



# Universal Temperature Converter KFD2-UT2-Ex1

- 1-channel isolated barrier
- 24 V DC supply (Power Rail)
- Thermocouple, RTD, potentiometer or voltage input
- Current output 0/4 mA ... 20 mA
- Sink or source mode
- Configurable by PACTware
- Line fault (LFD) and sensor burnout detection
- Up to SIL 2 acc. to IEC/EN 61508 / IEC/EN 61511



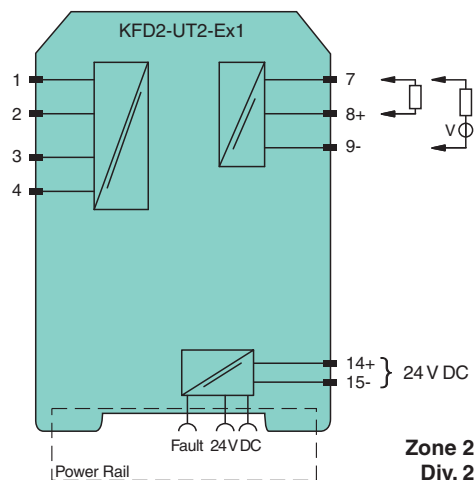
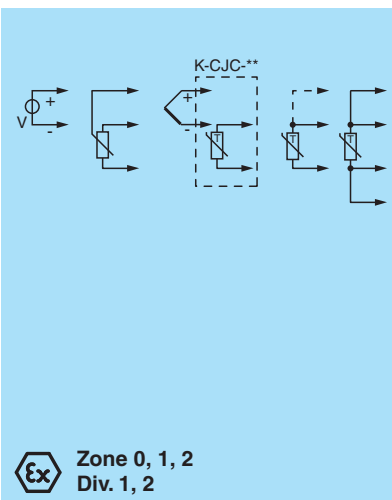
**SIL 2**



## Function

This isolated barrier is used for intrinsic safety applications. The device converts the signal of a resistance thermometer, thermocouple, or potentiometer to a proportional output current. The removable terminal block K-CJC-\*\* is available as an accessory for internal cold junction compensation of thermocouples. A fault is signaled by LEDs and a separate collective error message output. The device is easily configured by the use of the PACTware configuration software. For additional information, refer to the manual and [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

## Connection



## Technical Data

### General specifications

Signal type Analog input

### Functional safety related parameters

Safety Integrity Level (SIL) SIL 2

### Supply

|                   |                                                    |
|-------------------|----------------------------------------------------|
| Connection        | terminals 14+, 15- or power feed module/Power Rail |
| Rated voltage     | $U_r$ 20 ... 30 V DC                               |
| Ripple            | within the supply tolerance                        |
| Power dissipation | $\leq 0.98$ W                                      |
| Power consumption | max. 0.98 W                                        |

### Interface

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

Pepperl+Fuchs Group  
[www.pepperl-fuchs.com](http://www.pepperl-fuchs.com)

USA: +1 330 486 0002  
[pa-info@us.pepperl-fuchs.com](mailto:pa-info@us.pepperl-fuchs.com)

Germany: +49 621 776 2222  
[pa-info@de.pepperl-fuchs.com](mailto:pa-info@de.pepperl-fuchs.com)

Singapore: +65 6779 9091  
[pa-info@sg.pepperl-fuchs.com](mailto:pa-info@sg.pepperl-fuchs.com)

**PEPPERL+FUCHS**

## Technical Data

|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Programming interface            | programming socket                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Input</b>                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Connection side                  | field side                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Connection                       | terminals 1, 2, 3, 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| RTD                              | type Pt10, Pt50, Pt100, Pt500, Pt1000 (EN 60751: 1995)<br>type Pt10GOST, Pt50GOST, Pt100GOST, Pt500GOST, Pt1000GOST (6651-94)<br>type Cu10, Cu50, Cu100 (P50353-92)<br>type Ni100 (DIN 43760)                                                                                                                                                                                                                                                                                                                                                |
| Measuring current                | approx. 200 µA with RTD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Types of measuring               | 2-, 3-, 4-wire connection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Lead resistance                  | max. 50 Ω per line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Measurement loop monitoring      | sensor breakage, sensor short-circuit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Thermocouples                    | type B, E, J, K, N, R, S, T (IEC 584-1: 1995)<br>type L (DIN 43710: 1985)<br>type TXK, TXKH, TXA (P8.585-2001)                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Cold junction compensation       | external and internal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Measurement loop monitoring      | sensor breakage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Potentiometer                    | 0 ... 20 kΩ (2-wire connection), 0.8 ... 20 kΩ (3-wire connection)                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Voltage                          | selectable within the range -100 ... 100 mV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Input resistance                 | ≥ 1 MΩ (-100 ... 100 mV)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Output</b>                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Connection side                  | control side                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Connection                       | output I: terminal 7: source (-), sink (+), terminal 8: source (+), terminal 9: sink(-)                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Output                           | Analog current output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Current range                    | 0 ... 20 mA or 4 ... 20 mA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Fault signal                     | downscale 0 or 2 mA, upscale 21.5 mA (acc. NAMUR NE43)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Source                           | load 0 ... 550 Ω<br>open-circuit voltage ≤ 18 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Sink                             | Voltage across terminals 5 ... 30 V. If the current is supplied from a source > 16.5 V, series resistance of ≥ (V - 16.5)/0.0215 Ω is needed, where V is the source voltage. The maximum value of the resistance is (V - 5)/0.0215 Ω.                                                                                                                                                                                                                                                                                                        |
| <b>Transfer characteristics</b>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Deviation                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| After calibration                | Pt100: ± (0.06 % of measurement value in K + 0.1 % of span + 0.1 K (4-wire connection))<br>thermocouple: ± (0.05 % of measurement value in °C + 0.1 % of span + 1 K (1.2 K for types R and S)) , includes ± 0.8 K fault of the cold junction compensation (CJC)<br>mV: ± (50 µV + 0.1 % of span)<br>potentiometer: ± (0.05 % of full scale + 0.1 % of span, (excludes faults due to lead resistance))                                                                                                                                        |
| Influence of ambient temperature | Pt100: ± (0.0015 % of measurement value in K + 0.006 % of span)/K ΔT <sub>amb</sub> <sup>1)</sup><br>thermocouple: ± (0.02 K + 0.005 % of measurement value in °C + 0.006 % of span)/K ΔT <sub>amb</sub> <sup>1)</sup> , influence of cold junction compensation (CJC) included<br>mV: ± (0.01 % of measurement value + 0.006 % of span)/K ΔT <sub>amb</sub> <sup>1)</sup><br>potentiometer: ± 0.006 % of span/K ΔT <sub>amb</sub> <sup>1)</sup><br><sup>1)</sup> ΔT <sub>amb</sub> = ambient temperature change referenced to 23 °C (296 K) |
| Influence of supply voltage      | < 0.01 % of span                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Influence of load                | ≤ 0.001 % of output value per 100 Ω                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Reaction time                    | worst case value (sensor breakage and/or sensor short circuit detection enabled)<br>mV: 1 s, thermocouples with CJC: 1.1 s, thermocouples with fixed reference temperature: 1.1 s, 3- or 4-wire RTD: 920 ms, 2-wire RTD: 800 ms, Potentiometer: 2.05 s                                                                                                                                                                                                                                                                                       |
| <b>Galvanic isolation</b>        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Output/supply, programming input | functional insulation, rated insulation voltage 50 V AC<br>There is no electrical isolation between the programming input and the supply.<br>The programming cable provides galvanic isolation so that ground loops are avoided.                                                                                                                                                                                                                                                                                                             |
| <b>Indicators/settings</b>       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Display elements                 | LEDs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Configuration                    | via PACTware                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Labeling                         | space for labeling at the front                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Directive conformity</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Electromagnetic compatibility    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

Release date: 2023-01-03 Date of issue: 2023-01-03 Filename: 248764\_eng.pdf

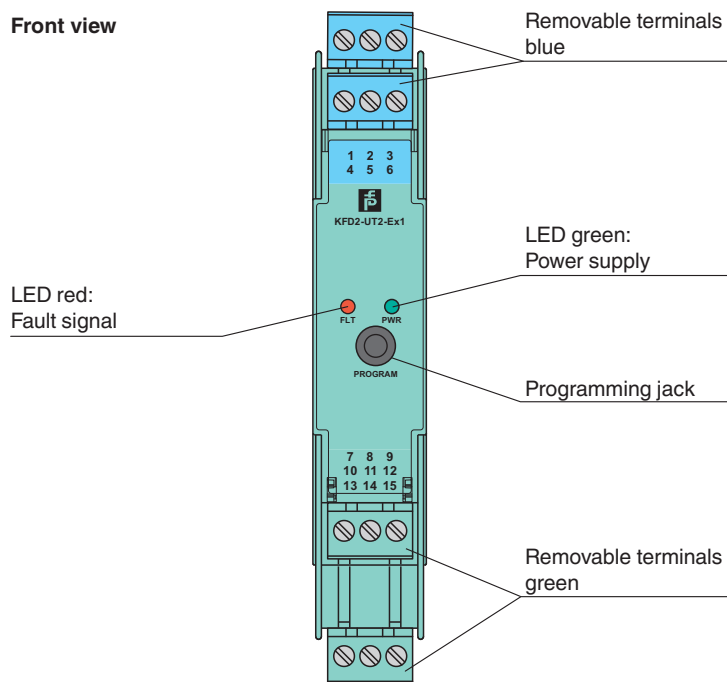
## Technical Data

|                                                                |       |                                                                                                                                                                                                 |
|----------------------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Directive 2014/30/EU                                           |       | EN 61326-1:2013 (industrial locations)                                                                                                                                                          |
| <b>Conformity</b>                                              |       |                                                                                                                                                                                                 |
| Electromagnetic compatibility                                  |       | NE 21:2006                                                                                                                                                                                      |
| Degree of protection                                           |       | IEC 60529:2001                                                                                                                                                                                  |
| Protection against electrical shock                            |       | UL 61010-1:2004                                                                                                                                                                                 |
| <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. 130 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                                |       | CESI 04 ATEX 143                                                                                                                                                                                |
| Marking                                                        |       | Ⓜ II (1)G [Ex ia Ga] IIC<br>Ⓜ II (1)D [Ex ia Da] IIIC<br>Ⓜ I (M1) [Ex ia Ma] I                                                                                                                  |
| Input                                                          |       | Ex ia                                                                                                                                                                                           |
| Inputs                                                         |       | terminals 1, 2, 3, 4                                                                                                                                                                            |
| Voltage $U_o$                                                  |       | 9 V                                                                                                                                                                                             |
| Current $I_o$                                                  |       | 22 mA                                                                                                                                                                                           |
| Power $P_o$                                                    |       | 50 mW                                                                                                                                                                                           |
| Analog outputs, power supply, collective error                 |       |                                                                                                                                                                                                 |
| Maximum safe voltage                                           | $U_m$ | 250 V (Attention! This is not the rated voltage.)                                                                                                                                               |
| Interface                                                      |       |                                                                                                                                                                                                 |
| Maximum safe voltage                                           | $U_m$ | 250 V (Attention! The rated voltage is lower.), RS 232                                                                                                                                          |
| Certificate                                                    |       | TÜV 02 ATEX 1797 X                                                                                                                                                                              |
| Marking                                                        |       | Ⓜ II 3G Ex nA II T4                                                                                                                                                                             |
| Galvanic isolation                                             |       |                                                                                                                                                                                                 |
| Input/Other circuits                                           |       | safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V                                                                                                                     |
| Directive conformity                                           |       |                                                                                                                                                                                                 |
| Directive 2014/34/EU                                           |       | EN 60079-0:2012+A11:2013 , EN 60079-11:2012 , EN 60079-15:2010 , EN 50303:2000                                                                                                                  |
| <b>International approvals</b>                                 |       |                                                                                                                                                                                                 |
| UL approval                                                    |       |                                                                                                                                                                                                 |
| Control drawing                                                |       | 116-0410                                                                                                                                                                                        |
| CSA approval                                                   |       |                                                                                                                                                                                                 |
| Control drawing                                                |       | 116-0314 (cCSAus)<br>116-0347                                                                                                                                                                   |
| IECEx approval                                                 |       |                                                                                                                                                                                                 |
| IECEx certificate                                              |       | IECEx TUN 07.0003<br>IECEx CML 16.0126X                                                                                                                                                         |
| IECEx marking                                                  |       | [Ex ia Ga] IIC<br>[Ex ia Da] IIIC<br>[Ex ia Ma] I<br>Ex nA IIC T4 Gc                                                                                                                            |
| <b>General information</b>                                     |       |                                                                                                                                                                                                 |
| Supplementary information                                      |       | Observe the certificates, declarations of conformity, instruction manuals, and manuals where applicable. For information see <a href="http://www.pepperl-fuchs.com">www.pepperl-fuchs.com</a> . |

Release date: 2023-01-03 Date of issue: 2023-01-03 Filename: 248764\_eng.pdf

## Assembly

Front view



## Matching System Components

|                                                                                     |                                 |                                                                                |
|-------------------------------------------------------------------------------------|---------------------------------|--------------------------------------------------------------------------------|
|  | <b>DTM Interface Technology</b> | Device type manager (DTM) for interface technology                             |
|  | <b>PACTware 5.0</b>             | FDT Framework                                                                  |
|  | <b>K-ADP-USB</b>                | Programming adapter with USB interface                                         |
|  | <b>KFD2-EB2</b>                 | Power Feed Module                                                              |
|  | <b>UPR-03</b>                   | Universal Power Rail with end caps and cover, 3 conductors, length: 2 m        |
|  | <b>UPR-03-M</b>                 | Universal Power Rail with end caps and cover, 3 conductors, length: 1,6 m      |
|  | <b>UPR-03-S</b>                 | Universal Power Rail with end caps and cover, 3 conductors, length: 0.8 m      |
|  | <b>K-DUCT-BU</b>                | Profile rail, wiring comb field side, blue                                     |
|  | <b>K-DUCT-BU-UPR-03</b>         | Profile rail with UPR-03- * insert, 3 conductors, wiring comb field side, blue |

## Accessories

|                                                                                     |               |                    |
|-------------------------------------------------------------------------------------|---------------|--------------------|
|  | <b>K-250R</b> | Measuring resistor |
|-------------------------------------------------------------------------------------|---------------|--------------------|

Release date: 2023-01-03 Date of issue: 2023-01-03 Filename: 248764\_eng.pdf

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

Pepperl+Fuchs Group  
www.pepperl-fuchs.comUSA: +1 330 486 0002  
pa-info@us.pepperl-fuchs.comGermany: +49 621 776 2222  
pa-info@de.pepperl-fuchs.comSingapore: +65 6779 9091  
pa-info@sg.pepperl-fuchs.com
 **PEPPERL+FUCHS**

## Accessories

|                                                                                   |                  |                                                                           |
|-----------------------------------------------------------------------------------|------------------|---------------------------------------------------------------------------|
|  | <b>K-500R0%1</b> | Measuring resistor                                                        |
|  | <b>K-CJC-BU</b>  | Terminal block for cold junction compensation, 3-pin screw terminal, blue |
|  | <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                                   |