



# NIVOTRACK

## MAGNETOSTRICTIVE LEVEL TRANSMITTER



- ◆ 4 ... 20 mA
- ◆ HART communication
- ◆ 1 mm accuracy
- ◆ Intrusion length maximum 10 m
- ◆ Rigid or flexible guide tube
- ◆ Stainless steel or plastic versions
- ◆ Plug in field display module
- ◆ ATEX certified versions

## ABOUT NIVOTRACK

NIVOTRACK M-300 series working on the magnetostrictive principle is high accuracy float level transmitter for affordable price. Its high precision renders the NIVOTRACK suitable for custody transfer measurement of valuable liquids such as fuels, solvents alcohol derivatives etc.

Due to its high temperature and pressure rating the NIVOTRACK can also be used for level measurement in vessels of production technologies. Most suitable applications are with liquids free of solid particles and with low viscosity both in ordinary and hazardous locations.

Plastic coated versions of the NIVOTRACK substantially expand the field of application by a wide range of aggressive materials.

Units with flexible tube do not only make this accurate measurement for higher tanks possible but offer a more convenient way for delivery and installation.

Weight at the bottom end of the flexible tube provides for the spanning and fixing of the guide. The spanning weight is integral part of the NIVOTRACK.

## OPERATING PRINCIPLE

Float containing a magnetic disc moves along a guide tube with the specific magnetostrictive wire in it.

A pulse generated by the electronics travels along the magnetostrictive wire. When the pulse reaches the float's magnetic field, a twist develops in the wire.

Reflected from the torsion point, the pulse creates an acoustic wave that travels back along the wire. The 4...20 mA output of the transmitter is proportional to the elapsed time between the excitation and detection.

# TECHNICAL DATA

TYPE	RIGID TUBE VERSION M□A..., M□C... M□D..., M□G... MTU..., MBU...	FLEXIBLE TUBE VERSION M□K... M□N...	RIGID PLASTIC VERSION MEU... MGU...
Measured process values	Level, interface level, level difference, medium temperature at one point		
Nominal length (L)	0.5 m ... 4.5 m	2 m ... 10 m	0.5 m ... 3 m
Material of the tube	Stainless steel: 1.4571 (DIN)		PFA coated st.st.
Max. medium pressure**	2.5 MPa (25 bar)	1.6 MPa (16 bar)	0.3 MPa (3 bar)
Medium temperature *	-40 °C ... +130 °C		
Linearity with dry calibration	±1 mm		
Resolution	1mm or 5 mm (depending on order)		
Temperature coefficient	0.04 mm/°C		
Range (M)	Maximum: see calculating formula under DIMENSIONS		Minimum: 200 mm
Zero span	Anywhere within the range		
Float diameter / material	∅ 52 x 59 mm / st.st or ∅ 95 mm / st.st **		∅ 76 x 87 mm / PVDF
Medium density	min. 0.8 g/cm <sup>3</sup> ; with ball float ∅ 95 mm: min. 0.5 g/cm <sup>3</sup>		
Material of wetted parts	Stainless steel: 1.4571 (DIN)		PFA and PVDF
Ambient temperature *	-40 °C ... +70 °C (-25 °C with the SAP-201)		
Outputs (for any process value)	Analogue	4...20 mA (can also be assigned in inverted mode)	
	Serial comm.	HART interface (close end resistor 250 Ohm)	
	Display	with SAP-201 6 digits (7 mm character) icon, bargraph	
Damping	0 ... 60 s programmable		
Error indication	By the current output: 3.8 mA or 22 mA		
Output load	Rs= (Us-12V) / 0.02 A, Us = voltage of the power supply		
Power supply	12 ... 36 V DC		
Intrinsic safety data	U <sub>max</sub> = 30 V I <sub>max</sub> = 140 mA P <sub>max</sub> = 1 W C <sub>i</sub> < 15 nF L <sub>i</sub> < 200 µH		
Electric protection	Class III.		
Ingress protection	IP 67		
Process connection	According to the order codes		
Electric connection	Outer diameter of the cable for M 20 x1.5 conduit: ∅ 6 ... ∅12 mm for ordinary and EEx ia ; ∅ 9 ... 16 mm for EExd and EExia+EExd units Wire cross section: max.1.5 mm <sup>2</sup>		
Housing	Aluminium (powder paint coated) or plastic (PBT fibre-glass reinforced, flame retardant)		
Mass	1.7 kg + tube: 0.6 kg/m	1.7 kg + tube: 0.6 kg/m + 12 kg	1.7 kg + tube: 0.6 kg/m

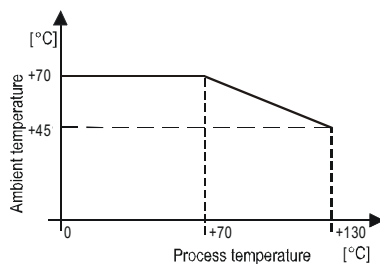
TYPES	M □□-3 □□-6Ex / 8Ex	M □□-3 □□-A Ex / B Ex	M □□-3 □□-C Ex / D Ex
Ex marking (depending on nominal probe length)	⊕ II 1 G EEx ia IIB T6-T4 0,5...5m	⊕ II 2 G EEx d IIB T6-T4 0,5 ... 10m	⊕ II 1/2 G EEx d ia IIB T6-T4 0,5...5m
	⊕ II 1 G EEx ia IIA T6-T4 5...10m		⊕ II 1/2 G EEx d ia IIA T6-T4 5...10m

\* See derating diagram

\*\* Max. medium pressure for ball float 1.6 MPa (16 bar)

## MAXIMUM TEMPERATURES

Ambient temperatures allowed for process temperatures exceeding +70 °C



ORDINARY UNITS

TYPE	TEMP. CLASS	AMBIENT TEMP.	PROCESS TEMP.
M□A..., M□C... M□D..., M□G... M□K..., M□N... MEU..., MGU...	T6	+70 °C	+80 °C
M□A..., M□C... M□D..., M□G... MEU..., MGU...			+70 °C
M□A..., M□C... M□D..., M□G... MEU..., MGU...	T5	+59 °C	+95 °C
M□A..., M□C... M□D..., M□G... MEU..., MGU...			+95 °C
M□A..., M□C... M□D..., M□G... MEU..., MGU...	T4	+45 °C	+130 °C
M□A..., M□C... M□D..., M□G... MEU..., MGU...			+130 °C

EX CERTIFIED UNITS

## MINIMUM TEMPERATURES

Units with SAP-201 should not be exposed to temp. below -25 °C

TYPE	EX MARKING		
	EEx ia	EEx d	EEx d+ EEx ia
MT□..., ME□...	-40 °C	-40 °C	-40 °C
MB□..., MG□...	-25 °C	-20 °C	-20 °C

EX CERTIFIED UNITS

# DIMENSIONS

TYPE: M□A..., M□C..., M□D..., M□G...	TYPE: MTU..., MBU...	TYPE: MEU..., MGU	TYPE: M□K..., M□N...
RIGID TUBE TRANSMITTER PROBE AND THREADED PROCESS CONNECTION	RIGID TUBE TRANSMITTER PROBE WITHOUT PROCESS CONNECTION	FLEXIBLE TUBE TRANSMITTER PROBE WITH SLIDING SLEEVE	RIGID TUBE PLASTIC TRANSMITTER PROBE
$M_{MAX} = L - B - A - C/2$	$M_{MAX} = L - B - H - C/2$	$M_{MAX} = L - B - A - C/2$	$M_{MAX} = L - B - C/2$

L = nominal length

M = measurement range B = bottom dead band

\* float size see in the Technical Data

\*\*flange on request

## INSTALLATION

To achieve the greatest range the nominal length of the unit should preferably be as long as possible but the probe must not reach the bottom. The range  $M_{max}$  of the unit can be defined by deducting  $B$  (bottom dead band) and  $A-C/2$  (top dead band) from  $L$  the nominal length. The bottom dead band is fixed value for one type (100, 195 and 110). The top dead band is depending from  $A$  or  $H$  being the strength of the flange or roof (threaded process connection) or adjustment distance as well as from the half of the float height  $C/2$ . The sliding sleeve of the flexible tube version offers accurate adjustment.

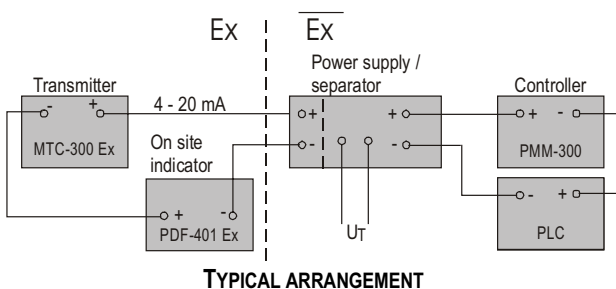
The  $\varnothing 52$  float can be inserted the free hole of the 2" process connection. For the installation of floats with greater diameters ( $\varnothing 95$  ball or  $\varnothing 72$  cylinder) the use of flange with a minimum dimension of DN 100 and PN 16 is recommended.

The minimum flange for the flexible tube version should be DN 125 and PN 16 so that the weight (with  $\varnothing 120$  mm) necessary for this model can be put into the tank.

## WIRING

The 2-wire transmitters are powered with 12 ... 36 V AC. The maximum load of the unit is depending on the operating voltage of the power supply. ( $R_{max} = 600$  Ohm in case of 24 V DC).

The unit should be grounded effectively with a maximum resistance value of 1 Ohm. The grounding of the unit should preferably separated from the grounding system of the plant.



TYPICAL ARRANGEMENT

## PROGRAMMING

The transmitter can be programmed in three different ways:

- On site programming without plug-in display module SAP-201, changing level in the tank and measuring the output current
- On site programming with plug-in display module SAP-201, changing level in the tank not necessary
- Remote programming of the transmitter with HART using PC or Universal controller MultiCONT PRW-100.

Sophisticated programming is offered only with SAP-201 or HART providing access to all features such as level and content measurement, error indication, damping and 32-point linearisation.

## EX PROTECTION

Models with the following certifications are available depending on the nominal length of the unit:

- in accordance with the Technical Data

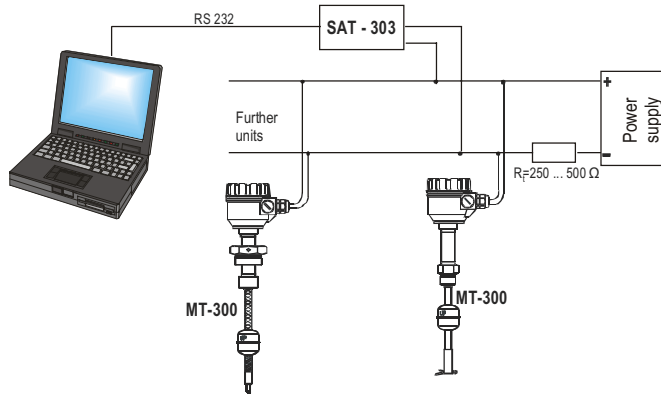
For temperatures see the table below the Technical Data.

## CONDITIONS OF THE EX APPLICATION

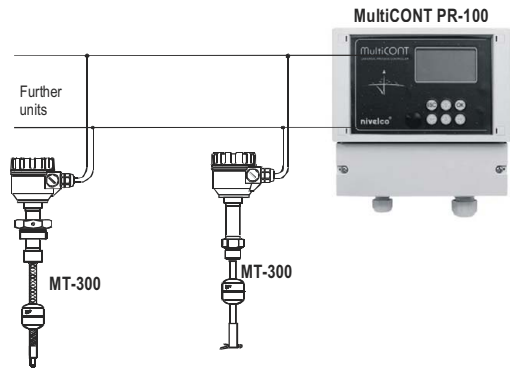
- Intrinsically safe unit can only be powered by a duly certified EEx ia power supply in accordance with the with technical data above
- Housing of the transmitter should be grounded
- Plastic probe units with order code MEU and MGU tend to statical charging thus
  - they can only be used to conductive mediums with a specific resistance not exceeding  $10^4 \Omega m$  even at the most unfavourable places and under the most unfavourable conditions.
  - filling and emptying rate should be selected in accordance with the relevant feature of the material.

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### ARRANGEMENT WITH PC



### ARRANGEMENT WITH MULTICONT PR-100



### ORDER CODE (Not all combinations possible)

**NIVOTRACK M**   -   -

FUNCTION	CODE	PROBE / PROCESS CONNECTION	CODE	HOUSING MATERIAL	CODE	CODE	INSERTION LENGTH	CODE	OUTPUT / FLOAT / RESOLUTION / APPROVAL	CODE
Transmitter	T	Rigid / 1" BSP	A	Aluminium	3	0	0 m	0	1 float / 1 mm	2
Transmitter + display	B	Rigid / 2" BSP	C	Plastic	4	1	1 m	0.1 m	HART / 1 float / 1 mm	4
		Rigid / 1" NPT	D			2	2 m	0.2 m	1 float / 5 mm	N
Transmitter, plastic version	E	Rigid / 2" NPT	G							
Transmitter+display plastic version	G	Without process connection	U							
		Flexible / 2" BSP	K*							
Flexible / 2" NPT	N*									
* Spanning weight included										
						3	3 m	0.3 m	<b>Ex VERSIONS</b>	
						4	4 m	0.4 m	1 float / 1 mm / EEx ia	6
						5	5 m	0.5 m	HART / 1 float / 1 mm EEx ia	8
						6	6 m	0.6 m	1 float / 1 mm / EEx d	A
						7	7 m	0.7 m	HART / 1 float / 1 mm EEx	B
						8	8 m	0.8 m	1 float / 1 mm / EEx d + EEx ia	C
						9	9 m	0.9 m	HART / 1 float / 1mm / EEd + EEx ia	D
						A	10 m			

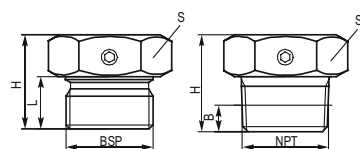
### ACCESSORIES

**FLANGES M F T** -    -

TYPE / MATERIAL	CODE	SIZE DIN	ANSI	CODE	PRESSURE	CODE	OPENING IN THE MIDDLE	CODE
DIN / Steel	1	DN 65	2 1/2"	1	PN 16 / 150 psi	1	Sliding sleeve	1
DIN / 1.4571	2	DN 80	3"	2	PN 25 / 300 psi	2	1" BSP	2
DIN / PP	3	DN 100	4"	3			2" BSP	3
DIN / Steel + PTFE	4	DN 125	5"	4	1" NPT	5	2" NPT	6
ANSI / Steel	5	DN 150	6"	5				
ANSI / 1.4571	6	DN 200	8"	6				
ANSI / PP	7							
ANSI / A38 + PTFE	8							

### SLIDING SLEEVES

TYPE	THREAD	S (mm)	H (mm)	L (mm)	B (mm)
MBH-105-2M-300-00	1" BSP	41	36	20	
MBK-105-2M-300-00	2" BSP	70	43	24	
MBL-105-2M-300-00	1" NPT	41	38		~10
MBN-105-2M-300-00	2" NPT	70	43		~11



### DISPLAY MODULE SAP-201



Technical specification may be changed without notice