



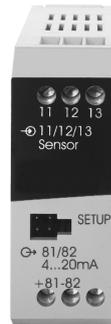
TT956530/...



TT956531/...



TT956533/...



TT956532/...



TT956534/...

## TT 95.653x

Analog transmitter  
with digital adjustment

## B 95.6530 Operating Instructions

# 1 Type designation

## 1.1 Basic version

### TT 95653x

#### (1) Basic version

|        |   |
|--------|---|
| 956530 | TT 956530 F<br>analog 2-wire transmitter<br>for mounting inside terminal head Form F<br>(2-wire only) |
| 956531 | TT 956531 B<br>analog 2-wire transmitter<br>for mounting inside terminal head Form B,BUZ,BUZ-H        |
| 956532 | TT 956532 T<br>analog 2-wire transmitter<br>for rail mounting   |
| 956533 | TT 956533 BU<br>analog 3-wire transmitter<br>for mounting inside terminal head Form B,BUZ,BUZ-H       |
| 956534 | TT 956534 TU<br>analog 3-wire transmitter<br>for rail mounting  |

#### (2) Basic type extension

|           |    |   |
|-----------|----|---|
| x x x x x | 88 | factory-set<br>(probe break: positive; lead resistance: 0Ω)               |
| x x x x x | 99 | configuration to customer specification<br>(please specify in plain text) |

#### (3) Input

|         |     |                         |
|---------|-----|-------------------------|
| x x x x | 001 | Pt100 in 3-wire circuit |
| x       | 003 | Pt100 in 2-wire circuit |

#### (4) Output

|       |     |          |
|-------|-----|----------|
| x x x | 005 | 4 — 20mA |
| x x   | 040 | 0 — 10V  |

Order code                     (1) /  (2) -  (3) -  (4)

Order example                956531 / 88 - 001 - 005

# 1 Type designation

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## 1.2 Standard accessories

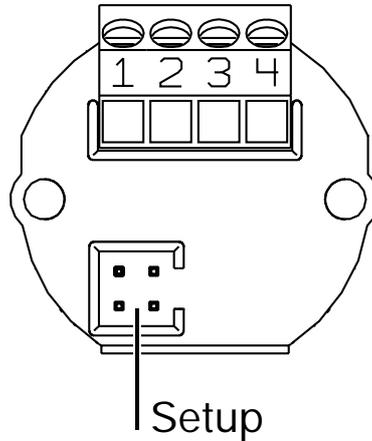
- Operating Instructions
- fixing items

## 1.3 Accessories

- PC setup program, multilingual
- PC interface cable (electrically isolated) with TTL/RS232 converter, power supply (230V AC) and adapter
- supply units 1-way and 4-way
- isolating amplifier and supply isolator
- supply unit for transmitters
- fixing bracket for mounting Type 956531/... and Type 956533/... on rail.

## 2 Installation

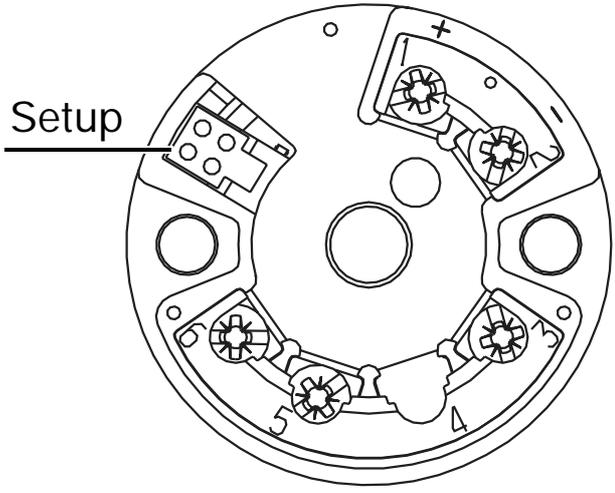
### 2.1 Connection Type 956530/...

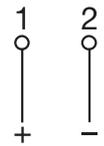
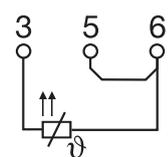
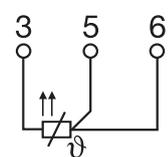


| Connection for   | Terminals |   |
|--|-----------|---|
| Supply voltage<br>7.5 — 30V DC<br>or<br>current output<br>4 — 20mA | +1<br>-2  | $R_B = \frac{U_b - 7.5V}{22mA}$ $R_B = \text{burden resistance}$ $U_b = \text{supply voltage}$ <div style="text-align: center;"> </div> |
| <b>Analog inputs</b>   |           |   |
| Resistance thermometer<br>in 2-wire<br>circuit                     | 3<br>4    | $R_L = 0\Omega$ as standard<br>$R_L = \text{lead resistance}$<br>per conductor <div style="text-align: center;"> </div>                 |

## 2 Installation

### 2.2 Connection Type 956531/...



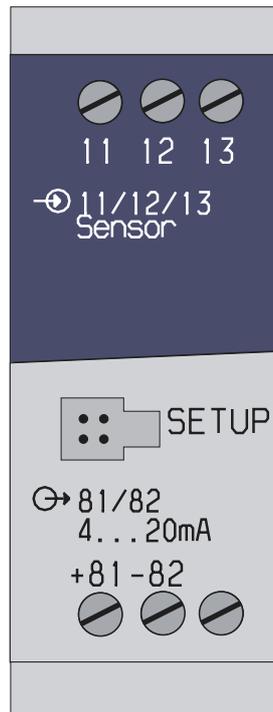
| Connection for   | Terminals  |   |
|--|--|---|
| Supply voltage<br>7.5 — 30V DC<br>or<br>current output<br>4 — 20mA | +1<br>-2<br>$R_B = \frac{U_b - 7.5V}{22mA}$<br>$R_B =$ burden resistance<br>$U_b =$ supply voltage |   |
| <b>Analog inputs</b>   |  |   |
| Resistance thermometer<br>in 2-wire<br>circuit                     | 3<br>5<br>6<br>$R_L = 0\Omega$ as standard<br>$R_L =$ lead resistance<br>per conductor             |  |
| Resistance thermometer<br>in 3-wire<br>circuit                     | 3<br>5<br>6<br>$R_L \leq 11\Omega$<br>$R_L =$ lead resistance<br>per conductor                     |  |



When mounting the transmitter Type 956531/... on the rail, using the mounting bracket. Make sure to route the cables in accordance with the EMC regulations.

## 2 Installation

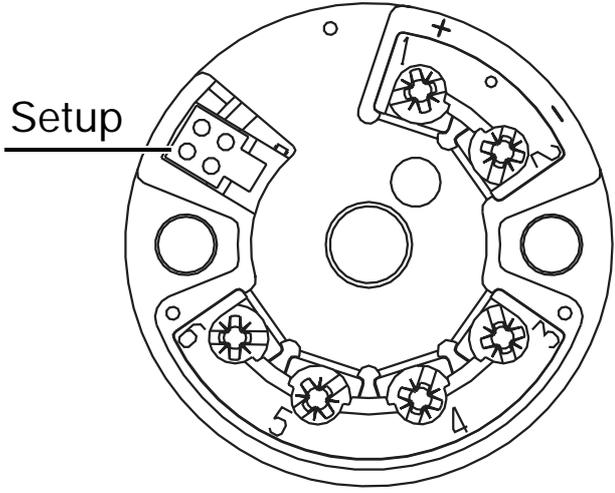
### 2.3 Connection Type 956532/...

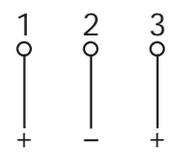
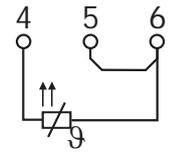
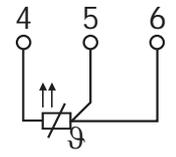


| Connection for   | Terminals      |   |
|--|----------------|---|
| Supply voltage<br>7.5 — 30V DC<br>or<br>current output<br>4 — 20mA | +81<br>-82     | $R_B = \frac{U_b - 7.5V}{22mA}$ $R_B =$ burden resistance<br>$U_b =$ supply voltage |
| <b>Analog inputs</b>   |                |   |
| Resistance thermometer<br>in 2-wire<br>circuit                     | 11<br>12<br>13 | $R_L = 0\Omega$ as standard<br>$R_L =$ lead resistance<br>per conductor             |
| Resistance thermometer<br>in 3-wire<br>circuit                     | 11<br>12<br>13 | $R_L \leq 11\Omega$<br>$R_L =$ lead resistance<br>per conductor                     |

## 2 Installation

### 2.4 Connection Type 956533/...



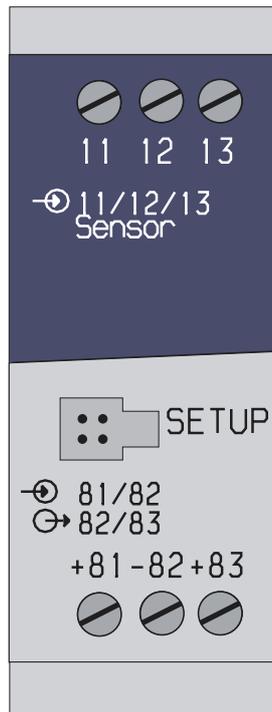
| Connection for                                 | Terminals  |   |
|--|--|---|
| Supply voltage<br>15 — 30V DC                  | +1<br>-2   |   |
| Voltage output<br>0 — 10V                      | -2 load $\geq 10k\Omega$<br>+3   |   |
| <b>Analog inputs</b>                           |  |   |
| Resistance thermometer<br>in 2-wire<br>circuit | 4<br>5<br>6<br>$R_L = 0\Omega$ as standard<br>$R_L =$ lead resistance<br>per conductor |  |
| Resistance thermometer<br>in 3-wire<br>circuit | 4<br>5<br>6<br>$R_L \leq 11\Omega$<br>$R_L =$ lead resistance<br>per conductor         |  |



When mounting the transmitter Type 956533/... on the rail, using the mounting bracket (Sales No. 00352463), make sure to route the cables in accordance with the EMC regulations.

## 2 Installation

### 2.5 Connection Type 956534/...



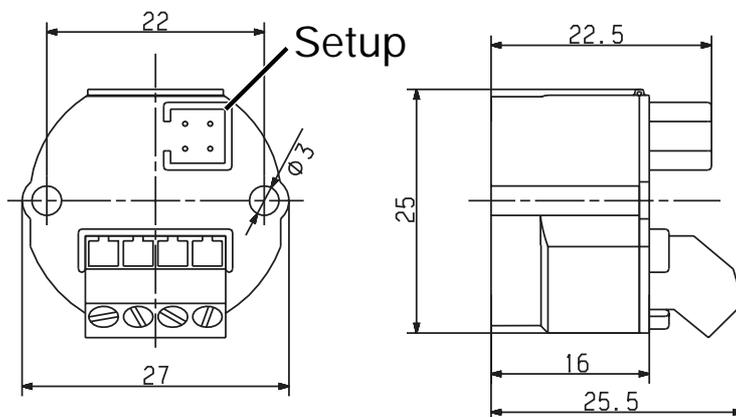
| Connection for                                 | Terminals   |  |
|--|---|--|
| Supply voltage<br>15 — 30V DC                  | +81<br>-82  |  |
| Voltage output<br>0 — 10V                      | -82    load $\geq 10\text{k}\Omega$<br>+83  |  |
| <b>Analog inputs</b>                           |   |  |
| Resistance thermometer<br>in 2-wire<br>circuit | 11<br>12<br>13<br>$R_L = 0\Omega$ as standard<br>$R_L =$ lead resistance<br>per conductor |  |
| Resistance thermometer<br>in 3-wire<br>circuit | 11<br>12<br>13<br>$R_L \leq 11\Omega$<br>$R_L =$ lead resistance<br>per conductor         |  |

## 2 Installation

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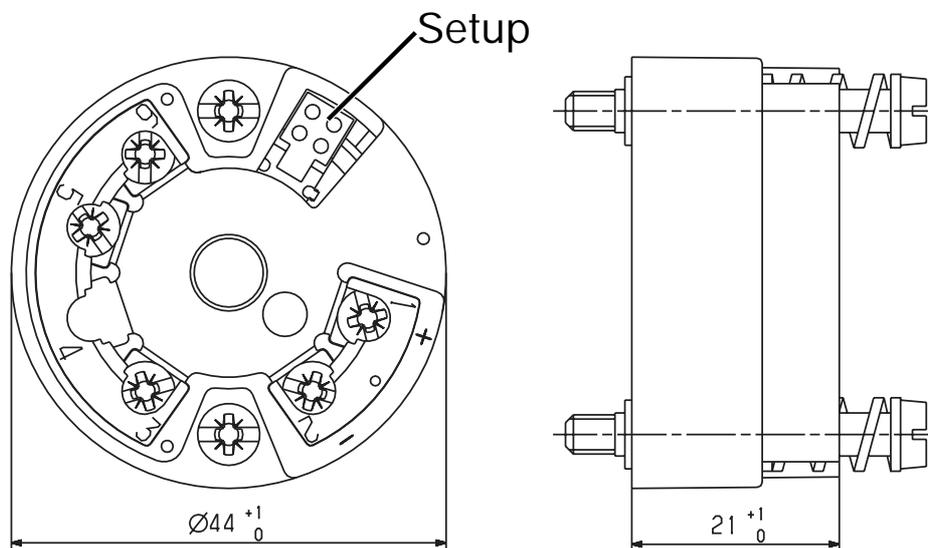
### 2.6 Dimensions

Type 956530/...



Type 956531/...

Type 956533/...



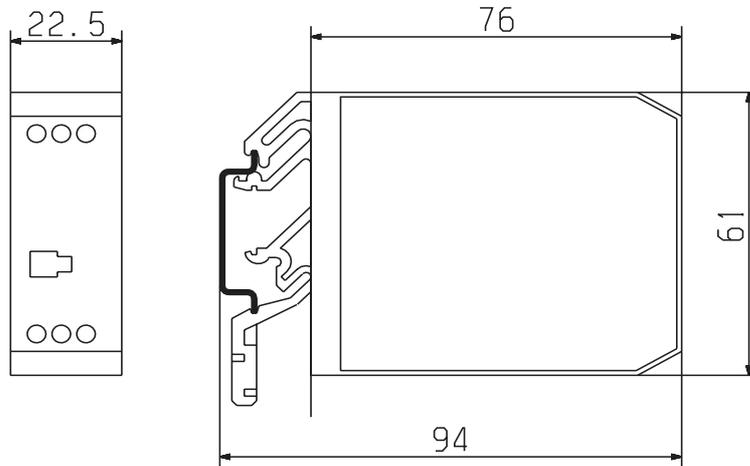
## 2 Installation

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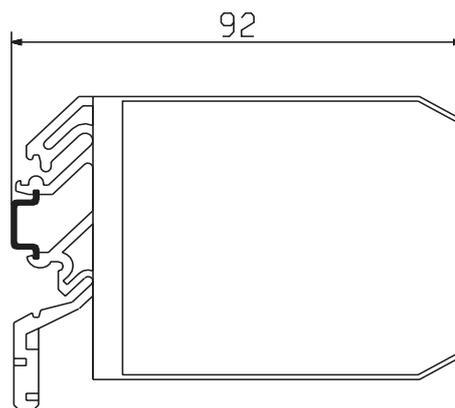
Type 956532/...

Type 956534/...

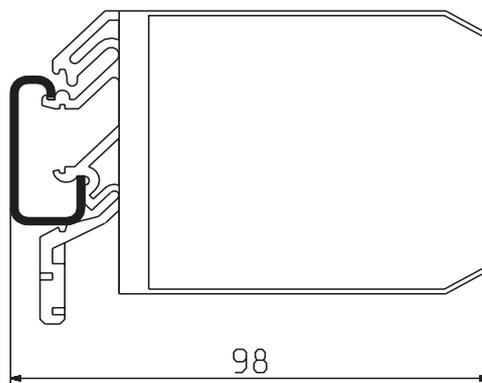
Mounting rail: C-rail 35mm x 7.5mm EN 50 022



Mounting rail: C-rail 15mm EN 50 045



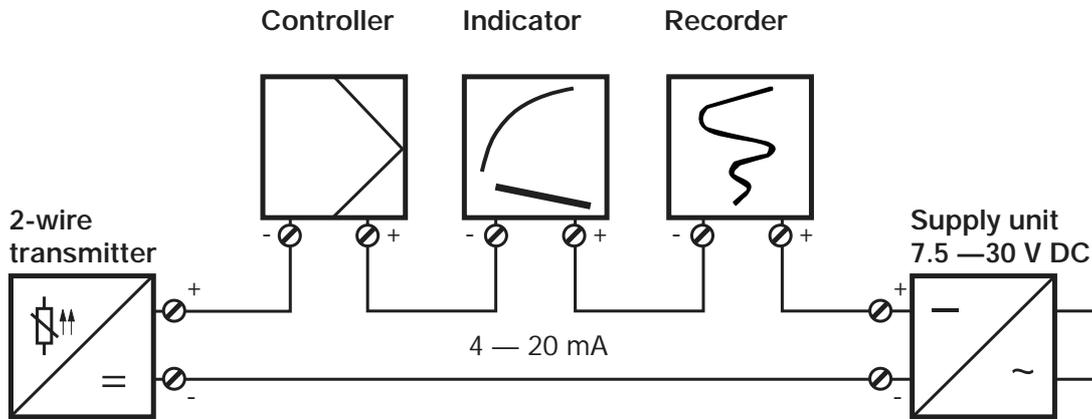
Mounting rail: G-rail EN 50 035



## 2 Installation

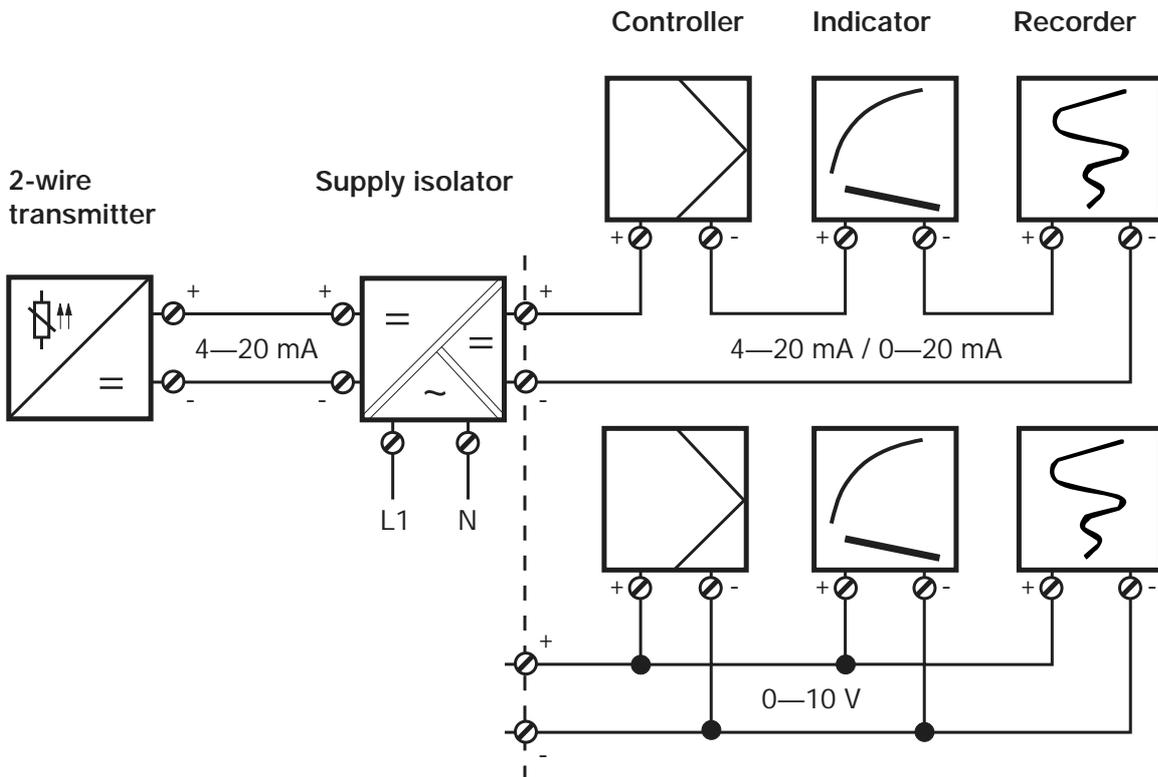
### 2.7 Connection example: current output with supply unit

2-wire transmitter (Type 956530/..., 956531/..., 956532/...)



### 2.8 Connection example: current output with supply isolator

2-wire transmitter (Type 956530/..., 956531/..., 956532/...)

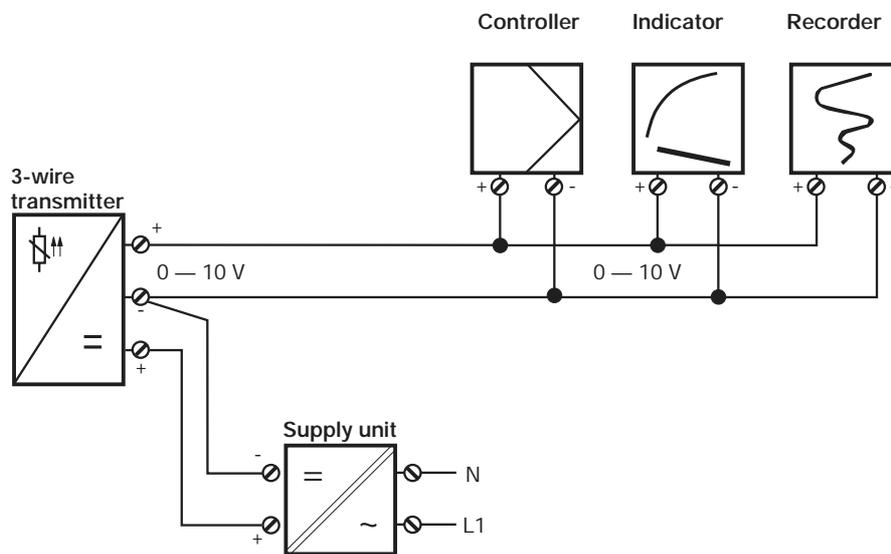


## 2 Installation

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### 2.9 Connection example: voltage output

3-wire transmitter (Type 956533/..., 956534/...)



## 3 Setup program

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The setup program is available for calibrating the transmitter from a PC. Connection is through the PC interface (incl. power supply and adapter) and the setup interface of the transmitter.

 In order to calibrate the transmitter, it has to be connected to the supply voltage. If no supply unit or supply isolator is available, Types 956530/..., 956531/... and 956532/... can be configured using a 9V block battery as a power source.

### 3.1 Hardware and software requirements

The following hardware and software requirements have to be met for installing and operating the setup program:

- IBM-compatible PC from 486DX-2-100
- 64 MB main memory
- 10MB available on hard disk
- CD-ROM drive
- 1 free serial interface
- Windows 95, 98, ME or Windows NT4.0, 2000

### 3.2 Configurable parameters

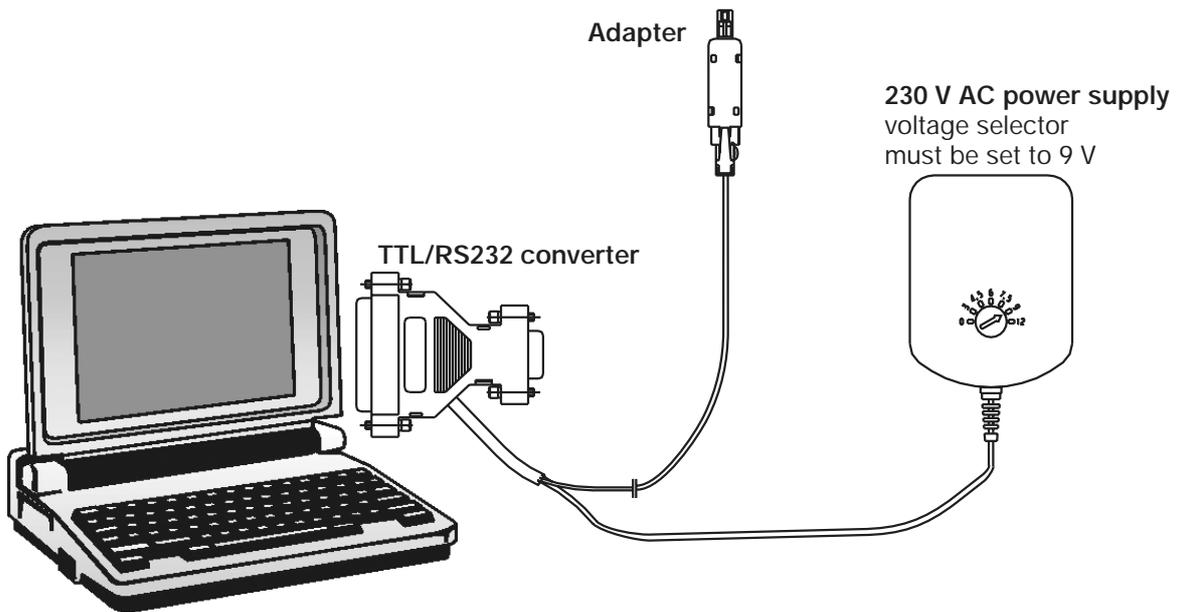
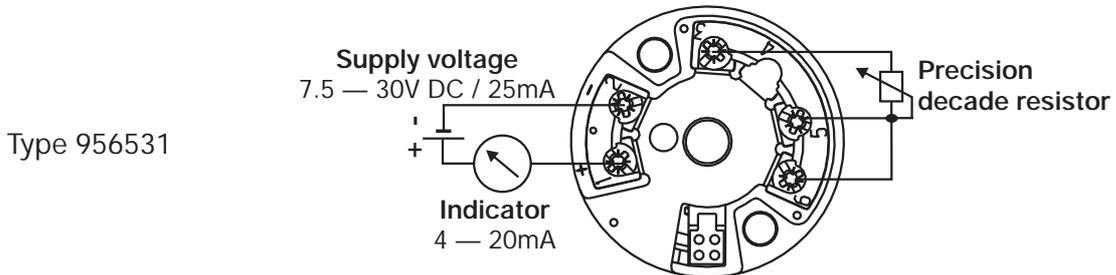
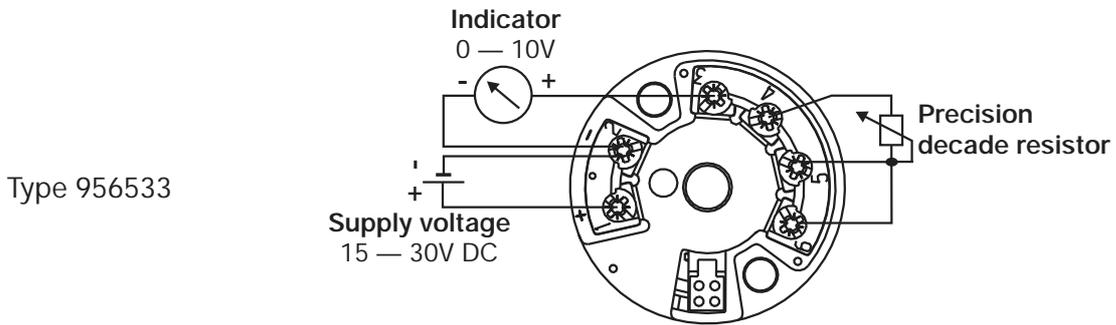
- TAG number (8 characters)
- Response to probe break /short-circuit

### 3.3 Parameters that can be calibrated

- Range start, range end
- Total lead resistance (out and return conductor)  
for 2-wire circuit

# 3 Setup program

## 3.4 Connection layout (calibrate new range)



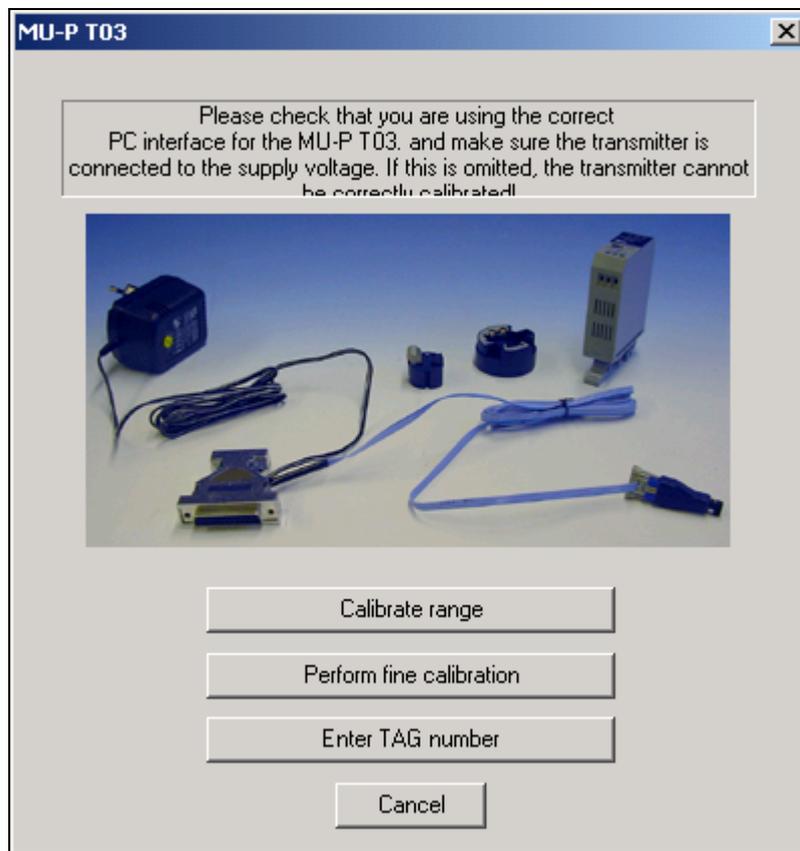
For the communication between transmitter and setup program, the transmitter and the interface have to be supplied with the appropriate voltage.

## 3 Setup program

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### 3.5 Overview of functions

The following dialog appears after the program start:



The following functions are available:

- Calibrate range
- Perform fine calibration
- Enter TAG number
- Cancel

#### **Operational philosophy**

All sub-functions will only be available when the function "Calibrate range" has been called up.

When fine calibration or the TAG number is called up directly, only the function that was called up can be used. This prevents an unintentional alteration of the range.

## 3 Setup program

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### 3.5.1 Calibrating the range

#### Preconditions

The following preconditions are necessary for achieving the accuracies specified in the data sheet:

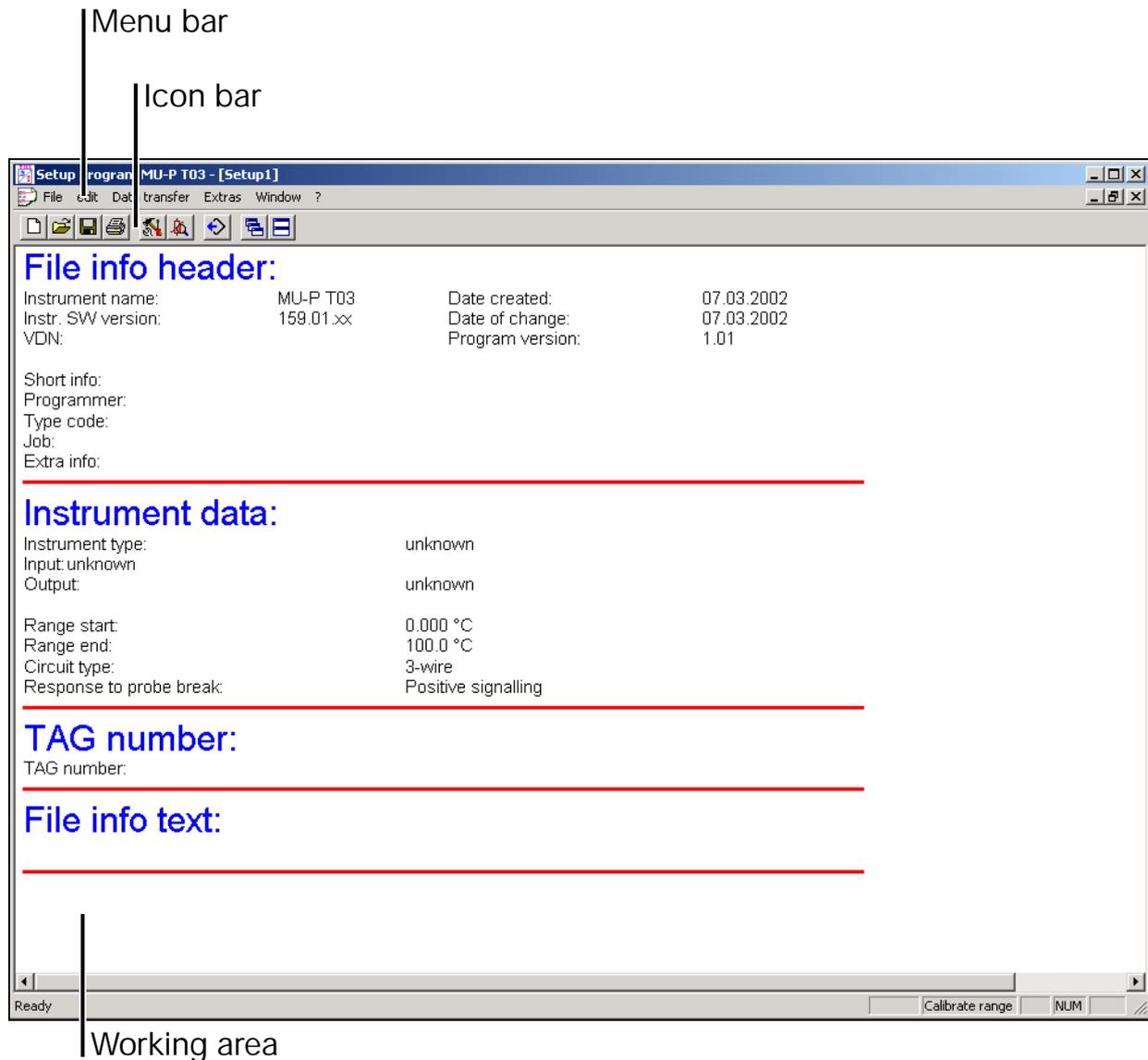
- precision decade resistor  
accuracy:  $\pm 0.05\%$ , resolution:  $0.01\ \Omega$
- ammeter/voltmeter  
accuracy:  $\pm 0.05\% \triangleq \pm 10\ \mu\text{A} / \pm 5\ \text{mV}$
- warming-up time: 2 min
- connect transmitter according to the type used,  
see Chapter 3.4 "Connection layout (calibrate new range)"

# 3 Setup program

## Calibration procedure

- \* Start up the PC setup program and select the function "Calibrate range".

You will see the following program interface:

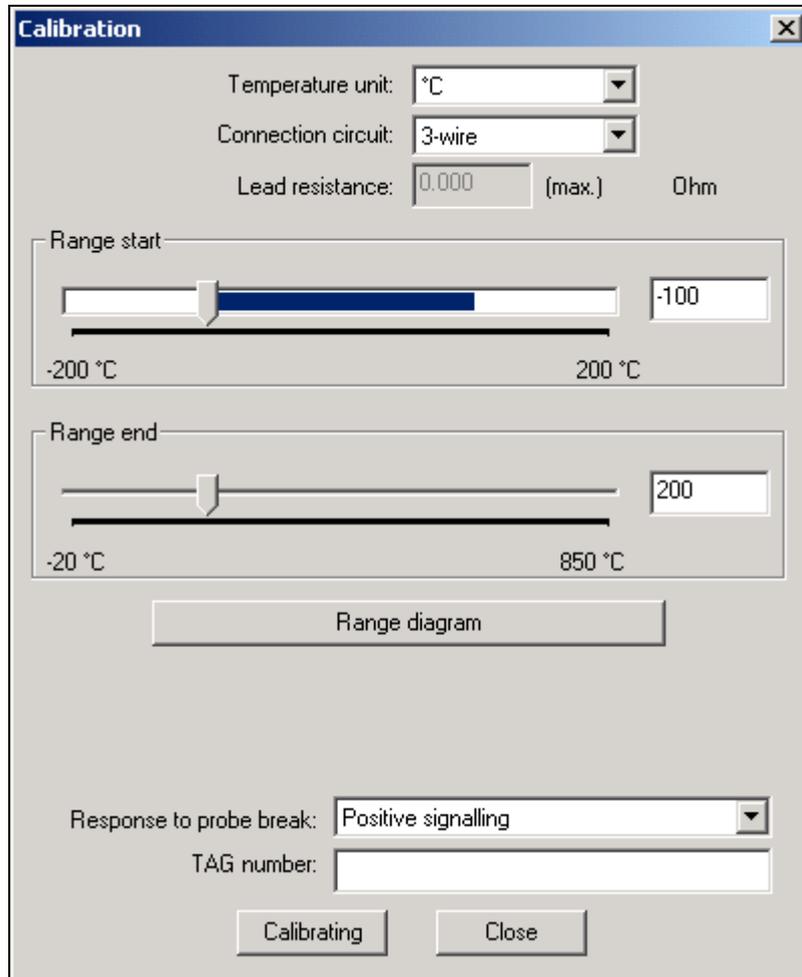


## 3 Setup program

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- \* Call up the function by using the menu bar (Extras → Calibrate) or the icon bar , or double-click on the working area (instrument data).

The dialog box "Calibration" appears:



The screenshot shows the "Calibration" dialog box with the following settings:

- Temperature unit: °C
- Connection circuit: 3-wire
- Lead resistance: 0.000 (max.) Ohm
- Range start: -200 °C to 200 °C (slider set to approximately -100 °C)
- Range end: -20 °C to 850 °C (slider set to approximately 200 °C)
- Response to probe break: Positive signalling
- TAG number: (empty text box)
- Buttons: Calibrating, Close

Set the range to be calibrated.

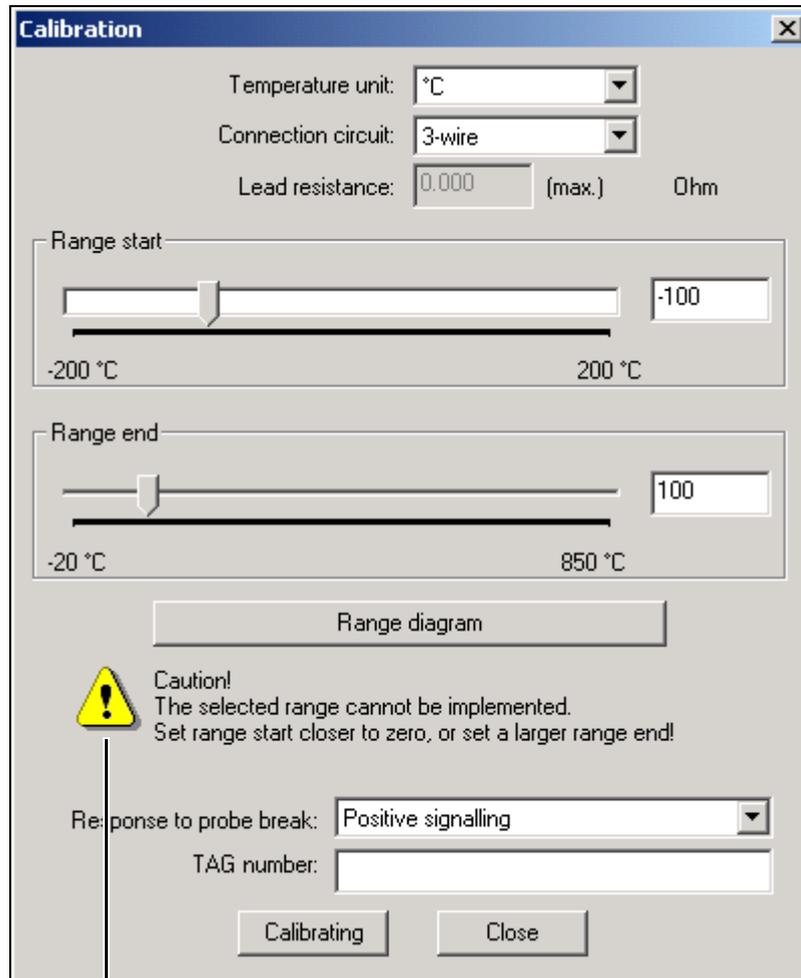
Please note that the range-start values are related to the range span<sup>1</sup>. If the range limits are modified, the setup program will monitor the input and come up with an error message.

<sup>1</sup> range span = range end – range start

### 3 Setup program

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The screenshot below shows such an erroneous entry.

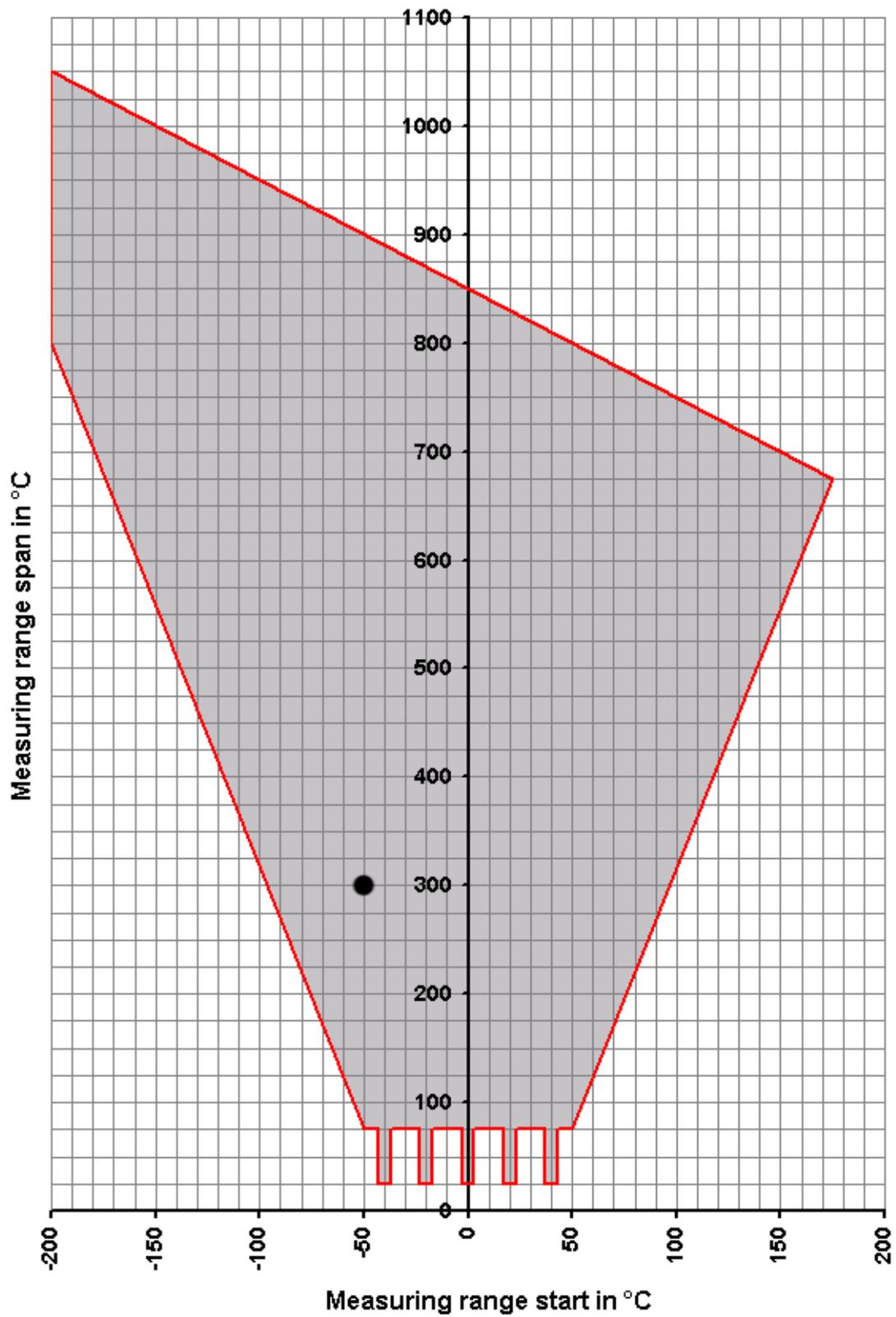


Error message

When you activate the "Range diagram" button, all the possible range-start values in relation to the range span will be shown to you.

### 3 Setup program

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range span = range end - range start

## 3 Setup program

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### Calculation example:

range start =  $-50^{\circ}\text{C}$ ,  
range end =  $250^{\circ}\text{C}$

range span = range end – range start  
range span =  $250^{\circ}\text{C} - (-50^{\circ}\text{C})$   
range span =  $300^{\circ}\text{C}$



When selecting the range start, make sure it lies within the gray area.



For spans that are smaller than  $75^{\circ}\text{C}$ , the only permissible range-start values are:  $-40^{\circ}\text{C}$ ,  $-20^{\circ}\text{C}$ ,  $0^{\circ}\text{C}$ ,  $+20^{\circ}\text{C}$  and  $+40^{\circ}\text{C}$ .

- \* When you have selected a valid range, start the calibration procedure by activating the "Calibrate" button.

The setup program will instruct you further.



Please remember that, for a 2-wire circuit, the total lead resistance has to be specified in order to achieve maximum measurement accuracy.

## 3 Setup program

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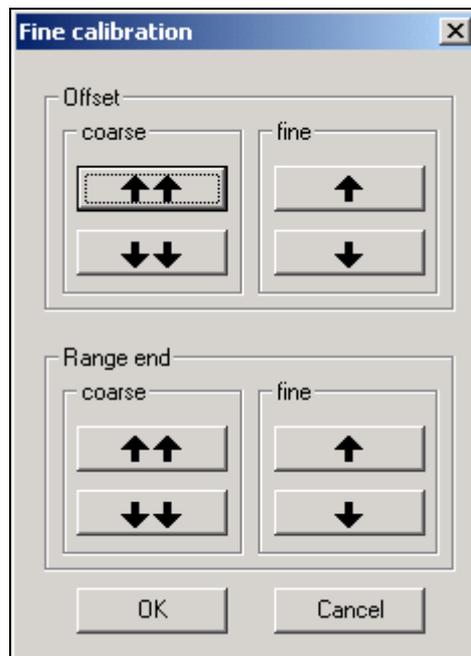
### 3.5.2 Performing the fine calibration

Fine calibration means adjustment of the output signal of a calibrated transmitter. The signal can be adjusted within the range of  $\pm 0.2\text{mA}$  for current output, and  $\pm 0.1\text{V}$  for voltage output.

#### Procedure

- \* Start up the PC setup program and select the function "Perform fine calibration".
- \* Call up the function by using the menu bar (Extras → Fine calibration) or use the icon bar .

You will see the dialog box "Fine calibration":



- \* Perform the fine calibration by using the arrow buttons and click on "OK".



When performing fine calibration of the offset and range end, make sure that the corresponding input signal is present.

## 3 Setup program

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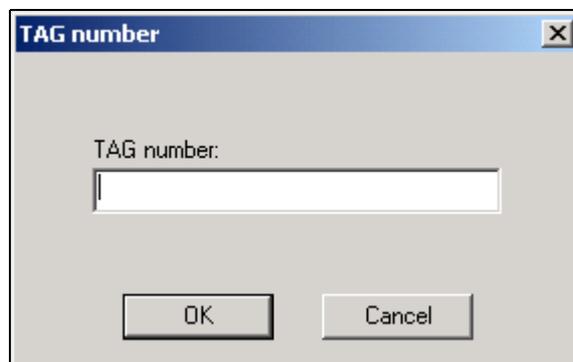
### 3.5.3 Entering the TAG number

The TAG number (max 8 characters) is available for storing an identifier (designation of measurement point) in the transmitter.

#### Procedure

- \* Start up the PC setup program.
- \* Call up the function by using the menu bar (Edit → TAG number) or by a double-click on the working area (TAG number).

The dialog box "TAG number" will appear:



- \* Enter the number and confirm the dialog by clicking on "OK".
- \* Transfer the TAG number to the transmitter by using the menu bar (Data transfer → Data transfer to instrument), or with the help of the icon bar .





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