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

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Area of applicability

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

- NivoGuide 8100: NG8100.AN*A/B**1*** *****A/D
- NivoGuide 3100: NG3100.AN*A/B**1*** *****A/D
- NivoGuide 8200: NG8200.BN*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 1013250.

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

Type of protection marking:

- CL II, DIV1, GP EFG
- CL III
- Ta = -40 °C ... +60 °C

Important specification in the type code

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

Position		Feature	Description
2	Certificate	N	FM DIP CL II, III, DIV1, GP EFG
3	Seal / Second line of defense / Process temperature	A	FKM (SHS EPM 70C3 GLT) / 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
		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
4	Electronics module	P	FFKM (Kalrez 6375) / with / -20 ... +150 °C
		A	Two-wire 4 ... 20 mA/HART
5,6	Process fitting	B	Two-wire 4 ... 20 mA/HART with SIL qualification
		**	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	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"	0	without (version with rod)
		Z	L1 = customer-specific (version with cable)
16	Housing	A	Aluminium - single chamber
		D	Aluminium - double chamber

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

Position		Feature	Description
2	Certificate	N	FM DIP CL II, III, DIV1, GP EFG
3	Seal / Process temperature	A	FKM (SHS EPM 70C3 GLT) / -40 ... +80 °C
		B	EPDM (A+P 70.10-02) / -40 ... +80 °C
		F	FKM (SHS FPM 70C3 GLT) / -40 ... +150 °C
		K	FFKM (Kalrez 6375) / -20 ... +200 °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
8	Version and length of bracket "L" / Material	A	exchangeable cable (ø 4 mm) / 316
		F	exchangeable cable (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

Position		Feature	Description
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.BN*A/B**1**0 ****A/D

Position		Feature	Description
2	Certificate	N	FM DIP CL II, III, DIV1, GP EFG
3	Seal / Second line of defense / Process temperature	1	Ceramic-graphite / with / -196 ... +280 °C
		2	Ceramic-graphite / with / -196 ... +400 °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
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 potentially explosive atmospheres of class II, DIV1, where combustible dusts of group E, F, G may be present.

The NivoGuide 8100, 3100, 8200 are suitable for applications in class III.

NivoGuide 8100, 3100, 8200 are used for monitoring or control in areas with flammable, dust-generating bulk solids that require instruments with (DIP) approval.

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.

Non-grounded, metallic parts

The resistance between aluminium housing to metal measuring point identification plate is > 10⁹ 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 $> 70\text{ °C}$, 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 "Ex t"



- 1 Lid, optionally with inspection window
- 2 "Ex t" connection compartment with electronics module
- 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 "Ex t"



- 1 Lid, optionally with inspection window
- 2 "Ex t" connection compartment with electronics module
- 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

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.

Dust-explosion protection

- The terminals for connecting the operating voltage or signal circuits are integrated in the connection compartment with type of protection dust explosion protection by housing "t"
- Cable, wire entries and the closing screws must be certified acc. to ignition protection type dust ignition protection by enclosure (DIP)
- All field wiring entries must be sealed during installation with appropriately approved products using a profile that meets the requirements of the type of protection
- Separately certified cable and wire entries can determine the permissible ambient temperature range or the temperature classes

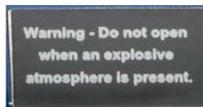
Version with exchangeable cable or rod probe

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:



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:

- in the case of extremely flammable dusts with a minimum ignition energy of less than 3 mJ, the device must not be used in areas where intensive electrostatic charging processes can be expected
- 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

For the electronic versions A/B it must be observed, that when installed as EPL Da device in zone 20, the maximum power at the sensor must be limited to the $P_{max} \leq 2 \text{ W}$.

NivoGuide 8100, 3100, 8200, single chamber housing

Supply and signal circuit in the electronics and connection compartment:	
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, double chamber housing

Supply and signal circuit in the connection compartment:	
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 or for service purposes the interface adapter, if it is ensured that no explosive atmosphere is present.

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)	≥ 4 mm ²
Housing protection rating	IP 66
<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 ambient temperature ranges and surface temperatures apply to applications requiring instruments suitable for use in Class II, DIV1 and Class III hazardous areas:

On the sensor, limited by seal

Permissible process temperature on the sensor:	
NivoGuide NG8100A*AA/B**1*** *****	-40 ... +80 °C
NivoGuide NG8100A*D/F/PA/B**1*** *****	-20 ... +150 °C
NivoGuide NG8100A*G/M/NA/B**1*** *****	-40 ... +150 °C
Nivoguide NG8100A*LA/B**1*** *****	-20 ... +200 °C
NivoGuide NG3100A*A/BA/B**1*** *****	-40 ... +80 °C
NivoGuide NG3100A*F/HA/B**1*** *****	-40 ... +150 °C
NivoGuide NG3100A*KA/B**1*** *****	-20 ... +200 °C
NivoGuide NG8200B*1A/B**1**0 *****	-196 ... +280 °C
NivoGuide NG8200B*2A/B**1**0 *****	-196 ... +450 °C (+400 °C)
NivoGuide NG8200B*3A/B**1**0 *****	-20 ... +250 °C
Permissible ambient temperature on the electronics housing:	-40 °C ≤ Ta ≤ +60 °C

Surface temperature increases

NivoGuide 8100, 3100, 8200, Installation in DIV1:

NivoGuide 8100, 3100, 8200, $P_{max} < 2 \text{ W}$	Process/ambient temperature +86 K
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NivoGuide 8100, 3100, 8200, Installation in DIV2:

NivoGuide 8100, 3100, 8200	Ambient temperature +38 K (38 K = (41.1 K/W x 828 mW) + 4 K)
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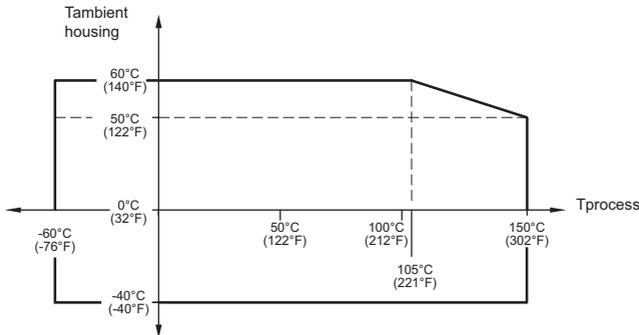
The sensors may only be operated in areas for DIV1 and DIV2 applications if atmospheric conditions are present.

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

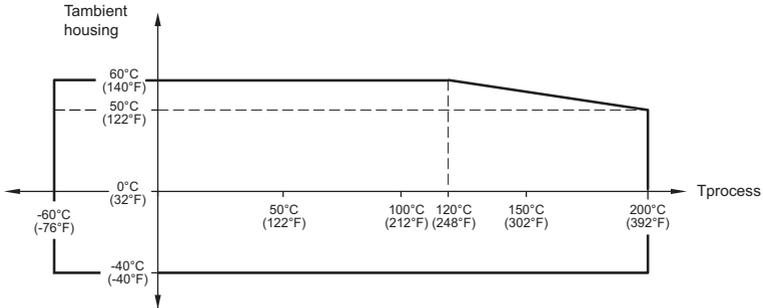
If the sensors (measuring cable, measuring rod) are operated at temperatures higher than those listed in the table above, measures must be taken to prevent the risk of ignition from hot surfaces.

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

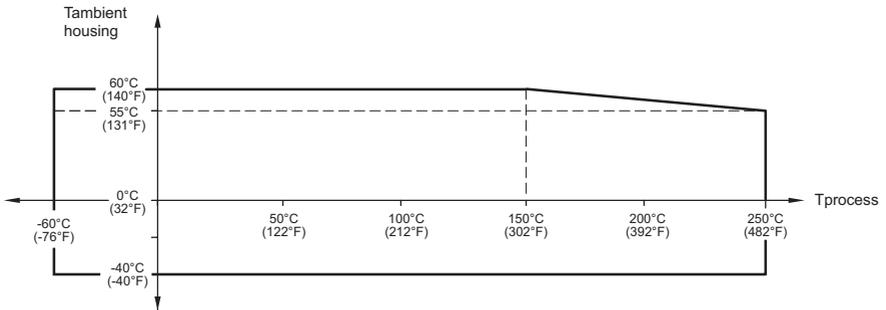
Versions for process temperatures up to +150 °C



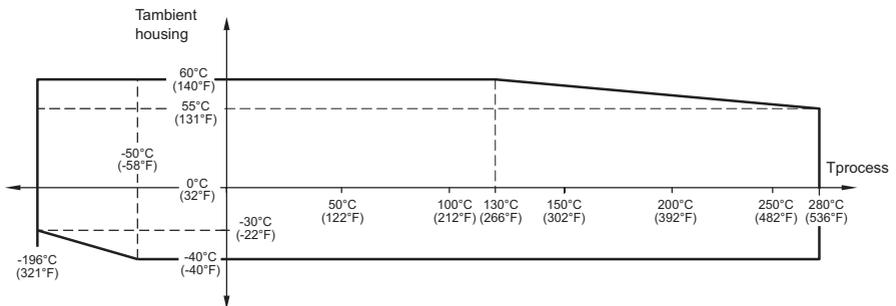
Versions for process temperatures up to +200 °C



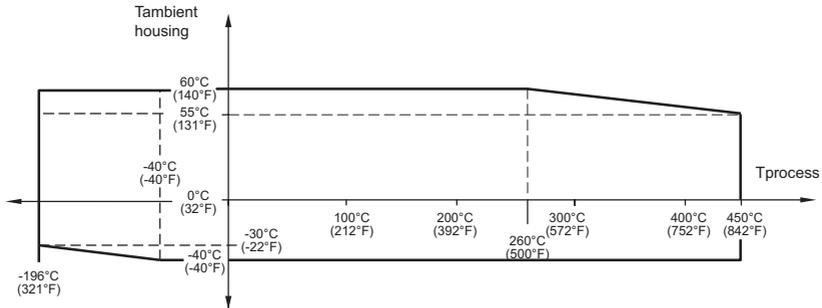
Versions for process temperatures up to +250 °C



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 kN
 - Diameter 2 mm: F = 1.5 kN
- NivoGuide 3100
 - Diameter 4 mm: F = 12 kN
 - Diameter 6 mm coated: F = 8 kN
 - Diameter 6 mm: F = 30 kN
 - Diameter 11 mm coated: F = 30 kN
- NivoGuide 8200
 - Diameter 4 mm: F = 2.5 kN
 - Diameter 2 mm: F = 1.5 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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