

# Operating instruction

English



## Simulator ALMEMO® KA 7531

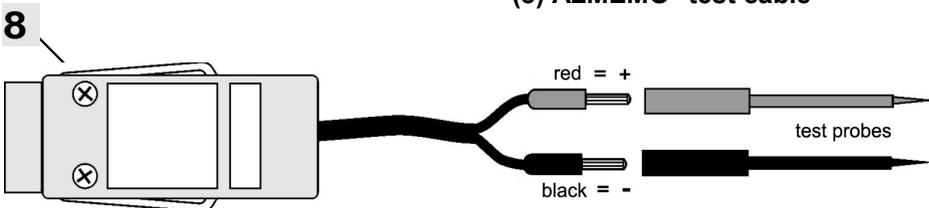
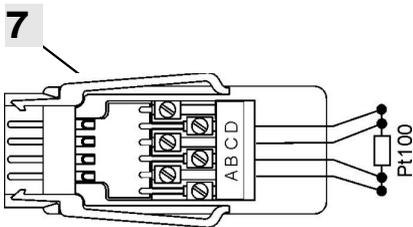
V1.4  
03.12.2012

# 1. OPERATING CONTROLS



Rear of device:

- (6) **Battery compartment**  
3 AA alkaline-manganese batteries



- (1) **Signal sockets P0 to P4**  
for ALMEMO® clamp connectors  
P0 Pt100  
P1 10V, 60mV, thermocouples  
P2 20mA  
P3 Digital signals  
P4 Continuity check

- (2) **Output socket A1**  
A1 V24 Interface (ZA 1909-DK5)  
USB (ZA 1919-DKU)  
LWL (ZA 1909-DKL)  
Ethernet (ZA 1945-DK)

- (3) **DC socket**  
DC Mains adapter (ZA 1312NA1, 12V)  
12V and RS422 (ZA 5099-FSV)  
9V and USB (ZA 1919-DKUV)

- (4) **LCD, graphics display**  
7 rows for functions  
1 row for softkeys F1, , , , F2  
Shown in brackets:  **SET** 

- (5) **Operating keys**
-  Device configuration
  -  Main menu, simulator
  -  Display illumination ON
  -  Programming
  -  F: Function selection
  -  To change the function
  -  S: To set the steps
  -  Programming
  -  P: Data entry
  -  To cancel the function

## Accessories

- (7) Pt100 test connector  
(8) ALMEMO® test cable

## 2. TABLE OF CONTENTS

<b>1. OPERATING CONTROLS.....</b>	<b>2</b>
<b>3. GENERAL.....</b>	<b>4</b>
3.1 Warranty.....	4
3.2 Standard delivery.....	4
3.3 Waste disposal.....	5
<b>4. SAFETY INSTRUCTIONS.....</b>	<b>5</b>
4.1 Special notes on use.....	5
4.2 Handling batteries / rechargeable batteries correctly.....	5
<b>5. THE SIMULATOR FUNCTIONS.....</b>	<b>6</b>
<b>6. CONNECTING THE SIMULATOR.....</b>	<b>6</b>
<b>7. POWER SUPPLY.....</b>	<b>7</b>
7.1 Battery operation and supply voltage monitoring.....	7
7.2 External power supply.....	7
7.3 Switching ON / OFF, reinitialization.....	7
<b>8. DISPLAY AND OPERATING CONTROLS.....</b>	<b>8</b>
8.1 Function keys.....	8
8.2 Data entry.....	8
<b>9. MENUS.....</b>	<b>9</b>
9.1 Main menu.....	9
9.2 Submenus.....	9
9.2.1 Pt100 output.....	9
9.2.2 Voltage output, thermocouples.....	10
9.2.3 Current output.....	10
9.2.4 Digital signal output.....	11
9.2.5 Continuity check.....	11
9.3 Simulator functions.....	12
9.3.1 Steps, manual.....	12
9.3.2 Steps, automatic.....	12
9.3.3 Ramp, automatic.....	12
9.4 Device configuration.....	13
9.4.1 Language.....	13
9.4.2 Illumination and contrast.....	13
9.4.3 Battery voltage.....	13
9.4.4 Baud rate, data format.....	13
<b>10. SERIAL INTERFACE.....</b>	<b>14</b>
10.1 Programming via the interface.....	15
<b>11. ELECTROMAGNETIC COMPATIBILITY.....</b>	<b>16</b>
<b>12. APPENDIX.....</b>	<b>17</b>
12.1 Technical data.....	17
12.2 Product overview.....	17
12.3 Index.....	18
<b>13. YOUR CONTACT PARTNER.....</b>	<b>20</b>

### 3. GENERAL

Congratulations on your purchase of this new and innovative ALMEMO® simulator. It will allow you to perform a wide range of simulation runs on sensors and transmitters and put data acquisition and automation systems into service quickly and easily. It also accepts signals from Pt100 and thermocouple sensors, e.g. 0-10 V, 0-20 mA, and pulses and frequencies, 0-100 kHz. With its range of softkeys and its clear and readily understandable graphics display the device is easy and convenient to operate. You are nonetheless advised to properly familiarize yourself with the way the device functions and with its numerous possibilities and to carefully read these operating instructions and the basic information on sensors in the ALMEMO® Manual. This is the best way to avoid operating errors and prevent damage to the device. To help you find answers to your questions as quickly and easily as possible an index is provided at the end of these instructions and at the end of the Manual.

#### 3.1 Warranty

Each and every device, before leaving our factory, undergoes numerous quality tests. We provide a guarantee, lasting two years from delivery date, that your device will function trouble-free. In the unlikely event that the device proves defective and you need to return it please wherever possible use the original packaging material for dispatch and enclose a clear and informative description of the fault and of the conditions in which it occurs.

This guarantee will not apply in the following circumstances :

- The user attempts any form of unauthorized tampering and alteration inside the device.
- The device is used in environments or conditions for which it is not suited.
- The device is used with an unsuitable power supply and / or in conjunction with unsuitable peripheral equipment.
- The device is used for any purpose other than that for which it is intended.
- The device is damaged by electrostatic discharge or lightning.
- The user fails to observe these operating instructions

The manufacturer reserves the right to change the product's characteristics in the light of technical progress or to benefit from the introduction of new components.

#### 3.2 Standard delivery

When you unpack the device check carefully for any signs of transport damage and ensure that delivery is complete:

Simulator ALMEMO® KA 7531, ALMEMO® clamp connector, test cable with test probes, These operating instructions, ALMEMO® Manual, CD with AMR-Control software and various useful accessories

In the event of transport damage please retain the packaging material and inform your supplier immediately.

### 3.3 Waste disposal



This symbol means that the product is subject to European Union regulations on segregated waste disposal. This applies both to the product itself and to any accessories marked with the same symbol. Disposal of any such item as unsorted domestic waste is strictly forbidden. Batteries and rechargeable battery packs are special waste and must not be discarded as normal domestic waste. Please dispose of packaging materials, plastics, and electronic components separately and in the proper manner.

## 4. SAFETY INSTRUCTIONS



**CAUTION!** This sign is intended to warn the user of a situation that risks damaging the device. The user should carefully read the operating instructions in order to avoid possible errors, damage to equipment, and even the risk of personal injury. The device may only be opened by duly authorized and qualified service technicians.



**WARNING!** This sign is intended to warn the user of a possibly life-threatening situation with risk of fatal injury through high voltage. Before connecting any equipment to the power supply always ensure that the operating voltage is correct. Please note that the device may be susceptible to damage by electrostatic discharge or lightning. Do not run wires in the vicinity of high-voltage power cables!

### 4.1 Special notes on use



If the device is brought into the work-room from a cold environment there is a risk that condensation might form on the electronics. You are advised therefore to wait until the device has adjusted to the ambient temperature before starting to use it.

### 4.2 Handling batteries / rechargeable batteries correctly



When inserting batteries / rechargeable batteries ensure that these are correctly polarized. If the device will probably not be needed for a relatively long period of time or if the batteries are empty remove the batteries; this will prevent battery acid leaking onto the device and damaging it. Rechargeable batteries should be recharged as and when necessary. You should never attempt to recharge an ordinary (non-rechargeable) battery; it may explode ! Batteries / rechargeable batteries must never be short-circuited or thrown on the fire.

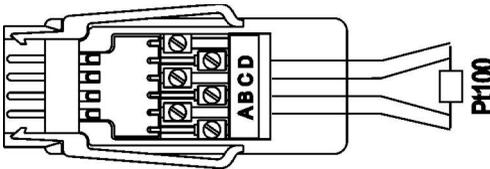
## 5. THE SIMULATOR FUNCTIONS

Simulator ALMEMO® KA7531 is a universal generator of sensor and transmitter variables. For Pt100 sensors it incorporates 5 precision resistors in 4-conductor circuitry. Voltage signals from 7 different thermocouple types with settable cold junction temperature are calculated and output via a 16-bit D/A converter. Transmitter signals 0-10 V and 0-20 mA are generated in exactly the same way. Pt100, voltage, and current signals are electrically isolated from one another. The output values can be specified digit-by-digit or set manually in selectable steps or automatically. It even provides continuous ramp generation with settable limit values. Digital signals of 0.01 Hz to 500 kHz can be used as frequency with selectable pulse width or pulse / pause duration. A continuity check is also provided; this measures the voltage drop and, in the event of the result exceeding a settable threshold, issues an acoustic signal. The simulator can also, via the interface, be controlled from a PC or operated in an ALMEMO® network.

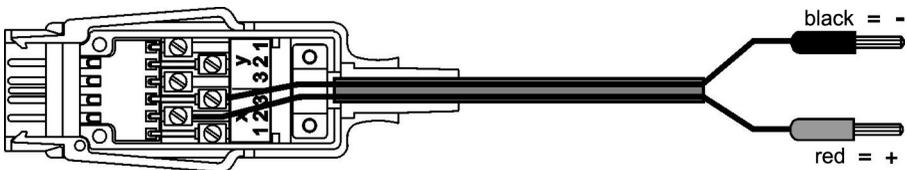
## 6. CONNECTING THE SIMULATOR

To supply simulator variables to the appropriate devices the simulator incorporates 5 ALMEMO® sockets P0 to P4 (1). The accessories include one ALMEMO® test connector (7) with 6 terminals for connecting the Pt100 resistors in 4-conductor circuitry. For all other signals there is the connector with two-pole cable and banana plugs. For the continuity check test probes are also provided.

Connection of Pt100 simulator with ALMEMO® test connector ZA 100-TS in 4-conductor circuitry (terminals A, B, C, D):



Connection of voltage signals, current signals, digital signals, and continuity check via 2-contact ALMEMO® test cable ZA 1000-TK fitted with banana plugs, (terminals A = +, B = -):



## 7. POWER SUPPLY

Power can be supplied to the simulator in any of the following ways :

3 AA alkaline batteries, in the device	
Mains adapter 12 V, 0.2 A, with ALMEMO® connector	ZA1312NA1
External DC voltage, 10 to 30 V via ALMEMO® connector	ZA1000FSV
Supply and RS422 network connection via ALMEMO® connector	ZA5099FSV
Supply and USB connection via ALMEMO® data cable	ZA1919DKUV

### 7.1 Battery operation and supply voltage monitoring

The measuring instrument is powered by 3 AA alkaline batteries. Basic current consumption is approx. 30 mA; this will give an operating time of approx. 70 hours. If the display illumination is left switched on, this operating time will be reduced to approx. 30 hours. If the current output is often used the batteries may last as little as 15 hours. The available operating voltage is displayed in the device configuration (see 9.4), thus allowing you to assess the remaining operating time. As soon as the remaining battery capacity drops to approx. 10%, the battery symbol  in the softkey bar of the displays will start to flash and display illumination is switched off. If the batteries are completely discharged the device itself will switch off. To replace old batteries unscrew the battery compartment cover (6) on the rear of the device.



To save on battery use when in battery mode the electrically isolated current / voltage signals P1 and P2, so long as they are not selected, are switched off.

### 7.2 External power supply

Via the simulator it is also possible to draw power from an external source - preferably using mains adapter ZA1312NA1 (12 V / 0.2 A) connected via the DC socket (3). Please ensure that the mains voltage is correct. At this socket it is also possible, via an ALMEMO® connector (ZA1000FSV) to connect a DC voltage from 9 to 12 V (minimum 0.2 A). Another interesting possibility is the combined connection of power supply and interface to the ALMEMO® network via ALMEMO® connector ZA5099FSV or to a USB interface via ALMEMO® cable ZA 1919-DKUV.



With an external supply all outputs can be used simultaneously.

### 7.3 Switching ON / OFF, reinitialization

To switch the device ON briefly press and release the key **ON** (5) in the middle of the keypad; to switch the device OFF press the key **ON** and hold down. If interference (e.g. electrostatic) or a malfunction (e.g. battery failure) causes the device to behave abnormally, it can be reinitialized; to do so press key **F2** when switching on. This will restore all settings to the factory default status.

## 8. DISPLAY AND OPERATING CONTROLS

The simulator incorporates a keypad (4) and a graphic display (5) for the purposes of configuring the device and operating all signals. The main menu shows the associated ports P0 to P4 and the variables set.

### 8.1 Function keys

The way in which the function keys **F1** , **F2** (5) and the cursor keys **◀** , **▶** , **▲** , **▼** operate may vary from menu to menu. The function is indicated as an abbreviation in the bottom line of the display (softkeys).

In the instructions and documentation these soft-key abbreviations are shown in angle brackets. e.g.

To select device configuration

To return to main menu

To switch display illumination ON / OFF

To switch device OFF press and hold down

**To select a function** press any of keys

Symbol lights up in the middle indicating function selection.

The function is highlighted in inverse font.

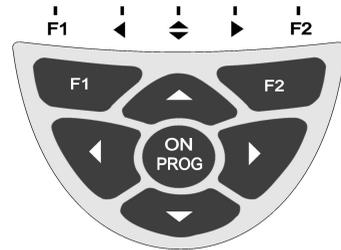
To access the next submenu press

Depending on the function the keys are assigned an abbreviation.

To set a parameter directly

To cancel the function

SIMULATOR KA 7531		V6.01	
P0: Pt100		100.0 °C	
P1: 0-10 V		5.000 V	
P2: 0-20 mA		12.000 mA	
P3: 0-4000Hz		1000. Hz	
P4: Continuity	Yes	36 mU	
<b>CONFIG</b>		<b>*ON</b>	



**<CONFIG>**

**<MENU>**

**<\* ON>** , **<\* OFF>**

**ON**

**PROG** , **▲** oder **▼** ...

**<F>** für Funktionswahl

**100.0 °C**

**▶F**

**<SET>**

**<ESC>**

### 8.2 Data entry

If a programmable function is selected you can clear or reprogram the current value directly.

To program press

Symbol lights up in the middle indicating programming mode.

The cursor blinks below the first input position.

To clear the programmed values

To increment the selected digit

To decrement the selected digit

**PROG**

**<P>**

**P1: 0-10V: 00.000 V**

**<CLR>**

**▲** ...

**▼** ...

To change the arithmetic sign

< +/- >

To select the next position

▶

The cursor blinks below the second digit.

P1: 0-10V: 10.000 V

To move back to the previous digit

◀

Each position is programmed like the first.

▲ / ▼..., ▶...

To complete data input

PROG

To cancel programming

<ESC>



If a data cable or interface connector is plugged in at socket A1 or DC, key operation on the simulator is - for safety reasons - automatically blocked.

The following should appear in the softkey bar:

Remote Control ! \*ON

## 9. MENUS

The simulator is operated via the main menu and a series of associated sub-menus in which its operating parameters can be individually set.

### 9.1 Main menu

In the main menu all parameters for output ports P0 to P3 can be selected and set directly by means of keys **PROG**, **▲** / **▼**. see 8.2.

The threshold for the continuity check can be programmed via port P4. The ports can be configured in detail via the appropriate sub-menus.

The 5 Pt100 values can also be selected by means of.

SIMULATOR KA 7531		V6.01
P0: Pt100	100.0	°C
P1: 0-10 V	5.000	V
P2: 0-20 mA	12.000	mA
P3: 0-4000Hz	1000.	Hz
P4: Continuity	Yes	36 mV
ESC F		▶F SET

<SET>

### 9.2 Submenus

Passing via the main menu to the submenus all ports P0 to P4 can be configured in detail and simulation functions can be activated.

To call up these submenus press

▶F

To return to the main menu press

F◀

#### 9.2.1 Pt100 output

At socket P0 there are 5 resistors in 4-conductor circuitry for simulating Pt100 sensors. (see 6.) In submenu P0 Pt100 you can by means of keys **▲** / **▼** (abbreviation S for steps) scroll up and down between the 5 temperature values 0, 50, 100, 200, and 300 °C.

P0: Output Pt100	
Function: stePs individually	
100.0 °C	
F4	S *ON

### 9.2.2 Voltage output, thermocouples

The voltage output is present at socket P1. see6. In associated submenu P1 the following voltage ranges can be selected:

- 3 to 10V,
- 10 to 60mV

plus 7 thermocouple ranges:

TC NiCr	type K	0.1°C
TC Nisil	type N	0.1°C
TC FeCo	type J	0.1°C
TC CoCo	type T	0.1°C
TC Pt10	type S	1 °C
TC Pt13	type R	1 °C
TC EI18	type B	1 °C

To select function 'P1: Output' press (see 9.3):

**To choose the output range**

press:

To choose simulator functions

press:

Display of temperature value in mV

To simulate real temperatures the cold junction temperature (socket temperature of test item) must either be disabled in the test item or imaged in the simulator.

To select the cold junction temperature press

Enter the cold junction temperature in the function press

To enable / disable the cold junction temperature

Display of temperature value in mV

To return to simulator's main menu

### 9.2.3 Current output

The current output is present at socket P2. see6. In submenu P2 the current range is fixed permanently at 0 to 20 mA.

To choose simulator functions (see 9.3)

To return to simulator's main menu

P1: Output 0 - 10V  
Function steps automatically

5.000 V

Step: 01.000 V

F1 S \*ON

P1: Output TC NiCr type K  
Function: steps individually

500.0 °C

Step: 0100.0°C U: 20.644mV

ESC F SET

PROG , ▲ / ▼ see

P1: Output -10..60mV

<SET> or see

Function: Steps individually

<SET> oder see

U: 20.644mV

<VK>

UK: 20.6°C see

PROG , <OFF> / <ON>

<mV>

F1

P2: Output 0..20 mA  
Function: steps individually

5.000 mA

Step: 01.000 mA

F1 S \*ON

Funktion: Steps individuell

F1

## 9.2.4 Digital signal output

### Frequencies

For frequencies and pulses socket P3 is provided. In submenu P3 the following can be selected : 4 **frequency ranges**

- 1 to 4000 Hz,
- 1 to 10.00 kHz
- 1 to 40.0 kHz
- 1 to 100 kHz

Within these ranges the pulse width and the pulse / pause ratio can be set in %.

### Pulses

There are also two **pulse ranges** for which the **period duration** is specified :

- 2  $\mu$ s to 99.999 ms
- 2 ms to 99.999 s

The **pulse duration** can also be set here.

### Pulse variables, an overview

For a clear and easy-to-understand overview of these variables (frequency, pulse width, pulse duration, pause duration) there is a further submenu; this can be accessed by pressing the  key again.

To return to the 1st submenu press:

## 9.2.5 Continuity check

The test cable connected at socket P4 provides a continuity check. The threshold above which continuity is reported (by visual and acoustic signals) can be set between 1 and 1000 mV. The displayed measured value indicates the voltage drop, e.g. the voltage flowing through a diode.

```

P3: Output Frequency 4000Hz
Function: steps individually
1000 Hz
Pulse width: 50.0 %
Step: 00100 Hz
F4 S MF *ON
  
```

Pulse width: 50.0 %

```

P3:OutP. Period duration 99ms
Function: steps individually
10.000 ms
Pulse duration: 01.000 ms
Step: 02.000 ms
F4 S MF *ON
  
```

Pulse duration: 01.000 ms

```

P3:OutP. Period duration 99ms
Frequency: 100 Hz
Period duration: 10.000 ms
Pulse width: 10.0 %
Pulse duration: 01.000 ms
Step: 02.000 ms
F4 S *ON
  
```



```

P4: Continuity ies
650 mV
Threshold: 1000 mV
F4 *ON
  
```

### 9.3 Simulator functions

To run a quick and easy check on a control process or a control element various values can be systematically specified either in steps or automatically in ramp form. To do this select the **Function** line (see 8.1).

Program one of the available functions

Steps manual  
 Steps automatic  
 Ramp automatic  
 <SET>

or by means of key (see 8.2)

#### 9.3.1 Steps, manual

In this function the output value can be selected and modified manually digit-by-digit; to terminate press <PROG>. (see 8.2)

To specify a step percentage select the function **Steps** (see 8.1) and enter the desired value.

To change the control variable step-by-step press

P1: OutPut 0...10 V  
 Function: Steps manual  
 5.000 V  
 Step: 01.000 V  
 0

▲ or ▼ (softkey abbreviation S)

#### 9.3.2 Steps, automatic

In this function **Steps automatically** modification of the control variable can be automated. In the function **Time** the waiting period per step can be entered.

To start step-by-step output press:

To stop step-by-step output press:

P1: OutPut 0...10 V  
 Function: Steps automatically  
 5.000 V  
 Step: 01.000 V Time: 10 s  
 START F4 S \*ON

<START>

<STOP>

#### 9.3.3 Ramp, automatic

In this function the control variable is simulated automatically and continuously from a start value up to a stop value or for a certain period of time. One can enter a start value; one can also enter a stop value in the **Stop** function and the period of time from start to stop in the **Time** function.

To start continuous output press:

To stop continuous output press:

P3: OutP.Period duration 99ms  
 Function: Ramp automatically  
 Start: 10.000 ms  
 Pulse duration:: 99.999 ms  
 Stop: 50.000 ms Time: 999 s  
 START F4 S F \*ON

<START>

<STOP>

## 9.4 Device configuration

In the menu 'DEVICE CONFIGURATION' certain basic settings for the adapter can be made. namely the operating parameters 'Device address' and 'Baud rate' for the serial interface, the menu language, and the display illumination mode.

```
* DEVICE CONFIGURATION *
Device address: 00
Baud rate:      9600 Bd
Language:      English
Illumination:  ✓duration: 20sec
Contrast:      50 % UBat: 4.5 V

MENU           *ON
```

To select 'Device configuration' in the main menu

<CONFIG>

To return to the main menu:

<MENU>

### 9.4.1 Language

As menu language the user can choose between 'Deutsch' / 'English' / 'Français'; (other languages are available on request).

The softkeys are international; these cannot be changed.

To select the 'Language' function:

Language: English

To change the language

<SET>

### 9.4.2 Illumination and contrast

The display can be illuminated but this consumes more power. In battery mode therefore backlighting switches off automatically on expiry of a settable period of time during which no key is touched.

To switch display illumination ON

<\* ON>

Illumination: ✓

To switch display illumination OFF

<\* OFF>

Illumination: -

To enter a duration for display illumination ON

Duration: 20 sec

To switch illumination ON permanently

Duration: - -

To switch back ON again without this function

ON or ◀

Set the contrast (5 to 100 %) in the function

Contrast: 50%

### 9.4.3 Battery voltage

View current operating voltage

UBat: 4.5 V

As soon as battery voltage drops below 3.5 V dis-Symbol  in place of

<\* ON>

play illumination is switched OFF automatically.

As soon as battery voltage drops below 3.0 V the device itself is switched OFF automatically

### 9.4.4 Baud rate, data format

On leaving the factory the baud rate for all interface modules is programmed to 9600 baud. In order to avoid unnecessary problems when networking several devices together the baud rate should not be altered; instead, the computer should be set to match. If for some reason this proves impossible you can, in the 'Baud rate' function, choose a value from 1200 / 2400 / 4800 / 9600 baud or 57.6 / 115.2 kilobaud. Set the baud rate in the function (s. 8.2): Baud rate: 9600 bd  
Data format 8 data bits, 1 stop bit, no parity (cannot be changed)

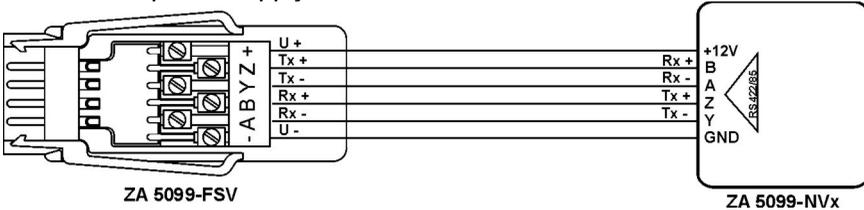
### 9.4.5 Device address

To communicate with networked devices it is absolutely essential that all the devices concerned should have the same baud rate setting but that each should have its own dedicated address; this is because only one device should respond per command. Before starting network operation ensure therefore that all the measuring instruments and modules involved are assigned different device addresses. On leaving the factory address 00 is normally set.

Set the device address in the function (see 8.2): **Device address: 00**

## 10. SERIAL INTERFACE

All ports can be controlled not only by pressing the appropriate keys but also, with option I, via the serial interface; (see Manual, Chapter 6). For connecting to socket A1 (2) various data cables are available; (see Manual 5.2). The best way of connecting to a network distributor is on a 6-wire basis via connector ZA 5099-FSV in the DC socket leading to a free RS422 output; (see Manual 5.3). This combines power supply and data transmission.



The same combined connection is also implemented with the new USB data supply cable ZA 1919-DKUV.



If a data cable or interface connector is plugged in at socket A1 or DC, key operation on the simulator is - for safety reasons - automatically blocked.

The following should appear in the softkey bar:

Remote Control ! \*ON

The '**Device address**' can be modified as and when necessary in the menu '**DEVICE Configuration**'. (see 9.4.5)

## 10.1 Programming via the interface

### To program a function

	Command
Port 01 range V	i01 B11
Port 01 range mV	i01 B10
Port 01 range TC type K	i01 B04
Port 01 range TC type N	i01 B34
Port 01 range TC type J	i01 B35
Port 01 range TC type T	i01 B36
Port 01 range TC type S	i01 B07
Port 01 range TC type R	i01 B37
Port 01 range TC type B	i01 B08
Port 03 range 4000Hz	i03 B29
Port 03 range 10kHz	i03 f1 B29
Port 03 range 40kHz	i03 f2 B29
Port 03 range 100kHz	i03 f3 B29
Port 03 range 99ms	i03 B54
Port 03 range 99s	i03 f1 B54
Cold junction temperature in digits (e.g. 23.4°C)	f1 g00234
Value of simulator port pp to 5 digits	ipp f9 ayyyyy Aufl. s.u.

### Output programming and status

Response	Simulator	
<b>Px Interface element</b>	<b>Variant</b>	<b>P0. KA7531</b>
00 Pt100 output	Controlled	00:T00 COM +0300.0 °C
01 Analog output, 10 V	Controlled	01:DA1 COM +10.000 V
01 Analog output, 60 mV	Controlled	01:DA7 COM +60.000mV
01 Analog output, TC type K	Controlled	01:TC0 COM +1370.0 °C VK:+025.1 °C
01 Analog output, TC type N	Controlled	01:TC1 COM +1300.0 °C VK: - - °C
01 Analog output, TC type J	Controlled	01:TC2 COM +1000.0 °C VK: - - °C
01 Analog output, TC type T	Controlled	01:TC3 COM +0400.0 °C VK: - - °C
01 Analog output, TC type S	Controlled	01:TC4 COM +01760. °C VK:+0025. °C
01 Analog output, TC type R	Controlled	01:TC5 COM +01760. °C VK: - - °C
01 Analog output, TC type B	Controlled	01:TC6 COM +01800. °C VK: - - °C
02 Analog output, 20 mA	Controlled	02:DA2 COM +20.000mA
03 Frequency output, 0.4 kHz	Controlled	03:F00 COM +04000. Hz
03 Frequency output, 10 kHz	Controlled	03:F01 COM +010.00kHz
03 Frequency output, 40 kHz	Controlled	03:F02 COM +0040.0kHz
03 Frequency output, 100 kHz	Controlled	03:F02 COM +00100. kHz
03 Pulse output, 99 ms	Controlled	03:P00 COM +99.999ms
03 Pulse output, 99 s	Controlled	03:P01 COM +99.999 s
04 Continuity voltage		04:INO +01000. mV DS:+0500. mV

## 11. ELECTROMAGNETIC COMPATIBILITY

Ahborn Mess- und Regelungstechnik GmbH declares herewith that measuring instrument ALMEMO® KA 7531 carries the CE label and complies in full with the requirements of EU directives relating to low voltage and to electromagnetic compatibility (EMC) (89/336/EWG).

The following standards have been applied in evaluating the product.

Safety / security:	EN 61010-1:2001
EMC:	EN 61326-1: 2013



If a product is modified in any manner not agreed with us in advance, this declaration becomes void.

## 12. APPENDIX

### 12.1 Technical data

<b>Pt100</b>	5 resistors in 4-conductor circuitry, electr. isolated 0, 50, 100, 200, 300 °C
Temperature values	±0.1 °C
Accuracy	Temperature drift 0.01 °C/K
<b>Analog outputs</b>	Electr. isolated      Resolution 15 bits
	-4.0 to +10.000 V      Load >100 kΩ
	-10.0 to +60 000 mV      Load >1 MΩ
	0.0 to +20 000 mA      Load <500 Ω
Accuracy	±0.05% ±0.05% of final val.      Temp. drift 20 ppm / K
Time constant	100 µs
<b>Thermocouple ranges</b>	Types K, N, T, J (ITS90)      Resolution 0.1 K
	Types S, R, B (ITS90)      Resolution 1 K
Accuracy	±0.05% ±0.05% of final value
Temp. range for cold junction compensation	-30 to +100 °C
<b>Frequency ranges</b>	1 to 4000 Hz; 0.01 to 10.00 kHz; 0.1 to 40.0 kHz; 1 to 100 kHz
Accuracy	as per resolution
<b>Pulse ranges</b>	Period duration      Pulse duration
	2 µs to 99.999 ms      1 µs to 99.998 ms
	2 ms to 99.999 s      1 ms to 99.998 s
Accuracy	0.01%
<b>Continuity check</b>	Current appr. 1 mA      Threshold 0 to 1000 mV
<b>Power supply</b>	10 to 12 VDC
Current consumption	Standard approx. 30 mA
From battery 4.5 V	With voltage / current output approx. 80mA + 4x I <sub>OUT</sub>
	Illumination approx. 40 mA extra
<b>Standard equipment</b>	Graphics display 126 x 64 (55x30 mm) 7 silicone keys
<b>Housing</b>	(LxWxH) 127x83x42mm, ABS, Weight approx. 260g
<b>Suitable conditions</b>	
Operating temperature	-10 to +50 °C      Storage temperature -20 to +60 °C
Ambient relative humidity	10 to 90 % RH (non-condensing)

### 12.2 Product overview

Order No.

#### ALMEMO®-Simulator

Pt100, 7 thermocouples -10 to +60 mV, -3 to +10 V, 0 to 20 mA, 0 to 500 kHz

Continuity check, graphics display, keypad, ALMEMO® clamp connector,

ALMEMO® test cable, test probes

KA 7531

Option I Interface for control via PC

OA 7531-I

#### Accessories

ALMEMO® test cable with test probes

ZA 1000-TK

Mains adapter with ALMEMO® connector, 12 V, 0.2 A

ZA 1312-NA1

ALMEMO® supply connector

ZA 1000-FSV

ALMEMO® data cable, V24 interface, el. isol., max. 115.2 kilobaud

ZA 1909-DK5

ALMEMO® data supply cable, USB interface, 9 V, 200 mA

ZA 1919-DKU

ALMEMO® data supply connector with RS422 interface

ZA 5099-FSV

**12.3 Index**

4-conductor circuitry	6	6
Accessories	12.2	17
Accuracy	12.1	17
Analog outputs	12.1	17
available operating voltage	7.1	7
Battery operation	7.1	7
Battery voltage	9.4.3	13
Baud rate	9.4.4	13
cold junction temperature	9.2.2	10
Connecting the simulator	6	6
Continuity check	12.1	11, 17
contrast	9.4.2	13
current consumption	7.1	7
Current consumption	12.1	17
Current output	9.2.3	10
Data entry	8.2	8
data format	9.4.4	13
data supply cable	12.2	14, 17
Device address	9.4.5	14
Device configuration	9.4	13
Digital signal output	9.2.4	11
Display and operating controls	8	8
duration for display illumination	9.4.2	13
Electromagnetic compatibility	11	16
External power supply	7.2	7
factory default status	7.3	7
frequency ranges	9.2.4	11
Frequency ranges	12.1	17
Function keys	8.1	8
Handling batteries	4.2	5
illumination	8.1	8
Illumination	9.4.2	13
Language	9.4.1	13
Main menu	9.1	9
Mains adapter	7	7
menu language	9.4	13
Menus	9	9
network distributor	10	14
network operation	9.4.5	14
Operating Controls	1	2
operating time	7.1	7
Order No.	12.2	17
period duration	9.2.4	11

Power supply	12.1	7, 17
Programming via the interface	10.1	15
Pt100	12.1	17
Pt100 output	9.2.1	9
pulse / pause ratio	9.2.4	11
pulse duration	9.2.4	11
pulse range	9.2.4	11
Pulse ranges	12.1	17
pulse width	9.2.4	11
Ramp	9.3.3	12
reinitialization	7.3	7
Remote Control	10	14
replace old batteries	7.1	7
Safety instructions	4	5
select a function	8.1	8
Serial interface	10	14
Signal sockets	1	2
simulator functions	5	6
Simulator functions	9.3	12
softkey	8.1	8
Special notes on use	4.1	5
Standard delivery	3.2	4
Standard equipment	12.1	17
start	9.3.2	12
start value	9.3.3	12
step percentage	9.3.1	12
Steps	9.3.1	12
stop	9.3.2	12
stop value	9.3.3	12
Submenus	9.2	9
Suitable conditions	12.1	17
supply voltage monitoring	7.1	7
Switching ON / OFF	7.3	7
Temp. range for cold junction compensation	12.1	17
test cable	6	6
test connector	6	6
thermocouple ranges	9.2.2	10
Thermocouple ranges	12.1	17
threshold	9.2.5	11
Time constant	12.1	17
voltage flowing	9.2.5	11
Voltage output, thermocouples	9.2.2	10
waiting period	9.3.2	12
Warranty	3.1	4
Waste disposal	3.3	5

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**Even the greatest possible care cannot exclude the possibility of inaccuracies.  
We reserve the right to make technical changes without advance notice.**