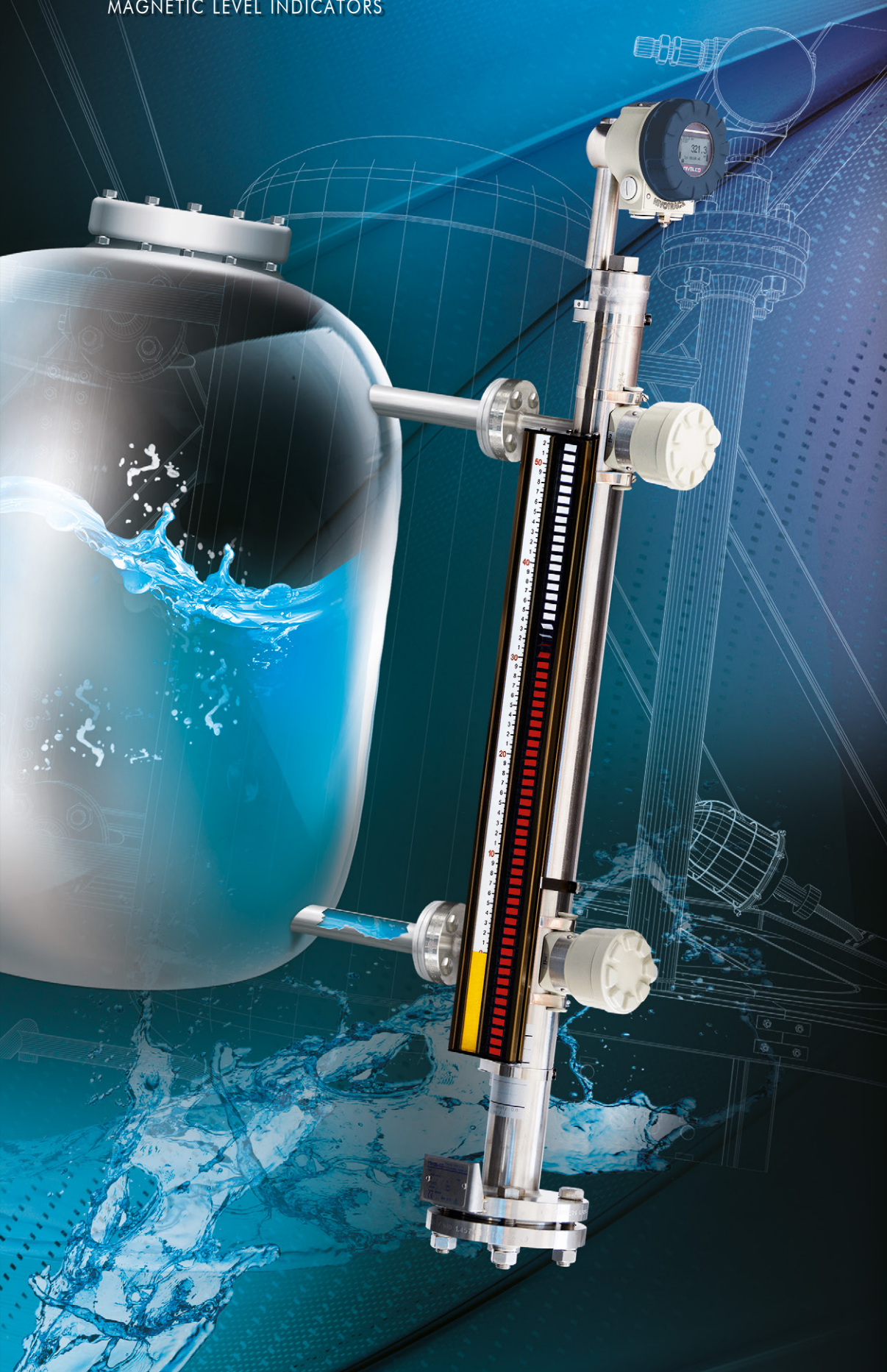


VISUAL DISPLAY

# NIVOFLIP

MAGNETIC LEVEL INDICATORS



3 YEARS WARRANTY @ NIVELCO – WHERE ELSE?

# NIVELCO

LEVEL INDICATOR

## NIVOFLIP BYPASS LIQUID LEVEL INDICATORS

### MAIN FEATURES

- Clearly visible indicator
- Measuring range: 500-5500 mm (1.65 – 18 ft)
- $\pm 10$  mm (0.4 inch) accuracy
- Max. 100 bar g (1440 psi g) process pressure
- High temperature version
- Optional level switches
- Optional magnetostrictive level transmitter
- PED approval

### APPLICATIONS

- Oil and gas industries
- Chemical industry
- Power generation
- Boilers
- Pressurized vessels
- Tanks

### GENERAL DESCRIPTION

The **NIVOFLIP** is a magnetic level indicator for pressurized vessels with up to 5.5 m (18 ft) flange distance containing liquids. The device has the international PED (Pressure Equipment Directive) approval, so it can be used for level indication of pressurized vessels up to 100 bar g (1440 psi g) process pressure. The high temperature types are applicable up to 250 °C (482 °F) process temperature. The **NIVOFLIP** can be equipped with optional limit switches or with **NIVELCO**'s **NIVOTRACK** high-precision magnetostrictive level transmitter if point-level detection or continuous level transmission is required.

### OPERATION

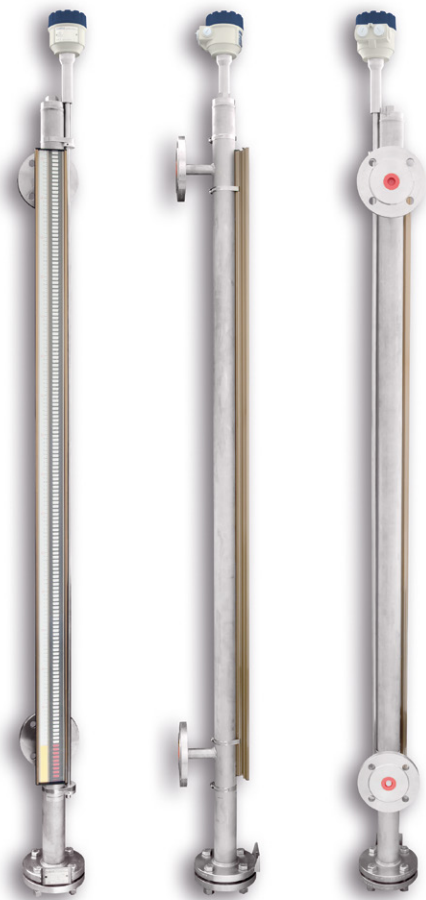
The welded bypass chamber that is the body of the indicator and the tank form one pressurized system. Mounted on suitable connection flanges located on the side of the tank the liquid level in the bypass tube and the tank is equal. A float in the bypass tube incorporating a polarized magnet tracks the level of the liquid. The bi-coloured magnetic flaps mounted on the tube composing a bar are serving as visual indicators by changing their colour as the float passes. The rotated flaps represent the actual level. The lower 100 mm (4 inch) of the bottom section of the indicating bar has different colour providing for an visual error signal in case the liquid level drops below the lower connection point of the instrument.

### NIVOFLIP LEVEL INDICATOR SYSTEM

The **NIVOFLIP** bypass liquid level indicator can be equipped with **MAK-100-□** external level switches and this way it can provide limit level indication. In case of using **MAK-100** level switch the minimal medium density should be 0.1 kg/dm<sup>3</sup> (100 oz/ft<sup>3</sup>) more than the specified. When the provided accuracy of the magnetic flaps is not enough, the high-precision **NIVOTRACK M□L-500/600** series magnetostrictive level transmitters are recommended to use. Equipped with the OIML R85 approved **NIVOTRACK** the measurement system is suitable for custody transfer measurements. The magnetostrictive level transmitter has rigid probe in accordance to the length of the center to center distance of the connection flanges. The unit without float and process connection can be mounted externally by clamps to the bypass chamber. All the optional units are operated by the special designed float via magnetic coupling, there is no direct contact with the measured medium.

### FLOAT SELECTION

Type	Float material					
	Stainless steel			Titanium Ti Gr.2		
	1.4301 (304L)		1.4571 (316Ti)			
Maximal process pressure	40 bar g (580 psi g)	63 bar g (930 psi g)	100 bar g (1440 psi g)	40 bar g (580 psi g)	63 bar g (930 psi g)	100 bar g (1440 psi g)
Medium density	0.8 – 1.25 kg/dm <sup>3</sup> (800 – 1200 oz/ft <sup>3</sup> )		0.9 – 1.25 kg/dm <sup>3</sup> (900 – 1500 oz/ft <sup>3</sup> )	0.6 – 1.1 kg/dm <sup>3</sup> (600 – 1110 oz/ft <sup>3</sup> )		0.7 – 1.1 kg/dm <sup>3</sup> (700 – 1110 oz/ft <sup>3</sup> )
Maximal medium temperature	150 °C (302 °F)			250 °C (482 °F)		



### PROPERTIES

NIVOFLIP	Normal type	High temperature type
Viscous version	■	–
Stainless steel float	■	■
Titanium float	■	■
PED approval	■	■
Max. 100 bar g (1440 psi g) medium pressure	■	–
Max. 250 °C (482 °F) medium temperature	–	■
Optional level switches	■	–
Optional level transmitter	■	■

## TECHNICAL DATA

Type	Normal type		High temperature type
	Standard	Viscous	
Visual display	Bi-coloured magnetic flaps		
Display	scale	centimeter, inch scale is available on request	
	accuracy	± 10 mm (0.4 inch)	
	resolution	5 mm (0.2 inch)	
	error indication	inverse polarized flaps on the lower 100 mm (4 inch)	
Tube diameter	Ø 60.3 mm (2.35 inch)	Ø 73.3 mm (2.85 inch)	Ø 60.3 mm (2.35 inch)
Material	Bypass tube and flange: 1.4571 (316Ti)		
Flange distance (center to center)	500 – 5500 mm (20 inch – 18 feet) (as per order code)		
Process connection	DIN, ANSI flanges (as per order code)		
Aerating connection	M20 x 1.5		
Process pressure	max. 100 bar g (1440 psi g)	max. 40 bar g (580 psi g)	max. 88 bar g (1275 psi g)
Medium temperature	–40 °C ... +130 °C (–40 °F ... +266 °F)		–40 °C ... +250 °C (–40 °F ... +482 °F)
Ambient temperature	–40 °C ... +60 °C (–40 °F ... +140 °F)		
Medium density <sup>(1)</sup>	stainless steel float: 0.8-1.25 kg/dm <sup>3</sup> (800-1250 oz/ft <sup>3</sup> ), titanium float: 0.6-1.1 kg/dm <sup>3</sup> (600-1100 oz/ft <sup>3</sup> )		
Level switch	optional, freely adjustable MAK-100 magnetic level switch	–	
Level transmitter	optional NIVOTRACK M□L-500/600 magnetostrictive level transmitter <sup>(2)</sup>		
Mass	about 25 kg (55 lb) for 1 m (3.3 ft) center to centre distance		

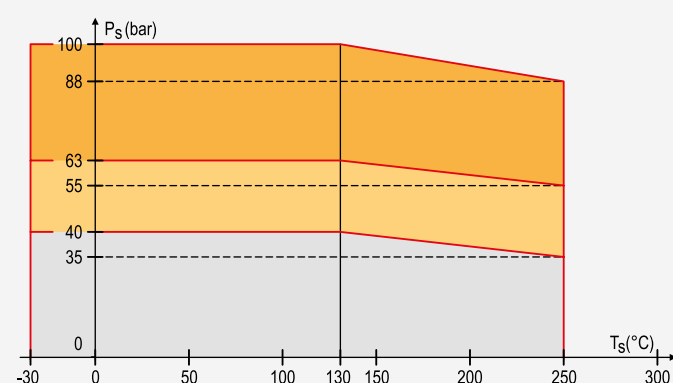
<sup>(1)</sup> In case of using MAK-100 level switch the minimal medium density should be 0.1 kg/dm<sup>3</sup> (100 oz/ft<sup>3</sup>) more than the above specified

<sup>(2)</sup> In case of using NIVOTRACK level transmitter the maximum temperature values are shown on the diagram below

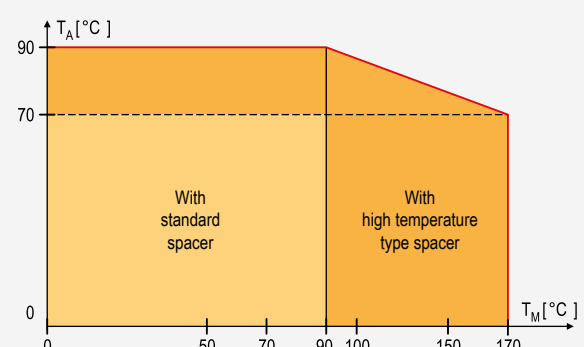
Maximal process pressure		Maximal medium temperature			
Process connection	Bypass tube / Flange rating	T <sub>MAX</sub> = 130 °C		T <sub>MAX</sub> = 250 °C	
		Standard	Viscous	High temperature type	
Maximal process pressure					
DIN flanges DN15 – DN50	Ø 60mm / PN40	40 bar	–	40 bar	35 bar
	Ø 73mm / PN40	–	40 bar	–	–
	Ø 60mm / PN63	63 bar	–	63 bar	55 bar
	Ø 60mm / PN100	100 bar	–	100 bar	88 bar
ANSI flanges ½" – 2"	Ø 2.35" / 400 Class	580 psi	–	580 psi	500 psi
	Ø 2.85" / 400 Class	–	580 psi	–	–
	Ø 2.35" / 600 Class	930 psi	–	930 psi	800 psi
	Ø 2.35" / 900 Class	1440 psi	–	1440 psi	1275 psi

## TEMPERATURE DIAGRAM

Temperature (T<sub>S</sub>) – Pressure (P<sub>S</sub>) diagram



Medium temperature (T<sub>M</sub>) – Ambient temperature (T<sub>A</sub>) diagram when NIVOTRACK level transmitter is mounted on NIVOFLIP



## MAK-100 MAGNETIC LEVEL SWITCHES

### GENERAL DESCRIPTION

The **MAK-100** type magnetic level switches are optional accessories for **NIVOFLIP** bypass level indicators. In the stainless steel bypass tube the float of **NIVOFLIP** tracks the liquid level. The float (incorporating a permanent magnet) operates the freely positioned **MAK-100** level switch via magnetic coupling and provides non-contact signal transfer to the microswitch. There should be at least 100 mm (4 inch) distance between two switching points.

### TEMPERATURE DATA FOR EX CERTIFIED MODELS

TEMPERATURE CLASSES		
Classes	Max. medium temp.	Max. ambient temp.
T6	+80 °C (+176 °F)	-20 ... +60 °C (-4 ... +140 °F)
T5	+95 °C (+203 °F)	-20 ... +70 °C (-4 ... +158 °F)
T4	+130 °C (+266 °F)	-20 ... +80 °C (-4 ... +176 °F)

### TECHNICAL DATA

Type	MAK-100-0	MAK-100-6
Medium temperature	max.: 130 °C	see: temperature classes table
Ambient temperature	-20 °C ... +80 °C (-4 °F ... +176 °F)	
Material of the switch-housing	Paint coated aluminium	
Switch	1 microswitch, with NO, NC contacts	
Switching data	250V 2.5 A AC12 220V 0.3 A DC13	only Ex ia certified and approved intrinsically safe isolator power supply should be used
Switching hysteresis	±35 mm (1.37 inch)	
Electrical connection	M20x1.5 cable gland, terminal for max. 2.5 mm <sup>2</sup> (AWG14) wire cross section	
Ingress protection	IP65	
Electrical protection	Class I.	
Ex marking	-	⊕ II 1G
Mass	1.5 kg (3.3 lb)	

## NIVOTRACK MAGNETOSTRICTIVE LEVEL TRANSMITTERS

### GENERAL DESCRIPTION

**NIVOTRACK** magnetostrictive level transmitters are an ideal solution for high accuracy measurement of liquids. Its high precision renders the **NIVOTRACK** suitable even for custody transfer measurement of liquids such as fuels, solvents, alcohol derivatives etc.

When ordered together with **NIVOFLIP** Magnetic Level Indicator the magnetostrictive transmitters are factory calibrated to the bypass tube and the magnetic float. The transmitter is fixed with pipe clamps and aluminium spacers.



### TECHNICAL DATA

Type	NIVOTRACK M□L-500/600	
Measured process value	liquid level, distance, volume	
Probe length	In accordance to the center to center distance of NIVOFLIP +300 / 400 mm (12 / 15.75") in accordance to the float type	
Material of the probe	1.4571 (316 Ti) stainless steel	
Resolution	0.1 or 1 mm (0.004 or 0.04 inch) – as per selected type	
Linearity with dry calibration	±0.25 or ±1 mm (± 0.01 or ±0.04 inch) – as per selected type	
Zero span	Anywhere within the active range	
Ambient temperature (1)	-40 °C ... +90 °C (-40 °F ... +194 °F), plastic housing: -25 °C ... +90 °C (-13 °F ... +194 °F), with display: -25 °C ... +90 °C (-13 °F ... +194 °F), Ex type: see temperature diagram	
Output	Analogue	4–20 mA
	Digital	4–20 mA + HART
	Display	SAP-300 graphic display
Damping time	0 s ... 99 s	
Error indication	22 mA or 3.8 mA or holding	
Power supply	12.5 V ... 36 V DC	
Electrical protection	Class III.	
Ingress protection	IP67	
Electrical connection	2x M20x1.5 plastic cable glands 6...12 mm (0.25 ... 0.5") cable + 2x NPT 1/2" internal thread for cable protective pipe terminal block for 0.5...1.5 mm <sup>2</sup> (AWG 20 ... AWG 15) wire cross section Ex type: see „Special data for Ex certified models“ table	
Housing	Paint coated aluminium or plastic (PBT)	
Mass	1.7 kg (3.75 lb) + m. probe: 0.6 kg/m (0.4 lb/ft)	

(1) When mounted on NIVOFLIP bypass chamber

## SPECIAL DATA FOR Ex CERTIFIED MODELS

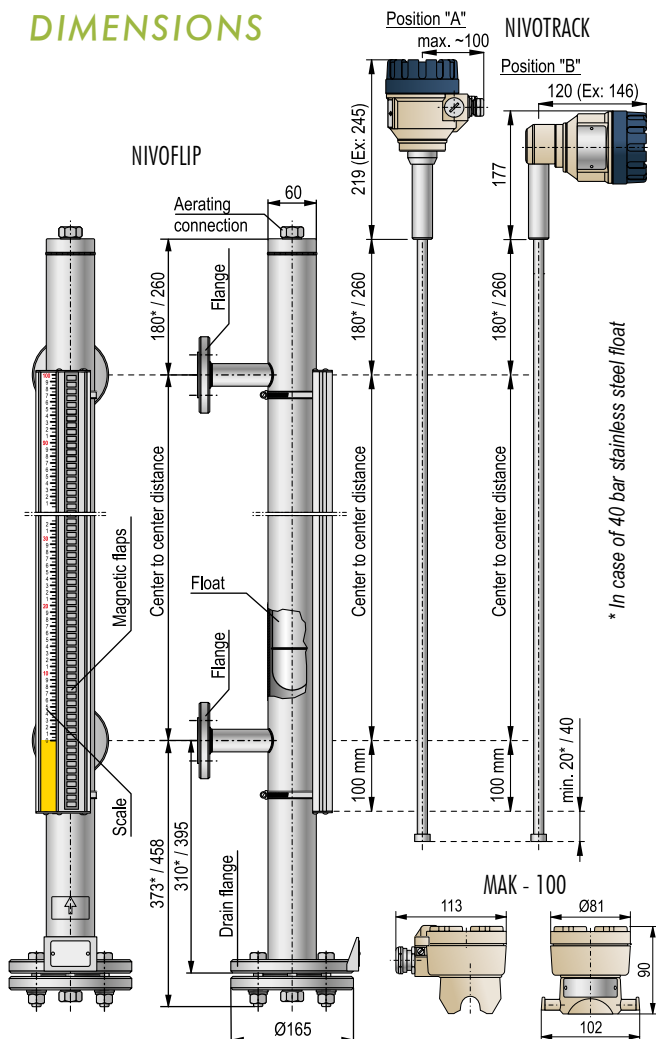
Protection type	ia		d	d ia
Ex marking	ATEX	⊕ II 1 G Ex ia IIB T6...T5	⊕ II 2 G Ex d IIB T6...T5	⊕ II 1/2 G Ex d ia IIB T6...T5
	IEC Ex	Ex ia IIB T6 Ga	Ex d IIB T6 Gb	Ex d ia IIB T6 Ga
Intrinsically safe data	$U_{imax} = 30 \text{ V}$ $I_{imax} = 140 \text{ mA}$		$P_{imax} = 1 \text{ W}$	$C_i < 15 \text{ nF}$ $L_i < 200 \text{ } \mu\text{H}$
Ambient temperature	-40°C ... +70°C (-40 °F ... 158 °F), with display: -25°C ... +70°C (-13 °F ... 158 °F)			
Cable gland	Brass Nickel plated M20x1.5 cable gland		Brass Nickel plated M20x1.5 Ex d approved cable gland	
Cable outer diameter	Ø 7...13 mm (0.275 ... 0.55 in)		Ø 9...11 mm (0.35 ... 0.45 in)	

## POSITION OF THE DISPLAY

Vertical and horizontal display position is offered for optimal mounting in your application.



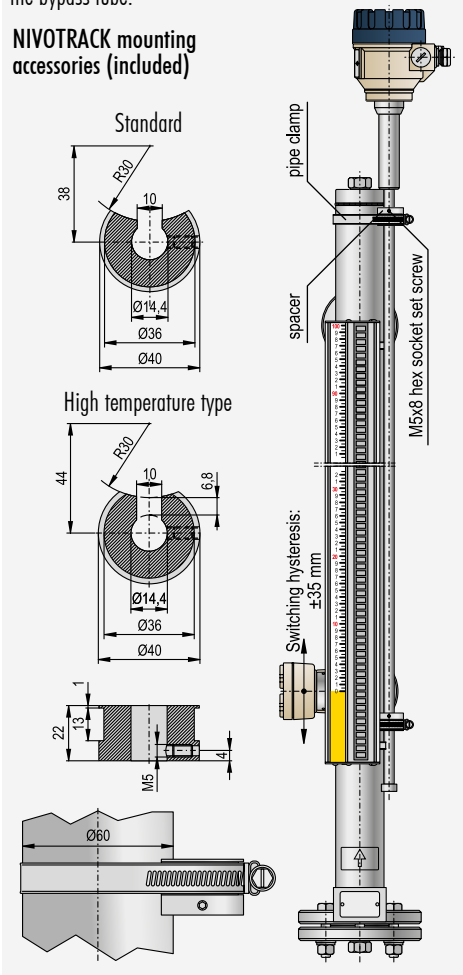
## DIMENSIONS



## NIVOTRACK MOUNTED ON NIVOFLIP

The probe length of the magnetostrictive level transmitter should be 300 / 400 mm (11.8 / 15.75 inch) longer than the center to center distance of the bypass tube in accordance to the float type. The level transmitter is placed onto the bypass tube that the top of the magnetostrictive probe is in the same height with the top of the bypass tube. The end of the probe should extend the inverse polarized error indication flaps with 20 / 40 mm (0.75 / 1.5 inch). The supplied aluminium spacers are fixed with hex socket set screws and they are mounted to the bypass tube with pipe clamps. In case of the high temperature type there is a ceramic fiber insulation blanket between the magnetostrictive probe and the bypass tube.

### NIVOTRACK mounting accessories (included)



## ORDER CODES (NOT ALL COMBINATIONS AVAILABLE)

### NIVOFLIP bypass liquid level indicator

NIVOFLIP

M ■ ■ ■ ■ ■ ■ ■ ■ ■ ■

Type	Code	Process connection	Code	Code	Measuring range center to center (1)		Code	Float (3)	Code
Normal	L	DN15 / B form	A	0	0 m	0 m	0	Stainless steel (1.4571)	0
High temperature	H	DN20 / B form	B	1	1 m	0.1 m	1	Titanium	1
		DN25 / B form	C	2	2 m	0.2 m	2		
		DN40 / B form	D	3	3 m	0.3 m	3		
		DN50 / B form	E	4	4 m	0.4 m	4		
		ANSI 1/2"	F	5	5 m	0.5 m	5		
		ANSI 3/4"	G			0.6 m	6		
		ANSI 1"	H			0.7 m	7		
		ANSI 1 1/2"	J			0.8 m	8		
		ANSI 2"	K			0.9 m	9		

Bypass tube / Pressure rating	Code
Standard / PN40	1
Viscous / PN40 (2)	2
Standard / PN63	3
Standard / PN100	4

Code	Measuring range center to center (1)
6	0.6 m
7	0.7 m
8	0.8 m
9	0.9 m

Float (3)	Code
Stainless steel (1.4571)	0
Titanium	1

(1) Maximal center to center distance: 5.5 m (18 ft)  
 (2) Can be ordered only for normal type  
 (3) Special float is available to order for interface level indication

## ACCESSORIES

### NIVOFLIP magnetic level switches

NIVOFLIP

MAK-100-■ (1)

Output / Ex	Code
Normal	0
Ex ia	6



### NIVOTRACK magnetostrictive level transmitter

NIVOTRACK

M ■ L-■ ■ ■ ■ ■ (1)

Type	Code	Code	Probe length (4)		Code	Output / Resolution / Ex		Code
Transmitter	T	0	0 m	0 m	0	4-20 mA	0.1 mm	1
Transmitter + display (2)	B	1	1 m	0.1 m	1		1 mm	2
		2	2 m	0.2 m	2		0.1 mm / Ex ia	5
		3	3 m	0.3 m	3		1 mm / Ex ia	6
		4	4 m	0.4 m	4		0.1 mm / Ex d	A
		5	5 m	0.5 m	5		0.1 mm / Ex d ia	C
				0.6 m	6		0.1 mm	3
				0.7 m	7		1 mm	4
				0.8 m	8		0.1 mm / Ex ia	7
				0.9 m	9		1 mm / Ex ia	8
						0.1 mm / Ex d	B	
						0.1 mm / Ex d ia	D	

(1) The order code of an Ex version should end in „Ex“  
 (2) The position of the display (A or B) should be specified in the order  
 (3) Not available in Ex version  
 (4) The probe length of the NIVOTRACK should be: NIVOFLIP center to center distance + 300 mm / 400 mm (12 inch / 15.75 inch) in accordance to the float type

### Intrinsically safe isolator power supply modules

4-20 mA, high precision	UNICONT PGK-301-A
4-20 mA, high precision / HART	UNICONT PGK-301-B
4-20 mA, high speed	UNICONT PGK-301-C
4-20 mA, high speed / HART	UNICONT PGK-301-D

### Spacer

Normal	MLB-105-MM-600-00
High temperature type	MLC-110-MM-601-00

