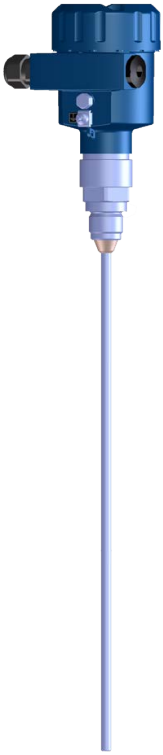
NivoGuide 8100, 3100, 8200

Intrinsic safety "i"

Two-wire 4 … 20 mA/HART

Two-wire 4 … 20 mA/HART with SIL qualification

Safety instructions



Document ID: 61521

SOLUTIONS

Contents

Supplementary documentation:

- Operating Instructions NivoGuide 8100, 3100, 8200
- Quick setup guide NivoGuide 8100, 3100, 8200
- Certificate of Conformity IECEx TUN 19.0006 X (Document ID: 61522)

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1 Area of applicability

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

- NivoGuide 8100 NG8100.AB/D*A/B**1*** *****A/D/N
- NivoGuide 3100 NG3100.AB*A/B**1*** *****A/D/N
- NivoGuide 8200 NG8200.B/D*A/B**1**0 *****A/D/N

With the electronics versions:

- A - Two-wire 4 … 20 mA/HART
- B - Two-wire 4 … 20 mA/HART with SIL qualification

According to Certificate of Conformity IECEx TUN 19.0006 X (certificate number on the type label) and for all instruments with safety instruction 61521.

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

- IEC 60079-0: 2017 (Edition 7.0)
- IEC 60079-11: 2011 (Edition 6.0)
- IEC 60079-26: 2014 (Edition 3.0)

Type of protection marking:

- Ex ia IIC T6 … T1 Ga, Ga/Gb, Gb

2 Important specification in the type code

NivoGuide 8100 NG8100.AB/D*A/B1*** *****A/D/N**

Position		Feature	Description
2	Certificate	B	Ex ia IIC T6 … T1 Ga, Ga/Gb, Gb
		D	Ex ia IIC T6 … T1 Ga, Ga/Gb, Gb, II 1D, 1/2D, 1/3D, 2D Ex ta, ta/tb, ta/tc, tb IIIC T*
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
		O	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	exchangable 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
		N	Stainless steel single chamber

NivoGuide 3100 NG3100AB*A/B1*** *****A/D/N**

Position		Feature	Description
2	Certificate	B	Ex ia IIC T6 … T1 Ga, Ga/Gb, Gb
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
		N	Stainless steel single chamber

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

Position		Feature	Description
2	Certificate	B	Ex ia IIC T6 … T1 Ga, Ga/Gb, Gb
		D	Ex ia IIC T6 … T1 Ga, Ga/Gb, Gb, II 1D, 1/2D, 1/3D, 2D Ex ta, ta/tb, ta/tc, tb IIIC T*
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	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
		N	Stainless steel single chamber

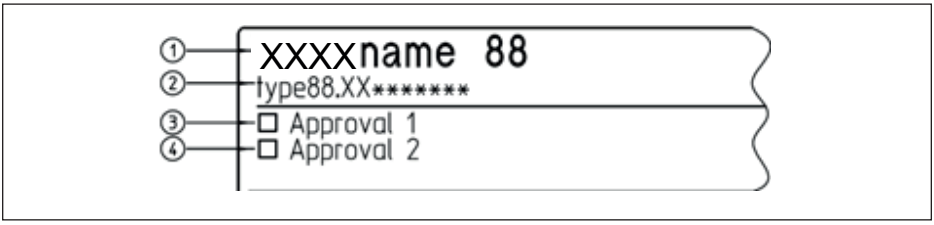
Multiple listed characteristics according to the dependencies of the device configuration.

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.

3 Different ignition protection types

The NivoGuide 8100, 3100, 8200 can be either used in explosive dust atmospheres or in explosive gas atmospheres.

The operator must specify the selected ignition protection type before installation. The selected ignition protection must be determined by marking it firmly on the identification label of the type plate.



1 NivoGuide 8100, 3100, 8200
2 Instrument version
3 Identificatiion label: Approval in dust ignition protection type e. g. „Ex t“
4 Identificatiion label: Approval in Gas ignition protection type e. g. „Ex i“, „Ex d“

If NivoGuide 8100, 3100, 8200 is installed in a dust atmosphere, then the safety instructions and the instructions in the respective certificates must be noted:

Installation	Approval	Certificate	Safety instruction
Dust (Protection by enclosure "t")	"A"	IECEx TUN 20.0006X	64005

4 General information

The level measuring instruments NivoGuide 8100, 3100, 8200 as guided radar sensors are used to detect the distance between product 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 product surface to calculate the distance to the product 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.

The NivoGuide 8100, 3100, 8200 are suitable for applications in hazardous atmospheres of all combustible materials of explosion groups IIA, IIB and IIC.

The NivoGuide 8100, 3100, 8200 are suitable for applications requiring EPL Ga, EPL Ga/Gb or EPL Gb instruments.

5 Application area

EPL Ga instrument
The NivoGuide 8100, 3100, 8200 with the mechanical fixing element are installed in hazardous areas of zone 0 requiring EPL Ga instruments.

EPL Ga/Gb or EPL Ga/Gc instrument
The NivoGuide 8100, 3100, 8200 with mechanical fixing element are installed in hazardous areas of zone 1 or zone 2 requiring EPL Gb or EPL Gc instruments. The mechanical fixing element, process connection element is installed in the separating wall, which separates areas requiring EPL Gb or EPL Gc instruments. The sensor measuring system is installed in hazardous areas of zone 0 requiring EPL Ga instruments.

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

Instrument	EPL Gc	EPL Gb	EPL Ga/Gb	EPL Ga
Ex Zone 2 				
Ex Zone 1 				
Ex Zone 0 				

6 Specific conditions of use ("X" identification)

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
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 with 15 pF.

7 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 respectively valid regulations, e.g. planning and installation acc. to IEC/EN 60079-14
- 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 and the valid regulations and standards
- Modifications on the instrument can influence the explosion protection and hence the safety
- 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 flame proofing and the IP protection 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 cable entries or closing screws suitable for the respective ignition protection type and IP protection.
- 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. 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. 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.

Mounting

Keep in mind for instrument mounting

- Mechanical damage on the instrument must be avoided
- Mechanical friction must be avoided
- Process connections separating two areas of different Ex-zones must comply to valid regulations and standards and the protection rating must be in conformity to IEC/EN 60529.
- Close the housing lid (s) up to the stop before starting operating, to ensure the IP protection rating specified on the type label

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.

Intrinsic safety "i"
- Valid regulations for connection of intrinsically safe circuits, e.g. proof of intrinsic safety according to IEC/EN 60079-14 must be observed
- The instrument is only suitable for connection to certified, intrinsically safe instruments
- When connecting a circuit with protection level Ex ib, the device, the sensor meas. system of the device must no more be used in hazardous areas of zone 0.
- When connecting an intrinsically safe instruments with classification mark Ex ia to a circuit with protection level Ex ib, then the classification mark of the instrument changes to Ex ib. After the use as instrument with Ex ib power supply, the instrument must no more be used in circuits with protection level Ex ia
- When connecting an intrinsically safe instrument to an non-intrinsically safe circuit, the instrument must be no longer used in intrinsically safe circuits
- With surface temperatures > 70 °C, the cables must be suitable for the higher application conditions

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.

8 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
- 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
- For assessment and reduction of the explosion risk, valid standards such as for example ISO/EN 1127-1 must be taken into account

9 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, e.g. acc. to IEC/EN 60079-14
- The intrinsically safe input and the intrinsically safe output circuits are ground-free. The voltage resistance against ground is min. 500 Veff.

10 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

The warning label indicates danger:

WARNING - POTENTIAL ELECTROSTATIC CHARGING HAZARD - SEE INSTRUCTIONS

11 Instructions for zone 0, zone 0/1 applications

In hazardous areas, the instrument, sensor measuring system in zone 0 should only be operated under atmospheric conditions:

- Temperature: -20 … +60 °C.
- Pressure: 80 … 110 kPa (0.8 … 1.1 bar)
- Air with normal oxygen content, normally 21 %

The operator must ensure that the medium temperature in zone 0 is not higher than 80 % of the self-ignition temperature of the concerned medium (in °C) and does not exceed the max. permissible flange temperature depending on the temperature class. The parts of the sensor which during operation are in contact with flammable products, must be integrated in the periodic overpressure test of the plant.

If no explosive mixtures or additional application conditions are certified resp. supplementary measures such as e.g. according to ISO/EN 1127-1 taken, then the instruments can be also operated according to the manufacturer specification outside atmospheric conditions.

If there is a risk of dangerous potential differences inside zone 0, then suitable measures for circuits in zone 0 must be taken, e.g. according to the requirements of IEC/EN 60079-14.

Process fittings between two explosion protection areas require category 1G (EPL Ga) and less endangered areas must show a tightness in accordance with protection rating IP67 acc. to IEC/EN 60529.

12 Electrical data

NivoGuide 8100, 3100, 8200, single chamber housing, Ex i electronics and connection compartment

Intrinsically safe voltage supply, signal circuit:	
Terminals 1[+], 2[-]	In type of protection intrinsic safety Ex ia IIC
	For connection to a certified, intrinsically safe circuit. U_i = 30 V I_i= 131 mA P_i= 983 mW
	The effective internal capacitance C_i is negligibly small. The effective internal inductance is $L_i \leq 5$ µH.

NivoGuide 8100, 3100, 8200, double chamber housing, Ex i connection compartment

Intrinsically safe voltage supply, signal circuit:	
Terminals 1[+], 2[-]	In type of protection intrinsic safety Ex ia IIC
	For connection to a certified, intrinsically safe circuit. U_i = 30 V I_i= 131 mA P_i= 983 mW
	The effective internal capacitance C_i is negligibly small. The effective internal inductance is $L_i \leq 10$ µH.

NivoGuide 8100, 3100, 8200, single and double chamber housing, Ex i electronics and connection compartment

Intrinsically safe circuit for the display and adjustment module or the interface adapter	
Spring contacts	In type of protection intrinsic safety Ex ia IIC.
	Only for connection to the NivoGuide display and adjustment module.

13 Mechanical data

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

Mechanical data	
Ground terminal (connection cross-section)	≥ 4 mm²
Overvoltage category	See operating instructions NivoGuide 8100, 3100, 8200, chapter "*Technical data*"

Mechanical data	
Pollution degree	2
● 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*".

14 Thermal data

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

If the NivoGuide 8100, 3100, 8200 level transmitters are operated in hazardous areas for EPL Ga, EPL Ga/Gb and EPL Gb applications, the permissible temperature range on the electronics/housings as well as on the sensor (measuring cable, rod) depending on the temperature class can be found in the following table:

Temperature class	Ambient temperature range (Electronics/housing)	Product temperature range on the sensor (measuring cable, rod)
T6	-40 … +46 °C	-40 … +80 °C
T5	-40 … +61 °C	-40 … +95 °C
T4	-40 … +70 °C	-40 … +130 °C
T3	-40 … +70 °C	-40 … +195 °C
T2	-40 … +70 °C	-40 … +290 °C
T1	-40 … +70 °C	-40 … +440 °C

Low temperature version up to -196 °C

Temperature class	Ambient temperature range (Electronics/housing)	Product temperature range on the sensor (measuring cable, rod)
T6	-40 … +46 °C	-196 … +80 °C
T5	-40 … +61 °C	-196 … +95 °C
T4	-40 … +70 °C	-196 … +130 °C
T3	-40 … +70 °C	-196 … +195 °C
T2	-40 … +70 °C	-196 … +290 °C
T1	-40 … +70 °C	-196 … +440 °C

The sensors (measuring cable, rod) may only be operated in areas for EPL Ga, EPL Ga/Gb and EPL Gb applications if atmospheric conditions are present (pressure of 0.8 … 1.1 bar).

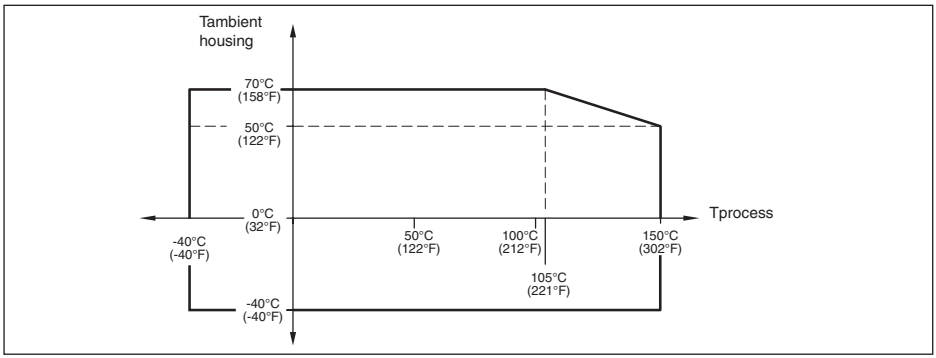
If there is no explosive atmosphere, the permissible operating temperatures and pressures must be taken from the manufacturer specifications (operating instructions).

If the sensors (measuring cable, measuring rod) are operated at temperatures higher than those listed in the table above, measures must be taken to prevent the risk of ignition from hot surfaces.

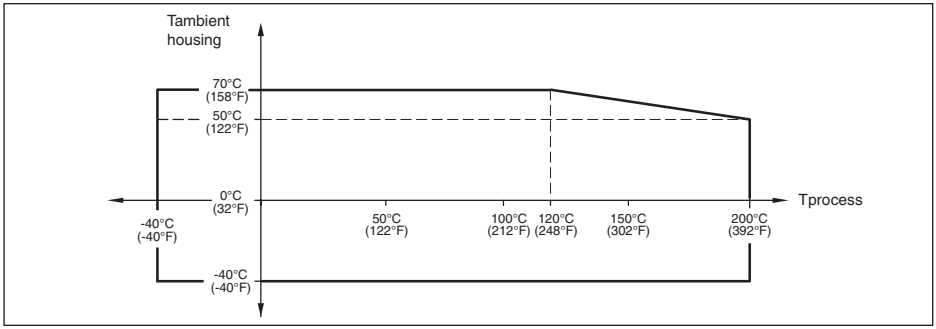
The maximum permissible temperature at the electronics/housing must not exceed the values in the above table.

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

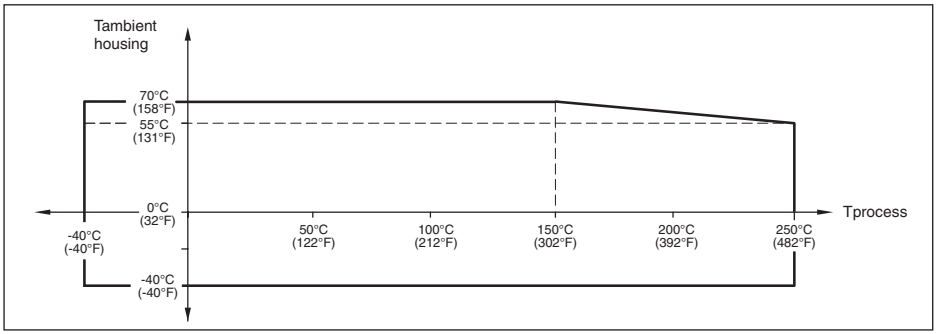
Versions for process temperatures up to +150 °C with metal housing



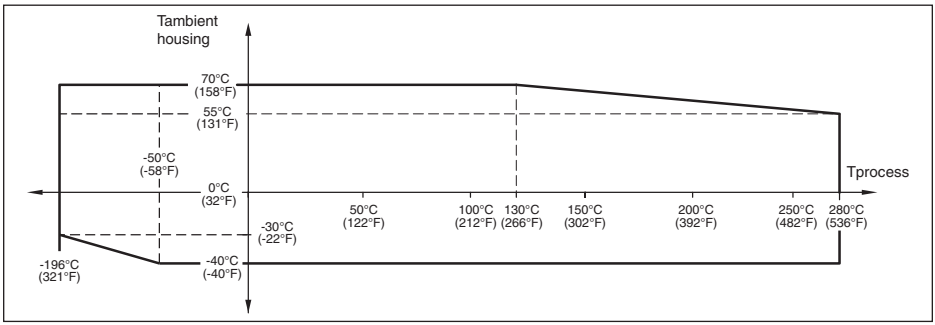
Versions for process temperatures up to +200 °C with metal housing



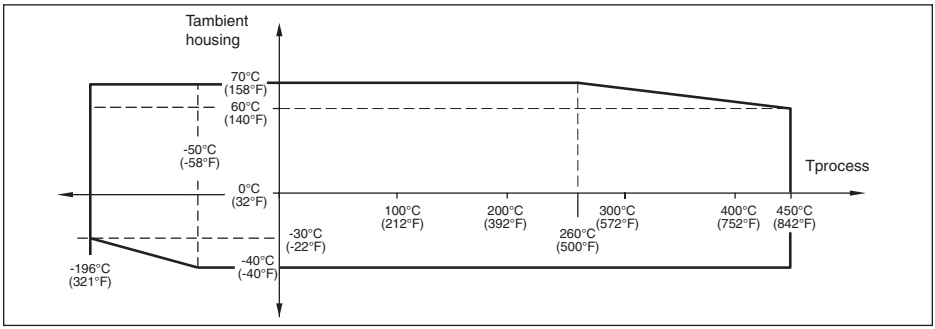
Versions for process temperatures up to +250 °C with metal housing



Versions for process temperatures up to +280 °C with metal housing



Versions for process temperatures up to +450 °C with metal housing



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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