



## Model Number

NJ3-18GK-S1N-5M

## Features

- Nonferrous targets
- 3 mm flush in ST37 / 1.0037
- 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

## 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 as an integral part of this product's documentation.

## Accessories

### BF 18

Mounting flange, 18 mm

## Technical Data

### General specifications

|                              |       |   |
|------------------------------|-------|---|
| Switching function           |       | Normally open (NO)  |
| Output type                  |       | NAMUR with safety function  |
| Rated operating distance     | $s_n$ | 3 mm  |
| Installation                 |       | flush in mild steel   |
| Assured operating distance   | $s_a$ | 0 ... 2.4 mm  |
| Actual operating distance    | $s_r$ | 2.7 ... 3.3 mm typ.   |
| Reduction factor $r_{AI}$    |       | 1   |
| Reduction factor $r_{CU}$    |       | 1   |
| Reduction factor $r_{304}$   |       | 0   |
| 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 this product's documentation as an integral part of |
| Output type                  |       | 2-wire  |

### Nominal ratings

|                              |       |              |
|------------------------------|-------|--------------|
| Nominal voltage              | $U_o$ | 8.2 V        |
| Switching frequency          | $f$   | 0 ... 200 Hz |
| Current consumption          |       |              |
| Measuring plate not detected |       | ≤ 1 mA       |
| Measuring plate detected     |       | ≥ 3 mA       |

### Functional safety related parameters

|                                |  |         |
|--------------------------------|--|---------|
| Safety Integrity Level (SIL)   |  | SIL 3   |
| MTTF <sub>d</sub>              |  | 10660 a |
| Mission Time (T <sub>M</sub> ) |  | 20 a    |
| Diagnostic Coverage (DC)       |  | 0 %     |

### Ambient conditions

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

### Mechanical specifications

|                      |  |                            |
|----------------------|--|----------------------------|
| Connection type      |  | cable silicone , 5 m       |
| Core cross-section   |  | 0.75 mm <sup>2</sup>       |
| Housing material     |  | Crastin (PBTB), black      |
| Sensing face         |  | Crastin (PBTB), black      |
| Degree of protection |  | IP68                       |
| Cable                |  |                            |
| Bending radius       |  | > 10 x cable diameter      |
| Note                 |  | only for non-ferrous metal |

### General information

|                           |  |                         |
|---------------------------|--|-------------------------|
| Use in the hazardous area |  | see instruction manuals |
|---------------------------|--|-------------------------|

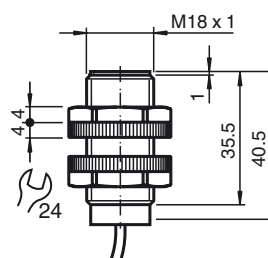
### Compliance with standards and directives

|                     |  |   |
|---------------------|--|---|
| Standard conformity |  |   |
| 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 |

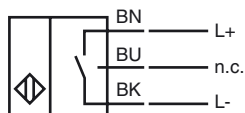
### Approvals and certificates

|                 |  |  |
|-----------------|--|--|
| EAC conformity  |  | TR CU 012/2011   |
| FM approval     |  |  |
| Control drawing |  | 116-0165   |
| UL approval     |  | cULus Listed, General Purpose                                |
| CCC approval    |  | CCC approval / marking not required for products rated ≤36 V |

## Dimensions



Electrical Connection



**Data for application in connection with hazardous areas**

|                            |  |
|----------------------------|--|
| Equipment protection level | Ga , Gb , Gc (ic) , Gc (nA) , Da , Dc , Mb |
|----------------------------|--|

**Equipment protection level Ga**

|                    |                  |
|--------------------|------------------|
| Type of protection | intrinsic safety |
| CE marking         | CE 0102          |

**Certificates**

|                   |   |
|-------------------|---|
| Appropriate type  | NJ 3-18GK-S1N...                            |
| 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 inductivity | $C_i$ | $\leq 70 \text{ nF}$<br>A cable length of 10 m is considered. |
|--------------------------------|-------|---|

|                               |       |   |
|-------------------------------|-------|---|
| Effective internal inductance | $L_i$ | $\leq 200 \text{ }\mu\text{H}$<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. |
|---|--|

|          |  |
|----------|--|
| 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/> <math>T_6 : 57 \text{ }^\circ\text{C}</math> (134.6 °F)<br/> <math>T_5 : 69 \text{ }^\circ\text{C}</math> (156.2 °F)<br/> <math>T_4 : 97 \text{ }^\circ\text{C}</math> (206.6 °F)<br/> <math>T_3 : 97 \text{ }^\circ\text{C}</math> (206.6 °F)<br/> <math>T_2 : 97 \text{ }^\circ\text{C}</math> (206.6 °F)<br/> <math>T_1 : 97 \text{ }^\circ\text{C}</math> (206.6 °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/> <math>T_6 : 52 \text{ }^\circ\text{C}</math> (125.6 °F)<br/> <math>T_5 : 64 \text{ }^\circ\text{C}</math> (147.2 °F)<br/> <math>T_4 : 92 \text{ }^\circ\text{C}</math> (197.6 °F)<br/> <math>T_3 : 92 \text{ }^\circ\text{C}</math> (197.6 °F)<br/> <math>T_2 : 92 \text{ }^\circ\text{C}</math> (197.6 °F)<br/> <math>T_1 : 92 \text{ }^\circ\text{C}</math> (197.6 °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/> <math>T_6 : 34 \text{ }^\circ\text{C}</math> (93.2 °F)<br/> <math>T_5 : 46 \text{ }^\circ\text{C}</math> (114.8 °F)<br/> <math>T_4 : 74 \text{ }^\circ\text{C}</math> (165.2 °F)<br/> <math>T_3 : 74 \text{ }^\circ\text{C}</math> (165.2 °F)<br/> <math>T_2 : 74 \text{ }^\circ\text{C}</math> (165.2 °F)<br/> <math>T_1 : 74 \text{ }^\circ\text{C}</math> (165.2 °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/> <math>T_6 : 22 \text{ }^\circ\text{C}</math> (71.6 °F)<br/> <math>T_5 : 34 \text{ }^\circ\text{C}</math> (93.2 °F)<br/> <math>T_4 : 61 \text{ }^\circ\text{C}</math> (141.8 °F)<br/> <math>T_3 : 61 \text{ }^\circ\text{C}</math> (141.8 °F)<br/> <math>T_2 : 61 \text{ }^\circ\text{C}</math> (141.8 °F)<br/> <math>T_1 : 61 \text{ }^\circ\text{C}</math> (141.8 °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/> <math>T_6 : 73 \text{ }^\circ\text{C}</math> (163.4 °F)<br/> <math>T_5 : 88 \text{ }^\circ\text{C}</math> (190.4 °F)<br/> <math>T_4 : 100 \text{ }^\circ\text{C}</math> (212 °F)<br/> <math>T_3 : 100 \text{ }^\circ\text{C}</math> (212 °F)<br/> <math>T_2 : 100 \text{ }^\circ\text{C}</math> (212 °F)<br/> <math>T_1 : 100 \text{ }^\circ\text{C}</math> (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/> <math>T_6 : 69 \text{ }^\circ\text{C}</math> (156.2 °F)<br/> <math>T_5 : 84 \text{ }^\circ\text{C}</math> (183.2 °F)<br/> <math>T_4 : 100 \text{ }^\circ\text{C}</math> (212 °F)<br/> <math>T_3 : 100 \text{ }^\circ\text{C}</math> (212 °F)<br/> <math>T_2 : 100 \text{ }^\circ\text{C}</math> (212 °F)<br/> <math>T_1 : 100 \text{ }^\circ\text{C}</math> (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/> <math>T_6 : 51 \text{ }^\circ\text{C}</math> (123.8 °F)<br/> <math>T_5 : 66 \text{ }^\circ\text{C}</math> (150.8 °F)<br/> <math>T_4 : 80 \text{ }^\circ\text{C}</math> (176 °F)<br/> <math>T_3 : 80 \text{ }^\circ\text{C}</math> (176 °F)<br/> <math>T_2 : 80 \text{ }^\circ\text{C}</math> (176 °F)<br/> <math>T_1 : 80 \text{ }^\circ\text{C}</math> (176 °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/> <math>T_6 : 39 \text{ }^\circ\text{C}</math> (102.2 °F)<br/> <math>T_5 : 54 \text{ }^\circ\text{C}</math> (129.2 °F)<br/> <math>T_4 : 61 \text{ }^\circ\text{C}</math> (141.8 °F)<br/> <math>T_3 : 61 \text{ }^\circ\text{C}</math> (141.8 °F)<br/> <math>T_2 : 61 \text{ }^\circ\text{C}</math> (141.8 °F)<br/> <math>T_1 : 61 \text{ }^\circ\text{C}</math> (141.8 °F)</p> |
|-----------|---|

**Equipment protection level Gb**

|   |  |   |
|---|--|---|
| Type of protection                                | intrinsic safety   |   |
| CE marking  | CE 0102  |   |
| <b>Certificates</b>                               |  |   |
| Appropriate type                                  | NJ 3-18GK-S1N...   |   |
| ATEX certificate                                  | PTB 00 ATEX 2049 X   |   |
| ATEX marking                                      | Ex 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 inductivity                    | $C_i$  | $\leq 70$ nF<br>A cable length of 10 m is considered.       |
| Effective internal inductance                     | $L_i$  | $\leq 200$ $\mu$ 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 ,<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 $U_i = 16$ V , $I_i = 25$ mA , $P_i = 64$ mW ,<br>T6 : 69 °C (156.2 °F)<br>T5 : 84 °C (183.2 °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 $U_i = 16$ V , $I_i = 52$ mA , $P_i = 169$ mW ,<br>T6 : 51 °C (123.8 °F)<br>T5 : 66 °C (150.8 °F)<br>T4 : 80 °C (176 °F)<br>T3 : 80 °C (176 °F)<br>T2 : 80 °C (176 °F)<br>T1 : 80 °C (176 °F)<br>at $U_i = 16$ V , $I_i = 76$ mA , $P_i = 242$ mW ,<br>T6 : 39 °C (102.2 °F)<br>T5 : 54 °C (129.2 °F)<br>T4 : 61 °C (141.8 °F)<br>T3 : 61 °C (141.8 °F)<br>T2 : 61 °C (141.8 °F)<br>T1 : 61 °C (141.8 °F) |   |

**Equipment protection level Gc (ic)**

|   |  |   |
|---|--|---|
| Type of protection                                | intrinsic safety   |   |
| CE marking  | CE   |   |
| <b>Certificates</b>                               |  |   |
| ATEX certificate                                  | PF 13 CERT 2895 X  |   |
| ATEX marking                                      | Ex II 3G Ex ic IIC T6...T1 Gc  |   |
| Standards   | EN 60079-0:2012+A11:2013 , EN 60079-11:2012  |   |
| Effective internal inductivity                    | $C_i$  | $\leq 70$ nF<br>A cable length of 10 m is considered.       |
| Effective internal inductance                     | $L_i$  | $\leq 200$ $\mu$ 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 $U_i = 20$ V , $I_i = 25$ mA , $P_i = 34$ mW ,<br>T6 : 70 °C (158 °F)<br>T5 : 85 °C (185 °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 $U_i = 20$ V , $I_i = 25$ mA , $P_i = 64$ mW ,<br>T6 : 69 °C (156.2 °F)<br>T5 : 84 °C (183.2 °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 $U_i = 20$ V , $I_i = 52$ mA , $P_i = 169$ mW ,<br>T6 : 51 °C (123.8 °F)<br>T5 : 66 °C (150.8 °F)<br>T4 : 80 °C (176 °F)<br>T3 : 80 °C (176 °F)<br>T2 : 80 °C (176 °F)<br>T1 : 80 °C (176 °F)<br>at $U_i = 20$ V , $I_i = 76$ mA , $P_i = 242$ mW ,<br>T6 : 39 °C (102.2 °F)<br>T5 : 54 °C (129.2 °F)<br>T4 : 61 °C (141.8 °F)<br>T3 : 61 °C (141.8 °F)<br>T2 : 61 °C (141.8 °F)<br>T1 : 61 °C (141.8 °F) |   |

**Equipment protection level Gc (nA)**

|   |  |
|---|--|
| Type of protection                                | "n"  |
| CE marking  | CE   |
| <b>Certificates</b>                               |  |
| ATEX certificate                                  | PF 15CERT3754 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 $U_{Bmax}$ , load current $I_L$ , 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 : 58 °C (136.4 °F)<br>at $U_{Bmax} = 9 V$ , $R_V = 562 \Omega$ : 58 °C (136.4 °F) |

**Equipment protection level Da**

|   |  |
|---|--|
| Type of protection                                | intrinsic safety   |
| CE marking  | CE 0102  |
| <b>Certificates</b>                               |  |
| Appropriate type                                  | NJ 3-18GK-S1N...   |
| 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 inductivity $C_i$              | $\leq 70$ nF<br>A cable length of 10 m is considered.  |
| Effective internal inductance $L_i$               | $\leq 200$ $\mu$ 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 : 80 °C (176 °F)<br>at $U_i = 16 V$ , $I_i = 76$ mA, $P_i = 242$ mW : 61 °C (141.8 °F) |

**Equipment protection level Dc**

|   |  |
|---|--|
| Type of protection                                | Protection by enclosure "tc"   |
| CE marking  | CE   |
| <b>Certificates</b>                               |  |
| 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 : 58 °C (136.4 °F)<br>at $U_{Bmax} = 9 V$ , $R_V = 562 \Omega$ : 58 °C (136.4 °F) |

**Equipment protection level Mb**

|   |  |
|---|--|
| Type of protection                                | intrinsic safety   |
| <b>Certificates</b>                               |  |
| Appropriate type                                  | NJ 3-18GK-S1N...   |
| IECEX certificate                                 | IECEX PTB 11.0092X   |
| IECEX marking                                     | Ex ia I Mb   |
| Standards   | IEC 60079-0:2011 , IEC 60079-11:2011   |
| Effective internal inductivity $C_i$              | $\leq 70$ nF<br>A cable length of 10 m is considered.  |
| Effective internal inductance $L_i$               | $\leq 200$ $\mu$ 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 : 80 °C (176 °F)<br>at $U_i = 16 V$ , $I_i = 76$ mA, $P_i = 242$ mW : 61 °C (141.8 °F) |