

# Thermocouple Converter

## KFD0-TT-Ex1

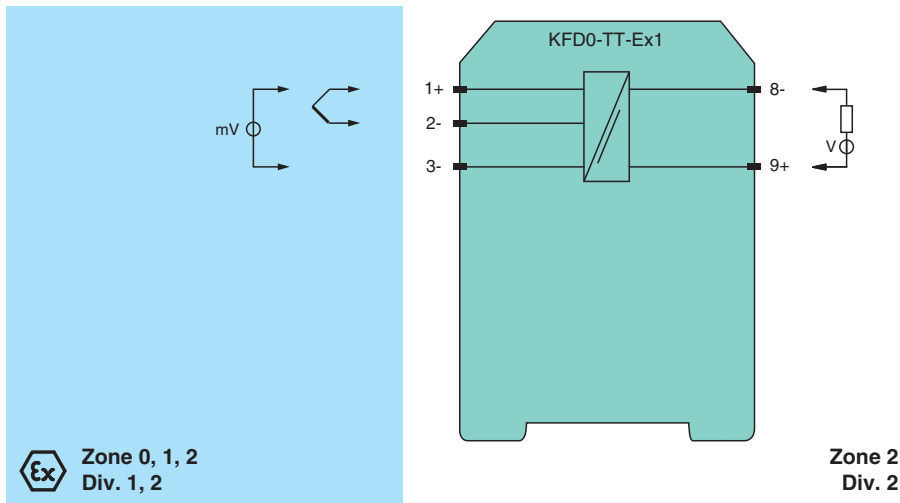
- 1-channel isolated barrier
- 24 V DC supply (loop powered)
- Thermocouple input
- Output 4 mA ... 20 mA
- Internal cold junction compensation
- Sensor breakage detection
- DIP switch selectable ranges



### Function

This isolated barrier is used for intrinsic safety applications. It is a loop-powered isolator that converts thermocouple inputs in the hazardous area to a 4 mA ... 20mA signal in the safe area. The internal cold junction compensation can be bypassed by using terminals 1 and 3. The output current is linear to input voltage, not proportional to temperature. Zero, span, and burnout detection are field-configurable.

### Connection



### Technical Data

#### General specifications

Signal type	Analog input		
<b>Supply</b>			
Rated voltage	$U_r$	12 ... 35 V DC loop powered	
Power dissipation		0.4 W	
<b>Input</b>			
Connection side		field side	
Connection		terminals 1+, 2-, 3- thermocouple E, J, K, N, R, S or T, cold junction referenced to 0 °C (32 °F)	
Lead resistance		max. 100 Ω per line	
Current		lead monitoring ON: ≤ 15 nA; OFF: ≤ 1 nA	
<b>Output</b>			

Release date: 2021-11-25 Date of issue: 2021-11-25 Filename: 043692\_eng.pdf

## Technical Data

Connection side	control side	
Connection	terminals 9+, 8-	
Load	(U -12 V) / 0.02 A	
Current output	4 ... 20 mA , limited to ≤ 35 mA	
Fault signal	downscaling ≤ 3 mA , upscaling ≥ 22 mA	
<b>Transfer characteristics</b>		
Measurement range	$f_n$	span 4 ... 100 mV, zero point -12 ... 60 mV , both adjustable
Deviation		
After calibration	0.1 % of full-scale value ± 1 K for the cold junction	
Temperature effect	temperature deviation 0.015 % of the span/K or 1.5 μV/K cold junction ± 2 K (calibrated at $T_{amb} = 20\text{ °C}$ (68 °F))	
Influence of supply voltage	6.5 ppm/V	
Characteristic curve	the output voltage is linearly proportionate to the input voltage (not to temperature)	
Rise time	250 ms	
<b>Galvanic isolation</b>		
Input/Output	safe isolation according to EN 50178, rated insulation voltage 253 V <sub>eff</sub>	
<b>Indicators/settings</b>		
Control elements	DIP switch rotary switch	
Configuration	via DIP switches via rotary switch	
Labeling	space for labeling at the front	
<b>Directive conformity</b>		
Electromagnetic compatibility		
Directive 2014/30/EU	EN 61326-1:2013 (industrial locations)	
<b>Conformity</b>		
Insulation coordination	EN 50178	
Galvanic isolation	EN 50178	
Degree of protection	IEC 60529	
<b>Ambient conditions</b>		
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)	
<b>Mechanical specifications</b>		
Degree of protection	IP20	
Connection	screw terminals	
Mass	approx. 150 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	
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	ZELM 00 ATEX 0035	
Marking	Ⓔ II (1)GD [Ex ia] IIC	
Voltage	$U_o$	16.1 V
Current	$I_o$	0.8 mA
Power	$P_o$	3.2 mW
<b>Output</b>		
Maximum safe voltage	$U_m$	60 V (Attention! The rated voltage can be lower.)
Certificate	TÜV 01 ATEX 1777 X	
Marking	Ⓔ II 3G Ex nA II T4	
<b>Galvanic isolation</b>		
Input/Output	safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V	
<b>Directive conformity</b>		
Directive 2014/34/EU	EN 60079-0:2012+A11:2013 , EN 60079-11:2012 , EN 60079-15:2010	
<b>International approvals</b>		
CSA approval		
Control drawing	116-0132	

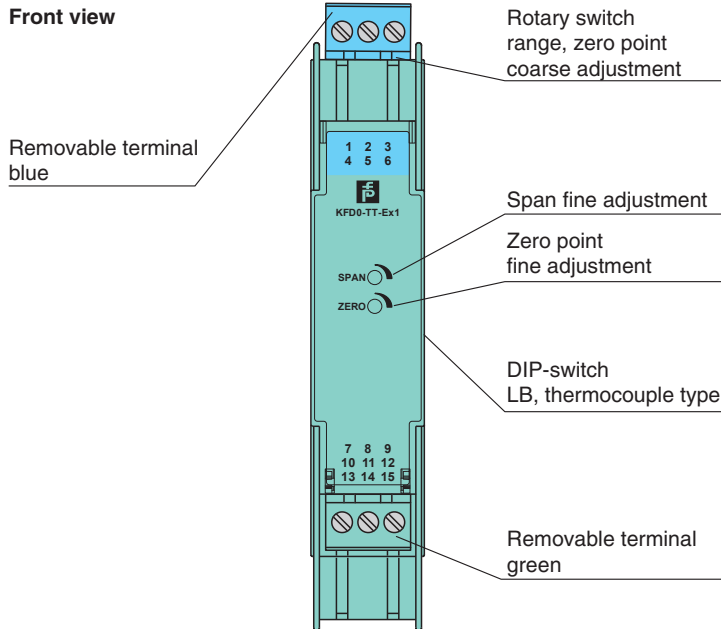
## Technical Data

### General information


Supplementary information

Observe the certificates, declarations of conformity, instruction manuals, and manuals where applicable. For information see [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).




## Assembly



## Matching System Components

	<b>K-DUCT-BU</b>	Profile rail, wiring comb field side, blue
---	------------------	--

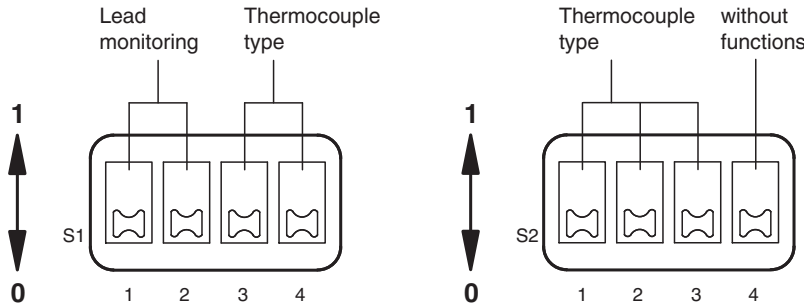
## Accessories

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

Release date: 2021-11-25 Date of issue: 2021-11-25 Filename: 043692\_eng.pdf

**Configuration**

**DIP switches function**

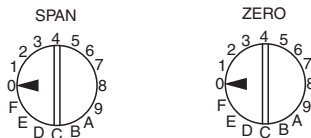


Switch	Position	Function
S1.1/S1.2	1/0	LB UP-upscaled
S1.1/S1.2	0/1	LB DOWN-downscaled
S1.3	1	Thermocouple type E
S1.4	1	Thermocouple type J
S2.1	1	Thermocouple type K, T
S2.2	1	Thermocouple type N
S2.3	1	Thermocouple type R, S

\* other combinations not allowed/defined

**Note:** A new adjustment is necessary in the case of modified configuration (e. g. LB from upscaled to downscaled).

**Rotary switches function**



Please consider that the values of the Zero-table are only valid for the span range Pos. 0 and that both tables contain typical values, which can be used as an adjustment help.

Switch SPAN coarse adjustment	Span (mV)	Switch ZERO coarse adjustment	Zero point (mV) for max. span (potentiometer right-hand stop)	Zero point (mV) for min. span (potentiometer left-hand stop)
0	100.0 ... 53.0	0	-12.0 ... -8.0	-13.6 ... -8.5
1	55.0 ... 30.0	1	-8.3 ... -3.7	-9.0 ... -4.0
2	32.0 ... 20.0	2	-4.0 ... 1.0	-4.3 ... 1.1
3	22.0 ... 5.0	3	0.5 ... 5.6	0.5 ... 6.1
4	17.0 ... 12.0	4	4.6 ... 10.2	5.2 ... 11.2
5	14.0 ... 11.0	5	9.3 ... 14.9	10.2 ... 16.2
6	13.0 ... 9.0	6	13.9 ... 19.5	15.2 ... 21.1
7	11.0 ... 8.0	7	18.3 ... 23.9	20.1 ... 25.6
8	10.0 ... 7.0	8	23.0 ... 28.6	24.7 ... 31.0
9	9.0 ... 6.0	9	27.6 ... 33.1	30.0 ... 36.0
A	8.0 ... 5.5	A	32.1 ... 37.6	35.0 ... 40.5
B	7.5 ... 5.0	B	36.6 ... 42.1	39.4 ... 46.0
C	7.0 ... 4.5	C	41.1 ... 46.6	45.1 ... 51.0
D	6.5 ... 4.2	D	45.5 ... 51.0	50.1 ... 56.0
E	6.2 ... 4.1	E	50.0 ... 55.5	55.0 ... 61.0
F	6.1 ... 4.0	F	54.4 ... 60.0	60.0 ... 62.0

**Recommendation for adjustment:**

1. Span determination (in mV).
2. "Span coarse adjustment" in accordance with the table.
3. Minimum value adjustment (in mV or °C) at the input.
4. "Zero point coarse adjustment", to approach to 4 mA.
5. "Zero point fine adjustment" to exactly 4 mA.
6. Maximum value adjustment (in mV or °C) at the input.
7. "Span fine adjustment" to exactly 20 mA.
8. If necessary repeat fine adjustment for 4 mA and 20 mA.

Release date: 2021-11-25 Date of issue: 2021-11-25 Filename: 043692\_eng.pdf

Release date: 2021-11-25 Date of issue: 2021-11-25 Filename: 043692\_eng.pdf