



Relay Module

KFD2-RSH-1.2D.FL2

- 1-channel signal conditioner
- 24 V DC supply
- Logic input 19 V DC ... 26.4 V DC
- Recommended connectable voltage 8 V DC ... 60 V DC
- Relay contact output for de-energized to safe function
- Line fault transparency (LFT)
- Diagnostic function
- Up to SIL 3 acc. to IEC/EN 61508
- Up to PL e acc. to EN/ISO 13849

C€ SIL3 PL e

Function

This signal conditioner provides the galvanic isolation between field circuits and control circuits.

The device is a relay module that is suitable for safely switching applications of a load circuit. The device isolates load circuits up to 60 V DC and the 24 V DC control circuit.

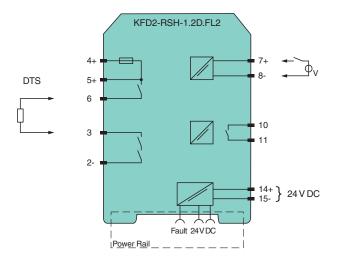
The de-energized to safe (DTS) function is permitted for SIL 3 and PL e applications.

An internal fault or a line fault is signalized by the impedance change of the relay contact input and an additional relay contact output.

A fault is signalized by LEDs and a separate collective error message output.

The output must be protected against contact welding by an internal fuse or an external current limitation.

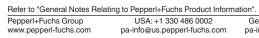
Connection



Technical Data

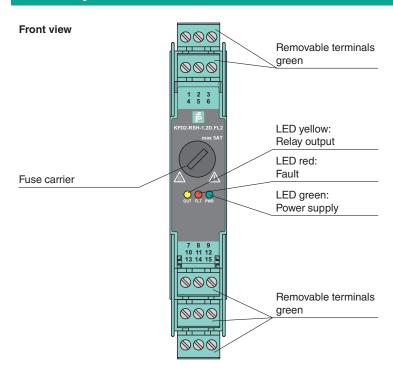
General specifications		
Signal type		Digital Output
Functional safety related parameters		
Safety Integrity Level (SIL)		SIL 3
Systematic capability (SC)		SC 3
Performance level (PL)		PL e
Supply		
Connection		Power Rail or terminals 14+, 15-
Rated voltage	U_{r}	19 26.4 V DC
Input current		max. 35 mA at 24 V DC , max. 44 mA at 19 V DC , with enabled internal fault detection
ū		max. 35 mA at 24 V DC , max. 44 mA at 19 V DC , with enabled internal fault detection

Connection side Connection Connection Description Test pulse length Test pulse lengt	Connection side Connection Pulse/Pause ratio Test pulse length Signal level Rated current Ir Inrush current Output Connection side Connection Connectable voltage Power dissipation Contact loading Minimum switch current Mechanical life	terminals 7+, 8- min. 150 ms / min. 150 ms with disabled internal fault detection min. 1 s / min. 1 s with enabled internal fault detection max. 2 ms from DO card 0-signal: -5 5 V DC 1-signal: 19 26.4 V DC 0-signal: typ. 1.6 mA at 1.5 V DC; typ. 8 mA at 3 V DC (maximum leakage current I card) 1-signal: ≥ 36 mA (minimum load current DO card) < 200 mA after 100 μs field side external voltage: terminals 4+, 5+, 2-load: terminals 6, 3 8 60 V DC < 3.3 W at 5 A , see derating curves 30 V DC / 5 A resistive load , see derating curves 10 mA 5 x 10 ⁶ switching cycles low voltage < 5 V DC undercurrent: 10 mA DC; overcurrent: 2.2 A DC (relay energized)
Connection side Connection terminals 7+, 6- Pulser/Pause ratio min. 150 ms with disabled internal fault detection min. 15 ms. 7 min. 150 ms with disabled internal fault detection min. 15 ms. 7 min. 150 ms with disabled internal fault detection min. 15 ms. 7 ms. 15 ms. 150 ms. Test pulse length max. 2 ms from DO card O-signal: -5 5 V DC T-signal: 19 16. mA at 1.5 V DC; typ. 8 mA at 3 V DC (maximum leakage current activity). Inrush current -2 c00 mA after 100 µs Poutput Connection side -2 field side -2 connection	Connection side Connection Pulse/Pause ratio Test pulse length Signal level Rated current Inrush current Output Connection side Connection Connectable voltage Power dissipation Contact loading Minimum switch current Mechanical life	terminals 7+, 8- min. 150 ms / min. 150 ms with disabled internal fault detection min. 1 s / min. 1 s with enabled internal fault detection max. 2 ms from DO card 0-signal: -5 5 V DC 1-signal: 19 26.4 V DC 0-signal: typ. 1.6 mA at 1.5 V DC; typ. 8 mA at 3 V DC (maximum leakage current I card) 1-signal: ≥ 36 mA (minimum load current DO card) < 200 mA after 100 μs field side external voltage: terminals 4+, 5+, 2-load: terminals 6, 3 8 60 V DC < 3.3 W at 5 A , see derating curves 30 V DC / 5 A resistive load , see derating curves 10 mA 5 x 10 ⁶ switching cycles low voltage < 5 V DC undercurrent: 10 mA DC; overcurrent: 2.2 A DC (relay energized)
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Contact loading 30 V DC / 5 A resistive load , see derating curves Minimum switch current 10 mA Mechanical life 5 x 10° switching cycles Line fault detection low voltage < 5 V DC undercurrent: 10 mA DC; overcurrent: 2.2 A DC (relay energized) breakage: 8.2 kG; short-circuit: 11 Ω (load, relay de-energized)	Contact loading Minimum switch current Mechanical life	30 V DC / 5 A resistive load , see derating curves 10 mA 5 x 10 ⁶ switching cycles low voltage < 5 V DC undercurrent: 10 mA DC; overcurrent: 2.2 A DC (relay energized)
Minimum switch current Mechanical life S x 10° switching cycles Line fault detection low voltage < 5 V DC undercurrent: 10 mA DC; overcurrent: 2.2 A DC (relay energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-circuit: 11 Ω (load, relay de-energized) breakagei. 8.2 kΩ, short-lay de-energized) breakagei. 8.2 kΩ, short-lay de-energized) bre	Minimum switch current Mechanical life	10 mA 5 x 10 ⁶ switching cycles low voltage < 5 V DC undercurrent: 10 mA DC; overcurrent: 2.2 A DC (relay energized)
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Line fault detection low voltage < 5 V DC undercurrent: 10 mA DC; overcurrent: 22 A DC (relay energized) breakage; 8,2 KG; short-circuit: 11 Ω (load, relay de-energized) breakage; 8,2 KG; short-circuit: 11 Ω (load, relay de-energized) breakage; 8,2 KG; short-circuit: 11 Ω (load, relay de-energized) wax. 5 AT, recommended maximum utilization of the fuse; 80 % Fault indication output Connection terminals 10, 11 Contact loading 30 V DC / 0.5 A resistive load Reaction time < 2 s Mechanical life 10 ⁵ switching cycles Transfer characteristics Switching frequency < 3 Hz with disabled internal fault detection <		low voltage < 5 V DC undercurrent: 10 mA DC; overcurrent: 2.2 A DC (relay energized)
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Reaction time < 2 s Mechanical life 10 ⁵ switching cycles Transfer characteristics Switching frequency < 3 Hz with disabled internal fault detection Salvanic isolation Input/power supply basic insulation according to IEC/EN 61010-1, rated insulation voltage 60 V _{eff} Input/fault indication output basic insulation according to IEC/EN 61010-1, rated insulation voltage 300 V _{eff} Output/other circuits reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V _{eff} Output/other circuits reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V _{eff} Output/other circuits reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V _{eff} Output/other circuits DIP switch Input/fault indication output DIP switch Output/other circuits DIP switch	Connection	terminals 10, 11
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Transfer characteristics Switching frequency < 3 Hz with disabled internal fault detection < 0.5 Hz with enabled internal fault detection Input/power supply basic insulation according to IEC/EN 61010-1, rated insulation voltage 60 Veff Input/fault indication output basic insulation according to IEC/EN 61010-1, rated insulation voltage 30 Veff Output/other circuits reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other circuits reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other circuits reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other circuits reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other circuits reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other circuits according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/other insulation according to IEC/EN 61010-1, rated insulation voltage 300 Veff Output/Other insulation voltage 300	Reaction time	<2s
Switching frequency < 3 Hz with disabled internal fault detection < 0.5 Hz with enabled internal fault detection < 0.5 Hz with enabled internal fault detection	Mechanical life	10 ⁵ switching cycles
< 0.5 Hz with enabled internal fault detection Galvanic isolation Input/power supply basic insulation according to IEC/EN 61010-1, rated insulation voltage 60 V _{eff} Input/fault indication output basic insulation according to IEC/EN 61010-1, rated insulation voltage 30 V _{eff} Output/other circuits reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V Indicators/settings Display elements Control elements Configuration LEDs Configuration Labeling Directive conformity Electromagnetic compatibility Directive 2014/30/EU Machinery Directive Directive 2006/42/EC EN 62061:2005+AC:2010+A1:2013+A2:2015, EN/ISO 13849-1:2015 Conformity Electromagnetic compatibility Directive 2006/42/EC EN 62061:2017, IEC/EN 61326-3-2:2018, EN 61326-3-1:2017 Degree of protection Postection against electrical shock EN 61010-1:2010 Ambient temperature -20 60 °C (-4 140 °F)	Fransfer characteristics	
Input/power supply basic insulation according to IEC/EN 61010-1, rated insulation voltage 60 V _{eff} Input/fault indication output basic insulation according to IEC/EN 61010-1, rated insulation voltage 30 V _{eff} Output/other circuits reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V ndicators/settings Display elements LEDs Control elements DIP switch Configuration 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 62061:2005+AC:2010+A1:2013+A2:2015, EN/ISO 13849-1:2015 Conformity Electromagnetic compatibility NE 21:2017, IEC/EN 61326-3-2:2018, EN 61326-3-1:2017 Degree of protection IEC 60529:2013 Protection against electrical shock Ambient conditions Ambient temperature -20 60 °C (-4 140 °F)	Switching frequency	
Input/fault indication output Output/other circuits reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V reinforced insulation voltag	Galvanic isolation	
Output/other circuits reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V ndicators/settings Display elements Control elements DIP switch Configuration Labeling Directive conformity Electromagnetic compatibility Directive 2014/30/EU Directive 2006/42/EC Directive 2006/42/EC EN 62061:2005+AC:2010+A1:2013+A2:2015, EN/ISO 13849-1:2015 Conformity Electromagnetic compatibility NE 21:2017, IEC/EN 61326-3-2:2018, EN 61326-3-1:2017 Degree of protection Protection against electrical shock Ambient conditions Ambient temperature -20 60 °C (-4 140 °F)	Input/power supply	basic insulation according to IEC/EN 61010-1, rated insulation voltage 60 $\ensuremath{V_{\text{eff}}}$
Display elements Control elements Configuration Labeling Directive conformity Electromagnetic compatibility Directive 2014/30/EU Directive 2006/42/EC Conformity Electromagnetic compatibility Directive 2006/42/EC Directive 2014/30/EU EN 62061:2005+AC:2010+A1:2013+A2:2015, EN/ISO 13849-1:2015 Conformity Electromagnetic compatibility Directive 2014/30/EU EN 62061:2005+AC:2010+A1:2013+A2:2015, EN/ISO 13849-1:2015 Conformity Electromagnetic compatibility NE 21:2017, IEC/EN 61326-3-2:2018, EN 61326-3-1:2017 Degree of protection IEC 60529:2013 Protection against electrical shock EN 61010-1:2010 Ambient conditions Ambient temperature -20 60 °C (-4 140 °F)	Input/fault indication output	basic insulation according to IEC/EN 61010-1, rated insulation voltage 30 $\ensuremath{V_{\text{eff}}}$
Display elements Control elements DIP switch Configuration via DIP switches 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 62061:2005+AC:2010+A1:2013+A2:2015, EN/ISO 13849-1:2015 Conformity Electromagnetic compatibility NE 21:2017, IEC/EN 61326-3-2:2018, EN 61326-3-1:2017 Degree of protection IEC 60529:2013 Protection against electrical shock EN 61010-1:2010 Ambient conditions Ambient temperature -20 60 °C (-4 140 °F)	Output/other circuits	reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 $\ensuremath{V_{\text{e}}}$
Control elements Configuration Labeling Directive conformity Electromagnetic compatibility Directive 2014/30/EU Directive 2006/42/EC Directive 2006/42/EC EN 62061:2005+AC:2010+A1:2013+A2:2015, EN/ISO 13849-1:2015 Conformity Electromagnetic compatibility Directive 2006/42/EC EN 62061:2005+AC:2010+A1:2013+A2:2015, EN/ISO 13849-1:2015 Conformity Electromagnetic compatibility NE 21:2017, IEC/EN 61326-3-2:2018, EN 61326-3-1:2017 Degree of protection IEC 60529:2013 Protection against electrical shock EN 61010-1:2010 Ambient conditions Ambient temperature -20 60 °C (-4 140 °F)	ndicators/settings	
Configuration Labeling via DIP switches 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 62061:2005+AC:2010+A1:2013+A2:2015, EN/ISO 13849-1:2015 Conformity Electromagnetic compatibility NE 21:2017, IEC/EN 61326-3-2:2018, EN 61326-3-1:2017 Degree of protection IEC 60529:2013 Protection against electrical shock EN 61010-1:2010 Ambient conditions Ambient temperature -20 60 °C (-4 140 °F)	Display elements	LEDs
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Directive conformity Electromagnetic compatibility Directive 2014/30/EU EN 61326-1:2013 (industrial locations) Machinery Directive Directive 2006/42/EC EN 62061:2005+AC:2010+A1:2013+A2:2015, EN/ISO 13849-1:2015 Conformity Electromagnetic compatibility NE 21:2017, IEC/EN 61326-3-2:2018, EN 61326-3-1:2017 Degree of protection Protection against electrical shock Ambient conditions Ambient temperature -20 60 °C (-4 140 °F)	Configuration	via DIP switches
Electromagnetic compatibility Directive 2014/30/EU EN 61326-1:2013 (industrial locations) Machinery Directive Directive 2006/42/EC EN 62061:2005+AC:2010+A1:2013+A2:2015, EN/ISO 13849-1:2015 Conformity Electromagnetic compatibility NE 21:2017, IEC/EN 61326-3-2:2018, EN 61326-3-1:2017 Degree of protection Protection against electrical shock Ambient conditions Ambient temperature -20 60 °C (-4 140 °F)	Labeling	space for labeling at the front
Directive 2014/30/EU EN 61326-1:2013 (industrial locations) Machinery Directive Directive 2006/42/EC EN 62061:2005+AC:2010+A1:2013+A2:2015, EN/ISO 13849-1:2015 Conformity Electromagnetic compatibility NE 21:2017, IEC/EN 61326-3-2:2018, EN 61326-3-1:2017 Degree of protection Protection against electrical shock Ambient conditions Ambient temperature -20 60 °C (-4 140 °F)	Directive conformity	
Machinery Directive Directive 2006/42/EC EN 62061:2005+AC:2010+A1:2013+A2:2015, EN/ISO 13849-1:2015 Conformity Electromagnetic compatibility NE 21:2017, IEC/EN 61326-3-2:2018, EN 61326-3-1:2017 Degree of protection IEC 60529:2013 Protection against electrical shock EN 61010-1:2010 Ambient conditions Ambient temperature -20 60 °C (-4 140 °F)	Electromagnetic compatibility	
Directive 2006/42/EC EN 62061:2005+AC:2010+A1:2013+A2:2015 , EN/ISO 13849-1:2015 Conformity NE 21:2017 , IEC/EN 61326-3-2:2018 , EN 61326-3-1:2017 Degree of protection IEC 60529:2013 Protection against electrical shock EN 61010-1:2010 Ambient conditions -20 60 °C (-4 140 °F)	Directive 2014/30/EU	EN 61326-1:2013 (industrial locations)
Electromagnetic compatibility NE 21:2017 , IEC/EN 61326-3-2:2018 , EN 61326-3-1:2017 Degree of protection Protection against electrical shock Ambient conditions Ambient temperature -20 60 °C (-4 140 °F)	Machinery Directive	
Electromagnetic compatibility NE 21:2017 , IEC/EN 61326-3-2:2018 , EN 61326-3-1:2017 Degree of protection Protection against electrical shock EN 61010-1:2010 Ambient conditions Ambient temperature -20 60 °C (-4 140 °F)	Directive 2006/42/EC	EN 62061:2005+AC:2010+A1:2013+A2:2015 , EN/ISO 13849-1:2015
Degree of protection IEC 60529:2013 Protection against electrical shock EN 61010-1:2010 Ambient conditions Ambient temperature -20 60 °C (-4 140 °F)	Conformity	
Protection against electrical shock EN 61010-1:2010 Ambient conditions Ambient temperature -20 60 °C (-4 140 °F)	Electromagnetic compatibility	NE 21:2017, IEC/EN 61326-3-2:2018, EN 61326-3-1:2017
Ambient conditions Ambient temperature -20 60 °C (-4 140 °F)	Degree of protection	IEC 60529:2013
Ambient temperature -20 60 °C (-4 140 °F)	Protection against electrical shock	EN 61010-1:2010
Ambient temperature -20 60 °C (-4 140 °F) Observe the temperature range limited by derating see section derating	Ambient conditions	
Costine the temperature range inflicted by defaulty, see section defaulty.	Ambient temperature	-20 60 °C (-4 140 °F) Observe the temperature range limited by derating, see section derating.



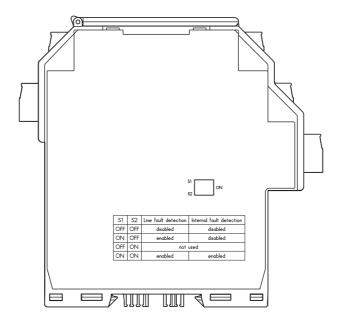
Degree of protection	IP20
Connection	screw terminals
Mass	approx. 142 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 inch) (W x H x D) , housing type B2
Height	119 mm
Width	20 mm
Depth	115 mm
Mounting	on 35 mm DIN mounting rail acc. to EN 60715:2001
General information	
Supplementary information	Observe the certificates, declarations of conformity, instruction manuals, and manuals where applicable. For information see www.pepperl-fuchs.com.

Assembly



Relay Module KFD2-RSH-1.2D.FL2

Configuration



Output switch settings

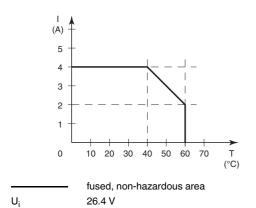
S1	S2	Line fault detection	Internal fault detection	
OFF	OFF	disabled	disabled	
ON	OFF	enabled	disabled	
OFF	ON	not used		
ON	ON	enabled	enabled	

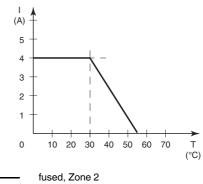
Factory settings: line fault detection enabled, internal fault detection enabled

During a switching event the device detects an internal fault. A full test of all 3 redundant relay channels requires 3 consecutive switching events.

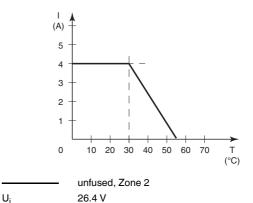
Characteristic Curve

Derating



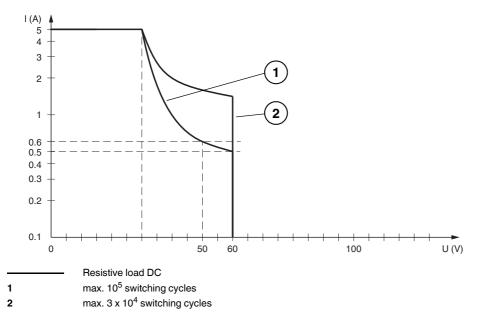


Relay Module



Characteristic Curve

Maximum Switching Power of Output Contacts



The maximum number of switching cycles is depending on the electrical load and may be higher if reduced currents and voltages are applied.