

NIVOTRACK

M-500/600, M-500 Ex
2-wire magnetostrictive level transmitters

User's and Programming Manual
12th edition



Manufacturer:

NIVELCO Process Control Co.

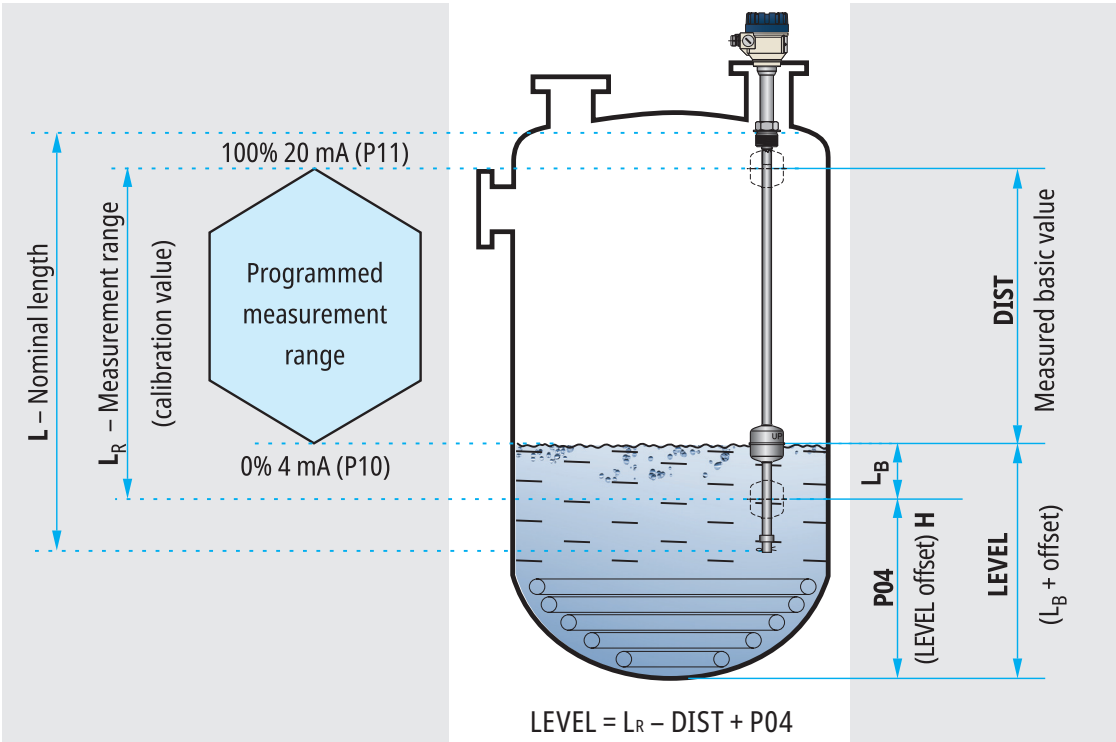
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BASIC CONCEPTS AND ELEMENTS



Approvals		Reference document number
	BKI ATEX, Certificate No.: BKI16ATEX0012X/3	mba5052m0600p_12-b
	BKI IECEx, Certificate No.: IECEx BKI 12.0002 issue No.:1	mba5052a0600p_10
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Thank you for purchasing a NIVELCO product.

1. INTRODUCTION

Application

The **NIVOTRACK M-500 / 600** series, working on the magnetostrictive principle, is suitable for high-accuracy level measurement of storage tanks. Due to their high temperature and pressure rating, these units can also be used for level gauging of technological tanks. The most suitable applications are with liquids free of solid particles and with low viscosity, both in ordinary and hazardous locations. Its high precision renders **NIVOTRACK** suitable for custody transfer measurement of valuable liquids such as fuels, solvents, alcohol distillates, etc. The chemically resistant plastic-coated versions also allow the measurement of aggressive materials.

Operating principle

The magnetostrictive transmitter operates based on the specific physical property of a magnetostrictive wire placed inside a rigid or flexible probe. When the wire is excited by a magnetic field, and interacts with the magnetic field of a permanent magnet located in the float, a mechanical (acoustic) wave is generated. This acoustic wave travels back along the wire to the electronics at a known speed. The device measures the time of flight of this wave, which is proportional to the distance between the float and the sensor electronics. This distance forms the basis of all output signals of the **NIVOTRACK**! Using additional application-specific parameters, the system can also calculate level and volume (tank content).

2. ORDER CODE (NOT ALL COMBINATIONS ARE AVAILABLE)

NIVOTRACK **M** ☐ ☐ ☐ ☐ ☐ ☐ ⁽¹⁾

Type	Code	Probe / Process Connection	Code	Housing	Code	Code	Probe length [m (ft)]	Code	Output / Resolution / Ex	Code			
Transmitter	T	Rigid probe ⁽⁴⁾	A	Head Position "A"	5	0	0	0	4...20 mA	0.1 mm (0.004")	1		
Transmitter + display	B			Painted aluminum		1	1 (3.3)	0.1 (0.33)		1 mm (0.04")	2		
Transmitter with plastic-coated probe ⁽²⁾	E			Fiberglass-reinforced plastic (PBT) ⁽⁸⁾		2	2 (6.6)	0.2 (0.7)		0.1 mm (0.004") / Ex ia G	5		
				Stainless steel		3	3 (10)	0.3 (1)		1 mm (0.04") / Ex ia G	6		
Transmitter with plastic-coated probe + display ⁽²⁾	G			Head Position "B"		4	4 (13.1)	0.4 (1.3)		0.1 mm (0.004") / Ex d G	A		
Transmitter mini version ⁽³⁾	M	2" BSP	C	Painted aluminum	E	5	5 (16.4)	0.5 (1.6)	4...20 mA + HART®	0.1 mm (0.004") / Ex d ia G	C		
Transmitter with plastic-coated probe + display ⁽²⁾	G	2" NPT	D			6	6 (20)	0.6 (2)		0.1 mm (0.004")	3		
		1½" TriClamp	J			7	7 (23)	0.7 (2.3)		1 mm (0.04")	4		
Transmitter mini version + display ⁽³⁾	C	2" TriClamp	M			8	8 (26.2)	0.8 (2.6)		0.1 mm (0.004") / Ex ia G	7		
		2½" TriClamp	O			9	9 (29.5)	0.9 (3)		1 mm (0.04") / Ex ia G	8		
Transmitter mini version + display ⁽³⁾	C	3" TriClamp	P			Fiberglass-reinforced plastic (PBT) ⁽⁸⁾	F	A		10 (32.8)		0.1 mm (0.004") / Ex ia G (IP68)	9
		4" TriClamp	R	Stainless steel	B	11 (36.1)				0.1 mm (0.004") / Ex d G	B		
		Without a process connection ⁽⁵⁾	U	C	12 (39.4)			0.1 mm (0.004") / Ex d ia G		D			
		Rigid probe for NIVOFLIP ⁽⁶⁾		D	13 (42.7)			0.1 mm (0.004") / XP Div 1 (FM)		L			
		Without float, with clamp (max. +90 °C [+194 °F])	L	E	14 (45.9)								
		Without float, with clamp (max. +200 °C [+392 °F])	T	F	15 (50)								
		Flexible probe ⁽⁷⁾											
		2" BSP, Ø54 mm (Ø2.13") float	B										
		2" NPT, Ø54 mm (Ø2.13") float	E										
		2" BSP, Ø96 mm (3.78") float	K										
2" NPT, Ø96 mm (3.78") float	N												

⁽¹⁾ For explosion-proof devices, the article number is followed by "Ex" on the nameplate. ⁽²⁾ Insertion length up to 3 m (10 ft). ⁽³⁾ Insertion length up to 1.5 m (5 ft). ⁽⁴⁾ Insertion length up to 4.5 m (14.5 ft) (3...4.5 m [10...14.5 ft] as per special offer). ⁽⁵⁾ Threaded sliding sleeve to be ordered separately. For bypass level indicators other than NIVOFLIP, only if calibrated with the bypass' own float. ⁽⁶⁾ Probe length (up to 5.8 m [19 ft.]) = center to center of NIVOFLIP +300 mm (+11.8"). ⁽⁷⁾ Insertion length up to 15 m (50 ft). ⁽⁸⁾ Ex version not available.

For certified level measurement for custody transfer only the HART® output with 0.1 mm (0.004") resolution version including local display unit can be ordered.

⁽¹⁾ For explosion-proof devices, the article number is followed by "Ex" on the nameplate. ⁽²⁾ Insertion length up to 3 m (10 ft).

⁽³⁾ Insertion length up to 1.5 m (5 ft). ⁽⁴⁾ Insertion length up to 4.5 m (14.5 ft) (3...4.5 m [10...14.5 ft] as per special offer).

⁽⁵⁾ Threaded sliding sleeve to be ordered separately. For bypass level indicators other than NIVOFLIP, only if calibrated with the bypass' own float. ⁽⁶⁾ Probe length (up to 5.8 m [19 ft.]) = center to center of NIVOFLIP +300 mm (+11.8").

⁽⁷⁾ Insertion length up to 15 m (50 ft). ⁽⁸⁾ Ex version not available.

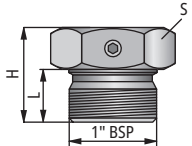
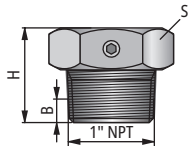
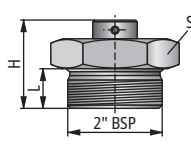
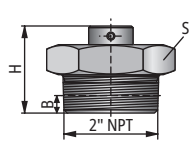
For certified level measurement for custody transfer only the HART® output with 0.1 mm (0.004") resolution version including local display unit can be ordered.

ACCESSORIES SOLD SEPARATELY

Available accessories	Order code
Display unit	SAP-300-0
HART®-USB/Bluetooth® modem	SAT-504-□
eLink unit for software/firmware updates and for data logger reading	SAK-506-□
HART®-USB/RS485 modem	SAK-305-□

SLIDING SLEEVES

Type	Connection	Material	S [mm (inch)]	H [mm (inch)]	L [mm (inch)]	B [mm (inch)]
MBH-105-2M-300-00	1" BSP	1.4571/1.4404 (316Ti/316L)	41 (1.6)	36 (1.42)	20 (0.79)	
MBK-105-2M-300-00	2" BSP		60 (2.36)	55 (2.17)	~24 (0.94)	
MBL-105-2M-300-00	1" NPT		41 (1.6)	37 (1.45)		~10 (0.39)
MBN-105-2M-300-00	2" NPT	PVDF	60 (2.36)	44.5 (1.75)		~11 (0.43)
MGH-105-2M-300-00	1" BSP		46 (1.81)	42 (1.65)	22 (0.87)	
MGL-105-2M-300-00	1" NPT		46 (1.81)	45 (1.77)		10 (0.98)

MBH / MGH	MBL / MGL	MBK	MBN
			

3. TECHNICAL DATA

3.1 General Technical Data

Type		Rigid probe MT□-□□□-□ MB□-□□□-□	Mini version with rigid probe MM□-□□□-□ MC□-□□□-□	Flexible probe MT□-□□□-□ MB□-□□□-□	Plastic-coated rigid probe MEU-□□□-□ MGU-□□□-□
Measured process values		Liquid level, Distance, Volume			
Nominal length (L)		0.3...4.5 m (1...14.8 ft)	0.3...1.5 m (1...4.9 ft)	2...15 m (6.6...49.2 ft)	0.3...3 m (1...9.8 ft)
Material of the probe		1.4571/1.4404 (316Ti/316L equivalent) stainless steel			
Max. process pressure ⁽¹⁾		25 bar (363 psi)	10 bar (145 psi)	16 bar (232 psi)	3 bar (43.5 psi)
Process temperature ⁽²⁾		-40...+90 °C (-40...+194 °F)			
Standard float (see: 3.6 Floats)		MBA-505-2M-200-00	4w34bs16yyyyy	MBK-530-2M-400-00	MGU-505-2M-200-00
Material of wetted parts		Titanium, Stainless steel (for floats, see 3.6 Floats)			
Ambient temperature ⁽²⁾		-40...+70 °C (-40...+158 °F) (SAP plug-in display: min. -25 °C [-13 °F])			
Output	Analog	4...20 mA (limit values: 3.9...20.5 mA)			
	Digital	HART® (lowest loop resistance: 250 Ω)			
	Display	SAP-300 plug-in display			
Damping time		Adjustable: 0...99 sec			
Error indication		Adjustable: 22 mA or 3.8 mA or holding (HOLD)			
Output load		$R_L = (U_s - 12.5 \text{ V}) / 0.02 \text{ A}$, U_s = supply voltage			
Supply voltage		12.5...36 V DC			
Electrical protection		Class III			
Ingress protection ⁽⁴⁾		IP67 (NEMA 6 equivalent)			
Process connection ⁽³⁾		As per order code			
Electric connection ⁽⁴⁾		2× M20×1.5 cable glands + 2× internally threaded ½" NPT connection, cable outer diameter: Ø6...12 mm (Ø0.236"...0.472") (shielded cable is recommended), wire cross section: 0.5...1.5 mm² (20...16AWG) For devices with IP68 protection (M□□-□□□-9): up to 20 m (65.6 ft), equipped with LiY-CY 6× 0.5 mm (6× 0.02"), 500 V cable.			
Housing		Plastic (PBT) or painted aluminum or stainless steel			
Weight		1.7 kg (3.75 lb) + probe: 0.6 kg/m (0.4 lb/ft)	max. 1.7 kg (3.75 lb) + probe: 0.25 kg/m (0.17 lb/ft)	max. 2.9 kg (6.39 lb) + probe: 0.3 kg/m (0.20 lb/ft) + weight (3.5 kg (7.72 lb))	1.7 kg (3.75 lb) + probe: 0.7 kg/m (0.45 lb/ft)

⁽¹⁾ The maximum value of the process pressure also depends on the selected float! See section 2.2 for the maximum pressure data of floats. ⁽²⁾ See the ambient and process temperature diagram in sections [3.7.2](#) and [3.7.4](#).

⁽³⁾ See the Order Code table in section 2. ⁽⁴⁾ M□□-□□□-9 is a special type+ with IP68 protection; the cable gland, cable, and sealing plug are glued and cannot be opened! (IP68 specification: 4 m [13.12 ft] / 4 hours).

3.2 Measurement Data

(MSZ EN 60770-1:2011, MSZ EN 61298-1:2009, MSZ EN 61298-3:2009)

Type		M□□-□□□-2/4/6/8	M□□-□□□-1/3/5/7 M□□-□□□-A/B/C/D
Resolution ⁽¹⁾		1 mm (0.04")	0.1 mm (0.004")
Nonlinearity ⁽¹⁾⁽²⁾ (up to 10 m [32.8 ft] order length)		±2 mm (±0.08") or ± 0.02% F.S. whichever is greater	±1 mm (±0.04") or ±0.01% F.S. whichever is greater
Nonlinearity ⁽¹⁾⁽²⁾ (above 10 m [32.8 ft] order length)		±3 mm (±0.12") or ± 0.02% F.S. whichever is greater	
Hysteresis ⁽²⁾		±1 mm (±0.04")	±0.25 mm (±0.01") (up to 10 m [32.8 ft] order length)
			±1 mm (±0.04") (above 10 m [32.8 ft] order length)
Zero span (in LEVEL mode)		Anywhere within the active range	
Measuring range (reducing) ⁽³⁾		Minimum distance: 200 mm (7.9"); Maximum distance: see 3.5 Dimensions	
Temperature error		0.04 mm/10 °C (0.0015" / 50 °F) between -25...+50 °C (-13...+122 °F)	
Current output	Resolution	2 uA	
	Accuracy	±10 uA	
	Temperature error	200 ppm/°C	

⁽¹⁾ For the displayed and transmitted value of the HART® line.

⁽²⁾ Under reference conditions, only with the original float factory-calibrated to the device. When used with a bypass float, see section 3.4.

⁽³⁾ Accuracy specifications are not valid if the settings differ from the factory defaults.

3.3 Technical Data for Devices Mounted on NIVOFLIP Level Indicators

Type	NIVOTRACK devices for NIVOFLIP bypass chamber MTU- / MBU- / MTL- / MBL- / MTT- / MBT-□□□-□
Nominal length (L)	0.5...6 m (1.64...19.69 ft)
Material of the probe	1.4571/1.4404 (316Ti/316L equivalent) stainless steel
Process temperature ⁽¹⁾	MTU- / MBU- / MTL- / MBL-□□□-□: -40...+90 °C (-40...+194 °F) MTT- / MBT-□□□-□: -40...+200 °C (-40...+392 °F) (equipped with the required thermal insulation)
Ambient temperature ⁽¹⁾	-40...+70 °C (-40...+158 °F) (SAP plug-in display: min. -25 °C [-13 °F])
Ingress protection	IP67 (NEMA 6 equivalent)
Process connection ⁽²⁾	MTU- / MBU-□□□-□: none; MTL- / MBL-□□□-□: with AWAB clamp; MTT- / MBT-□□□-□: with AWAB clamp and ceramic thermal insulation
Housing	Plastic (PBT) or Painted aluminum or stainless steel
Weight	1.7 kg (3.75 lb) + probe: 0.6 kg/m (0.4 lb/ft)

⁽¹⁾ See the ambient and process temperature diagram in sections 3.5.2 and 3.5.4.

⁽²⁾ See the Order Code Table in section 2.

3.4 Measurement Data for Devices Mounted on NIVOFLIP Level Indicators

(MSZ EN 60770-1:2011, MSZ EN 61298-1:2009, MSZ EN 61298-3:2009)

Type	M□L-□□□-2/4/6/8 M□U-□□□-2/4/6/8	M□L-□□□-1/3/5/7/9/A/B/C/D M□U-□□□-1/3/5/7/9/A/B/C/D	M□T-□□□-2/4/6/8	M□T-□□□-1/3/5/7/9/A/B/C/D
Resolution ⁽³⁾	1 mm (0.04")	0.1 mm (0.004")	1 mm (0.04")	0.1 mm (0.004")
Nonlinearity ⁽³⁾⁽⁴⁾	±3 mm (±0.12") or ±0.07% F.S. whichever is greater		±4 mm (±0.16") or ±0.09% F.S. whichever is greater	
Hysteresis ⁽⁴⁾	±1 mm (±0.04")		±2 mm (±0.08")	

⁽³⁾ For the displayed and transmitted value of the HART® line.

⁽⁴⁾ Under reference conditions, only with the original float calibrated at the factory for the device.

3.5 Dimensions

Rigid probe transmitter with threaded process connection		Flexible probe transmitter with sliding sleeve process connection	
M□A-□□□-□, M□C-□□□-□, M□D-□□□-□, M□G-□□□-□		M□K-□□□-□ M□N-□□□-□	
Position "A"	Position "B"	Position "A"	Position "B"

Rigid probe transmitter without process connection ⁽¹⁾		Plastic coated rigid probe transmitter without process connection ⁽¹⁾	Mini rigid probe transmitter with threaded process connection	Device types that can be mounted on NIVOFLIP
MTU-□□□-□ MBU-□□□-□		MEU-□□□-□ MGU-□□□-□	MM□-□□□-□ MC□-□□□-□	MTL- / MBL-□□□-□ MTT- / MBT-□□□-□
Position "A"	Position "B"			

⁽¹⁾ Without float, with clamp, the process connection can be ordered separately.

3.6 Floats

Type	MBA-505-		MBK-530-2M -400-00	MBA-505-2M-		MBA-505-2M -900-00	4w34bs- 16yyyyy ⁽²⁾	MGU-505-2M -200-00	MGU-506-1M -200-00
	2X-0C7-10	2M-600-00 ⁽¹⁾		800-00 ⁽¹⁾	200-00 ⁽¹⁾				
Dimensions									
Medium density (Specific gravity (min.) [kg/dm ³])	0.61	0.45	0.55	0.55	0.8	0.4	0.8	0.7	0.4
Material	Titanium		Austenitic stainless steel ⁽³⁾	Titanium	Austenitic stainless steel ⁽³⁾			PVDF	PP
Process pressure	16 bar (232 psi)			25 bar (363 psi)			10 bar (145 psi)	3 bar (43.5 psi)	

⁽¹⁾ Designed for min. 2" process connection.

⁽²⁾ Designed for min. 1" process connection, only order with mini version.

⁽³⁾ Austenitic stainless steel: 1.4401, 1.4404, 1.4435, 1.4571 (316, 316L, 316Ti), etc.

3.7 Explosion Protection, Designation, Limit Values

3.7.1 ATEX Intrinsically safe protection (Ex ia, Ex db ia, Ex db) – ATEX Certificate No.: BKI16ATEX0012X/3

Type	M□□-□□□-9 Ex ⁽¹⁾	M□□-□□□-5 Ex / 6 Ex M□□-□□□-7 Ex / 8 Ex	M□□-□□□-C Ex / D Ex	M□□-□□□-A Ex / B Ex
Ex marking (ATEX)	Ⓔ II 1 G Ex ia IIB T6...T5 Ga		Ⓔ II 1/2 G Ex db ia IIB T6...T5 Ga/Gb	Ⓔ II 2 G Ex db IIB T6...T5 Gb
Nominal length (L)	0.3...15 m (1...49.2 ft)		0.3...10 m (1...32.8 ft)	
Cable entry	–		Metal M20×1.5 cable gland with Ex d certification	
Cable outer diameter	–		Ø9...11 mm (Ø0.35"...Ø0.43")	
Stock cable	max. 20 m (65.6 ft), LiY-CY 6× 0.5 mm, 500 V C < 9 nF, L < 10 µH		–	
Ex supply voltage, Intrinsically safety data	U _i = 30 V DC I _i = 140 mA P _i = 1 W C _i ≤ 25 nF L _i ≤ 210 µH		U _i = 30 V DC I _i = 140 mA P _i = 1 W C _i ≤ 15 nF L _i ≤ 200 µH	U _t = 12.5...36 V DC I _{max} = 140 mA

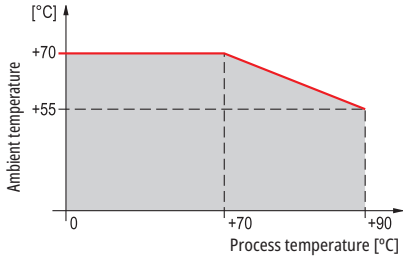
⁽¹⁾ Attention! The M□□-5□□-9 Ex type device is IP68-rated. The cover, cable gland, cable and the plug are glued and cannot be opened!

3.7.2 Temperature limit data for ATEX (Ex ia, Ex db ia, Ex db) approved models

Device probe version	Temperature class	Ambient temperature ⁽²⁾	Process temperature
Rigid probe (Rod)	T6	–40...+70 °C (–40...+158 °F)	+80 °C (+176 °F)
Flexible probe (Cable)			+70 °C (+158 °F)
Rigid probe (Rod)	T5	–40...+55 °C (–40...+131 °F)	+90 °C (+194 °F)

⁽²⁾ For models equipped with an SAP display, the lower limit of the ambient temperature is restricted to –25 °C (–13 °F).

For process temperatures above +70 °C (158 °F),
the permissible ambient temperature is shown
in the diagram below:



3.7.3 IECEx Intrinsically safe protection (Ex ia, Ex db ia, Ex db) – IECEx Certificate No.: IECEx BKI 12.0002X Issue No.:1

Type	M□□-□□□-9 Ex ⁽¹⁾	M□□-□□□-5 Ex / 6 Ex M□□-□□□-7 Ex / 8 Ex	M□□-□□□-C Ex / D Ex	M□□-□□□-A Ex / B Ex
Ex marking (IECEx)	Ex ia IIB T6...T5 Ga		Ex db ia IIB T6 Ga/Gb	Ex db IIB T6...T5 Gb
Nominal length (L)	0.3...15 m (1...49.2 ft)		0.3...10 m (1...32.8 ft)	
Cable entry	–	M20×1.5 cable glands	Metal M20×1.5 cable gland with Ex d certification	
Cable outer diameter	–	Ø7...13 mm (Ø0.28"...Ø0.5")	Ø9...11 mm (Ø0.35"...Ø0.43")	
Stock cable	max. 20 m (65.6 ft), LiY-CY 6× 0.5 mm, 500 V C < 9 nF L < 10 µH	–		
Ex supply voltage, Intrinsically safety data	U _i = 30 V DC I _i = 140 mA P _i = 1 W C _i ≤ 25 nF L _i ≤ 210 µH	U _i = 30 V DC I _i = 140 mA P _i = 1 W C _i ≤ 15 nF L _i ≤ 200 µH		U _t = 12.5...36 V DC I _{max} = 140 mA

⁽¹⁾Attention! The M□□-5□□-9 Ex type device is IP68-rated. The cover, cable gland, cable and the plug are glued and cannot be opened!

3.7.4 Temperature limit data for IECEx (Ex ia, Ex db ia, Ex db) approved models

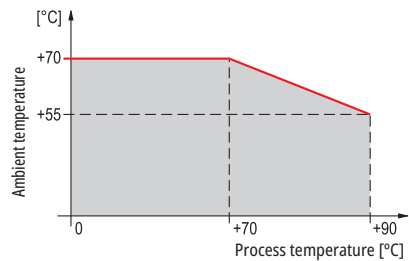
Maximum allowed ambient temperature over process temperature

Type	Temperature Class	Max. Ambient Temperature	Max. Process Temperature
M□A, M□C M□D, M□G MEU, MGU	T6	+70 °C (+158 °F)	+80 °C (+176 °F)
M□K, M□N			+70 °C (+158 °F)
M□A, M□C M□D, M□G MEU, MGU	T5	+55 °C (+131 °F)	+90 °C (+194 °F)

Lower temperature limits

Type	Ex Protection Type		
	Ex ia	Ex db	Ex db ia
MT□, ME□, MM□	-40 °C (-104 °F)	-40 °C (-104 °F)	-40 °C (-104 °F)
MB□, MG□, MC□	-25 °C (-13 °F)	-25 °C (-13 °F)	-25 °C (-13 °F)

For process temperatures above +70 °C (158 °F), the permissible ambient temperature is shown in the diagram below:



3.8 Accessories

- User and programming manual
- Warranty card
- EU Declaration of Conformity
- 2× cable glands (M20×1.5)
- 1× gasket (klingerit oilit) for BSP threads only

Only for models equipped with a flexible probe

- 1× weight
- 1× M10 nut
- 1× M10 spring washer
- 1× M10 washer
- 1× spacer (except when using Ø50 mm tension weight)

3.9 Conditions for Safe Operation



- Before putting the device into operation, check whether the installation is correct and if there are any visible deficiencies.
- The device must only be used within the limits specified in the technical specifications.
- During the device's installation and/or programming, the IP20 protection level must be maintained.
- The aluminum content of equipment with metallic enclosure exceeds the limit, the devices must be protected against impact and friction effects.
- Intrinsically safe devices may only be operated from a circuit that complies with the technical data of the device and is marked [Ex ia IIC] or [Ex ia IIB].
- The device must be connected to the earth of the EP network via its earth screw.

3.10 Maintenance, Repair, and Storage Conditions

The device does not require regular maintenance. Refer to the warranty card for warranty information. The device returned for repair must be cleaned by the user, all chemical deposits must be removed, and the device must be disinfected before sending it back. In addition, the return package must include a properly filled [Returned Equipment Handling Form](#), in which the sender declares that the device is free of all contamination and substances hazardous to health. If the device is not used, store it within the ambient temperature specified in the technical data, with a maximum humidity of 98%.

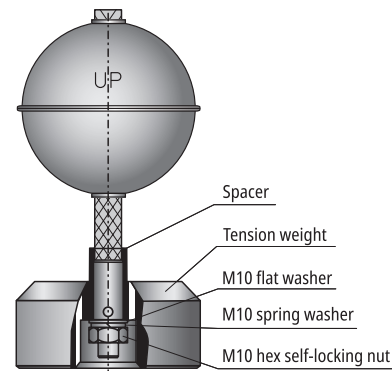
For devices with a flexible probe, special attention must be paid to the following:

- The minimum bending radius of the probe is 0.3 m (0.98 ft) (Ø0.6 m [Ø1.968 ft]). Bending the probe below the specified radius may damage the measuring sensor.
- Avoid unnecessary repeated coiling and uncoiling of the probe.
- Twisting of the probe may lead to malfunction.
- The connection point between the device housing and the flexible probe is particularly vulnerable.

4. INTEGRATION INTO THE TECHNOLOGICAL PROCESS

4.1 Mounting

- When selecting the installation location, ensure adequate access for calibration, inspection, and maintenance.
 - Waves, vortex formation, or vibrations can affect measurement accuracy. The device should be installed as far as possible from sources of such disturbances, such as inlet or outlet openings. For rigid probe devices, we recommend installing a stilling well inside the tank along the full length of the probe to dampen these effects. Please consult the manufacturer.
 - To ensure continuous and reliable operation, the measured medium should not contain suspended solid particles, as these may accumulate on the float rod and hinder float movement.
 - **The device must be shielded from radiant heat.**
 - Before installation, check the dimensions of the device, the tank, and the installation site, as well as the relevant calculations.
 - A functional check of the device is recommended before installation.
 - If modification of the factory settings is required, follow the instructions in [Chapter 5](#).
 - Depending on the order, the devices may have different process connections. The tank opening must match the selected model and be large enough for the float to pass through. If this is not possible, the float must be removed from the rod and reattached from inside the tank after installation. The "UP" marking on the float ensures correct orientation during reassembly. See the dimensions drawing. After completing the installation, reposition the spacer to its original
-
- For types equipped with plastic-coated probes, the insertion length of the probe can be adjusted. However, the portion of the probe extending outside the tank must not exceed 200 mm (7.87").
 - **For devices with flexible probes, a counterweight is attached to the end of the probe to straighten and secure it in the correct position. The counterweight and fastening nut are included with the device. When lowering the flexible probe with the counterweight into the tank, special care must be taken to prevent the probe from twisting, looping, or knotting. The coiling diameter must not be less than 0.6 m (1.97 ft) during the process. Dropping or sudden twitching of the cable probe may damage the unit. To prevent the float from falling and hitting the weight, it should be positioned at the bottom end of the probe, adjacent to the counterweight. The counterweight must not touch the bottom of the tank. The proper straightening and tension of the flexible probe can be verified via the analog output or the display. If the float is at the lowest position, the output current $I_{OUT} = 4 \text{ mA}$, or the displayed level should read 0 mm (0 ft).**



ATTENTION!

To avoid damaging the probe, do not subject it to torsion when installing or removing the unit. Therefore, special care must be taken when screwing the process connection into or out of the clamping ring flange. It is recommended to hold the rigid part of the probe with a suitable tool to counteract rotation while tightening or loosening the connection. The sliding sleeve must not be loosened while the tank is under pressure!

For devices with a flexible probe, special attention must be paid to the following:

- The minimum bending radius of the probe is 0.3 m (0.98 ft) (Ø0.6 m [Ø 1.97 ft]). Bending the probe below this radius may damage the measuring sensor.
- Avoid unnecessary repeated coiling and uncoiling of the probe.
- Twisting of the probe may lead to malfunction.
- The connection point between the device housing and the flexible probe is particularly vulnerable. Ensure that the probe is not bent or damaged during storage or installation.

During installation, it is recommended that a designated technician supervises the entire process to ensure compliance with the above precautions.

If the float has been removed, make sure during reassembly that the "UP" marking on the float is facing upward. Also ensure that the retaining ring is securely fastened in the same position as before disassembly.

If the retaining ring is not properly secured, the float may slip off the probe when the tank is empty, which will result in the device becoming unable to measure.

4.2 Assembly of Devices Mounted on a NIVOFLIP Level Indicator

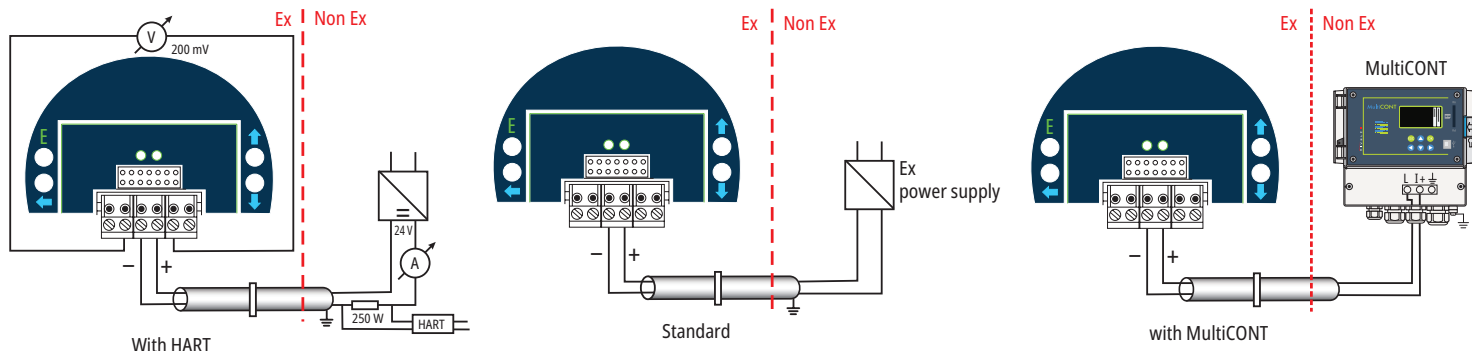
For devices MTU-□□□-□, MBU-□□□-□, MTL-□□□-□, MBL-□□□-□ (See Appendix 1):

1. Place the magnetostrictive rod spacers ② onto the NIVOTRACK magnetostrictive transmitter in the positions shown in the diagram (Views I and III).
2. Secure the magnetostrictive rod spacers ② using the set screws ③.
3. Attach the AWAB clamps ① around the spacer ② and the bypass chamber, and use them to fasten the NIVOTRACK magnetostrictive transmitter to the bypass chamber.

For devices MTT-□□□-□, MBT-□□□-□ (See Appendix 2):

1. Place the magnetostrictive rod spacers ④ onto the NIVOTRACK magnetostrictive transmitter in the positions shown in the diagram (Views I and III).
2. Secure the magnetostrictive rod spacers ④ using the set screws ⑥.
3. Install the ceramic insulating tapes ② and the stainless steel plate cover of the ceramic insulation ③ between the NIVOTRACK magnetostrictive transmitter and the bypass chamber as shown in the diagram (Views I, II, and III).
4. Place the ceramic insulating tape ⑤ in the position indicated in the diagrams (Views I, II, and III).
5. Attach the AWAB clamps ① around the spacer ④ and the bypass chamber, and use them to fasten the NIVOTRACK magnetostrictive transmitter to the bypass chamber, together with the ceramic insulating tapes ② and ⑤ and the stainless steel plate cover of the ceramic insulation ③.

4.3.1 Wiring of Ex certified units



4.4 Loop Current Check using a Handheld Meter

After unscrewing the device cover and removing the display unit, the instantaneous loop current can be measured with approximately 0.5% accuracy. To do this, connect a handheld meter (set to the 200 mV range) to the measurement terminal 2 and 5 indicated in the diagram in section 4.3.

5. PROGRAMMING

NIVOTRACK transmitters can be programmed by two basic ways

- Programming with **SAP-300** display unit, ([see chapter 5.2](#)).
- Full access to all device parameters allows complete customization of its functionality, including: measurement configuration, zero point offset, output settings, measurement optimization, entering the dimensions of 11 types of tanks into the parameter set, and a 99-point linearization table.

NIVOTRACK transmitters with display include the SAP-300 display unit.

Programming is performed via a text-based menu system, navigated using the  /  /  /  buttons.

NIVOTRACK transmitters without a display unit are fully operational without the display; the SAP-300 module is only required for parameter configuration and/or local display of measured values.

During programming, the device continues measuring based on the previously active parameter set. The new, modified parameters only take effect after returning to Measurement Mode.

If the transmitter is accidentally left in Programming Mode, it will automatically switch back to Measurement Mode after 30 minutes, and any changes made will be discarded.

FACTORY DEFAULT

The NIVOTRACK M-500/600 level transmitters are delivered with the following factory default settings:

- ➔ Measurement mode: Level (LEV). The displayed value shows the measured level.
- ➔ Current output and the bar graph on the right side are proportional to the level.
- ➔ 4 mA / 0% corresponds to the zero level (lowest float position).
- ➔ 20 mA / 100% corresponds to the maximum level (highest float position).
- ➔ In case of an error, the current output holds its last value (loop current error state: HOLD).
- ➔ Level tracking time constant: 0 seconds.

The transmitter measures the distance (DIST) from the highest position of the float as its primary value. This distance can be displayed in m, cm, mm, feet, or inches. Since the measurement range of the device is known, the electronics calculate the actual level (LEV) accordingly. If the exact mechanical installation dimensions are known — specifically, the distance between the lowest float position and the bottom of the tank — the calculated level can be refined using this information. This calculated level serves as the basis for volume (VOL) or mass (MASS) calculations, and is also used as the input for the 99-point linearization table (VMT).

5.1 The SAP-300 Display Unit

The SAP-300 is a plug-in display module with a 64×128 dot-matrix LCD. It is universal — it can also be used in other NIVELCO devices, provided that the device's software supports the SAP-300.

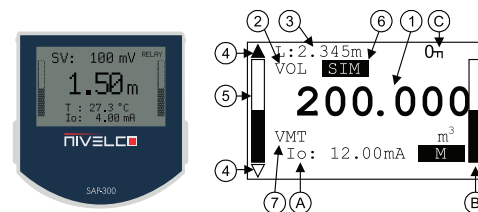
Warning!

Since the SAP-300 uses LCD technology, do not expose it to prolonged heat or direct sunlight, as this may damage the display. If the device cannot be protected from sunlight or is to be used outside the SAP-300's specified operating temperature range, the display module should not be left installed in the device.

Displaying with the SAP-300 module

Elements of the display

1. Primary value (PV), as defined in BASIC SETUP / PV. MODE.
2. Calculation mode of the primary value, as per BASIC SETUP / PV. MODE.
3. Type and value of the base quantity used for calculating the primary value:
 - In case of level measurement (LEVEL): distance (DISTANCE)
 - In case of volume (VOLUME) or mass (MASS): level (LEVEL)
4. Trend indicator arrows:
 - An empty triangle indicates a slight change in the measured value.
 - A filled triangle indicates a significant change.
 - If no arrows are visible, the measured value is stable.
5. Bar graph showing the relationship between the measured base value (distance) and the sensor range.
6. Simulation mode indicator:
 - Indicates that the display and output are based on simulated values, not actual measurements.
7. Volume/Mass Table (VMT) indicator:
 - Shows that the volume or mass is being calculated using the VMT table.
 - Note: Even during active simulation, critical error messages will still be displayed.



- A.** The calculated value of the output current is displayed.

After the unit, the current output mode is indicated in inverse text:

- H** Manual mode (see [chapter 5.3.2.1](#))
 - H** HART® address is not 0, so the output current is overridden to 4 mA (see [chapter 5.3.3.1](#))
 - E !** The analogue output responds to a programmed fault condition, if a lower or upper fault current is configured (see [chapter 5.3.2.4](#))
- B.** The output current (4...20 mA) is shown as a bar graph, where the bottom represents 4 mA and the top represents 20 mA.
- C.** Menu lock indicator:
- If the key symbol is visible, the device is protected by a user password. Upon entering the menu, the device will prompt for the password (see [chapter 5.3.3.1](#)).
 - If REM is displayed, remote programming is active and menu access is locked.

Any measurement errors are displayed on the bottom line of the screen.

Information displays

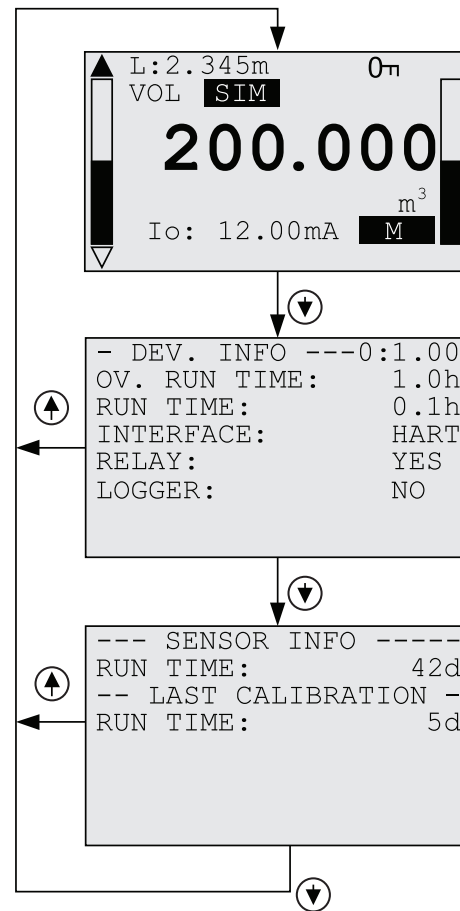
From the main measurement screen, you can navigate to the information screens using the  button.

- Device information screen (DEV. INFO):

Displays overall operating time (OV. RUN TIME), run time since last power-up (RUN TIME), interface type (INTERFACE), presence of relay (RELAY), and logger (LOGGER).

- Sensor information screen

The display will automatically return to the main measurement screen after 30 seconds of inactivity. You can return to the main screen at any time by pressing the  button. From any screen, pressing the  button opens the menu. Exiting the menu always returns you to the main measurement screen.



5.2 Programming with the SAP-300 Display Unit

When entering the menu, the device creates a copy of the current parameter set. All changes are made to this copy. During programming, the device continues to measure and transmit using the original (unchanged) parameter set. Upon exiting the menu, the modified parameters overwrite the original set, and the device will then operate based on the new configuration. This means that parameter changes do not take effect immediately upon pressing the **E** button.

To enter the programming menu, press the **E** button. To exit the menu, press the **◀** button.

If the device remains in programming mode for 30 minutes without user interaction, it will automatically return to measurement display mode. If the SAP-300 display is removed during programming, the device will immediately switch back to measurement mode.

Since manual programming via SAP-300 and remote programming via HART® create a concurrent access situation, only one method can be used at a time. However, measured values can be read via HART® at any time, regardless of the programming mode.

5.2.1 Elements of the programming interface

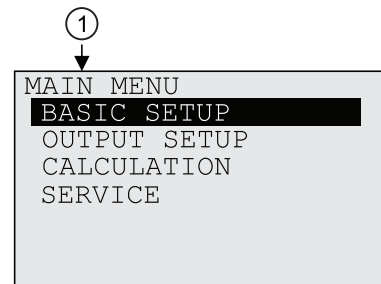
Lists

You can navigate between the rows of a list using the **▼** / **▲** buttons. Press the **E** button to select a list item. The selected item is highlighted with inverse colors. To exit the list without making a selection, press the **◀** button.

Menu List

A menu list is a specialized type of list. Its key feature is that selecting an item opens another list, and these lists can be nested across multiple levels. The menu header (1) helps with navigation.

To enter the programming menu, press the **E** button. Use the **▼** / **▲** buttons to navigate between menu items. To enter a selected menu item, press the **E** button again. The selected item is highlighted with inverse colors. To return to the previous menu level, press the **◀** button. Exiting from the top-level menu returns the device to measurement mode.



Dialog Window

During programming, dialog windows may appear. The system uses these to display warnings or error messages. In most cases, they must be acknowledged by pressing the  button. In simpler cases, the user can choose between two options (e.g., YES/NO) using the  /  buttons. In more complex situations, resolving the issue may require modifying one of the parameters.

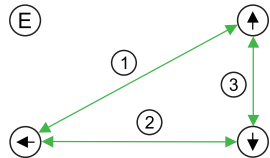
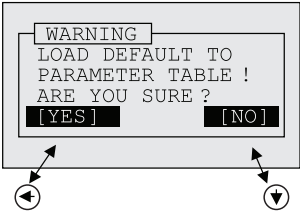
Edit Window

The edit window is used to modify a numeric parameter value. The digit at the cursor position (highlighted in inverse color) can be changed using the  /  buttons. The cursor can be moved to the left using the  button. Once the cursor has moved through all valid digits, it reappears on the right side. Press the  button to confirm the entered value. The device will then validate the parameter. Exiting the edit window is only possible if the value is valid. If the value is incorrect, an error message will appear on the bottom line (1) of the display.

Edit Window – Button Combinations

The following button combinations are available in the edit window:

- 1. Restore the parameter to its state before editing ( + , hold for 3 seconds)
 - 2. Load the default value of the parameter ( + , 3. hold for 3 seconds)
 - 3. Insert the currently measured value into the edit field ( + , hold for 3 seconds)
- These functions are only available for certain parameters!



5.2.2 Menu structure

Main menu

BASIC SETUP	Parameter group of the basic measurement parameters
OUTPUT SETUP	Parameter group of the output parameters
CALCULATION	Calculations
SERVICE	Service functions, calibration, test and simulation

5.3 Programmable Features Description

5.3.1 Basic Measurement Settings

5.3.1.1 Units

Default measuring unit

Parameter:	P00: c, where a: 0, 1.	Default value: EU
Menu path:	BASIC SETUP / UNITS/ENGINEERING SYSTEM	(for USA versions: US)
Description:	This should be configured as the first step of the programming. Here you can choose the default unit system: • EU European unit system • US Anglo-Saxon unit system	

Dimension of the default measuring unit

Parameter:	P00: b, and P02: b	Default value: mm, m ³ , t
Menu path:	BASIC SETUP / UNITS/ENGINEERING UNITS	(for USA versions: inch, ft ³ , t)
Description:	The dimension of the unit can be specified in this menu: • BASIC UNITS (mm, cm, m, ft, inch) • VOLUME UNITS (m³, l) • MASS UNITS (t, t)	

If the unit of measurement is changed, the device will display a warning message and then reset all parameters to their default values.

5.3.1.2 PV mode

Parameter:	P01: b a	Default value: DIST
Menu path:	BASIC SETUP / PV MODE	
Description:	This mode determines the primary value and the displayed value. It also determines the value which will be proportional to the output current. • DISTANCE • LEVEL • VOLUME • MASS	

5.3.1.3 Damping time

Parameter:	P20	Default value:	0 sec
Menu path:	BASIC SETUP / DAMPING TIME		
Description:	Damping time is used to damp the unwanted fluctuations of the output and display. If the measured value changes rapidly the new value will settle with 1% accuracy after this set time. (damping according to an exponential function).		

5.3.1.4 Application

Parameter:	P0: a, where a: 0, 1.	Default value:	NORMAL
Menu path:	BASIC SETUP / APPLICATION		
Description:	Application mode, refers to the mounting position of the devices, and affects the function of error indications.		
	• NORMAL Device sensor is in the tank. Every error indication in normal mode. • BYPASS Device sensor is outside the tank in a measuring tube The "SIGNAL IN N.D.B." and "SIGNAL IN F.D.B." error indication are inactive.		

5.3.1.5 Installation mode (ONLY USD (UpSide Down) – "Reverse installation position" devices)

Parameter:	P0: d, where d: 0, 1.	Default value:	NORMAL
Menu path:	BASIC SETUP / MOUNTING MODE		
Description:	It reverses the reference points of the level calculation in accordance with the mounting position.		
	• NORMAL Device housing on top, sensor on bottom (normal position) • UPSIDE DOWN Device housing on bottom, sensor on top (reverse position)		

5.3.2 Analog output

5.3.2.1 Output current mode

Parameter:	P12: b, where a: 0, 1.	Default value:	AUTO
Menu path:	OUTPUT SETUP / ANALOG OUTPUT / CURRENT MODE		
Description:	Transmission mode of the current output [AUTO, MANUAL]		
	- AUTO The output current is calculated from the measured value, output is active. - MANUAL The output current is fixed at a constant (set) value (see 5.3.2.5). In this mode the setting of the error current is irrelevant. The set (current) value overwrites the 4 mA output of HART multidrop mode!		

5.3.2.2 Output current value 4 mA

Parameter:	P10	Default value:	0
Menu path:	OUTPUT SETUP / ANALOG OUTPUT / 4 mA VALUE		
Description:	Measured value assigned to 4 mA. The transmitted value is in accordance to the primary value (PV) (P01: a). Assignment can be done that the change in measured value and the change in the output value are the same (normal), or opposite directional (inverse operation). For example: 1 m level is 4 mA, 10 m level is 20 mA, or 1 m level is 20 mA and 10 m level is 4 mA.		

5.3.2.3 Output current value 20 mA

Parameter:	P11	Default value:	
Menu path:	OUTPUT SETUP / ANALOG OUTPUT / 20 mA VALUE		
Description:	Measured value assigned to 20mA. The transmitted value is in accordance to the primary value (PV) (P01: a). Assignment can be done that the change in measured value and the change in the output value are the same (normal), or opposite directional (inverse operation). For example: 1 m level is 4 mA, 10 m level is 20 mA, or 1 m level is 20 mA and 10 m level is 4 mA.		
		Active measurement range	

5.3.2.4 Output current error mode

Parameter:	P12: a, where a: 0, 1, 2	Default value:	HOLD
Menu path:	OUTPUT SETUP / ANALOG OUTPUT / ERROR MODE		
Description:	Error indication by the current output		

- HOLD Error indication has no effect on the output current.
- 3.8 mA Error indication: the output current gets 3.8 mA.
- 22 mA Error indication: the output current gets 22 mA.

Warning This error indication is active unless the failure is fixed, or until the failure terminates

5.3.2.5 Fixed output current

Parameter:	P08	Default value:	4 mA
Menu path:	OUTPUT SETUP / ANALOG OUTPUT / MANUAL VALUE		
Description:	Parameter for setting the fixed output current Values between 3.8 and 20.5 can be entered. The output current will be set to the entered value and analogue transmission will be suspended (see: 5.3.2.1). This error indication overrides all other error indication		

5.3.3 Digital Output

5.3.3.1 HART® polling address (if there is a HART option in the device)

Parameter:	P19	Default value:	0
Menu path:	OUTPUT SETUP / SERIAL OUTPUT / ADDRESS		
Description:	HART polling address (only HART capable types) The polling address can be set between 0 and 15. For a single device the polling address is 0 and the output is 4...20 mA (analogue output). If multiple units are used in HART Multidrop mode (max. 15) the polling addresses should differ from 0 (1 – 15), in this case the output current will be fixed at 4 mA		

5.3.4 Calculation

5.3.4.1 Zero point offset (Distance between the lowest position of the float and the bottom of the tank)

Parameter:	P04	Default value:	0
Menu path:	CALCULATION / LEVEL OFFSET		
Description:	This parameter is used for the zero point offset. In level measurement mode, the device considers the lowest position of the float as the zero level. Due to the device's construction, it may not be able to measure the entire height of the tank, as the float might not reach the bottom. This parameter allows you to specify the distance between the lowest position of the float and the bottom of the tank. If you wish to virtually reduce the measurement range, you must enter a negative value into this parameter. The value always represents the distance between the float's lowest position and the shifted zero point of the measurement. The absolute value of this offset must be less than the active measurement range. If no zero point offset is required, the parameter should remain at its factory default value. (See page 3: Basic concepts and elements.) Incorrect configuration may result in a negative level reading. A negative level is not considered a valid or normal value. Although no error message is displayed, such a value cannot be used for 4...20 mA programming or for volume/mass calculations.		

5.3.4.2 Calculation mode (V/M)

Parameter:	P47: a, where a: 0, 1.	Default value:	0
Menu path:	CALCULATION / V/M CALC. MODE		
Description:	Calculation of the volume and mass can be performed with two ways: • TANK FUNCTION/SHAPE – volume and mass calculation with a tank shape formula. Entering this menu point table is automatically OFF. • V/M TABLE – volume and mass calculation with a table. Entering this menu point table is automatically ON.		

5.3.4.3 Tank function / shape

Parameter:	P40: a, where a: 0, 1, 2, 3, 4.	Default value:	0
Menu path:	CALCULATION / V/M CALC. MODE / TANK FUNCTION/SHAPE		
Description:	• Standing cylindrical tank • Standing cylindrical tank with conical bottom • Standing rectangular tank with or without chute • Lying cylindrical tank • Spherical tank		

5.3.4.4 Tank bottom shape

Parameter:	P40: b, where a: 0, 1, 2, 3.	Default value:	0
Menu path:	CALCULATION / V/M CALC. MODE / TANK FUNCTION/SHAPE		
Description:	This menu only appears, if it has an importance on the selected type! • SHAPE1 • SHAPE2 • SHAPE3 • SHAPE4		

5.3.4.5 Tank Dimensions

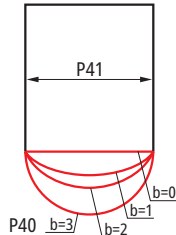
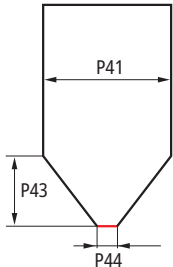
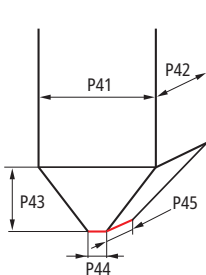
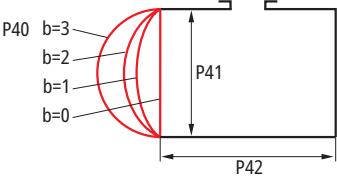
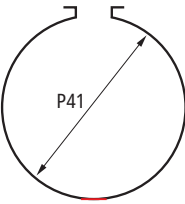
Parameter: P41-P45

Menu path: CALCULATION / V/M CALC. MODE / TANK FUNCTION/SHAPE

Default value: 0

Description:

- DIM1 (P41)
- DIM2 (P42)
- DIM3 (P43)
- DIM4 (P44)
- DIM5 (P45)

Vertical cylindrical tank with a convex bottom $a = 0$ 	Vertical cylindrical tank with a conical bottom $a = 1, b = 0$ 	Vertical rectangular tank with a pyramidal bottom $a = 2, b = 1$  if no chute: P43, P44 and P45 = 0
Horizontal cylindrical tank $a = 3$ 	Spherical tank $a = 4, b = 0$ 	

5.3.4.6 Volume and Mass Table (VMT)

Parameter: -

Menu path: CALCULATION / V/M CALC. MODE / V/M TABLE

Description:

- View/Edit table
- Add item
- Delete item

If none of the predefined tank formulas meet the requirements, a tabular calculation mode can be used instead. The device supports a table of up to 99 points and performs linear interpolation between adjacent point pairs. The input (left) column of the table represents the level values, while the output (right) column contains the corresponding volume or mass values. The first entry in the table must be 0.0. If a longer table needs to be shortened, the last entry should also be set to 0.0. Unused point pairs are automatically filled with 0.0 values in the background by the device. The status of the table (enabled or disabled) is indicated by a message on the bottom line of the display.

All modifications are made in a temporary table. This temporary table becomes active only after exiting the menu. Changes made during programming do not affect ongoing measurements or data transmission in the background.

Point pairs can be entered in any order; the device will automatically sort them in ascending order. Both columns of the sorted table must be strictly monotonically increasing. If an error is detected, a warning message will appear on the bottom line of the display (see [Chapter 6](#)). When re-entering the table, the cursor will automatically highlight the first incorrect row.

Viewing the Table

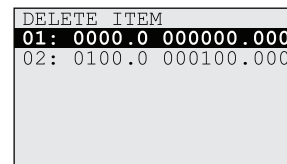
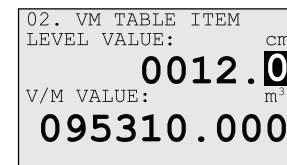
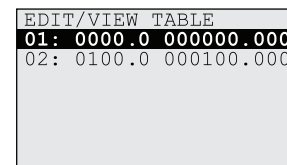
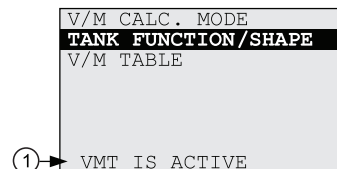
The sorted table entries can be reviewed in the VIEW/EDIT TABLE menu. Use the  /  buttons to navigate through the list, and press the  button to edit the selected entry. Press the  button to exit the list.

Edit Table Entry

Pressing the  button on an existing item or selecting ADD ITEM opens the edit screen. This screen contains two input fields, both functioning the same way as parameter editing. Press the  button in the first field to move to the second field. In the second field, pressing the  button returns you to the previous menu. After exiting the last field, the device automatically sorts the table entries.

Delete Table Entry

Use the  /  buttons to navigate through the list. To delete the selected item, press the  button. Press the  button to exit the list. The table must contain at least two entries.



5.3.4.7 Specific gravity

Parameter: P12: b, where a: 0, 1.

Default value: 0

Menu path: CALCULATION / SPECIFIC GRAVITY

Description: Transmission mode of the current output [AUTO, MANUAL]

Specific gravity (density) of the measured medium, expressed in kg/dm³ or lb/ft³, depending on the selected unit. This parameter is available only when the MASS unit is selected (depending on P00 (c) and P02 (b) settings).

5.3.5 Service functions

5.3.5.1 Security codes

User codes:

Menu path: SERVICE / SECURITY / USER LOCK

Description: Setting or unlocking the user security code.

The device can be protected against unauthorized programming with a 4-digit PIN (Personal Identification Number) code. If either of the digits differs from 0 the code is active. If zero is specified, then the secret code has been deleted! In case of Active code, this code is requested at menu entry.

Service code:

Menu path: SERVICE / SECURITY / SERVICE LOCK

Description: Setting of the service code.

Only for trained personnel!

5.3.5.2 Current output test

Parameter: P80

Menu path: SERVICE / OUTPUT TEST / ANALOG OUTPUT

Description: Loop Current Test (mA)

When entering this parameter, the display and the output show the current value corresponding to the actual measurement. In test mode, any value between 3.9 mA and 20.5 mA can be entered in the edit window. The output current will then be set to the entered value.

A dialog window indicates that the device is in test mode. The output will remain at the test value until the user exits the warning dialog. To exit the dialog, press the **E** button.

5.3.5.3 Distance simulation

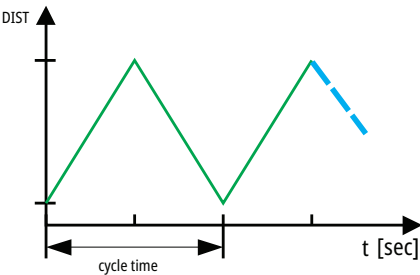
This function helps the user verify calculations (tank formula, table), output signals, and any connected processing devices. The NIVOTRACK can simulate either a constant or a variable level value. To start the simulation, the device must return to Measurement Mode. When simulation is active, the display shows an inverse SIM label in Measurement Mode.

Simulation Mode

Parameter: P84: a, where a: 0, 1, 2, 3.
Menu path: SERVICE / DIST SIMULATION / MODE
Description:

Default value: OFF

- Simulation mode:
 - OFF No simulation
 - FIX VALUE Value of the simulated distance is set according to the lowest value of the simulation.
 - TRIANGLE WAVE Value of the simulated distance changes linearly between the lowest and highest values with an adjustable cycle time.
 - SQUARE WAVE The simulated value jumps between the lowest and highest values with an adjustable cycle time.



Simulation cycle

Parameter: P85
Menu path: SERVICE / DIST. SIMULATION / TIME
Description: Cycle time of the simulation

Default value: 60 sec

Bottom value of the simulation

Parameter: P86
Menu path: SERVICE / DIST. SIMULATION / BOTTOM VALUE
Description: Lowest value of the simulation

Default value: 0 mm

Upper value of the simulation

Parameter: P87
Menu path: SERVICE / SIMULATION / UPPER VALUE
Description: Highest value of the simulation

Default value: Programmed measurement range

5.3.5.4 Load Default Values

Menu path: SERVICE / DEFAULTS / LOAD DEFAULT

Description: This command loads all default values of the device.

After loading the default values the parameters can freely be changed, the effect of the changes does not affect the measurement until the user exits programming mode and returns to measurement mode. Before loading the defaults the software asks for a confirmation warning the user that all user parameters will be lost!

5.3.5.5 Service Distance Offset

Parameter: P05

Default value: 0 mm

Menu path: SERVICE / SERVICE DIST OFFSET

Description: There is a possibility to display auxiliary service information on the bottom line of the screen. This information is useful when verifying measurement is performed with a hand-device and zero point of this device is not the same as the highest position of the float. In this case a distance should be entered into this Parameter which is the distance between the highest position of the float (which is the zero point of the measurement range) and the zero point of the verifying device.

This Parameter has no effect on level measurement or on volume and mass calculation, it only appears on the screen. If the value of this Parameter is not zero, "SDIST=x.xxx" format display appears on the bottom line of the measurement screen.

5.3.5.6 Restart

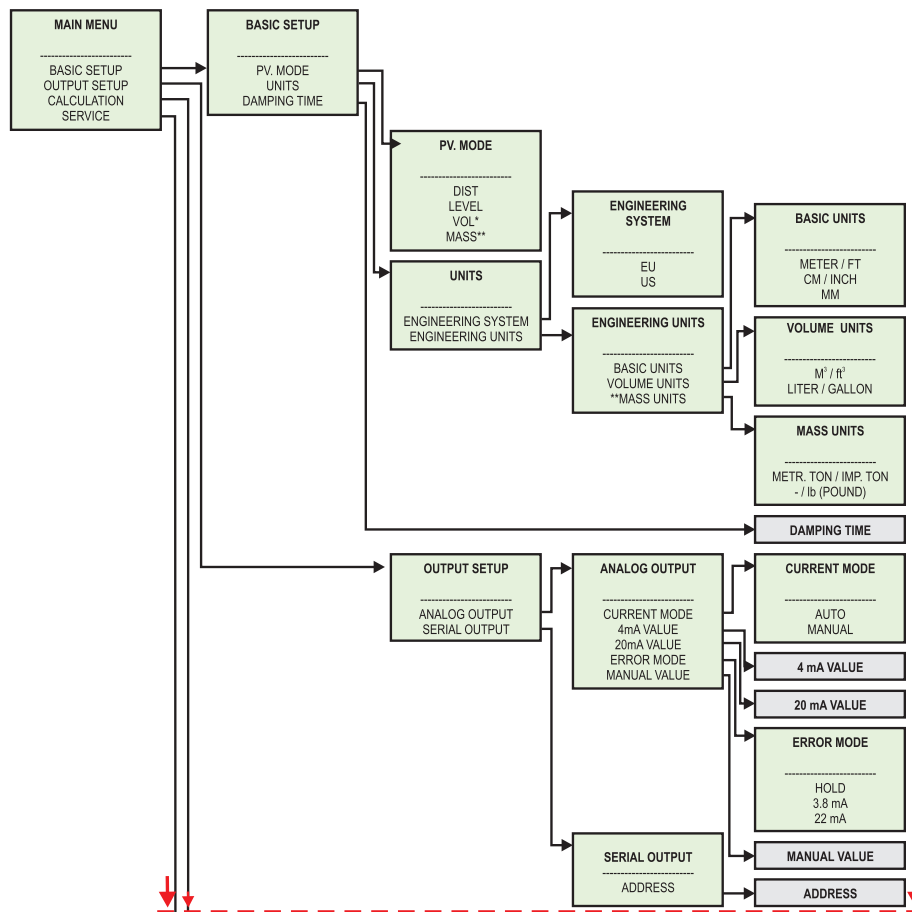
Menu path: SERVICE / RESTART

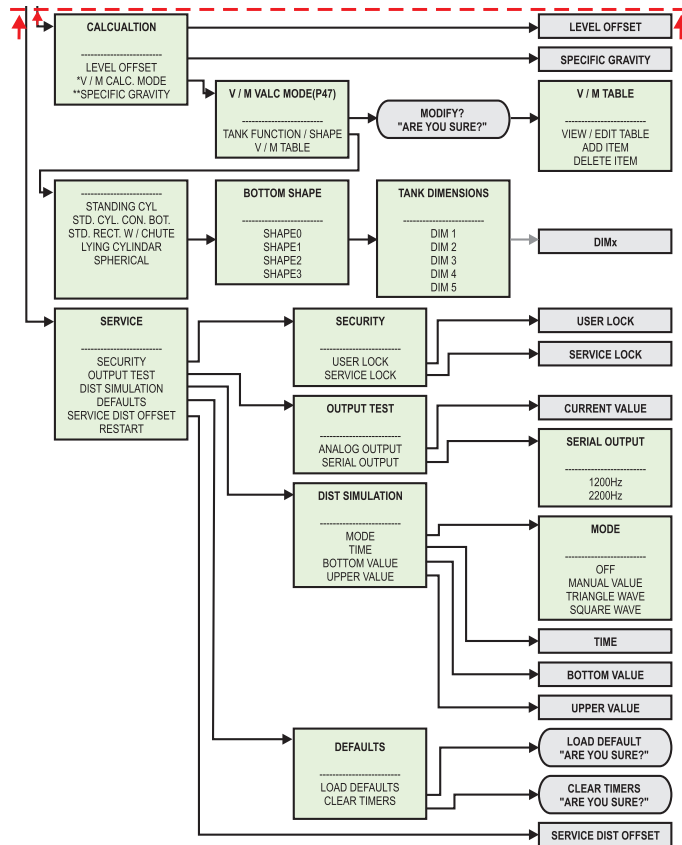
Description: Restarts the device (Cold boot) (Reloads parameters from the non-volatile memory)

6. ERROR CODES

Message on the screen	Error Description	Procedure
MEMORY ERROR	Memory error in the electronics	Contact the service!
NO INPUT SIGNAL	Probe error	Contact the service!
EE COM. ERROR	Hardware error (EEPROM communication error)	Contact the service!
MATH. OVERLOAD	Display overflow	Check the programming!
SIGNAL IN N.D.B.	Probe or calibration error (Signal is in near dead band)	Contact the service!
SIGNAL IN F.D.B.	Probe or calibration error (Signal is in far dead band)	Check the mounting specifications.
VMT SIZE ERROR	Linearization error: Less than two items are in the table.	Check the content of the VMT! See: 5.3.4.6
VMT INPUT ERROR	Linearization table error: monotonicity error in the input (level) side of the table.	Check the content of the VMT! See: 5.3.4.6
VMT OUTPUT ERROR	Linearization table error: monotonicity error in the output (volume or mass) side of the table.	Check the content of the VMT! See: 5.3.4.6
VMT INPUT OV.RNG.	Linearization table error: The measured level is greater than the highest level of the table's input side.	Check the content of the VMT! See 5.3.4.6 Device performs extrapolation according to the last point pairs!
EE CHK ERROR	Parameter checksum error.	Check the programming! For regenerating the checksum, modify a Parameter and return to Measurement mode. If this error still remains, contact the service!
INTEGRITY ERROR	Parameter consistency error. (Automatically fixed internal error.) Only WARNING	Check the programming!
AC COM. ERROR	Hardware error	Contact the service!
CALIBRATION ERROR	Sensor calibration error	Contact the service!

7. MENU MAP





mba505en26p12

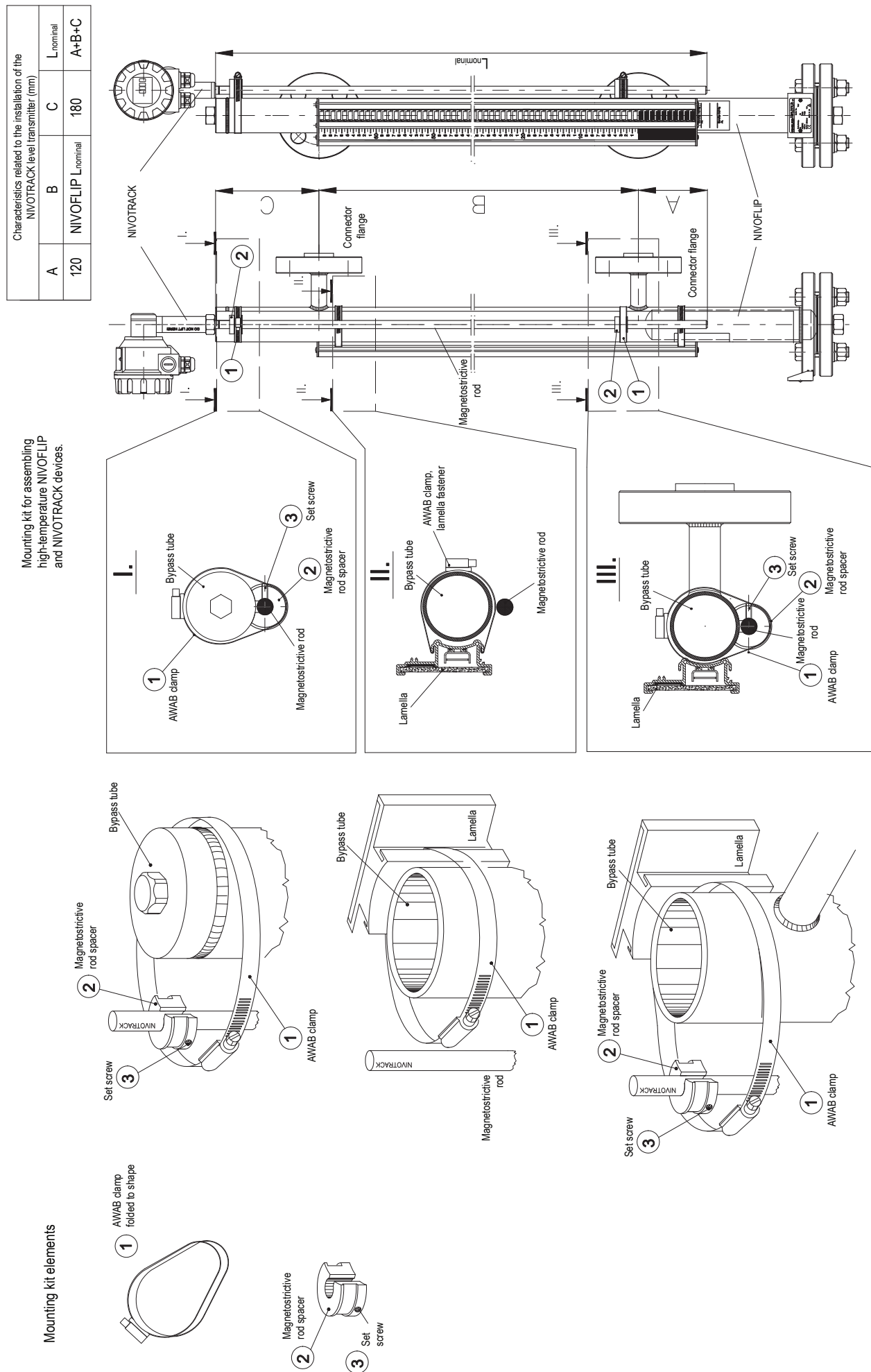
October 2026

Information is accurate to the best of NIVELCO's knowledge.

We reserve the right to change specifications at any time.

APPENDIX 1. – ASSEMBLY OF MTU– / MBU– / MTL– / MBL–□□□–□ DEVICES

1. Place the ② magnetostrictive rod spacers onto the NIVOTRACK magnetostrictive transmitter in the positions shown in the diagram (Views I and III).
2. Secure the ② magnetostrictive rod spacers using the ③ set screws.
3. Attach the ① AWAB clamps around the spacer and the bypass chamber, and use them to fasten the NIVOTRACK magnetostrictive transmitter to the bypass chamber.



APPENDIX 2. ASSEMBLY OF MTT-□□□-□, MBT-□□□-□ DEVICES:

1. Place the magnetostrictive rod spacers ④ onto the NIVOTRACK magnetostrictive transmitter in the positions shown in the diagram (Views I and III).
2. Secure the magnetostrictive rod spacers ④ using the set screws ⑥.
3. Install the ceramic insulating tapes ② and the stainless steel plate cover of the ceramic insulation ③ between the NIVOTRACK magnetostrictive transmitter and the bypass chamber as shown in the diagram (Views I, II, and III).
4. Place the ceramic insulating tape ⑤ in the position indicated in the diagrams (Views I, II, and III).
5. Attach the AWAB clamps ① around the spacer ④ and the bypass chamber, and use them to fasten the NIVOTRACK magnetostrictive transmitter to the bypass chamber, together with the ceramic insulating tapes ② and ⑤ and the stainless steel plate cover of the ceramic insulation ③.

Mounting and insulation kit elements

