JUMO dTRANS T04

Four-wire Transmitter

Operating Manual

70704000T90Z000K000

EN/00443954

Important notes

Only attach the transmitter to the type of sensor for which it was configured during manufacture.

707040/1... for Pt100 resistance thermometer

707040/2... for Pt1000 resistance thermometer

707040/3... for potentiometer

Please check the details against those on the nameplate of the transmitter!

Several fixed ranges and output actions are available via DIP switches.

Ranges that go beyond these fixed settings can be set through the setup program.

Contents

Contents

1 Identifying the device version

1.1 Order details

				(1)	**Basic version**[a]
			707040/1		dTRANS T04 for Pt100 resistance thermometer
			707040/2		dTRANS T04 for Pt1000 resistance thermometer
			707040/3		dTRANS T04 for potentiometer
				(2)	**Input**
x	x		888		Factory-set[b] (three-wire circuit, 0 to 100 °C)
		x	888		Factory-set[b] (three-wire circuit, 0 to 1 kΩ)
x	x	x	999		Configuration to customer specification (please specify in plain text)[c]
				(3)	**Output**
x	x	x	888		Factory-set (0 to 20 mA)
x	x	x	999		Setting to customer specification (please specify in plain text)[c]
				(4)	**Voltage supply**
x	x	x	22		AC/DC 20 to 53 V, 48 to 63 Hz
x	x	x	23		AC 110 to 240 V +10/-15 %, 48 to 63 Hz

[a] It is not possible to switch between the sensor types.

[b] Additional measuring ranges are selectable via DIP switch or PC setup program.

[c] Please check whether the required measuring range and output can be set via DIP switch. In such a case, “factory-set” can be ordered.

	(1)		**(2)**		**(3)**		**(4)**
Order code		-		-		-	
Order example	707040/1	-	888	-	888	-	23

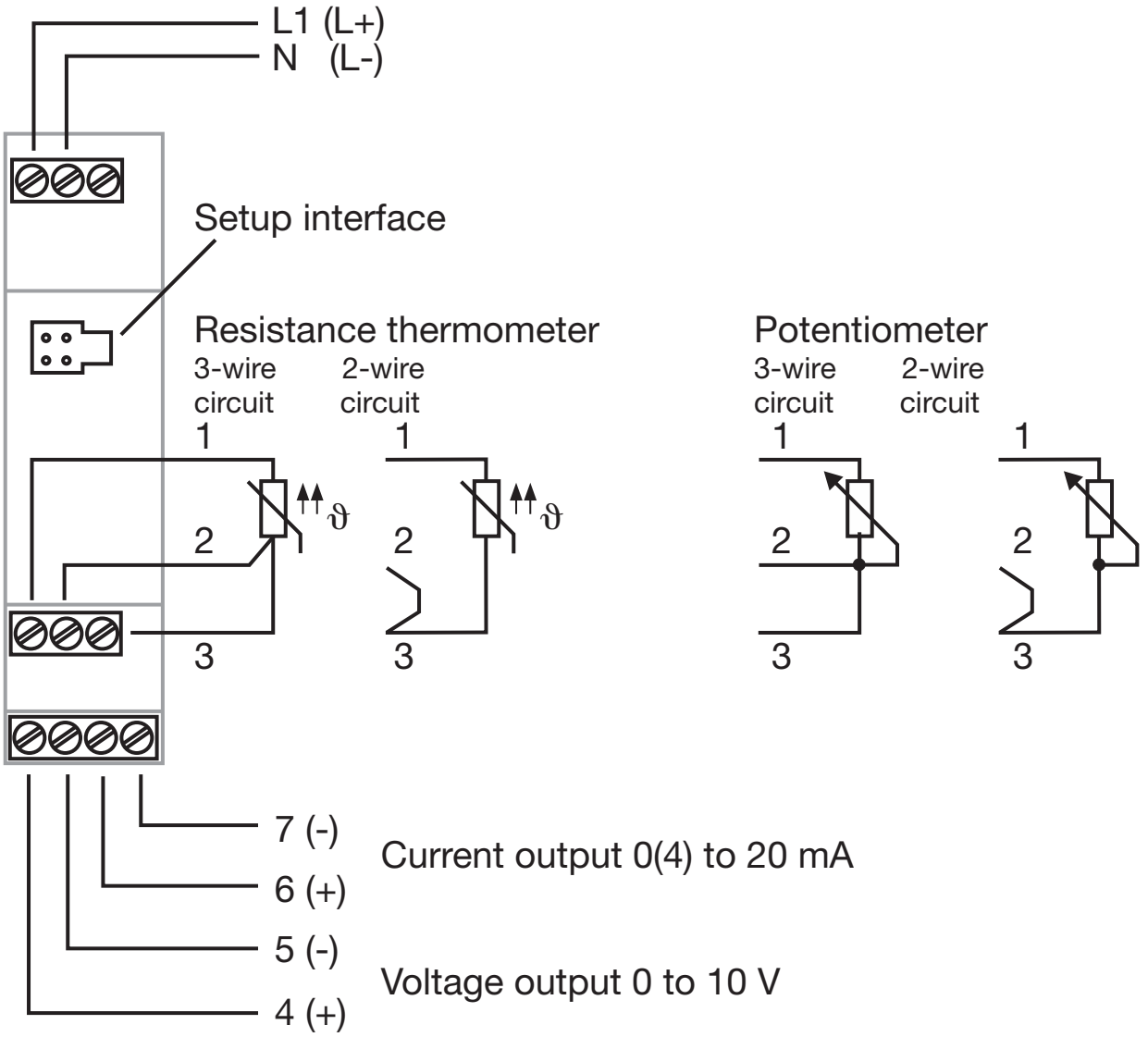
1.2 Standard accessory

Operating Manual

1.3 Accessories

Article	**Part no.**
PC setup program, multilingual	00448774
PC interface with USB/TTL converter, adapter (socket) and adapter (pins)	00456352

2.1 Connection diagram



The setup interface, analog input and analog output are not electrically isolated (⇨ Page 8).

Any electrical connection other than that specified in the connection diagram may result in the destruction of the instrument.

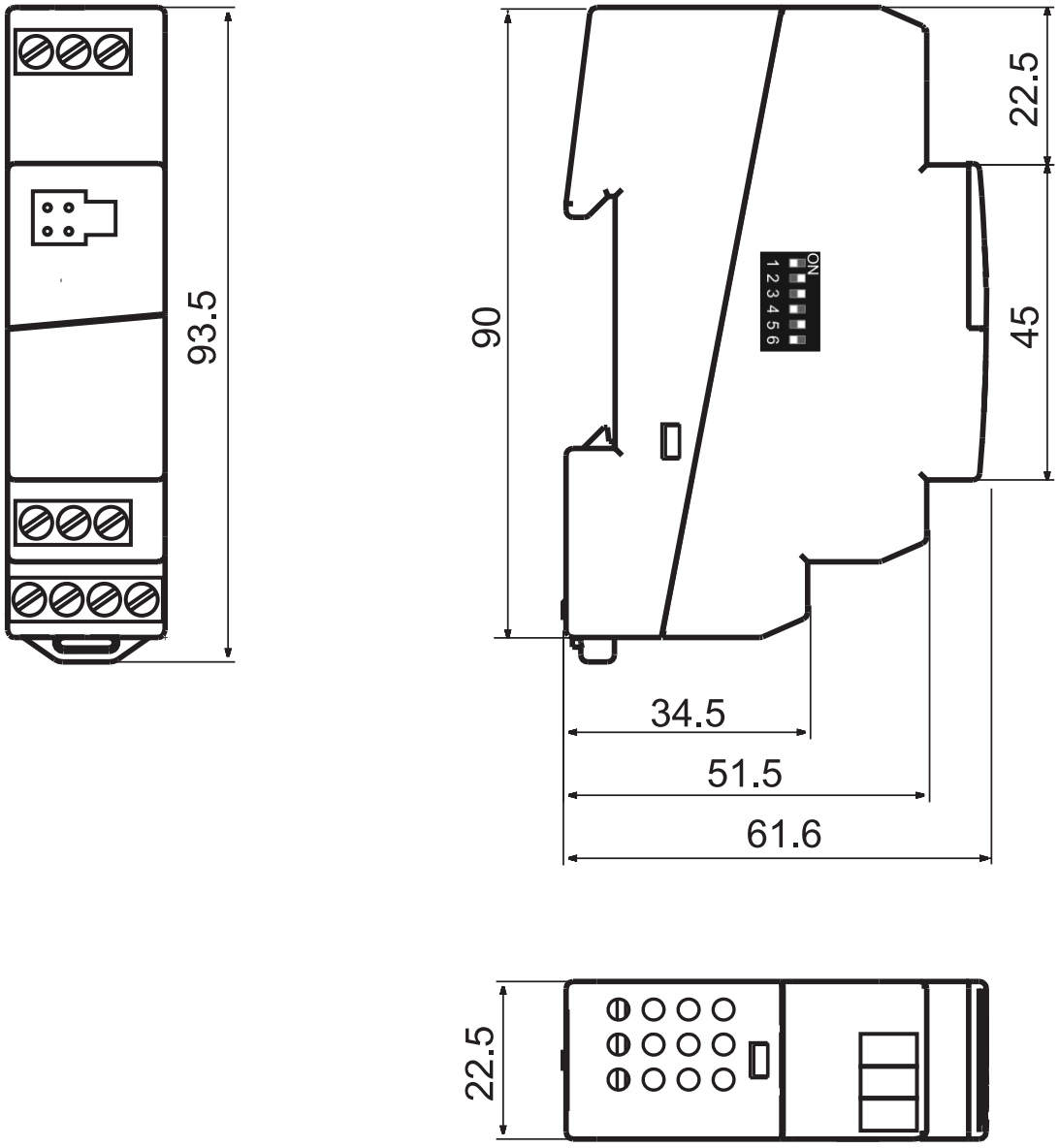
2.2 Installation notes

- The choice of cable, the installation and the electrical connection must conform to the requirements of VDE 0100 “Regulations on the Installation of Power Circuits with Nominal Voltages below 1000 V” or the appropriate local regulations.
- The electrical connection, as well as work inside the unit, must only be carried out by qualified personnel.
- If contact with live parts is possible while working on the unit, it must be disconnected from the supply on both poles.
- A current limiting resistor (safety function) interrupts the supply circuit in the event of a short-circuit in the transmitter. The external fusing of the supply should not be rated below 1 A (slow).
- Stray electromagnetic fields, e. g. from transformers, mobile phones or electrostatic discharge must be avoided in the vicinity of the transmitter[a].
- Do not install inductive loads (relays, solenoid valves etc.) close to the transmitter. Fit RC or spark quenching combinations, or free-wheeling diodes, for interference suppression.
- Run input, output and supply cables separately and not parallel to one another. Run out/return cables next to each other and twist them, if possible.
- Route input and output cables without any connection to the mains supply as twisted and screened cables. Do not run them close to power cables or components. Ground the screen close to the instrument to the earth potential.
- Do not connect any additional loads to the supply terminals of the instrument.
- The device is not suitable for use in areas with an explosion hazard (**Ex** areas).

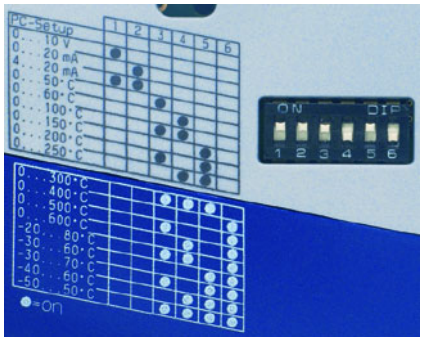
- With supply networks that are subject to interference (e.g. thyristor control units), the transmitter should be fed from an isolating transformer.
- Supply fluctuations are only permissible within the specified tolerances[a].
- The setup interface, the analog input and analog output are not electrically isolated. This means that, in unfavorable conditions and with a built-in transmitter, equalizing currents may flow when the PC interface cable is connected. The equalizing currents may damage the affected instruments.
- However, there is no danger if the output circuit of the transmitter is electrically isolated from ground. If it cannot be ensured that, with a built-in transmitter, the output circuit is electrically isolated, one of the following safety measures has to be taken:
- Use a PC that is not directly coupled to ground (e.g. battery-operated notebook), or disconnect the output of the transmitter before connecting the PC interface.

[a] see Chapter 4 “Technical data”

2.3 Dimensions



2.4 DIP switch configuration



Function or measuring range for Pt100 and Pt1000	Function or measuring range for potentiometer	DIP switch					
		1	2	3	4	5	6
PC setup	PC setup						
Output 0 to 10 V	Output 0 to 10 V	•					
Output 0 to 20 mA	Output 0 to 20 mA		•				
Output 4 to 20 mA	Output 4 to 20 mA	•	•				
Range 0 to 50 °C	Range 0 to 500 Ω			•			
Range 0 to 60 °C	Range 0 to 1 kΩ				•		
Range 0 to 100 °C	Range 0 to 2 kΩ			•	•		
Range 0 to 150 °C	Range 0 to 3 kΩ					•	
Range 0 to 200 °C	Range 0 to 4 kΩ			•		•	
Range 0 to 250 °C	Range 0 to 5 kΩ				•	•	
Range 0 to 300 °C	Range 0 to 6 kΩ			•	•	•	
Range 0 to 400 °C	Range 0 to 7 kΩ						•
Range 0 to 500 °C	Range 0 to 8 kΩ			•			•
Range 0 to 600 °C	Range 0 to 9 kΩ				•		•
Range -20 to +80 °C	Range 0 to 10 kΩ			•	•		•
Range -30 to +60 °C	Range 0 to 11 kΩ					•	•
Range -30 to +70 °C				•		•	•
Range -40 to +60 °C					•	•	•
Range -50 to +50 °C				•	•	•	•

• = on

☞ See note on Page 11.

3 PC setup program

The PC setup program is used for configuration and fine adjustment of the transmitter from a PC (e.g. when the sensor drifts). Connection is through the PC interface with USB/TTL converter and adapter and the setup interface of the transmitter. In order to configure the transmitter, it has to be connected to the supply voltage.

If you want to operate the transmitter with the setting that was transferred through the PC setup program, **all** DIP switches must be set to **off**.

If you want to use a configuration that is available in the transmitter, the measuring range as well as input and output have to be set via the DIP switches.

3 PC setup program

3.1 Hardware and software requirements

The following hardware and software requirements must be met for installing and operating the PC setup program:

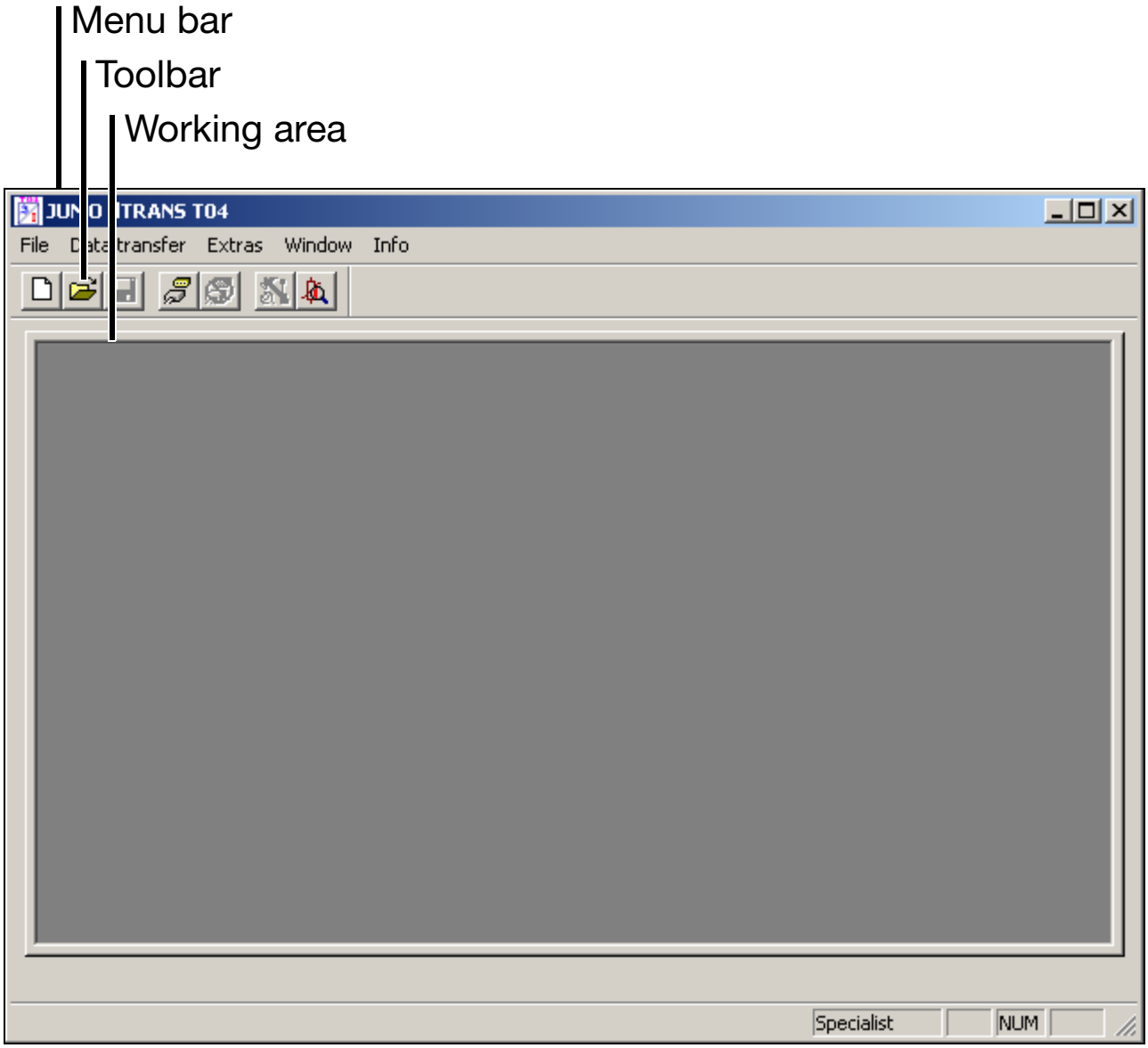
- IBM-PC or compatible PC with Pentium processor or higher
- 512 MB main memory
- 500 MB available on hard disk
- CD-ROM drive
- 1 free USB interface
- Windows® 7, 8, or 10 (32-bit and 64-bit version)

3.2 Configurable parameters

- TAG number (14 characters)
- response to probe and cable break
- range start, range end
- output signal 0(4) to 20 mA or 0 to 10 V
- lead resistance with two-wire circuit

3.3 Program start

After starting up the PC setup program, the user interface appears.



Select the function you require via the menu bar or toolbar (left mouse click).

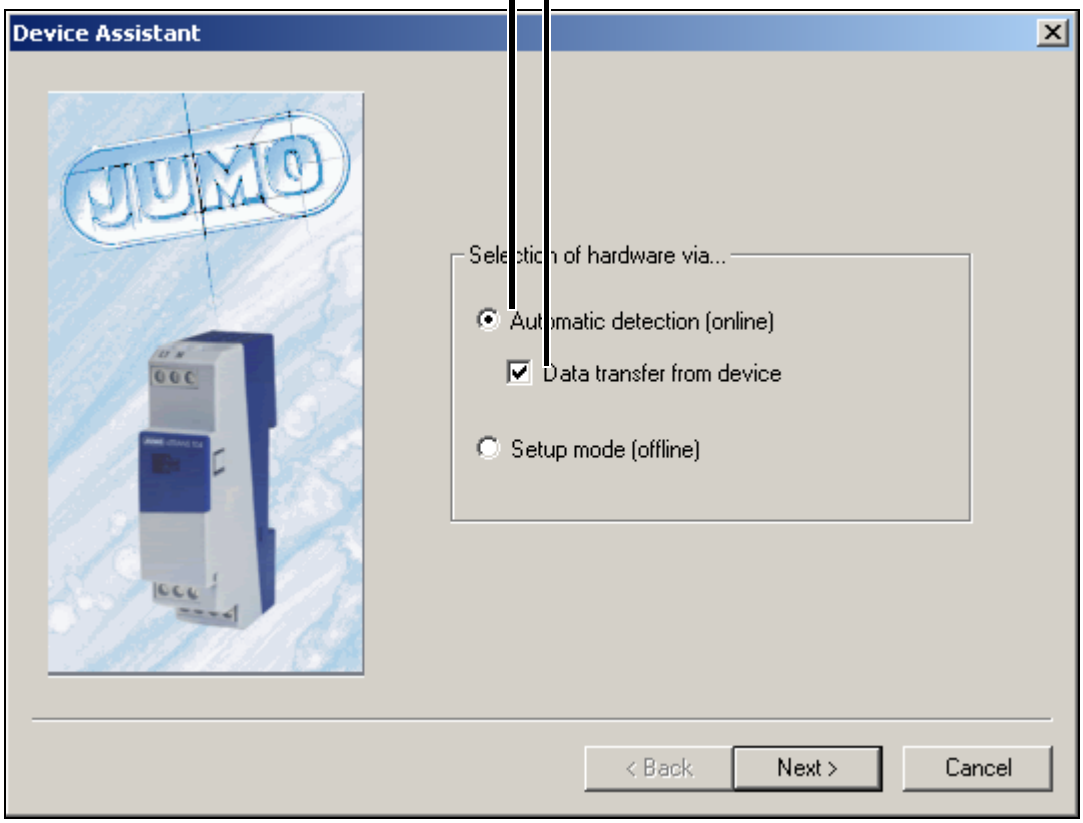
You can configure in on-line or off-line mode.

∗ Choose the function *File* ➔ *New* (🗋) to perform a new configuration.

Next, you will see the Device Assistant. Here you can choose between on-line or off-line mode.

On-line mode

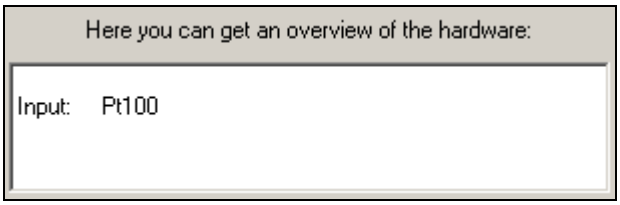
Check input type only(☐) or transfer the setting from the device (☑).



∗ Choose on-line or off-line mode.

3.3.1 On-line mode

In on-line mode, a search is made for a connected transmitter. When the search has been successful, the input type and, if required, the current configuration are read out (☑ Data transfer from device).



The on-line mode is always the better choice, i.e. preferable to working off-line. Wrong settings can by avoided in this way.

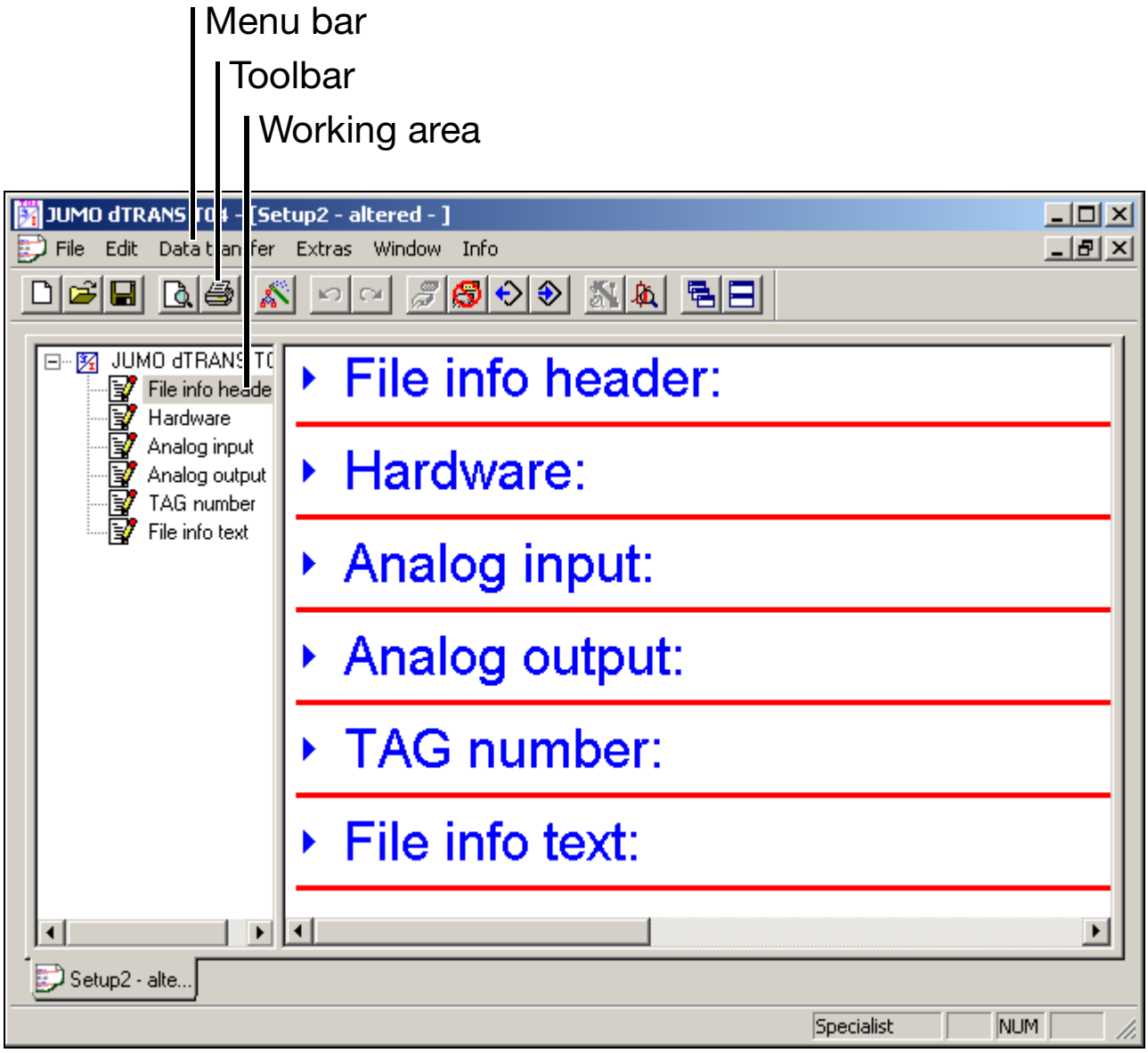
3.3.2 Off-line mode

In off-line mode, the user has to decide whether the transmitter is suitable for a particular sensor type.

This function can be selected, if the transmitter to be configured is not connected or a configuration file has to be prepared.

☞ The type of transmitter is specified on the nameplate. Please check the type against the type designation (Chapter 1 “Identifying the device version”).

3.4 User interface



Menu bar

Using the menu bar, the individual functions of the PC setup program can be started.

Toolbar

The toolbar contains selected functions. They can be started from the left mouse button. If you rest the mouse pointer on one of the

icons, you will see the function title after a short while.

Working area

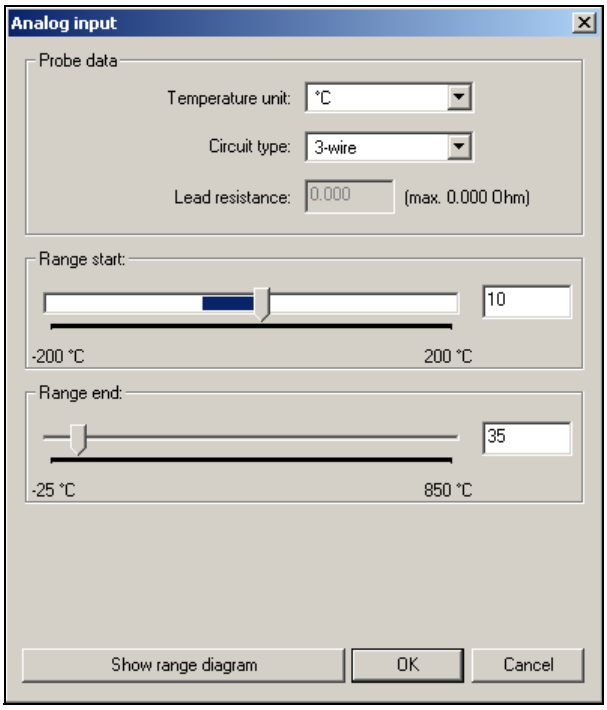
Here you are provided with an overview of the current settings of a configuration file.

By double-clicking (left mouse button) on an entry in the working area you can initiate the corresponding function - just like calling up the function via the menu bar.

Double-click on Analog input:

A left-click on the (▸ or ▾) arrow will expand the display or shrink it.

The function *Edit* ➔ *Analog input* is started.



3.5 Functional summary

The following functions are available through the *Edit* menu (or the working area):

- Hardware (▸ Hardware),
- Analog input (▸ Analog input),
- Analog output (▸ Analog output),
- TAG number (▸ TAG number),
- Setup data info (▸ File info header and ▸ File info text) and
- Configuration data.

These functions are available through the *Data transfer* menu (or the toolbar):

- Data transfer[1] to device () and
- Data transfer from device ().

The following functions are available through the *Extras* menu (or the toolbar):

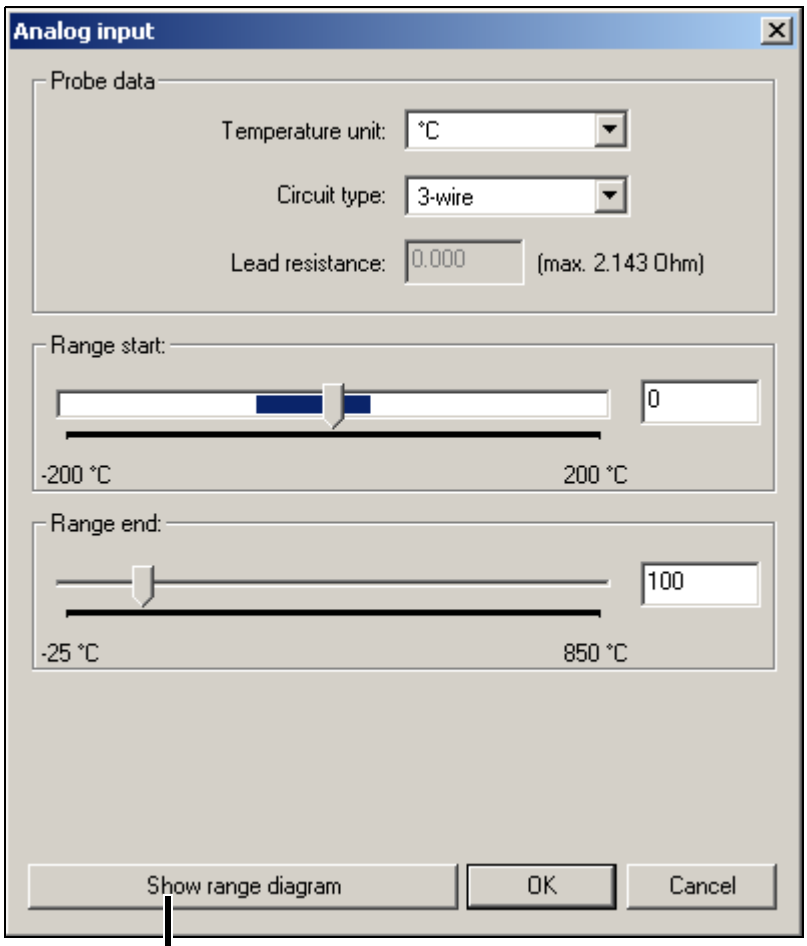
- Calibrating and testing ()
- Fine calibration ().

[1] The parameters in the device are only updated through the data transfer.

3.5.1 Hardware

The function *Edit* ➔ *Hardware* (or icon in the toolbar) will start the Device Assistant (see Page 14).

3.5.2 Analog input



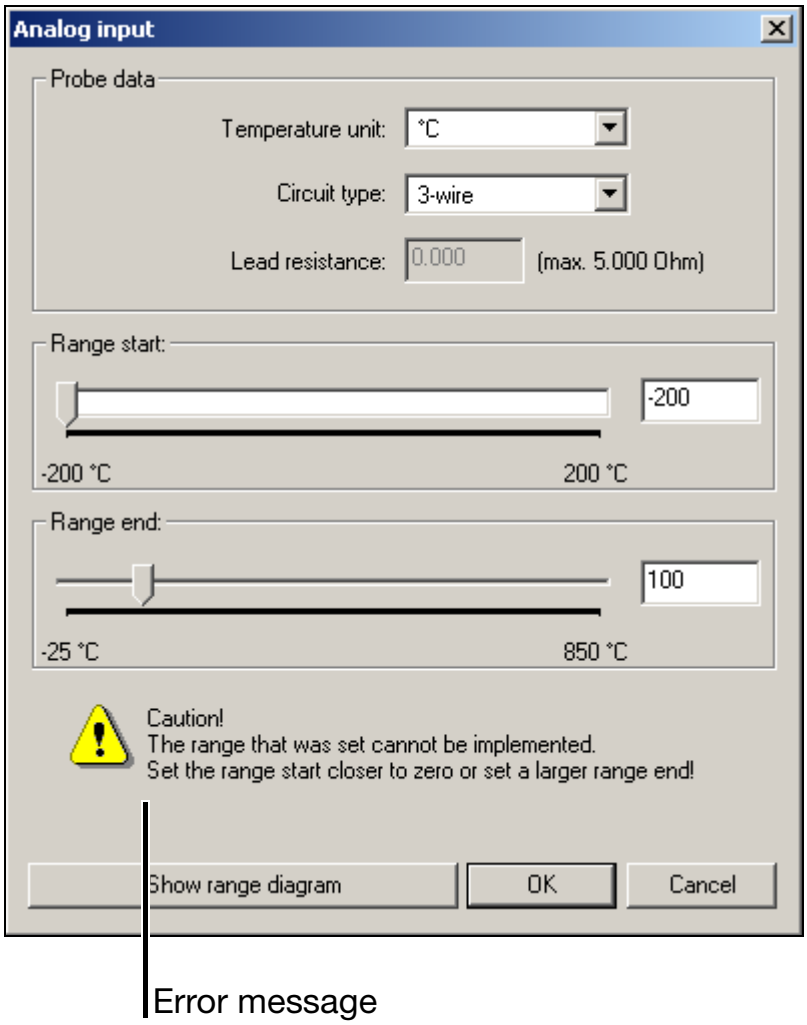
see Page 26 and Page 28

The *Edit* ➔ *Analog input* function is used to set the input parameters.

Please note that the range start values depend on the range span. When the measuring range limits are altered, the setup program will monitor the entry and warn you about wrong entries.

range span =
range end - range start

The picture below shows such a wrong entry:

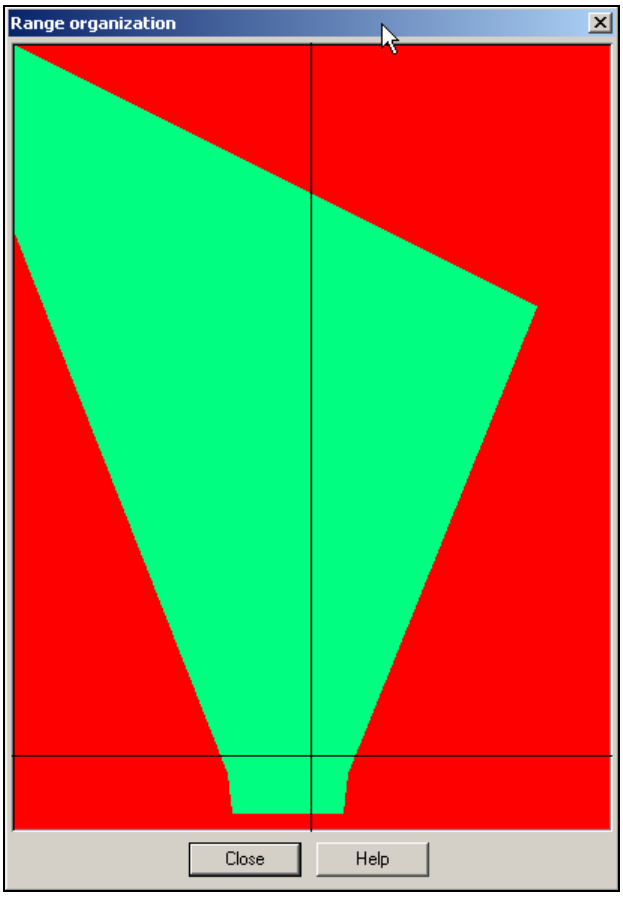


Using the *Show range diagram* button will show you all possible range start values as a function of the range span.

⇨ Chapter 3.6 “Measuring range span (Pt100 and Pt1000)”

∗ Activate the *Show range diagram* button.

The following window will appear (e.g. with Pt100 input):



* Position the mouse pointer in the window's title bar and, holding down the left mouse button, drag the window to the side.

You will see both windows now (“Analog input” and “Range organization”).

* Change over to the “Analog input” window.

* Alter the range start or range end.

The intersection point of the horizontal and vertical lines in the “Range organization” window shifts and shows the current setting. The setting is only valid if the point of intersection lies within the green area.

3.5.3 Analog output

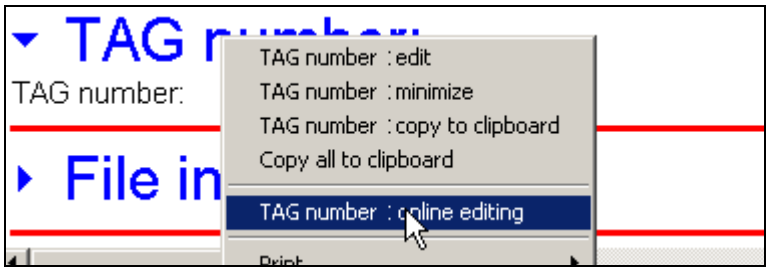
The *Edit* ➔ *Analog output* function can be used to configure the type of analog output (changeover between current and voltage output) and the response to probe break.

3.5.4 Editing the TAG number

Using *Edit* ➔ *TAG number* (14 characters max.) you can save an identifier (measurement point designation) to the transmitter.

By means of the menu function *Data transfer* ➔ *Data transfer to device* or the  icon in the toolbar, the TAG number setting is transferred to the transmitter, together with the input parameters. If you want to enter the TAG number only (all other settings are retained), then use the *Online editing* function.

* Position the mouse pointer in the working area, above the “TAG number” display, and press the right mouse button.



* Start the *Edit TAG number online* function by clicking on it with the left mouse button.

The setup program reads the current number out of the connected transmitter and sends the new number back to the transmitter after the entry (conclude the entry with the *Transfer*) button.

3.5.5 Setup data info

The *Edit* ➔ *Setup data info* function consists of the two parts: *File info header* and *File info text*, and serves to describe the setup file on the PC side. The information is not stored in the transmitter.

3.5.6 Configuration data

The *Edit* ➔ *Configuration data* function can be used if data have been read out from a connected transmitter. The device name and the version number of the software contained in the device are displayed.

3.5.7 Data transfer to device

Using *Data transfer* ➔ *Data transfer to device* (or the  in the toolbar), the present setting is transferred to the transmitter by the PC setup program.

3.5.8 Data transfer from device

Using *Data transfer* ➔ *Data transfer from device* (or the  icon in the toolbar), the present setting of a transmitter is read out and displayed in the PC setup program. The *Setup data info* (*File info header* and *File info text*) information will not be lost by the readout, i.e. will not be overwritten.

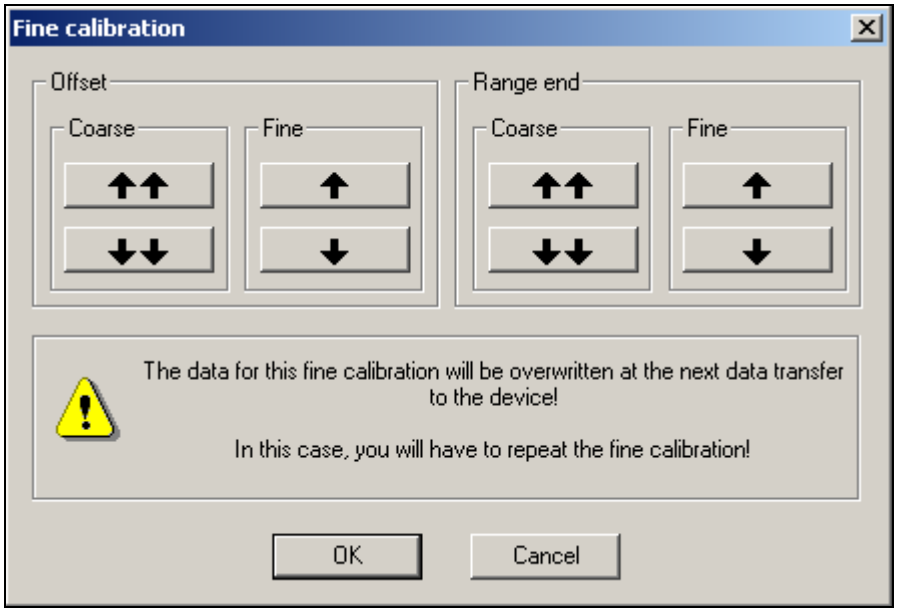
3.5.9 Calibrating and testing

Extras ➔ *Calibrating and testing* (or the  icon in the toolbar) is only available for the manufacturer, for servicing purposes.

3.5.10 Fine calibration

Extras ➔ *Fine calibration* (or the icon in the toolbar) refers to the adjustment of the output signal of a calibrated transmitter. The signal can be adjusted within the range ±0.2 mA for current output, and ±0.1 V for voltage output.

After calling up the function, the “Fine calibration” window appears:



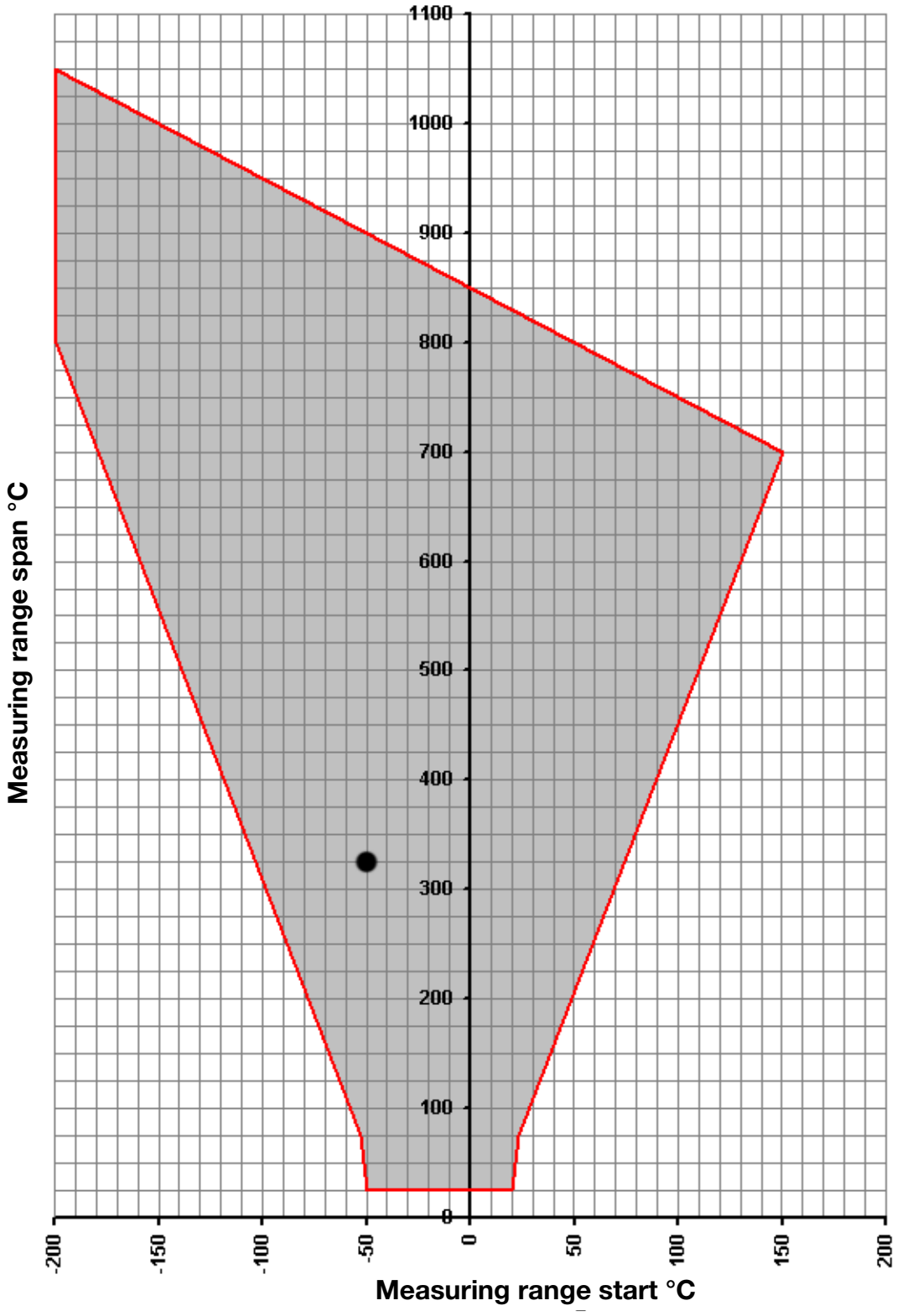
∗ Perform fine calibration using the arrow buttons and click *OK*.

Reject fine calibration by using the *Cancel* button.

☞ Please note that the input signal must be set to “Range start” (when performing fine calibration of the offset) and to “Range end” (when performing fine calibration of the range end).

The fine calibration data will be overwritten at the next data transfer to the transmitter. Fine calibration has to be repeated in this case.

3.6 Measuring range span (Pt100 and Pt1000)



range span = range end - range start

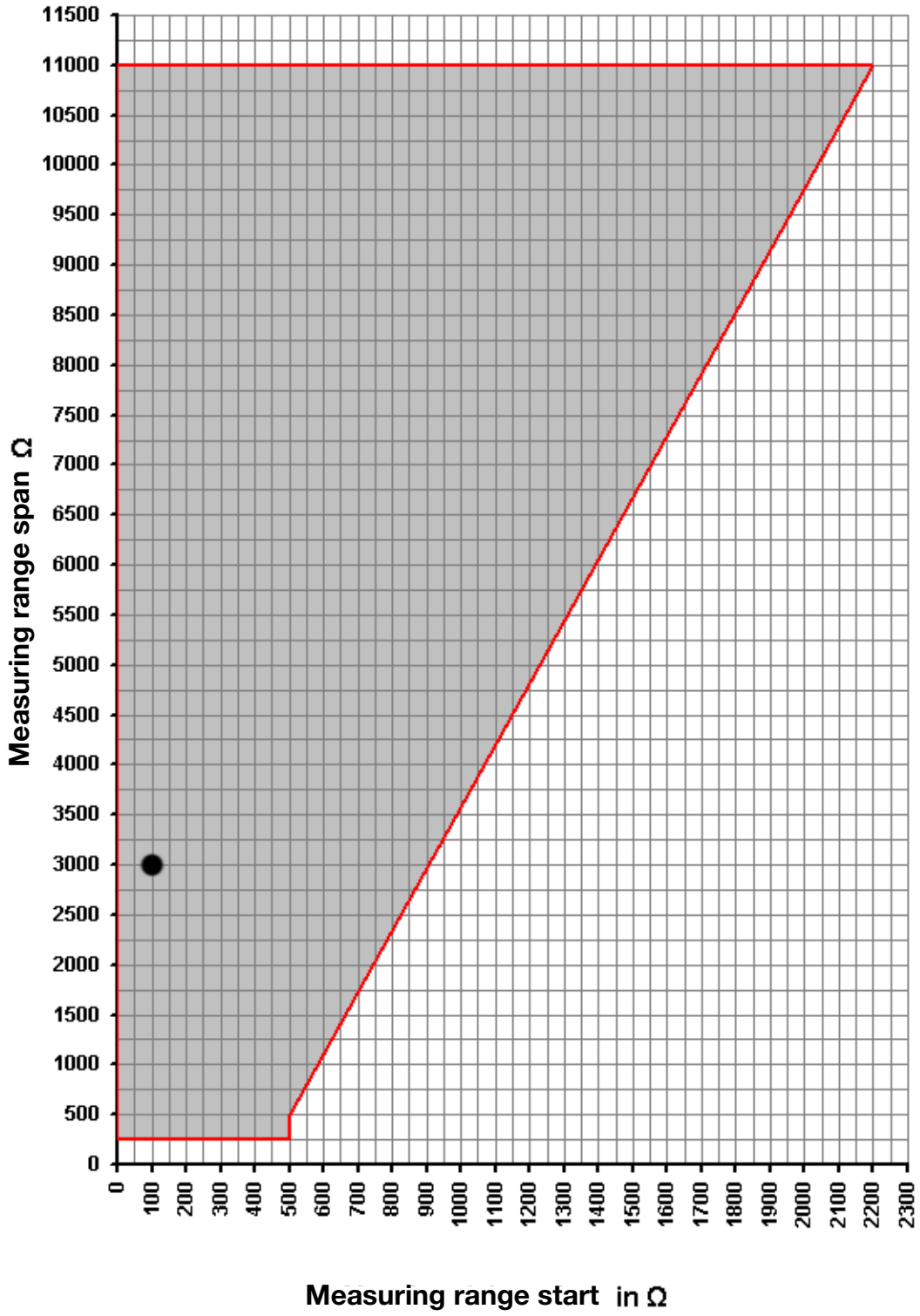
Calculation example:

range start = -50 °C,
range end = 275 °C

range span = range end - range start
range span = 275 °C - (-50 °C)
range span = 325 °C

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

3.7 Measuring range span (potentiometer)



range span = range end – range start

Calculation example:

range start = 100 Ω,
range end = 3100 Ω

range span = range end - range start
range span = 3100 Ω - 100 Ω
range span = 3000 Ω

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

Input

	707040/1	707040/2	707040/3
Measurement input	Pt100 EN 60751	Pt1000 EN 60751	Potentiometer
Range limits	-200 to +850 °C	-200 to +850 °C	0 to 11000 Ω
Connection circuit	Two- and three-wire circuit		
Configuration	Through DIP switch or using the PC setup program		
Shortest span	25 °C	25 °C	250 Ω
Largest span	1050 °C	1050 °C	11000 Ω
Range start for shortest span	-50 to +20 °C	-50 to +20 °C	0 to 500 Ω
Range start for other spans	See range organization on Page 26 and Page 28		
Unit	°C (°F settable through the PC setup program)	°C (°F settable through the PC setup program)	Ω
Sensor lead resistance for 3-wire connection	≤ 11 Ω per conductor		
Sensor lead resistance for 2-wire connection	Factory-set: 0 Ω lead resistance, adjustable through the PC setup program		
Sensor current	≤ 0.5 mA	≤ 0.1 mA	≤ 0.1 mA
Sampling rate	Continuous measurement (analog signal path)		

Output

	707040/1	707040/2	707040/3
Measurement input	Pt100 EN 60751	Pt1000 EN 60751	Potentiometer
Output signal - Current: - Voltage:	Selectable through DIP switch or PC setup program Proportional DC current 0 to 20 mA or 4 to 20 mA DC voltage 0 to 10 V		
Transfer characteristic - For resistance thermometer: - For potentiometer:	 Linear with temperature Linear with resistance		
Transfer accuracy	≤ ±0.1 %[a]		
Residual ripple	≤ ±0.2 %[a]		
Burden (with current output)	≤ 750 Ω		
Burden error	≤ ±0.01 % per 100 Ω[a]		
Current limiting	> 21.6 to < 28 mA (24 mA typical)		
Load (with voltage output)	≥ 10 kΩ		
Load error	≤ ±0.1 %[a]		
Voltage limiting	> 11 to < 14 V (12 V typical)		
Settling time on a temperature change	≤ 40 msec		
Settling time after switch-on or reset	≤ 200 msec		
Calibration conditions	AC 230 V or DC 24 V (depending on the supply) at 23 °C (±5 °C)		
Calibration accuracy	≤ ±0.3 %[a, b] or ≤ ±0.3 °C[b]	≤ ±0.5 %[a, b] or ≤ ±0.5 °C[b]	≤ ±0.3 %[a]
Supply voltage error	≤ ±0.05 %[a]		

[a] All data refer to the range end value 10 V or 20 mA.
[b] The larger value applies.

Measuring circuit monitoring

Underrange: - Current output 4 to 20 mA - Current output 0 to 20 mA - Voltage output 0 to 10 V	 Falling to ≤ 3.6 mA < 0 mA (-0.05 mA typical) < 0 V -0.6 V typical)
Overrange - Current output 4 to 20 mA - Current output 0 to 20 mA - Voltage output 0 to 10 V	 Rising to > 21.6 to < 28 mA (24 mA typical) Rising to > 21.6 to < 28 mA (24 mA typical) Rising to > 11 to < 14 V (12 V typical)
Probe short-circuit: - Current output 4 to 20 mA - Current output 0 to 20 mA - Voltage output 0 to 10 V	 ≥ 1.5 to ≤ 3.6 mA (2 mA typical) < 0 mA (-0.05 mA typical) < 0 V (-0.6 V typical)
Probe and lead break: - Current output 4 to 20 mA - Current output 0 to 20 mA - Voltage output 0 to 10 V	Signal is configurable. Positive signal: > 21.6 to < 28 mA (24 mA typical) Negative signal: ≥ 1.5 to ≤ 3.6 mA (2 mA typical) Positive signal: > 21.6 to < 28 mA (24 mA typical) Negative signal: < 0 mA (-0.05 mA typical) Positive signal: > 11 V to < 14 V (12 V typical) Negative signal: < 0 V (-0.6 V typical)

Electrical data

Voltage supply	AC 110 to 240 V +10/-15 %, 48 to 63 Hz	AC/DC 20 to 53 V, 48 to 63 Hz
Power consumption	4 VA	3 VA
Electrical safety	To EN 61010, Part 1 Overvoltage category III, pollution degree 2, for switching cabinet mounting to EN 50178	To EN 61010, Part 1 Protection class III, for operation with SELV/PELV circuits
Test voltage	3700 V	500 V
Electrical isolation	The supply is electrically isolated from the input and the output. There is no electrical isolation between input, output and setup connector.	

Environmental influences

Operating temperature range	-25 to +55 °C
Storage temperature range	-40 to +90 °C
Storage temperature humidity	Rel. humidity ≤ 85 %, no condensation
Temperature error	≤ ±0.01 %/°C[a]
Climatic conditions	EN 60721-3-3 3K3 Rel. humidity ≤ 85 % annual average, no condensation
Vibration strength	According to GL Characteristic 2
EMC - Interference emission - Immunity to interference	EN 61326 Class B[b] To industrial requirements
IP enclosure protection	IP20 to EN 60529

[a] All data refer to the range end value 10 V or 20 mA.
[b] The product is suitable for industrial use as well as for households and small businesses.

Housing

Material	Polycarbonate
Flammability class	UL 94 V0
Dimensions (W × H × D)	22.5 mm × 93.5 × 60 mm
Screw terminal	2,5 mm^2 wire cross-section/2.5 mm wire dia.
Mounting	On 35 mm × 7.5 mm DIN rail to EN 60715 A.1, for installation in control cabinets
Operating position	Unrestricted
Weight	Approx. 100 g

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