PROCESS AUTOMATION

Manual

KFD2-UT-Ex1

CONVERTER

ISO 9001

PEPPERL+FUCHS

Contents

1   Symbols used in this document

This symbol indicates a warning about a possible danger.
In the case of the warning being ignored, the consequences may range
from personal injury through to death or from damage to equipment
through to destruction.

Warning

This symbol warns of a possible fault.
If the instruction given in this warning is not heeded, the device and any
plant or systems connected to it could develop a fault or even fail
completely.

Attention

This symbol brings important information to your attention.

Note

2   Overview

Pepperl+Fuchs K-System devices are used for transmission of signals between field
devices and process control / control systems. Devices that contain the identification
"Ex" in their type code are appropriate for connection of field devices from the
explosion danger area. The field circuits in these devices are intrinsically safe and
galvanically isolated from non-intrinsically safe circuits. In this way, the devices
provide electrical isolation of the region of the plant that is safe from that which is
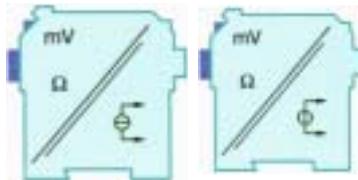exposed to danger of explosion.

The converters
• KFD2-UT-Ex1,
• KFD2-UT-1,
• KFD2-UT-Ex1-1
• KFD2-UT-1-1

in the K-Systems range
(known in short as UT)

are used for purposes of temperature monitoring:

2.1 Input and Output

- To the input of a UT you can connect RTDs Pt100/Ni100 or thermocouples (types: B, E, J, K, L, N, R, S, T). It is possible to enter special characteristics for special RTDs or thermocouples.

- On the UT output, a device current signal is produced in proportion to the temperature of 4 mA ... 20 mA,which can be passed on to the display device or an analog input on the process control / control system.

- To the UT serial RS 232 interface you can connect a PC for programming and diagnosis using PACTware (see Chapter 6).

Input

RS232

Output

3 Safety Instructions

STOP
Warning

The converter KFD2-UT-Ex1 should only be operated by trained specialist personnel in accordance with the manual.

STOP
Warning

Protection of operating personnel and the plant is only assured if the devices are operated in accordance with the instructions for intended use. Operating the devices in any other manner than that described in this manual will compromise the safety and functionality of the devices and attached systems.

STOP
Warning

*Devices should only be fitted, connected and configured **outside the area exposed to danger of explosion** by personnel with the appropriate electrical specialization.*

STOP
Warning

When it is not possible to correct faults, the devices must be taken out of service and action taken to protect against accidental use. Devices should only be repaired directly by the manufacturer, Pepperl+Fuchs. Accessing and modifying the inside of the devices constitutes a danger, and is not authorised. Any actions of this kind will nullify all claim to guarantee.

> *Responsibility for adhering to local safety regulations and directives is held by the operator.*

Note

4   Explosion Protection

For matters concerning primary explosion protection, i.e. measures to prevent or restrict formation of a potentially explosive atmosphere, please refer to DIN EN 1127-1 or the corresponding national regulations.

For matters concerning secondary explosion protection, i.e. measures to prevent ignition by electrical apparatus of a potentially explosive atmosphere, Pepperl+Fuchs are happy to provide their "Ex-Protection Manual" free of charge.

In particular, please refer to DIN EN 60079-10, DIN EN 60079-14, DIN EN 50014 and DIN EN 50020 or the corresponding national regulations. The regulations for the USA, for example, are given in section 9 of the Ex-protection manual.

Pepperl+Fuchs also offers a video and seminar on the topic of "Explosion Protection via Intrinsic Safety".

7

5 Mounting and Connection

5.1 Mounting

⚠️ **Attention**

The KFD2-UT-Ex1 converters are constructed according to protection class IP20 and must be protected accordingly against unfavourable ambient conditions (water, small foreign bodies).

The Pepperl+Fuchs K-System devices, including the converters KFD2-UT-Ex1, can be mounted on a 35 mm DIN rail in accordance with DIN EN 50022. The devices should be clipped on perfectly **vertically**, under no circumstances should they be turned or mounted not straight at the side.

Additional possibilities for mounting, e.g. using the "Power Rail", can be found in the "DIN-Rail Housing" catalog from Pepperl+Fuchs or in the "CD-ROM catalog".
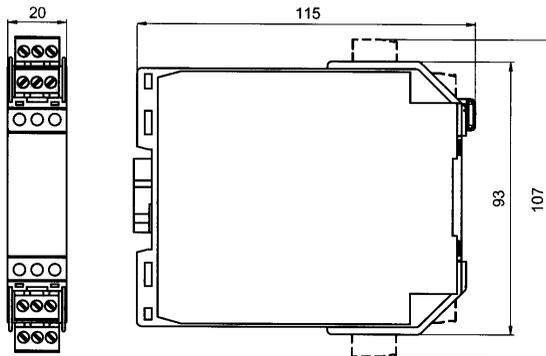
Fig. 5.1:   KFD2-UT-(Ex)1(-1) dimensions (in mm)

5.2 Connection

The removable terminals on the KF line of models simplify connection and switch cabinet construction considerably. In case of service, they enable devices to be swapped in and out whilst the power remains on. The terminals can be screwed, are self opening and provide generous space for connection for conductor cross sections up to 2.5 mm² as well as coded connectors so as to avoid incorrect wiring.

The intrinsically safe field circuit is connected to the **blue** terminals 1 -4 of the KFD2-UT-Ex1. This can be connected by means of interface cable in accordance with DIN EN 60079-14 to the area exposed to danger of explosion.

You can connect:

- a RTD Pt100, Ni100 or special input characteristic
  - in 2-wire design (terminals 2 and 3)
  - in 3-wire design (terminals 1 to 3)
 - in 4-wire design (terminals 1 to 4)

  Terminals 5 and 6 always remain free.
- A thermoelement of type B, E, J, K, L, N, R, S, T or special input characteristic (terminals 1 and 2); for internal cold junction compensation you require the K-CJC terminal accessories instead of the normal terminals 1 – 3.

The **green** terminals provide the following functions:

- Terminals 7-8: Current output (9 free)
- Terminals 11-12: For 24 V DC power supply (10 free); for power supply via power rail with combined fault indication, please see the "DIN-Rail Housing" catalog from Pepperl+Fuchs or the "CD-ROM catalog"

The exact terminal composition can be found in the datasheet.
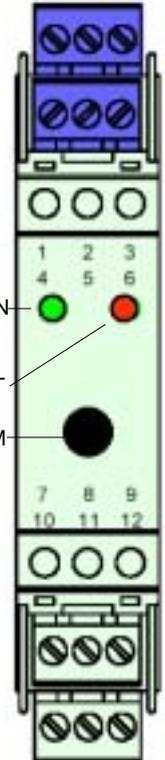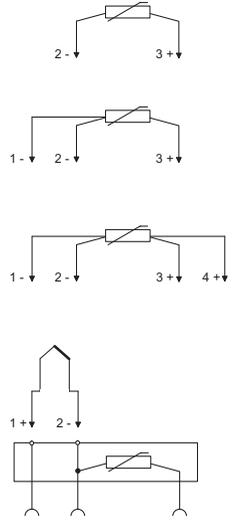
5.3 Front

On the front of the UT you will find (see figure above):

- LED ON (green) to indicate the presence of the supply voltage
- LED FAULT (red) to indicate a fault
- Serial RS 232 interface to connect to a PC for die parameterisation and diagnosis of the UT with PACTware

6 PC-programming software PACTware™

The KFD2-UT-(Ex)1(-1) converters are configured using the PACTware™ software from Pepperl+Fuchs.

PACTware™ can be operated offline and online.

In offline mode, you can create projects and device records and save these to data carrier without a UT needing to be connected.

In online mode, you can then transfer the saved device records to the UT. You can also read the record from the device and make modifications. You can also obviously create a new record when in online mode.

6.1 Installation and Connection to the device

Install the PACTware™ on a PC. The system requirements and the steps of installation you will find in the manual "PACTware™ Edition 2 - Frame Application".

Connect the PC to the UT using the K-ADP1 cable. This cable can be ordered as an accessory.

Insert the cable jack into the RS 232 interface on the front of the UT and the 9-pin or 25-pin connector to a free serial interface on the PC.

Start the PACTware™ software using the icon or Start menu item that was created at installation.
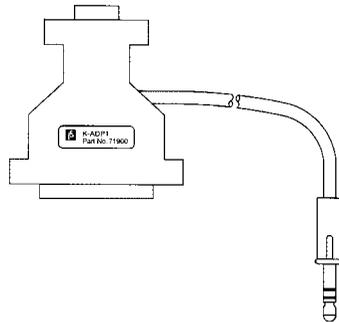
6.2 Device list

With a new project, the device list in the left-hand pane in the PACTware™ software initially contains only the *HOST IBM-PC* entry.

You can work with the device list using the buttons, bottom left:

- *Add*   a device to the list; when this button is pressed, the devices that could be added under the current device selected with the mouse are listed for selection
- *Remove*   the selected device

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- *Edit*   *the data for the selected device*
(also via the Device data menu, via 🖼 and function key F5)

When creating a new UT project, you must first add the *com-KE-300 driver* to the device list. The only parameter for this driver is the PC interface being used. This parameter can be changed as follows:

- *Select com-KE-300 driver Driver* with the mouse
- Click on the button *Edit*
- Properties tab: *Parameter*
- Select the corresponding interface
- *Close*

6.3 Monitor function

If the Monitor function for an UT is chosen (details see in the PACTware™ Edition 2 manual), the following window appears


             cyclical update   Update
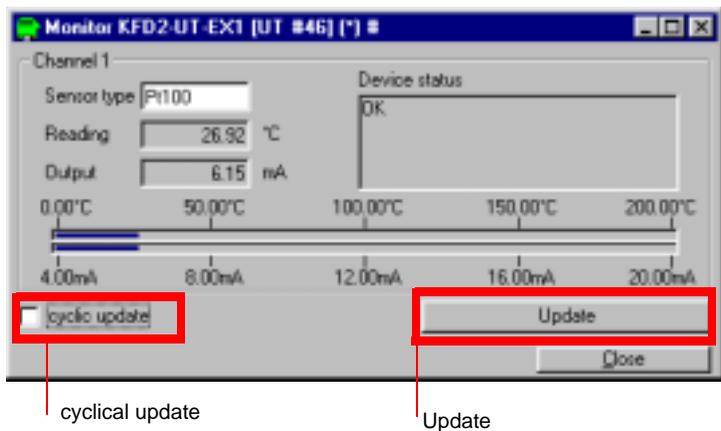
The following nformations will be displayed:

- Sensor type
- value
- corresponding output current
  corresponding output voltage
- device status
- value and output current in form of a bar graph diagram showing relationship to measurement range.

Press the *Update* button to refresh the display. In order to make the display update at regular intervals, press the *Cyclical Update* button.
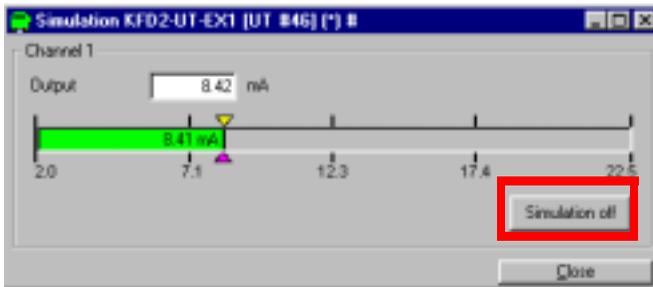
6.4 Simulation function

If the Simulation function for an UT is chosen (details see in the PACTware™ Edition 2 manual), the following window appears:.

STOP
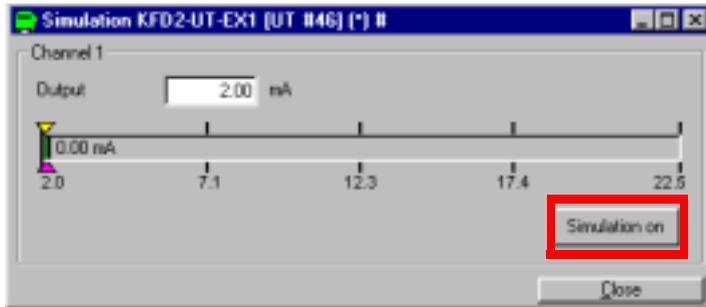
Simulation interrupts the normal function of the device! Ensure before starting the simulation that this interruption will not cause any problems for the plant.

Warning

The simulation is started with the *Simulation on* button:

The simulation is ended by pressing the *Simulation off* button that appears in the place of *Simulation on*. When the simulation is ended, the device starts its normal function again.

The Simulation window can be closed using the *Close* button the standard ⊠ button, upper right, The device **remains** in simulation mode, however, until you select *Simulation off* or turn the device power supply switch off.
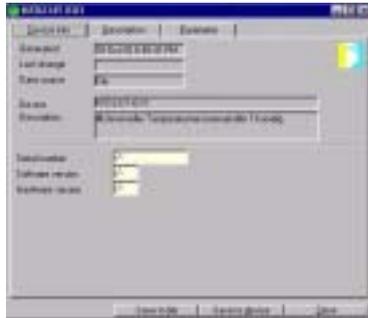
7 Work with Device Data

STOP

Warning

*A change to the device data will change the function of the device!
Ensure before starting transferring new data to the device that this will
not cause any problems for the plant.*

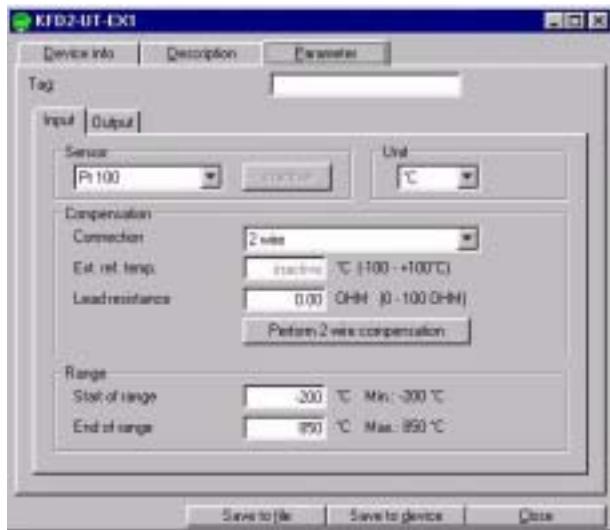### 7.1 *Device Info* and *Description* properties tabs

The information on the *Device Info* properties tab is generated automatically.

The texts on the *Description* properties tab can be changed and saved in the project
file.

Date of issue 28.10.2002

7.2 **Properties tab *Input Parameters***

Once configured in the dialog, the new parameters can be saved to the project file or to the device using the buttons below. The window can be closed using the button on the right or the standard ⊠ button, upper right,

The following parameters can be set:

• *Sensor:*
  – RTD: *PT 100, Ni 100, User RTD*
  – Thermocouples: *T/C-type B, T/C-type E, T/C-type J, T/C-type K, T/C-type L, T/C-type N, T/C-type R, T/C-type S, T/C-type T, User T/C*
  – Other: *Ohm, mV*

  If you select *User RTD* or *User T/C*, you can enter a new sensor characteristic or change an existing characteristic and save this under a new name. With these new sensors, you can then set the same parameters as for the standard sensors.

• *Units*:
  – For RTDs and thermocouples: *°C* or *K*
  – on selection of *Ohm* under Sensor: *Ohm*
  – on selection of *mV* under Sensor: *mV*

  The unit selected at this point is used for **all** corresponding settings and displays in PACTware.

• *Connection type*:
  – for RTDs and *Ohm*: *2 wire, 3 wire, 4 wire*

    For more information please see the data sheet.

If you select *2 wire* you can

→ enter the *lead resistance* (range of values: 0 Ohm ... 100 Ohm) or
→ perform *2 wire equalisation*, in order to specify the resistance

− with Thermocouples: *Ext. Ref. Temp.* or *CJC* (internal cold junction compensation)
For more information please see the data sheet.

If *Ext. Ref. Temp.* is selected, you can

→ enter the external reference temperature (values: -100 °C ... 100 °C)

− If *mV* is selected under Sensor, the connection method of connection cannot be selected

• *Start value* for measurement range: the minimum value corresponds to the selected sensor
• *Final value* for measurement range: the maximum value corresponds to the selected sensor

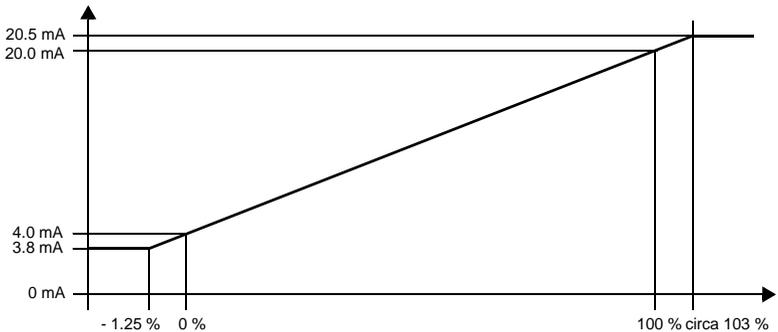## 7.3   Properties tab *Output Parameters*

Here too, once configured in the dialog, the new parameters can be saved to the project file or to the device using the buttons below. The window can be closed using the button on the right or the standard ⊠ button, upper right,

- The *output type* is fixed *4-20 mA.*
- If you select *inverted characteristic* the conversion of *Start value* and *Final value* is reversed (siehe Kapitel 7.2 and under "Output behaviour"), i.e. the UT gives an current output of 20 mA ... 4 mA instead of 4 mA ... 20 mA.
- The *lead breakage* monitor is available for all sensor types, whereas the *lead short circuit* monitor is only for RTDs.
  - You can select and deselect a monitor by clicking on the corresponding control box or vice versa (☑ = selected, ☐ = deselected).
  - For each monitor, you can select the current output reaction - *downscale* or *upscale*.
  - For *downscale* a value between 2 mA and 4 mA can be entered.
  - For *upscale* a value between 20.5 mA and 22 mA can be entered.
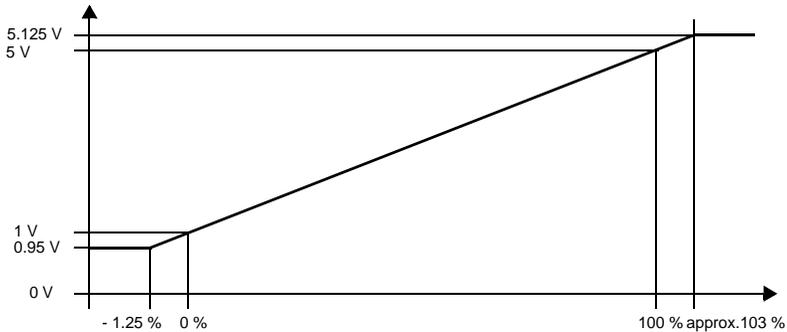
7.4 Current output behaviour

The *Input Parameter Start value* set on the properties tab is converted to 4 mA, the corresponding *Final value* to 20 mA, and all intermediate values are converted in proportion.

When the start value is not attained, the output current decreases in a linear fashion to a minimum of 3.8 mA (- 1.25 % of the measurement range). Further undercutting of the value will not be evaluated (output: 3.8 mA). If the final value is exceeded, the output current increases in a linear fashion to a maximum of 20.5 mA (103 % of the measurement range). Further exceeding of the value will not be evaluated (output: 20.5 mA).

If you select *down scale* for a monitor and have entered a value $\geq$ 3.8 mA, it will not be possible to distinguish the monitor from a value that does not achieve the start value. If you select *upscale* for a monitor and have entered 20.5 mA it will not be possible to distinguish the monitor from a value that exceeds the end value.

7.5   Voltage output behaviour

The *Input Parameter Start value* set on the properties tab is converted to 1 V, the corresponding *Final value* to 5 V, and all intermediate values are converted in proportion.

When the start value is not attained, the output current decreases in a linear fashion to a minimum of 0.95 V (- 1.25 % of the measurement range). Further undercutting of the value will not be evaluated (output: 0.95 V). If the final value is exceeded, the output current increases in a linear fashion to a maximum of 5.125 (103 % of the measurement range). Further exceeding of the value will not be evaluated (output: 5.125 V).

If you select *down scale* for a monitor and have entered a value ≥ 0,95 V, it will not be possible to distinguish the monitor from a value that does not achieve the start value. If you select *upscale* for a monitor and have entered 5.125 V it will not be possible to distinguish the monitor from a value that exceeds the end value.

One Company, Two Divisions.

Factory Automation Division

Product Range

- Digital and analogue sensors
- in different technologies
    - Inductive and capacitive sensors
    - Magnetic sensors
    - Ultrasonic sensors
    - Photoelectric sensors
- Incremental and absolute rotary encoders
- Counters and control equipment
- Identification Systems
- AS-Interface

Areas of Application

- Machine engineering
- Conveyor or transport
- Packaging and bottling
- Automotive industry

Process Automation Division

Product Range

- Signal conditioners
- Intrinsically safe interface modules
- Remote Process Interface (RPI)
- Intrinsically safe field bus solutions
- Level control sensors
- Process measuring and control systems engineering at the interface level
- Intrinsic safety training

Areas of Application

- Chemical industry
- Industrial and community sewage
- Oil, gas and petrochemical industry
- PLC and process control systems
- Engineering companies for process systems

Service Area

Worldwide sales, customer service and consultation via competent and reliable Pepperl+Fuchs associates ensure that you can contact us wherever or whenever you need us. We have subsidiaries worldwide for your convenience.

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