

Switch Amplifier KFD2-SH-Ex1

- 1-channel isolated barrier
- 24 V DC supply (Power Rail)
- Input for approved dry contacts or SN/S1N sensors
- Relay contact output
- Fault indication output
- Line fault detection (LFD)
- Up to SIL 3 acc. to IEC/EN 61508
- Up to PL d acc. to EN/ISO 13849



SIL 3 PL d



Function

This isolated barrier is used for intrinsic safety applications.

The device transfers digital signals (SN/S1N proximity sensors or approved dry contacts) from a hazardous area to a safe area.

The input controls one relay contact output with 3 NO contacts (one output is in series to the both output relays for the safety function), one relay contact output with one NO contact, and one passive transistor output.

Unlike an SN/S1N series proximity sensor, a mechanical contact, requires a 10 kΩ resistor to be placed across the contact in addition to a 1.5 kΩ resistor in series.

Lead breakage (LB) and short circuit (SC) conditions of the control circuit are continuously monitored.

During an fault condition, the fault indication output energizes and outputs I and II de-energize.

For safety applications up to SIL3, output I must be used. For safety applications up to SIL2, output I and output II can be used.

Application

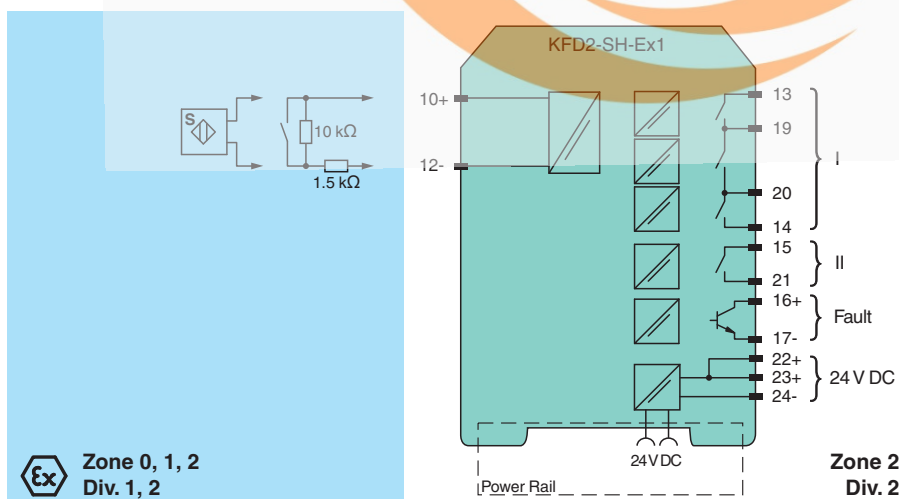
The input (terminals 10, 12) may generally be operated only with **potentially** free (passive) switches.

Single channel operations up to SIL 3 **must** occur via terminals 13 and 14. The center tap of the contacts (terminals 19, 20) can **also** be used if an operation is to occur a redundant branch.

If the device is used for safety operations the information in the test documents should be observed. The **fault message** output III delivers an 1-signal when the control circuit experiences lead breakage (LB) or a short circuit (LK).

The device has removable terminals.

Connection



Technical Data

General specifications

Signal type

Digital Input

Functional safety related parameters

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

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Technical Data

Safety Integrity Level (SIL)		SIL 3
Performance level (PL)		PL d
Supply		
Connection		Power Rail or terminals 22+, 23+, 24-
Rated voltage	U_r	20 ... 35 V DC
Ripple		$\leq 10\%$
Rated current	I_r	$\leq 130\text{ mA}$
Power dissipation		2.1 W
Power consumption		max. 2.3 W
Input		
Connection side		field side
Connection		terminals 10+, 12-
Open circuit voltage/short-circuit current		approx. 8.4 V DC / approx. 11.7 mA
Lead resistance		$\leq 50\ \Omega$, in hazardous area cable capacitances and inductivities are to be taken into account
Switching point		
Relay de-energized		$I < 2.1\text{ mA}$ and $I > 5.9\text{ mA}$
Relay energized		$2.8\text{ mA} < I < 5.3\text{ mA}$
Response delay		$\leq 1\text{ ms}$
Output		
Connection side		control side
Connection		output I: terminals 13, 14 ; output II: terminals 15, 21 ; output III: terminals 16+, 17-
Output I		relay , signal
Contact loading		50 V AC/1 A/ $\cos \phi > 0.7$; 24 V DC/1 A resistive load
Mechanical life		50×10^6 switching cycles
Output II		relay , signal
Contact loading		50 V AC/1 A/ $\cos \phi > 0.7$; 24 V DC/1 A resistive load
Mechanical life		50×10^6 switching cycles
Output III		electronic output, passive , fault signal
Rated voltage		10 ... 30 V DC
Signal level		1-signal: (L+) -2.5 V (7 mA, short-circuit proof) / 0-signal: blocked output (Leakage current $\leq 10\ \mu\text{A}$)
Transfer characteristics		
Switching frequency		5 Hz
Galvanic isolation		
Output/power supply		reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V _{eff}
Mutual output I, II, III		basic insulation according to IEC/EN 61010-1, rated insulation voltage 50 V _{eff}
Indicators/settings		
Display elements		LEDs
Labeling		space for labeling at the front
Directive conformity		
Electromagnetic compatibility		
Directive 2014/30/EU		EN 61326-1:2013 (industrial locations)
Machinery Directive		
Directive 2006/42/EC		EN/ISO 13849-1:2015
Conformity		
Electromagnetic compatibility		NE 21:2017 , EN 61326-3-1:2017
Degree of protection		IEC 60529:2001
Safety		IEC/EN 61508:2010
Ambient conditions		
Ambient temperature		-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications		
Degree of protection		IP20
Connection		screw terminals

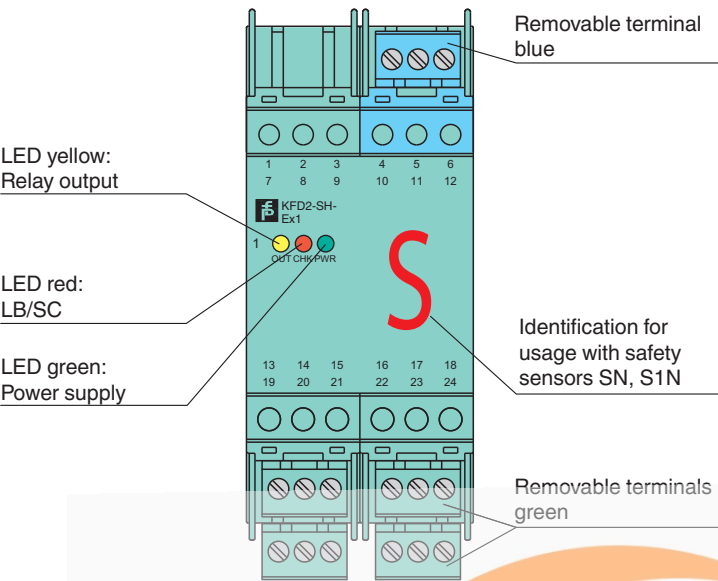
Release date: 2023-07-25 Date of issue: 2023-07-25 Filename: 046903_eng.pdf

Technical Data

Mass	approx. 280 g		
Dimensions		40 x 107 x 115 mm (1.6 x 4.2 x 4.5 inch) (W x H x D) , housing type C1	
Mounting	on 35 mm DIN mounting rail acc. to EN 60715:2001		
Data for application in connection with hazardous areas			
EU-type examination certificate	PTB 00 ATEX 2042		
Marking		Ⓜ II (1)G [Ex ia Ga] IIC Ⓜ II (1)D [Ex ia Da] IIIC Ⓜ I (M1) [Ex ia Ma] I	
Input	Ex ia		
Voltage	U _o	9.56 V	
Current	I _o	16.8 mA	
Power	P _o	41 mW (linear characteristic)	
Supply			
Maximum safe voltage	U _m	40 V AC/DC (Attention! The rated voltage can be lower.)	
Output			
Maximum safe voltage	U _m	output I/output II: 253 V AC/DC (Attention! U _m is no rated voltage.) output III: 60 V AC/DC (Attention! U _m is no rated voltage.)	
Certificate	TÜV 99 ATEX 1493 X		
Marking		Ⓜ II 3G Ex ec nC IIC T4 Gc	
Galvanic isolation			
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 IEC 60079-0:2018+AC:2020 , EN 60079-7:2015+A1:2018 , EN 60079-11:2012 , EN IEC 60079-15:2019	
International approvals			
FM approval			
Control drawing		116-0158	
IECEX approval			
IECEX certificate		IECEX TUN 19.0013X	
IECEX marking		Ex ec nC IIC T4 Gc	
General information			
Supplementary information	Observe the certificates, declarations of conformity, instruction manuals, and manuals where applicable. For information see www.pepperl-fuchs.com .		

Assembly

Front view



Matching System Components

	KFD2-EB2	Power Feed Module
	UPR-03	Universal Power Rail with end caps and cover, 3 conductors, length: 2 m
	UPR-03-M	Universal Power Rail with end caps and cover, 3 conductors, length: 1,6 m
	UPR-03-S	Universal Power Rail with end caps and cover, 3 conductors, length: 0.8 m
	K-DUCT-BU	Profile rail, wiring comb field side, blue
	K-DUCT-BU-UPR-03	Profile rail with UPR-03- * insert, 3 conductors, wiring comb field side, blue

Accessories

	KF-ST-5GN	Terminal block for KF modules, 3-pin screw terminal, green
	KF-ST-5BU	Terminal block for KF modules, 3-pin screw terminal, blue
	KF-CP	Red coding pins, packaging unit: 20 x 6

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Characteristic Curve

Maximal switching power of the output

