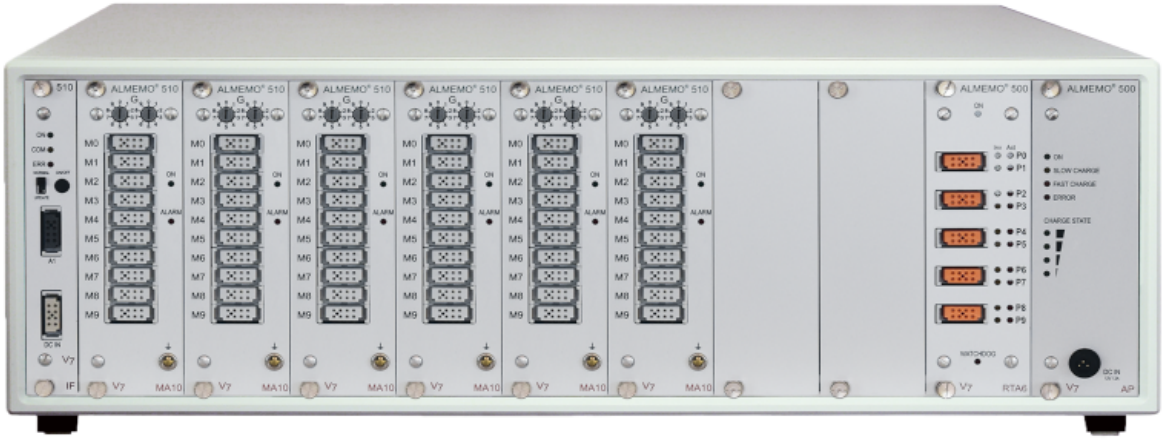
Operating instructions



V7 Data acquisition system

Almemo® 510

Version 1.7
16/09/2025

www.ahlborn.com

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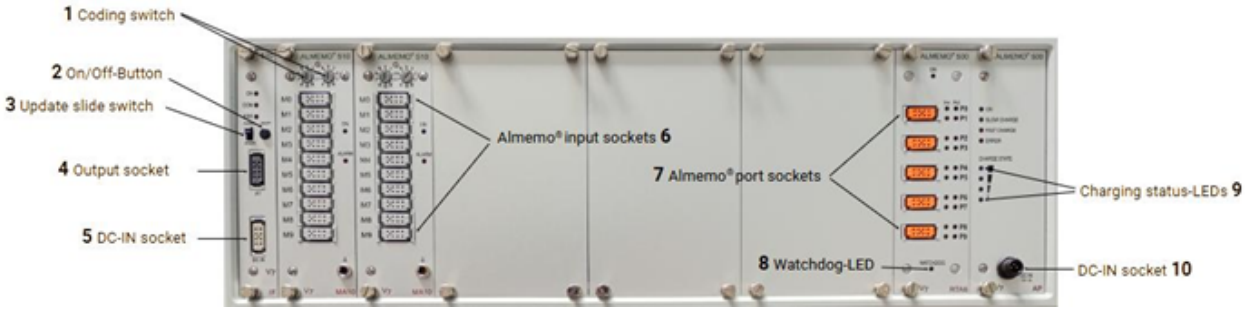

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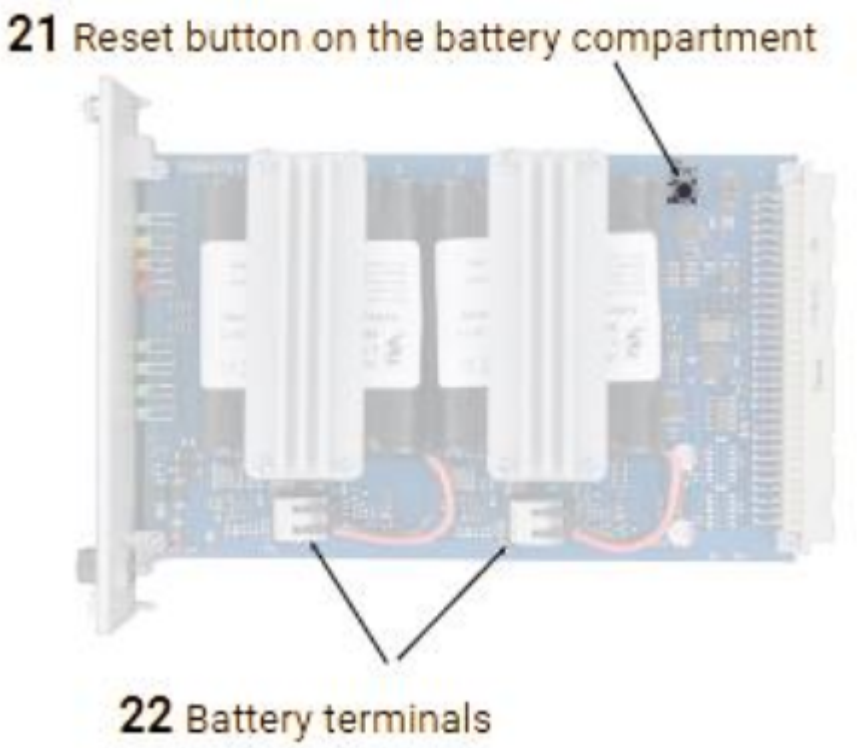

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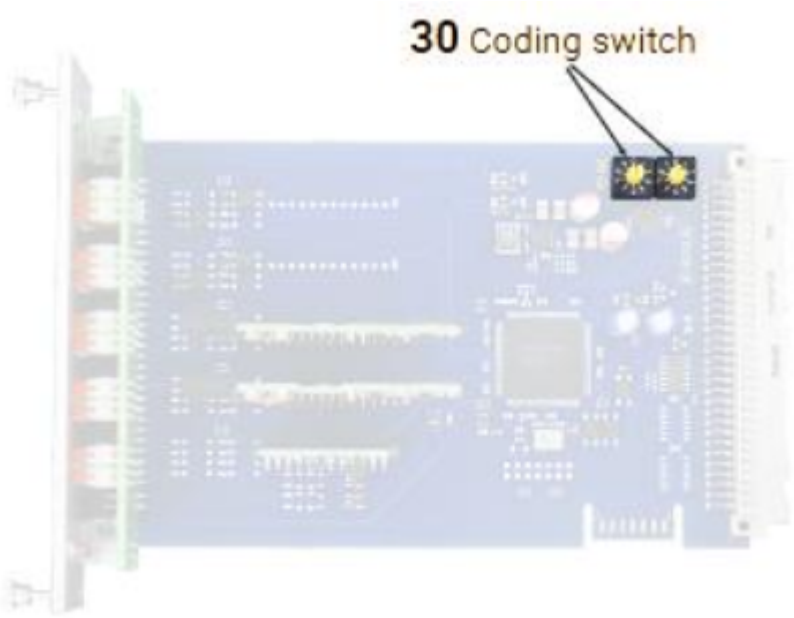


Explanation of symbols

	Safety note
!	Requirement
→	Request
☞	Note
➢	Result
3	Reference to figures
Back	Text displayed in a software

Safety instructions

- → Read the operating instructions carefully and observe the safety and warning instructions.
- → Only use the measuring device for its intended use.
- → Do not use the measuring device outside the operating conditions applicable to this measuring device and only within the technical specifications (Technical Data).
- → Only open the measuring device for maintenance and care, see chapter “Maintenance and care”.
- → Ensure that static electricity is discharged before touching sensor cables.
- → Do not lay sensor cables near high-voltage power lines.
- → Do not operate the measuring device near fuels or chemicals, at gas stations or in explosive areas.
- → Only use the supplied power adapter and do not open or tamper with it.
- → Do not operate the measuring device if it has been damaged by electromagnetic discharge, radiation or lightning.
- → Ensure that batteries are not mechanically damaged, short-circuited or thrown into fire.

Avoid measurement errors and product damage

- → Wait until the measuring device has adjusted to the ambient temperature before putting it into operation.

☞ If the measuring device is brought into the operating room from a cold environment, condensation may form on the electronics. In addition, significant measurement errors are possible during thermocouple measurements if there are large temperature changes.

- → If you are using a battery compartment in the system, thermocouple measurements using the device's internal reference junction temperature should be performed in battery mode (no power adapter connected) whenever possible.

☞ Sensors with DC power supply from the measuring system are not galvanically isolated from each other. If you require galvanic isolation, please contact technical support (phone 08024/3007-32, email help@ahlborn.com).

- → When connecting power adapters, pay attention to the mains voltage.
- → Pay attention to the maximum load capacity of the sensor power supply.
- → Do not make any changes to the measuring device.
- → Do not connect unsuitable peripheral devices to the measuring device.
- → Avoid heat, extreme temperature fluctuations, and increased electromagnetic radiation during operation.

Intended use

The ALMEMO® 510 measurement data acquisition system is a measuring device and is intended exclusively for measuring a wide variety of parameters. The system allows the connection of various sensors and peripheral devices with many special functions.
A detailed overview of the intended use and possible measurement tasks can be found in the **ALMEMO® manual**. It is recommended that you read the relevant chapter for each measurement task and follow the instructions to avoid measurement errors and product damage.
Observe all information and safety instructions listed in the operating instructions. Only use the measuring device within the technical specifications (see chapter Technical Data, Operating Conditions and Power Supply). Any other use is considered improper and may result in damage to property or personal injury. Such use will also void the warranty.

☞ If in doubt, please contact our technical support
(phone 08024/3007-32, mail help@ahlborn.com).

Handling batteries (optional)

The batteries are usually not charged when delivered. Therefore, first charge them completely with the included power adapter until the CHARGE indicator goes out.

Important information:

- → Avoid short circuits or throwing batteries into fire.
- → Batteries are classified as hazardous waste and must not be disposed of with household waste. Please dispose of them properly at appropriate collection points.

Commissioning

1. Plug the DC connector of the power adapter into the DC-IN socket **5** and connect the mains connector to a power outlet.
   ☞ If you want to use one or more battery compartments, wait until the batteries are fully charged and all CHARGE STATE LEDs **9** are lit and the SLOW CHARGE LED or FAST CHARGE LED goes out (see **Operation with battery compartment (optional)**).
2. Plug the ALMEMO® connectors of the desired sensors into the ALMEMO® input sockets **6**.
3. Check the setting of the coding switches **1** for assigning the measuring circuit card addresses.
   ☞ Each measuring circuit card must have a unique address – duplicate addresses are not permitted.
   For error-free operation, the following applies:
   The **first measuring circuit card** is assigned address **0**, and all other cards are configured with **consecutive addresses without gaps** (e.g. 1, 2, 3, ...).
4. Briefly press the ON/OFF button **2**.
   ➢ The ON LED of the status and indicator lights illuminates.

Operation

Prepare measurements

Connect and check the power supply

Connect power supply

→ Plug the DC connector of the power adapter into the DC-IN socket **5** and plug the power cord into a power outlet.

☞ If you want to use battery compartments, wait until the batteries are fully charged and all CHARGE STATE LEDs **9** are lit and the FAST CHARGE LED or SLOW CHARGE LED goes out (see Operation with battery compartment (optional)).

☞ The measuring system is supplied with a supply voltage of 12 VDC. Power is supplied via the supplied power adapter or via optionally available battery compartments

Connect/disconnect sensors

Connect sensors

! The measuring system must be switched off (ON LED off). Otherwise, switch it off using the On/Off button **2**.

→ Plug the ALMEMO® connectors of the desired sensors into the ALMEMO® input sockets **6**. Make sure that the two locking levers engage.

☞ All standard sensors with ALMEMO® connectors are generally programmed with a measuring range and dimension and can therefore be easily plugged into any ALMEMO® input socket.

☞ The extensive ALMEMO® sensor range and the connection of your own sensors to ALMEMO® measuring devices are described in detail in the ALMEMO® manual (see ALMEMO® manual, 2020, chapters 3 and 4).

Disconnect sensors

! The measuring system must be switched off.

→ Press the two locking levers on the ALMEMO® connector and pull it out of the input socket.

Perform measurements

The ALMEMO® 510 is part of the V7 system and was developed specifically for use with PC evaluation software, such as our WinControl measurement software. It supports both analog and digital D6/D7 ALMEMO® connectors, but is not a standalone data logger. However, the individual measurement circuit cards are equipped with a real-time clock and a measurement value memory (see “Features” in the Technical Data) and can be configured to record measurement values. The recording is done independently, so the measured values must then be read out individually and merged using software.

The functionality and programming of the ALMEMO® measurement system are explained in detail in the accompanying ALMEMO® manual.

The ALMEMO® 510 works with the extended V7 interface protocol, but still supports many commands from the previous V6 version. Please refer to the specific notes on the V7 system in the ALMEMO® manual to ensure optimal use.

Operation with battery compartment (optional)

Before using the battery compartment for the first time

☞ For safety reasons, the battery connections are disconnected before shipping so that the power supply to the battery compartment is properly interrupted by the batteries.

→ If the battery compartment was supplied with the measuring system, remove the battery compartment from the measuring system housing, see chapter **Pull out the battery compartment**.

1. Plug the battery connectors **22** into the nearest pin header.
2. Press the reset button on the battery compartment **21**.

➢ First, all LEDs on the battery compartment light up, then only the ON LED and the CHARGE STATE LEDs **9**.

➢ The battery compartment has been reset.

3. Slide the battery compartment into the housing of the measuring system .
4. Tighten the knurled screws of the battery compartment.

☞ Fully charge the batteries before using them for the first time. See chapter **Charging the batteries**.

Pull out the battery compartment

! The measuring device must be switched off.

! The measuring device must be disconnected from the power supply.

1. Loosen the knurled screws that secure the battery compartment.
2. Pull the battery compartment out of the measuring device housing.

⚠ Make sure that no short circuits occur on the circuit board. Do not place any conductive parts (e.g., screwdrivers) on the circuit board. Short circuits would cause damage to the product.

⚠ Protect the assembly from electrical discharge. Only handle the assembly in an electrostatic-protected environment.

Charge batteries

☞ The CHARGE STATE LEDs **9** indicate the charge status of the battery compartment.

All LEDs are lit	Battery charge > 80 %
The three lower LEDs light up	Battery charge > 60 %
The two bottom LEDs light up	Battery charge > 40 %
Bottom LED is lit	Battery charge > 20 %
Bottom LED flashes slowly	Battery charge < 20 %
Bottom LED flashes quickly	Battery charge < 10 %
Bottom CHARGE STATE LED and ERROR LED flash quickly	Battery charge < 5 %

The power supply and charging of the batteries can be configured in three charging scenarios:

Via the battery compartment

→ Plug the DC connector of the power adapter into the DC-IN socket **10** of the battery compartment and plug the power cord into a power outlet.

Via the interface card

→ Plug the DC connector of the power adapter into the DC-IN socket **5** of the interface card and plug the power cord into a power outlet.

Simultaneously via the interface card and the battery compartment

Plug the DC connector of the power adapter into the DC-IN socket **5** of the interface card and the DC connector of another power adapter into the DC-IN socket **10** of the battery compartment and the power connectors into a power outlet.

Charging multiple battery compartments

☞ If multiple battery compartments are used in the measuring system, a power supply must be connected to each battery compartment at the same time to charge the batteries.

→ Plug the DC connector of the power adapter into the DC-IN socket **10** of the battery compartment and the power connector into a power outlet. Repeat this step for each battery compartment.

➢ The batteries are fully charged when all CHARGE STATE LEDs **9** are lit and the SLOW or FAST CHARGE LED goes out.

Clean the battery compartment

→ Pull the battery compartment out of the measuring system housing, see chapter Pull out the battery compartment.

→ Remove the dust using light compressed air.

⚠ Only use low air pressures. Excessive air pressures can damage the electronics .

Send battery compartment

☞ Before shipping the battery compartment or the device with the battery compartment, the power supply to the battery compartment must be properly disconnected from the batteries for safety reasons.

→ Pull the battery compartment out of the housing of the measuring system, see chapter **Pull out the battery compartment**.

1. Disconnect the battery connections **22** from the respective pin headers.

➢ The power supply is now properly disconnected.

2. If you want to ship the battery compartment with the device, slide the battery compartment into the housing of the measurement system.
3. Tighten the knurled screws of the battery compartment.

Operation with RTA module (optional)

Function of the relay trigger analog plug-in module

The ES 500 RTA6 relay trigger analog plug-in module is a universal trigger output interface for the ALMEMO® 510 data acquisition system with up to 10 input/output interfaces (standard 4 semiconductor relays (normally open contacts) and 2 trigger inputs, with optional additional relays and/or analog outputs. On request: up to 10 solid-state relays or 10 galvanically isolated analog outputs).

Options

Option	Description	Order number
2 additional relays (N/O contacts)	Per normally open pair	OA500SH2
2 additional N/C contacts	(with the N/O contacts, there are 2 changeover contacts)	OA500OH2
2 analog outputs (common ground)	galvanically isolated, 10 V or 20 mA (programmable)	OA500R02

Possible combinations:

- 2 x OA500SH2 (+ 4 relays)
- 1 x OA500SH2 (+ 2 relays) + 1 x OA500R02 (+ 2 analog outputs)
- 2 x OA500R02 (+ 4 analog outputs)

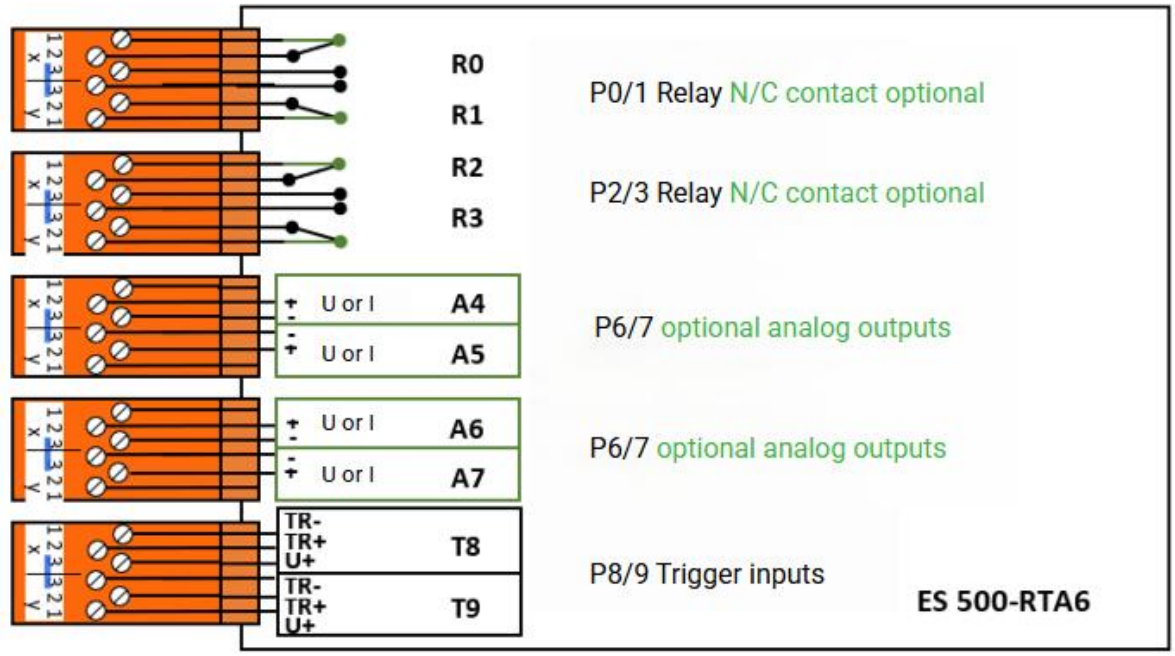
Port addresses

All 10 input/output interfaces of each RTA plug-in module can be individually selected and assigned as ports P0 to P9 via each measuring circuit card. The port addresses depend on the set RTA plug-in module address: 0-9 for address 0, 10-19 for address 1, 20-29 for address 2, and 30-39 for address 3. The ports are configured using the AlmemoConnect software or via the interface with interface commands

Power supply

The RTA6 plug-in module is supplied by the ALMEMO® 510 data acquisition system.

Connections for relays, triggers and analog outputs



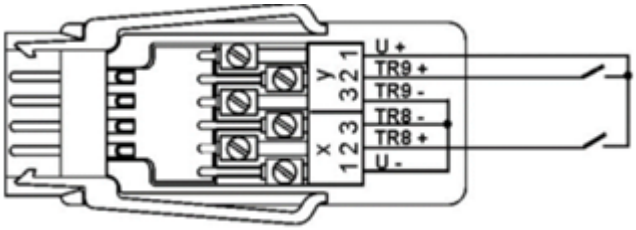
By default, sockets P0/1 and P2/3 are equipped with 4 semiconductor relays (normally open contacts, changeover contacts optional) and P8/9 with 2 trigger inputs. Sockets P4/5 and P6/7 can be optionally equipped with analog outputs or additional semiconductor relays.

Relays

The output relays can be controlled automatically by the measuring circuit card in the event of an alarm or via interface commands. The function of each relay can be set as desired through configuration. The assignment of limit values to relays can be programmed via the measuring circuit card in the sensor.
A short alarm tone sounds by default each time a relay is activated. The relay control can be set by inversion so that the relays normally engage and disengage in the event of an alarm or power failure.

Trigger inputs

The trigger inputs P8 and P9 can be controlled via optocouplers with a voltage level of 4 to 30 V. When using potential-free switching contacts, the optocouplers must be connected to the U+ and U- supply accordingly (see figure). The trigger function (starting or stopping a measurement) can be edge-triggered or level-triggered (see Setting the trigger port usage).

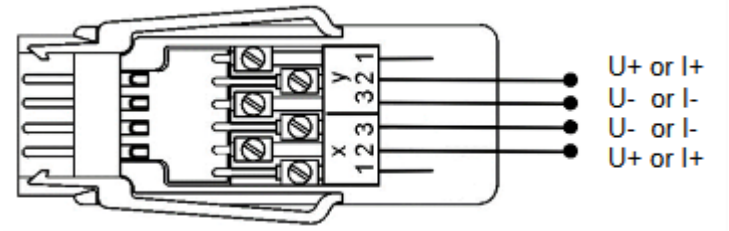


Analog outputs

Optionally, the plug-in module can also be equipped with galvanically isolated analog outputs, which offer the following signals.

Option	Output signal	Slope
OA 500-R02	0.000 V ... +10.000 V	0.5 mV/Digit
	0.000 mA ...+20.000 mA	1 µA/Digit

The output value normally corresponds to the measured value of a selectable measuring point. However, the analog value must also be assigned to the measuring circuit card via which it is programmed. Activate the corresponding selection “Analog output assigned to this measuring circuit card”. Alternatively, the analog value can also be specified as a control variable via the interface (see chapter 5.5.4 Setting analog output port usage). The output signal can be programmed as a standard output of 0-10 V, 0-20 mA, or 4-20 mA from any partial measuring range (see section 5.5.4 Setting analog output port usage).



Use RTA6 plug-in module

If the RTA6 plug-in module was supplied with the measurement data acquisition system, the RTA plug-in module address is already set and the RTA plug-in module is inserted in a slot suitable for the RTA.
If the RTA6 plug-in module was delivered separately from the measurement data acquisition system (e.g., because it was reordered), the RTA plug-in module address must be set (see Setting the RTA6 plug-in module address) before the RTA6 plug-in module is inserted into the measurement data acquisition system.

Connecting peripherals to the ALMEMO® terminal connector

ALMEMO® terminal connectors are connected to the ALMEMO® port sockets **7** of the RTA6 plug-in module, to which the relay, trigger, or analog signals were previously connected.

⚠ Do not connect voltages exceeding 50 V to a relay port.

⚠ Do not connect voltages exceeding 30 V to a trigger port.

⚠ Voltage and current outputs are pure output ports. Do not connect external voltage sources to these ports.

The relay, trigger, or analog signals are connected to the supplied ALMEMO® terminal connectors according to the following scheme:

Clamps	Port 0/1 Relays	Port 2/3 Relays	Port 4/5 Analog (opt.)	Port 6/7 Analog (opt.)	Port 8/9 Trigger
y1	R1 N/O contact (opt.)	R3 N/C contact (opt.)			U+
y2	R1 Common	R3 Common	AO5 +	AO7 +	TR9+
y3	R1 N/O	R3 N/O	AO5 -	AO7 -	TR9 -
x3	R0 N/O	R2 N/O	AO4 -	AO6 -	TR8 -
x2	R0 Common	R2 Common	AO4 +	AO6 +	TR8+
x1	R0 N/C contact (opt.)	R2 N/C contact (opt.)			U -

Set RTA6 plug-in module address

→ If the RTA6 plug-in module is inserted in the measurement data acquisition system, pull the RTA6 plug-in module out of the housing of the measurement data acquisition system, see chapter Pulling the RTA6 plug-in module out of the housing of the measurement data acquisition system.

→ Turn the coding switches **30** so that the slot on the coding switch wheel points to the desired number.

☞ The RTA plug-in addresses of the individual RTA plug-in modules must be coded in ascending order from 00 to 03. The first RTA plug-in module must have the RTA plug-in address 00.

☞ Multiple RTA6 plug-in modules must not have the same RTA plug-in module address.

☞ The RTA plug-in modules are displayed in the AlmemoConnect software after the sensor entries as A modules in each measuring circuit card. The final digit 0 to 3 depends on the RTA plug-in module address 00 to 03.

Slide the RTA6 plug-in module into the housing of the data acquisition system

! The measurement data acquisition system must be switched off .

! The measurement data acquisition system must be disconnected from the power supply .

☞ For the RTA6 plug-in module, use the slot after the interface card and after the measuring circuit cards (from left to right). If you want to use several RTA6 plug-in modules, insert the RTA6 plug-in modules

(RTA6 plug-in module address ascending from left to right) into the slots of the measurement data acquisition system.

1. Slide the RTA6 plug-in module into the housing of the measurement data acquisition system.
2. Tighten the knurled screws of the RTA6 plug-in module.

➢ The ON LED lights up as soon as the measurement data acquisition system is switched on.

Plug in the ALMEMO® terminal connector

! The data acquisition system must be switched off.
! Connect the peripheral devices to the ALMEMO® terminal connectors (see chapter Connecting peripherals to the ALMEMO® terminal connector).

1. Plug the ALMEMO® terminal connectors into the ALMEMO® sockets on the RTA6 plug-in module. Pay attention to the port assignment of your RTA6 plug-in module and plug the ALMEMO® terminal connector into the ALMEMO® socket with the appropriate port (relay/trigger/analog output).
2. Switch on the measurement data acquisition system.

Set port usage

☞ It is best to set the port usage via the AlmemoConnect software. It provides the best overview of all port settings.

Open port settings

1. Search for the desired A entry in the Explorer tree in AlmemoConnect.
2. Tap on this entry. The RTA settings menu opens on the right.
3. Search for the corresponding port entry in the port table.
4. In the port list, tap on the arrow » in the row of the port you want to set.

Set relay port usage

Close/open relays when a specific measurement channel exceeds or falls below a certain limit

☞ With the function assigned, Reference Channel, the relay can be closed or opened as a limit value action of a measurement channel.

→ Set a Max limit value and/or Min limit value in the measurement channel whose limit value action is to be the closing or opening of the relay.

→ In the same measurement channel, set the port address of the relay in the relay max or relay min limit value action.

→ Follow steps 1 to 4 in Open port settings.

5. Tap the field next to Variant.
6. Tap assigned, Reference Channel.

➢ The current relay status is displayed in the Contact line.

➢ If the Max limit value is exceeded and/or the Min limit value is undershot in the selected measurement channel, the relay is closed and the port's active LED lights up. If there is a sensor break in the selected measurement channel, the relay is also closed and the port's active LED lights up .

7. If you want the relay to normally engage and disengage in the event of an alarm or power failure, tap the checkbox next to Inversion so that a check mark is set. The port's Inverse LED lights up when

the port is inverted.

Close/open relays when a specific sensor breaks

☞ With the function assigned, Reference Channel, the relay can be closed or opened in the event of a sensor break, even if no limit values are set in the reference channel.

In a measurement channel of the sensor whose sensor break is to be indicated by the relay closing or opening, set the port address of the relay in the Limit value action Relay Max or Relay Min .

→ Follow steps 1 to 4 in the section Open port settings.

5. Tap the field next to Variant.
6. Tap assigned, Reference Channel.

➢ The current relay status is displayed in the Contact line.

➢ If there is a sensor break in the selected measurement channel, the relay is closed and the port's active LED lights up.

7. If you want the relay to normally engage and disengage in the event of an alarm or power failure, tap the checkbox next to Inversion so that a check mark is set. The port's inverse LED lights up when the port is inverted.

Close/open relays in case of alarm in measurement data acquisition system

☞ The Total Alarm function closes or opens the relay when an alarm is active in the measurement data acquisition system (limit value exceeded, limit value not reached, or sensor break).

→ Follow steps 1 to 4 in the section Open port settings.

5. Tap the field next to Variant.
6. Tap on Total Alarm.

➢ The current relay status is displayed in the Contact line.

➢ If a maximum limit value is exceeded, a minimum limit value is undershot, or a sensor break occurs, the relay is closed and the port's active LED lights up .

7. If you want the relay to normally engage and disengage in the event of an alarm or power failure, tap the checkbox next to Inversion so that a check mark is set. The port's Inverse LED lights up when the port is inverted.

Close/open relays when limit values are exceeded in the measurement data acquisition system

☞ The Total Alarm Max function closes the relay when the Max limit value of any measurement channel is exceeded in the measurement data acquisition system.

→ Follow steps 1 to 4 in the section Open port settings.

5. Tap the field next to Variant.
6. Tap on Total Alarm Max.

➢ The current relay status is displayed in the Contact line.

➢ If a Max limit value is exceeded, the relay is closed and the port's Active LED lights up .

7. If you want the relay to normally engage and disengage in the event of an alarm or power failure, tap the checkbox next to Inversion so that a check mark is set. The port's Inverse LED lights up when the port is inverted.

Close/open relays when measured values fall below the limit value in the measurement data acquisition system

☞ The Total Alarm Min function closes the relay when the measured value in the measurement

system falls below the Min limit value of any measurement channel.

→ Follow steps 1 to 4 in the section Open port settings.
5. Tap the field next to Variant.
6. Tap on Total Alarm Min.
➢ The current relay status is displayed in the Contact line.
➢ If the value falls below a Min limit value, the relay is closed and the port's Active LED lights up.
➢ If you want the relay to normally engage and disengage in the event of an alarm or power failure, tap the checkbox next to Inversion so that a check mark is set. The port's Inverse LED lights up when the port is inverted.

Close/open relay manually

→ Follow steps 1 to 4 in the section Open port settings.
5. Tap the field next to Variant.
6. Tap on controlled.
➢ In this setting, the relay status is independent of the measurement channels and measured values of the measurement data acquisition system.
7. Tap the field next to Relay so that
   - a check mark is set if you want the relay to close.
   - no check mark is set if you want the relay to open.
➢ If the check mark is set in the field next to Relay, the port's active LED lights up.
➢ The current relay status is displayed in the Contact line.
8. If you want the relay to normally engage and disengage in the event of an alarm or power failure, tap the checkbox next to Inversion so that a check mark is set. The port's Inverse LED lights up when the port is inverted.

☞ If you want to close or open the relay manually, deactivate the Watchdog function (see Activating or deactivating Wachtdog function).

Close/open relay via signal from device interface

☞ The controlled function closes the relay when the relay is activated via the device interface. Closing/opening is then independent of the measurement channels and measured values of the measurement data acquisition system.

→ Follow steps 1 to 4 in the section Open port settings.
5. Tap the field next to Variant.
6. Tap on controlled.
➢ The current relay status is displayed in the Contact line.
➢ If the relay port is activated by control via the device interface, the port's Active LED lights up.
7. If you want the relay to normally engage and disengage in the event of an alarm or power failure, tap the checkbox next to Inversion so that a check mark is set. The port's Inverse LED lights up when the port is inverted.

☞ To monitor control via the device interface, see chapterActivating or deactivating the Watchdog function.

Set trigger port usage

→ Follow steps 1 to 4 in the section Open port settings.
5. Tap the field next to Variant.
6. Tap the function you want to control via the trigger cable.

☞ The Start-Stop function starts or stops the measurement as soon as a signal is sent to the

measurement data acquisition system via the trigger input.
The Start-Stop level-triggered function starts the measurement as long as a signal is sent to the measurement system via the trigger input and stops it as soon as no more signals are sent to the measurement system via the trigger input.

Set analog output port usage

Output measured values from a specific measurement channel to the analog output

→ Follow steps 1 to 4 in the section Open port settings.

5. Tap the field next to Variant.
6. Tap assigned, Reference Channel.
7. Tap the field next to Analog output assigned to this measurement circuit card.
8. Tap on YES.

➢ The Analog output and Channel lines are displayed.

9. Tap the field next to Channel.
10. Tap the measurement channel whose measured values you want to output to the analog output
11. Tap the field next to Type.
12. Tap the type 0...10 V or the type 0...20 mA.

☞ The type specifies the current range or voltage range to which the measured values of the measuring channel are to be scaled.

➢ The currently output value is displayed in the Analog Output line.

☞ If no analog start and no analog end are set in the selected reference channel, 0.5 mV per digit is output for type 0...10 V (e.g., for a measured value of -20.4 °C, -0.102 V is output). For type 0…20 mA, 1 µA per digit is output (e.g., for 30.2 °C, 0.302 mA is output).

☞ If the measured values are to be scaled and output to 4…20 mA instead of 0…20 mA, this can be set in the measurement channel whose measured values are to be output.

☞ The measurement range to be scaled and output to the selected current range or voltage range is set in the measurement channel using the Analog Start and Analog End values, as described in the following steps.

13. In the Explorer tree, tap the corresponding sensor entry that contains the desired measurement channel.
14. Tap the arrow » in the Sensor Channels line.
15. Tap the arrow » in the line of the measurement channel whose measured values are to be output as an analog signal.
16. Tap the arrow » in the Analog Output line.
17. Tap the checkbox in the Lock 6 line so that it is not checked.

➢ The fields next to Analog Start and Analog End can be edited.

☞ Analog Start and Analog End specify the range of measured values that are to be scaled and output as an analog signal at the analog output.
If only a portion of the measurement range is to be output (e.g., -30.0 to 120.0 °C scaled to 0-20 mA), the range must be at least 100 digits (e.g., -30.0 to -20.0 °C scaled to 0-20 mA).

18. Tap the field next to Analog Start.
19. Enter the lowest value that is to be output scaled at the analog output.
20. Tap the field next to Analog End.
21. Enter the highest value that is to be output scaled at the analog output.
22. If you want to output the measured values in mA and the measured values are to be scaled and output at 4...20 mA instead of 0...20 mA, tap the checkbox next to Lock 1 so that it is not checked, and tap

the checkbox next to Analog Output 4-20 instead of 0-20 mA so that it is checked.

☞ If the check mark is set in the line Analog Output 4-20 instead of 0-20 and the type 0…10 volts is set in the analog output, the selected measuring range between analog start and analog end is output scaled to 2…10 V.

➢ The measured value of the selected measuring channel is output to the analog output in the desired scaling.

☞ If there is a sensor break in the measuring channel, 0 V or 0 mA is output at the analog output .

☞ If there is an overrange in the measuring channel, the maximum analog output value is output (10 V or 20 mA).

Output manually set analog values to analog output

→ Follow steps 1 to 4 in the section Open port settings.

5. Tap the field next to Variant.
6. Tap on controlled.
7. Tap the field next to Analog output.
8. Enter the analog value to be output at the analog output.

➢ The analog value you entered will be output at the analog output of the selected port. In this setting, the analog value is independent of the measurement channels and measured values of the measurement data acquisition system.

☞ If you want to output manually set analog values to the analog output, deactivate the Watchdog function (see Activating or deactivating the Watchdog function).

Output analog values specified by the interface to the analog output

→ Follow steps 1 to 4 in the section Open port settings.

5. Tap the field next to Variant.
6. Tap on controlled.

Activating or deactivating the Watchdog function

☞ When the Watchdog function is activated, all relays disengage and all analog outputs output 0 V or 0 mA if the control signal from the measurement data acquisition system or the control signal for controlled relays or analog outputs via the interface fails for 1 minute.
The Watchdog can be activated individually for each RTA6 plug-in module.

Activate Watchdog function

1. Search for the desired A entry in the Explorer tree in AlmemoConnect.
2. Tap on this entry. The RTA settings menu opens on the right
3. Tap on the checkbox next to Watchdog so that a check mark is set.

➢ The Watchdog function is activated.

➢ OK is displayed in the Watchdog status line as long as the interface or the measuring circuit cards are activated at least once per minute.

➢ All relays disengage and all analog outputs output 0 V or 0 mA if the control signal from the measurement data acquisition system or the control signal for controlled relays and/or analog outputs via the interface fails for 1 minute.

➢ ➢ ERROR is displayed in the Watchdog status line and the Watchdog LED **8** of the RTA6 plug-in module lights up if the control signal from the measurement data acquisition system or the control signal from controlled relays via the interface fails for 1 minute. The Watchdog status ERROR is displayed until the function is deactivated and reactivated if necessary.

Deactivate Watchdog function

→ Follow steps 1 to 2 in the section Activate Watchdog function .

→ Tap the checkbox next to Watchdog so that it is not checked.

➢ The Watchdog function is now deactivated.

Pull the RTA6 plug-in module out of the housing of the data acquisition system

! The measurement data acquisition system must be switched off.

! The measurement data acquisition system must be disconnected from the power supply.

1. Loosen the knurled screws that secure the RTA6 plug-in module.
2. Pull the RTA6 plug-in module out of the housing of the measurement data acquisition system.

⚠ Make sure that no short circuits occur on the circuit board. Do not place any conductive parts (e.g., screwdrivers) on the circuit board. Short circuits would cause damage to the product.

⚠ Protect the assembly from electrical discharge. Only handle the assembly in an electrostatic-protected environment.

Technical Data

RTA6 plug-in module ES 500-RTA6

Trigger inputs	Optocoupler 4 ... 30 V, Ri > 3 kΩ
Relay	Semiconductor relay 50 V, 0.5 A, 1 Ω
Analog outputs 0.0...10.0 V 0.0...20.0 mA Accuracy Temperature drift	10 V or 20 mA (programmable) 16 bit DAC, galvanically isolated 0.5 mV/Digit, Load > 100 kOhm 1 µA/Digit, Load < 500 Ohm ± 0.1 % of meas. value ± 0.1 % of end value 10 ppm/K
Output rate	Up to 100 actions/s in total for a system with 1 RTA6 plug-in module
Power supply Current consumption	via ALMEMO® 510 measurement data acquisition system Standard: approx. 10…20 mA 2 Analog outputs: approx. 15 mA + 1.8·I_{Out}
Plug-in module	19" 8TE (2 slots)

Technical changes reserved!

Maintenance and care

Clean the housing

! The measuring system must be switched off.
! The measuring system must be disconnected from the power supply.
→ Clean the housing with a damp cloth if it is dirty.
⚠ Do not use harsh cleaning agents or solvents for cleaning.

Cleaning the measuring circuit cards and interface card

! The measuring system must be switched off.
! The measuring system must be disconnected from the power supply.
1. Loosen the knurled screws that secure the measuring circuit cards and the interface card .
2. Pull the measuring circuit cards and the interface card out of the measuring system housing .
3. Remove the dust using light compressed air.

⚠ Only use low air pressures. Excessive air pressures can cause damage to the electronics.
⚠ Protect the assembly from electrical discharge. Only handle the assembly in an electrostatic protected environment.

Battery compartments

→ Charge the batteries regularly and ensure that they are always sufficiently charged.
☞ Deep discharges can significantly reduce the service life of the battery

Clean the battery compartments regularly, see chapter **Cleaning the battery compartment**

Update measurement circuit cards

→ Unplug the DC connector of the power adapter from the DC-IN socket **5** to disconnect the measurement data acquisition system from the power supply.
→ If available, pull out the battery compartment.
→ Only one card can be updated at a time. Therefore, remove all other cards so that only the card to be updated is inserted.
→ Connect the interface cable to output socket **4**.
→ Start the update program.
→ Select the COM port according to the list. Make sure that it is not being used by other software.
→ Press the Flash button in the update program.
→ Set the update slide switch **3** to “Update mode”.
→ Plug the DC connector of the power adapter into the DC-IN socket **5** and connect the power connector to a power outlet.
→ Wait until the “HEX-Load” window closes again.
→ The update was successful if all LEDs on the measuring circuit card light up briefly.

Warranty and disposal

Warranty

Each device undergoes several quality tests before leaving the factory. A 2-year warranty is provided from the date of delivery to ensure proper functioning. If there is a defect, please use the original packaging material for shipping if possible and include a detailed description of the defect with the relevant conditions. The warranty does not apply in the following cases:

- Unauthorized tampering with or modifications to the device by the customer
- Operation outside the environmental conditions applicable to this product
- Use of unsuitable power supply and peripheral devices
- Improper use of the device
- Damage caused by electrostatic discharge or lightning strikes
- Failure to observe the operating instructions

The manufacturer reserves the right to modify product characteristics in the interest of technical progress or due to new components.

Disposal

The symbol of the crossed-out wheelie bin means that the product must be disposed of separately in the European Union.
This applies to both the product itself and all accessories marked with this symbol. The products must not be disposed of with unsorted household waste.

→ Dispose of defective batteries/empty batteries in accordance with the applicable legal regulations.

→ At the end of its useful life, take the product to a separate collection point for electrical and electronic equipment. Observe the local disposal regulations.

→ Dispose of packaging material in accordance with the regulations applicable in your country.

Technical Data

Standard configuration

Measuring inputs	20 ALMEMO® input sockets for all ALMEMO® sensors (V5, V6, D6, D7)
Channels (Standard)	up to 200 measurement channels
Extension	to up to 100 ALMEMO® input sockets depending on the housing
Precision class	AA see catalog, chapter 01
Meas. rate V5, V6, D6 connectors	100, 50, 10 and 2.5 Measurements/s
Input range	-2...+2.9 V
Overload	±12 V
Input current	100 pA
Measuring current	Pt100: 1mA, Pt1000: 0.1mA
System accuracy at 2.5 M/s	0.02 % of meas. value ±2 Digit
Temperature drift	0.003 %/K (30 ppm)
Galvanic isolation for analog sensors	with semiconductor relay (50 V) Additional galvanic isolation between measurement inputs and power supply (device ground)
Sensor power supply	12 V or reducible to 9 or 6 V in battery mode, max. 400 mA per card, max. 1.2 A per measuring system
Interfaces	One ALMEMO® output socket for interface cables
Features Memory Time and date	 8MB flash memory (400,000...1.5 million measured values) per measurement card Real-time clock (4.7 ppm) with lithium battery
Power supply: Power adapter Battery (accessory)	 ZB1312NAx, 100 ... 240 V AC to 12 V DC, at least 2 A galvanically isolated 2 lithium batteries, total 13.8 Ah, fast charging circuit (3h) built in
Current consumption without input and output modules	Approx. 180 mA without probe/sensors (standard configuration)
Housing	Desktop housing TG3 W179 x H158 x D232 mm, approx. 2.1 kg Desktop housing TG8 W444 x H158 x D232 mm, approx. 4 kg Rack housing BT8 W483 x H132 x D273 mm, approx. 4.2 kg
Operating conditions	Operating temperature: -10 ... +50 °C (Storage temperature: -20 ... +60 °C) Ambient humidity: 10 ... 90 % rH (non-condensing)

Technical changes reserved!

Declaration of conformity

Doc-Nr. CE_MA510_000_20250804_R1.doc

EU-Konformitätserklärung

EU-Declaration of Conformity

nach/*according to* EN 17050-1

Hersteller: *Manufacturer:*	Ahlborn Mess- und Regelungstechnik GmbH
Adresse: *Address:*	Eichenfeldstrasse 1 83607 Holzkirchen Germany

bestätigt, dass das Produkt
declares, that the product

Produktbezeichnung: *Product Name:*	Universalmessgerät Datenlogger Almemo® 510
Produkt Typ: *Product Type:*	MA510
Produkt Optionen: *Product Options:*	Alle/*all*

den nachfolgenden Europäischen Anforderungen und Richtlinien entspricht und folglich das CE Zeichen trägt.
conforms to following European Product Specifications and Regulations and carries the CE marking accordingly.

2014/35/EU	Niederspannungsrichtlinie *Low Voltage Directive*
2014/30/EU	EMV Richtlinie *EMC Directive*

Angewandte harmonisierte Normen und technische Spezifikationen: *Applied harmonised standards and technical specifications:*	Sicherheit *(Safety)* EN 61010-1: 2010+A1 EMV *(EMC)* EN 61326-2-3: 2013 Tabelle 2

Holzkirchen, 05.08.2025
Ort, Datum der Ausstellung
Place, date of issue

Entwicklungsleitung

Qualitätsmanagement

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Your contact

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You will find the present and further Operating Instruction, as well as the ALMEMO® Manual on **www.ahlborn.com** under the tab MENU on DOWNLOADS.

Despite great care, incorrect information cannot be ruled out.
Technical changes are reserved.