



## New products 2016

Measuring Instruments

Meteorology

Reference Measuring Instruments

Input connectors and adapter cables

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## ALMEMO® 500



**ALMEMO® precision measuring instrument and data logger, up to 90 measuring inputs. Comprehensive functions covering all application areas. Tablet control via app.**



ALMEMO® 500

## Solving complex measuring tasks using the ALMEMO® 500

The increasing digitalization and networking changes the entire chain of production. This also applies to measuring instruments that must be able to integrate themselves into existing networks – Keyword Industry 4.0. Our new web-based technology positions us future-proof for the era of increasing networking.

Our customer receives a scalable system for recording numerous measuring points with maximum precision. The device can be controlled via tablet and state-of-the-art interfaces such as USB. A web service makes the measurement data accessible anywhere and anytime.

The new networking features are perfect for e.g. monitoring climate or production processes.

It is possible to access all networking features and measured value enquiries via tablet app or – as usual with Ahlborn devices – via PC using the WinControl software.

### Modern control via app and web service

The user operates the ALMEMO® 500 via an included 8-inch tablet and a preinstalled app. An integrated web service enables access to the data logger.

However, the app not only visualizes the measurement data. The software also allows the user to configure the entire data logger as well as all attached sensors conveniently on the tablet. It is possible to export data to Excel as well. This is useful in case the measurement data shall be further processed in Excel or other programs.

Thanks to the web service it is possible for several users to simultaneously log into the device e.g. from different locations in case of decentralized measured value monitoring. An intelligent permission management ensures that measurements are not accidentally changed.

A Wi-Fi hotspot integrated in the data logger is responsible for the connection between the tablet and the data logger. In the standard configuration this is set up as an access point, which provides the user with a secure Wi-Fi network.

Alternatively, the data logger can also connect to an existing network as client. This is enabled by a special client mode in the measuring instrument that allows the user to access the data logger via a company network or an external VPN connection.

A configuration website integrated in the data logger allows the user to configure the Wi-Fi hotspot, e.g. network settings or encryption, in just a few steps. This works similar to the configuration of a router.

The ALMEMO® 500 enables the user to view historical measurement sequences saved on the measurement data storage using the app. The measurement sequences can be loaded offline as well as during measurement operations.

### Monitor up to 90 measuring inputs in fail-safe operation

Ahlborn features the ALMEMO® 500 standard version with 20 galvanically isolated measuring input sockets. Depending on the housing width, the device can be augmented to up to 90 measuring input sockets by inserting further plug-in cards.

For thermocouple measurements, the data logger features internal cold junction compensation.

Optionally available battery compartments enable fail-safe long-term measurements. Operated with batteries, the ALMEMO® 500 can be used as a mobile device as well.

### Store 600 million measured values internally

A 4GB SD memory card is integrated in the data memory of the ALMEMO® 500. Depending on the measurement resolution, this card is sufficient for up to 600 million measured values. For long-term measurements, it is possible to configure the data memory as a ring memory. In case the memory is not sufficient, the user can plug in additional memory in form of an USB flash drive or an USB hard disk via the USB port. The ALMEMO® 500 will then save all measurement data to the external medium.

### Networking thanks to state-of-the-art interfaces

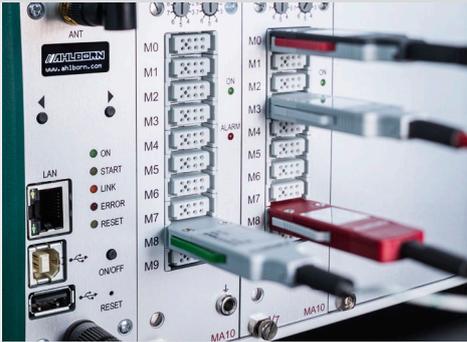
It is possible to link several ALMEMO® 500 devices via the USB interfaces or via the integrated access point, using either Wi-Fi or LAN network. The user operates all devices via the ALMEMO® 500 app. Additionally, the measured values can also be queried and displayed using the measured value acquisition software WinControl.

### Depending on the use case: desktop housing or rack housing

Ahlborn features the ALMEMO® 500 with a desktop housing of type TG6 and TG8. The side frames are manufactured using two-component injection molding (2-shot-molding). The device can be carried on stable aluminum handles. Rubberized components prevent the ALMEMO® 500 from slipping. Thanks to the particular form of the side frames, the housings are stackable.

Apart from the desktop housing, Ahlborn features an additional device version in the classic 19-inch rack housing suitable for cabinet solutions..

## ALMEMO® 500



Ports for ALMEMO® sensors and for networking (OLED status display)



Simple programming and visualization of measured values via tablet

### Technical data and functions ALMEMO® 500

- ALMEMO® data logger from the latest V7 generation
- Access via integrated web service and access point, two Wi-Fi access modes: access point or client (for integration in an existing network)
- The device is easy and intuitive to use thanks to an 8-inch tablet with a preinstalled app (included in delivery)
- Visualizing measured values and configuring the data logger via the preinstalled app, simultaneous login of several users possible, integrated user and permission management
- Connecting the new ALMEMO® D7 sensor generation: Measuring rate up to 1000 mops, simultaneous operation of high speed and low speed sensors, display of measured values up to 8 digits, up to 10 channels per sensor, comments up to 20 characters, dimensions up to 6 characters, measured value damping for up to 4 channels per sensor
- Display of measured values as numerical single measurement values, value lists or freely configurable displays
- Graphic display of measured values as line graph for depicting up to 20 measurement sequences, integrated sidebar for switching quickly between three display modes
- Measurement function: measured value, minimum value, maximum value, zeroing, target value comparison, damping, average value over a period of time or over several measurement points, limit value monitoring, cold junction compensation and temperature compensation
- Stored measurement sequences can be displayed offline as well as during ongoing measurement operation
- Modern desktop housing in two variants: TG6 and TG8, side frames manufactured by the use of 2-shot-molding, stackable or available in 19-inch rack housing
- 20 ALMEMO® input sockets (galvanically isolated) for connecting up to 20 ALMEMO® sensors of all generations (standard), up to 200 sensor channels, can be upgraded to 90 ALMEMO® input sockets, up to 900 sensor channels
- 2 USB ports for connecting external memory and PC, Ethernet and Wi-Fi for accessing the web service via app
- Networking via integrated access point, using LAN or Wi-Fi network, or via USB using WinControl
- High speed and high resolution A/D Converter (ADC)
- Integrated 4GB SD card, sufficient storage for up to 600 million measured values, configurable as linear or ring memory, memory expansion possible via USB port
- Choice of languages: German, English (other options available on request)
- Programming menu for concise parametrization of e.g. cycles, times, memory and power supply
- OLED display (0.82 inch) and LED displays for visualization of network parameters and system messages directly on the device
- Option KL: multi-point adjustment, customer specific linearization
- Battery compartments (accessory) for fail-safe long-term measurements or for mobile device usage

### Technical data

<b>Measuring inputs:</b>			
Standard configuration:	20 ALMEMO®-input sockets for all ALMEMO® sensors (standard, DIGI, D6, D7)	<b>Standard equipment:</b>	Control unit industrial tablet with preinstalled app ALMEMO® 500
Channels (standard):	up to 200 measurement channels	Memory:	4GB SD card (for up to 600 million measured values)
Expansion:	up to 90 input sockets (depending on the device housing)	Date and time-of-day:	Real-time clock (4.7ppm) buffered with lithium battery
Precision class:	AA (see Catalog, p.01.05)	<b>Power supply:</b>	
Measuring rate for analog sensors, DIGI and D6 sensors:	100 / 50 / 10 / 2.5 mops	Mains adapter:	ZB1212NA10, 100 to 240VAC, 12VDC, 2A galvanically isolated
Galvanic Isolation for analog sensors	using semiconductor relays (50V) additional galvanic isolation between measuring input and power supply (device ground)	Recharg. battery (accessory):	2 lithium-batteries, total of 13.8 Ah, integrated high-speed charging (3h)
Sensor power supply:	6 / 9 / 12V, maximum 400mA	Power consumption (without input and output modules)	approx. 300 mA without sensors (default configuration)
<b>Interfaces:</b>	2 USB ports for additional memory and networking, Ethernet, Wi-Fi for accessing the web service and networking		

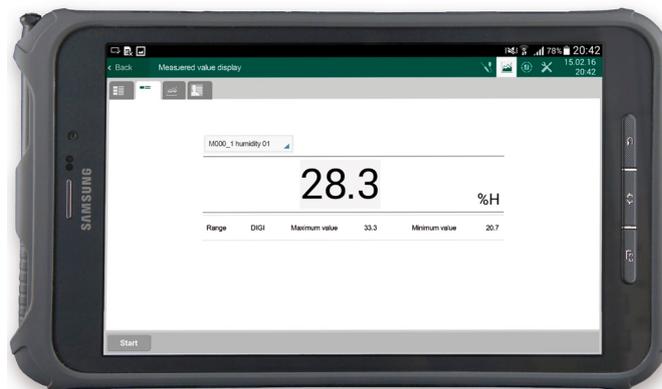
for further general data:  
see ALMEMO® Technical Data, Product Catalog, p. 01.05

## ALMEMO® 500

### Numerous measured value displays

The ALMEMO® 500 app offers different measured value displays.

- Measured values can be displayed as numerical single measurement values, value lists or freely configurable measurement value displays.
- The measurement functions include inter alia measured value, minimum value, maximum value and average value.
- To graphically display the measured values, the line graph is able to show 20 measurement sequences.
- An integrated sidebar enables the user to quickly switch between three different display modes: automatic, manual and entire measurement.



Single measurement value displays for monitoring single measured values



Line graphs for monitoring measurement sequences for a set period of time

Channel	Value	Minimum	Maximum
M000_0 temperature 01	23.1 °C	25.3 °C	20.7 °C
M000_1 humidity 01	28.3 %H	33.3 %H	20.7 %H
M000_2 dew point 01	5.1 °C	5.3 °C	4.7 °C
M000_3 atm. pressure	938.1 mb	939.3 mb	937.8 mb
M001_0 temperature 02	22.7 °C	24.3 °C	18.7 °C
M001_1 temperature 03	18.2 °C	19.7 °C	18 °C
M001_2 temperature 04	18.1 °C	19.3 °C	18 °C
M001_3 temperature 05	17.9 °C	19.3 °C	17.8 °C

Value lists for displaying several measurement values and function values simultaneously

### Accessories

Li-Ion battery pack, 13.8 Ah. Required space: 2 slots. Included mains adapter ZB 1212 NA10  
 Active measuring circuit card MA10 (expansion). 10 input sockets for all ALMEMO® sensors (standard, DIGI, D6, D7)  
 Required space: 2 slots

**Order no.**

**ES500AP**

**ES500MA10**

### Option

Multi-point adjustment or linearization can be programmed by the customer with any ALMEMO® plug version

**Order no.**

**OA500KL**

### Standard delivery

#### Data logger ALMEMO® 500

CPU card including interfaces and web service. 4GB SD memory card. 2 active measuring circuit cards MA10 featuring 20 input sockets for all ALMEMO® sensors (standard, DIGI, D6, D7). Manufacturer's test certificate. Mains adapter ZB 1212 NA10  
 Control unit with preinstalled app, mount for control unit

In desktop housing TG6, 9 free slots

In desktop housing TG8, 15 free slots

In 19-inch rack housing, 15 free slots

**Order no.**

**MA500CPUA20TG6B**

**MA500CPUA20TG8B**

**MA500CPUA20BT8B**

**Mobile weather station****Meteorological sensor FMD7-60 with ALMEMO® data logger**

Universal mobile weather station for measuring a wide range of meteorological data, e.g. wind direction, wind velocity, temperature, atmospheric humidity, atmospheric pressure, rainfall quantity and intensity, and global radiation. Quick and easy to install, robust design, compatible with various ALMEMO® V7 data loggers.

**Applications**

- Building automation (heating, ventilation, shading)
- Photovoltaic monitoring
- Industrial emissions tracing
- Disaster control (tracing clouds of poisonous gas, etc.)
- Sporting events
- Agricultural trials
- Road weather information systems (RWIS)
- Icy roads warning systems
- Vehicle test circuits

**The mobile weather station comprises :**

- Meteorological sensor FMD7-60 including mobile tripod
- Probe head for measuring optical radiation
- ALMEMO® data logger choice of ALMEMO® 202 / 710 / 809

**Digital meteorological sensor**

Sensor with built-in plug, including sensor connection cable length = 10 meters fitted in junction box, mains adapter unit (24 V) ZB 1024 NA2 fitted in junction box, ALMEMO® connection cable fitted in junction box, length = 2 meters. with ALMEMO® D7 plug **FMD760**

**Mobile tripod**, extendable up to approx. 4.4 meters

including set of anchoring fixtures, comprising three karabiners, three guy lines (4 meters long), three ground pegs **ZB9760ST**

**Carry-bag**, space for one tripod including accessories and two probe head holders **ZB9510TT**

**Probe head for measuring global radiation, illuminance, photosynthesis, and UVA or UVB radiation, including probe head holder**

**Measuring of global radiation** up to 1200 W/m<sup>2</sup>,

Probe head with cable, 1.5 meters long

**FLA613GS**

**Measuring of illuminance** up to 170 kLux,

Probe head with cable, 1.5 meters long

**FLA613VLM**

**Measuring of photosynthetically active radiation** up to 3000 μmol/m<sup>2</sup>s,

Probe head with cable, 1.5 meters long

**FLA613PSM**

**Measuring of UVA radiation** up to 3 mW/cm<sup>2</sup>,

Probe head with cable, 1.5 meters long

**FLA613UVA**

**Measuring of UVB radiation** up to 50 μW/cm<sup>2</sup>,

Probe head with cable, 1.5 meters long

**FLA613UVB**

Option of probe head with longer cable Total length = 5 meters

**OA9613K05**

**Probe head holder** to tripod Length = approx. 0.5 meters, for one radiation probe head FLA613-GS / -VLM / -PSM / -UVA / -UVB

**ZB9510MH****Advisory note**

To connect these radiation probe heads to data logger ALMEMO® 202 a digital ALMEMO® D7 measuring connector is required.

This variant is offered on request.



## Weather-proof housing for ALMEMO® 202 / 710 / 809 devices with meteorological sensor FMD7 60

### Technical data and functions

The sensor connection cable, mains unit ZB 1024 NA2 (for heating, ventilation, and sensor supply), the junction box, and the sensor's ALMEMO® connection cable are all permanently fitted in the weather-proof housing. (Sensor FMD7-60 should be ordered separately.)

The ALMEMO® measuring instrument is integrated in the DIN rail mounting. The mains unit for the device supply (mains plug assembly, NA9 design) is plugged into the integrated socket. (The measuring instrument should be ordered separately.)

The device receives its continuous 110 / 230 V supply via the mains connection cable. Length = 2 meters (Connection is on the rear of the housing.)

When using devices ALMEMO® 202 / 710, any short-term failures to the supply voltage are bridged; in the case of ALMEMO® 202, this is by means of batteries and in the case of ALMEMO® 710, by means of the integrated rechargeable battery. The ALMEMO® device cannot be operated in sleep mode.

### Advisory note

For information on protective housing for various ALMEMO® measuring instruments performing general applications without meteorological sensor FMD7-60, please refer to chapter 'General accessories'.



## Weather-proof housing AG2 for ALMEMO® 202 with meteorological sensor

### Weather-proof housing for ALMEMO® 202,

lockable transparent door, mast fixture  
integrated rail for fastening ALMEMO® 202 device  
including mains unit ZA 1312 NA9 for supplying the device  
permanently fitted sensor connection cable for sensor FMD7-60  
integrated mains unit for supplying sensor heating and sensor ventilation  
Option of weather-proof housing for sensor FMD7 60

**OM9760AG2**

## Data logger ALMEMO® 202 with accessories

### ALMEMO® 202 professional measuring instrument

2 measuring inputs, graphics display, keypad controls, batteries

**MA202**

DIN rail holder for the measuring instrument

**ZB2490HS**

Memory connector with micro SD

**ZA1904SD**

USB data cable

**ZA1919DKU**



### Weather-proof housing AG7 for ALMEMO® 710 with meteorological sensor

**Weather-proof housing for ALMEMO® 710,**  
lockable transparent door, mast fixture  
integrated rail for fastening ALMEMO® 710WG device  
including mains unit ZA 1312 NA9 for supplying the device  
permanently fitted sensor connection cable for sensor FMD7-60  
integrated mains unit for supplying sensor heating and sensor ventilation  
Option of weather-proof housing for sensor FMD7 60 **OM9760AG7**

### Data logger ALMEMO® 710 with accessories

**ALMEMO® 710WG precision measuring instrument in wall-mounted housing,**  
10 measuring inputs, display and operation via touch screen  
internal measured value memory, integrated rechargeable battery  
including mains unit NA10 (100 to 240 VAC / 12 VDC)  
and USB data cable **MA710WG**

Option of external memory  
**Memory connector** with micro SD **ZA1904SD**



### Weather-proof housing AG8 for ALMEMO® 809 with meteorological sensor

**Weather-proof housing for ALMEMO® 809,**  
lockable transparent door, mast fixture  
integrated rail for fastening ALMEMO® 809 device  
including mains unit ZB 1212 NA9 for supplying the device  
permanently fitted sensor connection cable for sensor FMD7-60  
integrated mains unit for supplying sensor heating and sensor ventilation  
Option of weather-proof housing for sensor FMD7 60 **OM9760AG8**

### Data logger ALMEMO® 809 with accessories

**ALMEMO® 809 precision measuring instrument**  
9 measuring inputs  
operation via ALMEMO® Control software  
internal measured value memory  
including mains unit NA10 (100 to 240 VAC / 12 VDC) **MA809**  
**DIN rail holder for the measuring instrument** **OA2290HS**  
**USB data cable** **ZA1919DKU**

Option of external memory  
**Memory connector** with micro SD **ZA1904SD**

## ALMEMO® 202



**ALMEMO® professional measuring instrument, latest V7 generation with data logger function**  
**Two measuring inputs for all digital ALMEMO® D6 and D7 sensors, for ALMEMO® standard sensors with the DIGI measuring range. Special functions for applications using ALMEMO® D7 sensors**

## Technical data and functions

### Professional measuring instrument from our latest V7 generation

Professional measuring instrument ALMEMO® 202 provides numerous outstanding functions for special applications using digital ALMEMO® D6 sensors and the latest ALMEMO® D7 sensors.

### Brightly lit graphics display, easy and convenient operation by means of soft-keys

The white, illuminated graphics display ensures that functions and measured values can be viewed in the clearest way possible. The device is easy and convenient to operate by means of 4 soft-keys and a cursor block. The menu guidance is clearly structured and easy-to-understand.

The sensor display shows the measured values together with all relevant sensor-specific functions, e.g. temperature compensation, atmospheric pressure compensation. Measured values, peak values, average values, and limit values can all be displayed in an easy-to-understand way in various forms, namely lists or bar charts.

Users can even configure their own customized user menus from a range of 50 different parameters to display exactly those parameters required by a particular application. Choice of languages : German, English, French

### End-to-end programming of all parameters for ALMEMO® D6 and D7 sensors

The ALMEMO® 202 professional measuring instrument provides a programming menu for the end-to-end programming of all the parameters needed for digital ALMEMO® D6 and D7 sensors. The required measuring ranges are selected (with ALMEMO® D7 sensors up to 10 measuring channels) and other relevant sensor parameters are configured, e.g. moving average, atmospheric pressure compensation, temperature compensation.

### One measuring instrument for every need

This compact, handy device can, as an option, be fitted with rubberized impact protection for mobile use. The latest energy-saving technology ensures long operating times. For stationary applications a DIN rail mounting is available.

### Data logger for all storage applications

To save measured values an external memory is available in the form of a plug-in SD card.

For autonomous long-term monitoring the data logger can also be run in energy-saving sleep mode.

### Two measuring inputs for all digital ALMEMO® D6 and D7 sensors

All new digital ALMEMO® D6 and D7 sensors for a wide variety of measurable variables can be connected and evaluated. ALMEMO® standard sensors with the DIGI measuring range can also be used, e.g. for crossflow turbines and high-voltage modules for thermocouples and DC and AC voltages. The ALMEMO® 202 supports all ALMEMO® functions.

### New digital ALMEMO® D7 sensors

With these digital ALMEMO® D7 sensors the ALMEMO® system is enhanced by many new functions and applications. ALMEMO® D7 sensors operate via an all-digital interface to the ALMEMO® 202 professional measuring instrument ensuring high-speed serial transmission of all measured values.

The measuring ranges of ALMEMO® D7 plugs are independent of the ALMEMO® measuring instrument being used and can be expanded as and when required for new applications.

Measured values can be displayed with up to 8 digits (depending on range) and the units with up to 6 characters. Sensor designation and information can be up to 20 characters.

Each connected D7 sensor has its own processor. They all work in parallel at their own sensor-specific sampling rate. D7 sensors thus attain very high measuring speeds in dynamic measuring operations. Scanning times on the ALMEMO® 202 professional measuring instrument can be set individually for quick-acting and slow-acting sensors.

The ALMEMO® D7 plug can process up to 10 channels for measured values and function values. This includes new applications, especially for multi-purpose sensors (e.g. Meteo sensors) and for linking up to complex third-party devices (e.g. chemical analysers, power analysers).

### Other equipment

The two ALMEMO® output sockets can be used to connect a PC / network and an ALMEMO® output interface with relays and analog output at the same time.

With option KL it is possible - for a digital ALMEMO® sensor (e.g. ALMEMO® D6 / D7 temperature or pressure sensors) - to program multi-point adjustment or linearization in the ALMEMO® plug itself. This option is possible with all digital ALMEMO® plug versions. Standard connector (DIGI), ALMEMO® D6 and D7 plugs.

## ALMEMO® 202



**Professional measuring instrument, latest V7 generation**  
**Two measuring inputs for all digital ALMEMO® D6 and D7 sensors**  
**for ALMEMO® standard sensors with the DIGI measuring range**  
**Data logger with external memory connector (accessory)**

**Technical data**

Measuring inputs	2 ALMEMO® input sockets for all digital ALMEMO® D6 and D7 sensors and for ALMEMO® standard sensors with the DIGI measuring range
Precision class	depends on the digital ALMEMO® sensor being used
Measuring rate	for ALMEMO® D6 sensors and ALMEMO® standard sensors with the DIGI measuring range 2.5 / 10 mops (measuring operations per second) for ALMEMO® D7 sensors Up to 1000 mops (depending on sensor)
Channels	Up to 20 measuring channels with ALMEMO® D7 sensors
Sensor power supply	6 / 9 / 12 V, maximum 0.4 A
Outputs	2 ALMEMO® sockets, suitable for all output modules (analog / data / trigger / relay cables, etc.)

Display	Graphics display, 128 x 64 pixels, 8 rows Illumination 2 white LEDs
Keypad	7 silicone keys (of which 4 soft-keys)
Date and time-of-day	Real-time clock, buffered by device battery
Memory, internal	99 measured values, can be called onto display
External mem. (accessory)	ALMEMO® plug-in memory with micro SD card, 512 MB (sufficient for up to 30 million measured values)
<b>Power supply</b>	
Battery set	3 AA alkaline batteries
Mains adapter	ZA1312NA10 100 to 240 VAC to 12 VDC, 2 A electrically isolated
DC adapter cable	ZA2690-UK 10 to 30 V, 0.25 A electrically isolated
Current consumption (without input and output modules)	Active mode approx. 35 mA With display illumination approx. 70 mA Sleepmode approx. 0.05 mA
Housing	127 x 83 x 42 mm (LxWxH) ABS (maximum 70 °C) Weight 290 g

**Standard equipment****Accessories**

Mains adapter 12 V / 2 A	
DC adapter cable, 10 to 30 VDC, 12 V / 0.25A, electrically isolated	
Rubberized impact protection, gray	
Magnetic fastening	
DIN rail mounting	
Instrument case	
Network technology, Bluetooth modules (see chapter „Networking“)	

**Order no.**

ZA1312NA10
ZA2690UK
ZB2490GS2
ZB2490MH
ZB2490HS
ZB2490TK2

**Connecting cables**

USB data cable, electrically isolated	
Ethernet data cable, electrically isolated	
Analog output cable, -1.25 to 2.0 V, 0.1 mV / digit	
V24 data cable, electrically isolated	
Network technology, Bluetooth modules (see chapter „Networking“)	

**Order no.**

ZA1919DKU
ZA1945DK
ZA1601RK
ZA1909DK5

**Option**

Multi-point adjustment and / or linearization can - with all digital ALMEMO® plug versions - be programmed by users themselves	
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**Order no.**

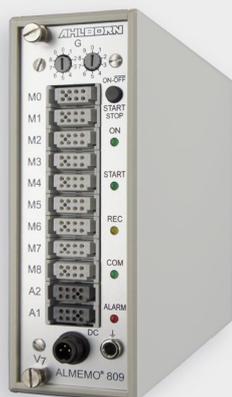
OA202KE

**Standard delivery**

Measuring instrument, batteries, operating instructions,  
**ALMEMO® 202 professional measuring instrument**

Order no.  
**MA202**

## ALMEMO® 809



**ALMEMO® precision measuring instrument, latest V7 generation**

**Nine measuring inputs for all sensors**

**Operates as data logger or PC interface**

**Increased measuring accuracy, fast sampling rate, with ALMEMO® D7 sensors up to 1000 measuring operations per second**

### Data logger from our latest V7 generation.

Data logger ALMEMO® 809 offers outstanding functions and applications using our latest D7 sensors. This measuring instrument operates either as data logger or as PC interface using the WinControl measuring software (an accessory). The device parameters can be fully configured by means of the ALMEMO® Control software (included in delivery).

### New digital ALMEMO® D7 sensors

With these digital ALMEMO® D7 sensors the existing ALMEMO® system is enhanced by many new functions. These operate via an all-digital interface to the ALMEMO® 809 measuring instrument ensuring high-speed serial transmission of all measured values. The measuring ranges of ALMEMO® D7 plugs are independent of the measuring instrument and can be expanded as and when required for new applications.

Measured values can be displayed with up to 8 digits (depending on quantity and range) and the units with up to 6 characters. Sensor designation and information can be up to 20 characters. Each ALMEMO® D7 sensor has its own processor. They all work in parallel at their own sensor-specific sampling rate. D7 sensors thus attain very high measuring speeds in dynamic measuring operations. Scanning times on the ALMEMO® 809 can be set individually for quick-acting and slow-acting sensors. The ALMEMO® D7 plug can process up to 10 channels for measured values and function values. This includes new applications, especially for multi-purpose sensors (e.g. Meteo sensors) and for linking up to complex third-party devices (e.g. chemical analysers, power analysers).

### Measuring inputs for nine ALMEMO® sensors, all generations

Data logger ALMEMO® 809 incorporates nine measuring inputs. The measuring instrument can process up to 90 measuring channels - depending on the sensors connected. All new and already existing sensors designed for any measurable variable can be connected and evaluated. Sensors using analog signals pass via the integrated high-speed, high-resolution A/D converter. Additional electrical isolation between measuring inputs and power supply (device ground) increases measuring quality. Digital D6 and the latest digital D7 sensors transfer measured values to the measuring instrument directly in digital form.

The measuring instrument supports all ALMEMO® plug connectors and sensor functions. All sensor parameters for ALMEMO®

standard / D6 / D7 sensors can be fully configured by means of the ALMEMO® Control software (included in delivery).

### Data logger for all storage applications

For the purpose of saving measured values the device incorporates an 8-MB flash memory. This can also be configured as a ring memory for monitoring tasks.

To save larger data quantities an external memory is available in the form of a plug-in SD card.

For autonomous long-term monitoring the data logger can also be run in energy-saving sleep mode.

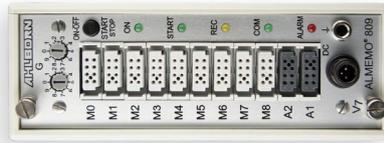
### Other equipment

With two ALMEMO® output sockets it is possible to connect simultaneously a PC / network, an ALMEMO® output interface with relays and analog output, or an ALMEMO® memory connector with an SD card.

There are five LEDs for indicating various operating states. The operating key is used to switch on the device and to start / stop a measuring operation.

With option KL it is possible - for an ALMEMO® sensor (e.g. temperature or pressure sensors) - to program multi-point adjustment or linearization in the ALMEMO® plug itself. This option is possible with all ALMEMO® plug versions, standard connectors (analog or DIGI), ALMEMO® D6 and D7 plugs.

## ALMEMO® 809



**Precision measuring instrument, latest V7 generation, nine measuring inputs  
Data logger with internal memory or external memory connector (accessory)**

### Technical data

<b>Measuring inputs</b>	Nine ALMEMO® input sockets suitable for all generations of ALMEMO® sensors, analog sensors, D6 and D7 sensors	<b>Standard equipment</b>	
Precision class	AA see page 01.05	Operation	1 key, 5 LEDs, 2 coding switches
Sampling rate for analog sensors, D6 sensors	2.5 / 10 / 50 / 100 mops	Memory	8-MB flash memory (400,000 up to 1.5 million meas. values)
Electrical isolation for analog sensors	with semiconductor relays (50 V) Additional electrical isolation between measuring inputs and power supply (device ground)	Date and time-of-day	Real-time clock (4.7 ppm) with lithium buffer battery
Channels	Up to 90 measuring channels per device	<b>Power supply</b>	
Sensor power supply	12 V, maximum 400 mA	Mains adapter	ZB1212NA10 100 to 240 VAC to 12 VDC, 2 A, electrically isolated
<b>Outputs</b>	Two ALMEMO® sockets, suitable for all output modules (data / analog / trigger / relay cables, memory connector, etc.)	Current consumption without Input and output modules	
		active mode	approx. 50 mA
		Sleep mode	approx. 0.05 mA
		<b>Housing</b>	180 x 049 x 137 mm (LxWxH) Polystyrene (PS) Weight approx. 490 g

### Accessories

	Order no.
Plug-in memory with micro SD card, including USB card reader (see chapter 'General accessories')	<b>ZA1904SD</b>
DC adapter cable, 10 to 30 VDC, 12 V / 1 A, electrically isolated	<b>ZB3090UK2</b>
WinControl software for measured data acquisition per device up to 20 channels for any number of devices and channels	<b>SW5600WC1</b> <b>SW5600WC2</b>

Note on WinControl measuring software

WinControl measuring software is suitable for version 7 and above. For version 6 or earlier a WinControl compatibility update is required. For versions and description see Chapter Software.

### Connecting cables

	Order no.
USB data cable, electrically isolated	<b>ZA1919DKU</b>
Ethernet data cable, electrically isolated	<b>ZA1945DK</b>
Analog output cable -1.25 to +2.0 V	<b>ZA1601RK</b>
Trigger and alarm cable (2 relays, 0.5 A, 50 VDC)	<b>ZA1006EKG</b>

### Option

	Order no.
Multi-point adjustment and / or linearization can - with all ALMEMO® plug versions - be programmed by users themselves	<b>OA809KL</b>
Temperature ranges for 8 refrigerants	<b>SB0000R2</b>

### Standard delivery

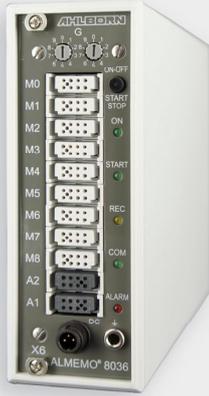
Measuring instrument, Mains unit 12 V / 2 A ZB1212NA10, Manufacturer's test certificate  
**Precision measuring instrument ALMEMO 809**

Order no.

ALMEMO 809

# Reference Measuring Instruments

## ALMEMO® 8036-9



**Reference measuring instrument for temperature and humidity**

**Multi-channel measuring instrument with nine measuring inputs for Pt100 sensors and Pt100 psychrometers. High-precision measuring with resolution of 0.001 K**

**For calibration laboratories, quality assurance procedures, and monitoring of test and measuring rooms**

**For use either as PC interface or with external memory connector as data logger**

## Technical data and functions

### Multi-channel instrument for high-precision measuring

Reference measuring instrument ALMEMO® 8036-9 ensures very high levels of resolution, precision, and linearity when measuring temperature, using up to nine Pt100 sensors - or alternatively up to four Pt100 psychrometers.

This reference measuring instrument is suitable for use as calibration standard in calibration laboratories, for quality assurance procedures, or as a multi-channel instrument for high-precision measuring operations, e.g. in test and measuring rooms or climate chambers.

With the Pt100 the measuring ranges have been expanded considerably, up to +670 °C at the highest resolution of 0.001 K and up to +850 °C at a resolution of 0.01 K. The measured value units can be programmed to either °C / K / °F.

Reference measuring instrument ALMEMO® 8036-9 operates with special ALMEMO® plugs incorporating expanded programming possibilities. These plugs, it should be noted, cannot be interchanged with the ordinary plugs used with ALMEMO® V6 / V7 measuring instruments.

### Very high precision thanks to multi-point adjustment and input of coefficients for the Pt100 characteristic

This very high level of precision is achieved by calibrating the measuring chain comprising Pt100 sensor and measuring instrument. For each individual sensor there are two error correction methods available.

1. Multi-point adjustment in up to 35 temperature points
2. Input of coefficients R0 and A, B, C for the Pt100 characteristic as per the Callendar / Van Dusen equation

Linearization is then performed using the sensor-specific Pt100 characteristic.

Both correction procedures can be used for any sensor simultaneously. The correction values from multi-point adjustment and the coefficients of the Pt100 characteristic are saved in the sensor connector.

Sensors are identified by means of a programmable 10-character alphanumeric designation stored in the sensor connector and a serial number. Similarly, for the purpose of monitoring the calibration interval, the date of the next calibration due and the calibration interval can be programmed and saved in the sensor connector.

### High-precision humidity measuring with atmospheric pressure compensation and calculation as per Dr. Sonntag and W. Bögel

The Pt100 psychrometer incorporates two temperature sensors assigned to two measuring inputs.

The digital atmospheric pressure sensor integrated in the ALMEMO® device ensures that any pressure-dependent humidity variables are pressure-compensated automatically.

Humidity is calculated on the basis of formulae as per Dr. Sonntag and the enhancement factor as per W. Bögel (correction factor fw(t,p)) for real mixed gas systems). This substantially widens the measuring range and improves the accuracy of humidity variable calculations.

Temperature is measured to a resolution of 0.001 K, relative humidity to 0.01% RH, and dewpoint temperature to 0.01 K.

Humidity variables are calculated from the three primary measuring channels (real measurable variables) - dry temperature (TD °C), wet temperature (TW °C), and atmospheric pressure (mbar).

In the second ALMEMO® plug (dry sensor) there are up to three humidity variables, simultaneously programmable: relative humidity (%), dewpoint (°C), and mixture (g/kg). New: Abs. humidity (g/m³), vapor pressure (mbar), enthalpy (kJ/kg)

### Other equipment

- Five LEDs for indicating various operating states
- One pushbutton for switching the device on / off and to start / stop a measuring operation
- Data logger mode with plug-in ALMEMO® memory connector with micro SD card (accessory)
- Two ALMEMO® output sockets for simultaneously connecting a PC or network and an ALMEMO® memory connector

### ALMEMO® Control configuration software

The ALMEMO® Control software (included in delivery) can be used on a PC to program all sensor parameters in the Pt100 sensor or in the Pt100 psychrometer: measuring range / resolution, units, smoothing, text description, calibration date and calibration interval, multi-point adjustment, locking level.

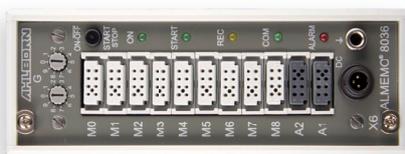
The ALMEMO® Control software also be used to completely program the device.

### WinControl software for measured data acquisition

The WinControl software (accessory) can be used to acquire and document measured values from the reference measuring instrument. In the calibration laboratory the reference measuring instrument (reference standard) and the ALMEMO® device (test item) can be networked together and evaluated using WinControl.

# Reference Measuring Instruments

## ALMEMO® 8036-9



### Technical data

<b>Measuring inputs</b>	Nine ALMEMO® measuring inputs for Pt100 sensors and Pt100 psychrometers	<b>Digital atmospheric pressure sensor</b> (integrated in the device)	Measuring range	700 to 1100 mbar
Electrical isolation	Semiconductor relay (50 V)	Accuracy	±2.5 mbar (at 0 to +65 °C)	
A/D converter	Delta-sigma, 24-bit, 1.25 mops	<b>Outputs</b>	Two ALMEMO® sockets for interface cable and ALMEMO® memory connector	
Measuring range	Pt100, 4 conductors, -200 to +670 °C Resolution 0.001 K Pt100, 4 conductors, -200 to +850 °C Resolution 0.01 K	<b>Standard equipment</b>	Operation	
Measuring current	1 mA	Date and time-of-day	Real-time clock, buffered by lithium battery	
Accuracy	±0.010 K ±1 digit in range -50 to +560 °C Resolution 0.001 K ±0.05 K ±1 digit in range -100 to +850 °C Resolution 0.01 K	<b>Power supply</b>	Mains adapter	
Nominal conditions	+23 °C ±2 K, 1013 mbar	Current consumption	ZB1212NA10 100 to 240 VAC to 12 VDC, 2 A, electrically isolated without input and output modules	
Temperature drift	typical 2 ppm / K	Active mode	approx. 35 mA (with memory connector approx. 45 mA)	
Calculated humidity variables	Analytic equation (not an approximation)	Sleep mode	approx. 0.05 mA	
		<b>Housing</b>	180 x 049 x 137 mm (LxWxH) Polystyrene (PS), approx. 490 g	

### Input connector ALMEMO® 8036-9

Order no.

ALMEMO® input connector for the user's own third party high-precision sensors, Pt100, 4 conductors, 0.001 K resolution, for ALMEMO® 1030-2/1036-2/8036-9

ZA9030FS7P3

ALMEMO® input connector for the user's own third party high-precision sensors, Pt100, 4 conductors, 0.01 K resolution, for ALMEMO® 1030-2/1036-2/8036-9

ZA9030FS2P3

### Accessories

Order no.

Memory connector with micro SD, including USB card reader (see chapter 'General accessories')

ZA1904SD

WinControl software for measured data acquisition  
per device up to 20 channels  
for any number of devices and channels

SW5600WC1

SW5600WC2

### Connecting cables

Order no.

USB data cable, electrically isolated

ZA1919DKU

Ethernet data cable, electrically isolated

ZA1945DK

### Standard delivery

Order no.

Reference measuring instrument ALMEMO® 8036-9, nine inputs for Pt100 sensors and Pt100 psychrometers, integrated atmospheric pressure sensor, including desktop mains unit ZB1212NA10

ZA80369

# Reference Measuring Instruments

## Pt100 high-precision sensor FPA923L0250 for reference measuring instrument ALMEMO® 1030-2/1036-2/8036-9



### Technical data

Measuring element	Pt100 as per DIN EN 60751	Nominal length	250 mm
Class	1/10 B (DIN EN 60751) at 0 °C	Shaft	Stainless steel, diameter 3 mm
Measuring tip	Operative range -50 to +400 °C	Connecting cable	2 meters, FEP / silicone
Response time T90	5 seconds	ALMEMO® plug	Resolution 0.001 K

### Standard delivery

Order no.

High-precision temperature sensor, measuring element Pt100 1/10 DIN class B Sensor diameter 3 mm, length 250 mm Measuring tip -50 to +400 °C with 2-meter FEP / silicone cable and ALMEMO® plug Resolution 0.001 K for ALMEMO® 1030-2/1036-2/8036-9

**FPA923L0250**

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)  
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

## Pt100 high-precision psychrometer FPA 836-3P3 for reference measuring instrument ALMEMO® 1036-2/8036-9



### Technical data

Operating temperature	up to +90 °C (no ice)	Housing	Plastic PMMA
Humidity measuring range	approx. 10 to 100 % RH	Dimensions	175 x 050 x 075 mm (LxWxH)
Measuring system	psychrometric	Ventilator power supply	12 VDC via mains unit Cable, approx. 1.5 meters (included in delivery)
Accuracy	< ±1 % RH under nominal conditions	Connecting cables	2 cables, each 5 meters, FEP / silicone
Nominal conditions	+23 °C ±2 K, 1013 mbar, 50 % RH	ALMEMO® plug	Pt100, resolution 0.001 K
Temperature sensors	2 x Pt100, class B, ALMEMO® adjusted		

### Accessories

Order no.

Spare wicks (2 pieces)	ZB98462ED
Extension cable for mains units, 3-pin bayonet coupling, length 5 meters	ZB5090VK05

### Standard delivery

Order no.

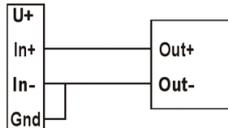
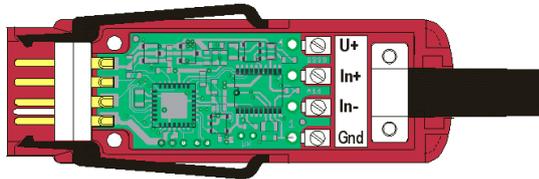
Psychrometer with two Pt100 sensors Fitted cable, with two ALMEMO® plugs Resolution 0.001 K for ALMEMO® 1036-2/8036-9, mains unit, water bottle, 1 pair of wicks, carry case ZB2490TK2

**FPA8363P3**

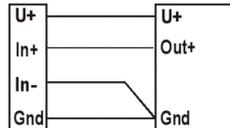
DAkkS or factory calibration KH91xx, temperature, humidity, for sensor or measuring chain (sensor + device) (see chapter „Calibration certificates“).  
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

## Digital ALMEMO® D7 measuring connector for DC voltage differential (volt) / DC current differential (mA)

Fast measuring rate, up to 1000 measuring operations per second (mops) at resolution up to 1 mV / 10 µA (2,000 digits) or High resolution up to 0.001 mV / 0.1 µA (200,000 digits) at 5 mops  
Only for latest ALMEMO® V7 measuring instruments, including precision measuring instruments ALMEMO® 710 or ALMEMO® 202



without supply voltage



with supply voltage

The new ALMEMO® D7 measuring connector successfully combines very different measuring tasks in just one digital connector. High speed or high precision  
The user can select the preferred configuration quickly and easily on the ALMEMO® V7 measuring instrument itself.

### Technical data and functions

- The digital ALMEMO® D7 measuring connector uses its own integrated A/D converter. The overall accuracy of the measuring operation is unaffected by the presence of an ALMEMO® V7 display device / data logger. The measuring rate is determined entirely and exclusively by the integrated A/D converter. On the ALMEMO® V7 measuring instrument all D7 measuring connectors operate in parallel at their own measuring rate. The measuring instrument's very short scan cycle is determined by the measuring rates of the D7 measuring connectors - irrespective of their number.
- For measuring dynamic processes the ALMEMO® D7 measu-

ring connector operates in the high-speed range at a fast conversion rate. The ALMEMO® V7 measuring instrument saves the measured values; the measuring software WinControl displays them in graphical form. If high-level resolution and stable values are required, e.g. precision transducers for pressure, the ALMEMO® D7 measuring connector operates in the high-resolution range but at a reduced conversion rate.

- Measuring transducers without their own mains unit and needing a power supply are powered from the ALMEMO® D7 plug. Each signal is scaled to its actual physical quantity (e.g. pressure 25 bar at voltage 10 volts); the assigned units can be up to 6 characters in length. Sensor identification can be programmed with designations up to 20 characters in length.

### Technical data

Measuring input	electrically interconnected with the power supply (ALMEMO® device ground)	System accuracy	0.02 % +2 digits
Measuring range	see variants	Nominal temperature	+22 °C ±2 K
Conversion rate, resolution	see variants	Temperature drift	0.003 % / K (30 ppm)
Overload	see variants	Operative range	-10 to +60 °C, 10 to 90 % RH (non-condensing)
Internal resistance	see variants	Supply voltage	6 / 9 / 12 V, from ALMEMO® device (sensor supply voltage)
Input current	100 pA	Current consumption	approx. 8 mA (without transducer)

### Variants

Measuring range	Range	Resolution	Conversion rate	Internal resistance	Overload	Order no
-2.2 to +2.2 Volt	U25* U24 U23	0.01 mV 0.1 mV 1 mV	5 mops 500 mops 1000 mops	110 kOhm	5 V	ZED700FS
-250 to +250 mV -64 to +64 mV	U254* U643	0.001 mV	5 mops	5 GOhm	±2.8 V	ZED700FS2
-20 to +20 Volt	U204* U203 U202	0.1 mV 1 mV 10 mV	5 mops 500 mops 1000 mops	110 kOhm	38 V	ZED702FS
-20 to +20 mA	I204* I203 I202	0.1 µA 1 µA 10 µA	5 mops 500 mops 1000 mops	130 Ohm	38 mA	ZED701FS

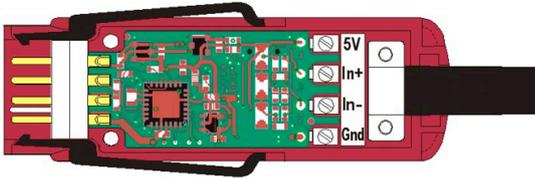
\* Factory setting : The desired measuring range can be programmed on the ALMEMO® V7 device itself.

## Digital ALMEMO® D7 measuring connector for bridge differential mV

For force transducers (tension / compression), torque transducers, or strain gauges

High-speed measuring at 1000 measuring operations per second (mops) and resolution 50,000 digits or high-level resolution at up to 200,000 digits and 10 mops

Only for latest ALMEMO® V7 measuring instruments, including precision measuring instruments ALMEMO® 710 or ALMEMO® 202.



The new ALMEMO® D7 measuring connector successfully combines very different measuring tasks in just one digital connector. High speed - or - high precision  
The user can select the preferred configuration quickly and easily on the ALMEMO® V7 measuring instrument itself.

### Technical data and functions

- The digital ALMEMO® D7 measuring connector uses its own integrated A/D converter. The overall accuracy of the measuring operation is unaffected by the presence of an ALMEMO® V7 display device / data logger. The whole measuring chain, comprising e.g. a force transducer and the connected ALMEMO® D7 measuring connector, can be calibrated end-to-end.
- The measuring rate is determined entirely and exclusively by the integrated A/D converter. On the ALMEMO® V7 measuring instrument all D7 measuring connectors operate in parallel at their own measuring rate. The measuring instrument's very short scan cycle is determined by the measuring rates of the D7 measuring connectors - irrespective of their number.
- For measuring dynamic processes the ALMEMO® D7 measuring connector operates in the high-speed range at a fast conversion rate. The ALMEMO® V7 measuring instrument saves the measured values; the measuring software WinControl dis-

plays them in graphical form. If high-level resolution and stable values are required, e.g. precision transducers for force, the ALMEMO® D7 measuring connector operates in the „High-level resolution“ range but at a reduced conversion rate.

- Measurements are taken using a full bridge with a 4-conductor circuit. The bridge is powered from the ALMEMO® D7 plug.
- The sensor is scaled to its actual physical quantity (e.g. end value 1 kN with characteristic 2 mV / V); this is performed via the ALMEMO® V7 device (device itself or ALMEMO® Control software). - zero-point adjustment, - scaling of end value by entering characteristic mV / V or adjustment by loading the bridge with end value The assigned units can be up to 6 characters in length. Sensor identification can be programmed with designations up to 20 characters in length.

### Technical data

Sensor type	Full bridge, 4 conductors
Measuring input	electrically interconnected with the power supply (ALMEMO® device ground)
Input range	-29.3 to +29.3 mV
Display range, Conversion rate,	see variants
Bridge power supply	5 V, self-calibrating with divider chain Accuracy 0.01 % Temperature drift 10 ppm / K

System accuracy	0.02 % +2 digits
Nominal temperature	+22 °C ±2 K
Temperature drift	0.003 % / K (30 ppm)
Operative range	-10 to +60 °C / 10 to 90 % RH (non-condensing)
Supply voltage	from 6 V up. from ALMEMO® device (sensor supply voltage)
Current consumption	approx. 15 mA (without force transducer)

### Variants

Range	Display range	Conversion rate	Order no.
DMS2* or DMS1	±50 000 digits ±200 000 digits	1000 mops 10 mops	ZKD700FS

\* Factory setting : The desired measuring range can be programmed on the ALMEMO® V7 device itself.

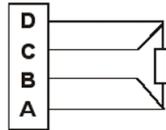
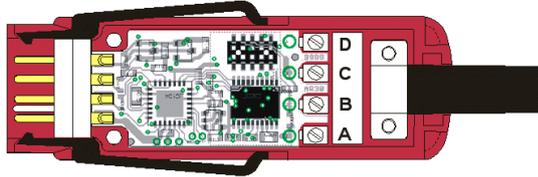
## Digital ALMEMO® D7 measuring connector for Pt100 temperature sensor

High-level resolution of 0.01 K across the entire measuring range up to 850 °C

Linearization of the Pt100 characteristic calculated error-free

Calibration with greater accuracy by subjecting the Pt100 sensor to multi-point adjustment

Only for latest ALMEMO® V7 measuring instruments, including precision measuring instruments ALMEMO® 710 or ALMEMO® 202.



The new ALMEMO® D7 measuring connector provides even greater precision!

### Technical data and functions

- The digital ALMEMO® D7 measuring connector uses its own integrated A/D converter. It provides a high-level resolution of 0.01 K across the entire measuring range up to 850 °C. Linearization of the Pt100 characteristic is calculated error-free in compliance with DIN IEC 751 (not an approximation).
- The overall accuracy of the measuring operation is unaffected by the presence of an ALMEMO® V7 display device / data logger. The whole measuring chain, comprising e.g. a Pt100 sensor and the connected ALMEMO® D7 measuring connector, can be calibrated end-to-end. Calibration can be performed with greater accuracy by subjecting the Pt100 sensor to a process of multi-point adjustment.
- The measuring rate is determined entirely and exclusively by the integrated A/D converter. On the ALMEMO® V7 measuring instrument all D7 measuring connectors operate in parallel at their own measuring rate. The measuring instrument's very short scan cycle is determined by the measuring rates of the D7 measuring connectors - irrespective of their number.
- Sensor identification can be programmed with designations up to 20 characters in length.

### Technical data

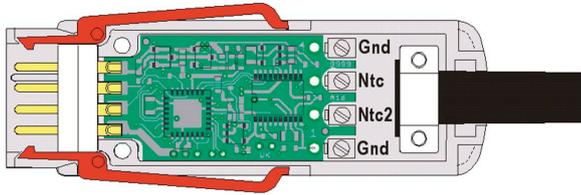
Sensor type	Pt100, 4 conductors	Accuracy	0.07 K +2 digits
Measuring input	electrically interconnected with the power supply (ALMEMO® device ground)	Nominal temperature	+22 °C ±2 K
Measuring range	-200 to +850 °C	Temperature drift	0.003 % / K (30 ppm) (resistance)
Resolution	0.01 K	Operative range	-10 to +60 °C / 10 to 90 % RH (non-condensing)
Conversion rate	10 mops	Supply voltage	from 6 V up. from ALMEMO® device (sensor supply voltage)
Measuring current Pt100	approx. 1 mA	Current consumption	approx. 9 mA
Linearization	calculated error-free (not an approximation)		

### Variants

Type	Measuring range	Range	Resolution	Order no.
Pt100, 4 conductors	-200 to +850 °C	DP04	0.01 K	ZPD700FS

## Digital temperature sensor with ALMEMO® D6 measuring connector for NTC ZAD040FS

High levels of precision and resolution 0.001 K across measuring range -20 to +65 °C  
 Linearization of the NTC characteristic - calculated error-free using Galway Steinhart coefficients  
 Increased measured value accuracy - thanks to multi-point adjustment of the NTC sensor during calibration  
 For all ALMEMO® V6 and V7 measuring instruments, including ALMEMO® 2490 and ALMEMO® 202.



### Technical data and functions

- The digital ALMEMO® D6 measuring connector uses its own integrated A/D converter. Linearization of the NTC characteristic is calculated error-free using the Galway Steinhart coefficients (not an approximation). Across measuring range -20 to +65 °C this produces the very high resolution of 0.001 K.
- The digital temperature sensor reaches this high level of precision irrespective of any extension cables used and of any processing in the ALMEMO® display device / data logger. Overall accuracy is determined exclusively by the NTC sensor and the ALMEMO® D6 measuring connector. This increased measured value accuracy is achieved by subjecting the NTC sensor to multi-point adjustment during calibration.

### Technical data

Sensor type	NTC type N
Measuring input	Electrically interconnected with the power supply (ALMEMO® device ground)
Measuring ranges	see variants
Resolution	see variants
Refresh rate	0.3 seconds for up to two channels
Linearization	Calculated error-free (not an approximation)

Accuracy	
Range DNtc / DNt2	±0.05 K at -50 to +100 °C
Range DNtc3	±0.02 K at -20 to +65 °C
Nominal temperature	23 °C ±2 K
Temperature drift	0.004 % / K (40 ppm)
Operative range	-10 to +60 °C, 10 to 90 % RH (non-condensing)
Supply voltage	from 6 V up, from ALMEMO® device (sensor supply voltage)
Current consumption	approx. 4 mA

### Variants

Type / input	Measuring range	Range	Resolution	Order no.
NTC, 1 input	-50...+125 °C	DNtc	0.01 K	ZAD040FS
NTC, 1 input	-20...+65 °C	DNt3	0.001 K	ZAD040FS3

## Pt100 temperature sensors for special applications in humid conditions up to 150 / 250 °C

High-grade Pt100 resistance sensor  
For measuring operations in very humid atmospheric conditions  
Operative over a wide range of temperatures

## Pt100 temperature sensors for applications in laboratories and medical engineering



Especially suitable for measuring temperatures in autoclaves, sterilizing units, high-temperature steam applications, vacuum applications, and freeze drying units

### Technical data

Measuring element	Pt100 4L, DIN class A (see page 07.03)
Protective tube	Stainless steel, diameter 3 mm, length 20 mm
Operative range	-30 to +150 °C
Cable	PFA, length 5 m
Working pressure	maximum 3.0 bar
Protective class	IP69K
ALMEMO® plug	Pt100 with resolution 0.01 K.

### Variants

Pt100 sensor, cable length = 5 m, ALMEMO® plug

**Order no. FPA30K20L0020**

## Pt100 temperature sensors for industrial applications in air-conditioning / heat cabinets



Especially suitable for measuring temperatures in air-conditioning / heat cabinets with high atmospheric humidity  
Operative over a wide range of temperatures

### Variants

Pt100 sensor, cable length = 5 m, ALMEMO® plug  
Pt100 sensor, cable length = 10 m, ALMEMO® plug

### Technical data

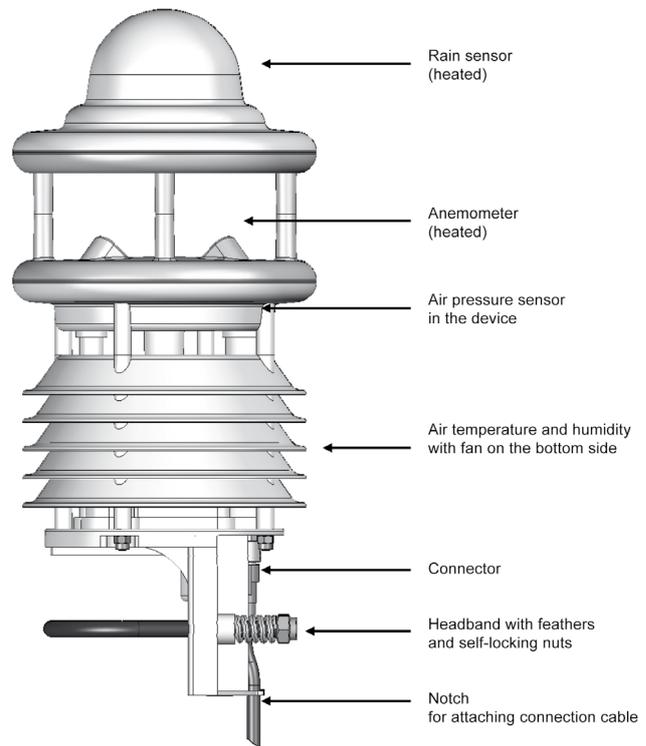
Measuring element	Pt100 4L, DIN class B (see page 07.03)
Protective tube	Stainless steel, diameter 4 mm, length 50 mm
Operative range	-100 to +250 °C
Cable	PFA
Protective class	IP68
ALMEMO® plug	Pt100 with resolution 0.01 K.

**Order no. FPA40ST0050S01KL0050**

**Order no. FPA40ST0050S01KL0100**

## Compact meteorological transducer for professional use - FMD760

Digital sensors for measuring wind, precipitation, air temperature, atmospheric humidity, atmospheric pressure. Maintenance-free measuring procedures for wind and precipitation  
Forced-ventilated radiation-protected housing



### Technical data and functions

#### Digital meteorological transducer for operating with ALMEMO® V7 devices

This digital meteorological transducer, with its integrated signal processor or A/D converter, can acquire all important weather variables in one device (over 20 different measurable variables). Up to 10 measuring channels can be evaluated simultaneously via the ALMEMO® D7 plug.

On leaving our factory the following variables are programmed: wind velocity (m/s), wind direction (°), precipitation quantity (mm), precipitation intensity (mm/h), air temperature (°C), relative atmospheric humidity (% RH), barometric atmospheric pressure (hPa).

The meteorological transducer operates with current ALMEMO® V7 devices, including precision measuring instrument ALMEMO® 710 and professional measuring instrument ALMEMO® 202.

#### For professional applications

The meteorological transducer complies in essence with all specifications laid down by the WMO (world meteorological organization) and is used in a wide variety of areas, e.g. weather services, water management, transport technology (roads, rail), agriculture, renewable energy technology, and the monitoring of air quality and atmospheric emissions.

The transducer can be fitted quickly and easily, e.g. on a mast or pole, using the supplied bracket.

The connection cable can be plugged onto the transducer. In the small connection box the signal cables are clamped and the mains unit 24V for the heating system supply are plugged. In mobile use (without mains unit 24V) heating and fan (see below) are deactivated, and the rainfall radar (see below) can be operated in Energy Saver mode. 1

#### Wind

Wind is measured by means of four ultrasonic sensors (the four main compass points). From the runtime differences the wind velocity is calculated in m/s and the wind direction in °.

This measuring procedure is maintenance-free (no moving parts). For operation in winter the ultrasonic sensors can if so required be heated.

#### Precipitation, rainfall

Precipitation is acquired using tried and tested radar technology. A Doppler radar measures the velocity of individual drops of rain / snow. Precipitation quantity (in mm) and precipitation intensity (in mm/h) can be calculated on the basis of the correlation of drop size and drop velocity. The type of precipitation (rain / snow) is determined on the basis of the different velocity of descent.

This measuring procedure is maintenance-free (no moving parts). For operation in winter the precipitation sensor can if so required be heated.

#### Air temperature and atmospheric humidity

Air temperature is measured (in °C) by means of a high-precision NTC resistance sensor; relative atmospheric humidity is measured (in % RH) by means of a capacitive humidity sensor. These sensors are enclosed in a forced-ventilated radiation-protected housing in order to minimize external influences (e.g. solar radiation, etc.). This ensures that in spite of high solar radiation accurate measuring results can still be achieved. The forced ventilation, similarly, improves responsiveness in the event of condensation.

#### Atmospheric pressure

Absolute atmospheric pressure is measured (in hPa) by means of an integrated sensor.

#### Measured values

The sensors in the meteorological transducer measure the current measured values continuously and at their internal sampling rate. In the ALMEMO® D7 plug the minimum / maximum / average values and quantities are calculated (at the output cycle of the ALMEMO® V7 device); this is for the purpose of various measurable variables.

## Technical data

<b>Wind velocity</b>		Measuring range	300 to 1200 hPa
Measuring method	Ultrasonic	Resolution	0.1 hPa
Measuring range	0 to 75 m/s	Accuracy sensor	±0.5 hPa (0 to +40 °C)
Resolution	0.1 m/s	Sampling rate	1 minute
Accuracy	±0.3 m/s or ±3 % (0 to 35 m/s) ±5 % (>35 m/s) RMS	ALMEMO® D7 quantities	Current momentary value
Response threshold	0.3 m/s	<b>Operating conditions</b>	
Sampling rate	10 seconds	Temperature	-50 to +60 °C (with heating)
ALMEMO® D7 quantities	Average value, minimum value, maximum value (at output cycle)	Relative humidity	0 to 100 % RH
<b>Wind direction</b>		<b>Dimensions (including fixture)</b>	
Measuring method	Ultrasonic	Height	343 mm
Measuring range	0 to 359.9 °	Diameter	150 mm
Resolution	0.1 degrees	Weight	approx. 1.5 kg (including fixture, excluding connection cables)
Accuracy	<3 ° (>1 m/s)	<b>Housing</b>	
Response threshold	0.3 m/s	Plastic Protective class IP66	
Sampling rate	10 seconds	Fixture	Mast fixture, stainless steel, for Ø 60 to 76 mm
ALMEMO® D7 quantities	Average value, minimum value, maximum value, average value as text (at output cycle)	Sensor connector	Built-in plug
<b>Precipitation, rainfall</b>		Sensor connection cable	fitted in connection box Length (see variants, accessories)
Measuring method	Radar sensor	<b>Connection box</b>	
Measuring range	Drop size 0.3 to 5.0 mm	Clamp fitting the sensor connection cable and the ALMEMO® connection cable	
Resolution	Precipitation, liquid 0.01 mm	Plug fitting the mains unit cable for the heating system supply	
Precipitation types	rain, snow	Dimensions 80 x 82 x 55 mm	
Reproducibility	typical >90 %	3 cable glands	
Response threshold	0.002 mm	<b>Heating</b>	
Sampling rate	On reaching the response threshold, event-dependent	Supply voltage	24 VDC
Rainfall intensity	0 to 200 mm/h; Sampling rate 1 minute	Current consumption	1.7 A (40 W)
ALMEMO® D7 quantities	Rainfall quantity or snow quantity (at the output cycle) Rainfall intensity or snow intensity, current momentary value	via external mains unit ZB1024NA2 (in delivery), 100 to 240 V AC / 24 V DC, 4,17 A with hollow connector, fitted in the connection box	
<b>Air temperature</b>		ALMEMO® connection cable	fitted in connection box Length = 2 meters
Measuring method	NTC	<b>ALMEMO® D7 plug</b>	
Measuring range	-50 to +60 °C	Refresh rate 2 seconds for all current momentary values	
Resolution	0.1 K (-20 to +50 °C), otherwise 0.2 K	Average value, maximum value, minimum value and quantities	
Accuracy sensor	±0.2 K (-20 to +50 °C), otherwise ±0.5 K (>-30 °C)	- at the output cycle (minimum 2 sec. up to 24 hours)	
Sampling rate	1 minute	of the ALMEMO® V7 device	
ALMEMO® D7 quantities	Current momentary value, average value, minimum value, maximum value (at output cycle)	<b>Supply with mains unit 24V (default):</b>	
<b>Atmospheric humidity</b>		All functions available.	
Measuring method	capacitive	24 V from the mains unit, max. 1,8 A.	
Measuring range	0 to 100 % RH	12 V from ALMEMO® device, typ. 10 mA.	
Resolution	0.1 % RH	<b>Supply without mains unit 24V (mobile operation):</b>	
Accuracy sensor	±2 % RH	Fan and heating deactivated.	
Sampling rate	1 minute	12 V from ALMEMO® device,	
ALMEMO® D7 quantities	Current momentary value	typ. 130 mA with rainfall radar in continuous operation.	
<b>Atmospheric pressure</b>		Operating in Energy Saver mode 1:	
Measuring method	MEMS sensor, capacitive	typ. 25 mA, no rain test / no rain,	
		typ. 130 mA for 2 s / Min in the rain test,	
		typ. 130 mA continuously, in the rain	

## Accessories

Sensor connection cable, free ends	Length = 20 meters
Sensor connection cable, free ends	Length = 100 meters
Overvoltage arrester (for stationary operation)	

## Order no.

ZB9760AK20
ZB9760AK100
ZB9760USP

## Variants

Digital meteorological transducer for measuring wind, precipitation, air temperature, atmospheric humidity, atmospheric pressure. Forced-ventilated radiation-protected housing, integrated heating, bracket for mast fitting. Sensor with built-in plug, including sensor connection cable Length = 10 meters fitted in connection box, external mains unit ZB1024NA2, fitted in the connection box, ALMEMO® connection cable fitted in connection box Length = 2 meters with ALMEMO® D7 plug

## Order no.

DAkkS calibration KM90xxxD temperature, humidity, atmospheric pressure wind velocity or factory calibration KM90xxxW temperature, humidity, atmospheric pressure wind velocity wind direction rainfall for digital sensor (see chapter Calibration certificates).

## Digital probes for measuring conductivity FYD 741 LFE01 and FYD 741 LFP with ALMEMO® D7 plug



ALMEMO® 202

Just one single probe for measuring conductivity from very low (10 µS/cm) up to very high levels (500 mS/cm)

4-contact graphite electrode with high linearity across the whole measuring range

Integrated NTC sensor for temperature compensation of measured conductivity values

Suitable for the latest ALMEMO® V7 devices, including professional measuring instrument ALMEMO® 202 and precision measuring instrument ALMEMO® 710.

05/2015 • We reserve the right to make technical changes.

### Technical data and functions

The digital conductivity probe provides this high level of precision irrespective of any extension cables used and of any processing in the ALMEMO® V7 display device / data logger. Overall accuracy is determined exclusively by the conductivity electrode and the ALMEMO® D7 plug.

All parameters for the sensor can be programmed end-to-end via the programming menu on the ALMEMO® V7 measuring instrument. The desired measuring range can be selected and

temperature compensation can be activated or deactivated.

The temperature coefficient of the solution to be measured, if known, can also be programmed.

The probe is delivered already adjusted and ready-to-use. The electrode's measured cell constant can also be entered, if so required, and / or the probe can be adjusted using a reference solution.

### Common technical data FYD 741 LFE01 and FYD 741 LFP ALMEMO® D7 plug with A/D converter

Measuring method	Electrical conductivity measurement with AC voltage (approx. 1 kHz)	Temperature coefficient	Natural surface water or linear in range 0.00 to 9,99
Measuring ranges		Linearization NTC	Calculated error-free (not an approximation)
Range DLF1	up to maximum 500.00 µS/cm	Nominal temperature	+23 °C ±2 K
	Resolution 0.01 µS/cm	Temperature drift	0.004 % / K (40 ppm)
Range DLF2	up to 50.000 mS/cm	Refresh time	2.5 seconds
	Resolution 0.001 mS/cm (factory default settings)	Sleep mode on the device	possible with wakeup delay of 5 seconds
Range DLF3	with FYD 741 LFE01 up to 500.00 mS/cm	Supply voltage	6 to 13 VDC, from ALMEMO® device (sensor supply voltage)
	with FYD 741 LFP up to 200.00 mS/cm	Current consumption	approx. 10 mA
	Resolution 0.01 mS/cm		
Range NTC	Resolution 0.01 K		
Temperature compensation	either automatic or non-compensated		

### Accessories

Reference solution for monitoring / calibration  
 Conductivity 147 µS/cm, Container 250 ml  
 Conductivity 2.77 mS/cm, Container 250 ml  
 Conductivity 12.88 mS/cm, Container 250 ml  
 Conductivity 111.8 mS/cm, Container 250 ml

### Order no.

ZB96LFR1.2  
 ZB96LFR1  
 ZB96LFR1.4  
 ZB96LFR1.3

## Digital probe for measuring conductivity FYD 741 LFP



Probe for process applications

General description and common technical data  
see previous page

### Technical data FYD 741 LFP

Uses	Process applications
Conductivity	10 µS/cm up to 200 mS/cm
Temperature	0 to +70 °C
Pressure	up to 16 bar under nominal conditions
Process connection	Thread G ¾-inch Fitted length 145 mm
Electrode type	4-contact graphite electrode electrically connected to the power supply (ALMEMO® device ground)
Cell constant	approx. 0.5 cm <sup>-1</sup>
Temperature sensor	NTC 10 kilohms, integrated
Accuracy	
Conductivity	±3% of meas. value ±0.2% of final value under nominal conditions
Temperature	±0.2 K under nominal conditions
Nominal conditions	+25 °C ±2 K
Minimum immersion depth	30 mm
Electrode shaft	Material PVC-C diameter 20 mm, length 130 mm
Connecting cable	length = 1.5 meters, permanently fitted, with ALMEMO® D7 plug

## Digital probe for measuring conductivity FYD 741 LFE01



Probe for laboratory applications

General description and common technical data  
see previous page

### Technical data FYD 741 LFE01

Uses	Laboratory applications
Conductivity	10 µS/cm up to 200 mS/cm, on demand up to 500 mS/cm
Temperature	0 to +80 °C
Pressure	Ambient pressure (unpressurized)
Electrode type	4-contact graphite electrode electrically connected to the power supply (ALMEMO® device ground)
Cell constant	approx. 0.5 cm <sup>-1</sup>
Temperature sensor	NTC 30 kilohms, integrated
Accuracy	
Conductivity	±2% of meas. value ±0.2% of final value under nominal conditions
Temperature	±0.2 K under nominal conditions
Nominal conditions	+25 °C ±2 K
Minimum immersion depth	30 mm
Electrode shaft	Material PC (+ABS) diameter 12 mm, length 120 mm
Connecting cable	length = 1 meter, permanently fitted, with ALMEMO® D7 plug

#### Variants

Digital probe for measuring conductivity, integrated temperature sensor, with process connection G ¾-inch, permanently fitted cable with ALMEMO® D7 plug,  
**probe for process applications**

#### Order no.

**FYD741LFP**

#### Variants

Digital probe for measuring conductivity, integrated temperature sensor, with permanently fitted cable with ALMEMO® D7 plug,  
**probe for laboratory applications**

#### Order no.

**FYD741LFE01**

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### Touchscreen data logger ALMEMO® 710 for universal use

- easy to use touchscreen operation
- more measuring channels, more accurate
- new independent, digital sensors for various applications
- plug and play, also for existing probes

More information on the Internet  
[www.ahlborn.com](http://www.ahlborn.com)



### Our calibration laboratory

We run our own calibration laboratory in order to offer customers a comprehensive range of calibration services covering all the measurable variables acquired by our ALMEMO® measuring technology.

For the temperature and atmospheric humidity variables we are accredited as per DIN EN ISO/IEC 17025.



Deutsche  
Akkreditierungsstelle  
D-K-19342-01-00



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