

## Features

- 4-channel isolated barrier
- 24 V DC supply (Power Rail)
- Dry contact or NAMUR inputs
- 50 % less wiring, 2:1 technology
- Relay contact output
- Line fault detection (LFD)
- Reversible mode of operation

## Function

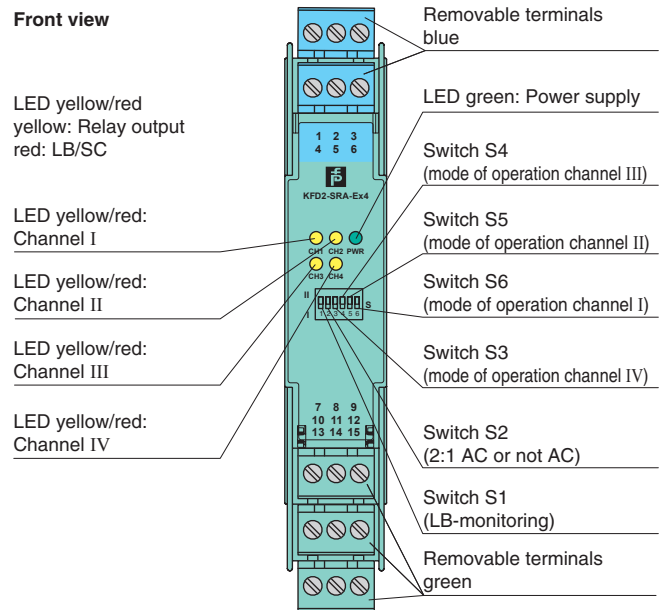
This isolated barrier is used for intrinsic safety applications. It transfers digital signals (NAMUR sensors/mechanical contacts) from a hazardous area to a safe area.

Each sensor or switch controls one form A normally open relay contact for the safe area load. A special 2:1 wire-saving technology is available on this isolator, reducing field wiring by 50 %.

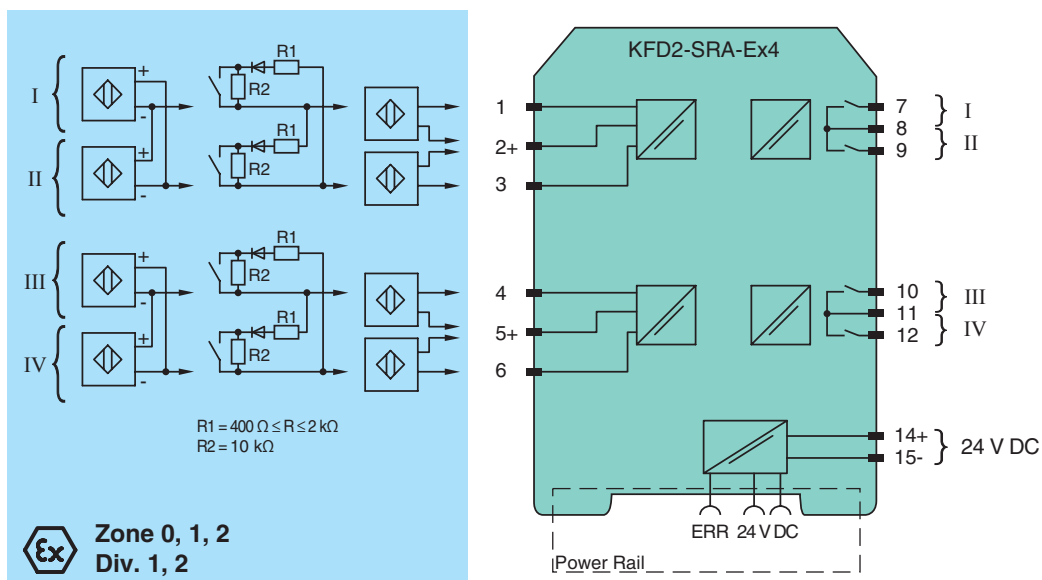
Switch S1 is used to enable or disable line fault detection of the field circuit. The 2:1 mode is selected with switch S2 while the remaining switches, S3 ... S6, are used for reversing the normal output state of the relays.

A unique collective error messaging feature is available when used with the Power Rail system.

## Assembly



## Connection



|                                                                |       |                                                                                                                       |
|----------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------|
| <b>General specifications</b>                                  |       |                                                                                                                       |
| Signal type                                                    |       | Digital Input                                                                                                         |
| <b>Supply</b>                                                  |       |                                                                                                                       |
| Connection                                                     |       | Power Rail or terminals 14+, 15-                                                                                      |
| Rated voltage                                                  | $U_r$ | 19 ... 30 V DC                                                                                                        |
| Ripple                                                         |       | $\leq 10 \%$                                                                                                          |
| Rated current                                                  | $I_r$ | 45 ... 70 mA                                                                                                          |
| Power dissipation                                              |       | 1.2 W                                                                                                                 |
| <b>Input</b>                                                   |       |                                                                                                                       |
| Connection side                                                |       | field side                                                                                                            |
| Connection                                                     |       | terminals 1-, 2+, 3-; 4-, 5+, 6-                                                                                      |
| Rated values                                                   |       | acc. to EN 60947-5-6 (NAMUR), see system description for electrical data                                              |
| Open circuit voltage/short-circuit current                     |       | approx. 8 V DC / approx. 8 mA                                                                                         |
| Switching point/switching hysteresis                           |       | 1.2 ... 2.1 mA / approx. 0.2 mA                                                                                       |
| Pulse/Pause ratio                                              |       | $\geq 35 \text{ ms} / \geq 35 \text{ ms}$ (non-AC operation) $\geq 70 \text{ ms} / \geq 70 \text{ ms}$ (AC operation) |
| Line fault detection                                           |       | breakage $I \leq 0.15 \text{ mA}$ , short-circuit $I > 6 \text{ mA}$                                                  |
| <b>Output</b>                                                  |       |                                                                                                                       |
| Connection side                                                |       | control side                                                                                                          |
| Connection                                                     |       | output I: terminals 7, 8 ; output II: terminals 8, 9 ; output III: terminals 10, 11 ; output IV: terminals 11, 12     |
| Output I ... IV                                                |       | Signal I ... Signal IV ; relay                                                                                        |
| Contact loading                                                |       | 253 V AC/2 A / $\cos \phi > 0.7$ ; 40 V DC/2 A resistive load;                                                        |
| Energized/De-energized delay                                   |       | approx. 30 ms / approx. 30 ms                                                                                         |
| Mechanical life                                                |       | $5 \times 10^6$ switching cycles                                                                                      |
| Collective error message                                       |       | Power Rail                                                                                                            |
| <b>Transfer characteristics</b>                                |       |                                                                                                                       |
| Switching frequency                                            |       | $\leq 10 \text{ Hz}$ (non-AC operation) $\leq 3 \text{ Hz}$ (AC operation)                                            |
| <b>Galvanic isolation</b>                                      |       |                                                                                                                       |
| Input/Output                                                   |       | reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V <sub>eff</sub>                      |
| Input/power supply                                             |       | reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V <sub>eff</sub>                      |
| Output/power supply                                            |       | reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V <sub>eff</sub>                      |
| Output/Output                                                  |       | basic insulation according to IEC/EN 61010-1, rated insulation voltage 300 V <sub>eff</sub>                           |
| <b>Indicators/settings</b>                                     |       |                                                                                                                       |
| Display elements                                               |       | LEDs                                                                                                                  |
| Control elements                                               |       | DIP-switch                                                                                                            |
| Configuration                                                  |       | via DIP switches                                                                                                      |
| Labeling                                                       |       | space for labeling at the front                                                                                       |
| <b>Directive conformity</b>                                    |       |                                                                                                                       |
| Electromagnetic compatibility                                  |       |                                                                                                                       |
| Directive 2014/30/EU                                           |       | EN 61326-1:2013 (industrial locations)                                                                                |
| Low voltage                                                    |       |                                                                                                                       |
| Directive 2014/35/EU                                           |       | EN 61010-1:2010                                                                                                       |
| <b>Conformity</b>                                              |       |                                                                                                                       |
| Electromagnetic compatibility                                  |       | NE 21:2006                                                                                                            |
| Degree of protection                                           |       | IEC 60529:2001                                                                                                        |
| Input                                                          |       | EN 60947-5-6:2000                                                                                                     |
| <b>Ambient conditions</b>                                      |       |                                                                                                                       |
| Ambient temperature                                            |       | -20 ... 60 °C (-4 ... 140 °F)                                                                                         |
| <b>Mechanical specifications</b>                               |       |                                                                                                                       |
| Degree of protection                                           |       | IP20                                                                                                                  |
| Connection                                                     |       | screw terminals                                                                                                       |
| Mass                                                           |       | approx. 150 g                                                                                                         |
| Dimensions                                                     |       | 20 x 119 x 115 mm (0.8 x 4.7 x 4.5 inch), housing type B2                                                             |
| Mounting                                                       |       | on 35 mm DIN mounting rail acc. to EN 60715:2001                                                                      |
| <b>Data for application in connection with hazardous areas</b> |       |                                                                                                                       |
| EU-Type Examination Certificate                                |       | ZELM 99 ATEX 0009                                                                                                     |
| Marking                                                        |       | <div>Ex</div> II (1)G [Ex ia Ga] IIC<br><div>Ex</div> II (1)D [Ex ia Da] IIIC<br><div>Ex</div> I (M1) [Ex ia Ma] I    |
| Input                                                          |       | Ex ia IIC                                                                                                             |
| Voltage                                                        | $U_o$ | 10 V                                                                                                                  |
| Current                                                        | $I_o$ | 14 mA                                                                                                                 |
| Power                                                          | $P_o$ | 35 mW (linear characteristic)                                                                                         |
| <b>Supply</b>                                                  |       |                                                                                                                       |
| Maximum safe voltage                                           | $U_m$ | 40 V DC (Attention! $U_m$ is no rated voltage.)                                                                       |

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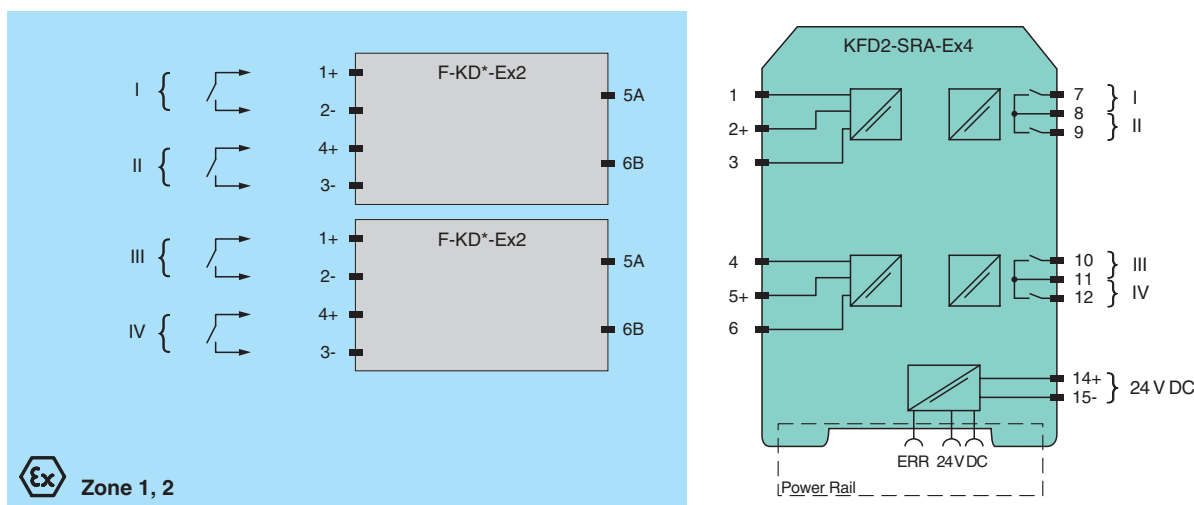
|                           |       |                                                                                                                                                                                                 |
|---------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output                    |       |                                                                                                                                                                                                 |
| Contact loading           |       | 230 V AC + 10 % / 2 A / 100 VA / $\cos \phi \geq 0.7$ ; 40 V DC / 2 A resistive load                                                                                                            |
| Fault indication output   |       |                                                                                                                                                                                                 |
| Maximum safe voltage      | $U_m$ | 40 V DC                                                                                                                                                                                         |
| Galvanic isolation        |       |                                                                                                                                                                                                 |
| Input/input               |       | not available                                                                                                                                                                                   |
| Input/Output              |       | safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V                                                                                                                     |
| Input/power supply        |       | safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V                                                                                                                     |
| Directive conformity      |       |                                                                                                                                                                                                 |
| Directive 2014/34/EU      |       | EN 60079-0:2012+A11:2013, EN 60079-11:2012, EN 60079-26:2007, EN 50303:2000                                                                                                                     |
| International approvals   |       |                                                                                                                                                                                                 |
| UL approval               |       |                                                                                                                                                                                                 |
| Control drawing           |       | 116-0145                                                                                                                                                                                        |
| IECEX approval            |       | IECEX TUN 04.0003                                                                                                                                                                               |
| Approved for              |       | [Ex ia Ga] IIC, [Ex ia Da] IIIC, [Ex ia Ma] I                                                                                                                                                   |
| General information       |       |                                                                                                                                                                                                 |
| Supplementary information |       | Observe the certificates, declarations of conformity, instruction manuals, and manuals where applicable. For information see <a href="http://www.pepperl-fuchs.com">www.pepperl-fuchs.com</a> . |

## Configuration

### Requirements for using the 2:1-transfer method

In the 2:1-transfer method the switch amplifier transfers digital signals from the hazardous area by means of the patented new 2:1-transfer method. This method allows to transfer two independent digital signals by means of a single pair of conductors.

The prerequisite for the use of the 2:1-transfer method is that sensors with reverse polarity protected diode are used. Pepperl+Fuchs offers suitable sensors for alternating polarity. When using sensors without integrated reverse polarity protection diode, clamp modules F-KD-Ex2 or F-KDR-Ex2 (with diode network) have to be fitted. In case of F-KDR-Ex2, a resistor combination has been fitted in addition for line fault detection of mechanical switches.



### Comments

When installing a serial diode, it has to be assured that the current in reverse direction is below a value of 0.15 mA in order to enable the line fault detection.

# Functions of the switches

| Line fault detection  | Pos. | Input |                         |
|-----------------------|------|-------|-------------------------|
| <br>S1 S2 S3 S4 S5 S6 | I    |       | Line fault detection    |
| <br>S1 S2 S3 S4 S5 S6 | II   |       | no Line fault detection |

| AC function           | Pos. | Input |                                         |
|-----------------------|------|-------|-----------------------------------------|
| <br>S1 S2 S3 S4 S5 S6 | I    |       | AC function<br>(2:1 transfer technique) |
| <br>S1 S2 S3 S4 S5 S6 | II   |       | none AC function                        |

| Mode of operation                                                                             | Pos. | Input                        |                               |
|-----------------------------------------------------------------------------------------------|------|------------------------------|-------------------------------|
| <br>S1 S2 S3 S4 S5 S6<br>S3: channel IV<br>S4: channel III<br>S5: channel II<br>S6: channel I | I    | 1 signal<br><br>0 signal<br> | energized<br><br>de-energized |
| <br>S1 S2 S3 S4 S5 S6<br>S3: channel IV<br>S4: channel III<br>S5: channel II<br>S6: channel I | II   | 0 signal<br><br>1 signal<br> | energized<br><br>de-energized |



Pepperl+Fuchs sensors for alternating polarity

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| Model number               | Housing      |
|----------------------------|--------------|
| NCB1,5-6,5M25-N0           | 6.5 mm metal |
| NCB1,5-6,5M25-N0-10M       | 6.5 mm metal |
| NCB1,5-6,5M25-N0-5M        | 6.5 mm metal |
| NCB1,5-6,5M25-N0-V1        | 6.5 mm metal |
| NCB1,5-8GM25-N0            | M8 metal     |
| NCB1,5-8GM25-N0-10M        | M8 metal     |
| NCB1,5-8GM25-N0-5M         | M8 metal     |
| NCB1,5-8GM25-N0-V1         | M8 metal     |
| NCB10-30GM40-N0            | M30 metal    |
| NCB10-30GM40-N0-10M        | M30 metal    |
| NCB10-30GM40-N0-15M        | M30 metal    |
| NCB10-30GM40-N0-5M         | M30 metal    |
| NCB10-30GM40-N0-V1         | M30 metal    |
| NCB15-30GM40-N0            | M30 metal    |
| NCB15-30GM40-N0-V1         | M30 metal    |
| NCB2-12GK35-N0             | M12 plastic  |
| NCB2-12GM35-N0             | M12 metal    |
| NCB2-12GM35-N0-10M         | M12 metal    |
| NCB2-12GM35-N0-21M         | M12 metal    |
| NCB2-12GM35-N0-5M          | M12 metal    |
| NCB2-12GM35-N0-V1          | M12 metal    |
| NCB2-F1-N0                 | F1           |
| NCB2-V3-N0                 | V3           |
| NCB2-V3-N0-V5              | V3           |
| NCB4-12GM40-N0             | M12 metal    |
| NCB4-12GM40-N0-V1          | M12 metal    |
| NCB5-18GK40-N0             | M18 plastic  |
| NCB5-18GM40-N0             | M18 metal    |
| NCB5-18GM40-N0-10M         | M18 metal    |
| NCB5-18GM40-N0-15M         | M18 metal    |
| NCB5-18GM40-N0-5M          | M18 metal    |
| NCB5-18GM40-N0-V1          | M18 metal    |
| NCB5-18GM70-N0             | M18 metal    |
| NCB8-18GM40-N0             | M18 metal    |
| NCB8-18GM40-N0-V1          | M18 metal    |
| NCN15-30GM40-N0            | M30 metal    |
| NCN15-30GM40-N0-10M        | M30 metal    |
| NCN15-30GM40-N0-20M        | M30 metal    |
| NCN15-30GM40-N0-V1         | M30 metal    |
| NCN3-F25F-N4-V1            | F25          |
| NCN3-F25F-N4-Y188326       | F25          |
| NCN3-F25F-N4-Y41364        | F25          |
| NCN3-F25F-N4-Y47292        | F25          |
| NCN3-F25-N4                | F25          |
| NCN3-F25-N4-0,14           | F25          |
| NCN3-F25-N4-5M             | F25          |
| NCN3-F25-N4-K1V1           | F25          |
| NCN3-F25-N4-V1             | F25          |
| NCN3-F25-N4-V1-Y205258     | F25          |
| NCN3-F31K-N4               | F31          |
| NCN3-F31K-N4-K             | F31          |
| NCN3-F31K-N4-V1-V1         | F31          |
| NCN3-F31-N4-K              | F31          |
| NCN3-F31-N4-K-K            | F31          |
| NCN3-F31-N4-V1             | F31          |
| NCN3-F31-N4-V16-K          | F31          |
| NCN3-F31-N4-V16-V16        | F31          |
| NCN3-F31-N4-V16-V1-Y201296 | F31          |
| NCN3-F31-N4-V18            | F31          |
| NCN3-F31-N4-V18-Y202412    | F31          |
| NJ4-12GK-N-5M              | M12 plastic  |
| NJ4-12GM-N                 | M12 metal    |
| NJ4-12GM-N-10M             | M12 metal    |

| Model number            | Housing       |
|-------------------------|---------------|
| NCN3-F31-N4-V1-Y186239  | F31           |
| NCN3-F31-N5-V18-V1      | F31           |
| NCN4-12GK35-N0          | M12 plastic   |
| NCN4-12GM35-N0          | M12 metal     |
| NCN4-12GM35-N0-10M      | M12 metal     |
| NCN4-12GM35-N0-5M       | M12 metal     |
| NCN4-12GM35-N0-V1       | M12 metal     |
| NCN4-V3-N0              | V3            |
| NCN8-18GK40-N0          | M18 plastic   |
| NCN8-18GM40-N0          | M18 metal     |
| NCN8-18GM40-N0-10M      | M18 metal     |
| NCN8-18GM40-N0-5M       | M18 metal     |
| NCN8-18GM40-N0-V1       | M18 metal     |
| NJ0,8-4,5-N             | 4.5 mm metal  |
| NJ0,8-5GM-N             | M5 metal      |
| NJ0,8-5GM-N-10M         | M5 metal      |
| NJ0,8-5GM-N-5M          | M5 metal      |
| NJ1,5-6,5-N             | 6.5 mm metal  |
| NJ1,5-6,5-N-15M         | 6.5 mm metal  |
| NJ1,5-6,5-N-5M          | 6.5 mm metal  |
| NJ1,5-6,5-N-Y10324      | 6.5 mm metal  |
| NJ1,5-8GM-N             | M8 metal      |
| NJ1,5-8GM-N-10M         | M8 metal      |
| NJ1,5-8GM-N-5M          | M8 metal      |
| NJ1,5-8GM-N-D           | M18 metal     |
| NJ1,5-8GM-N-D-10M       | M18 metal     |
| NJ1,5-8GM-N-D-V1        | M18 metal     |
| NJ1,5-8GM-N-D-V1-Y29033 | M18 metal     |
| NJ1,5-8GM-N-V1          | M8 metal      |
| NJ10-30GK-SN            | M30 plastic   |
| NJ10-30GK-SN-10M        | M30 plastic   |
| NJ10-30GK-SN-15M        | M30 plastic   |
| NJ10-30GM-N             | M30 metal     |
| NJ15-30GK-SN            | M30 plastic   |
| NJ15-30GK-SN-20M        | M30 plastic   |
| NJ2-11-N                | 11 mm plastic |
| NJ2-11-N-G              | M14 metal     |
| NJ2-11-N-G-15M          | M14 metal     |
| NJ2-11-N-G-5M           | M14 metal     |
| NJ2-11-N-G-Y28795       | M14 metal     |
| NJ2-11-SN               | 11 mm plastic |
| NJ2-11-SN-G             | M14 metal     |
| NJ2-11-SN-G-10M         | M14 metal     |
| NJ2-11-SN-G-5M          | M14 metal     |
| NJ2-12GK-N              | M12 plastic   |
| NJ2-12GK-N-5M           | M12 plastic   |
| NJ2-12GK-SN             | M12 plastic   |
| NJ2-12GK-SN-10M         | M12 plastic   |
| NJ2-12GM-N              | M12 metal     |
| NJ2-12GM-N-10M          | M12 metal     |
| NJ2-12GM-N-21M          | M12 metal     |
| NJ2-12GM-N-5M           | M12 metal     |
| NJ2-12GM-N-V1           | M12 metal     |
| NJ2-14GM-N-V1-Y19784    | M14 metal     |
| NJ2-F1-N                | F1            |
| NJ2-V3-N                | V3            |
| NJ2-V3-N-V5             | V3            |
| NJ3-18GK-S1N            | M18 plastic   |
| NJ4-12GK-N              | M12 plastic   |
| NJ4-12GK-N-10M          | M12 plastic   |
| PL1-F25-N4-K            | Platine       |
| PL2-F25-N4-K            | Platine       |
| PL2-F25-SN4-K           | Platine       |

| Model number       | Housing       |
|--------------------|---------------|
| NJ4-12GM-N-20M     | M12 metal     |
| NJ4-12GM-N-5M      | M12 metal     |
| NJ4-12GM-N-V1      | M12 metal     |
| NJ4-30GM-N-200     | M30 metal     |
| NJ4-30GM-N-200-10M | M30 metal     |
| NJ5-11-N           | 11 mm plastic |
| NJ5-11-N-15M       | 11 mm plastic |
| NJ5-11-N-5M        | 11 mm plastic |
| NJ5-11-N-G         | M14 metal     |
| NJ5-11-N-G-10M     | M14 metal     |
| NJ5-11-N-G-5M      | M14 metal     |
| NJ5-11-N-G-6M      | M14 metal     |
| NJ5-18GK-N         | M18 plastic   |
| NJ5-18GK-N-10M     | M18 plastic   |
| NJ5-18GK-N-5M      | M18 plastic   |
| NJ5-18GK-SN        | M18 plastic   |
| NJ5-18GK-SN-10M    | M18 plastic   |
| NJ5-18GK-SN-5M     | M18 plastic   |
| NJ5-18GM-N         | M18 metal     |
| NJ5-18GM-N-10M     | M18 metal     |
| NJ5-18GM-N-5M      | M18 metal     |
| NJ5-18GM-N-V1      | M18 metal     |
| NJ5-30GK-S1N       | M30 plastic   |
| NJ5-30GK-S1N-10M   | M30 plastic   |
| NJ5-30GK-S1N-5M    | M30 plastic   |
| NJ6-22-SN          | 22 mm plastic |
| NJ6-22-SN-G        | PG21 metal    |
| NJ6-22-SN-G-10M    | PG21 metal    |
| NJ6-22-SN-G-3M     | PG21 metal    |
| NJ8-18GK-N         | M18 plastic   |
| NJ8-18GK-N-10M     | M18 plastic   |
| NJ8-18GM-N         | M18 metal     |
| NJ8-18GM-N-5M      | M18 metal     |
| NJ8-18GM-N-V1      | M18 metal     |

| Model number         | Housing     |
|----------------------|-------------|
| PL3-F25-N4-K         | Platine     |
| PL3-F25-SN4-K        | Platine     |
| PL4-F25-N4-K         | Platine     |
| RC10-14-N0           | Ring        |
| RC15-14-N0           | Ring        |
| SC2-N0               | Slot 2 mm   |
| SC3,5-G-N0           | Slot 3.5 mm |
| SC3,5-G-N0-6M        | Slot 3.5 mm |
| SC3,5-N0             | Slot 3.5 mm |
| SC3,5-N0-BU          | Slot 3.5 mm |
| SC3,5-N0-GN          | Slot 3.5 mm |
| SC3,5-N0-WH          | Slot 3.5 mm |
| SC3,5-N0-Y37317      | Slot 3.5 mm |
| SC3,5-N0-YE          | Slot 3.5 mm |
| SJ2-N                | Slot 2 mm   |
| SJ2-S1N              | Slot 2 mm   |
| SJ2-SN               | Slot 2 mm   |
| SJ3,5-N              | Slot 3.5 mm |
| SJ3,5-G-N            | Slot 3.5 mm |
| SJ3,5-G-N-Y26478     | Slot 3.5 mm |
| SJ3,5-N-BU           | Slot 3.5 mm |
| SJ3,5-N-GN           | Slot 3.5 mm |
| SJ3,5-N-LED          | Slot 3.5 mm |
| SJ3,5-N-LED-Y43416   | Slot 3.5 mm |
| SJ3,5-N-WEISS        | Slot 3.5 mm |
| SJ3,5-N-Y08944       | Slot 3.5 mm |
| SJ3,5-N-Y33714       | Slot 3.5 mm |
| SJ3,5-N-Y41400-WEISS | Slot 3.5 mm |
| SJ3,5-N-YE           | Slot 3.5 mm |
| SJ3,5-S1N            | Slot 3.5 mm |
| SJ3,5-SN             | Slot 3.5 mm |
| SJ3,5-SN-Y27487      | Slot 3.5 mm |
| SJ3,5-SN-Y41402      | Slot 3.5 mm |

## Accessories

### Power feed module KFD2-EB2

The power feed module is used to supply the devices with 24 V DC via the Power Rail. The fuse-protected power feed module can supply up to 150 individual devices depending on the power consumption of the devices. A galvanically isolated mechanical contact uses the Power Rail to transmit collective error messages.

### Power Rail UPR-03

The Power Rail UPR-03 is a complete unit consisting of the electrical inset and an aluminium profile rail 35 mm x 15 mm. To make electrical contact, the devices are simply engaged.

### Profile Rail K-DUCT with Power Rail

The profile rail K-DUCT is an aluminum profile rail with Power Rail insert and two integral cable ducts for system and field cables. Due to this assembly no additional cable guides are necessary.



*Power Rail and Profile Rail must not be fed via the device terminals of the individual devices!*

### Clamp module F-KD-Ex2

Clamp module with integrated diode network

### Clamp module F-KDR-Ex2

Clamp module with integrated diode and resistance network