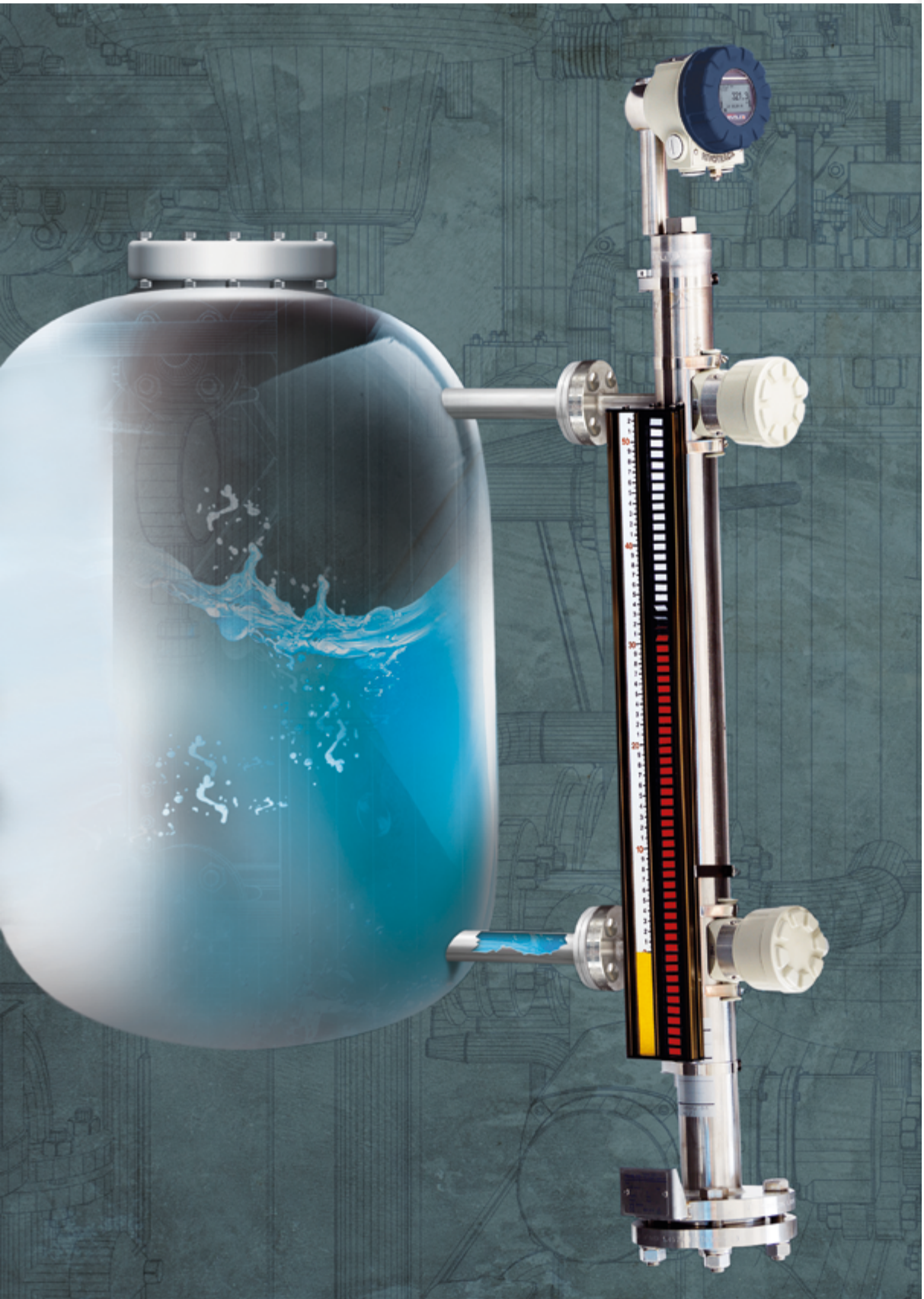
NIVOFLIP

BYPASS LIQUID LEVEL INDICATORS



5 YEARS WARRANTY

NIVELCO

LEVEL TRANSMITTERS

NIVOFLIP is a bypass 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 (1450 psi) process pressure.
The High-temperature types are applicable up to +250 °C (+482 °F) process temperature. **NIVOFLIP** can be equipped with optional limit switches or with NIVELCO's **NIVOTRACK** high-precision magnetostrictive level transmitter if level transmission is needed.

FEATURES

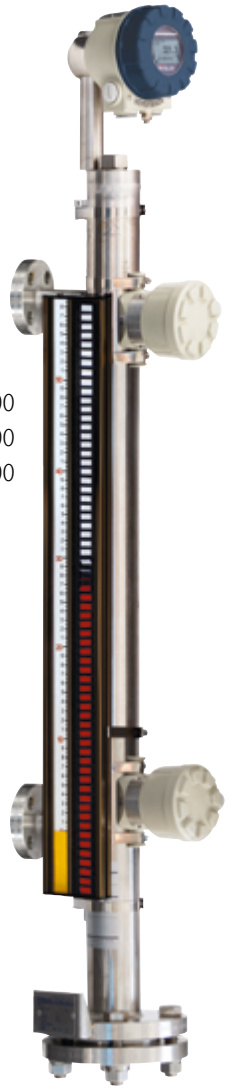
- Clearly visible display
- Measuring range: 500…5500 mm (19.7…216.5")
- ±10 mm (±0.39") accuracy
- Max. 100 bar (1450 psi) process pressure
- High-temperature version
- Optional level switches
- Optional magnetostrictive level transmitter
- Explosion-proof version

APPLICATIONS

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

CERTIFICATES

- PED certificate
- ATEX (Ex d e m Gb): MAK–100 level switches
- ATEX (Ex h Ga/Gb): ML–100 bypass level indicator



NIVOFLIP ML☐–100
+ MAK–100
+ NIVOTRACK M☐L–500 / 600

FLOAT SELECTION

	Float material				
	Stainless steel		Titán Ti Gr.2		
Highest process pressure	40 bar (580 psi)	63 bar (930 psi)	40 bar (580 psi)	63 bar (930 psi)	100 bar (1450 psi)
Medium-density (Specific gravity)	0.8…1.25 kg/dm³	0.85…1.25 kg/dm³	0.55…1.1 kg/dm³	0.6…1.1 kg/dm³	0.7…1.1 kg/dm³
Highest process temperature	+250 °C (+482 °F)				

OPERATION

The fluid level in the bypass chamber is the same as in the tank. The welded bypass chamber and the tank form one pressurized system, so the float containing a magnet rises and descends with the fluid level. The properly polarized magnet in the float topples the two-toned plates with the colored magnetic caps through the stainless steel tube's wall, indicating the fluid level. The plates with different color codes on the 100 mm (3.94") under the lower stem provide a visual error message when fluid levels drop below the instrument's lower connecting point.

NIVOFLIP LEVEL INDICATING SYSTEM

NIVOFLIP bypass liquid level indicator can be equipped with positionable MAK–100–☐ external level switches to provide level limit switching. For MAK–100 level switches, the minimal liquid density should exceed the default value specified in the datasheet by 0.1 kg/dm³.

For jobs requiring more accuracy than that of the magnetic flaps, high-precision **NIVOTRACK M–500** magnetostrictive level transmitters are recommended to use. Equipped with OIML R 85 certified **NIVOTRACK**, the measurement system is suitable for custody transfer measurements. The floatless rigid probe magnetostrictive transmitter can be mounted externally to the bypass chamber with clamps.

All optional units are operated via magnetic coupling, there is no direct contact with the measured material.

PROPERTIES

	Standard version	High-temperature version
Stainless steel float	■	■
Titanium float	■	■
PED certificate	■	■
Maximum 100 bar (1450 psi) medium pressure	■	–
Maximum +250 °C (+482 °F) medium temperature	–	■
Optional level switch	■	■
Optional level transmitter	■	■

TECHNICAL DATA

Features		Standard version	High-temperature version
Display type		Two-toned magnetic flaps	
Display	scale	cm / inch	
	accuracy	±10 mm (±0.4")	
	resolution	5 mm (0.2")	
	error indication	Lower 100 mm (~4"), inverse polarized flaps	
Tube diameter		Ø60.3 mm (Ø2.35")	
Flange distance (center to center)		500…5500 mm (19.7…216.5") (as per order code)	
Process connection		DIN, ANSI flanges (as per order code)	
Vent connection		M20×1.5	
Process pressure		Max. 100 bar (1450 psi)	Max. 88 bar (1276 psi)
Medium temperature		−60…+130 °C (−76…+266 °F)	−60…+250 °C (−76…+482 °F)
Ambient temperature		−60…+60 °C (−76…+140 °F)	
PED (2014/68/EU) certificate		Category I–III, Module B+C2	
Min. medium density[1]		With stainless steel float 40 bar (580 psi): 0.8 kg/dm³, 63 bar (930 psi): 0.85 kg/dm³; with Titanium float 40 bar (580 psi): 0.55 kg/dm³, 63 bar (930 psi): 0.6 kg/dm³, 100 bar (1450 psi): 0.7 kg/dm³	
Level switch		Optional, freely adjustable MAK–100 level switch [2]	
Level transmitter		Optional NIVOTRACK M□L–500 / −600 / −700 magnetostrictive level transmitter[2]	
Weight		About 25 kg (~55 lb) for 1 m (3.3 ft) center to center distance	

[1] With MAK–100 level switches, the minimal medium density should exceed the default value by 0.1 kg/dm³.
[2] For NIVOTRACK level transmitters and MAK–100 level switches, the highest temperature values are shown in the diagram below.

Ex INFORMATION

ATEX certificate	ML□–□□□–□Ex, MH□–□□□–□Ex	Ex marking: ⟨Ex⟩ II 1/2 G Ex h IIC T6…T2 Ga/Gb

Temperature data for Ex certified models	Hazardous gas atmospheres			
	Standard ML□–□□□–□Ex			High-temperature MH□–□□□–□Ex
Highest permissible medium temperature	+80 °C (+176 °F)	+95 °C (+203 °F)	+130 °C (+266 °F)	+250 °C (+482 °F)
Highest permissible ambient temperature	+60 °C (+140 °F)			
Highest resulting surface temperature	+80 °C (+176 °F)	+95 °C (+203 °F)	+130 °C (+266 °F)	+250 °C (+482 °F)
Temperature class	**T6**	**T5**	**T4**	**T2**

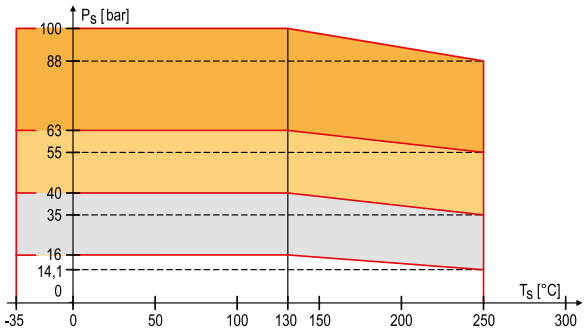
Lowest permissible ambient and medium temperature: −60 °C (−76 °F)

Highest process pressure		Highest process temperature	
Process connection	Bypass tube / Flange rating	T_{MAX} = 130 °C (266 °F)	T_{MAX} = 250 °C (482 °F)
		Standard version	High-temperature version
		Maximum process pressure	
DIN flanges DN15…DN50	Ø60 mm / PN16	16 bar	14.1 bar
	Ø60 mm / PN40	40 bar	35 bar
	Ø60 mm / PN63	63 bar	55 bar
	Ø60 mm / PN100	100 bar*	88 bar*
ANSI flanges ½…2"	Ø60 mm / 150 Class	232 psi	204 psi
	Ø60 mm / 400 Class	580 psi	500 psi
	Ø60 mm / 600 Class	930 psi	800 psi
	Ø60 mm / 900 Class	1440 psi*	1275 psi*

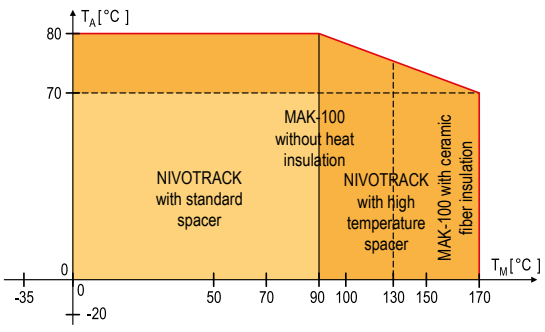
**Only with Titanium float*

TEMPERATURE DIAGRAM

Temperature (T_S) – Pressure (P_S) diagram



Medium temperature (T_M) – Ambient temperature (T_A) diagram when NIVOTRACK level transmitter or MAK–100 level switch is mounted on NIVOFLIP



NIVOFLIP ML–100
+ NIVOTRACK M–500
application in beverage industry

MAK–100 – MAGNETIC LEVEL SWITCHES

The **MAK–100** type magnetic level switches are optional accessories for **NIVOFLIP** bypass level indicators. The float in the stainless steel bypass tube follows the level of the measured liquid. The float *(permanent magnet)* operates the positionable **MAK–100** level switch via magnetic coupling and provides a non-contact signal transfer to the switch. There should be at least 100 mm (~4") distance between two switching points.

TECHNICAL DATA

	MAK–100–0	MAK–100–7
Medium temperature	Maximum +130°C (+266 °F)	See temperature classes table
Ambient temperature	–20…+80 °C (–4…+176 °F)	
Material of the switch housing	Powder-coated aluminum	
Switch	1 microswitch, with NO, NC contacts	
Switching data	250 V 2.5 A AC12, 220 V 0.3 A DC13	
Switching hysteresis	±35 mm (±1.37")	
Electrical connection	M20×1.5 cable gland, terminal for max. 2.5 mm² (AWG14) wire cross-section	
Ingress protection	IP65	
Electrical protection	Class I	
Ex marking	–	⟨Ex⟩ II 2 G Ex db eb mb IIC T6…T4
Weight	1.5 kg (3.3 lb)	

TEMPERATURE DATA FOR Ex CERTIFIED MODELS

Temperature classes		
Class	Max. medium temperature	Ambient temperature
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)

NIVOTRACK – MAGNETOSTRICTIVE LEVEL TRANSMITTERS

NIVOTRACK magnetostrictive level transmitters are an ideal solution for high-accuracy measurement of liquids. Its high precision – 0.1 mm or 1 mm (0.004" or 0.04") resolution – 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 aluminum spacers.

		NIVOTRACK M□L, M□T (compact)	NIVOTRACK MIL (integrated)
Measured process value		Liquid level, Distance, Volume	Liquid level, Distance
Nominal length		In accordance to the center with center distance of NIVOFLIP +300 / 400 mm (11.8 / 15.75") in accordance to the float type, max. 5.8 m (19 ft)	In accordance with the center to center distance of NIVOFLIP +300 / 400 mm (12 / 15.75") in accordance to the float type, max. 3.5 m (11.5 ft)
Material of the tube		1.4571 (316Ti) stainless steel	
Resolution		0.1 or 1 mm (0.004 or 0.04") – as per selected type	
Linearity with dry calibration		±0.25 or ±1 mm (± 0.01 or ±0.04") – as per selected type	
Zero span		Anywhere within the active range	
Ambient temperature[1]		−40…+90 °C (−40…194 °F), plastic housing: −25…+90 °C (−13…+194 °F), with display: −25…+90 °C (−13…+194 °F), Ex type: see temperature diagram	−40…+90 °C (−40…194 °F)
Output	Analog	4…20 mA (limit values: 3.9…20.5 mA)	
	Digital	HART® interface (minimal loop resistance: 250 Ω)	
	Display	SAP–300 graphic display	–
Damping time		Adjustable 0…99 s	
Error indication		22 mA or 3.8 mA or holding	
Power supply		12.5…36 V DC	
Electrical protection		Class III	
Ingress protection		IP67	IP65
Electric connection		2x M20×1.5 plastic cable glands for Ø7…13 mm (0.28…0.51") cable + Two internally threaded ½" NPT connection for protective pipes for 0.5…1.5 mm² (AWG20…15) wire cross section, Ex variant: see Ex Information	Hirschmann EN 175 301-803-A (DIN 43650)
Housing		Powder-coated aluminum (EN AC 42000), plastic (VALOX 412) or Stainless steel (KO)	Aluminum
Weight		1.7 kg (3.75 lb) + m. probe: 0.6 kg/m (0.4 lb/ft)	2.9 kg (6.4 lb) + measuring probe: 0.6 kg/m (0.4 lb/ft)

[1] When mounted on NIVOFLIP bypass chamber

Ex INFORMATION

	M□□–5/7□□–9Ex[1]	M□□–5/7□□ –5Ex, 6Ex, 7Ex, 8Ex	M□□–5/7□□ –CEx, DEx[2]	M□□–5/7□□ –AEx, BEx[2]
Ex marking (ATEX)	⟨Ex⟩ II 1 G Ex ia IIB T6…T5 Ga		⟨Ex⟩ II 1/2 G Ex d ia IIB T6…T5 Ga/Gb	⟨Ex⟩ II 2 G Ex d IIB T6…T5 Gb
Ex marking (IECEx)	Ex ia IIB T6…T5 Ga		Ex db ia IIB T6…T5 Ga/Gb	Ex db IIB T6…T5 Gb
Nominal length (L)	0.5…15 m (1.64…49 feet)		0.5…10 m (1.64…32.8 feet)	
Cable entry	–	M20×1.5 cable gland	Metal M20×1.5 cable gland Ex d certification	
Cable outer diameter	–	Ø7…Ø13 mm (Ø0.27…Ø0.5")	Ø9…Ø11 mm (Ø0.35…Ø0.43")	
Stock cable	max. 20 m; LiY-CY 6x0.5 mm; 500 V C < 9 nF; L < 10 µH	–		
Ex power supply, Intrinsically safety data	U_{imax} = 30 V I_{imax} = 140 mA P_{imax} = 1 W C_i < 25 nF L_i < 210 µH	U_{imax} = 30 V I_{imax} = 140 mA P_{imax} = 1 W C_i < 15 nF L_i < 200 µH		U_i: 12.5…36 V DC I_{imax} = 140 mA

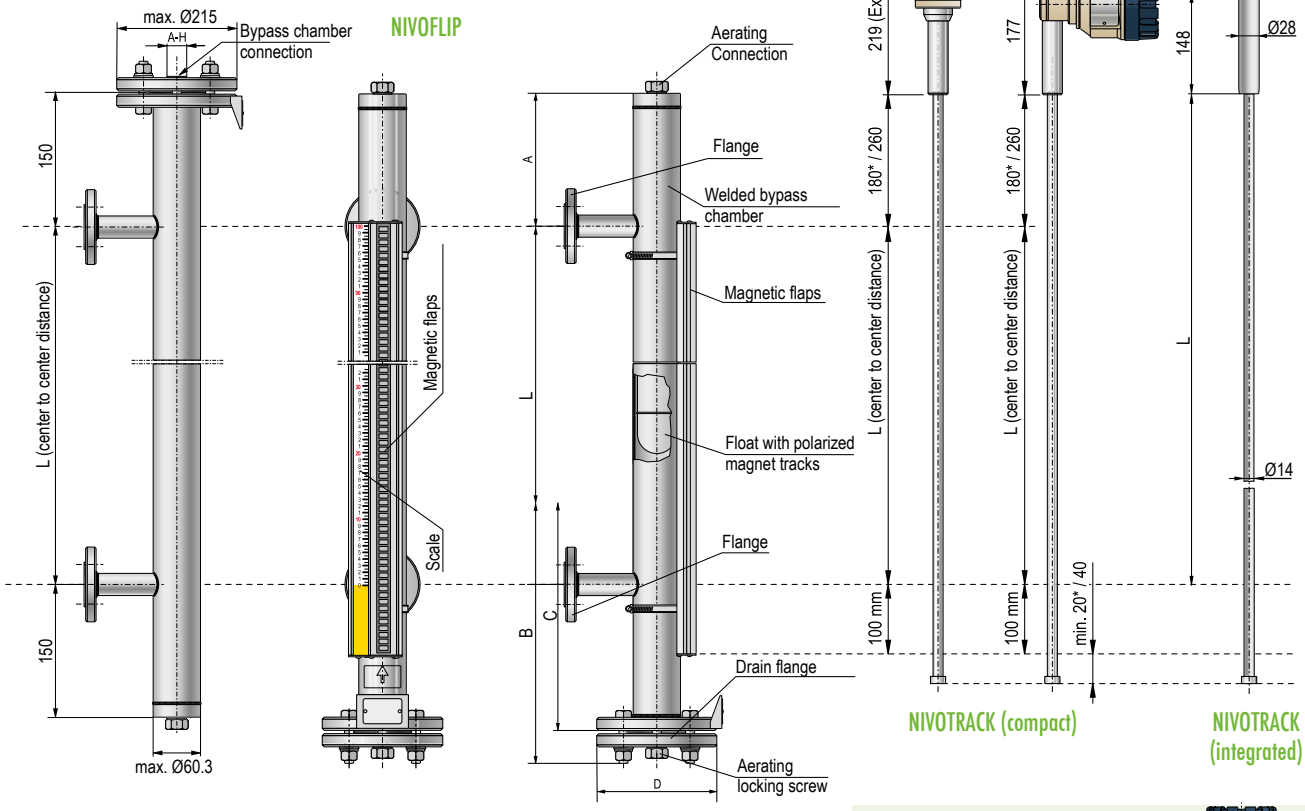
[1] Caution! The M□□-5□□-9Ex is rated IP68. The cover, the cable gland, the cable, and the cover plug are glued in place and cannot be opened!
[2] Can be ordered with FM US and FM CA Ex certificates.

NIVOTRACK FM US, FM CANADA CERTIFICATE

	M□□–5□□–E, M□□–5□□–F	M□□–5□□–G, M□□–5□□–H	M□□–5□□–J, M□□–5□□–K
Marking	Class I, Zone 1, AEx db IIB T6…T5 Gb	Class I, Division 1, Groups C, D T6…T5	Class I, Division 2, Groups C, D T6…T5
Power supply	12.5…35 V DC	24…35 V DC (min. 22.5 V @20 mA)	12.5…35 V DC
Maximum current	22 mA		
U_m	250 V		

NIVOTRACK MOUNTED ON NIVOFLIP

The length of the magnetostrictive level transmitter's probe should be 300 / 400 mm (11.8 / 15.75") longer than the center to center distance of the bypass tube, depending on float type. The level transmitter is placed onto the bypass tube so that the top of the magnetostrictive probe is at the same height as the bypass tube's top.

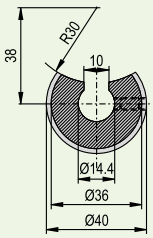


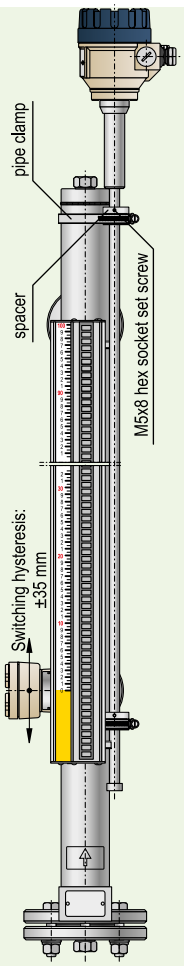
The end of the probe should extend the inverse polarized error indication flaps with 20 / 40 mm (0.78 / 1.57"). The supplied aluminum spacers are fixed with hex socket set screws and they are mounted to the bypass tube with pipe clamps. In case of the high-temperature type there is a ceramic fiber insulation blanket between the magnetostrictive probe and the bypass tube.

High-temperature versions have ceramic fiber insulator fabric between the bypass tube and the probe of the level transmitter.

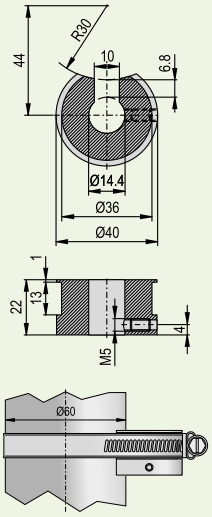
NIVOTRACK mounting accessories

Standard version





High-temperature version, heat-resistant design, 1.4301 (304) Stainless steel plate housing



POSITION OF THE DISPLAY

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

ORDER CODES (NOT ALL COMBINATIONS AVAILABLE)

Bypass liquid level indicator

NIVOFLIP M■■–■■■–■Ex[1]

Type	Code
Normal	L
High-temperature	H

Pressure rating	Code
PN40, Class 400	1
PN63, Class 600	3
PN100, Class 900	4
PN16, Class 150	5

Process connection		Code
DN15 (B form)		A
DN20 (B form)		B
DN25 (B form)		C
DN40 (B form)		D
DN50 (B form)		E
ANSI	½" RF	F
	¾" RF	G
	1" RF	H
	1½" RF	J
	2" RF	K
¾" BSPT[3]		X
¾" NPT[3]		Y
1" BSPT[3]		1
1" NPT[3]		2

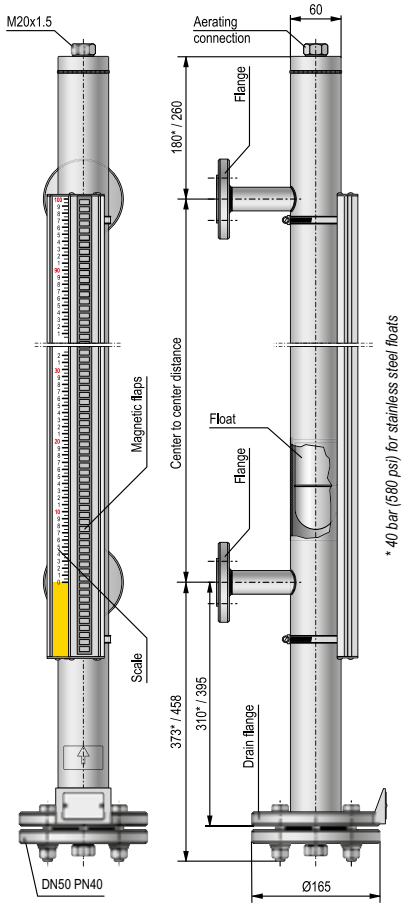
Code	Measuring range (center to center)[1]		Code
0	0 m	0 m	0
1	1 m	0.1 m	1
2	2 m	0.2 m	2
3	3 m	0.3 m	3
4	4 m	0.4 m	4
5	5 m	0.5 m	5
		0.6 m	6
		0.7 m	7
		0.8 m	8
		0.9 m	9

Float material / Scale[4]	Code
Stainless steel / mm scale[5]	0
Titanium / mm scale	1
Stainless steel / Feet/inch scale[5]	2
Titanium / Feet/inch scale	3

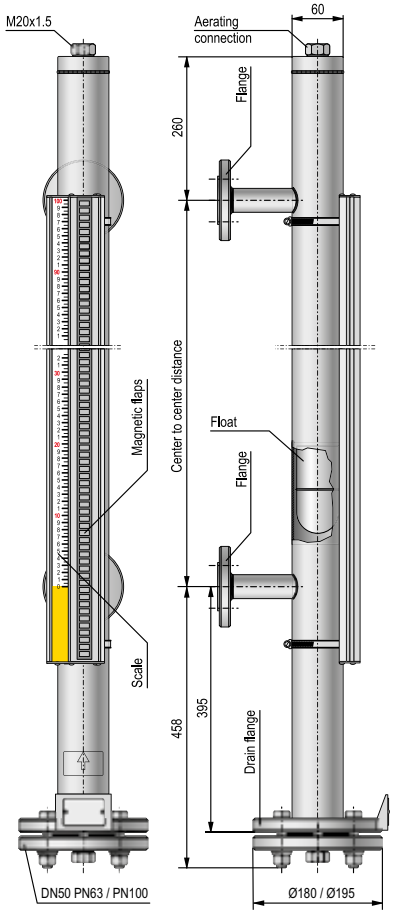
Bypass chamber version[6], Bypass connection	Code
¾" BSP	A
¾" NPT	B
1" BSP	C
1" NPT	D
1½" BSP	E
1½" NPT	F
2" BSP	G
2" NPT	H

[1] Ex versions are marked "Ex" right after the type designation on the label.
[2] Maximal center to center distance: 5.5 m (18 ft)
[3] Max. 40 bar (580 psi)
[4] Special float is available to order for interface level indication.
[5] Only for PN63, 600 psi type.
[6] Without float and flip.

DIMENSIONS



ML□–100



ML□–300 / –400

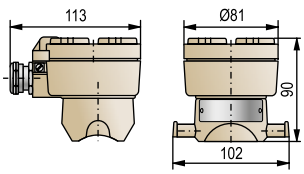
ACCESSORIES

Magnetic level switches

NIVOFLIP MAK–100–■[1]

Output / Ex	Code
Normal	0
Ex d e m Gb	7

[1] Ex versions are marked "Ex" right after the type designation on the label.



MAK–100

ORDER CODES (NOT ALL COMBINATIONS AVAILABLE)

Magnetostrictive Compact Level Transmitters

NIVOTRACK M□□–□□□–□Ex(1)

Type	Code
Transmitter	T
Transmitter + display(2)	B

Probe / temperature		Code
Without float, max. 5.8 m	max. +90 °C	L
	max. +200 °C	T

Housing	Code
Aluminum	5
Plastic(3)	6
Stainless steel	7

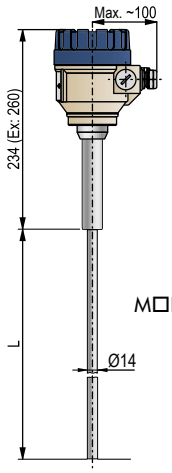
Code	Probe length(4)		Code
0	0 m	0 m	0
1	1 m	0.1 m	1
2	2 m	0.2 m	2
3	3 m	0.3 m	3
4	4 m	0,4 m	4
5	5 m	0.5 m	5
		0.6 m	6
		0.7 m	7
		0.8 m	8
		0.9 m	9

Output / Resolution / Ex			Code
4…20 mA		0.1 mm	1
		1 mm	2
		0.1 mm / Ex ia	5
		1 mm / Ex ia	6
		0.1 mm / Ex d	A
		0.1 mm / Ex d + Ex ia	C
	HART®	0.1 mm	3
		1 mm	4
		0.1 mm / Ex ia	7
		1 mm / Ex ia	8
		0.1 mm / Ex ia / IP68	9
		0.1 mm / Ex d	B
		0.1 mm / Ex d + Ex ia	D
Dual compartment type			
4…20 mA		0.1 mm /XP Zona 1	F
		0.1 mm /XP IS Div 1	H
		0.1 mm /NI Div 2	K
	HART®	0.1 mm /XP Zona 1	E
		0.1 mm /XP IS Div 1	G
		0.1 mm /NI Div 2	J

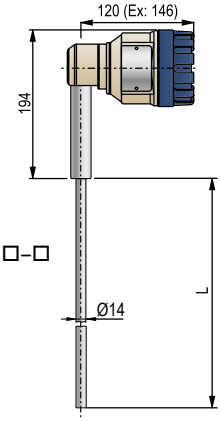
(1) *Ex versions are marked "Ex" right after the type designation on the label.*
(2) *The position of the display ("A" or "B") should be specified in the order*
(3) *Not available in Ex version*
(4) *Probe length = center to center of NIVOFLIP + 300 mm or 400 mm (11.8 / 15.75") as per float type and pressure rating. Maximum probe length 5.8 m (19 ft).*

DIMENSIONS

Position "A"



Position "B"



M□L–□□□–□

Magnetostrictive Integrated Level Transmitters

NIVOTRACK M I L– 5□□–M

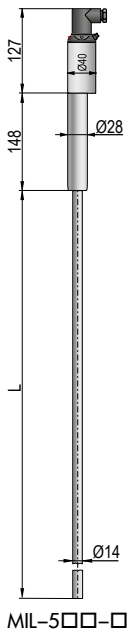
Type	Code
Integrated transmitter	I

Probe	Housing
Without float, max. 3.5 m	Stainless steel

Code	Probe length(1)		Code
0	0 m	0 m	0
1	1 m	0.1 m	1
2	2 m	0.2 m	2
3	3 m	0.3 m	3
		0.4 m	4
		0.5 m	5
		0.6 m	6
		0.7 m	7
		0.8 m	8
		0.9 m	9

Output / Resolution
4…20 mA + HART® / 1 mm / DIN connector

(1) *Probe length = center to center of NIVOFLIP + 300 mm or 400 mm (11.8 / 15.75") as per float type and pressure rating. Maximum probe length 3.5 m (11.5 ft)*



MIL–5□□–□

ACCESSORIES

Intrinsically safe isolator power supply modules

UNICONT PGK–301–		
4…20 mA	high precision	–A
	high precision / HART®	–B
	high speed	–C
	high speed / HART®	–D

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