

# 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 a 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

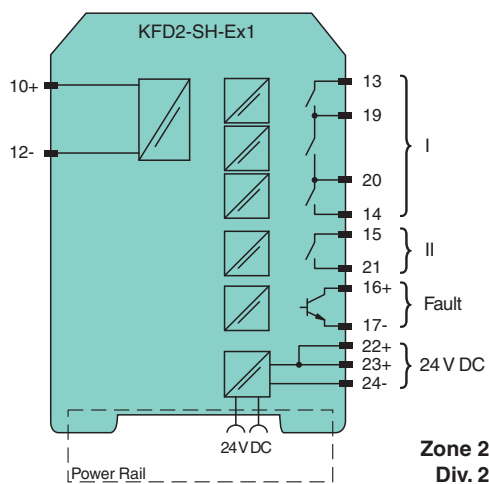
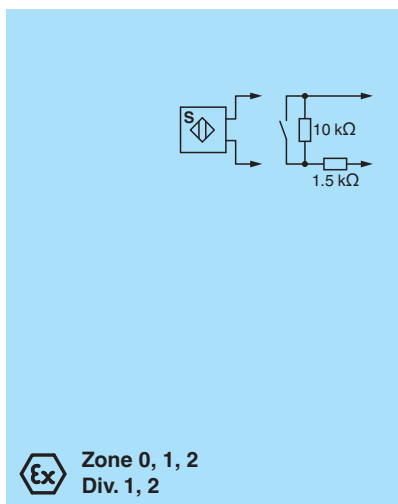
The input (terminals 10, 12) may generally be operated only with **potentially** free (passive) switches.

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

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## Technical Data

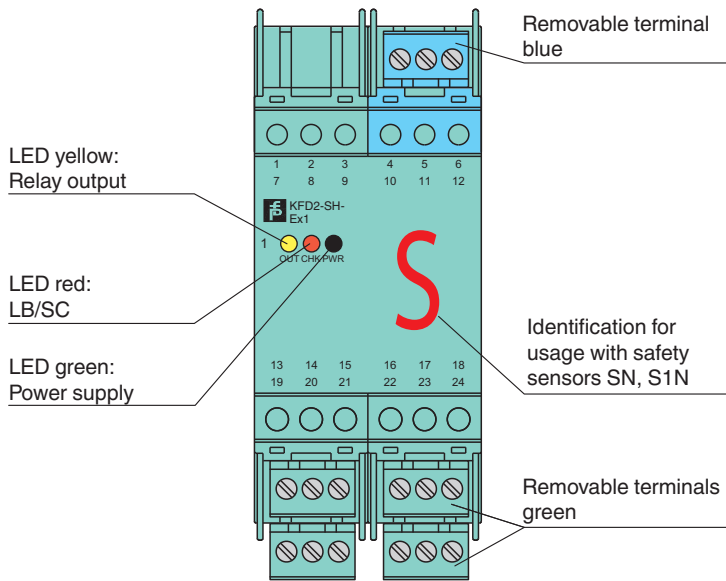
Safety Integrity Level (SIL)		SIL 3
Systematic capability (SC)		SC 3
Performance level (PL)		PL d
<b>Supply</b>		
Connection		Power Rail or terminals 22+, 23+, 24-
Rated voltage	$U_r$	20 ... 35 V DC
Ripple		≤ 10 %
Rated current	$I_r$	≤ 130 mA
Power dissipation		2.1 W
Power consumption		max. 2.3 W
<b>Input</b>		
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		≤ 50 Ω, 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		≤ 1 ms
<b>Output</b>		
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 φ > 0.7; 24 V DC/1 A resistive load
Mechanical life		50 x 10 <sup>6</sup> switching cycles
Output II		relay , signal
Contact loading		50 V AC/1 A/cos φ > 0.7; 24 V DC/1 A resistive load
Mechanical life		50 x 10 <sup>6</sup> 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 ≤ 10 μA)
<b>Transfer characteristics</b>		
Switching frequency		5 Hz
<b>Galvanic isolation</b>		
Output/power supply		reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V <sub>eff</sub>
Mutual output I, II, III		basic insulation according to IEC/EN 61010-1, rated insulation voltage 50 V <sub>eff</sub>
<b>Indicators/settings</b>		
Display elements		LEDs
Labeling		space for labeling at the front
<b>Directive conformity</b>		
Electromagnetic compatibility		
Directive 2014/30/EU		EN 61326-1:2013 (industrial locations)
Machinery Directive		
Directive 2006/42/EC		EN/ISO 13849-1:2015
<b>Conformity</b>		
Electromagnetic compatibility		NE 21:2017 , EN 61326-3-1:2017
Degree of protection		IEC 60529:2001
Safety		IEC/EN 61508:2010
<b>Ambient conditions</b>		
Ambient temperature		-20 ... 60 °C (-4 ... 140 °F)
<b>Mechanical specifications</b>		
Degree of protection		IP20

## Technical Data

Connection	screw terminals		
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		
<b>Data for application in connection with hazardous areas</b>			
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 <sub>o</sub>	9.56 V	
Current	I <sub>o</sub>	16.8 mA	
Power	P <sub>o</sub>	41 mW (linear characteristic)	
Supply			
Maximum safe voltage	U <sub>m</sub>	40 V AC/DC (Attention! The rated voltage can be lower.)	
Output			
Maximum safe voltage	U <sub>m</sub>	output I/output II: 253 V AC/DC (Attention! U <sub>m</sub> is no rated voltage.) output III: 60 V AC/DC (Attention! U <sub>m</sub> 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		
<b>International approvals</b>			
FM approval			
Control drawing	116-0158		
IECEX approval			
IECEX certificate	IECEX TUN 19.0013X		
IECEX marking	Ex ec nC IIC T4 Gc		
<b>General information</b>			
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> .		

Assembly

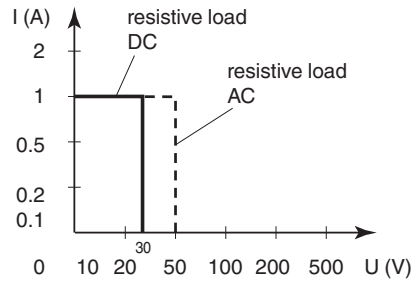
Front view



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## Characteristic Curve

### Maximal switching power of the output



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