0102

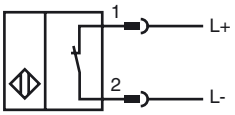
Model Number

NCB4-12GM40-N0-V1

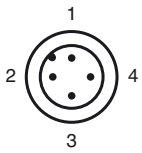
Features

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

Connection



Pinout



Wire colors in accordance with EN 60947-5-6

1	|	BN	(brown)
2	|	BU	(blue)

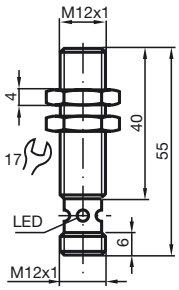
Accessories

BF 12
Mounting flange, 12 mm

V1-G-N-2M-PUR
Cable socket, M12, 2-pin, NAMUR, PUR cable

V1-W-N-2M-PUR
Cable socket, M12, 2-pin, NAMUR, PUR cable

Dimensions



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_{Al}		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 kΩ)
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 indication		Multihole-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		Device 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		Products with a maximum operating voltage of ≤36 V do not bear a CCC marking because they do not require approval.

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ATEX 1G

Instruction	**Manual electrical apparatus for hazardous areas**
Device category 1G	for use in hazardous areas with gas, vapour and mist
Directive conformity	94/9/EG
Standard conformity	EN 60079-0:2009, EN 60079-11:2007, EN 60079-26:2007 Ignition protection "Intrinsic safety" Use is restricted to the following stated conditions
CE marking	CE 0102
Ex-identification	Ex II 1G Ex ia IIC T6 Ga
EC-Type Examination Certificate	PTB 00 ATEX 2048 X
Appropriate type	NCB4-12GM...-N0...
Effective internal capacitance C_i	≤ 120 nF ; a cable length of 10 m is considered.
Effective internal inductance L_i	≤ 50 µH ; 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 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.
Highest permissible ambient temperature	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.
Installation, Comissioning	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.
Maintenance	No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

Specific conditions

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

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ATEX 2G

Instruction	**Manual electrical apparatus for hazardous areas**
Device category 2G	for use in hazardous areas with gas, vapour and mist
Directive conformity	94/9/EG
Standard conformity	EN 60079-0:2009, EN 60079-11:2007 Ignition protection "Intrinsic safety" Use is restricted to the following stated conditions
CE marking	CE 0102
Ex-identification	Ex II 1G Ex ia IIC T6 Ga
EC-Type Examination Certificate	PTB 00 ATEX 2048 X
Appropriate type	NCB4-12GM...-N0...
Effective internal capacitance C_i	≤ 120 nF ; a cable length of 10 m is considered.
Effective internal inductance L_i	≤ 50 µH ; 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 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.
Highest permissible ambient temperature	The temperature ranges, according to temperature class, are given in the EC-Type Examination Certificate.
Installation, Comissioning	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.
Maintenance	No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.
Specific conditions	
Protection from mechanical danger	When used in the temperature range below -20 °C the sensor should be protected from knocks by the provision of an additional housing.
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.

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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
Directive conformity	94/9/EG
Standard conformity	EN 50281-1-1 Protection via housing Use is restricted to the following stated conditions
CE marking	CE 0102
Ex-identification	Ex II 3D IP67 T 111 °C (231.8 °F) X The Ex-significant identification is on the enclosed adhesive label
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, Comissioning	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 RV 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 UBmax 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 Ub max and the minimum series resistance Rv.
at U_{Bmax}=9 V, R_V=562 Ω	11 K
using an amplifier in accordance with EN 60947-5-6	11 K
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).
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.

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ATEX 3D (tD)

Note	**This instruction is only valid for products according to EN 61241-0:2006 and EN 61241-1:2004** 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
Directive conformity	94/9/EG
Standard conformity	EN 61241-0:2006, EN 61241-1:2004 Protection via housing "tD" Use is restricted to the following stated conditions
CE marking	CE 0102
Ex-identification	Ex II 3D Ex tD A22 IP67 T80°C X The Ex-relevant identification may also be printed on the accompanying adhesive label.
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, Comissioning	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.

Specific conditions

Minimum series resistance R_V	A minimum series resistance RV 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 UBmax 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 Ub max and the minimum series resistance Rv.
at U_{Bmax}=9 V, R_V=562 Ω	58 °C (136.4 °F)
using an amplifier in accordance with EN 60947-5-6	58 °C (136.4 °F)
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).
Protection from mechanical danger	The sensor must not be exposed to **ANY FORM** 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.

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ATEX 3G (nL)

Instruction	**Manual electrical apparatus for hazardous areas**
Device category 3G (nL)	for use in hazardous areas with gas, vapour and mist
Directive conformity	94/9/EG
Standard conformity	EN 60079-15:2005 Ignition protection category "n" Use is restricted to the following stated conditions
CE marking	CE 0102
Ex-identification	Ex II 3G Ex nL IIC T6 X The Ex-significant identification is on the enclosed adhesive label
Effective internal capacitance C_i	≤ 120 nF ; a cable length of 10 m is considered.
Effective internal inductance L_i	≤ 50 µH ; 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!
Installation, Comissioning	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!
Maintenance	No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

Specific conditions

Maximum permissible ambient temperature T_{Umax} at Ui = 20 V	
for Pi=34 mW, Ii=25 mA, T6	55 °C (131 °F)
for Pi=34 mW, Ii=25 mA, T5	55 °C (131 °F)
for Pi=34 mW, Ii=25 mA, T4-T1	55 °C (131 °F)
for Pi=64 mW, Ii=25 mA, T6	55 °C (131 °F)
for Pi=64 mW, Ii=25 mA, T5	55 °C (131 °F)
for Pi=64 mW, Ii=25 mA, T4-T1	55 °C (131 °F)
for Pi=169 mW, Ii=52 mA, T6	41 °C (105.8 °F)
for Pi=169 mW, Ii=52 mA, T5	41 °C (105.8 °F)
for Pi=169 mW, Ii=52 mA, T4-T1	41 °C (105.8 °F)
for Pi=242 mW, Ii=76 mA, T6	29 °C (84.2 °F)
for Pi=242 mW, Ii=76 mA, T5	29 °C (84.2 °F)
for Pi=242 mW, Ii=76 mA, T4-T1	29 °C (84.2 °F)
Protection from mechanical danger	The sensor must not be exposed to **ANY FORM** of mechanical danger. When used in the temperature range below -20 °C the sensor should be protected from knocks by the provision of an additional housing.
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.
Connection parts	The connection parts are to be installed, such that a minimum protection class of IP20 is achieved, in accordance with IEC 60529.

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ATEX 3G (ic)

Instruction	**Manual electrical apparatus for hazardous areas**
Device category 3G (ic)	for use in hazardous areas with gas, vapour and mist
Directive conformity	94/9/EG
Standard conformity	EN 60079-0:2009, EN 60079-11:2007 Ignition protection category "ic" Use is restricted to the following stated conditions
CE marking	CE
Ex-identification	Ex II 3G Ex ic IIC T6 Gc X The Ex-significant identification is on the enclosed adhesive label
Effective internal capacitance C_i	≤ 120 nF ; a cable length of 10 m is considered.
Effective internal inductance L_i	≤ 50 µH ; 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!
Installation, Comissioning	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!
Maintenance	No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

Specific conditions

Maximum permissible ambient temperature T_{Umax} at Ui = 20 V	
for Pi=34 mW, Ii=25 mA, T6	55 °C (131 °F)
for Pi=34 mW, Ii=25 mA, T5	55 °C (131 °F)
for Pi=34 mW, Ii=25 mA, T4-T1	55 °C (131 °F)
for Pi=64 mW, Ii=25 mA, T6	55 °C (131 °F)
for Pi=64 mW, Ii=25 mA, T5	55 °C (131 °F)
for Pi=64 mW, Ii=25 mA, T4-T1	55 °C (131 °F)
for Pi=169 mW, Ii=52 mA, T6	41 °C (105.8 °F)
for Pi=169 mW, Ii=52 mA, T5	41 °C (105.8 °F)
for Pi=169 mW, Ii=52 mA, T4-T1	41 °C (105.8 °F)
for Pi=242 mW, Ii=76 mA, T6	29 °C (84.2 °F)
for Pi=242 mW, Ii=76 mA, T5	29 °C (84.2 °F)
for Pi=242 mW, Ii=76 mA, T4-T1	29 °C (84.2 °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 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.
Connection parts	The connection parts are to be installed, such that a minimum protection class of IP20 is achieved, in accordance with IEC 60529.

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