

Contents

Area of applicability	2
Important specification in the type code	2
General information	5
Application area	5
Special operating conditions	5
Important information for mounting and maintenance	6
Safe operating mode	9
Potential equalization/Grounding	10
Electrostatic charging (ESD)	10
Electrical data	11
Mechanical data	11
Thermal data	11
Tensile force on the measuring cable/ rod	14

Supplementary documentation:

- Operating Instructions NivoGuide 8100, 3100, 8200
- Quick setup guide NivoGuide 8100, 3100, 8200
- US Certificate of Conformity FM22US0054X (Document ID: 1013252)

Editing status: 2022-06-09

Area of applicability

These safety instructions apply to the NivoGuide 8100, 3100, 8200 of type series:

- NivoGuide NG8100.AU*A/B**1*** *****A/D
- NivoGuide NG3100.AU*A/B**1*** *****A/D
- NivoGuide NG8200.BU*A/B**1**0 *****A/D

With the electronics versions:

- H - Two-wire 4 ... 20 mA/HART
- A - Two-wire 4 ... 20 mA/HART with SIL qualification

According to US Certificate of Conformity FM22US0054X (certificate number on the type label) and for all instruments with safety instruction 1013249.

The classification as well as the respective standards are stated in the US Certificate of Conformity.

Type of protection marking:

- CL I, DIV1, GP ABCD T6 ... T1
- CL I Zone 1 AEx db IIC T6 ... T1
- Ta = -50 °C ... +60 °C

Important specification in the type code

NivoGuide 8100 NG8100.AU*A/B**1*** *****A/D

Position	Feature	Description
2	Certificate	U FM (XP) CL I, DIV1, GP ABCD
3	Seal / Second line of defense / Process temperature	A FKM (SHS EPM 70C3 GLT) / without / -40 ... +80 °C
		B EPDM (A+P 70.10-02) / without / -40 ... +80 °C
		D FFKM (Kalrez 6375) / without / -20 ... +150 °C
		F FKM (SHS FPM 70C3 GLT) / without / -40 ... +150 °C
		G FKM (SHS FPM 70C3 GLT) / with / -40 ... +150 °C
		H EPDM (A+P 70.10-02) / without / -40 ... +150 °C
		E Silicone FEP coated (A+P FEP-O-SEAL) / without / -40 ... +150 °C
		K FFKM (Kalrez 6375) / without / -20 ... +200 °C
		L FFKM (Kalrez 6375) / with / -20 ... +200 °C
		M EPDM (A+P 70.10-02) / with / -40 ... +150 °C
		N Silicone FEP coated (A+P FEP-O-SEAL) / with / -40 ... +150 °C
		C Silicone FEP coated (A+P FEP-O-SEAL) / without / -40 ... +80 °C
		P FFKM (Kalrez 6375) / with / -20 ... +150 °C
		Q FKM (SHS EPM 70C3 GLT) / with / -40 ... +80 °C
R EPDM (A+P 70.10-02) / with / -40 ... +80 °C		
S Silicone FEP coated (A+P FEP-O-SEAL) / with / -40 ... +80 °C		

Position		Feature	Description
4	Electronics module	A	Two-wire 4 ... 20 mA/HART
		B	Two-wire 4 ... 20 mA/HART with SIL qualification
5,6	Process fitting	**	Gas-tight threaded connections, pipe connections and industrial flanges acc. to ASME, BS, DIN, EN, GOST, HG/T, JIS, other international, national or industrial standards, regulations or standards, with pressure specifications
8	Version and length of bracket "L" / Material	E	exchangeable rod (ø 8 mm) / 316L
		F	exchangeable rod (ø 12 mm) / 316L
		B	exchangeable cable (ø 2 mm) with gravity weight / 316
		U	exchangeable cable (ø 4 mm) without weight / 316
		A	exchangeable cable (ø 4 mm) with gravity weight / 316
		K	Coax (ø 21.3 mm) with single hole / 316L
		L	Coax (ø 21.3 mm) with multiple hole / 316L
		P	Coax (ø 42.2 mm) with multiple hole / 316L
9	Indicating/adjustment module	0	without
		A	mounted; lid with inspection window
		F	without; lid with inspection window
		B	laterally mounted; double chamber housing, lid with inspection window
10	Length rigid part "L1"	O	without (version with rod)
		Z	L1 = customer-specific (version with cable)
16	Housing	A	Aluminium - single chamber
		D	Aluminium - double chamber

NivoGuide 3100 NG3100.AU*A/B**1*** *****A/D

Position		Feature	Description
2	Certificate	U	FM (XP) CL I, DIV1, GP ABCD
3	Seal / Process temperature	A	FKM (SHS EPM 70C3 GLT) / -40 ... +80 °C
		F	FKM (SHS FPM 70C3 GLT) / -40 ... +150 °C
		K	FFKM (Kalrez 6375) / -20 ... +200 °C
		B	EPDM (A+P 70.10-02) / -40 ... +80 °C
		H	EPDM (A+P 70.10-02) / -40 ... +150 °C
4	Electronics module	A	Two-wire 4 ... 20 mA/HART
		B	Two-wire 4 ... 20 mA/HART with SIL qualification
5, 6	Process fitting	**	Gas-tight threaded connections, pipe connections and industrial flanges acc. to ASME, BS, DIN, EN, GOST, HG/T, JIS, other international, national or industrial standards, regulations or standards, with pressure specifications

Position		Feature	Description
8	Version and length of bracket "L" / Material	A	exchangeable cable (ø 4 mm) / 316
		F	exchangeable rod (ø 6 mm) / 316
		E	exchangeable steel cable (ø 6 mm with gravity weight / PA coated
		G	exchangeable steel cable (ø 11 mm with gravity weight / PA coated
		H	exchangeable rod (ø 16 mm) / 316L
9	Indicating/adjustment module	0	without
		A	mounted; lid with inspection window
		F	without; lid with inspection window
		B	laterally mounted; double chamber housing, lid with inspection window
16	Housing	A	Aluminium - single chamber
		D	Aluminium - double chamber

NivoGuide 8200 NG8200.BU*A/B**1**0 *****A/D

Position		Feature	Description
2	Certificate	U	FM (XP) CL I, DIV1, GP ABCD
3	Seal / Second line of defense / Process temperature	1	Ceramic-graphite / with / -196 ... +280 °C
		2	Ceramic-graphite / with / -196 ... +450 °C
		3	PEEK-FFKM (Kalrez 6375) / with / -20 ... +250 °C
4	Electronics module	A	Two-wire 4 ... 20 mA/HART
		B	Two-wire 4 ... 20 mA/HART with SIL qualification
5,6	Process fitting	**	Gas-tight threaded connections, pipe connections and industrial flanges acc. to ASME, BS, DIN, EN, GOST, HG/T, JIS, other international, national or industrial standards, regulations or standards, with pressure specifications
8	Version and length of bracket "L" / Material	2	exchangeable cable (ø 2 mm) with centering weight / Duplex (1.4462)
		E	exchangeable rod (ø 8 mm) / 316L
		H	exchangeable rod (ø 16 mm) / 316L
		B	exchangeable cable (ø 2 mm) with gravity weight / 316
		A	exchangeable cable (ø 4 mm) with gravity weight / 316
		L	Coax (ø 21.3 mm) with multiple hole / 316L
		P	Coax (ø 42.2 mm) with multiple hole / 316L
9	Indicating/adjustment module	0	without
		A	mounted; lid with inspection window
		F	without; lid with inspection window
		B	laterally mounted; double chamber housing, lid with inspection window

Position		Feature	Description
16	Housing	A	Aluminium - single chamber
		D	Aluminium - double chamber

Multiple listed characteristics according to the dependencies of the device configuration.

In the following, all above mentioned versions are called NivoGuide 8100, 3100, 8200. If parts of these safety instructions refer only to certain versions, then these will be mentioned explicitly with their type code.

General information

The level measuring instruments NivoGuide 8100, 3100, 8200 as guided radar sensors are used to detect the distance between medium surface and sensor by means of high frequency electromagnetic waves in the GHz range. The electronics uses the running time of the signals reflected by the medium surface to calculate the distance to the medium surface.

The NivoGuide 8100, 3100, 8200 consist of an electronics housing, a process connection element and a sensor, i.e. a measuring cable or a measuring rod. As an option, the display and adjustment module can also be installed in the instrument.

Application area

The NivoGuide 8100, 3100, 8200 are suitable for use in Class I in explosive atmospheres of all flammable substances of explosion groups A, B, C, D which require DIV1 instruments.

The NivoGuide 8100, 3100, 8200 are suitable for use in explosive atmospheres of all combustible materials of explosion group IIA, IIB, IIC, which require class I, Zone 1 AEx db IIC T6 ... T1 Gb devices

The NivoGuide 8100, 3100, 8200 with the mechanical fixing element (process fitting) are installed in hazardous areas requiring DIV1.

The NivoGuide 8100, 3100, 8200 with the mechanical fixing element (process fitting) are installed in hazardous areas of zone 1 requiring EPL Gb instruments.

If the NivoGuide 8100, 3100, 8200 are installed and operated in hazardous areas, the general Ex installation regulations, National Electrical Code, further national and regional regulations as well as these safety instructions must be observed.

Special operating conditions

The following overview is listing all special properties of NivoGuide 8100, 3100, 8200, which make a labelling with the symbol "X" behind the certificate number necessary.

Electrostatic charging (ESD)

You can find the details in chapter " Electrostatic charging (ESD)" of these safety instructions.

Ambient temperature

You can find the details in chapter " Thermal data" of these safety instructions.

Impact and friction sparks

The NivoGuide 8100, 3100, 8200 in light metal versions (e.g. aluminium, titanium, zircon) must be mounted in such a way that sparks from impact and friction between light metals and steel

(except stainless steel, if the presence of rust particles can be excluded) cannot occur.

Non-grounded, metallic parts

The resistance between aluminium housing to metal measuring point identification plate is $> 10^9$ Ohm.

The capacitance of the metal measuring point identification plate was measured as follows:

Measurement loop identification label	Capacitance
45 x 23 mm (standard)	21 pF
100 x 30 mm	52 pF
73 x 47 mm	61 pF

Important information for mounting and maintenance

General instructions

The following requirements must be fulfilled for mounting, electrical installation, setup and maintenance of the instrument:

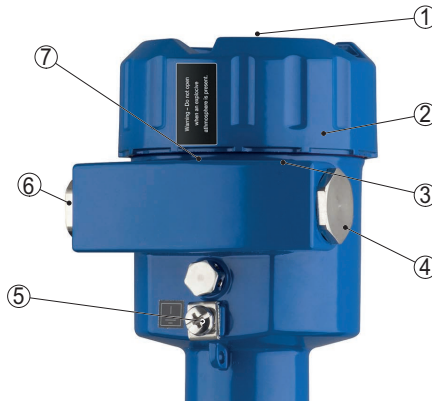
- The staff must be qualified according the respective tasks
- The staff must be trained in explosion protection
- The staff must be familiar with the relevant valid regulations which are necessary for the safe installation and operation of the device.
- Make sure when working on the instrument (mounting, installation, maintenance) that there is no explosive atmosphere present, the supply circuits should be voltage-free, if possible.
- The instrument has to be mounted according to the manufacturer specifications, the Certificate of Conformity, National Electrical Code and the valid regulations and standards
- Modifications on the instrument can influence the explosion protection and hence the safety, therefore repairs are not permitted to be conducted by the end user
- Modifications must only be carried out by authorized employees
- Use only approved spare parts
- Components for installation and connection not included in the approval documents are only permitted if these correspond technically to the latest standard mentioned on the cover sheet. They must be suitable for the application conditions and have a separate certificate. The special conditions of the components must be noted and if necessary, the components must be integrated in the type test. This applies also to the components already mentioned in the technical description.
- Vessel installations and probable flow must be taken into account

Cable and wire entries

- The NivoGuide 8100, 3100, 8200 must be connected via suitable cable gland or conduit systems that are in conformity with the requirements of the type of protection and the IP protection or NEMA rating and provided with a separate type approval certificate. When connecting NivoGuide 8100, 3100, 8200 to conduit systems, the corresponding sealing facility must be connected directly to the housing.
- The red thread or/dust covers screwed in when the instruments are shipped (depending on the version) must be removed before setup and replaced by approved cable entries or closing screws suitable for the respective ignition protection type and IP protection or NEMA rating.
- Note type and size of the thread: A label with the respective thread name is in the area of the respective thread

- Threads must have no damages
- Cable entries and closing screws should be mounted correctly and according to the safety instructions of the manufacturer to ensure the specified ignition protection type and IP protection rating or NEMA rating. When using certified or suitable cable glands, closing screws or plug connections, it is absolutely necessary to note the corresponding certificates/documents. Supplied cable entries or closing screws meet these requirements.
- Unused openings must be closed with plugs suitable for the ignition protection type and IP protection or NEMA rating. Supplied plugs meet these requirements.
- Cable or wire entries resp. the closing screws must be tightly screwed into the housing
- The connection cables resp. pipeline sealing facilities must be suitable for the application conditions (e.g. temperature range) of the application
- With surface temperatures > 70 °C, the cables must be suitable for the higher application conditions
- The connection cable of NivoGuide 8100, 3100, 8200 has to be wired fix and in such a way that damages can be excluded.

Single chamber housing



- 1 Lid, optionally with inspection window
- 2 Electronics compartment
- 3 Label: Thread type
- 4 Screw plug
- 5 External ground terminal
- 6 Red threaded or dust protection cap
Transport protection, replace with installation
- 7 Locking screws of the lid for lid locking

Double chamber housing



- 1 Lid, optionally with inspection window
- 2 Electronics compartment
- 3 Screw plug
- 4 Connection compartment
- 5 Transport protection, replace with installation
Red threaded or dust protection cap
- 6 Label: Thread type
- 7 Locking screws of the lid for lid locking
- 8 Lid, optionally with inspection window
- 9 Locking screws of the lid for lid locking

Mounting

When installing the device, observe the following:

- The instrument must be connected to the grounding system (via the process fitting or an external grounding clamp)
- Mechanical damage on the instrument must be avoided
- Impact and friction sparks are to be avoided
- If the device is used as a partition wall device, the operator must observe the valid applicable installation regulations and ensure a sufficiently tight joint (IP66 or IP67) between the less hazardous area and zone 0 are requiring EPL Ga

With single-chamber housing versions, the lid must be screwed in to the stop and secured with the locking device before setup and use of NivoGuide 8100, 3100, 8200 in hazardous atmospheres.

With double-chamber housing versions, the lid of the connection compartment and the lid of the electronics compartment must be screwed in to the stop and secured with the corresponding locking device before setup and use of NivoGuide 8100, 3100, 8200 in hazardous atmospheres.

Maintenance

To ensure the functionality of the device, periodic visual inspection is recommended for:

- Secure mounting

- No mechanical damages or corrosion
- Worn or otherwise damaged cables
- No loose connections of the line connections, equipotential bonding connections
- Correct and clearly marked cable connections

The parts of the NivoGuide 8100, 3100, 8200 being in contact with flammable media during operation must be included in the periodic overpressure test of the plant.

Flameproof "Ex db", Explosionproof "XP"

- The terminals for connecting the operating voltage or signal circuits are integrated in the connection compartment with type of protection Flameproof "Ex db", Explosionproof "XP".
- The thread gaps between housing and cover as well as between threaded fitting and container are flameproof joints
- It is not allowed to repair the flameproof joints.
- Cable, wire entries and closing screws must be certified acc. to ignition protection type Flameproof "Ex db", Explosionproof "XP". Cable, wire entries and closing screws of simple design must not be used.
- Separately certified cable and wire entries can determine the permissible ambient temperature range or the temperature classes
- Only one threaded adapter is allowed per thread, when using a closing screw, threaded adapters are not allowed

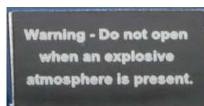
Version with exchangeable cable or rod probe

Only original cable or rod probes must be mounted to NivoGuide 8100, 3100, 8200. When mounting cable or rod probes, the torques specified in the respective operating instruction manuals must be maintained. The mechanical connection must be ensured.

Safe operating mode

General operating conditions

- Do not operate the instrument outside the electrical, thermal and mechanical specifications of the manufacturer
- Use the instrument only in media against which the wetted parts are sufficiently resistant
- To assess and reduce the explosion risk, the National Electrical Code applicable regulations, rules and standards must be taken into account
- For process pressures outside the standard atmospheric conditions of 80 kPa (0.8 bar) to 110 kPa (1.1 bar) additional requirements can be valid
- Note the relation between process temperature on the sensor/antenna and the permissible ambient temperature on the electronics housing. For permissible temperatures, see the respective temperature tables. See chapter " Thermal data".
- If necessary, a suitable overvoltage arrester can be connected in front of the NivoGuide 8100, 3100, 8200
- Lids must not be opened if there is a hazardous atmosphere. The housing lids are marked with the warning label:



Connection conditions

The connection cable of NivoGuide 8100, 3100, 8200 has to be wired fix and in such a way that damages can be excluded

If the temperature at the entry parts exceeds 70 °C, temperature-resistant connection cables must be used

Potential equalization/Grounding

- Integrate the instruments into the local potential equalisation, e.g. via the internal or external earth terminal
- The potential equalization terminal must be secured against loosening and twisting
- If grounding of the cable screening is necessary, this must be carried out acc. to the valid standards and regulations

Electrostatic charging (ESD)

In case of instrument versions with electrostatically chargeable plastic parts, the danger of electrostatic charging and discharging must be taken into account!

The following parts can charge and discharge:

- Lacquered housing version or alternative special lacquering
- Plastic housing, plastic housing parts
- Metal housing with inspection window
- Plastic process fittings
- Plastic-coated process fittings and/or plastic-coated sensors
- Connection cable for separate versions
- Type label
- Isolated metallic labels (measuring point identification plate)

Take note in case of danger of electrostatic charges:

- Avoid friction on the surfaces
- Do not dry clean the surfaces

The instruments must be mounted/installed in such a way that the following can be ruled out:

- electrostatic charges during operation, maintenance and cleaning.
- process-related electrostatic charges, e.g. by measuring media flowing past

The warning label indicates danger:

**WARNING - POTENTIAL ELECTROSTATIC
CHARGING HAZARD - SEE INSTRUCTIONS**

Electrical data

NivoGuide 8100, 3100, 8200

Supply and signal circuit in the electronics and connection compartment, single chamber housing:	
Terminals 1[+], 2[-]	$U = 9.6 \dots 35 \text{ V DC}$ $U_m = 253 \text{ V AC/DC}$ $I \leq 3.5 \dots 22.5 \text{ mA}$ (with superimposed HART signal)

NivoGuide 8100, 3100, 8200

Supply and signal circuit in the connection compartment, double chamber housing:	
Terminals 1[+], 2[-]	$U = 9.6 \dots 35 \text{ V DC}$ $U_m = 253 \text{ V AC/DC}$ $I \leq 3.5 \dots 22.5 \text{ mA}$ (with superimposed HART signal)

Display and adjustment circuit:	
Spring contacts in the connection compartment	Only for connection to the NivoGuide display and adjustment module.

The circuits of NivoGuide 8100, 3100, 8200 are galvanically separated from ground.

The metallic parts of NivoGuide 8100, 3100, 8200 are electrically connected with the earth terminals.

Mechanical data

The following mechanical data are valid for all housing and electronics versions.

Mechanical data	
Ground terminal (connection cross-section)	$\geq 4 \text{ mm}^2$
Overvoltage category	See operating instructions NivoGuide 8100, 3100, 8200, chapter " Technical data"
Pollution degree	2
<ul style="list-style-type: none"> ● Materials ● Max. tensile load on the cable or rod probe ● Potential connections and electrical separating measures in the instrument ● Electromechanical data ● Electrical protective measures 	Are described in the operating instructions NivoGuide 8100, 3100, 8200 in chapter " Technical data".

Thermal data

The following temperature tables are valid for all housing and electronics versions.

The relationship between the permissible ambient temperature for the electronics housing depending on the area of application and the maximum surface temperatures, temperature classes, can be seen in the following tables.

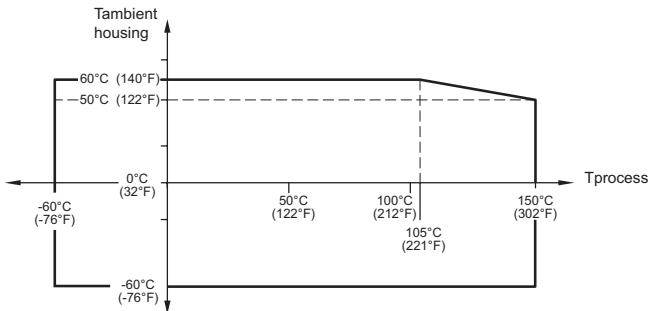
Temperature class	Ambient temperature on the electronics	Temperature on the sensor (measuring cable, rod)
T6	-50 ... +60 °C	-60 ... +80 °C
T5	-50 ... +60 °C	-60 ... +95 °C
T4	-50 ... +60 °C	-60 ... +130 °C
T3	-50 ... +60 °C	-60 ... +195 °C
T2	-50 ... +60 °C	-60 ... +290 °C
T1	-50 ... +60 °C	-60 ... +440 °C

Low temperature version up to -196 °C

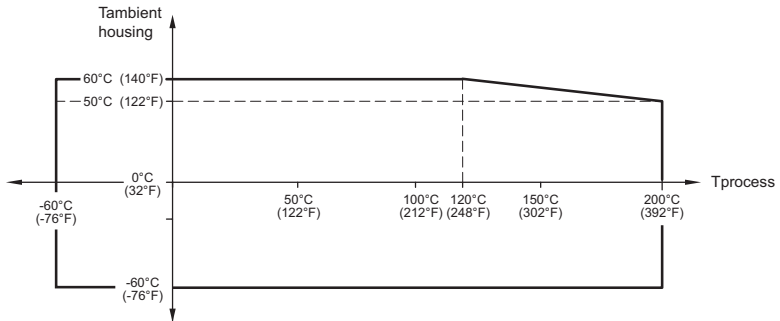
Temperature class	Ambient temperature on the electronics	Temperature on the sensor (measuring cable, rod)
T6	-50 ... +60 °C	-196 ... +80 °C
T5	-50 ... +60 °C	-196 ... +95 °C
T4	-50 ... +60 °C	-196 ... +130 °C
T3	-50 ... +60 °C	-196 ... +195 °C
T2	-50 ... +60 °C	-196 ... +290 °C
T1	-50 ... +60 °C	-196 ... +440 °C

Temperature derating for process temperatures up to +150 °C, +200 °C, +250 °C, +280 °C and +450 °C

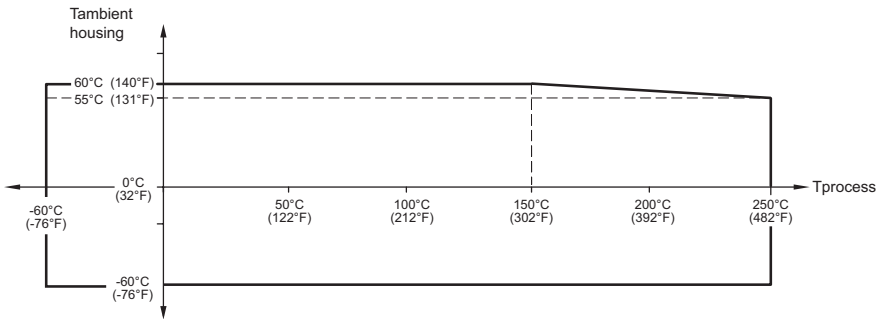
Versions for process temperatures up to +150 °C



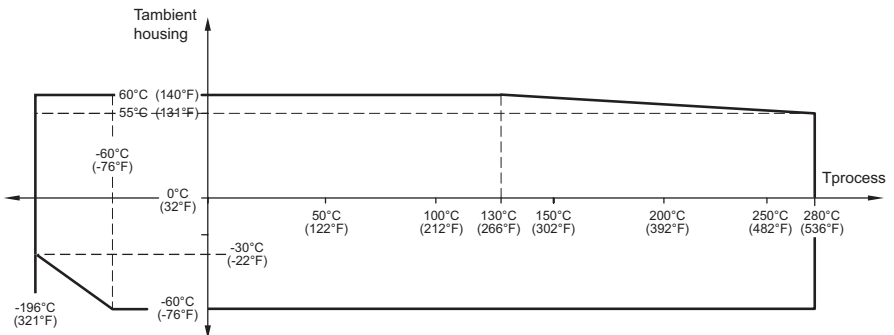
Versions for process temperatures up to +200 °C



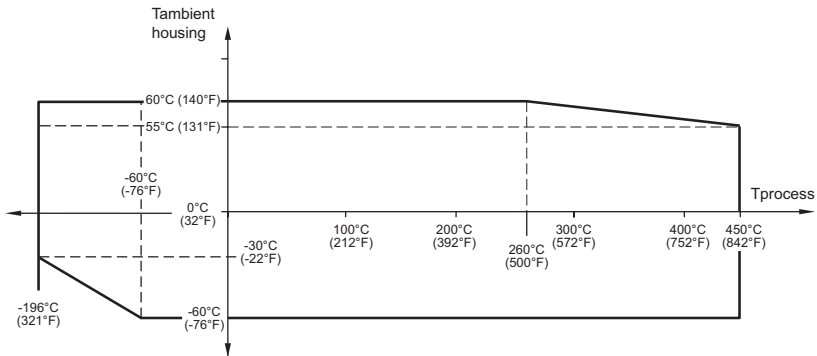
Versions for process temperatures up to +250 °C



Versions for process temperatures up to +280 °C



Versions for process temperatures up to +450 °C



Tensile force on the measuring cable/ rod

The permissible tensile force is

- NivoGuide 8100
 - Diameter 4 mm: $F = 2.5 \text{ kN}$
 - Diameter 2 mm: $F = 1.5 \text{ kN}$
- NivoGuide 3100
 - Diameter 4 mm: $F = 12 \text{ kN}$
 - Diameter 6 mm coated: $F = 8 \text{ kN}$
 - Diameter 6 mm: $F = 30 \text{ kN}$
 - Diameter 11 mm coated: $F = 30 \text{ kN}$
- NivoGuide 8200
 - Diameter 4 mm: $F = 2.5 \text{ kN}$
 - Diameter 2 mm: $F = 1.5 \text{ kN}$

Printing date:

All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.
Subject to change without prior notice

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