

MANUAL

Universal Temperature Converter KCD2-UT2-(Ex)1



With regard to the supply of products, the current issue of the following document is applicable:

The general terms of delivery for products and services of the electrical industry, as published by the Central Association of the "Elektrotechnik und Elektroindustrie (ZVEI) e.V.", including the supplementary clause "Extended ownership rights".

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1 Symbols used in this document



Warning

*This symbol indicates a warning about a possible danger.
Failure to observe this warning may result in personal injury or death, or property damage or destruction.*



Attention

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



Note

This symbol brings important information to your attention.

2 Overview

2.1 Application

The devices of the K-System from Pepperl+Fuchs are used to transmit signals between field devices and the process control system or control.

Devices with the "Ex" code in their type identifiers are suitable for connection to field devices in the hazardous area. The field current circuits of these devices are intrinsically safe and are galvanically isolated from the not intrinsically safe circuits. The devices thus represent an electrical isolation between the hazardous area and the safe area within a system.

Devices without an "Ex" code can be used for signal transmission between field devices in the safe area and the process control system or the control.

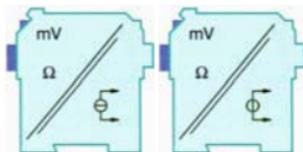


The temperature converters KCD2-UT2-(Ex)1 of the K-System (referred to as UT2) are used for temperature measurement.

Resistance temperature detectors, thermocouples, potentiometers or voltage sources can be connected to the inputs of the converter.

The device converts the input signals into proportional current signals or voltage signals.

The output signals can, for example, be forwarded to displays or analog inputs of the process control system.



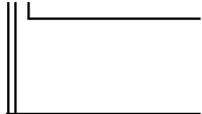
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Further information (e. g. certificates, the data sheets for the UT2 devices and the operating instructions for the K-System) can be found on our Internet page www.pepperl-fuchs.com/pa (under product search, enter "UT2").

2.2 Versions

The following versions of the temperature transmitter are available:

KCD2-UT2- ** *



1 = 1 input, 1 output

Ex = for connection of field devices in areas exposed to danger of explosion

without identifier letters = for connection of field devices in the safe area

3 Safety instructions



Warning

The devices may only be operated by trained personnel in a manner corresponding to this operating manual.



Warning

Protection of operating personnel and the plant is only guaranteed if the devices are used according to their specifications. Any use other than that described in the manual endangers the safety and functionality of the devices and the connected systems.



Warning

*The devices may only be mounted, connected and adjusted by electrical professionals **outside the explosion hazardous area.***



Warning

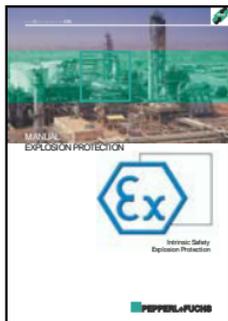
If malfunctions cannot be eliminated, place the devices out of service and protect them from accidental use. The devices may only be repaired directly by the manufacturer Pepperl+Fuchs. Any opening or change in the units are dangerous and are therefore not to be performed. They void any warranty.



Note

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

4 Explosion protection



For primary explosion protection, that is, measures to avoid or restrict the production of a dangerous, explosive atmosphere, please consult the directive 1999/92/EC (ATEX 137) or the corresponding national provisions.

For secondary explosion protection, that is, measures to avoid the ignition of a surrounding explosive atmosphere by electrical equipment, Pepperl+Fuchs will gladly provide you with a copy of the "Ex-protection manual" for a nominal fee.

Please pay particular attention to EN 60079-0, EN 60079-11 and EN 60079-15 or the corresponding national provisions.

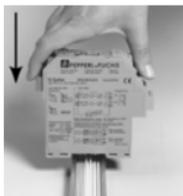
Pepperl+Fuchs also provides a seminar on the topic of explosion protection.

5 Mounting and connection

5.1 Mounting



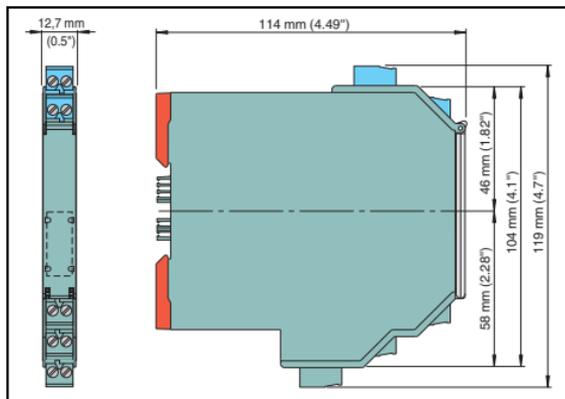
The devices are constructed in protection class IP20 and must therefore be protected from undesirable environmental conditions (water, dust, small foreign objects).



The devices of the K-Systems from Pepperl+Fuchs and thus also the temperature transmitters KCD2-UT2-(Ex)1 can be mounted on a 35 mm DIN mounting rail corresponding to EN 60715. The devices must be snapped onto the rail **vertically**, and never slanted or tipped to the side.

Further mounting alternatives, e. g. using the Power Rail, can be found in the operating instructions for the K-System on our Internet page www.pepperl-fuchs.com/pa (under product search, enter *UT2*).

Dimensions of the
KCD2-UT2-(Ex)1 in mm



5.2 Connection

The KC series' slip-off terminals significantly simplify connection and construction of switching cabinets. They allow quick and error-free exchange of the unit when service is needed.

The terminals can be screwed on, are self-opening, and have generous connection room for a wire diameter of up to 2.5 mm² and coded plugs, so that leads cannot be confused.

The Intrinsically safe field circuit is connected to the **blue** terminals 1 to 4 of the KCD2-UT2-Ex-1. These may be conducted using DIN EN 60079-14 compliant leads into the hazardous area.

The non-intrinsically safe field circuit is connected to the **green** terminals 1 to 4 of the KCD2-UT2-1.

The non-intrinsically safe circuit is connected to the **green** terminals 5 to 10 of the KCD2-UT2-(Ex)1.

Input connection (field circuit)

You can connect the following sensors:

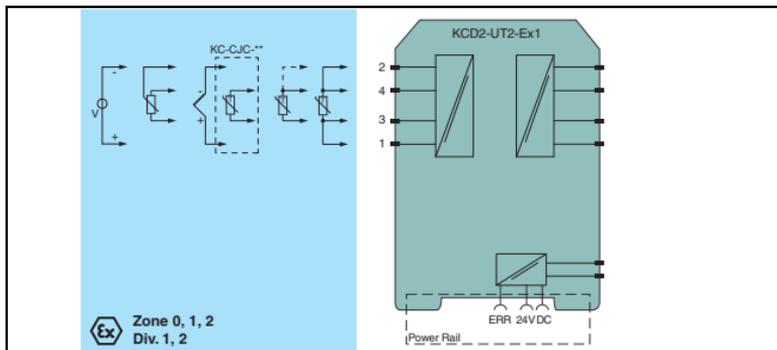
- Resistance temperature sensors
 - Pt10, Pt50, Pt100, Pt500, Pt1000 according to EN 60751: 1995 or GOST 6651-94
 - Ni 100 according to DIN 43760
 - Cu10, Cu50, Cu100 according to GOST P50353-92

in 2-wire, 3-wire or 4-wire technique

- Thermocouples
 - Type B, E, J, K, N, R, S, T according to IEC 584-1: 1995
 - Type L according to DIN 43710
 - Type TXA, TXK, TXKH according to GOST P8.585-2001

For a cold junction compensation, you require the K-CJC-** terminal block as an accessory;
for information on entering the external reference temperature see section 7.2.

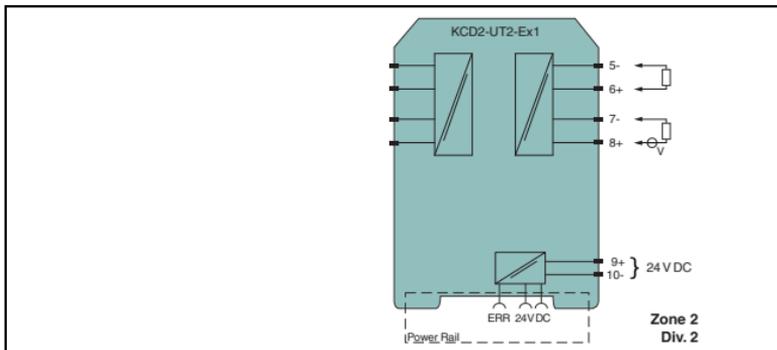
- Potentiometers (0 Ω to 20 k Ω) in 2-wire technique
- Sources for voltage signals between -100 mV and +100 mV



Output connection (control circuit)

The following connections are available:

- Terminals 5/6: analog current output, source
- Terminals 7/8: analog current output, sink
- Terminals 8/10: power supply 24 V DC



If a current output is operated as a sink, the voltage across the terminals must be between 5 V and 30 V. An additional resistance is only required if the voltage is above 16.5 V. The resistance must be between $(U - 16.5 \text{ V})/0.0215 \text{ A}$ and $(U - 5 \text{ V})/0.0215 \text{ A}$ (see diagram).

Example: $U = 24 \text{ V}$

$$(24 \text{ V} - 16.5 \text{ V})/0.0215 \text{ A} = 350 \Omega$$

$$(24 \text{ V} - 5 \text{ V})/0.0215 \text{ A} = 880 \Omega$$

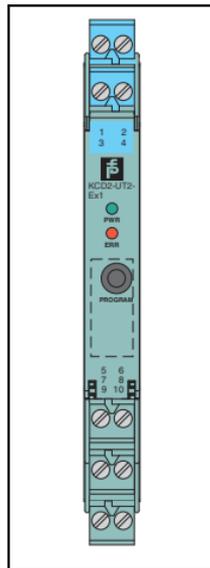


If a current output is operated as a source, the load resistance must be between $0\ \Omega$ and $550\ \Omega$. Further information on connecting the UT2 can be found in the data sheet and in the operating instructions for the K-System on our Internet page www.pepperl-fuchs.com/pa (under product search, enter *UT2*).

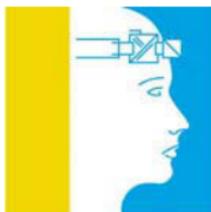
5.3 Controls and indicators of the device

On the front panel of the UT2 you will find:

- LED ERR 1 (red) to indicate a fault signal at terminals 1 to 4
- LED PWR (green) to indicate the supply voltage
- serial RS 232 interface to connect to a PC for parameterisation and diagnosis of the UT2 using **PACTware™**



6 Configuration tools



PACTware™

The temperature transmitters KFD2-UT2-(Ex)*(-1) are parameterised using the configuration tool **PACTware™**.

The **PACTware™** on-line version can be downloaded free of charge from our internet page www.pepperl-fuchs.com/pa under software/PACTware. Licensed versions are available at a charge.

The device-independent features of the software are described in the "**PACTware™** process automation configuration tool" manual, which can also be downloaded free of charge in several languages from our internet page www.pepperl-fuchs.com/pa under software/PACTware.

In the following, you will find the device-specific information for the temperature converters.

6.1 Installation and connection with the device

Install the **PACTware™** on a PC. The system requirements and the installation steps can be found in the "**PACTware™** process automation configuration tool" manual.

Connect the PC and the UT2 using the K-ADP1 cable. This cable can be ordered as an accessory. If possible, please use the new version of the cable (part number 181953, length of the jack plug 14 mm). When using the old version (length of plug 18 mm), the jack plug will project out approx. 3 mm. However, this does not affect the function.



Attention

Pressing the plug in by force may damage the end devices.

Connect the cable with the jack plug to the RS 232 interface on the front panel of the UT2. At the PC connect it to the 9-pin or the 25-pin connector of a free serial interface.

Start the **PACTware™** as described in the "**PACTware™** process automation configuration tool" manual.

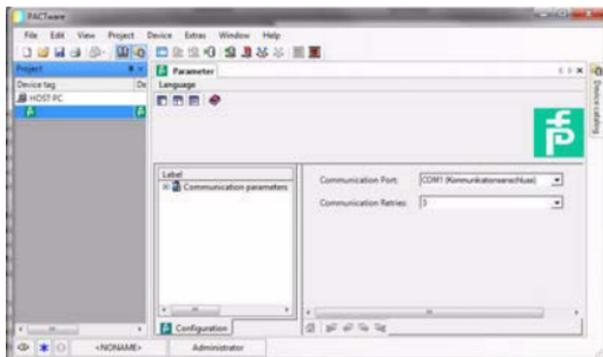
6.2 Communication driver

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In a **PACT^{ware}**™ project, communication with a UT2 is only possible via the communication driver **P2P RS232 FDT**. If your project does not yet contain such a driver, please add it to the project from the device catalogue (see "**PACT^{ware}**™ process automation configuration tool" manual).

The parameters of the communication DTM is the used PC interface and the number of retries. The parameter is set as follows:

- Double-click the **P2P RS232 FDT** driver with the mouse
- Select the **Communication Port**
- **Communication Retries**: number of retries the COM DTM attempts to establish communication to the connected device.



To add a UT2 to a project, select a **P2P RS232 FDT** driver of the project. Then add the UT2 from the device catalogue.

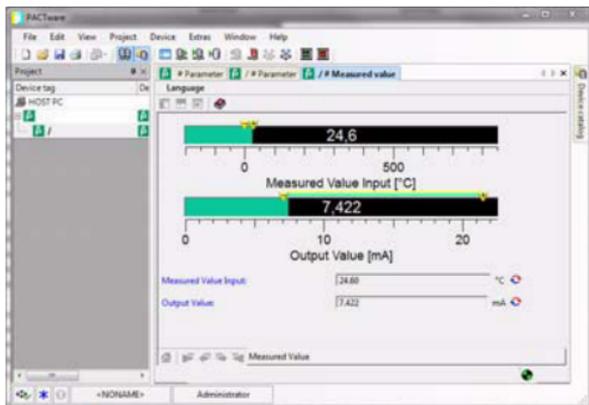
Further information on the individual steps can be found in the "**PACT^{ware}**™ process automation configuration tool" manual.

The description in the following chapter assumes that a UT2 has been selected in the project.

6.3 Measured value

If you have started the communication between **PACT_{ware}**TM and UT2 (e. g. via *Device data* → *Establish connection*), you can open the Measured value window via *Device data* → *Measured value*. It shows the following information on the outputs of the UT2:

- Measured values at the inputs as numerical values and bar graph, displayed in the selected units.
- Values of the analogue outputs as numerical value and bar graph, displayed in the selected unit.



6.4 Simulation

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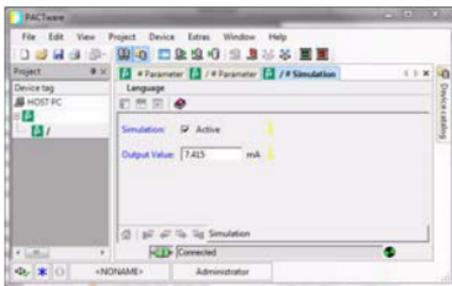
If you have started the communication between **PACT^{ware}™** and UT2 (e. g. via *Device data* → *Establish connection*), you can open the Simulation window via *Device data* → *Simulation*.



Warning

*The simulation interrupts the normal function of the device!
Before starting the simulation, make sure that no dangerous condition in the plant will result.*

The simulation mode is started with the check box *Simulation* *Active*.



You can now specify output currents or output voltages for testing purposes. Press Enter to take over the set numerical value.

Use the check box *Simulation* *Active* to end the simulation. The device will then immediately back to its normal function.

If the power supply is interrupted, the device ends the simulation.



Note

*You can close the simulation window with the Close button or by clicking on the Windows-standard button at the top right. The device will **remain** in simulation mode, however, until you select *Simulation* *Active* again.*

6.5 Diagnosis

If you have started the communication between **PACT_{ware}**TM and UT2 (e. g. via *Device data* → *Establish connection*), you can open the Diagnosis window via *Device data* → *Diagnosis*. It shows the following information:



Explanations:

- *Memory error*: error in the memory of the UT2; if this error was caused by an incorrect data transfer, you can eliminate it via *Device data* → *Additional functions* → *Service* (see section 6.6); otherwise, please contact Pepperl+Fuchs
- *Internal device error*: please contact Pepperl+Fuchs
- *Simulation mode*: see section 6.4

- *Undervoltage lockout*: the supply voltage is too low for the outputs to work properly, the outputs return 0 mA or 0 V, no matter which fault current/which fault voltage has been selected
- *Sensor breakage*: see section 7.2
- *Sensor short circuit*: only RTD type of sensor; see section 7.2
- *Overrange, Underrange*: measured variable outside the maximum measuring range of the selected sensor (see section 7.3 and section 7.4)
- *CJC Error*: if the cold junction compensation has been selected (see section 7.2) and a breakage or short circuit occurs within the K-CJC-** terminal
- *Input*: terminals 1 to 4 (also uses terminal 4 for 4-wire resistance measurement)

6.6 Service

In menu Service the factory settings of the UT2 can be reloaded.
Reload the factory settings via pressing the button *Factory Reset*.

7 Editing device data

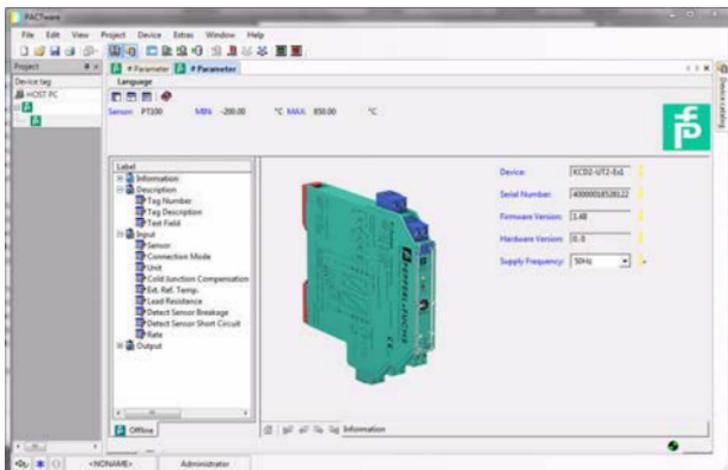


Warning

*Any change to device data will change the operation of the device!
Before transferring new data into the device, make sure that no danger to the installation will result.*

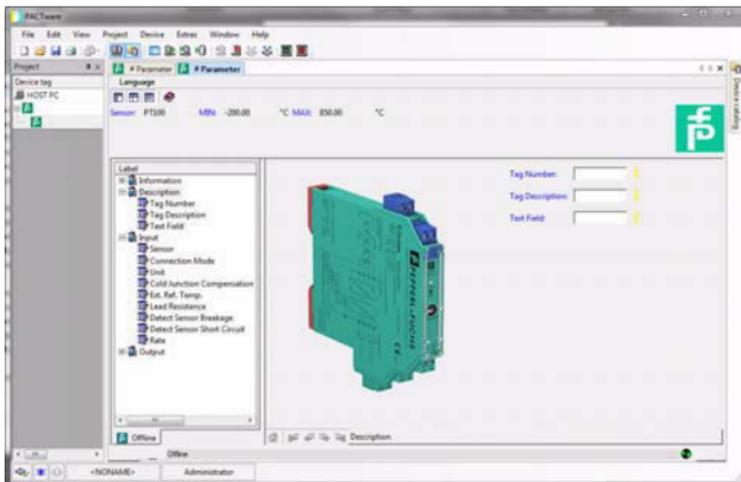
If you call the parameters for a UT2 in **PACT^{wire}™** (e. g. *Device data* → *Parameters*, see "**PACT^{wire}™** process automation configuration tool" manual), a window with menus for parameterization appears, these menus will be described as follows.

7.1 Menu Information and Description



The information in the upper part of the menu *Information* is read from the UT2. This information cannot be changed.

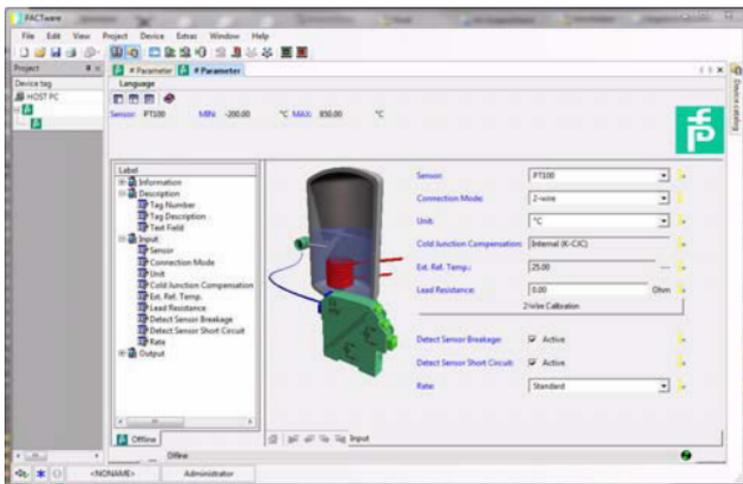
Please specify the frequency of your supply network (50 Hz or 60 Hz) under *Net frequency*. This way you achieve the best possible suppression of influences of this net frequency on the UT2.



The information in menu *Description* can be edited as desired.

7.2 Menu Input

On the menu *Input*, you set the parameters for the input at the terminals 1 to 4.



The following parameters can be set:

- **Sensor** (see section 5.2):
 - Resistance temperature detector: *Pt10GOST* etc.
 - Thermocouple: *TXK* etc.
 - *Potentiometer*
 - *Voltage*
- **Connection mode** (for resistance temperature detectors only, see section 5.2):
 - *2-wire*
 - *3-wire*
 - *4-wire*
- **Unit**:
 - for resistance temperature detectors and thermocouples: °F, K or °C
 - for potentiometers: fixed *ratio*
 - for voltage (sources): fixed *mV*

The unit selected here will be used for **all** respective settings and displays in **PACT_{wire}TM**.

- **Cold junction compensation** (for thermocouples only):
 - external (Reference temperature)
 - internal (K-CJC-**)

If you have selected *Ext. ref. temp.*, you can enter the external reference temperature (range of values: -100 °C to 320 °C)

For an *internal Cold junction compensation*, you require the K-CJC-** terminal block as an accessory instead of the normal terminal 1 to 4 (see section 5.2).

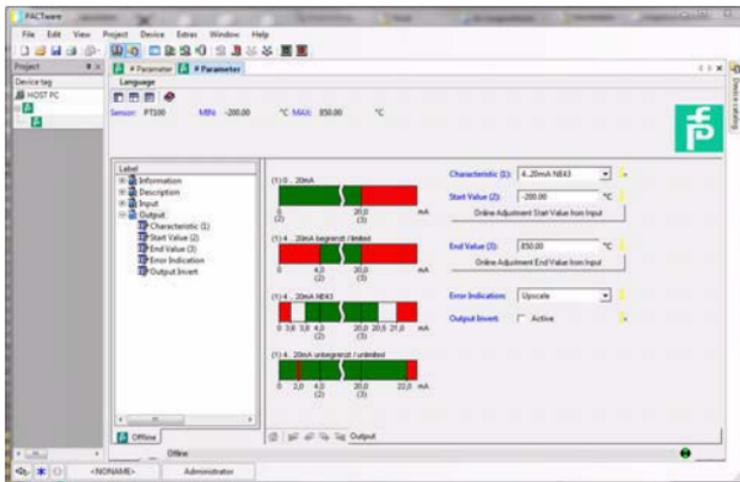
- **Lead Resistance**: When connecting an RTD with 2-wire connection the lead resistance of the cabling can be entered numerically if known.
- **2-Wire Calibration**: When connecting an RTD with 2-wire connection the lead resistance of the cabling can be calibrated if the resistance is unknown. For calibration the sensor must be jumpered.
- **Sensor-breakage monitoring** (for all types of sensors)

- *Sensor-short-circuit monitoring* (for resistance temperature detectors only)
You activate or deactivate monitoring by clicking the respective checkbox (= selected, = deselected).
- *Measuring rate* (for resistance temperature detectors only)
 - *slow*
 - *standard*

With the *standard* measuring rate, the accuracy values specified in the data sheet are adhered to. With the *slow* measuring rate, the rejection of 50 Hz and 60 Hz is improved.

7.3 Menu Output

On the menu *Output*, you set the parameters for the output at the terminals 5 to 8 (see section 5.2).



The following parameters can be set:

- **Characteristic:**
 - 4 mA ... 20 mA unlimited
 - 4 mA ... 20 mA (NE 43)
 - 4 mA ... 20 mA limited
 - 0 mA ... 20 mA

For information on the behaviour of the current output at the different settings, see section 7.4.

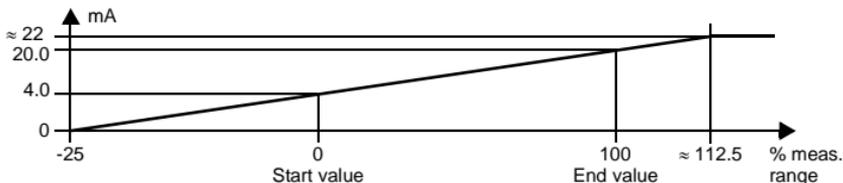
- **Start value** of the measurement range
The minimum possible value is displayed according to the selected sensor. You can also use the *Adopt from measured value* button for the start value.
- **End value** of the measurement range
The maximum possible value is displayed according to the selected sensor. You can also use the *Adopt from measured value* button for the end value.
- **Error Indication:** (see section 7.4.5)
 - Upscale
 - Downscale
 - Hold
 - Up-/downscale (only suitable for use with RTDs)
- **Characteristic inverted:** see section 7.4; you activate or deactivate the inverted characteristic by clicking the respective checkbox (= selected, = deselected).

7.4 Behaviour of the current output

The linear behaviour outside the measurement range described in the following only results if temperature values ranging between the minimum value and the maximum value of the selected sensor correspond to the current values. If this is not the case, the output current jumps to the minimum or maximum specified value. The Diagnosis window (see section 6.5) shows the message *Above limit* or *Below limit*.

If you select *Characteristic inverted*, the conversion of start value and end value will be inverted.

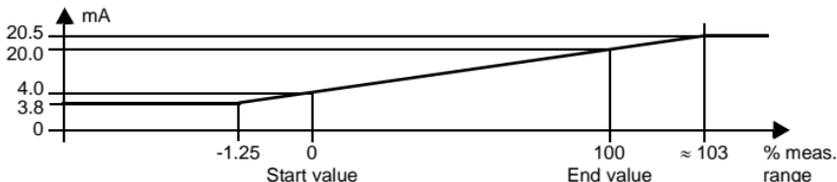
7.4.1 Setting 4 mA ... 20 mA unlimited



At this setting, the start value of the measurement range is converted to 4 mA and the end value to 20 mA. Intermediate values are converted proportionately.

If the value falls below the start value, the output current decreases linearly to a minimum of 0 mA (-25 % of the measurement range). Further decreases cannot be evaluated (output 0 mA). If the value exceeds the end value, the output current increases linearly to a maximum of 22 mA (approx. 112.5 % of the measurement range). Further increases cannot be evaluated (output approx. 22 mA).

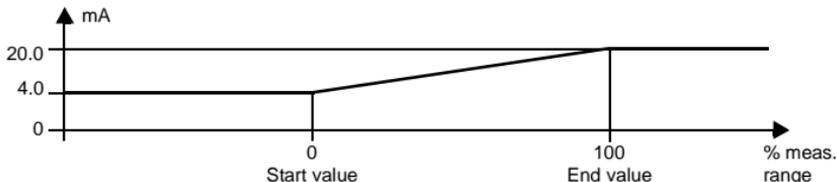
7.4.2 Setting 4 mA ... 20 mA (NE 43)



At this setting, the start value of the measurement range is converted to 4 mA and the end value to 20 mA. Intermediate values are converted proportionately.

If the value falls below the start value, the output current decreases linearly to a minimum of 3.8 mA (-1.25 % of the measurement range). Further decreases cannot be evaluated (output 3.8 mA). If the value exceeds the end value, the output current increases linearly to a maximum of 20.5 mA (approx. 103 % of the measurement range). Further increases cannot be evaluated (output 20.5 mA).

7.4.3 Setting 4 mA ... 20 mA limited

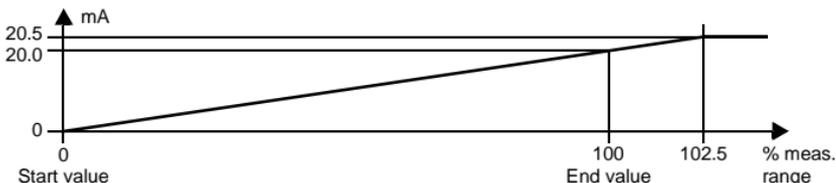


At this setting, the start value of the measurement range is converted to 4 mA and the end value to 20 mA. Intermediate values are converted proportionately.

Values below the start value cannot be evaluated (output 4 mA). Values above the end value cannot be evaluated either (output 20 mA).

7.4.4 Setting 0 mA ... 20 mA

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At this setting, the start value of the measurement range is converted to 0 mA and the end value to 20 mA. Intermediate values are converted proportionately.

Values less than the start value cannot be evaluated (output 0 mA). If the value exceeds the end value, the output current increases linearly to a maximum of 20.5 mA (102.5 % of the measuring range). Further increases cannot be evaluated (output 20.5 mA).

7.4.5 Fault current

The following table shows the values of the current output during a fault, depending on the settings.

Setting	Characteristic 4 mA ... 20 mA unlimited	Characteristics 4 mA ... 20 mA (NE 43) 4 mA ... 20 mA limited	Characteristic 0 mA ... 20 mA
Upscale	approx. 22 mA (cannot be distinguished from value exceeding end value)	approx. 21.5 mA	approx. 21.5 mA
Downscale	0 mA (cannot be distinguished from value below start value)	2.0 mA	0 mA (cannot be distinguished from measurement of the start value)
Hold	last measured value before the fault		
Upscale/ downscale only makes sense for RTD	approx. 22 mA in the case of lead short circuit (cannot be distinguished from value exceeding end value)	approx. 21.5 mA in the case of lead short circuit	approx. 21.5 mA in the case of lead short circuit
	0 mA in the case of lead breakage (cannot be distinguished from value below start value)	2.0 mA in the case of lead breakage	0 mA in the case of lead breakage (cannot be distinguished from measurement of the start value)

PROCESS AUTOMATION – PROTECTING YOUR PROCESS



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