4-channel

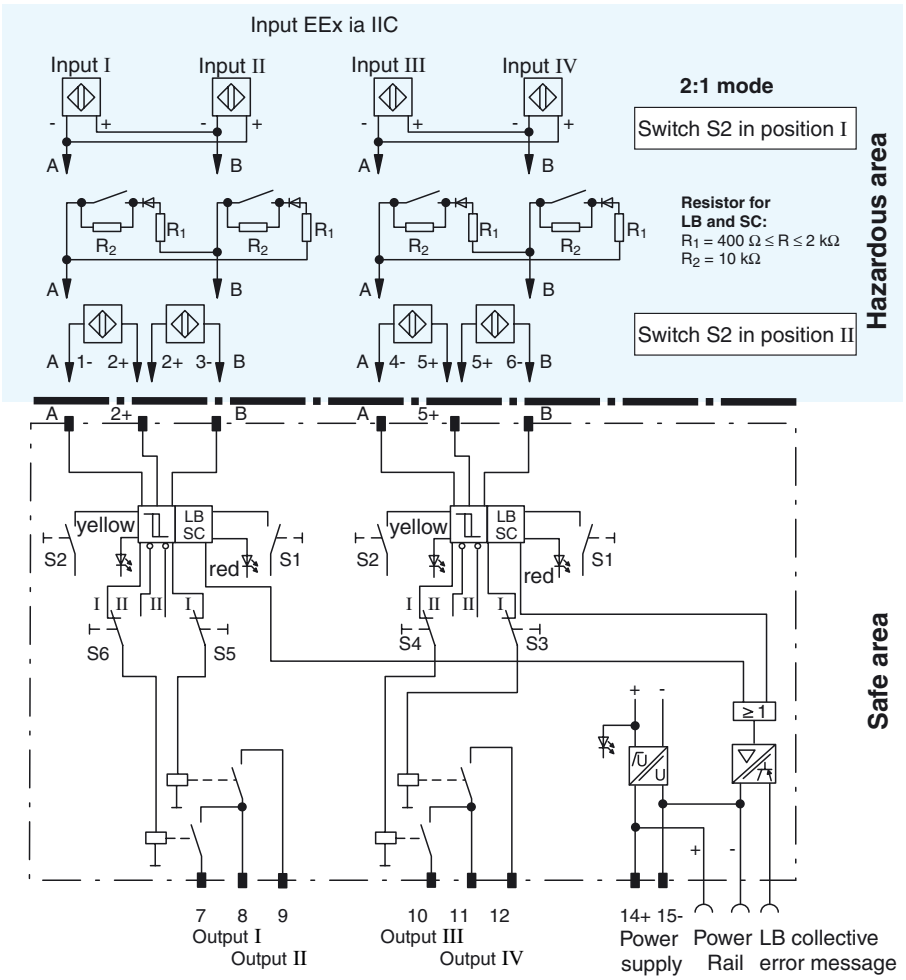
- Control circuit EEx ia IIC
- 24 V DC nominal supply voltage
- Reversible mode of operation
- Lead monitoring (short circuit LK and interruption LB) with LED indicator (red flashing), switching output and signal on Power Rail
- 50 % less wiring 2:1
- 2 relay outputs, 1 NO contact per channel, grouped into single-pole pairs
- EMC acc. to NAMUR NE 21

Function

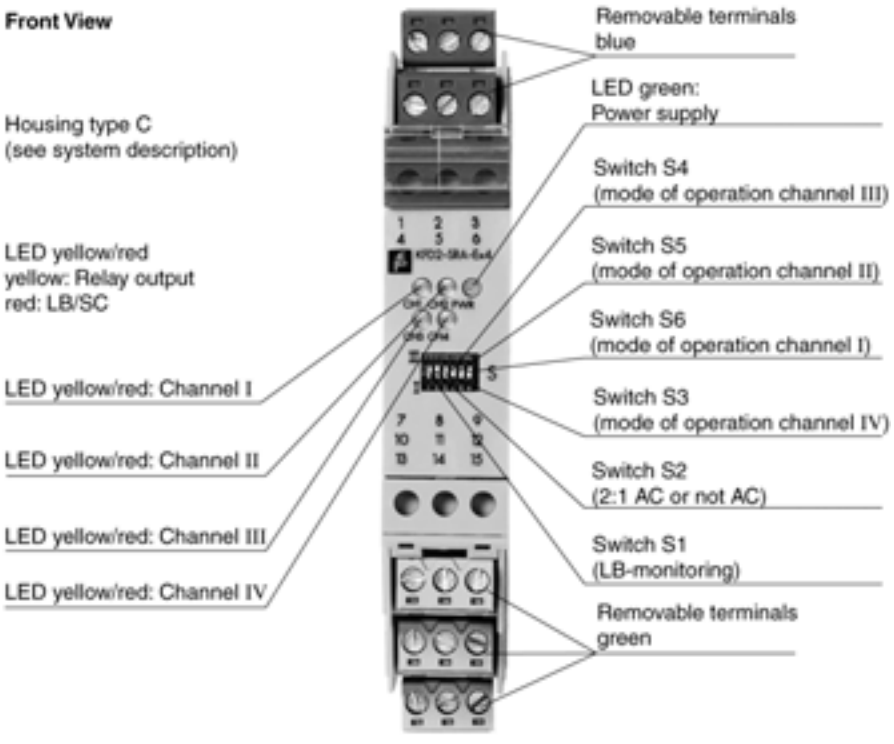
The transformer isolated barrier transfers digital signals from the hazardous area. The inputs are designed for the connection of NAMUR sensors (alternating polarity) per DIN EN 60947-5-6 or a mechanical contact.
The input, output and power supply are galvanically isolated from each other. The relay output and the power supply are galvanically isolated from each other per IEC 61140 with a rated insulation voltage of 50 V_{eff}.

Application

Min/Max manometer, valve positioners, magnetic immersion probes with 2 switch points.
Two signals can be monitored through one dual lead in the 2:1 mode of operation (AC), reducing wiring by fifty percent.



Composition



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Supply		
Connection		Power Rail or terminals 14+, 15-
Rated voltage		20 ... 30 V DC
Ripple		≤ 10 %
Rated current		45 ... 70 mA
Power loss		1,2 W
Input		
Connection		terminals 1-, 2+, 3-; 4-, 5+, 6-
Rated values		acc. to IEC 60947-5-6 (NAMUR, DIN 19234), 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		≥ 35 ms / ≥ 35 ms (non-AC operation) ≥ 70 ms / ≥ 70 ms (AC operation)
Lead monitoring		breakage I ≤ 0,15 mA
Output		
Connection		output I: terminals 7, 8 ; output II: terminals 8, 9 ; output III: terminals 10, 11 ; output IV: terminals 11, 12
Collective error message		Power Rail
Output I up to IV		Signal I ... Signal IV ; relay
Contact loading		253 V AC / 2 A / cos φ > 0.7; 40 V DC / 2 A resistive load;
Energised/De-energised delay		approx. 20 ms / approx. 20 ms
Mechanical life		5 x 10^6 switching cycles
Transfer characteristics		
Switching frequency		≤ 10 Hz (non-AC operation) ≤ 3 Hz (AC operation)
Electrical isolation		
Output/Power supply		basic insulation according to IEC 61140, rated insulation voltage 50 V_{eff}
Output/Output		basic insulation according to IEC 61140, rated insulation voltage 50 V_{eff}
Directive conformity		
Electromagnetic compatibility		standards
Directive 89/336/EEC		EN 61326, EN 50081-2, NE 21
Standard conformity		
Climatic conditions		acc. to DIN IEC 721
Ambient conditions		
Ambient temperature		-20 ... 60 °C (253 ... 333 K)
Mechanical specifications		
Protection degree		IP20
Mass		approx. 150 g
Data for application in conjunction with hazardous areas		
EC-Type Examination Certificate		ZELM 99 ATEX 0009 , for additional certificates see www.pepperl-fuchs.com
Group, category, type of protection		⟨Ex⟩ II (1) G D [EEx ia] IIC [circuit(s) in zone 0/1/2]
Input		EEx ia IIC
Voltage	U_0	10 V
Current	I_0	14 mA
Power	P_0	35 mW (linear characteristic)
Supply		
Safety maximum voltage	U_m	40 V DC (Attention! U_m is no rated voltage.)
Type of protection [EEx ia and EEx ib]		
Explosion group		IIB IIC
External capacitance		20,2 µF 3 µF
External inductance		640 mH 180 mH
Output		
Contact loading		230 V AC + 10 % / 3 A / 100 VA / cos φ ≥ 0.7; 40 V DC / 2 A resistive load
Safety maximum voltage	U_m	40 V DC (Attention! The rated voltage can be lower)
Electrical isolation		
Input/Input		not available
Input/Output		safe electrical isolation acc. to EN 50020, voltage peak value 375 V
Input/Power supply		safe electrical isolation acc. to EN 50020, voltage peak value 375 V
Directive conformity		standards
Directive 94/9 EC		EN 50014, EN 50020
Safety parameter		
UL control drawing		E 106378
Control drawing		No. 116-0201
Connection		terminals 1, 3; 2, 3; 4, 6; 5, 6
Input I		
Voltage	V_{OC}	10,6 V
Current	I_{SC}	19,5 mA
Explosion group		A&B C&E D, F&G

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Max. external capacitance C_a	1,273 µF	3,82 µF	10,18 µF
Max. external inductance L_a	84,88 mH	298,7 mH	744,4 mH

Notes

Accessories

External diodes (field installation)	F-KD-Ex2
External diodes and resistor combination (field installation)	F-KDR-Ex2
Power Rail	UPR-03
Power feed module 24 V DC	KFD2-EB ...

Lead breakage monitoring

In the case of an error, a fault signal is switched on the Power Rail (UPR-05). The power feed module evaluates and passes on the fault signal by means of a potentially free contact (see system description).

Mode of operation <u>with</u> 2:1 transfer method

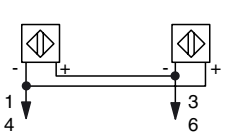
The transformer isolated barrier transfers binary signals from the hazardous area by means of the patented new 2:1-transfer method. This method allows to transfer two independent binary signals by means of a single pair of conductors. This allows wiring to be reduced by 50 %. The 2:1 transfer method is well suited for the transmission of 2 signals that are within close proximity such as min-/max-manometers, valve positioniers and magnetic immersion probes with two switch points.

Conditions

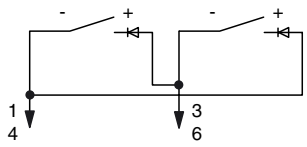
When using sensors they have to be provided with a reverse polarity protected diode.
Pepperl+Fuchs offers suitable sensors for alternating polarity (see table).
When using mechanical contacts in 2:1 mode, the blocking diode must be connected near the switch.

Connection of:

Sensors



Mechanical switches



Refer to the connection diagrams for lead breakage and short circuit monitoring.

see accessories
F-KD-Ex2 and F-KDR-Ex2

Comments:

When installing a serial diode, it must be assured that the reverse polarity current is < 0.15 mA, in order to enable the lead monitoring. For all types NJ, RC/RJ and SJ an adjustment by means of a serial diode is necessary.

Mode of operation <u>without</u> 2:1 transfer method

Set switch S2 to position II.

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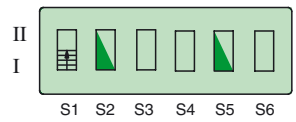
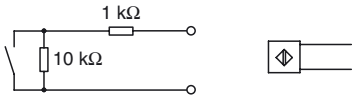
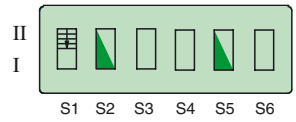
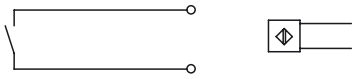
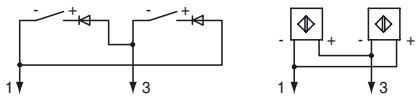
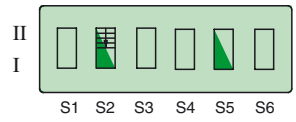
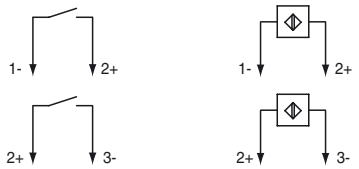
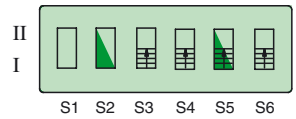
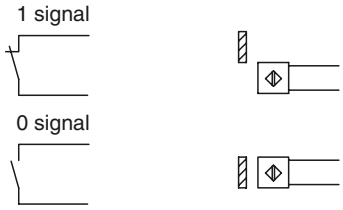
Functioning switch

Lead breakage and cable rupture monitoring	Input	
		with lead breakage and cable rupture monitoring
		without lead breakage and cable rupture monitoring

AC function	Input	
		AC function (2:1 transfer technique)
		none AC function

Mode of operation	Input	
 S3: channel I S4: channel II S5: channel III S6: channel IV		energised de-energised
 S3: channel I S4: channel II S5: channel III S6: channel IV		energised de-energised

Pepperl+Fuchs sensors for alternating polarity

Model number	External diode necessary	Operating temperature T_u/°C
FJ 6-110-F	yes	-25 °C ... 100 °C
FJ 7-N	yes	-25 °C ... 100 °C
NCB1,5-6,5M25-NO	no	-25 °C ... 70 °C
NCB1,5-6,5M25-NO-V1	no	-25 °C ... 70 °C
NCB1,5-8GM25-NO	no	-25 °C ... 70 °C
NCB1,5-8GM25-NO 1OM	no	-25 °C ... 70 °C
NCB1,5-8GM25-NO 5M	no	-25 °C ... 70 °C
NCB1,5-8GM25-NO-V1	no	-25 °C ... 70 °C
NCB2-12GM35-NO	no	-25 °C ... 70 °C
NCB2-12GM35-NO 1OM	no	-25 °C ... 70 °C
NCN15-30GM40-N0-V1	no	-25 °C ... 70 °C
NCN15-M1K-N0	no	-25 °C ... 70 °C
NCN20+U1+N0	no	-25 °C ... 70 °C
NCN30+U1+N0	no	-25 °C ... 70 °C
NCN3-F24L-N4	no	-25 °C ... 70 °C
NCN3-F24R-N4	no	-25 °C ... 70 °C
NCN3-F25F-N4-V1	no	-25 °C ... 70 °C
NCN3-F25-N4-014	no	-25 °C ... 70 °C
NCN3-F25-N4-075	no	-25 °C ... 70 °C
NCN3-F25-N4-V1	no	-25 °C ... 70 °C
NCN3-F31-N4-K	no	-25 °C ... 70 °C
NCN3-F31-N4-K-K	no	-25 °C ... 70 °C
NCN3-F31-N4-V16-V16	no	-25 °C ... 70 °C
NCN3-F31-N4-V18	no	-25 °C ... 70 °C
NCN40+U1+N0	no	-25 °C ... 70 °C
NCN4-12GM35-NO	no	-25 °C ... 70 °C
NCN4-12GM35-NO 1OM	no	-25 °C ... 70 °C
NCN4-12GM35-NO 5M	no	-25 °C ... 70 °C
NCN4-12GM35-NO-V1	no	-25 °C ... 70 °C
NCN4-M3K-N4	no	-25 °C ... 70 °C
NCN8-18GM4O-NO	no	-25 °C ... 70 °C
NCN8-18GM4O-NO 5M	no	-25 °C ... 70 °C
NCN8-18GM4O-NO-V1	no	-25 °C ... 70 °C
NJ 0,8-4,5-N	no	-25 °C ... 100 °C
NJ 0,8-5GM-N	no	-25 °C ... 100 °C
NJ 0,8-5GM-N 5M	no	-25 °C ... 100 °C
NJ 0,8-5GM-N 10M	no	-25 °C ... 100 °C
NJ 0,8-F-N	yes	-25 °C ... 100 °C
NJ 1,5-6,5-N	no	-25 °C ... 100 °C
NJ 1,5-6,5-N 15M	no	-25 °C ... 100 °C
NJ 1,5-6,5-N 5M	no	-25 °C ... 100 °C
NJ 1,5-8GM-N	no	-25 °C ... 100 °C
NJ 1,5-8GM-N 10M	no	-25 °C ... 100 °C
NJ 1,5-8GM-N 5M	no	-25 °C ... 100 °C
NJ 1,5-8GM-N-V1	no	-25 °C ... 100 °C
NJ 1,5-F-N	yes	-25 °C ... 100 °C
NJ 1-N2-G 82	yes	-25 °C ... 100 °C
NJ 1-N-728	no	-25 °C ... 70 °C
NJ 2,5-F-N	yes	-25 °C ... 100 °C
NJ 2-11-N	no	-25 °C ... 100 °C
NJ 2-11-N 5M	no	-25 °C ... 100 °C
NJ 2-11-N-G	no	-25 °C ... 100 °C
NJ 2-11-N-G 15M	no	-25 °C ... 100 °C
NJ 2-11-N-G 5M	no	-25 °C ... 100 °C

Model number	External diode necessary	Operating temperature T_u/°C
NCB2-12GM35-NO 5M	no	-25 °C ... 70 °C
NCB2-12GM35-NO-V1	no	-25 °C ... 70 °C
NCB5-18GM4O-NO	no	-25 °C ... 70 °C
NCB5-18GM4O-NO 1OM	no	-25 °C ... 70 °C
NCB5-18GM4O-NO 5M	no	-25 °C ... 70 °C
NCB5-18GM4O-NO-V1	no	-25 °C ... 70 °C
NCB10-30GM40-N0	no	-25 °C ... 70 °C
NCB10-30GM40-N0-V1	no	-25 °C ... 70 °C
NCB15+U1+N0	no	-25 °C ... 70 °C
NCN15-30GM40-N0	no	-25 °C ... 70 °C
NJ 2-N-H42	yes	-25 °C ... 100 °C
NJ 2-V3-N	yes	-25 °C ... 100 °C
NJ 2-V3-N-V5	yes	-25 °C ... 100 °C
NJ 3-18GK-S1N	no	-25 °C ... 100 °C
NJ 4-12GK-N	no	-25 °C ... 100 °C
NJ 4-12GK-N 10M	no	-25 °C ... 100 °C
NJ 4-12GK-N 5M	no	-25 °C ... 100 °C
NJ 4-12GM-N	no	-25 °C ... 100 °C
NJ 4-12GM-N 10M KA	no	-25 °C ... 100 °C
NJ 4-12GM-N 15M	no	-25 °C ... 100 °C
NJ 4-12GM-N 20M	no	-25 °C ... 100 °C
NJ 4-12GM-N 5M	no	-25 °C ... 100 °C
NJ 4-12GM-N-V1	no	-25 °C ... 100 °C
NJ 4-F-N	yes	-25 °C ... 100 °C
NJ 4-N-H31	yes	-25 °C ... 100 °C
NJ 5-11-N	no	-25 °C ... 100 °C
NJ 5-11-N 15M KA.	no	-25 °C ... 100 °C
NJ 5-11-N 5M KA.	no	-25 °C ... 100 °C
NJ 5-11-N-G	no	-25 °C ... 100 °C
NJ 5-11-N-G 10M KA.	no	-25 °C ... 100 °C
NJ 5-11-N-G 5M KA.	no	-25 °C ... 100 °C
NJ 5-11-N-G 6M	no	-25 °C ... 100 °C
NJ 5-18GK-N	no	-25 °C ... 100 °C
NJ 5-18GK-N 10M KA	no	-25 °C ... 100 °C
NJ 5-18GK-N 5M KA.	no	-25 °C ... 100 °C
NJ 5-18GK-SN	yes	-25 °C ... 100 °C
NJ 5-18GK-SN 5M KA.	yes	-25 °C ... 100 °C
NJ 5-18GK-SN 10M	yes	-25 °C ... 100 °C
NJ 5-18GM-N	no	-25 °C ... 100 °C
NJ 5-18GM-N 10M KA	no	-25 °C ... 100 °C
NJ 5-18GM-N 5M KA.	no	-25 °C ... 100 °C
NJ 5-18GM-N-V1	no	-25 °C ... 100 °C
NJ 5-30GK-S1N	yes	-25 °C ... 100 °C
NJ 5-30GK-S1N 10M	yes	-25 °C ... 100 °C
NJ 5-30GK-S1N 5M	yes	-25 °C ... 100 °C
NJ 6-22-SN	yes	-25 °C ... 100 °C
NJ 6-22-SN 10M	yes	-25 °C ... 100 °C
NJ 6-22-SN-G	yes	-25 °C ... 100 °C
NJ 6-22-SN-G 10M	yes	-25 °C ... 100 °C
NJ 6-22-SN-G 3M	yes	-25 °C ... 100 °C
NJ 6-F-N	yes	-25 °C ... 100 °C
NJ 6S1+U1+N1	yes	-25 °C ... 100 °C
NJ 8-18GK-N	no	-25 °C ... 100 °C
NJ 8-18GK-N 10M KA.	no	-25 °C ... 100 °C

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Model number	External diode necessary	Operating temperature T_u/°C
NJ 2-11-SN	yes	-25 °C ... 100 °C
NJ 2-11-SN	yes	-25 °C ... 100 °C
NJ 2-11-SN-G	yes	-25 °C ... 100 °C
NJ 2-11-SN-G 10M	yes	-25 °C ... 100 °C
NJ 2-11-SN-G 5M	yes	-25 °C ... 100 °C
NJ 2-12GK-N	no	-25 °C ... 100 °C
NJ 2-12GK-N 5M	no	-25 °C ... 100 °C
NJ 2-12GM-N	no	-25 °C ... 100 °C
NJ 2-12GM-N 10M	no	-25 °C ... 100 °C
NJ 2-12GM-N 21M	no	-25 °C ... 100 °C
NJ 2-12GM-N 5M	no	-25 °C ... 100 °C
NJ 2-12GM-N-V1	no	-25 °C ... 100 °C
NJ 2-F1-N	yes	-25 °C ... 100 °C
NJ 40+U1+N	yes	-25 °C ... 100 °C
RJ 10-14-N	yes	-25 °C ... 100 °C
RJ 10-N	yes	-25 °C ... 100 °C
RJ 15-14-N	yes	-25 °C ... 100 °C
RJ 15-N	yes	-25 °C ... 100 °C
RJ 21-N	yes	-25 °C ... 100 °C
RJ 43-N	yes	-25 °C ... 100 °C
SC2-N0	no	-25 °C ... 100 °C
SC3,5-N0	no	-25 °C ... 100 °C
SC3,5-N0 BLAU	no	-25 °C ... 100 °C
SC3,5-N0 GELB	no	-25 °C ... 100 °C
SC3,5-N0 GRÜN	no	-25 °C ... 100 °C
SC3,5-N0 WEIß	no	-25 °C ... 100 °C
SJ 2-N	no	-25 °C ... 100 °C
SJ 2-N 5M KA	no	-25 °C ... 100 °C
SJ 2-SN	yes	-25 °C ... 100 °C

Model number	External diode necessary	Operating temperature T_u/°C
NJ 8-18GM-N	no	-25 °C ... 100 °C
NJ 8-18GM-N 5M	no	-25 °C ... 100 °C
NJ 8-18GM-N-V1	no	-25 °C ... 100 °C
NJ 10-F-N	yes	-25 °C ... 100 °C
NJ 15+U1+N	yes	-25 °C ... 100 °C
NJ 15-M1K-N	yes	-25 °C ... 100 °C
NJ 15-M1-N	yes	-25 °C ... 100 °C
NJ 15-M1-N-V	yes	-25 °C ... 100 °C
NJ 15S+U1+N	yes	-25 °C ... 100 °C
NJ 20+U1+N	yes	-25 °C ... 100 °C
NJ 20S+U1+N	yes	-25 °C ... 100 °C
NJ 30+U1+N	yes	-25 °C ... 100 °C
NJ 30P+U1+1N	yes	-25 °C ... 100 °C
SJ 2-SN XM KA	yes	-25 °C ... 100 °C
SJ 3,5-G-N	no	-25 °C ... 100 °C
SJ 3,5-N	no	-25 °C ... 100 °C
SJ 3,5-N BLAU	no	-25 °C ... 100 °C
SJ 3,5-N GELB	no	-25 °C ... 100 °C
SJ 3,5-N GRÜN	no	-25 °C ... 100 °C
SJ 3,5-N LED	yes	-25 °C ... 100 °C
SJ 3,5-N WEISS	no	-25 °C ... 100 °C
SJ 3,5-S1N	yes	-25 °C ... 100 °C
SJ 3,5-SN	yes	-25 °C ... 100 °C
SJ 5 MIT LÖTSTIFTEN	yes	-25 °C ... 100 °C
SJ 5-G-N	yes	-25 °C ... 100 °C
SJ 5-K-N	yes	-25 °C ... 100 °C
SJ 5-N	yes	-25 °C ... 100 °C
SJ 10-N	yes	-25 °C ... 100 °C
SJ 15-N	yes	-25 °C ... 100 °C

Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com.

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