

For liquids and solids

MicroTREK

GUIDED MICROWAVE LEVEL TRANSMITTERS



LEVEL TRANSMITTERS

30 YEARS

PIVELE



OUR PROFESSION IS YOUR LEVEL

MicroTREK TRANSMITTERS FOR LIQUIDS AND SOLIDS

FEATURES

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

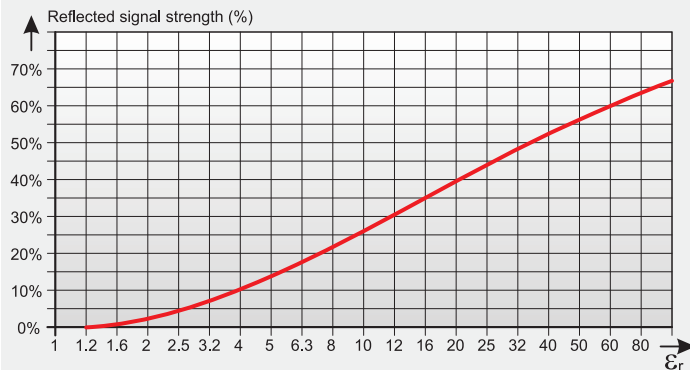


GENERAL DESCRIPTION

The **MicroTREK** guided microwave 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 pulse 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 pulse. 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 ϵ_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	Twin cable	Twin rod	Coaxial Pipe
<ul style="list-style-type: none"> ■ Cement, limestone, fly ash, alumina, carbon black ■ All high-viscosity liquids ■ Mineral powders ■ Clean and contaminated liquids ■ For all viscous liquids ■ For stilling wells (calibration required) ■ Aggressive mediums with coated probes ■ Slightly conductive foams ■ High temperature applications ■ Bypass applications 	<ul style="list-style-type: none"> ■ Tank parks with solvents, oil or fuels ■ Water storage tanks ■ Plastic granules ■ For products with low dielectric constant ($\epsilon_r > 1.8$) ■ Light granules ■ For narrow tanks ■ Where minimum dead-zone is needed ■ Mounting close to tank wall is possible 	<ul style="list-style-type: none"> ■ Plastic granule vessels ■ Coated tanks ■ Clean and contaminated liquids ■ Fine powders ■ For narrow tanks ■ Where minimum dead-zone is needed ■ For mediums with low dielectric constants and slightly moving products 	<ul style="list-style-type: none"> ■ Small vessels or tanks with max. 6 m (20 feet) height ■ 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 vapour spray near the probe ■ Can be heated ■ Contact possible with metallic object or tank wall ■ Where no dead zone allowed

TECHNICAL DATA

General Data		
Input data	Measured values	Distance, level, volume
	Measuring range	Depends on the probe type and dielectric constant of the measured medium
Probe types		Coaxial, twin cable, mono cable, twin rod and mono rod
Housing		Paint coated aluminium or plastic PBT
Medium temperature		-30 °C...+200 °C (-22 °F...+392 °F) (Ex), other temp. ranges for non-Ex versions on request Flange temperature: -30 °C...+90 °C (-22 °F...+194 °F), for H or P high temp. versions up to +200 °C (+392 °F)
Medium pressure		-1...16 bar (-14...232 psig); maximum allowed pressure on 20 °C (68 °F), with 1.4571 (stainless steel) flange: 40 bar (580 psig)
Ambient temperature		-30 °C...+60 °C (-22 °F...+140 °F), with display: -20 °C...+60 °C (-4 °F...+140 °F)
Sealing		FPM (Viton®), for high temp. versions optional Perfluoroelastomer (Kalrez®), EPDM
Ingress protection		IP 65
Power supply		18 - 35 V DC, protected against surge transients
Output data	Output signals	Analogue: 4 - 20 mA, (3.9 - 20.5 mA) passive output, error indication: 22 mA
		Digital: HART® interface, terminal resistor maximum 250 Ohm
		Display: SAP-300 LCD dot-matrix
	Accuracy *	For liquids: ± 5 mm (0.2 inch), if probe length L ≥ 10 m (32 feet): ± 0.05 % of the probe length For solids: ± 20 mm (0.75 inch), if probe length L ≥ 10m (32 feet): ± 0.2 % of the probe length
Resolution	± 3 µA	
Electrical connection		2 x M20x1.5 metal cable gland (Ex version), cable diameter: 7...13 mm (0.3...0.5 inch), or M20x1.5 plastic cable gland, cable diameter: 6...12 mm (0.25 ... 0.45 inch) wire cross section: 0.5...1.5 mm ² (0.0007...0.002 square inch) (shielded cable suggested) + 2 x NPT 1/2"
Electrical protection		Class III.
Mass (head unit)		1.5 kg (3.3 lb)

* under ideal reflecting surface and constant temperature conditions

Additional data for the Ex approved models

Ex marking	II 1G Ex ia IIC T6...T3; coated probe versions: II 1G Ex ia IIB T6...T3; II 1D iaD A20/A21 IP65 T100°C
Intrinsically safe data	Ci ≤ 10 nF, Li ≤ 100 µH, Ui ≤ 30 V, li ≤ 150 mA, Pi ≤ 1 W Ex transmitters should be powered with Ex ia power supply
Applicable Ex power supply, load	Uo < 28 V, Io < 140 mA, Po < 1 W, Supply range: 18 V...28 V, Rt max = (Ut - 12 V) / 0.02 A
Medium temperature	-30 °C...+200 °C (-22 °F...+392 °F)
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 technologic conditions.

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

* 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

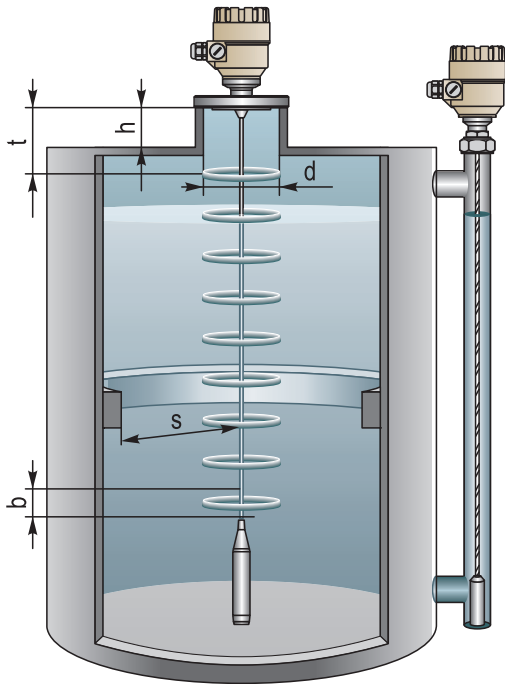
Type	HOK, HOL HOV, HOW	HOR, HOP	HOS, HOZ	HON, HOJ	HOT, HOU	HOD, HOE	HOA, HOB HOC, HOH
Denomin.	Cable	Rod	Rod	Cable	Twin cable	Twin rod	Coaxial
Max. meas. dist.	24 m (80 feet)	3 m (10 feet)	6 m (20 feet)	24 m (80 feet)		3 m (10 feet)	6 m (20 feet)
Min. meas. dist. $\epsilon_r=80 / \epsilon_r= 2.4$	0.3 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 ϵ_r	2.1			1.8		1.4	
Min. dist. to objects	Ø 600 mm (2 feet)			Ø 200 mm (0.65 feet)		Ø 0 mm (0 feet)	
Process connection	1" BSP; 1" NPT	1" BSP	1 1/2" BSP				1" BSP; 1" NPT
	1 1/2" BSP; 1 1/2" NPT	1" NPT	1 1/2" NPT				1 1/2" BSP; 1 1/2" NPT
Probe material	1.4401	1.4571		1.4401		1.4571	
Probe nominal Ø	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*	-			PFA, welded on the cable	PTFE-GF25	PTFE	
Weight dimensions	Ø 25x100 mm (1x4 inch)	-		Ø 40x260 mm (1.5x10 inch)	Ø 40x80 mm (1.5x3 inch)	-	
Weight material	1.4571	-		1.4571		-	
Dimensions (mm)							

*there is no separator below 1.5 m (5 feet) length

TECHNICAL DATA OF THE COATED PROBES

Type	HOQ, HOQ	HOX	HOY	HOM	HOQ	HOI
Denomination	FEP coated cable			PFA coated rod		PP coated rod
Max. meas. distance	24 m (80 feet)			3 m (10 feet)		
Min. meas. distance $\epsilon_r=80 / \epsilon_r= 2.4$	0.3 m / 0.4 m (1 feet / 1.3 feet)					
Minimum medium ϵ_r	2.4					
Min. dist. to objects	Ø 600 mm (2 feet)					
Process connection	1" BSP; 1"NPT	DN 40 Triclamp	DN 40 Milch	DN 50 PN40		
Max. medium temp.	+150 °C (302 °F)					+60 °C (140 °F)
Probe material	1.4401			1.4571		
Probe coating material	FEP			PFA	PP	
Probe nominal Ø	6 mm (0.225 inch)			12 mm (0.45 inch)	16 mm (0.65 inch)	
Fillet and weight coating material	-			PFA	PFA	PP
Weight material	1.4571			-		
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)						

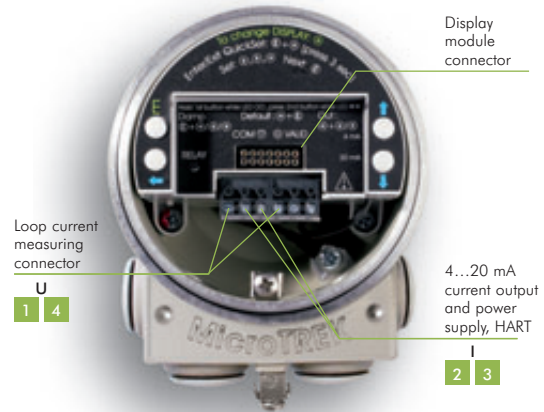
INSTALLATION



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

Mono probe $s > 300$ mm (12 inch) $h \leq d$
Twin probe $s > 100$ mm (4 inch) t = upper dead zone
Coaxial probe $s = 0$ mm (0 inch) b = lower dead zone

WIRING



SETUP, PROGRAMMING

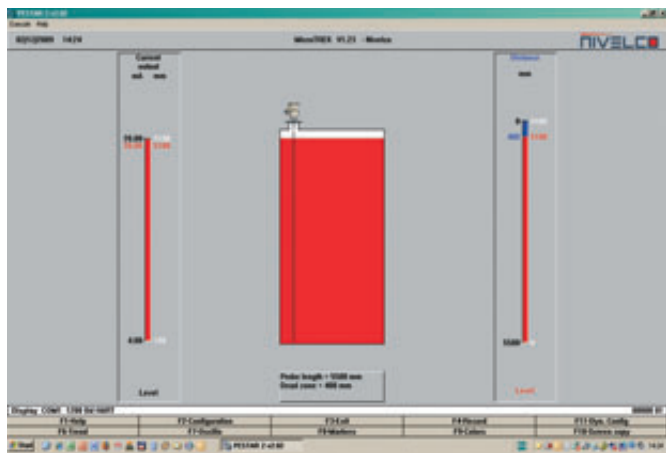
with SAP-300 display unit



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.

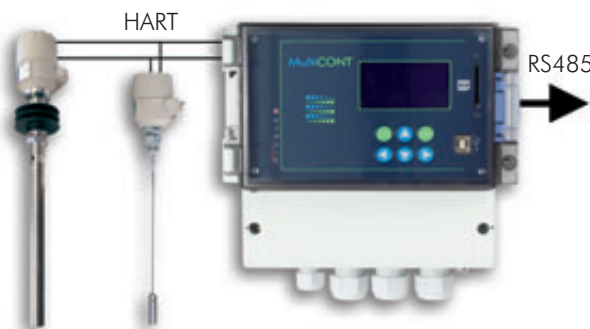
with PC-Star 2 software



PC-Star 2, which is shipped with the instrument free of charge, is a Windows software. All parameters of the MicroTREK can be set and all values can be queried through PC-Star 2. Other features are: continuous "echo-map" reading, trend monitoring, data logging, data saving.

MicroTREK IN SYSTEM WITH MultiCONT

MultiCONT can handle a max. of 8 MicroTREK transmitters. The digital (HART) information is processed, displayed and if needed it can be transmitted in RS485 communication line to a PC. Remote programming of the transmitters is also possible.



MicroTREK IN SYSTEM WITH A PC

The instrument can be connected to a PC using UNICOMM HART modem. Max. 15 normal (non Ex) instruments can be connected to a HART line. Measured values can be visualised and/or the instrument can be programmed via these interfaces. Applicable software: PC-Star 2 configuration software or NIVISION process visualization software.

ORDER CODE (NOT ALL COMBINATIONS AVAILABLE)

Two-wire guided microwave level transmitter

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 / Dust Ex	6
High temp. transmitter	H	Coaxial / 1 1/2" BSP	C	1	1 m	0.1 m	4 - 20 mA + HART / EEx ia	8
High temp. transmitter + 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	S	5	5 m	0.5 m		
		Rod / 1 1/2" NPT	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 version				
		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 coated cable / 1" BSP	F			6 m		
		4 mm FEP coated cable / 1" NPT	G			7 m		
		4 mm FEP coated cable / DN 50 / PN 25	M			8 m		
		4 mm FEP coated cable / DN 40 Triclamp	X			9 m		
		4 mm FEP coated cable / DN 40 Pipe-coupling	Y					
		PFA coated rod / DN 50 / PN 25	Q					
		PP coated rod / DN 50 / PN 25	I					

Housing	Code
Aluminium	4
Plastic Housing	5 ⁽²⁾

(1) The order code of an Ex version should end in 'Ex'
 (2) Ex version not available



Accessories

SAP-300 Plug-in display
UNICOMM SAT-304 HART - USB modem
UNICOMM SAK-305 HART - USB/RS485 modem
MH02 HART - RS232 modem
61622 PCMCIA / RS232 adapter
66217 PC Card / RS232 adapter