MicroTREK

GUIDED MICROWAVE LEVEL TRANSMITTERS
FOR LIQUIDS AND SOLIDS

5 YEARS WARRANTY

NIVELCO

LEVEL TRANSMITTERS

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 $\varepsilon_r \geq 1.4$.
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.

HHA-400 HTK-400

MAIN 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, segmented rod, cable and coaxial probe version
- Minimum $\varepsilon_r \geq 1.4$
- 2-wire version
- Graphic display
- 4 – 20 mA + HART® output
- Medium temperature range: -30 °C … +200 °C (-22 °F … +392 °F)
- Maximum process pressure: 40 bar (580 psig)
- IP67 protection

CERTIFICATIONS

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

SAP-300 display

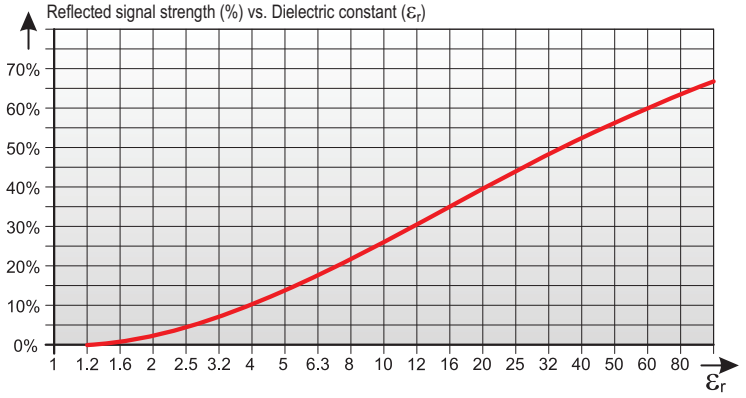
APPLICATIONS

Mono Cable / Mono Rod Mono Segmented Rod	Twin Cable	Twin Rod	Coaxial Pipe
▪ Cement, limestone, fly ash, alumina, carbon black ▪ All high-viscosity liquids ▪ Mineral powders ▪ Clean and contaminated liquids ▪ For stilling wells (calibration required) ▪ Aggressive mediums with plastic coated probes ▪ Slightly conductive foams ▪ High temperature applications ▪ Bypass applications	▪ Tank parks with solvents, oil or 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 granule vessels ▪ 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 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

MEASURABILITY OF THE MEDIUM

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	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



TECHNICAL DATA

Version		Plastic housing	Metal housing	Stainless steel housing (High temp. version)
Measured values		Distance, level; calculated values: volume, mass		
Measuring range		Depends on the probe type and dielectric constant (ε_r) of the measured medium		
Probe types		Mono cable, twin cable, mono rod, twin rod, coaxial pipe and segmented rod		
Accuracy	Linearity error[1]	For liquids: ±5 mm, if probe length ≥10 m: ±0.05% of the probe length For solids: ±20 mm, if probe length ≥10 m: ±0.2% of the probe length		
	Resolution	±3 µA		
Minimum er 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 (-22 °F … +194 °F); high temperature version: -30 °C … +200 °C (-22 °F … +392 °F)		
		With plastic coated probes see: Technical data of the coated probes		
Maximum medium pressure		4 MPa (40 bar [580 psig]); with plastic lined flange: max. 2.5 MPa (25 bar [363 psig]); with coaxial pipe probe: max. 1.6 MPa (16 bar [232 psig])		
Ambient temperature		-20 °C … +60 °C (-4 °F … +140 °F)	-30 °C … +60 °C (-22 °F … +140 °F), with display: -20 °C … +60 °C (-4 °F … +140 °F)	
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 ½" NPT cable protective pipe, cable outer diameter: Ø7 – Ø13 mm (Ø0.3 – Ø0.5 inch), wire cross section: max. 1.5 mm² (max. AWG15)		
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 (3.3 lb)	2 kg (4.4 lb)	2.5 kg (5.5 lb)

[1] *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	⟨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
	IEC Ex	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: Ø7 – Ø13 mm (0.3 – 0.5 inch), wire cross section: maximum 1.5 mm² (AWG 15)			
Ambient temperature		-30 °C (86 °F) … +60 °C (140 °F), with display: -20 °C (-4 °F) … +60 °C (140 °F)			

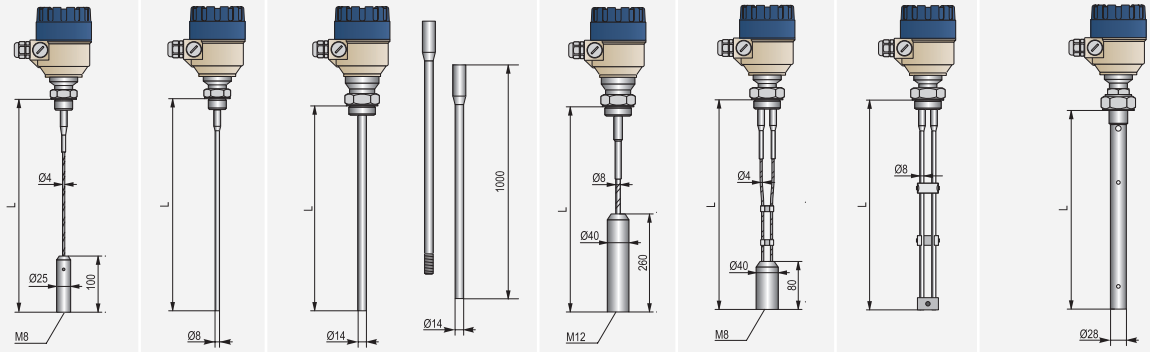
PROBE SELECTION

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[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 (0.15 inch)	24 m (80 ft)	300 / 20 mm (12 / 0.75 inch)	400 / 100 mm (16 / 4 inch)	1"; 1½"	2.1
Mono cable Ø8 mm (0.3 inch)				1½"	
Mono rod Ø8 mm (0.3 inch)	3 m (10 ft)			1"	
Mono / segmented rod Ø14 mm (0.55 inch)	6 m (20 ft)			1½"	1.8
Twin cable Ø4 mm (0.15 inch)	24 m (80 ft)	150 / 20 mm (6 / 0.75 inch)	300 / 100 mm (12 / 4 inch)		
Twin rod Ø8 mm (0.3 inch)	3 m (10 ft)				
Coaxial pipe Ø28 mm (1.1 inch)	6 m (20 ft)	0 / 10 mm (0 / 0.4 inch)	0 / 100 mm (0 / 4 inch)	1"; 1½"	1.4
Coated cable Ø6 mm (0.225 inch)	24 m (80 ft)	300 / 20 mm (12 / 0.75 inch)	400 / 100 mm (16 / 4 inch)	1"; 1½" TriClamp; DN40 MILCH, DN50	2.4
Coated rod Ø12 / Ø16 mm (0.45 / 0.65 inch)	3 m (10 ft)			DN50	

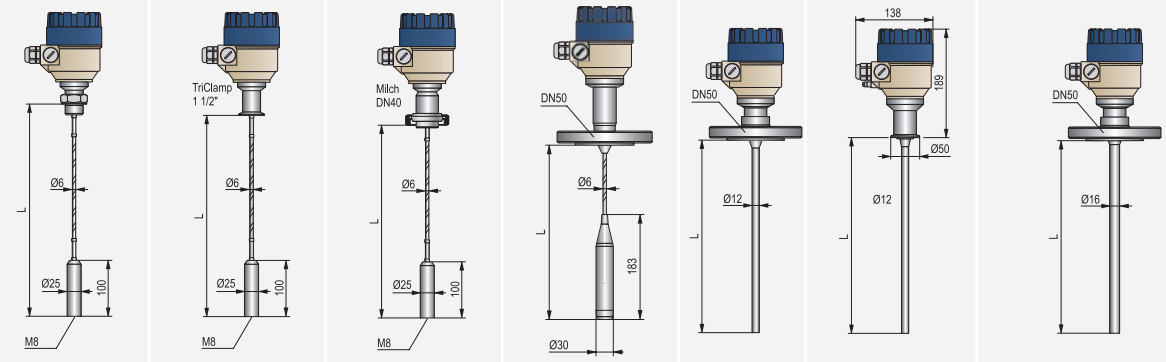
[2] *The unmeasurable upper and lower part of the tank, the lower dead-zone is extended with the length of the counterweight (cable versions only)*

TECHNICAL DATA OF THE PROBES

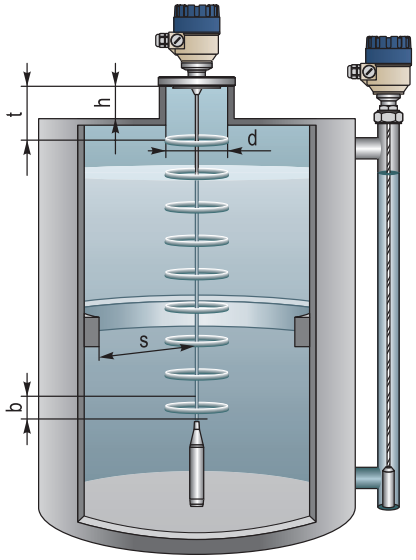
Type	H□K, H□L H□V, H□W	H□R, H□P	H□S, H□Z	H□N, H□J	H□T, H□U	H□D, H□E	H□A, H□B H□C, H□H
Denomin.	**Cable**	**Rod**	**Rod / Segmented Rod**	**Cable**	**Twin Cable**	**Twin Rod**	**Coaxial**
Max. meas. dist.	24 m (80 feet)	3 m (10 feet)	6 m (20 feet)	24 m (80 feet)		3 m (10 feet)	6 m (20 feet)
Min. meas. dist. (ε_r = 80 / ε_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)
Min. ε_r of the medium	2.1				1.8		1.4
Sensing space around the probe	Ø600 mm (2 feet)				Ø200 mm (0.65 feet)		Ø0 mm (0 feet)
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 (316)	1.4571 (316Ti)		1.4401 (316)		1.4571 (316Ti)	
Probe nominal Ø	4 mm (0.15 in)	8 mm (0.3 in)	14 mm (0.55 in)	8 mm (0.3 in)	4 mm (0.15 in)	8 mm (0.3 in)	28 mm (1.1 in)
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[2]	–				PFA, welded on the cable	PTFE-GF25	PTFE
Weight dimensions	Ø25 x 100 mm (1 x 4 inch)	–		Ø40 x 260 mm (1.5 x 10 inch)	Ø40 x 80 mm (1.5 x 3 inch)	–	
Weight material	1.4571 (316Ti)	–		1.4571 (316Ti)		–	
Dimensions (mm)							

[3] *There is no separator below 1.5 m (5 feet) length*

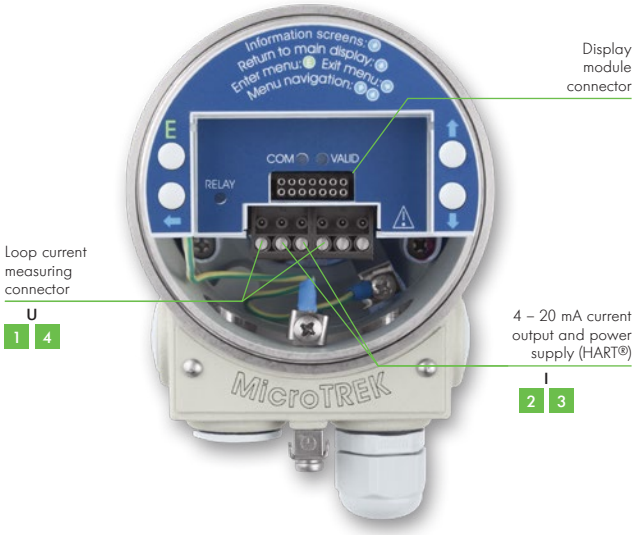
TECHNICAL DATA OF THE COATED PROBES

Type	H□F, H□G	H□X	H□Y	H□M	H□Q	H□O	H□I
Denomin.	**FEP Coated Cable**				**PFA Coated Rod**		**PP Coated Rod**
Max. meas. dist.	24 m (80 feet)				3 m (10 feet)		
Min. meas. dist. (ε_r = 80 / ε_r = 2.4)	0.3 m / 0.4 m (1 feet / 1.3 feet)						
Min. ε_r of the medium	2.4						
Sensing space around the probe	Ø 600 mm (2 feet)						
Process connection	1" BSP; 1" NPT	1½" TriClamp	DN40 MILCH	DN50 PN25 flange		1½" TriClamp	DN50 PN25
Max. medium temp.	+150 °C (302 °F)						+60 °C (140 °F)
Probe material	1.4401 (316)				1.4571 (316Ti)		
Probe coating material	FEP				PFA		PP
Probe nominal Ø	Ø6 mm (0.225 inch)				12 mm (0.45 inch)		16 mm (0.65 inch)
Fillet coating material	–			PFA			PP
Weight material	1.4571 (316Ti)			1.4571 (316Ti) + PFA coating	–		
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



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	h ≤ d
Twin Probe	s > 100 mm	t = upper dead-zone
Coaxial Probe	s = 0 mm	b = lower dead-zone

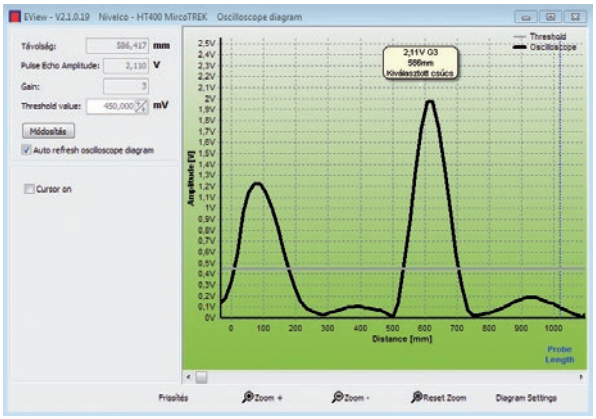
SETUP, PROGRAMMING

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.

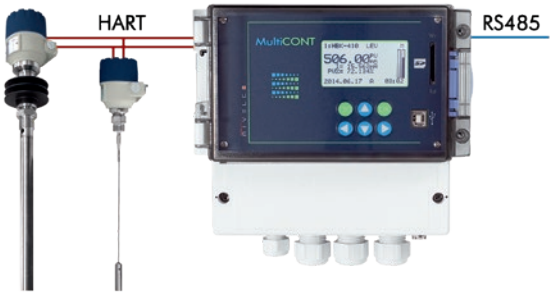
with EView2 software

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



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. Visualisation on PC can be accomplished with **NIVISION** process visualisation software.



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 Guided Wave Radar level transmitters

MicroTREK H□□-□□□-□

Type	Code
Transmitter	T
Transmitter + display	B
High temperature transmitter	H
High temperature transmitter + display	P

Housing	Code
Aluminium	4
Plastic	5[2]

Probe	Proc. conn.	Code
Coaxial	1" BSP	A
	1" NPT	B
	1½" BSP	C
	1½" NPT	H
Rod	1" BSP	R
	1" NPT	P
	1½" BSP[3]	S
	1½" NPT[3]	Z
Twin Rod	1½" BSP	D
	1½" NPT	E
4 mm (0.15 in) cable	1" BSP	K
	1" NPT	L
	1½" BSP	V
	1½" NPT	W
8 mm (0.3 in) cable	1½" BSP	N
	1½" NPT	J
4 mm (0.15 in) twin cable	1½" BSP	T
	1½" NPT	U
4 mm (0.15 in) FEP coated cable	1" BSP	F
	1" NPT	G
	DN50 PN25 flange	M
	1½" TriClamp	X
	DN40 MILCH	Y
PFA coated rod	DN50 PN25	Q
	1½" TriClamp	O
PP coated rod	DN50 PN25	I

Code	Length		Code
Coaxial, Rod, Twin rod			
0	0 m (0 ft)	0 m (0 ft)	0
1	1 m (3.3 ft)	0.1 m (0.33 ft)	1
2	2 m (6.5 ft)	0.2 m (0.65 ft)	2
3	3 m (10 ft)	0.3 m (1 ft)	3
4	4 m (13 ft)	0.4 m (1.3 ft)	4
5	5 m (16.4 ft)	0.5 m (1.64 ft)	5
6	6 m (19.68)	0.6 m (1.96 ft)	6
		0.7 m (2.29 ft)	7
		0.8 m (2.62 ft)	8
		0.9 m (2.95 ft)	9
Cable			
0	0 m (0 ft)	0 m (0 ft)	0
1	10 m (32 ft)	1 m (3.2 ft)	1
2	20 m (65 ft)	2 m (6.5 ft)	2
		3 m (10 ft)	3
		4 m (13 ft)	4
		5 m (16.4 ft)	5
		6 m (19.68)	6
		7 m (22.9 ft)	7
		8 m (26.2 ft)	8
		9 m (29.5 ft)	9

Output / Ex	Code
4 – 20 mA + HART®	4
4 – 20 mA + HART® / Ex tD[4]	5
4 – 20 mA + HART® / Ex iaD	6
4 – 20 mA + HART® / Ex ia	8

[1] *The order code of an Ex version should end in "Ex"*

[2] *Ex version not available*

[3] *Segmented probe version should be given in the text of the order*

[4] *Only for HT, HB and probes without coating*

ACCESSORIES

Plug-in graphical display module	SAP-300
Multichannel process controller and display unit	MultiCONT P-200
24 V DC power supply, DIN rail mountable	NIPOWER PPK-331
Intrinsically safe isolator module, DIN rail mountable	UNICONT PGK-301Ex
HART®-USB/RS485 modem for remote programming with PC, DIN rail mountable	UNICOMM SAK-305
HART®-USB modem for remote programming with PC	UNICOMM SAT-304
HART®-USB/Bluetooth® modem for remote programming UNICOMM	UNICOMM SAT-504
EView2 configuration software for remote programming with PC	FREE download

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