Operating instructions

Relay adapter, analog
ALMEMO® ZA 8006-RTA4

V1.0
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1. OPERATING CONTROLS

(1) Sockets P0/1 to P8/9
   for ALMEMO® clamp connectors
   P0/1 2 semiconductor relays R0, R1
   P2/3 2 semiconductor relays R2, R3
   P4/5 2 analog outputs (option)
   P6/7 2 analog outputs (option)
   P8/9 2 semiconductor relays R8, R9

(2) Output socket A1
   A1 V24 interface (ZA 1909-DK5)
   Optic fiber (ZA 1909-DKL)
   Ethernet (ZA 1945-DK)

(3) DC socket
   Mains adapter(ZA1312NA1, 12V, 0.2A)
   12 V + RS422 (ZA 5099-FSV)
   9 V + USB (ZA 1919-DKUV)

(4) LCD, graphics display
   7 rows for functions
   1 line for softkeys F1,◄,▲,►, F2
   Shown in brackets : <MENU>

(5) Operating keys
   ▲▼ P: Port selection
   <MENU> Main menu
   <□ ON> Switch display illumination ON
   ▲▼► F: Function selection
   <SET> Direct data selection
   PROG Programming
   ▲▼► P: Data input

2. CONNECTION DIAGRAM

Rear of device
(6) Battery compartment
   3 AA alkaline-manganese batteries
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4. Function of relay adapter, analog

4. FUNCTION OF RELAY ADAPTER, ANALOG
The analog relay adapter ZA 8006-RTA4 provides a universal output interface with up to 10 interface elements (i.e. maximum 10 semiconductor relays or up to 4 electrically isolated analog outputs). The adapter, in an ALMEMO® network, can be addressed via a PC and can also be used as a manual simulator for the purposes of putting regulating and control systems into service.

5. POWER SUPPLY
Power can be supplied to the adapter in any of the following ways:
- 3 AA alkaline batteries
- Mains adapter 12 V, 0.2 A, with ALMEMO® connector ZA 1312-NA1
- External DC voltage 10 to 30 V via ALMEMO® connector ZA 1000-FSV
- Supply and RS422 network connection via ALMEMO® connector ZA 5099-FSV
- Supply and USB connection via ALMEMO® data cable ZA 1919-DKUV

5.1 Battery operation and supply voltage monitoring
The measuring instrument is powered by 3 AA alkaline batteries. At a current consumption of on average 25 mA, these last for an operating time of approx. 100 hours. If display illumination is switched on, this operating period will be reduced to approx. 50 hours. The available operating voltage is displayed in the device configuration, thus allowing you to assess the remaining operating time; (see 7.3.5). As soon as the remaining battery capacity drops to approx. 10% the symbol in the display header will start to flash and the illumination is switched off. If the batteries are completely discharged the device will switch off. To replace old batteries first unscrew the battery compartment cover (6) on the rear of the device.

5.2 External power supply
Via the output interface it is also possible to draw power from an external source – preferably with mains adapter ZA1312NA1 (12V / 0.2A) 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 any other DC voltage from 10 to 30 V (minimum 200 mA). 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-1919DKUV.

5.3 Switching ON / OFF, reinitialization
To switch the device ON briefly press and release the key ON OFF (5) in the middle of the keypad; to switch the device OFF press and hold down the key ON OFF. 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.
6. INTERFACE ELEMENTS

6.1 Relays
Sockets P0/1, P2/3, and P8/9 (1) are normally fitted with six semiconductor relays, normally open type (changeover type as option). The output relays can be addressed via the keypad and via interface commands (see REF). Whenever a relay is activated a programmable message appears and whenever there is a change in status a short acoustic alarm is sounded. The acoustic alarm can also be permanently assigned to any relay (see REF). The way in which these relays are addressed can also be configured by inverting (see REF) so that they pick up in normal conditions and drop out in the event of alarm or power failure (see below).

In the following cases it is advisable to connect a mains voltage changeover relay downstream (e.g. Phoenix PLC-RSC-24DC/21, 250 V, 6 A):

► Current or voltage capacity is greater than 50 V, 0.5 A
► Separation of mains voltage side
► Implementation of an alarm in the event of failure on control side (see diagram)

![Relay Diagram](image)

6.2 Analog outputs
The relay adapter can also - in various options - be fitted with electrically isolated analog outputs at sockets P4/5 and P6/7 offering the following signals.

<table>
<thead>
<tr>
<th>Option</th>
<th>Output signal</th>
<th>Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>OA 8000-R2</td>
<td>0.000 to +10.000 V</td>
<td>0.5 mV / digit</td>
</tr>
<tr>
<td>OA 8000-R3</td>
<td>0.000 to +20.000 mA</td>
<td>1 µA / digit</td>
</tr>
</tbody>
</table>

The output value can be specified either via the keypad (see 7.3.3) or via the interface (see 8).

6.3 Connecting peripheral equipment:
Peripherals can be connected via the supplied ALMEMO screw connector according to the following schematic diagram.
6. Interface elements

<table>
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<tr>
<th>Terminals</th>
<th>P0/1 relay</th>
<th>P2/3 relay</th>
<th>P4/5 analog</th>
<th>P6/7 analog</th>
<th>P8/9 relay</th>
</tr>
</thead>
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<tr>
<td>y1</td>
<td>R1 normally closed (option)</td>
<td>R3 normally closed (option)</td>
<td>(option)</td>
<td>(option)</td>
<td>R9 normally closed (option)</td>
</tr>
<tr>
<td>y2</td>
<td>R1 common</td>
<td>R3 common</td>
<td>AO5 +</td>
<td>AO7 +</td>
<td>R9 common</td>
</tr>
<tr>
<td>y3</td>
<td>R1 normally open</td>
<td>R3 normally open</td>
<td>AO5 -</td>
<td>AO7 -</td>
<td>R9 normally open</td>
</tr>
<tr>
<td>x3</td>
<td>R0 normally open</td>
<td>R2 normally open</td>
<td>AO4 -</td>
<td>AO6 -</td>
<td>R8 normally open</td>
</tr>
<tr>
<td>x2</td>
<td>R0 common</td>
<td>R2 common</td>
<td>AO4 +</td>
<td>AO6 +</td>
<td>R8 common</td>
</tr>
<tr>
<td>x1</td>
<td>R0 normally closed (option)</td>
<td>R2 normally closed (option)</td>
<td>(option)</td>
<td>(option)</td>
<td>R8 normally closed (option)</td>
</tr>
</tbody>
</table>

7. DISPLAY AND OPERATION

The output interface comprises a keypad (5) and a graphic display (4) for the purposes of configuring the device and operating all interface elements.

7.1 Function keys

The way in which the function keys (5) F1, F2 and the cursor keys ◄, ►, ▲, ▼ operate may differ between menus. The function is indicated as an abbreviation in the bottom line of the display (softkeys). In the instructions and documentation these softkey abbreviations are shown in angle brackets, e.g. <MENU>.

All port menus (see right) will initially provide the following key functions:

**To select port** press cursor keys:
The softkey symbol lights up in the middle.

**To return to the main menu**:

**To select function** press keys:
The softkey symbol: "function selection" lights up in the middle.

Depending on the function the keys are assigned an abbreviation:

- **Switch illumination ON / OFF**: <ON>
- **Switch relay ON, Set parameter, etc.**: R ON, SET
- **Cancel function**: ESC

ZA 8006 RTA4
Device: 00
Port: 0
Relay: normally closed 0.5A
-8: ext. steered inv.
State: inactive
Contact: x2-x3 closed

F1 ◄ or ► ... for "port selection"

F2 <MENU> or ◄ for "function selection"

F3 PROG, ▲ or ▼ ...
7.2 Data input
For safety reasons data input is only possible if there is no interface connected. If this is the case you can select any programmed function (see 7.1) and then delete or reprogram the value directly.

To clear the programmed values press:
To program press:
You should now be in programming mode;
The cursor blinks below the first input position.
To increment the selected digit, press:
To decrement the selected digit, press:
To change the arithmetic sign of a numeric value, press:

To select the next position press:
The cursor blinks below the second digit
To move back to the previous digit, press:
Each position is programmed like the first
To complete data input:
To cancel programming:

7.3 Menus
The interface adapter is operated via various menus.

7.3.1 Main menu
The main menu is called up by pressing <MENU>. Here by pressing ▲ / ▼ you can call up the sub-menus All Ports or Individual Ports or Device configuration. Here too, if you are using option OA 8006-R42 incorporating two analog outputs 0 to 10 V and 0 to 20 mA, the two simulator menus can be called up directly.

To call up these menus press

7.3.2 All ports :
The menu All Ports lists all available ports. Under the port number the abbreviation indicates the type of elements available; R = relay, A = analog output. The line below this indicates whether the relays are activated; the xy23 line shows the actual switching status of the relays and the type of analog outputs 10 V or 20 mA at terminals x23 and y23.
7. Display and operation

7.3.3 Individual ports
In the menu **Individual Ports** you can by pressing ▲ and ▼ scroll through and select any port individually and display details of element type, variant, and status.

**Relays**
For addressing the relays two different variants can be programmed.

- Variant 8: Driven externally
- Variant -8: Driven externally, inverse

This inversion has the effect of ensuring that in the event of alarm or power failure the relays all adopt the same status. Below the line indicating whether the relay is activated one can also see the actual switching status of the individual contacts.

**Analog outputs**
With analog outputs (option) only the desired analog value can be programmed. The pin assignment is shown with the associated terminals.

By pressing <FCT> you can also call up other simulator functions (see 7.3.4).

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7.3.4 Simulator
In order to quickly check a control process or a control element it is possible with the analog outputs (option) to systematically specify certain values either in steps or automatically as a ramp. For this purpose the following functions can be programmed.

1. **Step-by-step, manual**
   - Specify step percentage in %
   - Change the control variable step-by-step by pressing <MANU> from 0% up to 100% or up and down by pressing ▲ and ▼.

2. **Step-by-step, automatic**
   - ditto, plus waiting period per step
   - To run through all steps from 0% to 100% automatically press <START>. To terminate press <STOP>.

3. **Ramp, automatic**
   - This function runs automatically through the control variable from a start value up to a stop value in a certain period of time.
7.3.5 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 (see 8.), the menu language, the illumination mode, and certain monitoring functions.

**Language**
The user can choose between German / English / French as the menu language; (other languages are available on request). The softkeys are international; these cannot be changed.

To select the language press **<SET>** in function: 

**Illumination**
To switch display illumination ON press **<☼ ON>**
To switch display illumination OFF press **<☼ OFF>**
To specify the duration for display illumination enter

To switch illumination ON permanently enter **Duration :  - -**
To switch back ON again without this function press **ON** or **<MENU>**

Display illumination can only be switched OFF when in battery mode - not when powered from the mains.

**Watchdog**
The watchdog function ensures that, in the event of a failure in interface addressing lasting for 1 minute, all relays will drop out. In the event of alarm the device configuration will be displayed and next to the "Watchdog" function a flashing "Error" symbol will appear.

To switch the watchdog function ON press **<ON>**.
To switch the watchdog function OFF press **<OFF>**.

**Alarm tone**
The integrated alarm signaling device is configured by default in such a way that whenever there is a change it issues a short alarm tone: **Symbol: ON**.
To reprogram the beeper select the **Alarm tone** function; (see 7.2).

e.g. switch beeper OFF with : **Symbol: OFF**
e.g. assign to relay ports with **Symbol: Px**

When this relay is activated the acoustic alarm tone sounds continuously; the associated message appears; (see 7.3.6) e.g.: **Relay Px active**
To switch the alarm tone OFF press **<OFF>**

**Battery voltage**
7. Display and operation

The currently available battery voltage is shown in the function $\text{UBat}: 4.5 \, \text{V}$.

As soon as the battery voltage drops below 3.5 V the display illumination is switched OFF:

As soon as the battery voltage drops to 3.0 V the device itself is switched OFF.

7.3.6 Messages

Each relay can be assigned a particular message - either via the AMR-Control software or a terminal; as soon as such a relay is activated the associated message will appear in the display in its own window (see 8). If several relays are active, you can leaf up and down through the associated messages by pressing $\uparrow / \downarrow$. These windows can be closed by pressing $<\text{OFF}>$. A message only disappears completely when the relay to which it is assigned is no longer active.

8. SERIAL INTERFACE

All ports can be controlled not only by pressing the appropriate keys but also via the serial interface ‘COM’ (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 over 6 wires with connector ZA 5099-FSV in the DC socket led 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 and supply cable ZA 1919-DKUV.

8.1 Device address

To communicate with networked devices it is absolutely indispensable that each device should have its own baud rate setting and 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. This can be checked in the Device address function in Device configuration (see 7.3.5). On leaving the factory address 00 is normally set. This can be modified as desired by entering the appropriate data (see 7.2).
8.2 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 **Device configuration** menu under the **Baud rate** function, choose a value from 1200 / 2400 / 4800 / 9600 baud or 57.6 / 115.2 kilobaud.

**To set the baud rate** in this function (see 7.2):

| Baud rate: | 9600 bd |

**Data format:** Cannot be changed 8 data bits, 1 stop bit, no parity

8.3 Programming via the interface

<table>
<thead>
<tr>
<th>Function</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay variant controlled by port pp, normal</td>
<td>ipp f9 k8</td>
</tr>
<tr>
<td>Relay variant controlled by port pp, inverse</td>
<td>ipp f9 k-8</td>
</tr>
<tr>
<td>To activate relay port pp</td>
<td>f1 Rpp</td>
</tr>
<tr>
<td>To deactivate relay port pp</td>
<td>f1 R-pp</td>
</tr>
<tr>
<td>To set analog value of analog output port pp</td>
<td>ipp f9 ayyyyy</td>
</tr>
<tr>
<td>To program message of port pp</td>
<td>ipp $message-port pp</td>
</tr>
<tr>
<td>Start new line with special character ‘</td>
<td>’:</td>
</tr>
<tr>
<td>To output message</td>
<td>ipp P48</td>
</tr>
<tr>
<td>Response</td>
<td>Message port pp</td>
</tr>
<tr>
<td>To output programming and status</td>
<td>Tel: 123 &lt;CRLF&gt;</td>
</tr>
<tr>
<td>Response</td>
<td>f3 P19</td>
</tr>
</tbody>
</table>

Output module

<table>
<thead>
<tr>
<th>Pxx interface element</th>
<th>Variant</th>
<th>Status</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Normally open 0.5 A</td>
<td>Driven</td>
<td>Inactive</td>
</tr>
<tr>
<td>01</td>
<td>Normally open 0.5 A</td>
<td>Driven, inverse</td>
<td>Inactive</td>
</tr>
<tr>
<td>02</td>
<td>Normally closed 0.5 A</td>
<td>Driven</td>
<td>Inactive</td>
</tr>
<tr>
<td>03</td>
<td>Changeover 0.5 A</td>
<td>Driven, inverse</td>
<td>Active</td>
</tr>
<tr>
<td>06</td>
<td>Analog output 10 V</td>
<td>Driven</td>
<td>by value</td>
</tr>
<tr>
<td>07</td>
<td>Analog output 20 mA</td>
<td>Driven</td>
<td>by value</td>
</tr>
</tbody>
</table>

NO=Normaly Open
NC=Normaly Closed
CO=Change Over

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9. ELECTROMAGNETIC COMPATIBILITY (EMC)
Peripheral adapter ZA8006-RTA4 complies in full with the safety requirements specified in the EU directive relating to electromagnetic compatibility (EMC) (89/336/EEC).

The following standards have been applied in evaluating the product.

- IEC 61000-6-1:1997
- IEC 61000-6-3:1996
- IEC 61000-4-4: 1995+A1:2000 2kV

10. 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. Before you return a device please refer to the operating instructions regarding the function in question and recheck. 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 customer attempts any form of unauthorized tampering and alteration inside the device.
- The device is used in environments and conditions for which it is not suited.
- The device is used with an unsuitable power supply and 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 the 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.
11. APPENDIX

11.1 Technical data

**Relays**
- Semiconductor relay 1ohm Load capacity 50V, 0.5A

**Analog outputs**
- electrically isolated
  - OA 8006-R22: -4.00 to +10.0 V, 0.5 mV / digit, Load > 100 kW
  - OA 8006-R32: 0.0 to +20.0 mA, 1 µA / digit, Load < 500 W
- Residual ripple: < 2 digits
- Accuracy: ±0.1 % ±6 digits
- Temperature drift: 1 digit / K
- Time constant: 100 ms

**Power supply**: 10 to 30 VDC
- Current consumption:
  - Standard approx. 20 mA,
  - with illumination approx. 35 mA
  - Per 2 analog outputs approx. 30 mA + 3.5 x \( I_{OUT} \)

**Standard equipment**
- Graphics display 126 x 64 (55 x 30 mm)
- 7 silicone keys

**Housing**
- (LxWxH) 127 x 83 x 42 mm
- ABS (acrylonitrile butadiene styrene), weight: approx. 260 g

**Suitable conditions**
- Operating temperature: -10 to +50 °C (storage temperature: -20 to +60 °C)
- Ambient relative humidity: 10 to 90 % rH (non-condensing)
11.2 Product overview

ALMEMO® relay adapter
with 6 normally open relays, graphics display, and keypad,
including 1.5-meter ALMEMO® connecting cable
and 3 ALMEMO® clamp connectors
Fixture for top-hat rail mounting

Order no.
ZA 8006-RTA4
ZA 2490-HS

Options
2 additional relays (maximum 10), including 1 ALMEMO® clamp connector
OA 8006-SH2
OA 8006-OH2
2 additional normally closed relays per relay pair
2 analog outputs, electrically isolated, including 1 ALMEMO® clamp connector
OA 8006-R22
OA 8006-R32
OA 8006-R42

Accessories
Mains adapter with ALMEMO connector 12 V, 0.2 A
ALMEMO® supply connector
ALMEMO® data cable, V24 interface, electrically isolated, maximum 115.2 kilo-baud
ALMEMO® data and supply cable, USB interface, 9 V, 200 mA
ALMEMO® data and supply connector with RS422 interface
ZA 1312-NA1
ZA 1000-FSV
ZA 1909-DK5
ZA 1919-DKUV
ZA 5099-FSV
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12. YOUR CONTACT PARTNER(S)