



- 1-channel
- Input EEx ia IIC
- 24 V DC supply voltage
- Current output: 0/4 mA ... 20 mA (optional voltage output)
- Accuracy ± 0.1 %
- User can use DIP switch to adjust: Temperature measuring range, measuring sensor, 2-, 3- or 4-wire connection, lead breakage monitoring
- Output: 0/4 mA ... 20 mA (adjustable)

KFD2-TR-Ex1

Discontinued type

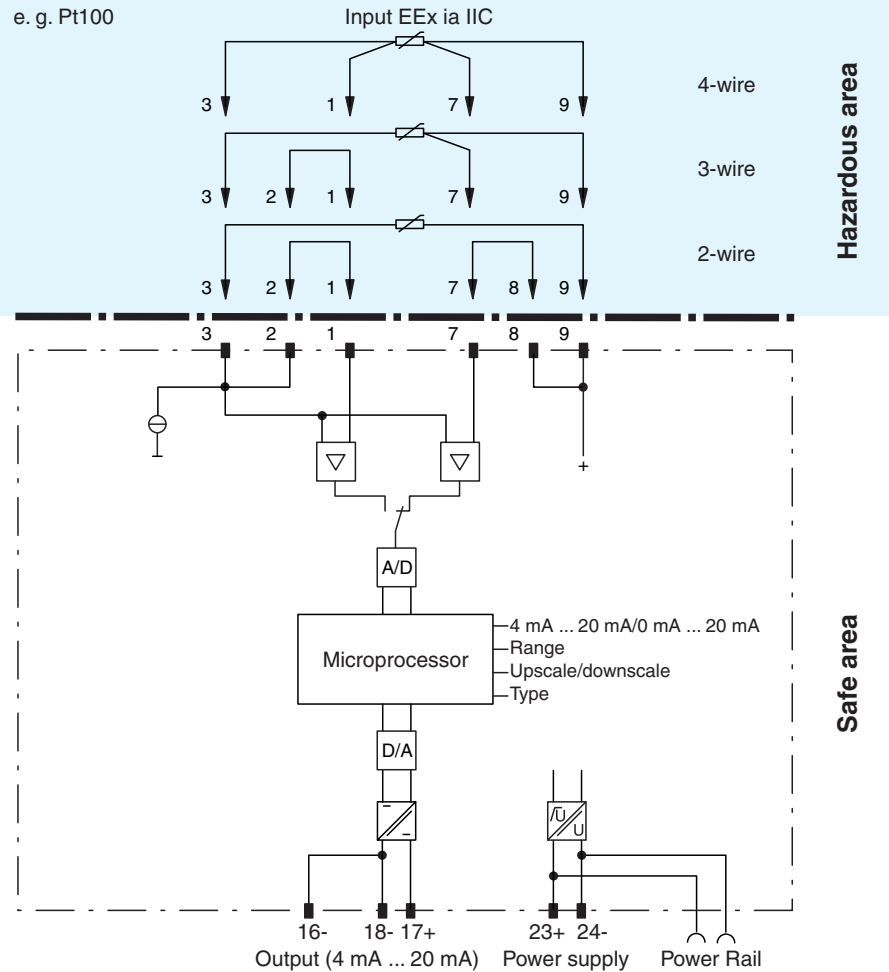
Function

The converter KFD2-TR-Ex1 is designed for the connection of temperature sensors, which corresponds to DIN 43760 (1980) or BS 1904: 1981 (IEC 751). The following models may be connected:

Pt50	DIN 43 760
Pt100	DIN 43 760
Pt500	DIN 43 760
Pt1000	DIN 43 760
Ni100	DIN 43 760
Ni120	DIN 43 760
Ni1000	DIN 43 760
D100	JIS C1604-1981
PRC100	Precision Resistor Co. Inc
F130	DIN 43 760
Mo1000	DIN 43 760
Ohm	0 ... 400

The KFD2-TR-Ex1 is designed for 2-, 3- or 4-wire connection. In a 2-wire connection, the lead resistance can be detected and compensated. The KFD2-TR-Ex1 produces a constant measurement current and measures the resulting voltage across the temperature sensor. The voltage signal is amplified and conditioned to produce a 0 mA ... 20 mA or 4 mA ... 20 mA output signal which is directly proportional to the temperature. The input is galvanically isolated from the output and the power supply.

Connection

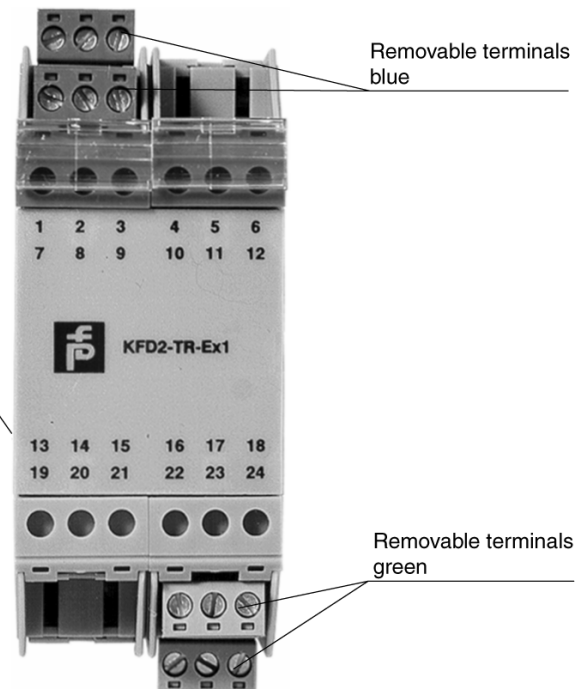


Composition

Front View

Housing type B4 (see system description)

DIP-switch



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Supply	
Connection	Power Rail or terminals 23+, 24-
Rated voltage	20 ... 35 V DC
Ripple	within the supply tolerance
Power consumption	approx. 1,2 W
Input	
Connection	terminals 1, 2, 3; 7, 8, 9 designed for the connection of a resistance temperature sensor in 2-, 3- or 4-wire technology according to BS1904: 1981 (IEC 751) or DIN 43760 (e. g. Pt100)
Lead monitoring	breakage: upscale or downscale (selectable)
Output	
Connection	terminals 16-, 17+, 18-
Current	0/4 ... 20 mA ; load ≤1 kOhm
Voltage	0 ... 20 V ; ≥ 30 kΩ load at error < 1 %
Transfer characteristics	
Deviation	
After calibration	at 293 K (20 °C) resistance input: ± 0.1 % Ohm temperature sensor: ± 0.01 % of measurement value in K + 0.07 % of span + linearisation error
Influence of ambient temperature	(± 0.0015 % of measuring value in K + 0.005 % of span) / K
Linearisation	2- and 3-wire: < 0.1 K, < 0.15 K 4-wire: < 0.1 K
Influence of supply voltage	0.01 % of span
Measuring current	approx. 2 mA in 50 Ohm ; approx. 0.2 mA in 500 Ohm and 1 kOhm
Rise time	300 ... 700 ms , dependent on temperature measurement probe used
Electrical isolation	
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
Output/power supply	basic insulation acc. to EN 50178, rated insulation voltage of 50 V AC
Directive conformity	
Electromagnetic compatibility	
Directive 89/336/EC	EN 50081-2, EN 50082-2
Conformity	
Insulation coordination	EN 50178
Electrical isolation	EN 50178
Protection degree	IEC 60529
Ambient conditions	
Ambient temperature	-20 ... 60 °C (253 ... 333 K)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	40 x 107 x 115 mm (1.6 x 4.2 x 4.5 in)
Data for application in conjunction with hazardous areas	
EC-Type Examination Certificate	BASEEFA No. Ex 91C2043 , for additional certificates see www.pepperl-fuchs.com
Group, category, type of protection	[EEx ia] IIC (T _{amb} = 60 °C)
Voltage U ₀	9,6 V DC
Current I ₀	22,3 mA
Power P ₀	41 mW
Type of protection [EEx ia]	
Explosion group	IIA IIB IIC
External capacitance	27,2 μF 10,2 μF 3,4 μF
External inductance	512 mH 192 mH 64 mH
Electrical isolation	
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	
Directive 94/9 EC	EN 50014, EN 50020
Entity parameter	
Certification number	4Z6A5.AX
FM control drawing	No. 116-0129
Suitable for installation in division 2	yes
Connection	terminals 1, 2, 3; 7, 8, 9
Input I	
Current I _t	19 mA
Voltage V _t	8,9 V

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Explosion group	A&B	C&E	D, F&G
Max. external capacitance C_a	5,05 μ F	15,16 μ F	40,42 μ F
Max. external inductance L_a	91,83 mH	322,9 mH	806,8 mH
Safety parameter			
CSA control drawing	LR 65756-13		
Control drawing	No. 116-0132		
Connection	terminals 1, 2, 3, 7, 8, 9		
Input I			
Voltage V_{OC}	8,9 V		
Current I_{SC}	19 mA		
Explosion group	A&B	C&E	D, F&G
Max. external capacitance C_a	5,1 μ F	15,5 μ F	41 μ F
Max. external inductance L_a	93 mH	329 mH	823 mH

Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. For information see www.pepperl-fuchs.com.

Accessories

Power Rail PR-03

Power Rail UPR-03

Power feed module KFD2-EB2...

Power supply of the devices is only permissible via the power feed modules KFD2-EB... Via the Power Rail PR-03 or UPR-03 the devices are supplied with 24 V DC by means of the power feed modules.

Each power feed module is used for fusing and monitoring groups with up to 100 individual devices. The Power Rail PR-03 is an inset component for the DIN rail. The Power Rail UPR-03 is a complete unit consisting of the electrical inset and an aluminium profile rail 35 mm x 15 mm x 2000 mm. To make electrical contact, the devices are simply engaged.

The Power Rail must not be fed via the device terminals of the individual devices!

If no Power Rails are used, power supply of the individual devices is realised directly via their device terminals.

Notes

Procedure using 2-wire mode:

1. Connect the KFD2-TR-Ex1 according to the connection diagram for the 2-wire mode. Please make sure that the connections 7 and 8 or 1 and 2 are made.
2. Set the two DIP switches on the right side to 2-wire mode (OFF ON).
3. After 5 seconds you can set the right DIP switch to OFF (equalisation).
4. Short circuit the RTD (as near as possible at the RTD) and keep it short circuited at least for 5 seconds.
5. Release the short circuit and set the right DIP switch to position ON (2-wire mode).

The converter has now stored the lead resistor and keeps it also after switch off of the supply voltage. If the output is set to 0 mA ... 20 mA, the normal converter operation starts immediately. If the converter is set to 4 mA ... 20 mA, the output takes a value between 1mA and 3.5 mA over a duration of approx. 30 seconds. This value is proportional to the stored lead resistor between 0 Ohm and 100 Ohm.

This value is a clue to the correct execution of the adjustment process. After expiration of these 30 s the normal converter operation starts again.

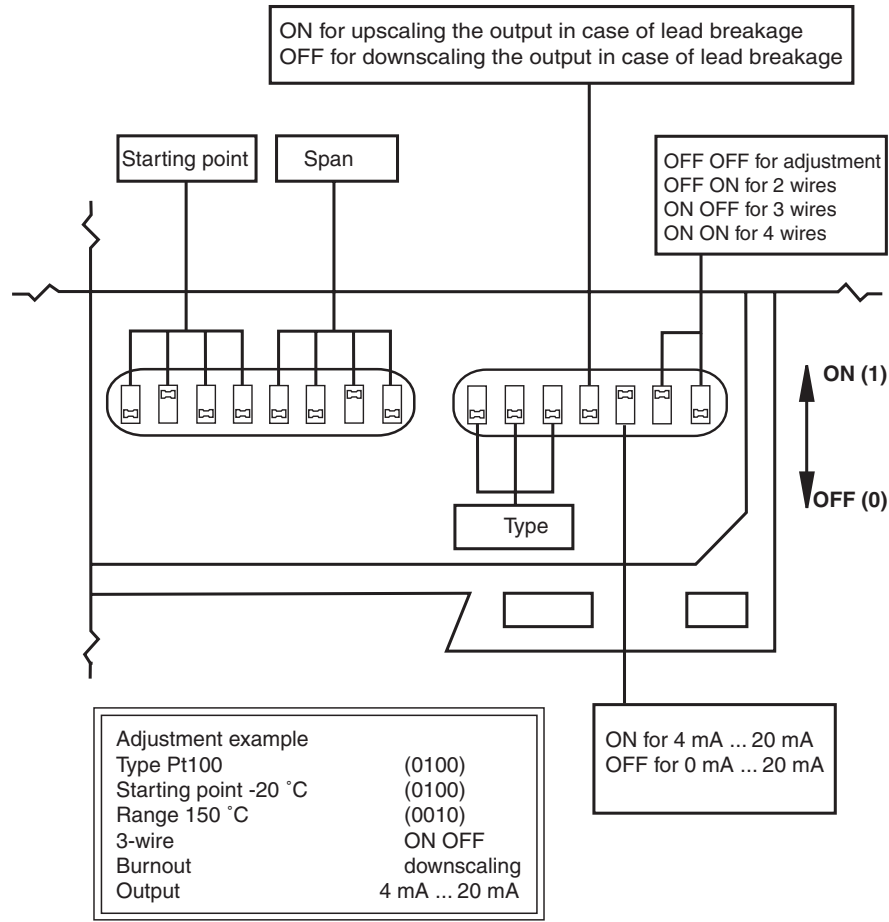
If the converter does not measure a resistance during the adjustment process, that is less than 100 Ohm (i. e. no short circuit or short circuit with insufficient duration), the converter interprets this adjustment to be faulty and does not store the corresponding value. This way, no faulty value is taken for the lead resistor in case of an operating error (i. e. aberrant manipulation of the adjustment switch).

This case is indicated, when the output provides a square wave signal over a duration of approx. 1 minute.

Note:

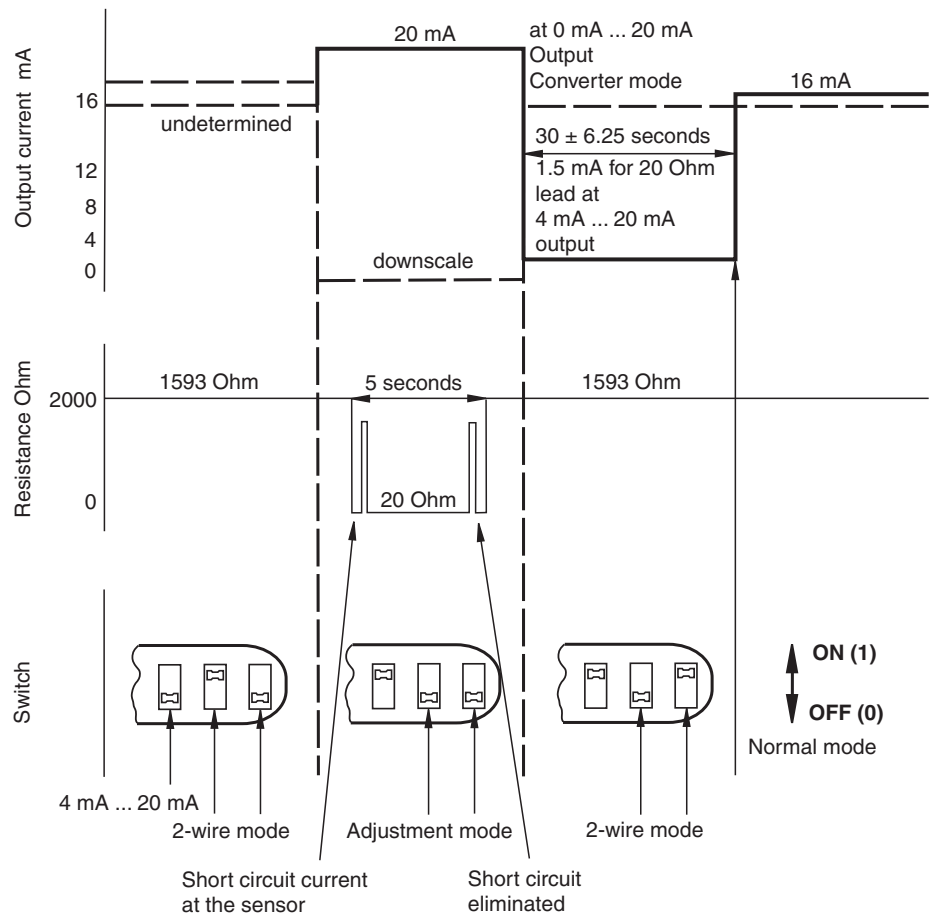
- When lead breakage occurs the current output always lowers to 0 mA, regardless whether 0 mA ... 20 mA or 4 mA ... 20 mA has been set.
- If the switches are adjusted in a way that the starting point and the span deliver the maximum temperature, the output rises to the end value (20 mA for the standard version).

Adjustment example: part of a housing side piece



Characteristics during adjustment

Example
Starting point 0 °C,
Range 200 °C,
Pt1000 at 150 °C,
20 Ohm lead resistance
Upscale



Adjustment table											
ON = 1 OFF = 0		Pt100	Pt100	Pt100	Pt50	Pt50	Pt50	Pt1000	Pt1000	Pt1000	Pt500
Switch position		000	001	001	010	001	001	011	100	100	101
I N I T I A L P O I N T	0000	-200	-	-200	-200	-	-200	-200	-	-200	-200
	0001	-150	-	-150	-150	-	-150	-150	-	-150	-150
	0010	-100	-	-100	-100	-	-100	-100	-	-100	-100
	0011	-50	-	-50	-50	-	-50	-50	-	-50	-50
	0100	-20	-	-20	-20	-	-20	-20	-	-20	-20
	0101	-10	-	-10	-10	-	-10	-10	-	-10	-10
	0110	0	-	0	0	-	0	0	-	0	0
	0111	50	-	50	50	-	50	50	-	50	50
	1000	100	450	-	100	450	-	100	450	-	100
	1001	150	500	-	150	500	-	150	500	-	150
	1010	200	550	-	200	550	-	200	550	-	200
S P A N	1011	250	600	-	250	600	-	250	600	-	250
	1100	300	650	-	300	650	-	300	650	-	300
	1101	350	700	-	350	700	-	350	700	-	350
	1110	400	750	-	400	750	-	400	750	-	400
	1111	450	800	-	450	800	-	450	800	-	450
	0000	50	50	700	50	-	-	50	50	700	50
	0001	100	100	750	100	-	-	100	100	750	100
	0010	150	150	800	150	-	-	150	150	800	150
	0011	200	200	850	200	-	-	200	200	850	200
	0100	250	250	900	250	-	-	250	250	900	250
	0101	300	300	950	300	-	-	300	300	950	300
0110	350	350	1000	350	-	-	350	350	1000	350	
0111	400	400	1050	400	-	-	400	400	1050	400	
1000	450	-	-	450	50	700	450	-	-	450	
1001	500	-	-	500	100	750	500	-	-	500	
1010	550	-	-	550	150	800	550	-	-	550	
1011	600	-	-	600	200	850	600	-	-	600	
1100	650	-	-	650	250	900	650	-	-	650	
1101	700	-	-	700	300	950	700	-	-	700	
1110	750	-	-	750	350	1000	750	-	-	750	
1111	800	-	-	800	400	1050	800	-	-	800	
Maximum		850	850	850	850	850	850	850	850	850	850
Units		°C	°C	°C	°C	°C	°C	°C	°C	°C	°C

Adjustment table											
ON = 1 OFF = 0		Pt500	Pt500	D100	Ni120	Ni100	PRC100 Ni1000	Ni1000	Ohms	F130	Mo100
		100	100	110	111	111	111	111	111	110	111
I N I T I A L P O I N T	0000	-	-200	-200	-80	-	-	-80	-	-200	-50
	0001	-	-150	-150	-40	-	-	-40	-	-150	0
	0010	-	-100	-100	0	-	-	0	-	-100	50
	0011	-	-50	-50	40	-	-	40	-	-50	100
	0100	-	-20	-200	80	-	-	80	-	-20	150
	0101	-	-10	-10	120	-	-	120	-	-10	200
	0110	-	0	0	-	-	-	-	-	0	-
	0111	-	50	50	-	-	-	-	-	50	-
	1000	450	-	100	-	-80	-40	-	-	100	-
	1001	500	-	150	-	-40	0	-	-	150	-
	1010	550	-	200	-	0	50	-	-	200	-
	1011	600	-	250	-	40	100	-	-	250	-
	1100	650	-	300	-	80	-	-	0	300	-
	1101	700	-	350	-	120	-	-	50	350	-
	1110	750	-	400	-	-	-	-	100	400	-
	1111	800	-	450	-	-	-	-	150	450	-
S P A N	0000	-	-	50	60	60	-	-	-	50	50
	0001	-	-	100	100	100	-	-	-	100	100
	0010	-	-	150	140	140	-	-	-	150	150
	0011	-	-	200	180	180	-	-	-	200	200
	0100	-	-	250	220	220	-	-	-	250	250
	0101	-	-	300	-	-	-	-	-	300	-
	0110	-	-	350	-	-	-	-	-	350	-
	0111	-	-	400	-	-	-	-	-	400	-
	1000	50	700	450	-	-	50	60	50	450	-
	1001	100	750	500	-	-	100	100	100	500	-
	1010	150	800	550	-	-	150	140	150	550	-
	1011	200	850	600	-	-	190	180	200	600	-
1100	250	900	650	-	-	-	220	250	650	-	
1101	300	950	700	-	-	-	-	300	700	-	
1110	350	1000	-	-	-	-	-	350	-	-	
1111	400	1050	-	-	-	-	-	400	-	-	
Maximum		850	850	500	220	220	150	220	400	500	250
Units		°C	°C	°C	°C	°C	°C	°C	Ohm	°C	°C