



Model Number

NCB4-12GM40-N0

Features

- 4 mm flush
- Usable up to SIL 2 acc. to IEC 61508

Accessories

BF 12

Mounting flange, 12 mm

Technical Data

General specifications

Switching function		Normally closed (NC)
Output type		NAMUR
Rated operating distance	s_n	4 mm
Installation		flush
Assured operating distance	s_a	0 ... 3.24 mm
Actual operating distance	s_r	3.6 ... 4.4 mm typ.
Reduction factor r_{AI}		0.41
Reduction factor r_{Cu}		0.39
Reduction factor r_{304}		0.78
Output type		2-wire

Nominal ratings

Nominal voltage	U_o	8.2 V (R_i approx. 1 k Ω)
Switching frequency	f	0 ... 1500 Hz
Hysteresis	H	1 ... 15 typ. 5 %
Reverse polarity protection		reverse polarity protected
Short-circuit protection		yes
Suitable for 2:1 technology		yes, Reverse polarity protection diode not required
Current consumption		
Measuring plate not detected		≥ 2.2 mA
Measuring plate detected		≤ 1 mA
Switching state indicator		all direction LED, yellow

Functional safety related parameters

MTTF _d	3010 a
Mission Time (T_M)	20 a
Diagnostic Coverage (DC)	0 %

Ambient conditions

Ambient temperature	-25 ... 100 °C (-13 ... 212 °F)
Storage temperature	-40 ... 100 °C (-40 ... 212 °F)

Mechanical specifications

Connection type	cable PVC, 2 m
Core cross-section	0.34 mm ²
Housing material	Stainless steel 1.4305 / AISI 303
Sensing face	PBT
Degree of protection	IP66 / IP67
Cable	
Bending radius	> 10 x cable diameter

General information

Scope of delivery	2 self locking nuts in scope of delivery
Use in the hazardous area	see instruction manuals
Category	1G; 2G; 3G; 1D

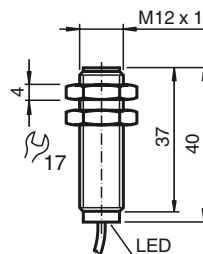
Compliance with standards and directives

Standard conformity	
NAMUR	EN 60947-5-6:2000 IEC 60947-5-6:1999
Electromagnetic compatibility	NE 21:2007
Standards	EN 60947-5-2:2007 IEC 60947-5-2:2007

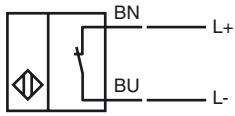
Approvals and certificates

FM approval	
Control drawing	116-0165
UL approval	cULus Listed, General Purpose
CSA approval	cCSAus Listed, General Purpose
CCC approval	CCC approval / marking not required for products rated ≤ 36 V

Dimensions



Electrical Connection



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Equipment protection level Ga

Instruction

Device category 1G

EC-Type Examination Certificate

CE marking

ATEX marking

Standards

Appropriate type

Effective internal inductivity

 C_i

Effective internal inductance

 L_i

General

Ambient temperature

Installation, commissioning

Maintenance

Special conditions

Protection from mechanical danger

Electrostatic charge

Manual electrical apparatus for hazardous areas

for use in hazardous areas with gas, vapour and mist

PTB 00 ATEX 2048 X

CE 0102

Ⓔ II 1G Ex ia IIC T6...T1 Ga The Ex-related marking can also be printed on the enclosed label.

EN 60079-0:2012+A11:2013 EN 60079-11:2012 Ignition protection "Intrinsic safety" Use is restricted to the following stated conditions

NCB4-12GM...-N0...

≤ 120 nF ; a cable length of 10 m is considered.

≤ 50 μH ; a cable length of 10 m is considered.

The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual.

The EU-type examination certificate has to be observed. The special conditions must be adhered to!

The ATEX directive and therefore the EU-type examination certificates apply in general only to the use of electrical apparatus under atmospheric conditions.

The use in ambient temperatures of > 60 °C was tested with regard to hot surfaces by the mentioned certification authority.

If the equipment is not used under atmospheric conditions, a reduction of the permissible minimum ignition energies may have to be taken into consideration.

Details of the correlation between the type of circuit connected, the maximum permissible ambient temperature, the temperature class, and the effective internal reactance values can be found on the EC-type examination certificate. **Note:** Use the temperature table for category 1 !!! The 20 % reduction in accordance with EN 1127-1 has already been applied to the temperature table for category 1.

Laws and/or regulations and standards governing the use or intended usage goal must be observed.

The intrinsic safety is only assured in connection with an appropriate related apparatus and according to the proof of intrinsic safety.

The associated apparatus must satisfy the requirements of category ia.

Due to the possible danger of ignition, which can arise due to faults and/or transient currents in the equipotential bonding system, galvanic isolation of the power supply and signal circuit is preferable. Associated apparatus without electrical isolation must only be used if the appropriate requirements of IEC 60079-14 are met. If the Ex-related marking is printed only on the supplied label, then this must be attached in the immediate vicinity of the sensor. The sticking surface for the label must be clean and free from grease. The attached label must be legible and indelible, including in the event of possible chemical corrosion.

No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

The connecting parts of the sensor must be set up in such a way that degree of protection IP20, in accordance with IEC 60529, is achieved as a minimum.

When using the device in a temperature range of -60 °C to -20 °C, protect the sensor against the effects of impact by installing an additional enclosure.

The information regarding the minimum ambient temperature for the sensor as provided in the datasheet must also be observed.

Electrostatic charges must be avoided on the mechanical housing components.

Dangerous electrostatic charges on the mechanical housing components can be avoided by incorporating these in the equipotential bonding.

Equipment protection level Gb

Instruction

Device category 2G

EC-Type Examination Certificate

CE marking

ATEX marking

Standards

Appropriate type

Effective internal inductivity C_i Effective internal inductance L_i

General

Maximum permissible ambient temperature T_{amb}

Installation, commissioning

Maintenance

Special conditions

Protection from mechanical danger

Electrostatic charge

Manual electrical apparatus for hazardous areas

for use in hazardous areas with gas, vapour and mist

PTB 00 ATEX 2048 X

CE 0102

Ⓔ II 1G Ex ia IIC T6...T1 Ga

The Ex-significant identification is on the enclosed adhesive label

EN 60079-0:2012+A11:2013 EN 60079-11:2012 Ignition protection "Intrinsic safety"
Use is restricted to the following stated conditions

NCB4-12GM...-N0...

≤ 120 nF ; a cable length of 10 m is considered.

≤ 50 μH ; a cable length of 10 m is considered.

The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual. The EU-type examination certificate has to be observed. The special conditions must be adhered to!

The ATEX directive and therefore the EU-type examination certificates apply in general only to the use of electrical apparatus under atmospheric conditions.

The use in ambient temperatures of > 60 °C was tested with regard to hot surfaces by the mentioned certification authority.

If the equipment is not used under atmospheric conditions, a reduction of the permissible minimum ignition energies may have to be taken into consideration.

Details of the correlation between the type of circuit connected, the maximum permissible ambient temperature, the temperature class, and the effective internal reactance values can be found on the EC-type examination certificate.

Laws and/or regulations and standards governing the use or intended usage goal must be observed. The intrinsic safety is only assured in connection with an appropriate related apparatus and according to the proof of intrinsic safety.

If the Ex-related marking is printed only on the supplied label, then this must be attached in the immediate vicinity of the sensor. The sticking surface for the label must be clean and free from grease. The attached label must be legible and indelible, including in the event of possible chemical corrosion.

No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

The connecting parts of the sensor must be set up in such a way that degree of protection IP20, in accordance with IEC 60529, is achieved as a minimum.

When using the device in a temperature range of -60 °C to -20 °C, protect the sensor against the effects of impact by installing an additional enclosure. The information regarding the minimum ambient temperature for the sensor as provided in the datasheet must also be observed.

Electrostatic charges must be avoided on the mechanical housing components. Dangerous electrostatic charges on the mechanical housing components can be avoided by incorporating these in the equipotential bonding.

Equipment protection level Gc (nL)

Note

This instruction is only valid for products according to EN 60079-15:2003, valid until 31-May-2008

Instruction**Manual electrical apparatus for hazardous areas****Device category 3G (nL)**

for use in hazardous areas with gas, vapour and mist

CE marking

CE 0102

ATEX marking

Ex II 3G EEx nL IIC T6 X

Standard conformity

EN 60079-15:2003 Ignition protection category "n"
Use is restricted to the following stated conditions

Effective internal capacitance C_i

≤ 120 nF ; a cable length of 10 m is considered.

Effective internal inductance L_i

≤ 50 μ H ; A cable length of 10 m is considered.

General

The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual. The data stated in the data sheet are restricted by this operating instruction!

The special conditions must be observed!

The ATEX Directive applies only to the use of apparatus under atmospheric conditions.

If you use the device outside atmospheric conditions, consider that the permissible safety parameters should be reduced.

Installation, commissioning

Laws and/or regulations and standards governing the use or intended usage goal must be observed. The sensor must only be operated with an energy-limited circuit, which satisfies the requirements of IEC 60079-15. The explosion group complies with the connected, supplying, power limiting circuit.

Maintenance

No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

Special conditions

for $P_i=34$ mW, $I_i=25$ mA, T6

74 °C (165.2 °F)

for $P_i=34$ mW, $I_i=25$ mA, T5

89 °C (192.2 °F)

for $P_i=34$ mW, $I_i=25$ mA, T4-T1

100 °C (212 °F)

for $P_i=64$ mW, $I_i=25$ mA, T6

69 °C (156.2 °F)

for $P_i=64$ mW, $I_i=25$ mA, T5

84 °C (183.2 °F)

for $P_i=64$ mW, $I_i=25$ mA, T4-T1

100 °C (212 °F)

for $P_i=169$ mW, $I_i=52$ mA, T6

51 °C (123.8 °F)

for $P_i=169$ mW, $I_i=52$ mA, T5

66 °C (150.8 °F)

for $P_i=169$ mW, $I_i=52$ mA, T4-T1

74 °C (165.2 °F)

for $P_i=242$ mW, $I_i=76$ mA, T6

39 °C (102.2 °F)

for $P_i=242$ mW, $I_i=76$ mA, T5

52 °C (125.6 °F)

for $P_i=242$ mW, $I_i=76$ mA, T4-T1

52 °C (125.6 °F)

Protection from mechanical danger

The sensor must not be mechanically damaged.

When used in the temperature range below -20 °C the sensor should be protected from knocks by the provision of an additional housing.

Electrostatic charge

Electrostatic charges must be avoided on the mechanical housing components. Dangerous electrostatic charges on the mechanical housing components can be avoided by incorporating these in the equipotential bonding.

Connection parts

The connection parts are to be installed, such that a minimum protection class of IP20 is achieved, in accordance with IEC 60529.

Equipment protection level Gc (ic)

Instruction

Device category 3G (ic)

Certificate

CE marking

ATEX marking

Standards

Effective internal inductivity C_i

Effective internal inductance L_i

General

Installation, commissioning

Maintenance

Special conditions

- for $P_i=34$ mW, $I_i=25$ mA, T6
- for $P_i=34$ mW, $I_i=25$ mA, T5
- for $P_i=34$ mW, $I_i=25$ mA, T4-T1
- for $P_i=64$ mW, $I_i=25$ mA, T6
- for $P_i=64$ mW, $I_i=25$ mA, T5
- for $P_i=64$ mW, $I_i=25$ mA, T4-T1
- for $P_i=169$ mW, $I_i=52$ mA, T6
- for $P_i=169$ mW, $I_i=52$ mA, T5
- for $P_i=169$ mW, $I_i=52$ mA, T4-T1
- for $P_i=242$ mW, $I_i=76$ mA, T6
- for $P_i=242$ mW, $I_i=76$ mA, T5
- for $P_i=242$ mW, $I_i=76$ mA, T4-T1

Protection from mechanical danger

Electrostatic charge

Connection parts

Manual electrical apparatus for hazardous areas

for use in hazardous areas with gas, vapour and mist

PF 13 CERT 2895 X



II 3G Ex ic IIC T6...T1 Gc

The Ex-significant identification is on the enclosed adhesive label

EN 60079-0:2012+A11:2013 EN 60079-11:2012 Ignition protection category "ic"
Use is restricted to the following stated conditions

≤ 120 nF ; a cable length of 10 m is considered.

≤ 50 μ H ; A cable length of 10 m is considered.

The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual. The data stated in the data sheet are restricted by this operating instruction!

The special conditions must be observed!

The ATEX Directive applies only to the use of apparatus under atmospheric conditions.

If you use the device outside atmospheric conditions, consider that the permissible safety parameters should be reduced.

Laws and/or regulations and standards governing the use or intended usage goal must be observed. The sensor must only be operated with energy-limited circuits, which satisfy the requirements of IEC 60079-11. The explosion group complies with the connected, supplying, power limiting circuit. If the Ex-relevant identification is printed exclusively on the adhesive label provided, this label must be affixed in the immediate vicinity of the sensor! The background surface to which the adhesive label is to be applied must be clean and free from grease! The applied label must be durable and remain legible, with due consideration of the possibility of chemical corrosion!

No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

74 °C (165.2 °F)

89 °C (192.2 °F)

100 °C (212 °F)

69 °C (156.2 °F)

84 °C (183.2 °F)

100 °C (212 °F)

51 °C (123.8 °F)

66 °C (150.8 °F)

74 °C (165.2 °F)

39 °C (102.2 °F)

52 °C (125.6 °F)

52 °C (125.6 °F)

The sensor must not be mechanically damaged.

When used in the temperature range below -20 °C the sensor should be protected from knocks by the provision of an additional housing.

Electrostatic charges must be avoided on the mechanical housing components. Dangerous electrostatic charges on the mechanical housing components can be avoided by incorporating these in the equipotential bonding.

The connection parts are to be installed, such that a minimum protection class of IP20 is achieved, in accordance with IEC 60529.

Equipment protection level Da

Instruction

Device category 1D

EC-Type Examination Certificate

CE marking

ATEX marking

Standards

Appropriate type

Effective internal inductivity C_i Effective internal inductance L_i

General

Maximum permissible ambient temperature T_{amb}

Installation, commissioning

Maintenance

Special conditions

Protection from mechanical danger


Electrostatic charge

Manual electrical apparatus for hazardous areas

for use in hazardous areas with combustible dust

PTB 00 ATEX 2048 X

CE0102

 II 1D Ex ia IIIC T135°C Da The Ex-related marking can also be printed on the enclosed label.

EN 60079-0:2012+A11:2013 EN 60079-11:2012 Ignition protection "Intrinsic safety"
Use is restricted to the following stated conditions

NCB4-12GM...-N0...

≤ 120 nF A cable length of 10 m is considered.

≤ 50 μH ; a cable length of 10 m is considered.

The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual.

The EU-type examination certificate has to be observed.

The ATEX directive and therefore the EU-type examination certificates apply in general only to the use of electrical apparatus under atmospheric conditions.

The use in ambient temperatures of > 60 °C was tested with regard to hot surfaces by the mentioned certification authority.

If the equipment is not used under atmospheric conditions, a reduction of the permissible minimum ignition energies may have to be taken into consideration.

Details of the correlation between the type of circuit connected, the maximum permissible ambient temperature, the surface temperature, and the effective internal reactance values can be found on the EC-type-examination certificate.

The maximum permissible ambient temperature of the data sheet must be noted, in addition, the lower of the two values must be maintained.

Laws and/or regulations and standards governing the use or intended usage goal must be observed.

The intrinsic safety is only assured in connection with an appropriate related apparatus and according to the proof of intrinsic safety.

If the Ex-related marking is printed only on the supplied label, then this must be attached in the immediate vicinity of the sensor. The sticking surface for the label must be clean and free from grease. The attached label must be legible and indelible, including in the event of possible chemical corrosion.

No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

The connecting parts of the sensor must be set up in such a way that degree of protection IP20, in accordance with IEC 60529, is achieved as a minimum.



When using the device in a temperature range of -60 °C to -20 °C, protect the sensor against the effects of impact by installing an additional enclosure. The information regarding the minimum ambient temperature for the sensor as provided in the datasheet must also be observed.

Electrostatic charges must be avoided on the mechanical housing components.

Dangerous electrostatic charges on the mechanical housing components can be avoided by incorporating these in the equipotential bonding.

Do not attach the nameplate provided in areas where electrostatic charge can build up.

Equipment protection level Dc

Note		This instruction is only valid for products according to EN 50281-1-1, valid until 30-September-2008 Note the ex-marking on the sensor or on the enclosed adhesive label
Instruction		Manual electrical apparatus for hazardous areas
Device category 3D		for use in hazardous areas with non-conducting combustible dust
CE marking		 0102
ATEX marking		 II 3D IP67 T 111 °C (231.8 °F) X
Standards		EN 50281-1-1 Protection via housing Use is restricted to the following stated conditions
General		The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual. The data stated in the data sheet are restricted by this operating instruction! The special conditions must be adhered to!
Installation, commissioning		Laws and/or regulations and standards governing the use or intended usage goal must be observed.
Maintenance		No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.
Special conditions		
Maximum operating voltage	U_{Bmax}	The maximum permissible operating voltage U_{Bmax} must be restricted to the values given in the following list. Tolerances are not permitted.
Minimum series resistance	R_V	A minimum series resistance R_V is to be provided between the power supply voltage and the proximity switch in accordance with the following list. This can also be assured by using a switch amplifier.
Maximum heating (Temperature rise)		Values can be obtained from the following list, depending on the max. operating voltage $U_{b max}$ and the minimum series resistance R_v .
at $U_{Bmax}=9 V$, $R_V=562 \Omega$		11 K
using an amplifier in accordance with EN 60947-5-6		11 K
Protection from mechanical danger		The sensor must not be mechanically damaged.
Protection of the connection cable		The connection cable must be prevented from being subjected to tension and torsional loading.
Electrostatic charge		Electrostatic charges must be avoided on the mechanical housing components. Dangerous electrostatic charges on the mechanical housing components can be avoided by incorporating these in the equipotential bonding.