NEW MICROTREK

GUIDED MICROWAVE LEVEL TRANSMITTERS FOR LIQUIDS & SOLIDS



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 (\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)
- 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 $\mathcal{E}_r \ge 1.4$
- 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			HTK-700
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 (£_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 With the series and the series

- Where no dead zone allowed

TECHNICAL DATA

Features	Version	Plastic housing	Plastic housing Aluminum housing						
Measured	values	Dist	ance, level; calculated values: volume, w	veight					
Measurin	g range	Depending or	probe version and dielectric constant (8	r) of the medium					
Probe ver	sions	Mono cable, twin cable, mono	rod, twin rod, coaxial pipe, segmented	coaxial pipe and segmented rod					
Accuracy	Linearity error ⁽¹⁾		±0.2"), if probe length ≥10 m (32 ft): ±0.05" (±0.75"), if probe length ≥10 m (32 ft): ±0.2						
	Resolution		1 mm (0.04")						
Lowest $\epsilon_{\textrm{r}}$	of medium		1.4 (depending on probe version)						
Supply vo	oltage	12 ⁽³⁾ 36 V DC, nominal 24 V DC, Ex version: 12 ⁽³⁾ 30 V DC, transient 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							
Process temperature		−30+90 °C (−22+194 °F); high-temperature version: −30+200 °C (−22+392 °F)							
FIOCESS IE	emperature	For plastic-coated probes, see "Probe Properties"							
Highest p	rocess pressure	40 bar (580 psi); with plastic lined	d flange: max. 25 bar (363 psi); with coaxia	l pipe probe: max. 16 bar (232 psi)					
Ambient t	emperature	-30+65 °C	C (−22+149 °F), with display: −20+65	°C (-4+149 °F)					
Process co	onnection	Threaded,	flanged or sanitary connections (as per	order code)					
Ingress pr	otection		IP67						
Electrical	connection		s + Two internally threaded ½" NPT con Ø12 mm (00.2300.47"), wire cross sectio						
Electrical	protection		Class III						
Housing r	material	Plastic (PBT)	Powder-coated aluminum	Stainless steel (KO35)					
Seal		FF	M (Viton®), optional: FFKM (Kalrez®), EP[DM					
Explosion	protection	_	See "Ex Ir	nformation"					
Weight (h	nead unit) 1.3 kg (2.86 lb) 2.2 kg (4.85 lb) 3.9 kg (8.6 lb)								
(1) Index reference conditions and constant temperature									

(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		100–900–8 Ex	HDD-7DD-5 Ex	HDD-7DD-6 Ex	HDD-7DD-9 Ex			
		Probe without coating	Coated probe	HDD-9DD-5 Ex	HDD-9DD-6 Ex	HDD-9DD-9 Ex			
Protection		Ex ia		Ex tD	Ex iaD	Ex ta D			
Ex marking ⁽⁴⁾	ATEX	🐵 II 1 G Ex ia IIC T6 T3 Ga	🖾 II 1 G Ex ia IIB T6 T3 Ga	ⓑ Ⅱ 1/2 D Ex ta/tb ⅢC T85°C T180°C Da/Db	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		$\begin{array}{l} C_i \leq 10 \; \text{nF}, L_i \leq 10 \; \mu\text{H}, U_i \leq 30 \; \text{V}, \\ I_i \leq 100 \; \text{mA}, P_i \leq 0.75 \; \text{W} \end{array}$		$C_i \le 10 \text{ nF}, L_i \le 10 \text{ \muH}, U_i \le 30 \text{ mH}$	0 V, I _i \leq 140 mA, P _i \leq 1 W				
Supply voltage				12 ⁽⁶⁾ 30 V DC					
Electrical connection		2× M20×1.5 metal ca	2× M20×1.5 metal cable 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+65 °C (-4+149 °F)						

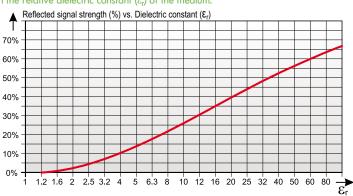
⁽⁴⁾ In IIC environment SAP-300 graphic display must not be used!
 ⁽⁶⁾ In an industrial environment, reliable operation can be guaranteed with a terminal voltage >13 V.

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

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 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 = $+20 \degree C [+68 \degree F]$)	84



PROBES

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

	Max.	Dead zo	ne ⁽¹⁾	D		
Probe types	measuring range	Upper (t) / lower (b) ε _r = 80	Upper (t) / lower (b) ε _r = 2.4	Process connection	ε _r min.	
Mono cable Ø4 mm (Ø0.15")	00 (00 F (i)			1"; 1½"		
Mono cable Ø8 mm (Ø0.3")	30 m (98.5 ft)	050 / 00	0.50 (100	11⁄2"		
Mono rod Ø8 mm (00.3")	3 m (10 ft)	250 mm / 20 mm 350 mm / 100 mm (9.84" / 0.75") (13.8" / 4")		ן"	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	11/2"	1.0	
Twin rod Ø8 mm (Ø0.3")	3 m (10 ft)	(6" / 0.75")	(12" / 4")		1.8	
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 mm / 10 mm (0" / 0.4")	0 mm / 100 mm (0" / 4")	11⁄2"	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 ft)	(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).

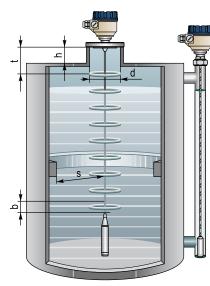
PROBE PROPERTIES

	Туре	HOK, HOL HOV, HOW	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 <i>(Ø0.15")</i> 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 ft)	6 m (20 ft)	30 r	n (98.5 ft)	3 m (10 ft)	6 m (20 ft)
Min. meas. $(\epsilon_r = 80 / \epsilon)$			250 mm /	350 mm (9.84" / 13.8")		150 mm / 300	mm (6" / 11.8")	0 m
Lowest ϵ_r o	f medium			2.1		1.8	3	1.4
Sensing spe around the			Ø6	00 mm (23.6")		Ø200 m	m (7.87")	Ø0 mm
Process cor	anaction	1" BSP / NPT	1" BSP		1½" BS	p		1" BSP / NPT
Frocess cor	nection	11⁄2" BSP / NPT	1" NPT		11⁄2" NP	Т		11⁄2" BSP / NPT
Probe mate	erial	1.4401		1.4571	1.4	1401	L	4571
Probe nomi	inal 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 din	nensions	Ø25 × 100 mm (Ø1 x 4")		-	Ø40 × 260 mm (Ø1.5 x 10")	Ø40 × 80 mm (Ø1.5 x 3")		-
Weight ma	iterial	1.4571		-	1.4571 –			
⁽²⁾ There is no	separator belo	w 1.5 m (5 ft) length						

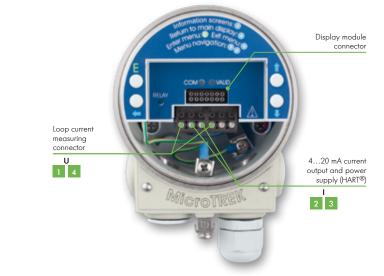
COATED PROBE PROPERTIES

Туре	H□F, H□G	Н□Х	H□Y	Н□м	H□Q	H⊡O	HDI	
Probe	Ø4 mm (J	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	n (98.5 ft)			3 m (10 ft)		
Min. measuring distance ($\epsilon_r = 80$ / $\epsilon_r = 2.4$)			25	50 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].4	4401			1.4571		
Probe coating		FEP			F	PFA	PP	
Probe nominal Ø		6 mm (0.24")			12 m	ım (0.48")	16 mm (0.63")	
Fillet coating		-			PFA		PP	
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/	0.6 kg/m (0.4 lb/ft)		
Dimensions		TriClamp 11/2***********************************						

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

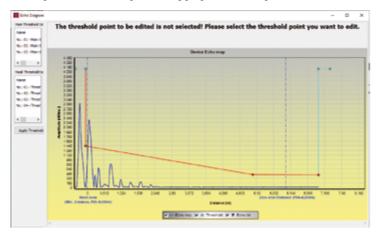
with SAP-300 display unit

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.



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.

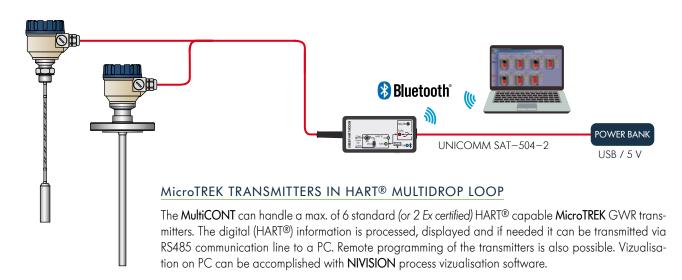


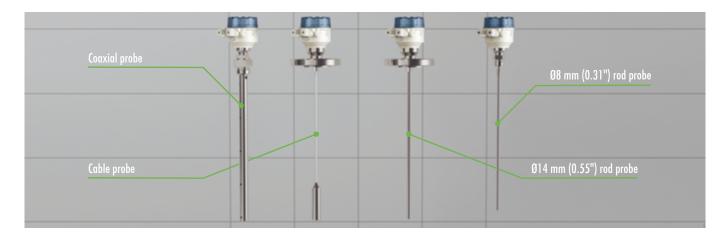


with segmented probe

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.





ORDER CODES (NOT ALL COMBINATIONS AVAILABLE)

MicroTREK H-700 - cable probe

			MicroTREK	н	— –I		⁽¹)				
Туре	Code	Probe / Process co	nnection	Code		Code	Probe l	ength ⁽⁶⁾	Code	Output / Ex		Code
Transmitter ⁽²⁾	Т		1" BSP	К		0	0 m	0 m	0		-	4
High temperature transmitter ⁽³⁾	Н		1" NPT	L		1	10 m	lm	1	420 mA + HART®	Ex ta/tb D	5
Transmitter	В	Mono cable, Ø4 mm (Ø0.15"),	11⁄2" BSP	V		2	20 m	2 m	2		Ex ia D	6
+ display ⁽²⁾	D	1.4401	11⁄2" NPT	W		3	30 m	3 m	3		Ex ia G	8
High temperature transmitter	Р		1½" TriClamp	1				4 m	4		Ex ta IIIC	9
+ display ⁽³⁾			2" TriClamp	2				5 m	5		+ Relay	Н
Houston	Code	Mono cable,	11⁄2" BSP	Ν				6 m	6	⁽¹⁾ The order code		
Housing Aluminum		Ø8 mm (0.31"), 1.4401	11/2" NPT	J				7 m	7	Ex version shou ⁽²⁾ Flange tempera	ld end in "Ex". ature max. +90 °C	2
(powder-coated)	7	Twin cable, 2×	11⁄2" BSP	Т				8 m	8	(+194 °F).		
Plastic, PBT, fiberalass-	8	Ø4 mm (Ø0.15"), 1.4401	11⁄2" NPT	U				9 m	9	0 1	ax. +200 °C (+3 > to +150 °C [+3	,
reinforced ⁽⁴⁾	0		1" BSP	F						⁽⁴⁾ Ex version not c ⁽⁵⁾ Only the cable		
Stainless steel	9	Mono cable,	1" NPT	G						,	3.5 ft) probe length	٦.
		Ø4 mm (Ø0.15"), FEP-coated ⁽⁵⁾	DN40 TriClamp	Х								
			DN40 Milch	Y								
		Mono cable, Ø4 m PFA/FEP fully coate / DN50, PN25, 1.4. PFA/FEP lining	d	М								

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

			MicroTRE	СНЩІ	-			1)							
Туре	Code	Probe / Process	connection	Code		Code	Probe	ength ⁽⁶⁾	Code		Output / Ex		Code		
Transmitter ⁽²⁾	Т	Mono rod,	1" BSP	R		0	0 m	0 m	0			-	4		
High-temperature	Н	Ø8 mm (0.31")	1" NPT	Р		1	lm	0.1 m	1			Ex ta/tb D	5		
transmitter ⁽³⁾ Transmitter		1.4571	1½" TriClamp	3		2	2 m	0.2 m	2		420 mA	420 mA	420 mA	Ex ia D	6
+ display ⁽²⁾	В	Twin rod,	11⁄2" BSP	D		3	3 m	0.3 m	3		+ HART®	Ex ia G	8		
High-temperature transmitter	Р	1.4571	11⁄2" NPT	E		4	4 m	0.4 m	4			Ex ta IIIC	9		
+ display ⁽³⁾			1½" TriClamp	0		5	5 m	0.5 m	5			+ Relay	Н		
Housing	Code	Mono rod	PFA-coated			6	6 m	0.6 m	6		he order code of c				
Housing Aluminum		PFA-coated	DN50, PN25, 1.4571 flange,	Q				0.7 m	7	(01)	x version should en lange temperature		94 °F).		
(powder-coated)	7		PFA lining	~				0.8 m	8		ange temp. max	`			
Plastic, PBT, fiberglass- reinforced ⁽⁴⁾	8	Mono rod PP-co DN50, PN25, 1.4		+ 150 °C [+302 °F] with plastic: 0.9 m 9 ⁽⁴⁾ Ex version not available. (⁵⁾ High-temperature version not ava (⁶⁾ Max. 3 m (10 ft) probe length.				able. ersion not available							
Stainless steel	9	PP lining ⁽⁵⁾								⁽⁰⁾ N	1ax. 3 m (10 ff) pro	bbe length.			



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

			MicroTREK	HE -		(1)		
						_		
Туре	Code	Probe / Process	connection	Code	Code	Probe	length ⁽⁶⁾	Code
Transmitter ⁽²⁾	Т	Mono rod ⁽⁵⁾ ,	11⁄2" BSP	S	0	0 m	0 m	0
High-temperature transmitter ⁽³⁾	Н	Ø14 mm (0.55"),	11/2" NPT	Z	1	lm	0.1 m	1
Transmitter		1.4571	2" TriClamp	4	2	2 m	0.2 m	2
+ display ⁽²⁾	В		1" BSP	А	3	3 m	0.3 m	3
High-temperature transmitter	Р		1" NPT	В	4	4 m	0.4 m	4
+ display ⁽³⁾		Coaxial	11⁄2" BSP	С	5	5 m	0.5 m	5
Housing	Code	probe ⁽⁵⁾ , 1.4571	11/2" NPT	Н	6	6 m	0.6 m	6
Housing Aluminum	Code		1½" TriClamp	5			0.7 m	7
(powder-coated)	7		2" TriClamp	6			0.8 m	8
Plastic, PBT, fiberglass- reinforced ⁽⁴⁾	8						0.9 m	9

Output / Ex		Code
420 mA	-	4
	Ex ta/tb D	5
	Ex ia D	6
+ HART®	Ex ia G	8
	Ex ta IIIC	9
	+ Relay	Н
⁽¹⁾ The order coo Ex version sho ⁽²⁾ Flange tempe	uld end in "Ex".	

EHL

CE

 $\langle \xi_X \rangle$

 $^{(2)}$ Flange temperature max. +90 $^{\circ}\mathrm{C}$

(+194 °F). ⁽³⁾ Flange temp. max. +200 °C (+392 °F).

⁽⁴⁾ Ex version not available.

 $^{\rm (5)}\,{\rm Can}$ 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.

653.00

ACCESSORIES

Stainless steel

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Plug-in graphical display module	SAP-300-0	
HART®-USB modem for remote programming with PC	UNICOMM SAT-304-0	U4-300
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-	653.00
Multichannel process controller and display unit	MultiCONT PRW-2	TIVE.CO
24 V DC power supply, DIN rail mountable	NIPOWER PPK-431-	
Intrinsically safe isolator module, DIN rail mountable	UNICONT PGK-301-	
EView2 configuration software for remote programming with PC	FREE download	6



MFT-601

PROCESS CONNECTIONS⁽⁷⁾

DIN and ANSI flanges	MFT-DDD-D
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

NIVELCO PROCESS CONTROL CO. H-1043 Budapest, Dugonics v. 11. Tel.: (36-1) 889-0100

