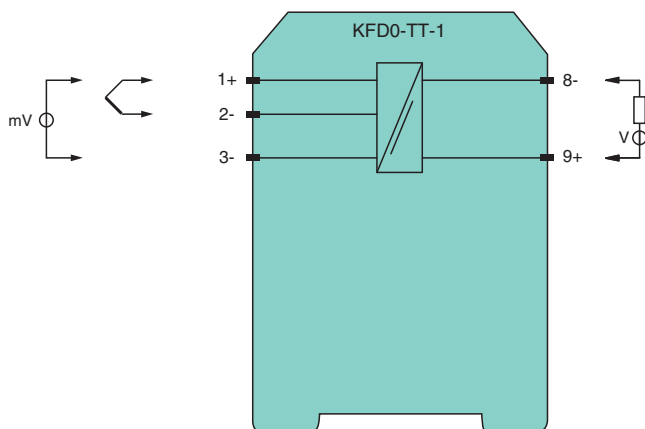# Thermocouple Converter

KFD0-TT-1

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

CE

Function

This isolated signal conditioner is a loop-powered isolator that converts thermocouple inputs to a 4 mA ... 20 mA signal and provides isolation for non-intrinsically safe applications.
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
Supply		
Rated voltage	U_r	12 ... 35 V DC loop powered
Power dissipation		0.4 W
Input		
Connection side		field side
Connection		terminals 1+, 2-, 3- thermocouples type 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

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

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Technical Data

|		
Output		
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
Transfer characteristics		
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 °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
Galvanic isolation		
Input/Output		safe isolation according to EN 50178, rated insulation voltage 253 V_{eff}
Indicators/settings		
Control elements		DIP switch rotary switch
Configuration		via DIP switches via rotary switch
Labeling		space for labeling at the front
Directive conformity		
Electromagnetic compatibility		
Directive 2014/30/EU		EN 61326-1:2013 (industrial locations)
Conformity		
Insulation coordination		EN 50178
Galvanic isolation		EN 50178
Degree of protection		IEC 60529
Ambient conditions		
Ambient temperature		-20 ... 60 °C (-4 ... 140 °F) extended ambient temperature range up to 70 °C (158 °F), refer to manual for necessary mounting conditions
Mechanical specifications		
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
General information		
Supplementary information		Observe the certificates, declarations of conformity, instruction manuals, and manuals where applicable. For information see www.pepperl-fuchs.com.

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Assembly

Front view

Removable terminal green

Rotary switch range, zero point coarse adjustment

1 2 3
4 5 6

KFD0-TT-1

SPAN

ZERO

Span fine adjustment

Zero point fine adjustment

DIP switch LB, thermocouple type

7 8 9
10 11 12
13 14 15

Removable terminal green

Matching System Components

	K-DUCT-GY	Profile rail, wiring comb field side, gray

Accessories

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

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Configuration

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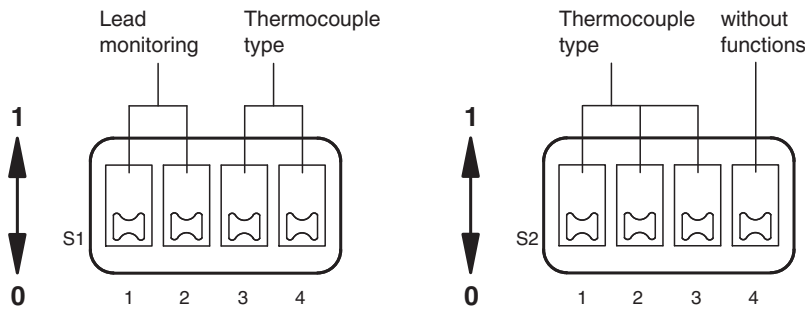
Switch	Position	Function	
S1.1/S1.2	1/0	LB UP-upscaled	} *
S1.1/S1.2	0/1	LB DOWN-downscaled	
S1.3	1	Thermocouple type E	
S1.4	1	Thermocouple type J	
S2.1	1	Thermocouple type K, T	
S2.2	1	Thermocouple type N	
S2.3	1	Thermocouple type R, S	

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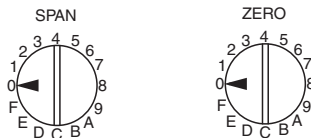
Please consider that the values of the Zero-table are only valid for the span range Pos. 0 and that both tables contain typical values, which can be used as an adjustment help.

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.

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