



RusAutomation

Для жидких и твердых веществ

# MicroTREK

РЕФЛЕКСНЫЙ МИКРОВОЛНОВОЙ ПРЕОБРАЗОВАТЕЛЬ УРОВНЯ



УРОВНЕМЕРЫ



ВАШ УРОВЕНЬ В НАШЕМ ПРОФЕССИОНАЛИЗМЕ

**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.

**MAIN FEATURES**

- Measuring range up to 24 m
- Accuracy:  $\pm 5$  mm
- 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
- Maximum process pressure: 40 bar
- IP67 protection

**CERTIFICATIONS**

- ATEX (Ex ia)
- ATEX (Ex iaD)
- ATEX (Dust Ex)
- IEC (Ex ia)
- IEC (Ex iaD)



HHA-400



HTK-400



SAP-300 display

**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 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	Stainless steel housing
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 <sup>(1)</sup> For liquids: $\pm 5$ mm, if probe length $\geq 10$ m: $\pm 0.05\%$ of the probe length For solids: $\pm 20$ mm, if probe length $\geq 10$ m: $\pm 0.2\%$ of the probe length		
	Resolution $\pm 3 \mu\text{A}$		
Minimum $\epsilon_r$ of the medium	1.4 (depending on the probe type)		
Power supply	18 – 35 V DC, nominal 24 V DC, Ex version: 18 – 28 V DC, protection against surge transients		
Output	Digital communication 4 – 20 mA + HART®		
	Display SAP-300 graphical display unit		
Medium temperature	-30 °C ... +90 °C; high temperature version: -30 °C ... +200 °C		
	With plastic coated probes see: Technical data of the coated probes		
Maximum medium pressure	4 MPa (40 bar); with plastic lined flange: max. 2.5 MPa (25 bar); with coaxial pipe probe: max. 1.6 MPa (16 bar)		
Ambient temperature	-30 °C ... +60 °C, with display: -20 °C ... +60 °C		
Process connection	Threaded, Flanged or Sanitary connections (as per order codes)		
Ingress protection	IP67		
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, wire cross section: max. 1.5 mm <sup>2</sup>		
Electrical protection	Class III		
Housing material	Plastic (PBT)	Paint coated aluminium	Stainless steel (KO35)
Sealing	FPM (Viton®), optional: FFKM (Kalrez®), EPDM		
Explosion protection	— See: Special data for Ex certified models		
Mass (head unit)	1.5 kg	2.4 kg	4.1 kg

<sup>(1)</sup> Under reference conditions and stabilized temperature

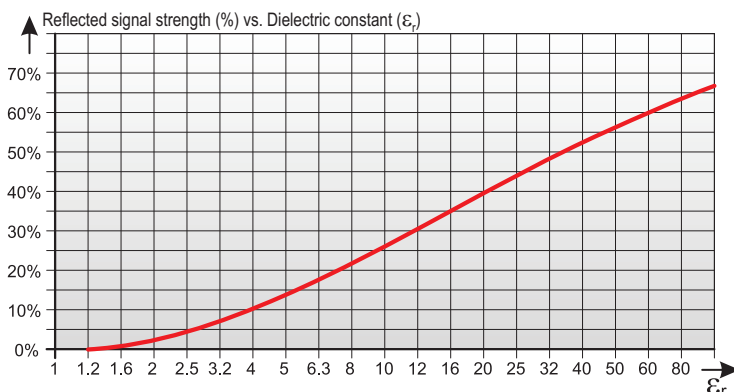
SPECIAL DATA FOR Ex CERTIFIED MODELS

Type	H□□-4□□-8Ex / H□□-6□□-8Ex		H□□-4□□-5Ex H□□-6□□-5Ex	H□□-4□□-6Ex H□□-6□□-6Ex
	Probe without coating	Coated probe		
Protection type	ia		tD	iaD
Ex marking	ATEX	⊕ II 1 G Ex ia IIC T6...T3 Ga	⊕ II 1 G Ex ia IIB T6...T3 Ga	⊕ II 1 D Ex ia IIIC T85°C...T180°C Da
	IEC Ex <sup>(2)</sup>	Ex ia IIC T6...T3 Ga	Ex ia IIB T6...T3 Ga	Ex ia IIIC T85°C...T180°C Da; -30 °C ≤ Tamb ≤ +60 °C
Intrinsically safe data	Ci ≤ 10 nF, Li ≤ 10 μH, Ui ≤ 30 V, Ii ≤ 100 mA, Pi ≤ 0.75 W		Ci ≤ 10 nF, Li ≤ 10 μH, Ui ≤ 30 V, Ii ≤ 140 mA, Pi ≤ 1 W	
Power supply	18 V – 28 V DC			
Electrical connection	2x M20x1.5 metal cable glands, cable outer diameter: $\varnothing 7 - \varnothing 13$ mm, wire cross section: maximum 1.5 mm <sup>2</sup>			
Ambient temperature	-30 °C ... +60 °C, with display: -20 °C ... +60 °C			

<sup>(2)</sup> Need of IEC Ex is to be specified with order.

MEASURABILITY OF THE MEDIUM

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	Grain	3 – 5
Cement	1.5 – 10	Edible 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
Benzene	2.3	Glycol	37
Asphalt	2.6	Nitrobenzene	40
Clinker	2.7	Water	80
Resin	2.4 – 3.6	Sulphuric acid (T = 20 °C)	84

## 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 <sup>(1)</sup>		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	24 m	300 / 20 mm	400 / 100 mm	1"; 1½"	2.1
Mono cable $\varnothing 8$ mm				1½"	
Mono rod $\varnothing 8$ mm				1"	
Mono / segmented rod $\varnothing 14$ mm				6 m	
Twin cable $\varnothing 4$ mm	24 m	150 / 20 mm	300 / 100 mm	1½"	1.8
Twin rod $\varnothing 8$ mm	3 m				
Coaxial pipe $\varnothing 28$ mm	6 m	0 / 10 mm	0 / 100 mm	1"; 1½"	1.4
Coated cable $\varnothing 6$ mm	24 m	300 / 20 mm	400 / 100 mm	1"; 1½" TriClamp; DN40 MILCH, DN50	2.4
Coated rod $\varnothing 12 / \varnothing 16$ mm				3 m	

<sup>(1)</sup> 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 / segmented rod	Cable	Twin cable	Twin rod	Coaxial
Max. meas. dist.	24 m	3 m	6 m	24 m		3 m	6 m
Min. meas. dist. ( $\epsilon_r=80 / \epsilon_r=2.4$ )	0.3 m / 0.4 m			0.15 m / 0.3 m		0 m	0 m
Minimum $\epsilon_r$ of the medium	2.1			1.8		1.4	1.4
Sensing space around the probe	$\varnothing 600$ mm			$\varnothing 200$ mm		0 mm	0 mm
Process connection	1" BSP; 1" NPT	1" BSP	1½" BSP		1" BSP; 1" NPT		
	1½" BSP; 1½" NPT	1" NPT	1½" NPT		1½" BSP; 1½" NPT		
Probe material	1.4401	1.4571		1.4401		1.4571	
Probe nominal $\varnothing$	4 mm	8 mm	14 mm	8 mm	4 mm	8 mm	28 mm
Mass	0.12 kg/m	0.4 kg/m	1.2 kg/m	0.4 kg/m	0.24 kg/m	0.8 kg/m	1.3 kg/m
Separator material <sup>(2)</sup>	-				PFA, welded on the cable	PTFE-GF25	PTFE
Weight dimensions	$\varnothing 25 \times 100$ mm	-		$\varnothing 40 \times 260$ mm	$\varnothing 40 \times 80$ mm	-	
Weight material	1.4571	-		1.4571		-	

<sup>(2)</sup> There is no separator below 1.5 m length

## TECHNICAL DATA OF THE COATED PROBES

Type	HOF, HOG	HOX	HOY	HOM	HQQ	HOO	HOI
Denomin.	FEP coated cable			PFA coated rod		PP coated rod	
Max. meas. dist.	24 m			3 m			
Min. meas. dist. ( $\epsilon_r = 80 / \epsilon_r = 2.4$ )	0.3 m / 0.4 m						
Minimum $\epsilon_r$ of the medium	2.4						
Sensing space around the probe	$\varnothing 600$ mm						
Process connection	1" BSP; 1" NPT	1½" TriClamp	DN 40 MILCH	DN 50 PN25 flange	1½" TriClamp	DN 50 PN25	
Max. medium temp.	+150 °C					+60 °C	
Probe material	1.4401			1.4571			
Probe coating material	FEP			PFA		PP	
Probe nominal $\varnothing$	6 mm			12 mm		16 mm	
Fillet coating material	-			PFA		PP	
Weight material	1.4571			1.4571 + PFA coating		-	
Mass	0.16 kg/m			0.5 kg/m		0.6 kg/m	