0102 APPROVED

Model Number

FJ7-N

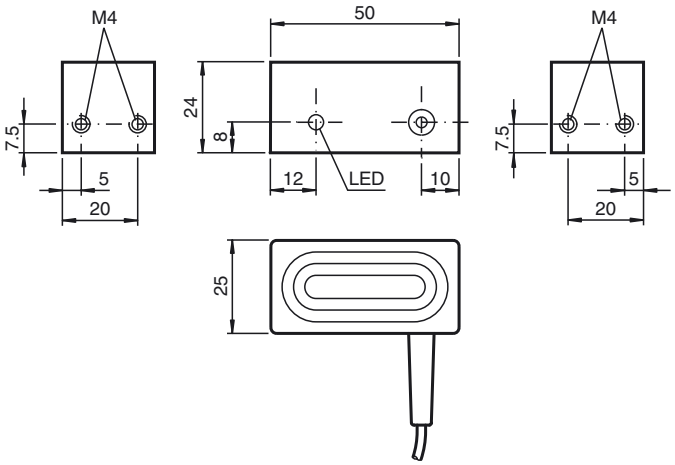
Features

- **7 mm flush**

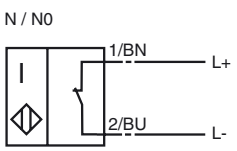
Technical Data

General specifications		
Switching element function		NAMUR, NC
Rated operating distance	s_n	7 mm
Installation		flush
Output polarity		NAMUR
Assured operating distance	s_a	0 ... 5.67 mm
Reduction factor r_{Al}		0.4
Reduction factor r_{Cu}		0.3
Reduction factor r_{304}		0.85
Nominal ratings		
Nominal voltage	U_o	8.2 V (R_i approx. 1 kΩ)
Operating voltage	U_B	5 ... 25 V
Switching frequency	f	0 ... 200 Hz
Hysteresis	H	typ. %
Current consumption		
Measuring plate not detected		≥ 3 mA
Measuring plate detected		≤ 1 mA
Switching state indicator		LED, yellow
Functional safety related parameters		
$MTTF_d$		4080 a
Mission Time (T_M)		20 a
Diagnostic Coverage (DC)		0 %
Ambient conditions		
Ambient temperature		-25 ... 100 °C (-13 ... 212 °F)
Mechanical specifications		
Connection type		cable PUR , 2 m
Core cross-section		0.34 mm²
Housing material		brass, zinc plated
Sensing face		POM
Degree of protection		IP67
Cable		
Bending radius		> 10 x cable diameter
General information		
Use in the hazardous area		see instruction manuals
Category		2G; 3G; 3D
Compliance with standards and directives		
Standard conformity		
NAMUR		EN 60947-5-6:2000
Standards		EN 60947-5-2:2007 IEC 60947-5-2:2007
Approvals and certificates		
FM approval		
Control drawing		116-0165
CCC approval		CCC approval / marking not required for products rated ≤36 V

Dimensions



Electrical Connection



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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
EC-Type Examination Certificate	PTB 00 ATEX 2032 X
CE marking	CE 0102
ATEX marking	Ex II 2G Ex ia IIC T6…T1 Gb
Directive conformity	94/9/EG
Standards	EN 60079-0:2012, EN 60079-11:2012 Ignition protection "Intrinsic safety" Use is restricted to the following stated conditions
Appropriate type	FJ7-N...
Effective internal capacitance C_i	≤ 65 nF ; a cable length of 10 m is considered.
Effective internal inductance L_i	≤ 220 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!
Ambient temperature	The temperature ranges, according to temperature class, are given in the EC-Type Examination Certificate.
Installation, commissioning	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. Install the device in such a way that the resin surface is not exposed to mechanical hazards.
Maintenance	No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

Special 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 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.

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ATEX 3G (nL)

Note	This instruction is only valid for products according to EN 60079-15:2005, valid until 01-May-2013
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 Ex nL IIC T6 X
Directive conformity	94/9/EG
Standard conformity	EN 60079-15:2005 Ignition protection category "n" Use is restricted to the following stated conditions
Effective internal capacitance C_i	≤ 65 nF ; a cable length of 10 m is considered.
Effective internal inductance L_i	≤ 220 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, 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

Maximum permissible ambient temperature T_{Umax} at Ui = 20 V	
for Pi=34 mW, Ii=25 mA, T6	73 °C (163.4 °F)
for Pi=34 mW, Ii=25 mA, T5	88 °C (190.4 °F)
for Pi=34 mW, Ii=25 mA, T4-T1	100 °C (212 °F)
for Pi=64 mW, Ii=25 mA, T6	73 °C (163.4 °F)
for Pi=64 mW, Ii=25 mA, T5	88 °C (190.4 °F)
for Pi=64 mW, Ii=25 mA, T4-T1	100 °C (212 °F)
for Pi=169 mW, Ii=52 mA, T6	62 °C (143.6 °F)
for Pi=169 mW, Ii=52 mA, T5	77 °C (170.6 °F)
for Pi=169 mW, Ii=52 mA, T4-T1	81 °C (177.8 °F)
for Pi=242 mW, Ii=76 mA, T6	54 °C (129.2 °F)
for Pi=242 mW, Ii=76 mA, T5	63 °C (145.4 °F)
for Pi=242 mW, Ii=76 mA, T4-T1	63 °C (145.4 °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.
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.
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
Certificate of Compliance	PF 13 CERT 2895 X
CE marking	CE
ATEX marking	Ex II 3G Ex ic IIC T6…T1 Gc
Directive conformity	94/9/EG
Standards	EN 60079-0:2012, EN 60079-11:2012 Ignition protection category "ic" Use is restricted to the following stated conditions
Effective internal capacitance C_i	≤ 65 nF ; a cable length of 10 m is considered.
Effective internal inductance L_i	≤ 220 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, commissioning	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. Install the device in such a way that the resin surface is not exposed to mechanical hazards.
Maintenance	No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

Special conditions

Maximum permissible ambient temperature T_{Umax} at Ui = 20 V	
for Pi=34 mW, Ii=25 mA, T6	73 °C (163.4 °F)
for Pi=34 mW, Ii=25 mA, T5	88 °C (190.4 °F)
for Pi=34 mW, Ii=25 mA, T4-T1	100 °C (212 °F)
for Pi=64 mW, Ii=25 mA, T6	73 °C (163.4 °F)
for Pi=64 mW, Ii=25 mA, T5	88 °C (190.4 °F)
for Pi=64 mW, Ii=25 mA, T4-T1	100 °C (212 °F)
for Pi=169 mW, Ii=52 mA, T6	62 °C (143.6 °F)
for Pi=169 mW, Ii=52 mA, T5	77 °C (170.6 °F)
for Pi=169 mW, Ii=52 mA, T4-T1	81 °C (177.8 °F)
for Pi=242 mW, Ii=76 mA, T6	54 °C (129.2 °F)
for Pi=242 mW, Ii=76 mA, T5	63 °C (145.4 °F)
for Pi=242 mW, Ii=76 mA, T4-T1	63 °C (145.4 °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.

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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
CE marking	CE 0102
ATEX marking	Ex II 3D IP67 T 109 °C (228.2 °F) X
Directive conformity	94/9/EG
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	
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	9 K
using an amplifier in accordance with EN 60947-5-6	9 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.

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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
CE marking	CE
ATEX marking	Ex II 3D Ex tD A22 IP67 T80°C X
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	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

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	61 °C (141.8 °F)
using an amplifier in accordance with EN 60947-5-6	61 °C (141.8 °F)
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.
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.

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