



## Model Number

NCB4-12GM40-N0-V1

## Features

- 4 mm flush
- Usable up to SIL2 acc. to IEC 61508

## Accessories

### BF 12

Mounting flange, 12 mm

### V1-G-N-2M-PUR

Female cordset, M12, 2-pin, NAMUR, PUR cable

### V1-W-N-2M-PUR

Female cordset, M12, 2-pin, NAMUR, PUR cable

## Technical Data

### General specifications

Switching element function		NAMUR, NC
Rated operating distance	$s_n$	4 mm
Installation		flush
Output polarity		NAMUR
Assured operating distance	$s_a$	0 ... 3.24 mm
Reduction factor $r_{AI}$		0.41
Reduction factor $r_{Cu}$		0.39
Reduction factor $r_{304}$		0.78

### Nominal ratings

Nominal voltage	$U_o$	8.2 V ( $R_i$ approx. 1 k $\Omega$ )
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		$\geq 2.2$ mA
Measuring plate detected		$\leq 1$ mA
Switching state indication		Multihole-LED, yellow

### Functional safety related parameters

MTTF <sub>d</sub>	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	Connector M12 x 1, 4-pin
Core cross-section	-
Housing material	Stainless steel 1.4305 / AISI 303
Sensing face	PBT
Protection degree	IP67

### 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; 3D

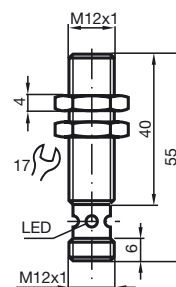
### Compliance with standards and directives

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

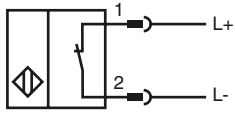
### Approvals and certificates

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

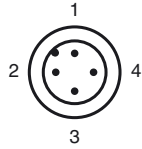
## Dimensions



**Electrical Connection**



**Pinout**



Wire colors in accordance with EN 60947-5-6

1	BN	(brown)
2	BU	(blue)

**ATEX 1G**

Instruction

Device category 1G

EC-Type Examination Certificate

CE marking

ATEX marking

Directive conformity

Standards

Appropriate type

Effective internal capacitance  $C_i$ Effective internal inductance  $L_i$ 

General

Ambient temperature

Installation, Commissioning

Maintenance

**Specific conditions**

Protection from mechanical danger

Electrostatic charging

**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 Ga

94/9/EG

EN 60079-0:2009, EN 60079-11:2007, EN 60079-26:2007

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 EC-Type Examination Certificate has to be observed. The special conditions must be adhered to!

Directive 94/9/EG and hence also EC-Type Examination Certificates apply in general only to the use of electrical apparatus under atmospheric conditions.

The use in ambient temperatures of &gt; 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.

The temperature ranges, according to temperature class, are given in the EC-Type Examination Certificate. Note: Use the temperature table for category 1 !!! The 20 % reduction in accordance with EN 1127-1:2007 has already been accounted for in 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.

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

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.

**ATEX 2G**

Instruction

**Device category 2G**

EC-Type Examination Certificate

CE marking

ATEX marking

Directive conformity

Standards

Appropriate type

Effective internal capacitance  $C_i$ Effective internal inductance  $L_i$ 

General

Ambient temperature

Installation, Commissioning

Maintenance

**Specific conditions**

Protection from mechanical danger

Electrostatic charging

**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 Ga

94/9/EG

EN 60079-0:2009, EN 60079-11:2007

Ignition protection "Intrinsic safety"

Use is restricted to the following stated conditions

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

 $\leq 120$  nF ; a cable length of 10 m is considered. $\leq 50$   $\mu$ 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 EC-Type Examination Certificate has to be observed. The special conditions must be adhered to!

Directive 94/9/EG and hence also EC-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.

The temperature ranges, according to temperature class, are given in 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.

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

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.

**ATEX 3G (nL)**

Instruction

**Device category 3G (nL)**

CE marking

ATEX marking

Directive conformity

Standard conformity

Effective internal capacitance  $C_i$ Effective internal inductance  $L_i$ 

General

Installation, Commissioning

Maintenance

**Specific conditions**Maximum permissible ambient temperature  $T_{Umax}$  at  $U_i = 20\text{ V}$ for  $P_i=34\text{ mW}$ ,  $I_i=25\text{ mA}$ , T6for  $P_i=34\text{ mW}$ ,  $I_i=25\text{ mA}$ , T5for  $P_i=34\text{ mW}$ ,  $I_i=25\text{ mA}$ , T4-T1for  $P_i=64\text{ mW}$ ,  $I_i=25\text{ mA}$ , T6for  $P_i=64\text{ mW}$ ,  $I_i=25\text{ mA}$ , T5for  $P_i=64\text{ mW}$ ,  $I_i=25\text{ mA}$ , T4-T1for  $P_i=169\text{ mW}$ ,  $I_i=52\text{ mA}$ , T6for  $P_i=169\text{ mW}$ ,  $I_i=52\text{ mA}$ , T5for  $P_i=169\text{ mW}$ ,  $I_i=52\text{ mA}$ , T4-T1for  $P_i=242\text{ mW}$ ,  $I_i=76\text{ mA}$ , T6for  $P_i=242\text{ mW}$ ,  $I_i=76\text{ mA}$ , T5for  $P_i=242\text{ mW}$ ,  $I_i=76\text{ mA}$ , T4-T1

Protection from mechanical danger

Protection from UV light


Electrostatic charging

Connection parts

**Manual electrical apparatus for hazardous areas**

for use in hazardous areas with gas, vapour and mist

CE 0102

 II 3G Ex nL IIC T6 X The Ex-significant identification is on the enclosed adhesive label

94/9/EG

EN 60079-15:2005 Ignition protection category "n"

Use is restricted to the following stated conditions

 $\leq 120\text{ nF}$  ; a cable length of 10 m is considered. $\leq 50\text{ }\mu\text{H}$  ; 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!

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. The adhesive label provided must be affixed in the immediate vicinity of the sensor! The surface to which the label is applied must be clean, flat and free from grease!

The affixed adhesive label must be readable and durable, taking account 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.

55 °C (131 °F)

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55 °C (131 °F)

55 °C (131 °F)

55 °C (131 °F)

55 °C (131 °F)

41 °C (105.8 °F)

41 °C (105.8 °F)

41 °C (105.8 °F)

29 °C (84.2 °F)

29 °C (84.2 °F)

29 °C (84.2 °F)

The sensor must not be exposed to **ANY FORM** of mechanical danger. When used in the temperature range below  $-20\text{ }^{\circ}\text{C}$  the sensor should be protected from knocks by the provision of an additional housing.

The sensor and the connection cable must be protected from damaging UV-radiation. This can be achieved when the sensor is used in internal areas.

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.

**ATEX 3G (ic)**

Instruction

**Device category 3G (ic)**

CE marking

ATEX marking

Directive conformity

Standards

Effective internal capacitance  $C_i$ Effective internal inductance  $L_i$ 

General

Installation, Commissioning

Maintenance

**Specific conditions**Maximum permissible ambient temperature  $T_{Umax}$  at  $U_i = 20\text{ V}$ for  $P_i=34\text{ mW}$ ,  $I_i=25\text{ mA}$ , T6for  $P_i=34\text{ mW}$ ,  $I_i=25\text{ mA}$ , T5for  $P_i=34\text{ mW}$ ,  $I_i=25\text{ mA}$ , T4-T1for  $P_i=64\text{ mW}$ ,  $I_i=25\text{ mA}$ , T6for  $P_i=64\text{ mW}$ ,  $I_i=25\text{ mA}$ , T5for  $P_i=64\text{ mW}$ ,  $I_i=25\text{ mA}$ , T4-T1for  $P_i=169\text{ mW}$ ,  $I_i=52\text{ mA}$ , T6for  $P_i=169\text{ mW}$ ,  $I_i=52\text{ mA}$ , T5for  $P_i=169\text{ mW}$ ,  $I_i=52\text{ mA}$ , T4-T1for  $P_i=242\text{ mW}$ ,  $I_i=76\text{ mA}$ , T6for  $P_i=242\text{ mW}$ ,  $I_i=76\text{ mA}$ , T5for  $P_i=242\text{ mW}$ ,  $I_i=76\text{ mA}$ , T4-T1

Protection from mechanical danger

Electrostatic charging

Connection parts

**Manual electrical apparatus for hazardous areas**

for use in hazardous areas with gas, vapour and mist

CE

⊕ II 3G Ex ic IIC T6 Gc X

The Ex-significant identification is on the enclosed adhesive label

94/9/EG

EN 60079-0:2009, EN 60079-11:2007 Ignition protection category "ic"

Use is restricted to the following stated conditions

 $\leq 120\text{ nF}$  ; a cable length of 10 m is considered. $\leq 50\text{ }\mu\text{H}$  ; 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!

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 depends on the connected and energy-limited supply circuit.

The adhesive label provided must be affixed in the immediate vicinity of the sensor!

The surface to which the label is applied must be clean, flat and free from grease!

The affixed adhesive label must be readable and durable, taking account 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.

55 °C (131 °F)

55 °C (131 °F)

55 °C (131 °F)

55 °C (131 °F)

55 °C (131 °F)

55 °C (131 °F)

41 °C (105.8 °F)

41 °C (105.8 °F)

41 °C (105.8 °F)

29 °C (84.2 °F)

29 °C (84.2 °F)

29 °C (84.2 °F)

The sensor must not be mechanically damaged.

When used in the temperature range below  $-20\text{ }^\circ\text{C}$  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.

**ATEX 3D**

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

CE 0102

ATEX marking

Ⓔ II 3D IP67 T 111 °C (231.8 °F) X

The Ex-significant identification is on the enclosed adhesive label

Directive conformity  
Standards

94/9/EG

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.  
The adhesive label provided must be affixed in the immediate vicinity of the sensor! The surface to which the label is applied must be clean, flat and free from grease!

The affixed adhesive label must be readable and durable, taking account of the possibility of chemical corrosion!

Maintenance

No changes can be made to apparatus, which are operated in hazardous areas.

Repairs to these apparatus are not possible.

**Specific conditions**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 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.

Maximum heating (Temperature rise)

Values can be obtained from the following list, depending on the max. operating voltage  $U_{bmax}$  and the minimum series resistance  $R_V$ .at  $U_{Bmax}=9\text{ V}$ ,  $R_V=562\ \Omega$ 

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.

Electrostatic charging



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.

Plug connector

The plug connector must not be disconnected under voltage. The proximity switch is marked as follows: "DO NOT DISCONNECT UNDER VOLTAGE!" When the plug connector is disconnected the ingress of dirt into the inner areas (i.e. the areas, which are not accessible in the plugged-in condition) must be prevented.

The plug connection can only be separated using a tool. This is achieved by using the locking protection V1-Clip (Mounting accessory from Pepperl + Fuchs).

**ATEX 3D (tD)**

Note	<b>This instruction is only valid for products according to EN 61241-0:2006 and EN 61241-1:2004</b> Note the ex-marking on the sensor or on the enclosed adhesive label
<b>Instruction</b>	<b>Manual electrical apparatus for hazardous areas</b>
<b>Device category 3D</b>	for use in hazardous areas with non-conducting combustible dust
CE marking	 0102
ATEX marking	 II 3D Ex tD A22 IP67 T80°C X The Ex-relevant identification may also be printed on the accompanying adhesive label.
Directive conformity	94/9/EG
Standards	EN 61241-0:2006, EN 61241-1:2004 Protection via housing "tD" 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 maximum surface temperature has been determined in accordance with method A without a dust layer on the equipment. The data stated in the data sheet are restricted by this operating instruction! The special conditions must be adhered to!
Installation, Commissioning	The statutory requirements, directives and standards applicable to the intended use and application must be observed. The adhesive label provided must be affixed in the immediate vicinity of the sensor! The surface to which the label is applied must be clean, flat and free from grease! The affixed adhesive label must be readable and durable, taking account of the possibility of chemical corrosion!
Maintenance	No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.
<b>Specific conditions</b>	
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 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.
Maximum permissible ambient temperature $T_{Umax}$	Values can be obtained from the following list, depending on the max. operating voltage $U_{bmax}$ and the minimum series resistance $R_V$ .
at $U_{Bmax}=9\text{ V}$ , $R_V=562\ \Omega$	58 °C (136.4 °F)
using an amplifier in accordance with EN 60947-5-6	58 °C (136.4 °F)
Protection from mechanical danger	The sensor must not be exposed to <b>ANY FORM</b> of mechanical danger.
Protection from UV light	The sensor and the connection cable must be protected from damaging UV-radiation. This can be achieved when the sensor is used in internal areas.
Electrostatic charging	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.
Plug connector	The plug connector must not be withdrawn under voltage. The proximity switch is identified as follows: "WARNING - DO NOT SEPARATE WHEN ENERGIZED". With the plug connector disconnected, soiling of the internal area must be prevented. (i.e. the area that is inaccessible when the connector is inserted) The plug connection can only be separated using a tool. This is achieved by using the locking protection V1-Clip (Mounting accessory from Pepperl + Fuchs).