

MicroTREK H–700 – cable probe

MicroTREK H■■–■■■–■[1]

Type	Code
Transmitter[2]	T
High temperature transmitter[3]	H
Transmitter + display[2]	B
High temperature transmitter + display[3]	P

Housing	Code
Aluminum	7
Plastic, PBT, fiberglass-reinforced[4]	8
Stainless steel	9

Probe / Process connection		Code
Mono cable, Ø4 mm (Ø0.15"), 1.4401	1" BSP	K
	1" NPT	L
	1½" BSP	V
	1½" NPT	W
	1½" TriClamp	1
	2" TriClamp	2
Mono cable, Ø8 mm (0.31"), 1.4401	1½" BSP	N
	1½" NPT	J
Twin cable, 2× Ø4 mm (Ø0.15"), 1.4401	1½" BSP	T
	1½" NPT	U
Mono cable, Ø4 mm (Ø0.15"), FEP-coated[5]	1" BSP	F
	1" NPT	G
	DN40 TriClamp	X
	DN40 Milch	Y
Mono cable, Ø4 mm (Ø0.15"), PFA/FEP fully coated / DN50, PN25, 1.4571 flange, PFA/FEP lining		M

Code	Probe length[6]		Code
0	0 m	0 m	0
1	10 m	1 m	1
2	20 m	2 m	2
3	30 m	3 m	3
		4 m	4
		5 m	5
		6 m	6
		7 m	7
		8 m	8
		9 m	9

Output / Ex		Code
4…20 mA + HART®	–	4
	Ex ta/tb D	5
	Ex ia D	6
	Ex ia G	8
	Ex ta IIIC	9
	+ Relay	H

[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 °C (+392 °F) (M type only up to +150 °C [+302 °F]).
[4] Ex version not available.
[5] Only the cable probe is coated.
[6] Max. 30 m (98.5 ft) probe length.

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

MicroTREK H■■–■■■–■[1]

Type	Code
Transmitter[2]	T
High-temperature transmitter[3]	H
Transmitter + display[2]	B
High-temperature transmitter + display[3]	P

Housing	Code
Aluminum	7
Plastic, PBT, fiberglass-reinforced[4]	8
Stainless steel	9

Probe / Process connection		Code
Mono rod, Ø8 mm (0.31") 1.4571	1" BSP	R
	1" NPT	P
	1½" TriClamp	3
Twin rod, 1.4571	1½" BSP	D
	1½" NPT	E
Mono rod PFA-coated	1½" TriClamp PFA-coated	O
	DN50, PN25, 1.4571 flange, PFA lining	Q
Mono rod PP-coated / DN50, PN25, 1.4571 flange, PP lining[5]		I

Code	Probe length[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…20 mA + HART®	–	4
	Ex ta/tb D	5
	Ex ia D	6
	Ex ia G	8
	Ex ta IIIC	9
	+ Relay	H

[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 °C (+392 °F) (up to +150 °C [+302 °F] with plastic-coated probes)
[4] Ex version not available.
[5] High-temperature version not available.
[6] Max. 3 m (10 ft) probe length.

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

MicroTREK H■■–■■■–■[1]

Type	Code
Transmitter[2]	T
High-temperature transmitter[3]	H
Transmitter + display[2]	B
High-temperature transmitter + display[3]	P

Housing	Code
Aluminum	7
Plastic, PBT, fiberglass-reinforced[4]	8
Stainless steel	9

Probe / Process connection		Code
Mono rod[5], Ø14 mm *(0.55")*, 1.4571	1½" BSP	S
	1½" NPT	Z
	2" TriClamp	4
Coaxial probe[5], 1.4571	1" BSP	A
	1" NPT	B
	1½" BSP	C
	1½" NPT	H
	1½" TriClamp	5
	2" TriClamp	6

Code	Probe length[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…20 mA + HART®	–	4
	Ex ta/tb D	5
	Ex ia D	6
	Ex ia G	8
	Ex ta IIIC	9
	+ Relay	H

[1] The order code of an Ex version should end in "Ex".
[2] Flange temperature max. +90 °C (+194 °F).
[3] Flange temperature max. +200 °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

HPA–726

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