

# Thermocouple Converter

# KFD0-TT-1

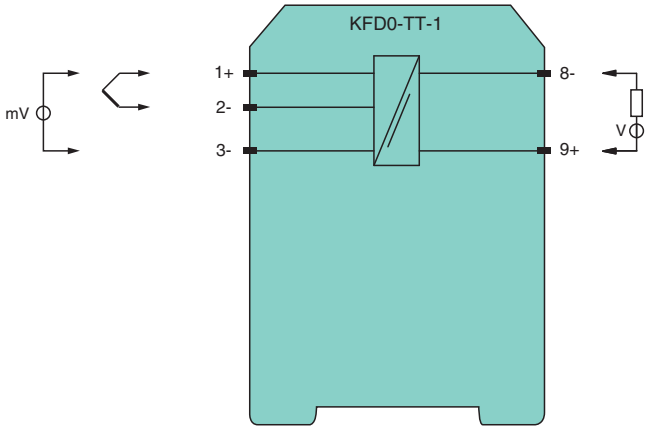
- 1-channel signal conditioner
- 24 V DC supply (loop powered)
- Thermocouple input
- Output 4 mA ... 20 mA
- Internal cold junction compensation
- Sensor breakage detection
- DIP switch selectable ranges

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## 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-<br>thermocouples type E, J, K, N, R, S or T<br>cold junction referenced to 0 °C (32 °F) |
| Lead resistance | | max. 100 Ω per line |
| Current | | lead monitoring ON: ≤ 15 nA; OFF: ≤ 1 nA |

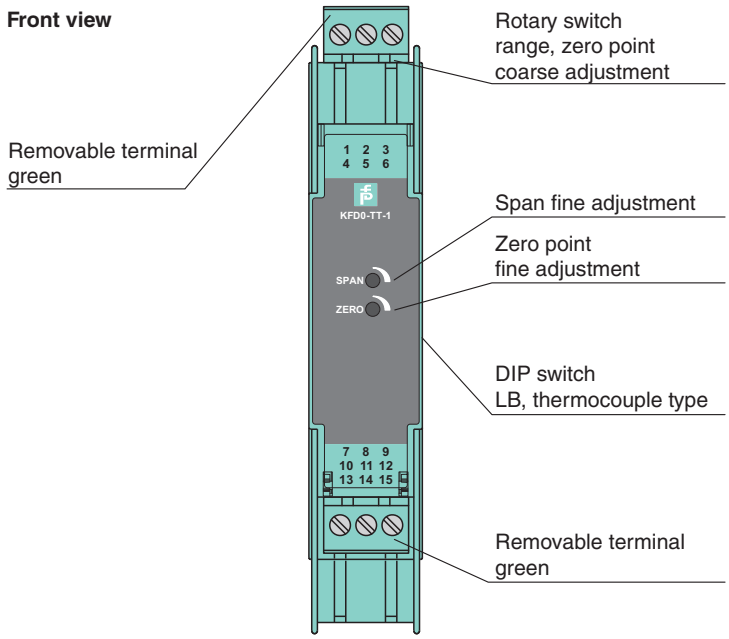
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## Technical Data

| | | |
|---|---|---|
| **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<br>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<br>rotary switch |
| Configuration | | via DIP switches<br>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)<br>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




## Matching System Components

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

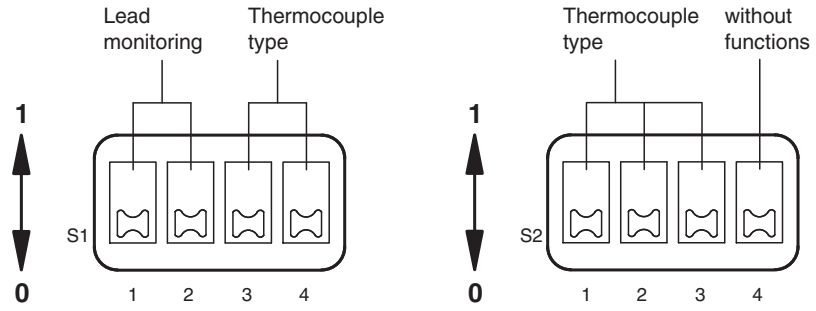
## Accessories

| | | |
|---|---|---|
|  | **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

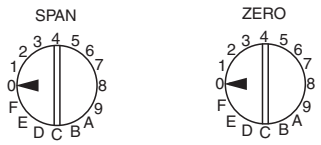



| Switch | Position | Function | |
|---|---|---|---|
| S1.1/S1.2 | 1/0 | LB UP-upscaled | }* |
| S1.1/S1.2 | 0/1 | LB DOWN-downscaled | |
| S1.3 | 1 | Thermocouple type E | |
| S1.4 | 1 | Thermocouple type J | |
| S2.1 | 1 | Thermocouple type K, T | |
| S2.2 | 1 | Thermocouple type N | |
| S2.3 | 1 | 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) |
|---|---|
| 0 | 100.0 ... 53.0 |
| 1 | 55.0 ... 30.0 |
| 2 | 32.0 ... 20.0 |
| 3 | 22.0 ... 5.0 |
| 4 | 17.0 ... 12.0 |
| 5 | 14.0 ... 11.0 |
| 6 | 13.0 ... 9.0 |
| 7 | 11.0 ... 8.0 |
| 8 | 10.0 ... 7.0 |
| 9 | 9.0 ... 6.0 |
| A | 8.0 ... 5.5 |
| B | 7.5 ... 5.0 |
| C | 7.0 ... 4.5 |
| D | 6.5 ... 4.2 |
| E | 6.2 ... 4.1 |
| F | 6.1 ... 4.0 |

| 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 | -12.0 ... -8.0 | -13.6 ... -8.5 |
| 1 | -8.3 ... -3.7 | -9.0 ... -4.0 |
| 2 | -4.0 ... 1.0 | -4.3 ... 1.1 |
| 3 | 0.5 ... 5.6 | 0.5 ... 6.1 |
| 4 | 4.6 ... 10.2 | 5.2 ... 11.2 |
| 5 | 9.3 ... 14.9 | 10.2 ... 16.2 |
| 6 | 13.9 ... 19.5 | 15.2 ... 21.1 |
| 7 | 18.3 ... 23.9 | 20.1 ... 25.6 |
| 8 | 23.0 ... 28.6 | 24.7 ... 31.0 |
| 9 | 27.6 ... 33.1 | 30.0 ... 36.0 |
| A | 32.1 ... 37.6 | 35.0 ... 40.5 |
| B | 36.6 ... 42.1 | 39.4 ... 46.0 |
| C | 41.1 ... 46.6 | 45.1 ... 51.0 |
| D | 45.5 ... 51.0 | 50.1 ... 56.0 |
| E | 50.0 ... 55.5 | 55.0 ... 61.0 |
| 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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