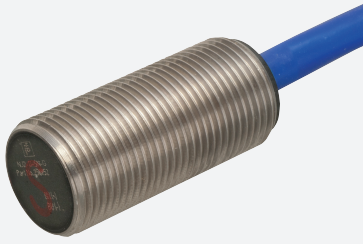


# Inductive sensor

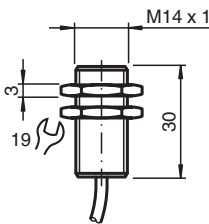
## NJ2-11-SN-G



- 2 mm flush
- Usable up to SIL 3 acc. to IEC 61508
- ATEX approval Ex-i and Ex-nA/tc for zone 0-2 and zone 20-22
- Degree of protection IP68



### Dimensions



### Technical Data

| General specifications       |       |   |
|------------------------------|-------|---|
| Switching function           |       | Normally closed (NC)  |
| Output type                  |       | NAMUR with safety function  |
| Rated operating distance     | $s_n$ | 2 mm  |
| Installation                 |       | flush   |
| Assured operating distance   | $s_a$ | 0 ... 1.62 mm   |
| Reduction factor $r_{AI}$    |       | 0.4   |
| Reduction factor $r_{Cu}$    |       | 0.3   |
| Reduction factor $r_{304}$   |       | 0.85  |
| Safety Integrity Level (SIL) |       | up to SIL3 acc. to IEC 61508 <b>Danger!</b> In safety-related applications the sensor must be operated with a qualified fail safe interface from Pepperl+Fuchs, such as KFD2-SH-EX1. Consider the "exida Functional Safety Assessment" document which is available on <a href="http://www.pepperl-fuchs.com">www.pepperl-fuchs.com</a> as an integral part of this product's documentation. |
| Output type                  |       | 2-wire  |
| Nominal ratings              |       |   |
| Nominal voltage              | $U_o$ | 8.2 V   |
| Switching frequency          | $f$   | 0 ... 3000 Hz   |

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Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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**PF** PEPPERL+FUCHS

## Technical Data

|  |                  |  |
|--|------------------|--|
| Suitable for 2:1 technology                                    |                  | yes , with reverse polarity protection diode   |
| Current consumption  |                  |  |
| Measuring plate not detected                                   |                  | ≥ 3 mA   |
| Measuring plate detected                                       |                  | ≤ 1 mA   |
| <b>Functional safety related parameters</b>                    |                  |  |
| Safety Integrity Level (SIL)                                   |                  | SIL 3  |
| MTTF <sub>d</sub>  |                  | 10660 a  |
| Mission Time (T <sub>M</sub> )                                 |                  | 20 a   |
| Diagnostic Coverage (DC)                                       |                  | 0 %  |
| <b>Compliance with standards and directives</b>                |                  |  |
| Standard conformity  |                  |  |
| NAMUR  |                  | EN 60947-5-6:2000<br>IEC 60947-5-6:1999  |
| Standards  |                  | EN 60947-5-2:2007<br>EN 60947-5-2/A1:2012<br>IEC 60947-5-2:2007<br>IEC 60947-5-2 AMD 1:2012  |
| <b>Approvals and certificates</b>                              |                  |  |
| EAC conformity   |                  | TR CU 012/2011   |
| FM approval  |                  |  |
| Control drawing  |                  | 116-0165   |
| UL approval  |                  | cULus Listed, General Purpose  |
| Ordinary Location  |                  | E87056   |
| Hazardous Location   |                  | E501628  |
| Control drawing  |                  | 116-0454   |
| CCC approval   |                  | CCC approval / marking not required for products rated ≤36 V   |
| <b>Ambient conditions</b>                                      |                  |  |
| Ambient temperature  |                  | -40 ... 100 °C (-40 ... 212 °F)  |
| <b>Mechanical specifications</b>                               |                  |  |
| Connection type  |                  | cable silicone , 2 m   |
| Core cross-section   |                  | 0.34 mm <sup>2</sup>   |
| Housing material   |                  | stainless steel (303/1.4305)   |
| Sensing face   |                  | Valox (PBT) , black  |
| Degree of protection   |                  | IP68   |
| Cable  |                  |  |
| Bending radius   |                  | > 10 x cable diameter  |
| <b>Data for application in connection with hazardous areas</b> |                  |  |
| Equipment protection level                                     |                  | Ga , Gb , Gc (nA) , Da , Dc , Mb   |
| <b>Equipment protection level Ga</b>                           |                  |  |
| Type of protection   |                  | intrinsic safety   |
| CE marking   |                  | [*PD-Z02585A*]   |
| <b>Certificates</b>  |                  |  |
| Appropriate type   |                  | NJ 2-11-SN-G...  |
| ATEX certificate   |                  | PTB 00 ATEX 2049 X   |
| ATEX marking   |                  | Ⓜ II 1G Ex ia IIC T6...T1 Ga   |
| Standards  |                  | EN 60079-0:2012+A11:2013 , EN 60079-11:2012  |
| IECEX certificate  |                  | IECEX PTB 11.0092X   |
| IECEX marking  |                  | Ex ia IIC T6...T1 Ga   |
| Standards  |                  | IEC 60079-0:2011 , IEC 60079-11:2011   |
| Effective internal capacitance                                 | C <sub>i</sub>   | max. 50 µF<br>A cable length of 10 m is considered.  |
| Effective internal inductance                                  | L <sub>i</sub>   | max. 150 µH<br>A cable length of 10 m is considered.   |
| Maximum permissible ambient temperature                        | T <sub>amb</sub> | Also observe the maximum permissible ambient temperature stated in the general technical data.<br>Keep to the lower of the two values. |

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Technical Data

|          |  |
|----------|--|
| for ATEX | <p>at <math>U_i = 16\text{ V}</math> , <math>I_i = 25\text{ mA}</math> , <math>P_i = 34\text{ mW}</math> ,<br/>                     T6 : 59 °C (138.2 °F)<br/>                     T5 : 71 °C (159.8 °F)<br/>                     T4 : 99 °C (210.2 °F)<br/>                     T3 : 99 °C (210.2 °F)<br/>                     T2 : 99 °C (210.2 °F)<br/>                     T1 : 99 °C (210.2 °F)</p> <p>at <math>U_i = 16\text{ V}</math> , <math>I_i = 25\text{ mA}</math> , <math>P_i = 64\text{ mW}</math> ,<br/>                     T6 : 56 °C (132.8 °F)<br/>                     T5 : 68 °C (154.4 °F)<br/>                     T4 : 96 °C (204.8 °F)<br/>                     T3 : 96 °C (204.8 °F)<br/>                     T2 : 96 °C (204.8 °F)<br/>                     T1 : 96 °C (204.8 °F)</p> <p>at <math>U_i = 16\text{ V}</math> , <math>I_i = 52\text{ mA}</math> , <math>P_i = 169\text{ mW}</math> ,<br/>                     T6 : 45 °C (113 °F)<br/>                     T5 : 57 °C (134.6 °F)<br/>                     T4 : 81 °C (177.8 °F)<br/>                     T3 : 81 °C (177.8 °F)<br/>                     T2 : 81 °C (177.8 °F)<br/>                     T1 : 81 °C (177.8 °F)</p> <p>at <math>U_i = 16\text{ V}</math> , <math>I_i = 76\text{ mA}</math> , <math>P_i = 242\text{ mW}</math> ,<br/>                     T6 : 37 °C (98.6 °F)<br/>                     T5 : 49 °C (120.2 °F)<br/>                     T4 : 63 °C (145.4 °F)<br/>                     T3 : 63 °C (145.4 °F)<br/>                     T2 : 63 °C (145.4 °F)<br/>                     T1 : 63 °C (145.4 °F)</p> |
|----------|--|

|           |   |
|-----------|---|
| for IECEx | <p>at <math>U_i = 16\text{ V}</math> , <math>I_i = 25\text{ mA}</math> , <math>P_i = 34\text{ mW}</math> ,<br/>                     T6 : 76 °C (168.8 °F)<br/>                     T5 : 91 °C (195.8 °F)<br/>                     T4 : 100 °C (212 °F)<br/>                     T3 : 100 °C (212 °F)<br/>                     T2 : 100 °C (212 °F)<br/>                     T1 : 100 °C (212 °F)</p> <p>at <math>U_i = 16\text{ V}</math> , <math>I_i = 25\text{ mA}</math> , <math>P_i = 64\text{ mW}</math> ,<br/>                     T6 : 73 °C (163.4 °F)<br/>                     T5 : 88 °C (190.4 °F)<br/>                     T4 : 100 °C (212 °F)<br/>                     T3 : 100 °C (212 °F)<br/>                     T2 : 100 °C (212 °F)<br/>                     T1 : 100 °C (212 °F)</p> <p>at <math>U_i = 16\text{ V}</math> , <math>I_i = 52\text{ mA}</math> , <math>P_i = 169\text{ mW}</math> ,<br/>                     T6 : 62 °C (143.6 °F)<br/>                     T5 : 77 °C (170.6 °F)<br/>                     T4 : 81 °C (177.8 °F)<br/>                     T3 : 81 °C (177.8 °F)<br/>                     T2 : 81 °C (177.8 °F)<br/>                     T1 : 81 °C (177.8 °F)</p> <p>at <math>U_i = 16\text{ V}</math> , <math>I_i = 76\text{ mA}</math> , <math>P_i = 242\text{ mW}</math> ,<br/>                     T6 : 54 °C (129.2 °F)<br/>                     T5 : 63 °C (145.4 °F)<br/>                     T4 : 63 °C (145.4 °F)<br/>                     T3 : 63 °C (145.4 °F)<br/>                     T2 : 63 °C (145.4 °F)<br/>                     T1 : 63 °C (145.4 °F)</p> |
|-----------|---|

Equipment protection level Gb

|                                |   |  |
|--------------------------------|---|--|
| Type of protection             | intrinsic safety                            |  |
| CE marking                     | [*PD-Z02585A*]                              |  |
| Certificates                   |   |  |
| Appropriate type               | NJ 2-11-SN-G...                             |  |
| ATEX certificate               | PTB 00 ATEX 2049 X                          |  |
| ATEX marking                   | Ⓜ II 1G Ex ia IIC T6...T1 Ga                |  |
| Standards                      | EN 60079-0:2012+A11:2013 , EN 60079-11:2012 |  |
| IECEx certificate              | IECEx PTB 11.0092X                          |  |
| IECEx marking                  | Ex ia IIC T6...T1 Ga                        |  |
| Standards                      | IEC 60079-0:2011 , IEC 60079-11:2011        |  |
| Effective internal capacitance | $C_i$                                       | max. 50 nF<br>A cable length of 10 m is considered.  |
| Effective internal inductance  | $L_i$                                       | max. 150 µH<br>A cable length of 10 m is considered. |

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Technical Data

|   |           |  |
|---|-----------|--|
| Maximum permissible ambient temperature | $T_{amb}$ | Also observe the maximum permissible ambient temperature stated in the general technical data.<br>Keep to the lower of the two values.<br>at $U_i = 16\text{ V}$ , $I_i = 25\text{ mA}$ , $P_i = 34\text{ mW}$ ,<br>T6: 76 °C (168.8 °F)<br>T5: 91 °C (195.8 °F)<br>T4: 100 °C (212 °F)<br>T3: 100 °C (212 °F)<br>T2: 100 °C (212 °F)<br>T1: 100 °C (212 °F)<br>at $U_i = 16\text{ V}$ , $I_i = 25\text{ mA}$ , $P_i = 64\text{ mW}$ ,<br>T6: 73 °C (163.4 °F)<br>T5: 88 °C (190.4 °F)<br>T4: 100 °C (212 °F)<br>T3: 100 °C (212 °F)<br>T2: 100 °C (212 °F)<br>T1: 100 °C (212 °F)<br>at $U_i = 16\text{ V}$ , $I_i = 52\text{ mA}$ , $P_i = 169\text{ mW}$ ,<br>T6: 62 °C (143.6 °F)<br>T5: 77 °C (170.6 °F)<br>T4: 81 °C (177.8 °F)<br>T3: 81 °C (177.8 °F)<br>T2: 81 °C (177.8 °F)<br>T1: 81 °C (177.8 °F)<br>at $U_i = 16\text{ V}$ , $I_i = 76\text{ mA}$ , $P_i = 242\text{ mW}$ ,<br>T6: 54 °C (129.2 °F)<br>T5: 63 °C (145.4 °F)<br>T4: 63 °C (145.4 °F)<br>T3: 63 °C (145.4 °F)<br>T2: 63 °C (145.4 °F)<br>T1: 63 °C (145.4 °F) |
|---|-----------|--|

Equipment protection level Gc (nA)

|                          |  |
|--------------------------|--|
| Type of protection       | "n"  |
| CE marking               | [*PD-Z02586A*]   |
| Certificates             |  |
| ATEX certificate         | PF 15 CERT 3754 X  |
| ATEX marking             | Ⓜ II 3G Ex nA IIC T6 Gc  |
| Standards                | EN 60079-0:2012+A11:2013, EN 60079-15:2010   |
| Possible characteristics | maximum operating voltage $U_{Bmax}$ , maximum load current $I_{Lmax}$ , minimum series resistance $R_V$ , maximum analog output voltage $U_{Amax}$ , maximum analog output current $I_{Amax}$ |

|   |           |  |
|---|-----------|--|
| Maximum permissible ambient temperature | $T_{amb}$ | Also observe the maximum permissible ambient temperature stated in the general technical data.<br>Keep to the lower of the two values.<br>using an amplifier in accordance with EN 60947-5-6 : 61 °C (141.8 °F)<br>at $U_{Bmax} = 9\text{ V}$ , $R_V = 562\ \Omega$ : 61 °C (141.8 °F) |
|---|-----------|--|

Equipment protection level Da

|   |  |  |
|---|--|--|
| Type of protection                      | intrinsic safety                           |  |
| CE marking                              | [*PD-Z02585A*]                             |  |
| Certificates                            |  |  |
| Appropriate type                        | NJ 2-11-SN-G...                            |  |
| ATEX certificate                        | PTB 00 ATEX 2049 X                         |  |
| ATEX marking                            | Ⓜ II 1D Ex ia IIIC T135°C Da               |  |
| Standards                               | EN 60079-0:2012+A11:2013, EN 60079-11:2012 |  |
| IECEx certificate                       | IECEx PTB 11.0092X                         |  |
| IECEx marking                           | Ex ia IIIC T135°C Da                       |  |
| Standards                               | IEC 60079-0:2011, IEC 60079-11:2011        |  |
| Effective internal capacitance          | $C_i$                                      | max. 50 nF<br>A cable length of 10 m is considered.  |
| Effective internal inductance           | $L_i$                                      | max. 150 µH<br>A cable length of 10 m is considered.   |
| Maximum permissible ambient temperature | $T_{amb}$                                  | Also observe the maximum permissible ambient temperature stated in the general technical data.<br>Keep to the lower of the two values.<br>at $U_i = 16\text{ V}$ , $I_i = 25\text{ mA}$ , $P_i = 34\text{ mW}$ : 100 °C (212 °F)<br>at $U_i = 16\text{ V}$ , $I_i = 25\text{ mA}$ , $P_i = 64\text{ mW}$ : 100 °C (212 °F)<br>at $U_i = 16\text{ V}$ , $I_i = 52\text{ mA}$ , $P_i = 169\text{ mW}$ : 81 °C (177.8 °F)<br>at $U_i = 16\text{ V}$ , $I_i = 76\text{ mA}$ , $P_i = 242\text{ mW}$ : 63 °C (145.4 °F) |

Equipment protection level Dc

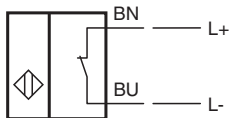
|                    |                              |
|--------------------|------------------------------|
| Type of protection | Protection by enclosure "tc" |
|--------------------|------------------------------|

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## Technical Data

|   |  |  |
|---|--|--|
| CE marking                              | [*PD-Z02586A*]   |  |
| Certificates                            |  |  |
| ATEX certificate                        | PF 15 CERT 3774 X  |  |
| ATEX marking                            | Ⓔ II 3D Ex tc IIIC T80 °C Dc   |  |
| Standards                               | EN 60079-0:2012+A11:2013 , EN 60079-31:2014  |  |
| Possible characteristics                | maximum operating voltage $U_{Bmax}$ , maximum load current $I_{Lmax}$ , minimum series resistance $R_V$ , maximum analog output voltage $U_{Amax}$ , maximum analog output current $I_{Amax}$ |  |
| Maximum permissible ambient temperature | $T_{amb}$  | Also observe the maximum permissible ambient temperature stated in the general technical data.<br>Keep to the lower of the two values.<br>using an amplifier in accordance with EN 60947-5-6 : 61 °C (141.8 °F)<br>at $U_{Bmax} = 9 V$ , $R_V = 562 \Omega$ : 61 °C (141.8 °F)   |
| <b>Equipment protection level Mb</b>    |  |  |
| Type of protection                      | intrinsic safety   |  |
| Certificates                            |  |  |
| Appropriate type                        | NJ 2-11-SN-G...  |  |
| IECEX certificate                       | IECEX PTB 11.0092X   |  |
| IECEX marking                           | Ex ia I Mb   |  |
| Standards                               | IEC 60079-0:2011 , IEC 60079-11:2011   |  |
| Effective internal capacitance          | $C_i$  | max. 50 nF<br>A cable length of 10 m is considered.  |
| Effective internal inductance           | $L_i$  | max. 150 $\mu$ H<br>A cable length of 10 m is considered.  |
| Maximum permissible ambient temperature | $T_{amb}$  | Also observe the maximum permissible ambient temperature stated in the general technical data.<br>Keep to the lower of the two values.<br>at $U_i = 16 V$ , $I_i = 25 mA$ , $P_i = 34 mW$ : 100 °C (212 °F)<br>at $U_i = 16 V$ , $I_i = 25 mA$ , $P_i = 64 mW$ : 100 °C (212 °F)<br>at $U_i = 16 V$ , $I_i = 52 mA$ , $P_i = 169 mW$ : 81 °C (177.8 °F)<br>at $U_i = 16 V$ , $I_i = 76 mA$ , $P_i = 242 mW$ : 63 °C (145.4 °F) |
| <b>General information</b>              |  |  |
| Use in the hazardous area               | see instruction manuals  |  |

## Connection



## Application

**Danger!**

In safety-related applications the sensor must be operated with a qualified fail safe interface from Pepperl+Fuchs, such as KFD2-SH-EX1.

Consider the "exida Functional Safety Assessment" document which is available on [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com) as an integral part of this product's documentation.