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# ALMEMO® Measuring Instruments



## The ALMEMO® system

The ALMEMO® system comprises an ALMEMO® measuring instrument and intelligent ALMEMO® connectors for the relevant sensor equipment.

An extensive range of measuring instrument variants is thus available - from the single-channel transmitter right through to data acquisition systems with over 1000 measuring points.

The only differences between most of the measuring instruments in the ALMEMO®

series concern their housing (i.e. handheld instruments, desktop instruments, 19-inch systems, fitted panel instruments, transmitters, etc.), the number of measuring inputs (1 to 250), the display, output, and operating controls, and their respective power supplies.

As soon as a sensor or interface cable is connected, the ALMEMO® measuring instrument will, thanks to the intelligent ALMEMO® connector system, be comple-

tely programmed right through to process scheduling.

These measuring instruments provide a uniform range of functions with many configurable options. All parameters can be accessed via the interface and can, since the media in the connectors are always overwritten, be freely modified as and whenever necessary.

## The ALMEMO® principle: Only one measuring instrument for all sensors

An extensive range of transducers, sensors, and signals can be connected to any measuring input on virtually any ALMEMO® measuring instrument - all via the patented ALMEMO® plug system. Since all the sensor data is saved in the connector, no extra programming is required; as soon as a sensor is connected, the measuring ins-

trument is configured automatically. The sensor data memory (EEPROM) ensures that each sensor can be identified, scaled, and calibrated - all on the basis of its own unique designation. This system of individual sensor designations avoids confusion and makes the measuring setup clear and logical. Sensor errors can be corrected

within the plug, turning simple sensors into precision transducers.

Standard signals can be displayed in their original dimensions. For multi-purpose sensors (e.g. temperature and humidity) only one shared plug will usually be required. Programming can be protected by a graduated locking function.

## With ALMEMO® measuring instruments you will not need new sensors

For your existing sensors we will provide you with a matching adapter that you can fit quickly and easily. You can also pro-

gram ALMEMO® plugs yourself quickly and easily via keypad, terminal, or software. The data medium in the plug can

be overwritten as and whenever necessary.

## ALMEMO® measuring instruments are ideal for all sorts of application

All incorporate the same measuring input circuitry. For applications that are not sector-specific there are more than 60 standard measuring ranges available, e.g. for measuring :

Temperature, humidity, flow velocity, flow rate, heat flow, pressure, rotational speed,

frequency, resistance, current, voltage, force, strain factor, displacement, pH value, redox potential, conductivity, O<sub>2</sub>, CO<sub>2</sub>, CO, O<sub>3</sub>, etc. Maximum and minimum values are saved automatically. Measured values can be averaged over a series of individual measurements, over the output cycle, or

over the actual measuring duration; limit values can be monitored in terms of programmable maximum / minimum values. Measured values can be corrected with regard to zero point and gain and can be scaled by factor, base value, exponent, and units.

# ALMEMO® Measuring Instruments

## ALMEMO® measuring instruments are real individuals

ALMEMO® instruments automatically recognize the specifications of a sensor as it is connected. Specific functions will only be activated as and when the appropriate connector, interface cable, or module is detected. With humidity sensors the dew point, mixture ratio, vapor pressure, and enthalpy will be calculated automa-

tically. Measuring operations involving psychrometers, dynamic pressure probes, or probes for solute oxygen may require pressure compensation; for this purpose the prevailing atmospheric pressure can be entered manually or calculated automatically by an integrated pressure transducer. When measuring dynamic pressure, pH

value, atmospheric humidity, solute oxygen, or conductivity it is possible similarly to perform temperature compensation. When using flow sensors to measure volume flow the appropriate cross-section can be entered. For certain special sensors there are connectors available incorporating an integrated adapter circuitry.

## ALMEMO® measuring instruments meet even the most stringent requirements

ALMEMO® devices incorporate a high-resolution 16-bit A/D converter, digital linearization (for Pt100 sensors with the new ITS 90 temperature scale), and digital

calibration. Optimal cold junction compensation is ensured by means of precision thermistors incorporated in the socket spring. Measuring inputs, power supply,

and interfaces are all electrically isolated from each other.

## The ALMEMO® data acquisition system adapts to your requirements

The internal measured data memory incorporated in ALMEMO® data loggers can be expanded by adding external capacity and can be configured either as linear or ring memory.

This memory can be read out selectively according to time or number. The switchover between measuring points is electrically isolated using semiconductor relays that are totally wear-resistant. Continuous measuring point scanning at 10 or 50 measuring operations per second can thus

be performed trouble-free. Measuring point scans can be individually programmed. Measuring cycles and output cycles can be selected independently; measured values, average values, and maximum / minimum values can be selectively output and / or saved to memory. The start / stop of each measuring point scan can be variably controlled (by keypad or interface, by date and time-of-day, by limit values, or by an external signal). All measuring instruments can be addressed via interface

and are thus fully network-capable. Up to 100 devices can be networked either via cable or over a wireless link. The output of measured values from all devices in the whole network can be initiated from any one such device. For covering longer distances RS422 drivers and distributors are available. This system minimizes hardware requirements, cabling costs, and possible EMC problems, and can be expanded as and when required.

## ALMEMO® measuring instruments accept virtually any peripheral equipment while maintaining optimal data transmission

Analog or digital interfaces are not integrated in the measuring instruments themselves but in the connectors and connecting cables. Depending on requirements a wide variety of adapters can be connected, e.g.

analog outputs, various interfaces (RS232, RS422, optic fiber, current loop, Ethernet, Bluetooth), alarm signaling devices, or trigger inputs. Data can also be transmitted via a standard fixed-line telephone

(analog or ISDN) or a wireless modem at a maximum baud rate of 9600 baud for remote interrogation purposes.

## ALMEMO® measuring instruments provide evaluation of measured data easily and conveniently

Suitable output formats are provided for printers or spreadsheet software. For the

graphical presentation and the evaluation of measured data there are various soft-

ware packages available.

## ALMEMO® instruments can be programmed quickly and easily

The software protocol and the commands list are identical for all devices. Only one terminal is enough to program all para-

meters and to scan the measured data. There is a free WINDOWS configuration software, AMR-Control, with terminal,

available for this purpose.

# ALMEMO® Measuring Instruments

## Measuring humidity and moisture

ALMEMO® atmospheric humidity sensors provide 4 channels that can be programmed optionally for any of the variables - temperature, relative atmospheric humidity, dew point, mixture ratio, partial vapor pressure, or enthalpy. The first 4 variables are provided as standard.

All measuring functions (maximum, mini-

mum, limit values) and all programming functions can be used for all these channels.

With psychrometers the atmospheric pressure function will also be activated, so that any strongly deviating atmospheric pressure (e.g. at high altitudes above mean sea level) can be entered and used for compen-

sation purposes.

Probes for measuring moisture in materials can be set using the base value for a wide variety of materials, e.g. in the material groups - construction materials, wood, paper.

## Measuring air flow velocity

When using hot-wire thermoanemometers, rotating vanes, or dynamic pressure transducers universal ALMEMO® measuring instruments 2590-2 and above can activate averaging functions, volume flow, cross section area, and diameter. The vo-

lume flow is calculated over the cross section area by matrix measuring with averaging over a series of individual values or continuous averaging. Since calculation of flow velocity in Pitot tubes is strongly influenced by air temperature, automatic

temperature compensation can be activated. It is also possible to set an attenuation filter with a selectable time constant, thus ensuring that relatively smooth values can be applied to particularly critical measuring points.

## Non-contacting temperature measurement

When measuring infra-red temperature the emissivity factor and background temperature must always be considered. As

soon as an infra-red probe is connected these two functions are activated and the associated parameters are stored in the

plug.

## Radiant temperature - WBGT measurement

Wet-bulb globe temperature (WBGT) is used e.g. for evaluating heat stress in the workplace. Using a psychrometer with disengageable motor and a globe thermome-

ter, WBGT is calculated from the dry temperature TD, the natural wet temperature TW, and the globe temperature TG.

$$WBGT = 0.1\mu TD + 0.7\mu TW + 0.2\mu TG$$

A function channel, WBGT, is provided for evaluating this formula.

## Measuring heat flow, thermal coefficient, and transmittance (U value)

The calibration value for each heat flux plate is saved as a factor in the plug, so that heat flow measuring operations can be performed without having to reset the calibration each time. It is also possible

to use function channels to determine the average heat flow and the average temperature difference and, from the quotient of these two average values, to determine a thermal coefficient. Depending on how

the temperature sensors are arranged, the thermal surface transfer coefficient ( $\alpha$ ), the thermal conductance coefficient ( $\lambda$ ) or the thermal transmittance coefficient (U value) can be determined.

## Force measurement including adjustment of zero-point and final value

With force transducers the basic load (tare weight) can be adjusted to zero and the final value can be entered as setpoint. From

these values the correction factor will then be calculated automatically. For force transducers with an integrated reference

resistor there is a connector available that switches this on for adjustment purposes.

## Adjustment and temperature compensation for pH probes

Probes for measuring pH are subject to ageing and must therefore be recalibrated at regular intervals. Zero-point and gain can be calibrated at the touch of a button using the standard reference solutions. A

big advantage here is that the calibration setting will be saved in the plug, thus ensuring that the probe can also be operated with other instruments. It is even possible to use several probes with their own indi-

vidual calibration settings.

Temperature compensation can be performed either automatically using a combined temperature / pH probe or manually by entering the temperature of the medium.

## Measuring conductivity - with temperature compensation

The conductivity probe measures the temperature of the medium and calculates conductance referred to 25 °C.



## General technical specifications

### Inputs

Channel switching  
between input sockets

4-contact with photo-MOS relays  
Potential separation maximum 50 V  
Measuring modules with higher potential separation (see chapter „Input modules“)  
Offset voltage <5 µV  
Cold junction compensation (CJC) effective in range -30 to +100 °C, Accuracy ±0.2 K (±0.01 K / °C)  
Nominal temperature 22 °C ±2 K  
Sensor power supply 6 to 12 V depending on power supply  
Self-calibration Automatic zero-point correction, measuring current calibration  
Monitoring functions Automatic sensor recognition and sensor breakage detection

		Basic measuring instruments	Professional measuring instruments	Precision measuring instruments	
Precision class	C	B	A	AA	
ALMEMO® series	2450, 2420	2490, 2590	2470, 2790 2590A	2890, 4390 5690, 8490 8590, 8690	2690A, 710
Measuring rates Measuring operations per second (mops)	2,5 mops	2,5, 10mops	2,5, 10mops	2,5, 10, 50, 100mops Option 400mops*   Option 500mops *	
Input range	0.26 to +2.6 V	-2 to +5 V	meas. range 2.6 V: -2 to +3 V in all other meas. ranges -1.9 to +2.9 V	meas. range 2.6 V: -3 to +3 V in all other meas. ranges -2.3 to +1.3 V	meas. range 2.6 V: -2 to +3 V in all other meas. ranges -1.9 to +2.9 V
Overload	-4 to +5 V	-2 to +5 V	-2 to +5 V	± 12V	± 12V
Input current	< 2nA	< 20nA	100pA	Meas. range 2.6 V: 500 nA in all other meas. ranges 500 pA	100pA
Measuring current		Pt100/1000: 0.3mA	Pt100/1000: 0.3mA	Pt100: 1mA, Pt1000: 0.1mA	
System accuracy at 2.5 mops	0.1% of measured value ±4 digits	0.03% of measured value ±4 digits	0.03% of measured value ±3 digits	0.02% of measured value ±2 digits	
Temperature drift	0.01% / K (100 ppm)	0.005% / K (50 ppm)	0.003% / K (30 ppm)	0.003% / K (30 ppm)	

\*Measuring rate 400 mops (Option SA0000Q4)

\*Measuring rate 500 mops (Option SA0000Q5):

It is also possible, in addition to the standard conversion rates, to set 400 or 500 mops (measuring operations per second). At the rate of 400 or 500 mops just one selected measuring channel can be saved. This can only be used with sensors with voltage or current ranges or with NTC sensors. Nor is it possible to change channels in the course of a measuring operation.

The resolution, accuracy, and sensitivity to disturbance caused by mains hum or electromagnetic interference are comparable with measuring operations performed at a rate of 50 mops. Care must be taken to ensure that the environment is free from interference and that the sensor lines are kept short.

Data can only be output to a micro SD card. Accessories ZA1904SD Memory connector with micro SD Data is saved in table format (separated by semi-colons) and with a time-stamp resolution of 0.0001 seconds. This format can be processed using the WinControl software (as of version 6.1.1.6).

### Measuring instrument

Interface to all ALMEMO® plugs / modules	I2C bus
Operating temperature	-10 to +60 °C
Storage temperature	-30 to +60 °C
Humidity range	10 to 90 % (non-condensing)
Electromagnetic compatibility Safety standards	EN 61010-1: 2001, EMC: EN 61326-1: 2013

## Measuring ranges

Sensor type	Type	Measuring range		Units	Resolution	Linearization accuracy		Connector programming
Resistance temperature detectors:								
Pt100 / Pt1000 -1 4-wire	FP Axxx	-200.0 to	+850.0	°C	0.1 K	±0.05 K	±0.05 % of measured value	ZA 9030 FS1/4
Pt100 / Pt1000 -2 4-wire	FP Axxx	-200.00 to	+400.00	°C	0.01 K	±0.05 K		ZA 9030 FS2 / 5
Pt100 -3 4-wire	FP Axxx	-8.000 to +	65.000	°C	0.001 K	±0.002 K		ZA 9030 FS7
Ni100/1000 4-wire		-60.00 to +	240.00	°C	0.1 K	±0.05 K		ZA 9030 FS3 / 6
NTC type N	FN Axxx	-50.00 to	+125.00	°C	0.01 K	±0.05 K		ZA 9040 FS
Thermocouples								
NiCr-Ni (K)	FT Axxx	-200.0 to	+1370.0	°C	0.1 K	±0.05 K	±0.05 % of measured value	ZA 9020 FS
NiCroSil-NiSiil (N)		-200.0 to	+1300.0	°C	0.1 K	±0.05 K	±0.05 % of measured value	ZA 9021 FSN
Fe-CuNi (L)		-200.0 to	+900.0	°C	0.1 K	±0.05 K	±0.05 % of measured value	ZA 9021 FSL
Fe-CuNi (J)		-200.0 to	+1000.0	°C	0.1 K	±0.05 K	±0.05 % of measured value	ZA 9021 FSJ
Cu-CuNi (U)		-200.0 to	+600.0	°C	0.1 K	±0.05 K	±0.05 % of measured value	ZA 9000 FSU
Cu-CuNi (T)		-200.0 to	+400.0	°C	0.1 K	±0.05 K	±0.05 % of measured value	ZA 9021 FST
PtRh10-Pt (S)		0.0 to	+1760.0	°C	0.1 K	±0.3 K		ZA 9000 FSS
PtRh13-Pt (R)		0.0 to	+1760.0	°C	0.1 K	±0.3 K		ZA 9000 FSR
PtRh30-PtRh6 (B)		+400.0 to	+1800.0	°C	0.1 K	±0.3 K		ZA 9000 FSB
AuFe-Cr		-270.0 to	+60.0	°C	0.1 K	±0.1 K		ZA 9000 FSA
Electrical and digital signals:								
Millivolts DC		-10.0 to	+55.0	mV	1 µV	—		ZA 9000 FS0
Millivolts 1 DC		-26.0 to	+26.0	mV	1 µV	—		ZA 9000 FS1
Millivolts 2 DC		-260.0 to	+260.0	mV	0.01 mV	—		ZA 9000 FS2
Volts DC		-2.6 to	+2.6	*	V	0.1 mV		— ZA 9000 FS3
Volts DC		-26 to	+26	V	1 mV	—		ZA 9602 FS
For measuring bridges Supply 5 V (Example)		-26.0 to	+26.0	mV	1 µV	-		ZA9650 FS1V
For potentiometers Supply 2.5 V		-2.6 to	+2.6	*	V	0.1 mV		- ZA9025 FS3
Volt AC (50 Hz to 2 kHz) (Example)		0 to	+26	V	0.1 V	—		ZA 9603 AK3
Volt AC (11 Hz to 250 Hz) (Example)		0 to	+400	V	1 V	—		ZA 9903 AB5
Ampere AC (11 Hz to 250 Hz) (Example)		0 to	+10.00	A	0.01 A	—		ZA 9904 AB2
Volts DC (sampling rate 1 kHz) (Example)		0 to	+400	V	1 V	—		ZA 9900 AB5
Ampere DC (sampling rate 1 kHz) (Example)		0 to	+10.00	A	0.01 A	—		ZA 9901 AB4
Milliamperes DC		-32.0 to	+32.0	*	mA	1 µA		— ZA 9601 FS1
Percent (4 / 20mA DC)		0.0 to	100.0	%	0,01 %			ZA 9601 FS2
Ohms		0.00 to	500.00	*	Ω	0.01 Ω		— ZA 9003 FS
Ohms		0.0 to	5000.0	*	Ω	0.1 Ω		— ZA 9003 FS2
Frequency		0 to	15000	Hz	1 Hz	—		ZA 9909 AK1U
Pulses / measuring cycle		0 to	65000			—		ZA 9909 AK2U
Digital interface		0 to	65000			—		ZA 9919 AKxx
Digital input		0.00 to	100.00	%		—		ZA 9000 ES2
Capacitive humidity sensors:								
Rel: humidity	FH A646	5.0 to	98.0	%H	0,1 %	—		
Rel: humidity with TC	FH A646-R	5.0 to	98.0	%H	0,1 %	±0,5 %		
Dew-point temperature		-25.0 to	+100.0	°C	0.1 K	±0.2 K		
Mixture ratio		0.0 to	500.0	g/kg	0.1 g/kg	±0.5 % of measured value		
Partial vapor pressure		0.0 to	1013.2	mbar	0.1 mbar	±0.1 mbar ±0.1 % of measured value		
Enthalpy		0.0 to	400.0	kJ/kg	0.1 kJ/kg	±0.5 % of measured value		
Psychrometer	FN A846					ZA 9846 AK		
Wet temperature		0.00 to	+100.00	°C	0.01 K	±0.05 K		
Relative humidity		0.0 to	+100.0	%H	0.1 %	±1,0 %H		
Dew-point temperature		-25.0 to	+100.0	°C	0.1 K	±0.2 K		
Mixture ratio		0.0 to	500.0	g/kg	0.1 g/kg	±0.5% of measured value		
Partial vapor pressure		0.0 to	1013.2	mbar	0.1 mbar	±0.1 mbar ±0.1% of measured value		
Enthalpy		0.0 to	400.0	kJ/kg	0.1 kJ/kg	±0.5% of measured value.		

\* Data may vary depending on device. (see relevant device data sheet)

Sensor type	Type	Measuring range	Units	Resolution	Linearization accuracy	Connector programming
Flow sensors						
Rot. vane, snap-on head	FV AD15-Sx (e.g.)	0.50 to 40,00	m/s	0.01 m/s	-	
Rotating vane Macro	FV AD15-MA1	0.10 to 20.00	m/s	0.01 m/s		
Water turbine	FV AD15-WM1	0.00 to 5.00	m/s	0.01 m/s		
Dynamic pressure sensor	FD A602-S1K	0.5 to 40.0	m/s	0.1 m/s	± 0.1 m/s	
Dynamic pressure sensor	FD A602-S6	1.8 to 90.0	m/s	0.1 m/s	± 0.1 m/s	
Hot-wire anemometer	FV A935-TH4	0 to 2.000	m/s	0.001 m/s	-	
Hot-wire anemometer	FV A935-TH5	0 to 20.00	m/s	0.01 m/s	-	
Hot-wire anemometer	FV A605-TA1	0.01 to 1.000	m/s	0.001 m/s	-	
Hot-wire anemometer	FV A605-TA5	0.15 to 5.00	m/s	0.01 m/s	-	
Chemical probes						
Conductivity	FY A641-LF (e.g.)	0 to 20.000	mS	0.001 mS	±0.2% of measured value	
O <sub>2</sub> dissolved saturation	FY A640-O2	0 to 260	%	1%	-	
O <sub>2</sub> dissolved, concentr:	FY A640-O2	0.0 to 40.0	mg/l	0.1 mg/l	±0.2 mg/l	
O <sub>2</sub> in gases	FY 9600-O2	1 to 100	%	1%	-	
O <sub>3</sub> in gases	FY 9600-O3	0 to 300	ppb	20 ppb	-	
CO probe	FY A600-CO (e.g.)	0 to 300	ppm	1 ppm	-	
CO <sub>2</sub> in gases	FY A600-CO2 (e.g.)	0.000 to 2.500	%	0.01%	±0.2% of measured value	
pH probe	FY96PH-Ex	0.0 to 14.00	pH	0.01 pH	-	ZA 9610 AKY4W
Redox probe	FY96RX-Ex	0.0 to 2600.0	mV	0.1 mV	-	ZA 9610 AKY5W
Optical radiation (Examples)						
Lux measuring probe	FL A613-VL	0 to 260000	lux	1 lux	-	
Lux measuring probe	FL A603-VL2	0.05 to 12500	lux	0.01 lux	-	
Lux measuring probe	FL A603-VL4	1 to 250000	lux	1 lux	-	
UV measuring probe	FL A613-UV	0 to 87.00	W/m <sup>2</sup>	0.01 W/m <sup>2</sup>	-	
UVA measuring probe	FL A603-UV24	0.0004 to 100	mW/cm <sup>2</sup>	0.1 µW/cm <sup>2</sup>	-	
Radiometric probe	FL A603-RW4	0.00004 to 10	mW/cm <sup>2</sup>	0.01 µW/cm <sup>2</sup>	-	
Photosynthesis probe	FL A603-PS5	0.0002 to 100	mmol/m <sup>2</sup> s	0.1 µmol/m <sup>2</sup> s	-	
Other connectable sensors / transducers (Examples)						
Heat flow plates	FQ Axxx	-260.0 to +260.0	mV	0.01 mV	-	ZA 9007 FS
Moisture content probe	FH A696-MF	0 to 50.0	%	0,1%	-	
Differential pressure	FD A612-SR	0 to 1000	mbar	0.1 mbar	-	
Barometer	FD A612-SA	0.0 to 1050 mbar		0.1 mbar	-	
Pressure transducer FDA	FD A602-xx (e.g.)	0.00 to 10.00	bar	0.01 bar	-	
Force transducer	FK Axxx (e.g.)	0.0 to 50.00	kN	0.01 kN		
Displacement transducer	FW Axxx(e.g.)	0.0 to 150.00	mm	0.01 mm	-	
Tachometer	FU A919-2	8 to 30000	rpm	1 rpm		ZA 9909 AK4U
Function values						
Differential					-	
Maximum value					-	
Minimum value					-	
Average value over time					-	
Average value over measuring point					-	
Summation over measuring points		0 to 65000			-	
Total number of pulses	ZA 9909-AK2U	0 to 65000			-	
Pulses / print cycle	ZA 9909-AK2U	0 to 65000			-	
Alarm value		0.0 to 100.00	%		-	
Thermal coefficient	M (q) / M (ΔT)					
Wet-bulb globe temperature (WBGT)	(0.1 TD + 0.7 TW + 0.2 TG)				-	
Measured value						
Cold junction temperature				°C		
Number of averaged values						
Volume flow		0 to 65000	m <sup>3</sup> /h	1 m <sup>3</sup> /h		

## Outputs

ALMEMO® socket A1	Digital interface	Baud rates 150, 300, 600, 1200, 2400, 4800, 9600 baud, 57.6, 115.2 kilobaud Data : 8 bit serial, 1 start bit, 1 stop bit, no parity ALMEMO® data link via USB, RS232, Ethernet wireless link via Bluetooth or RS422 (see chapter „Networking“)
	Analog output	ALMEMO® analog cable and analog interface (see chapter „Output modules“)
ALMEMO® socket A2	Networking	ALMEMO® network cable or wireless via Bluetooth (see chapter „Networking“)
	Saving data	ALMEMO® memory connector with memory card (see chapter „General accessories“)
	Analog output	ALMEMO® analog cable and analog interface (see chapter „Output modules“)
	Trigger input	ALMEMO® trigger cable and trigger interface (see chapter „Output modules“)
	Relay output	ALMEMO® relay cable and relay interface (see chapter „Output modules“)
	Relay output	ALMEMO® relay cable and relay interface (see chapter „Output modules“)

**Mains adapter and DC supply cable** see chapter „General accessories“

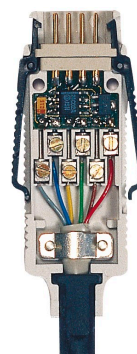
## Input connector

### ALMEMO® plug

In the ALMEMO® measuring system, depending on the sensor and measuring instrument, up to 4 measuring channels can be accessed at any one measuring input.

The patented ALMEMO® plug incorporates 6 screw terminals - 2 for the sensor's power supply and 4 for its measuring signal. With Pt100 sensors using 4-conductor circuitry all 4 free connections will be required for the measuring signal.

Only one sensor of this type can be connected therefore per measuring input. Electrical signals only require 2 connections for the measuring signal. One plug can thus acquire two different measuring signals over just one measuring channel. An atmospheric humidity sensor can example usually be combined with a temperature sensor. The associated operands (e.g. dew point, mixture ratio, partial vapor pressure, enthalpy) are programmed in the plug as additional measuring channels. Up to maximum four measuring channels can be output per measuring input.



### ALMEMO® D6 plugs for digital sensors

- The digital ALMEMO® D6 sensor can be connected to any ALMEMO® measuring instrument without in any way affecting its measuring accuracy. The A/D converter incorporated in the ALMEMO® D6 sensor is exclusively responsible for the measuring accuracy of the whole system.
- The digital ALMEMO® D6 sensor is calibrated without involving the ALMEMO® measuring instrument (DAkkS / factory) and can be replaced or exchanged as and whenever necessary.
- The connecting cable for the digital ALMEMO® D6 sensor can be extended using pluggable extension cables quickly and easily and without any line losses. (see chapter „General accessories“)
- These digital extension cables provide high transmission reliability; they have no effect on measuring accuracy.
- The digital ALMEMO® D6 sensor can be connected via USB directly to a PC or be incorporated via Ethernet in an ALMEMO® network. Measured values can be processed directly using the AMR WinControl software package. (see chapter „Software“)
- These digital ALMEMO® D6 sensors can be configured (e.g. measuring range selection) directly on the PC using USB adapter cable ZA1919AKUV (see page 04.05).



## ALMEMO® measuring instruments, overview

	Measuring inputs	Expansions	Display	Graphics display	Data logger function	Integrated memory	Interface / outputs	Precision class	Measuring rate (mops) max.	Measuring ranges	Multi-point adjustment	Portable device	Desktop device	Fitted device	Catalog page
<b>Compact measuring instrument</b>															
ALMEMO® 2450-1	1		✓				✓	C	2,5	35		✓			01.12
ALMEMO® 2450-1L	1		✓					C	2,5	35		✓			01.12
<b>Basic measuring instrument</b>															
ALMEMO® 2490-1	1		✓				✓	B	10	65		✓			01.14
ALMEMO® 2490-2	2		✓				✓	B	10	65		✓			01.14
ALMEMO® 2490-1L	1		✓					B	10	65		✓			01.14
ALMEMO® 2490-2L	2		✓					B	10	65		✓			01.14
<b>Professional measuring instrument</b>															
ALMEMO® 2470-1S/-1SRH	1		✓		✓	✓	✓	A	10	65		✓			01.16
ALMEMO® 2470-2S	2		✓		✓	✓	✓	A	10	65		✓			01.16
ALMEMO® 2470-2	2		✓				✓	A	10	65		✓			01.16
ALMEMO® 2590-2A	2			✓	✓		✓	A	10	65		✓			01.19
ALMEMO® 2590-4AS	4		✓	✓	✓	✓	✓	A	10	65		✓			01.19
<b>Precision measuring instrument</b>															
ALMEMO® 2690-8A	5			✓	✓	✓	✓	AA	100	66	opt.	✓			01.22
ALMEMO® 2890-9	9			✓	✓	✓	✓	AA	100	66	opt.	✓			01.24
ALMEMO® 710	10			✓	✓	✓	✓	AA	100	66	opt.	✓			01.26
ALMEMO® 8590-9	9				✓	opt.	✓	AA	100	66	opt.		✓		01.29
ALMEMO® 8690-9A	9				✓	opt.	✓	AA	100	66	opt.		✓		01.29
ALMEMO® 5690-1M09	9	opt.			✓	opt.	✓	AA	100	66	opt.		✓		01.32
ALMEMO® 5690-2M09	9	opt.		✓	✓	✓	✓	AA	100	66	opt.		✓		01.32
ALMEMO® 5790-2M09	9	opt.		✓	✓	opt.	✓	AA	100	66	opt.			✓	01.32
ALMEMO® 5690-1CPU		opt.			✓	✓	✓	AA	100	66	opt.		✓		01.42
ALMEMO® 5690-2CPU		opt.		✓	✓	✓	✓	AA	100	66	opt.				01.42
ALMEMO® 5790-2CPU		opt.		✓	✓	✓	✓	AA	100	66	opt.			✓	01.42
ALMEMO® 4390-2	1		✓		✓	✓	✓	AA	100	66				✓	01.52
<b>Compact device (transmitter)</b>															
ALMEMO® 2450-1R02	1		✓				✓	C	2,5	35				✓	01.50
<b>Basic device (transmitter)</b>															
ALMEMO® 2490-1R02	1		✓				✓	B	10	65				✓	01.50
ALMEMO® 2490-2R02	2		✓				✓	B	10	65				✓	01.50
<b>Reference measuring instrument</b>															
ALMEMO® 1020-2	2			✓	✓		✓	AS	1,25	4	✓	✓			01.54
ALMEMO® 1030-2	2			✓	✓		✓	AS	1,25	1	✓	✓			01.55
ALMEMO® 1036-2	2			✓	✓		✓	AS	1,25	7	✓	✓			01.58



# ALMEMO® Measuring Instruments

## Measuring ranges, ALMEMO® 2450, 2490, 2470, 2590A series

Sensor type / Measuring range	ALMEMO® series Precision class Type	2450 C	2490 B	2470 A	2590A A
<b>Temperature</b>					
<b>Thermocouple sensor</b>					
NiCr-Ni Typ K (NiCr)	FTA xxx	X	X	X	X
NiCroSil-NiSil Typ N (NiSi)		X	X	X	X
Fe-CuNi Typ L/J (FeCo/IrCo)		X	X	X	X
Cu-CuNi Typ U/T (CuCo/CoCo)		X	X	X	X
PtRh10-Pt Typ S (Pt10)		X	X	X	X
PtRh13-Pt Typ R (Pt13)		Range	X	X	X
PtRh30-PtRh6 Typ B (EL18)		Range	X	X	X
AuFe-Cr (AuFe)		Range	X	X	X
<b>Resistance temperature detectors</b>					
Pt100/1000 (P104, P204)	FPA xxx	Range	X	X	X
Ni100/1000 (N104)		Range	X	X	X
NTC Typ N (NTC)	FNA xxx	X	X	X	X
<b>Heat flow</b>	FQA xxx, FQADxx	X	X	X	X
<b>Atmospheric humidity</b>					
Capacitive with NTC	FHA 646 xxx	X	X	X	X
Digital temperature / humidity sensor	FHAD 46x	X	X	X	X
Digital temperature / humidity sensor	FHAD 36 Rx	X	X	X	X
Psychrometric with NTC	FNA 846	Range	Function	Function	X
Psychrometric with Pt100 (2 plugs)	FPA 8363	Range	Function	Function	X
Digital psychrometer	FNAD46, FNAD463	X	X	X	X
<b>Dew point</b>					
Digital dewpoint sensor	FH A646 DTC1	X	X	X	X
Dew detector	FHA 9461	X	X	X	X
<b>Moisture in materials</b>					
Water detection probe	FHA 936 WD	X	X	X	X
Sensor for measuring moisture in materials	FHA 696 MF	Function	Function	X	X
Moisture probe for wood	FHA 636 MFx, FHA 696 MFS1	X	X	X	X
Material moisture sensor for granulates	FHA 696 GF1	X	X	X	X
Moisture in the soil	FDA 602 TM1	X	X	X	X
<b>Air flow</b>					
Rotating vanes for air	FVAD 15 Sxxx, FVAD 15 MA1	X*	X*	X**	X
Differential pressure for Pitot tube	FDA 602 S1K, FDA 602 S6K	Range	X*	X**	X
Thermo-anemometer probe	FVAD 35 THxx	X*	X*	X**	X
Thermo-electric flow sensor	FVA 605 TAxx	X*	X*	X**	X
* An average value channel is not possible with flow measurement; (no start of continuous or cyclic measuring)					
** Smoothing is possible for 1 measuring channel					
<b>Pressure</b>					
Pressure transducer for liquid and gaseous media	FDA 602 Lxx	X	X	X	X
Temp.-compensated pressure transducer	FD 8214	X	X	X	X
Differential transmitter	FDA 602 D	X	X	X	X
Digital pressure sensor	FDAD 33, FDAD 35M	X	X	X	X
Pressure transducer, for wall mounting	FD 8612 DPS / APS / DPT	X	X	X	X
Barometric pressure	FDA 612 SA	Range	X	X	X
Barometric pressure, digital	FDAD 12 SA	X	X	X	X
Plug-in probe for differential pressure	FDA6 12 SR, FDA 602 SxK	Range	X	X	X
<b>Force</b>					
Push / pull force	FKA xxx	X*	X*	X*	X
* Only temporary zero-setting is possible; (no final value adjustment)					
<b>Tachometer</b>					
Tachometer	FUA 9192	X	X	X	X

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## Measuring ranges, ALMEMO® 2450, 2490, 2470, 2590A series

	ALMEMO® series Precision class Type	2450 C	2490 B	2470 A	2590A A
<b>Sensor type / Measuring range</b>					
<b>Displacement</b>					
Displacement transducer, potentiometric	FWA xxx T	X*	X*	X*	X
Displacement gauge, potentiometric	FWA xxx TR	X*	X*	X*	X
* Only temporary zero-setting is possible; (no final value adjustment)					
<b>Flow</b>					
Axial turbine flowmeter for liquids	FVA 915 VTHxxx	X	X	X	X
Flow sensor with temperature	FVA 645 GVx	X	X	X	X
<b>Electrical variables</b>					
Split-core-type transformer for AC current	FEA 6042, FEA 604 MN, FEA 6044 N	X X	X X	X X	X X
<b>ALMEMO® measuring modules for</b>					
DC voltage, DC	ZA 9900 ABx, ZA 9901 ABx,	X	X	X	X
AC voltage, AC	ZA 9903 ABx, ZA 9904 ABx	X	X	X	X
<b>Meteorology</b>					
Meteo Multi (2 plugs)	FMA 510, FMA 510H	Function	X	X	X
Wind velocity sensor	FVA 615-2	X	X	X	X
Wind direction sensor	FVA 614	X	X	X	X
Rainfall and precipitation sensor	FRA 916, FRA 916 H	Function	Function	X*	X
Rainfall detector	FRA 616 D	X	X	X	X
Radiation probe head	FLA 613 x	X	X	X	X
Star pyranometer	FLA 628 S	X	X	X	X
* for ALMEMO® 2470-2 - function missing					
<b>Indoor climate and air conditioning</b>					
Globe thermometer	FPA 805 GTS	Range	X	X	X
<b>Optical radiation</b>					
Radiation sensor	FLA 603 x	X	X	X	X
Radiation sensor	FLA 613 x	X	X	X	X
Radiation sensor	FLA 623 x	X	X	X	X
Digital color temperature sensor	FLAD 23 CCTx	X	X	X	X
<b>Water analysis</b>					
pH One-Bar Measuring Chain	FY 96 PH x	Adjustment	X	X	X
Redox-One-Bar Measuring Chain	FY 96 RXEK	Adjustment	X	X	X
Conductivity probe	FYA 641 LF xxx	Range	X	X	X
Oxygen sensor	FYA 640 O2	Adjustment	X	X	X
<b>Gas concentrations in air</b>					
Digital carbon dioxide sensor, hand-held	FYAD 00 CO2	X	X	X	X
Carbon dioxide probe	FYA 600 CO2	Range	X	X	X
Carbon monoxide probe	FYA 600 CO	X	X	X	X
Oxygen probe	FYA 600 O2	Adjustment	X	X	X
Ozone measuring transducer	FYA 600 O3	X	X	X	X
Gas probes	FYA 600 Ax	X	X	X	X
<b>Infra-red temperature measurement</b>					
ALMEMO® infra-red probe head	FIA 844	X	X	X	X
Infra-red probe	MR 7838, MR 7842	X	X	X	X
Hand-held IR device	MR 781420 SB	X	X	X	X
Digital IR sensor	FIAD 43	X*	X*	X*	X
* Emissivity cannot be modified					

### Prerequisites missing for perfect functioning

- **Range:** Measuring range missing or restricted -> Measured value cannot be shown.
- **Function:** Function missing for showing sensor-specific measured data (e.g. average value / cycle) or for necessary programming
- **Adjustment:** Measured value adjustment of this sensor is not possible (pressure, force, displacement, O2, pH, conductivity)

# ALMEMO® Measuring Instruments

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## ALMEMO® 2450



**Compact ALMEMO®  
measuring instrument  
1 measuring input,  
over 35 measuring ranges**

### Technical data and functions Serie ALMEMO® 2450

- Generously dimensioned 2-row segment display including units
- Easy and convenient to operate by means of 7 keys.
- Over 35 measuring ranges for
  - Thermocouple and NTC sensors  
For the customer's own sensors ready-to-use ALMEMO® connectors are available. (see chapter 07)
  - Atmospheric humidity sensor, capacitive, dewpoint sensor, water detection probe, moisture in wood FHA636MF (see chapter 13)
  - Pressure transducer FDA602L/D, FD8214, FD8612, Tachometer, turbine flowmeter (see chapter 10)
  - Current clamps FEA604, Voltage / current measuring modules ZA990xAB (see chapter XREF)
- Meteorological radiation probe heads FLA613 (see chapter XREF)
- Carbon dioxide sensor FYAD00CO2, Carbon monoxide probe and ozone probe (see chapter 15),
- ALMEMO® plugs with multi-point adjustment are supported.
- Measuring functions  
Measured value, zero-setting, saving of maximum / minimum values, hold function
- Test functions  
Segment monitoring, range monitoring, sensor breakage indication, battery voltage check and display.

### Technical data, ALMEMO® 2450 series

Measuring input	1 ALMEMO® socket	digital	
Precision class	C (see page 01.05)	Resolution	(see page 01.06 / 01.07)
Measuring rate	2.5 mops	Linearization accuracy	(see page 01.06 / 01.07)
Measuring ranges (see 01.06 / 01.07)	NiCr-Ni(K), NiCrSi-NiSi(N), Fe-CuNi(L), Cu-CuNi(U), Cu-CuNi(T), PtRh10-Pt(S), Fe-CuNi(J), NTC Voltage Current Humidity, capacitive Dew point, mixture ratio, partial vapor pressure, enthalpy, rotating vanes, digital process (0 / 100 %), frequency, pulse, rotational speed,	Standard equipment LCD 7 segments 16 segments Keypad Power supply Battery set Current consumption Housing Operating temperature Atmospheric humidity (ambient)	Measured value 5 characters, 15 mm Function 4½ characters, 9 mm Units 2 characters, 9 mm 9 symbols 7 silicone keys 3 AA alkaline batteries approx. 10 mA without input modules 127 x 83 x 42 mm (LxWxH) -10 to +60 °C 10 to 90 % RH (non-condensing)

### ALMEMO® 2450 series, accessories

#### Order no.

Rubberized impact protection, gray	ZB2490GS2	Magnetic fastening	ZB2490MH
DIN rail mounting	ZB2490HS	Instrument case	ZB2490TK2



DIN rail mounting



Rubberized protection



Magnetic fastening

## ALMEMO® 2450-1



**Compact measuring instrument with interface. Runs in battery mode or via mains unit**

### Technical data and functions

- Technical data and functions, as for ALMEMO® 2450 series
- 2 ALMEMO® output sockets, suitable for all interface cables, network cables, trigger / relay cables
- Complete sensor and device programming via interface
- ALMEMO® DC socket for mains adapter.

### Technical data

Technical data, as for ALMEMO® 2450 series

Sensor power supply	9 V, maximum 0.5 A
Option U	9 V, maximum 70 mA
Power supply	10 to 30 VDC not electr. isolated
Mains adapter	ZA1312NA7 230 VAC to 12 VDC, 1 A
Outputs	2 ALMEMO® sockets, suitable for all interface cables
with option OA2450I only	Internal RS485 interface, electrically isolated, via DC socket

### Accessories

### Order no.

Mains adapter 12 V, 1 A, with ALMEMO® plug	ZA1312NA7
DC adapter cable	
10 to 30 VDC, 12 V / 0.25 A, electrically isolated	ZA2690UK

### Connecting cables

USB data cable, electrically isolated	ZA1919DKU
Ethernet data cable, electrically isolated	ZA1945DK
Analog output cable, -1.25 to +2.0 V, 0.1 mV / digit	ZA1601RK
V24 data cable, electrically isolated	ZA1909DK5
Network technology, Bluetooth modules (see chapter „Networking“)	

### Option

### Order no.

Power supply, electrically isolated, 10 to 30 VDC, 80 mA including ALMEMO® plug for DC socket	OA2450U
RS485 interface, internal including ALMEMO® DC socket option	OA2450I
Analog outputs (socket P0), electrically isolated, integrated internally (see page 01.05) ALMEMO® transmitter	
Measuring instrument IP54 (if water-proof plugs are used)	OA2450W

### Standard delivery

### Order no.

Batteries, operating instructions, manufacturer's test certificate	
<b>Compact measuring instrument ALMEMO® 2450-1</b>	
	<b>MA2450I</b>

## ALMEMO® 2450-1L



**Compact measuring instrument with interface. Runs in battery mode**

### Technical data and functions

- Technical data and functions, as for ALMEMO® 2450 series

### Technical data

Technical data as for ALMEMO® 2450 series

Sensor power supply	9 V, maximum 0.5 A
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### Option

### Order no.

Measuring instrument IP54 (if water-proof plugs are used)	OA2450W
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### Standard delivery

### Order no.

Batteries, operating instructions, manufacturer's test certificate	
<b>Compact measuring instrument ALMEMO® 2450-1L</b>	
	<b>MA24501L</b>

DAkkS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“).

DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

# ALMEMO® Measuring Instruments

## ALMEMO® 2490



### ALMEMO® basic measuring instrument

Ideal for all sorts of application,  
quick and easy to operate  
1 or 2 measuring inputs,  
over 65 measuring ranges

## Technical data and functions ALMEMO® 2490 series

- Generously dimensioned 2-row static 7 / 16 segment display including units
- Easy and convenient to operate by means of 7 keys
- Over 65 standard measuring ranges
- Memory sufficient for 100 measured values, can be called up and viewed in the display
- Good measuring accuracy, measuring rate up to 10 measuring operations per second (mops)
- Support for ALMEMO® plugs with multi-point adjustment, special linearization, and special measuring ranges
- Measuring functions  
Measured value, zero-setting, sensor adjustment, saving of maximum / minimum values, memory for 100 values, cold junction compensation, and temperature compensation
- Test functions  
Segment monitoring, range monitoring, sensor breakage indication, battery voltage check and display

## Technical data ALMEMO® 2490 series

Precision class	B (see page 01.05)	Standard equipment	
Measuring rate	2.5 / 10 measuring operations per second	LCD 7 segments	Measured value 5 characters, 15 mm
Measuring ranges		16 segments	Function 4½ characters, 9 mm
as on page XREF - but			Units 2 characters, 9 mm
Milliamperes DC	-26 to +26 mA	Keypad	9 symbols
Battery set	3 AA alkaline batteries		7 silicone keys
Current consumption	approx. 20 mA without input modules	Housing	ABS (maximum 70 °C)
			127 x 83 x 42 mm (LxWxH)

## ALMEMO® 2490 series, accessories

### Order no.

DIN rail mounting	ZB2490HS	Magnetic fastening	ZB2490MH
Rubberized impact protection, green	ZB2490GS1	Instrument case	ZB2490TK2



DIN rail mounting



Rubberized protection



Magnetic fastening



## ALMEMO® 2490-1 / -2



ALMEMO® 2490-1



ALMEMO® 2490-2

**Basic measuring instrument with interface**  
**Runs in battery mode or via mains unit**

### Technical data and functions

- Technical data and functions, as for ALMEMO® 2490 series
- 2 ALMEMO® output sockets, suitable for all interface cables, network cables, trigger / relay cables
- Complete sensor and device programming via interface
- ALMEMO® DC socket for mains adapter.

### Technical data

Technical data, as for ALMEMO® 2490 series

Measuring input	
2490-1	1 ALMEMO® input socket
2490-2	2 ALMEMO® input sockets, el. isol., with semicond. relays (50V)
Additional channels	4 function channels, device-internal
Sensor power supply	9 V, maximum 0.5 A
Option U	9 V, maximum 70 mA
Power supply	10 to 30 VDC not electr. isolated
Mains adapter	ZA1312NA7 230 VAC to 12 VDC, 1 A
Outputs	2 ALMEMO® sockets, suitable for all interface cables
with option OA2490I only	RS485 interfac

### Accessories

Accessories	Order no.
Mains adapter 12 V, 1 A, with ALMEMO® plug	ZA1312NA7
DC adapter cable	
10 to 30 VDC, 12 V / 0.25 A, electrically isolated	ZA2690UK

### Connecting cables

USB data cable, electrically isolated	ZA1919DKU
Ethernet data cable, electrically isolated	ZA1945DK
Analog output cable, -1.25 to +2.0 V, 0.1 mV / digit	ZA1601RK
V24 data cable, electrically isolated.	ZA1909DK5
Network technology, Bluetooth modules (see chapter „Networking“)	

### Option

Option	Order no.
Power supply, electrically isolated, 10 to 30 VDC, 80 mA including ALMEMO® plug for DC socket	OA2490U
RS485 interface, internal, including option U	OA2490I
Analog outputs, electrically isolated, integrated internally (see page 01.50) ALMEMO® transmitter	
Measuring instrument IP54 (if water-proof plugs are used)	OA2490W

### Standard delivery

Standard delivery	Order no.
Batteries, operating instructions, manufacturer's test certificate	
Basic measuring instrument ALMEMO® 2490-1	MA24901
Basic measuring instrument ALMEMO® 2490-2	MA24902

## ALMEMO® 2490-1L / -2L



ALMEMO® 2490-1L



ALMEMO® 2490-2L

**Basic measuring instrument**  
**Runs in battery mode**

### Technical data and functions

- Technical data and functions, as for ALMEMO® 2490 series

### Technical data

Technical data, as for ALMEMO® 2490 series

Measuring inputs	
2490-1L	1 ALMEMO® input socket
2490-2L	2 ALMEMO® input sockets, el. isol., with semicond. relays (50 V)
Sensor power supply	9 V, maximum 0.5 A
Outputs	None

### Option

Option	Order no.
Measuring instrument IP54 (if water-proof plugs are used)	OA2490W

### Standard delivery

Standard delivery	Order no.
Batteries, operating instructions, manufacturer's test certificate	
Basic measuring instrument ALMEMO® 2490-1L	MA24901L
Basic measuring instrument ALMEMO® 2490-2L	MA24902L

DAkkS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“).  
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

# ALMEMO® Measuring Instruments

## ALMEMO® 2470



**ALMEMO® professional measuring instrument with data logger function**

**Functions for all application areas, 1 or 2 measuring inputs**

**Also with integrated sensor for temperature, atmospheric humidity, atmospheric pressure**

## Technical data and functions, ALMEMO® 2470 series

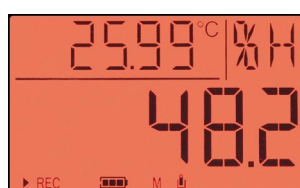
- **new** Segmented color display with bright, white illumination
  - Clear and easy-to-understand display of programming and measured values in 5 different colors and alarm display on a red background
  - **new** In the event of a limit value being overshoot / undershot various freely configurable alarm messages are available, namely acoustic signal, visual LED signal, alarm display on a red background.
  - **new** With the 2470-1S /-2S these alarm messages are also configurable for long-term recording; in sleep mode the messages remain active and the most recent measured value is displayed continuously.
- Good measuring accuracy, measuring rate up to 10 measuring operations per second (mops)
- More than 65 standard measuring ranges
  - Support for ALMEMO® plugs with multi-point adjustment, special linearization, and special measuring ranges
  - Easy and convenient to operate by means of 7 keys, with configurable locking for keys and functions
  - Measuring functions : Maximum and minimum values, measured value smoothing, zero-setting, sensor adjustment
  - Programming functions : Limit values, sensor correction with base value and factor
  - All ALMEMO® functions programmable via interface
  - Modern, compact housing (IP54 option)

## Technical data, ALMEMO® 2470 series

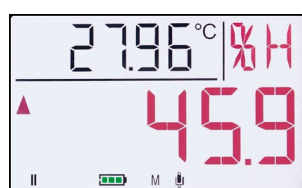
Precision class	A (see page 01.05)	Power supply	1 ALMEMO® DC socket
Measuring rate	2.5 / 10 measuring operations per second	Mains adapter	ZA1312NA7 230 VAC to 12 VDC, 1A, electrically isolated
Sensor power supply	Battery mode Sensor voltage 6 V, 400 mA 9 V, 300 mA and 12 V, 200 mA	DC adapter cable, el. isol.	ZA2690UK 10 to 30 V, 0.25 A
With mains adapter	12 V, 400 mA	Current consumption (without input and output modules)	
Standard equipment		Active without illumination	approx. 12 mA
Display	16 segments Measured value 5 characters, 15 mm Units 2 characters, 9 mm	Active with illumination	approx. 30 mA
	7 segments Function 4½ characters, 9 mm	Sleep mode	approx. 60 µA
Keypad	21 symbols, Illumination 2 RGB LEDs 7 silicone keys	Housing	127 x 83 x 42 mm (LxWxH) ABS (maximum 70 °C), 290g

## ALMEMO® 2470 series, accessories

Rubberized impact protection, gray	ZB2490GS2	DC cable 10 to 30 V, 12 V / 0.25 A, electr. isol.	ZA2690UK
Instrument case	ZB2490TK2	DIN rail mounting	ZB2490HS
Mains adapter 12 V / 1 A	ZA1312NA7	Magnetic fastening	ZB2490MH



Automatic alarm (red background). Display shows incorrect measured value



Dual display  
1. Humidity Measured value overshoots limit value (red).  
2. Temperature



1. Measured value is inside limit values (green).  
2. Peak value MAX overshoots limit value (red)



Programming of  
1. Save-to-memory cycle  
2. Sleep mode

## ALMEMO® 2470-1S



**Professional measuring instrument,  
1 measuring input  
Data logger with integrated memory**

### Technical data and functions

- Technical data and functions as for ALMEMO® 2470 series
- Data logger functions: Internal EEPROM, memory cycle, real-time clock
- Long-term recording in sleep mode with AA batteries
- Operating time up to 1.5 years with memory cycle of 15 minutes and temperature / humidity sensor..

### Technical data

Measuring inputs	1 ALMEMO® input socket
Outputs	ALMEMO® DC socket for mains adapter or USB cable with supply ZA 1919 DKU5
Memory, internal	EEPROM sufficient for 100,000 measured values
Date and time-of-day	Real-time clock, buffered by device battery
Power supply	3 AA batteries

### Connecting cable

USB data cable with 5-V power supply

### Order no.

**ZA1919DKU5**

### Option

Measuring instrument IP54  
(if water-proof plugs / sensors are used)

### Order no.

**OA2470W**

### Standard delivery

Batteries, operating instructions, manufacturer's test certificate  
**Professional measuring instrument ALMEMO® 2470-1S**  
**MA24701S**

### Order no.

## ALMEMO® 2470-1SRH



**Professional measuring instrument,  
1 measuring input, Data logger with integrated  
memory, Integrated sensor for temperature,  
atmospheric humidity, atmospheric pressure**

### Technical data and functions

- Technical data and functions, as for ALMEMO® 2470 series
- Data logger functions
- Internal EEPROM, memory cycle, real-time clock
- Long-term recording in sleep mode with AA batteries
- Operating time up to 1.5 years with memory cycle of 15 minutes and temperature / humidity sensor.

### Technical data

Measuring inputs	1 ALMEMO® input socket
Outputs	ALMEMO® DC socket for mains adapter or USB cable with supply ZA 1919 DKU5
Memory, internal	EEPROM sufficient for 100,000 measured values
Date and time-of-day	Real-time clock, buffered by device battery
Power supply	3 AA batteries

Digital atmospheric pressure sensor, integrated in the measuring instrument  
Measuring range 700 to 1100 mbar  
Accuracy  $\pm 2.5$  mbar (at 0 to 65 °C)

Digital sensor for measuring temperature / atmospheric humidity  
FH0D 462 plugged in on the measuring instrument

General description and other technical data (see chapter „Atmospheric humidity“)

### Connecting cable

USB data cable with 5-V power supply

### Order no.

**ZA1919DKU5**

### Option

Measuring instrument IP54  
(if water-proof plugs / sensors are used)

### Order no.

**OA2470W**

### Standard delivery

Batteries, digital plug-in sensor for temperature / atmospheric humidity, operating instructions, manufacturer's test certificate  
**Professional meas. instrument ALMEMO® 2470-1SRH**  
**MA24701SRH**

### Order no.

## ALMEMO® 2470-2



**Professional measuring instrument,  
2 measuring inputs**

### Technical data and functions

- Technical data and functions, as for ALMEMO® 2470 series
- Power supply, 3 AA rechargeable NiMH batteries, with charging via the device itself.

### Technical data

Measuring inputs	2 ALMEMO® input sockets el. isol., with semicond. relays (50 V)
Additional channels	4 channels, device-internal (e.g. difference)
Outputs	ALMEMO® sockets A1 and A2, suitable for all output modules (analog, data, trigger, relay cables, etc.) (see chapter „Networking“)
Individual value memory	99 individual measured values
Power supply	3 AA rechargeable NiMH batteries Integrated charge circuitry

### Connecting cables

	Order no.
USB data cable, electrically isolated	<b>ZA1919DKU</b>
USB data cable with 5-V power supply	<b>ZA1919DKU5</b>
V24 data cable, electrically isolated	<b>ZA1909DK5</b>
Ethernet data cable, electrically isolated	<b>ZA1945DK</b>
Analog output cable, -1.25 to +2.0 V, 0.1 mV / digit	<b>ZA1601RK</b>
Trigger and relay cable (2 relays, 500 mA, 50 V)	<b>ZA1006EKG</b>
Network technology, Bluetooth modules (see chapter „Networking“)	

### Option

	Order no.
Measuring instrument IP54 (if water-proof plugs / sensors are used)	<b>OA2470W</b>

### Standard delivery

	Order no.
Rechargeable batteries, operating instructions, manufacturer's test certificate, carry case, mains unit	
<b>Professional measuring instrument ALMEMO® 2470-2</b>	<b>MA24702KN</b>

## ALMEMO® 2470-2S



**Professional measuring instrument,  
2 measuring inputs,  
Data logger with internal memory**

### Technical data and functions

- Technical data and functions, as for ALMEMO® 2470 series
- Power supply, 3 AA rechargeable NiMH batteries, with charging via the device itself
- Data logger functions: Internal EEPROM or external memory connector (accessory), memory cycle, real-time clock
- Long-term recording in sleep mode, internal memory, AA rechargeable NiMH batteries. Operating time up to 1 year with memory cycle of 15 minutes and temperature / humidity sensor.

### Technical data

Measuring inputs	2 ALMEMO® input sockets el. isol., with semicond. relays (50 V)
Additional channels	4 channels, device-internal (e.g. difference)
Outputs	ALMEMO® sockets A1 and A2, suitable for all output modules (analog, data, trigger, relay cables, etc.) (see chapter „Networking“)
Memory, internal EEPROM	sufficient for 100,000 measured values
Date and time-of-day	Real-time clock, buffered by device battery
Power supply	3 AA rechargeable NiMH batteries Integrated charge circuitry

### Accessories

	Order no.
Memory connector with micro SD card	<b>ZA1904SD</b>

### Connecting cables

	Order no.
USB data cable, electrically isolated	<b>ZA1919DKU</b>
USB data cable with 5-V power supply	<b>ZA1919DKU5</b>
V24 data cable, electrically isolated	<b>ZA1909DK5</b>
Ethernet data cable, electrically isolated	<b>ZA1945DK</b>
Analog output cable, -1.25 to +2.0 V, 0.1 mV / digit	<b>ZA1601RK</b>
Trigger and relay cable (2 relays, 500 mA, 50 V)	<b>ZA1006EKG</b>
Network technology, Bluetooth modules (see chapter „Networking“)	

### Option

	Order no.
Measuring instrument IP54 (if water-proof plugs / sensors are used)	<b>OA2470W</b>

### Standard delivery

	Order no.
Rechargeable batteries, operating instructions, manufacturer's test certificate, carry case, mains unit	
<b>Professional measuring instrument ALMEMO® 2470-2S</b>	<b>MA24702SKN</b>

DAkKS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“).  
DAkKS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.



## ALMEMO® 2590A



**ALMEMO® professional measuring instrument with data logger function,**  
**Comprehensive range of functions for all application areas,**  
**Graphics display for showing measured values and programming,**  
**2 or 4 measuring inputs**

## Technical data and functions, ALMEMO® 2590A series

- New variant, further developed
- Good measuring accuracy, measuring rate up to 10 measuring operations per second (mops)
- Over 65 standard measuring ranges
- Support for ALMEMO® plugs with multi-point adjustment, special linearization, and special measuring ranges
- Graphics display with white illumination, easy and convenient operation by means of 4 soft-keys and cursor block
- Clear and easy-to-understand menu system
- 3 measuring menus (1 menu can be freely configured by user from a range of 50 functions), measured values displayed numerically, 1 to 12 measured values can be displayed in two sizes or graphically in bar chart form.
- Intelligent sensor readings with sensor-specific functions  
Cold junction compensation, temperature compensation, and atmospheric pressure compensation
- Measuring functions  
Measured value, zero-setting, setpoint adjustment
- Function menus  
Maximum value, minimum value, memory sufficient for 99 measured values, average value over time / individual values / measuring points, smoothing, volume flow with center point measuring, two-point adjustment, scaling, data logger with configuration menus
- Option VN  
Volume flow determined from matrix measuring as per DIN EN 12599
- Programming menus for clear and easy-to-understand sensor programming, range, units, designation, right through to special functions, configuration of device parameters and of output modules
- Choice of languages : German, English, French (other options also available)
- 2 ALMEMO® output sockets, suitable for digital interfaces, analog output, trigger input, alarm contacts, memory card
- External memory connector with micro SD can simply be plugged in.
- Sleep mode for long-term recording

## Technical data ALMEMO® 2590A series

Precision class	A (see page 01.05)	Power supply	
Measuring rate	2.5 / 10 measuring operations per second	Battery set	3 AA alkaline batteries
Additional channels	4 function channels, device-internal	Mains adapter	ZA1312NA7
Sensor power supply	6 / 9 / 12 V, maximum 0.5 A		230 VAC to 12 VDC, 1 A electrically isolated
Outputs	2 ALMEMO® sockets, suitable for all output modules (analog / data / trigger / relay cables, memory, etc.)	DC adapter cable, electrically isolated	ZA2690-UK 10 to 30 V, 0.25 A
Standard equipment		Current consumption (without input and output modules)	
Display	Graphics display, 128 x 64 pixels, 8 rows Illumination 2 white LEDs	Active mode	approx. 12mA
Keypad	7 silicone keys (of which 4 soft-keys)	With illumination	approx. 32 mA
Date and time-of-day	Real-time clock, buffered by battery	Sleep mode	approx. 0.05 mA
		Housing	127 x 83 x 42 mm (LxWxH) ABS (maximum 70 °C) 290 g



## Serie ALMEMO® 2590A

### Accessories

Memory connector with micro SD (see page 06.02)  
 Mains adapter 12 V / 1 A  
 DC adapter cable, 10 to 30 VDC, 12 V / 0.25 A, electrically isolated  
 Rubberized impact protection, green  
 Magnetic fastening  
 DIN rail mounting  
 Instrument case  
 Network technology, Bluetooth modules (see chapter „Networking“)

### Order no.

ZA1904SD  
 ZA1312NA7  
 ZA2690UK  
 ZB2490GS1  
 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



# ALMEMO® Measuring Instruments

## ALMEMO® 2590-2A



**Professional measuring instrument, 2 measuring inputs, Data logger with external memory connector (accessory)**

### Technical data and functions

- Technical data and functions as for ALMEMO® 2590A series

### Technical data

Technical data as for ALMEMO® 2590A series

Measuring inputs 2 ALMEMO® input sockets, el. isol., with semicond. relays (50V)

### Option

### Order no.

Volume flow determined from matrix measuring as per DIN EN 12599  
Temperature ranges for 8 refrigerants  
Measuring instrument IP54  
(if water-proof plugs are used)

**OA2590VN**

**SB0000R2**

**OA2590W**

### Standard delivery

### Order no.

Measuring instrument, batteries, operating instructions, manufacturer's test certificate

**Professional measuring instrument ALMEMO® 2590-2A**

**MA25902A**

## ALMEMO® 2590-4AS



**Professional measuring instrument, 4 measuring inputs, Data logger with internal memory or external memory connector**

### Technical data and functions

- Technical data and functions, as for ALMEMO® 2590A series
- Internal EEPROM sufficient for 100 000 measured values, configurable as linear or ring memory

### Technical data

Technical data as for Serie ALMEMO® 2590A series

Measuring inputs 4 ALMEMO® input sockets, el. isol., with semicond. relays (50V)

Memory, internal EEPROM sufficient for 100,000 measured values

### Option

### Order no.

Volume flow determined from matrix measuring as per DIN EN 12599  
Temperature ranges for 8 refrigerants  
Measuring instrument IP54  
(if water-proof plugs are used))

**OA2590VN**

**SB0000R2**

**OA2590W**

### Standard delivery

### Order no.

Measuring instrument, batteries, operating instructions, manufacturer's test certificate.

**Professional measuring instrument ALMEMO® 2590-4AS**

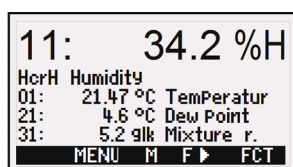
**MA25904AS**

Measuring instrument, batteries, rubberized impact protection ZB2490GS1, Mains unit ZA1312NA7, USB data cable ZA1919DKU, Case ZB2490TK2, Operating instructions, manufacturer's test certificate

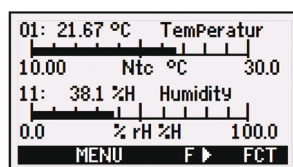
**Professional measuring instrument ALMEMO® 2590-4AS Case set MA25904ASKSU**

DAkKS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“).

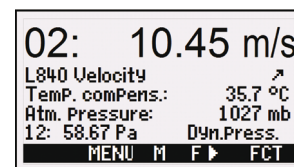
DAkKS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.



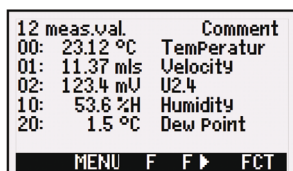
Humidity reading with further humidity variables, e.g. temperature, dew point, mixture ratio



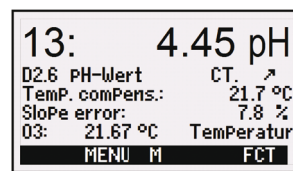
Temperature / humidity display in bar chart form



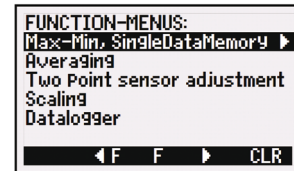
Flow reading, measured value with automatic temperature compensation and atmospheric pressure compensation



Overview of all sensors connected



pH reading, measured value with automatic temperature compensation



Function menus

# ALMEMO® Measuring Instruments

## ALMEMO® 2690-8A



**ALMEMO® precision measuring instrument with data logger function. Comprehensive range of functions for all application areas. Increased measuring accuracy, fast measuring rate. Generously dimensioned graphics display, bright illumination, 5 measuring inputs. Runs on rechargeable batteries, charging via the device itself**

## Technical data and functions ALMEMO® 2690-8A

- Increased measuring accuracy and stability
- Fast measuring rate, up to 50 measuring operations per second  
With SD memory card, up to 100 mops, optional for 1 channel up to 500 mops
- 5 measuring inputs, electrically isolated
- Integrated atmospheric pressure sensor, for automatic pressure compensation, inter alia for Pitot tube flow measurement and humidity variables
- Over 65 standard measuring ranges
- Support for ALMEMO® plugs with multi-point adjustment, special linearization, and special measuring ranges
- Option KL for independent multi-point adjustment or special linearization programmable in 30 points and management of calibration data saved in the sensor connector and the measuring instrument
- Option GT for higher measuring quality thanks to electrical isolation between measuring inputs and device power supply (device ground)
- Improved cold junction compensation with 2 sensors
- Data logger with internal EEPROM, sufficient for 200,000 measured values, configurable as linear or ring memory
- Memory connector with micro SD (accessory)
- Sleep mode for long-term recording
- Generously dimensioned graphics display, bright illumination, large display of measured values
- Measured values can be displayed graphically in line chart or bar chart form or numerically in various sizes.
- 3 user-defined menus can be freely configured from a range of 50 functions.
- Easy to operate by means of 4 soft-keys and cursor block, menu-guided with wizards and context-sensitive help windows
- Choice of languages : German, English, French (other options also available)
- 2 ALMEMO® output sockets, suitable for digital interfaces, analog output, trigger input, alarm contacts, memory card
- Runs on rechargeable batteries (standard), high-speed charging in the device itself using the mains unit, included in delivery
- Modern housing with rubberized impact protection and folding stand, splash-proof

## Technical data

Precision class	AA (see page 01.05)	Keypad	9 tactile silicone keys (4 soft-keys)
Measuring rate	2.5 / 10 / 50 / 100 mops	Memory	EEPROM sufficient for 200,000 measured values
Measuring inputs	5 ALMEMO® input sockets	Date and time-of-day	Real-time clock, buffered with battery
Electrical isolation	with semiconductor relay?*(50 V) for analog sensors	Power supply	
Option GT	Additional electrical isolation between measuring inputs and power supply (device ground)	Rechargeable battery/ies	3 AA batteries NiMH or alkaline integrated, high-speed charging (2.5 hours)
Additional channels	4 function channels, device-internal	Mains adapter	ZA1312NA7 230 VAC to 12 VDC, 1 A electrically isolated
Sensor power supply		DC adapter cable	electrically isolated ZA2690-UK2 10 to 30 V, 1 A
Rechargeable battery/ies	6 / 9 / 12 V, maximum 0.5 A	Current consumption (without input and output modules)	
Mains adapter	12 V, maximum 0.5 A	Active mode	approx. 17 mA
<b>new:</b> Atmospheric pressure sensor Integrated		With illumination	approx. 25 to 140 mA
Measuring range	700 to 1100 mbar	Sleep mode	approx. 0.05 mA
Accuracy	±2.5 mbar (at 0 to 65 °C)	Housing	209 x 107 x 54 mm (LxWxH) ABS (maximum +70 °C), 570 g
Outputs	2 ALMEMO® sockets, suitable for all output modules (analog / data / trigger / relay cables, memory, etc.)	Protective class	IP54 (if water-proof plugs / sensors are used)
Graphics display	128 x 128 pixels, 16 rows		
Illumination	5 white LEDs, 3 brightness levels		

## ALMEMO® 2690-8A



**Precision measuring instrument, 5 measuring inputs**  
**Data logger with internal memory or external memory connector (accessory)**

### Accessories

### Order no.

Memory connector with micro SD, including USB card reader (see chapter „General accessories“)  
 DC adapter cable, 10 to 30 VDC, 12 V / 1 A, electrically isolated  
 Generously dimensioned carry case, aluminum profile frame / ABS

**ZA1904SD**  
**ZA2690UK2**  
**ZB2590TK2**

### Connecting cables

### Order no.

Ethernet data cable, electrically isolated **ZA1945DK** Trigger and alarm cable (2 relays, 0.5 A, 50 V) **ZA1006EKG**  
 Analog output cable, -1.25 to +2.0 V, 0.1 mV / digit **ZA1601RK** Network technology, Bluetooth modules (see chapter „Networking“)

### Options

### Order no.

Measuring module electrically isolated  
 Multi-point adjustment, special linearization, management of calibration data  
 Temperature ranges for 8 refrigerants  
 Measuring rate 500 mops (SD card required)  
 DIN rail mounting

**OA2690GT**  
**OA2690KL**  
**SB0000R2**  
**SA0000Q5**  
**OA2290HS**

### Standard delivery

### Order no.

3 rechargeable NiMH batteries, rubberized protection, desktop mains unit ZA1312NA7, USB data cable ZA1919DKU,  
 Case ZB2490TK2, Operating instructions, manufacturer's test certificate

**Precision measuring instrument ALMEMO® 2690-8A in case set**

**MA26908AKSU**

as above but with RS232 data cable ZA1909DK5

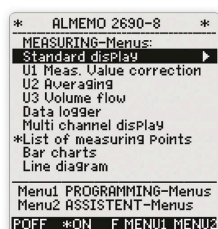
**Precision measuring instrument ALMEMO® 2690-8A in case set**

**MA26908AKS**

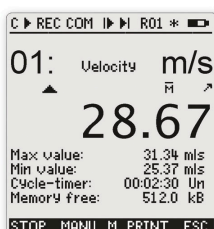
DakKS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“).

DakKS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

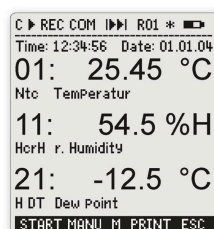
## Operating concept as for precision measuring instruments ALMEMO® 2690, 2890 und 5690 / 5790



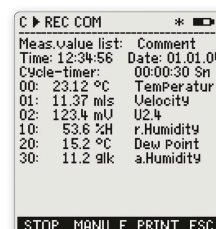
Menu selection



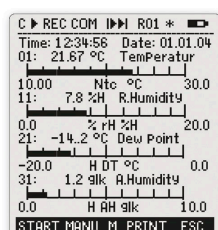
Standard display



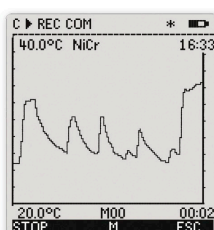
Multi-channel display



Measuring points list



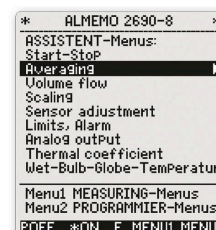
Bar chart



Line diagram



Programming menu



Assistant menu



# ALMEMO® Measuring Instruments

## ALMEMO® 2890-9



**ALMEMO® precision measuring instrument with data logger function. Comprehensive range of functions for all application areas. Increased measuring accuracy, fast measuring rate. Generously dimensioned graphics display, bright illumination. 9 measuring inputs Runs on rechargeable batteries, charging via the device itself**

06/2014 • We reserve the right to make technical changes.

## Technical data and functions

- Increased measuring accuracy and stability
- Fast measuring rate, up to 50 measuring operations per second  
With SD memory card, up to 100 mops, optional for 1 channel up to 400 mops
- 9 measuring inputs, electrically isolated
- Over 65 standard measuring ranges
- Support for ALMEMO® plugs with multi-point adjustment, special linearization, and special measuring ranges
- Option KL for independent multi-point adjustment or special linearization programmable in 30 points and management of calibration data saved in the sensor connector and the measuring instrument
- Higher measuring quality thanks to electrical isolation between measuring inputs and device power supply (device ground)
- Improved cold junction compensation with 2 sensors
- Data logger with internal EEPROM, sufficient for 100,000 measured values, configurable as linear or ring memory
- Memory connector with micro SD (accessory)
- Sleep mode for long-term recording
- Generously dimensioned graphics display, bright illumination, large display of measured values
- Measured values can be displayed graphically in line chart or bar chart form or numerically in various sizes.
- 3 user-defined menus can be freely configured from a range of 50 functions.
- Easy to operate by means of 4 soft-keys and cursor block, menu-guided with wizards and context-sensitive help windows
- Additional thumb-wheel for extra cursor speed
- Choice of languages : German, English, French (other options also available)
- 2 ALMEMO® output sockets, suitable for digital interfaces, analog output, trigger input, alarm contacts, memory card
- Runs on rechargeable batteries (as standard), high-speed charging in the device itself using mains unit, included in delivery

## Technical data

Precision class	AA (see page 01.05)	Keypad	9 membrane keys (4 soft-keys), thumb-wheel
Measuring rate	2.5 / 10 / 50 / 100 mops (measuring operations per second)	Memory, EEPROM	sufficient for 100,000 measured values
Measuring inputs	9 ALMEMO® input sockets	Date and time-of-day	Real-time clock, buffered with battery
Electrical isolation for analog sensors	with semiconductor relays (50 V) Additional electrical isolation between measuring inputs and power supply (device ground)	Power supply	
Additional channels	4 function channels, device-internal	Rechargeable battery pack	6 rechargeable NiMH batteries, 1600 mA Integrated high-speed charging (2.5 h)
Sensor power supply		Mains adapter	ZB1112NA7 230 VAC to 12 VDC, 1 A electrically isolated
Rechargeable battery/ies	9 or 12 V, maximum 0.5 A	DC adapter cable	electrically isolated ZB2590-UK 10 to 30 V, 1 A
Mains adapter	12 V, maximum 0.3 A	Current consumption (without input and output modules)	
Outputs	2 ALMEMO® sockets, suitable for all output modules (analog / data / trigger / relay cables, memory, etc.)	Active mode	approx. 37 mA
Standard equipment		With illumination	approx. 45 to 100 mA
Display		Sleep mode	approx. 0.05 mA
Graphics display	128 x 128 pixels, 16 rows	Housing	204 x 109 x 44 mm (LxWxH) ABS (maximum 70 °C), 550g
Illumination	5 white LEDs, 3 brightness levels		

## ALMEMO® 2890-9



**Precision measuring instrument, 9 measuring inputs**  
**Data logger with internal memory or external memory connector (accessory)**

### Accessories

#### Order no.

Memory connector with micro SD, including USB card reader (see chapter „General accessories“)  
 DC adapter cable, 10 to 30 VDC, 12 V / 1 A, electrically isolated  
 Generously dimensioned carry case, aluminum profile frame / ABS

**ZA1904SD**  
**ZB2590UK**  
**ZB2590TK2**

### Connecting cables

#### Order no.

V24 data cable, electrically isolated  
 Ethernet data cable, electrically isolated  
 Analog output cable, -1.25 to +2.0 V, 0.1 mV / digit  
 Trigger and alarm cable (2 relays, 0.5 A, 50 V)  
 Network technology, Bluetooth modules (see chapter „Networking“)

**ZA1909DK5**  
**ZA1945DK**  
**ZA1601RK**  
**ZA1006EKG**

### Options

#### Order no.

Multi-point adjustment, special linearization, management of calibration data  
 Temperature ranges for 8 refrigerants  
 Measuring rate 400 mops (SD card required)

**OA2690KL**  
**SB0000R2**  
**SA0000Q4**

### Standard delivery

#### Order no.

Rechargeable battery pack, desktop mains unit ZB1112NA7, USB data cable ZA1919DKU, case ZB2490TK2,  
 Operating instructions, manufacturer's test certificate

**Precision measuring instrument ALMEMO® 2890-9**

**MA28909**

DAkkS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“).  
 DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.





## ALMEMO® 710



**ALMEMO® precision measuring instrument, latest V7 generation**  
**With data logger function and touchscreen.**  
**Comprehensive range of functions for all application areas.**  
**Increased measuring accuracy, fast measuring rate.**  
**10 measuring inputs**

**Data logger from our latest V7 generation**

Data logger ALMEMO® 710 offers outstanding functions - thanks to our latest D7 sensors.

**High-quality display - easy and convenient touchscreen operation**

The brightly illuminated, generously dimensioned 5.7-inch color graphics display shows all measured values and functions clearly and precisely. The device is operated easily and conveniently via touchscreen. The menu guidance system, incorporating wizards and help windows, has a clear, straightforward structure.

Measured values, peak values, average values, and limit values can all be displayed in an easy-to-understand way in various forms, namely list, bar chart, or line graph (up to 4 lines).

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

**One measuring instrument for every use**

The measuring instrument is enclosed in a handy, compact housing with rubberized impact protection. This device can be used in a wide variety of ways, in mobile applications or as a desktop unit, on a folding stand or as a stationary unit in a wall-mounted housing.

It incorporates a powerful rechargeable lithium battery to ensure a long operating time.

**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.

**Measuring inputs for 10 ALMEMO® sensors, all generations**

Data logger ALMEMO® 710 incorporates 10 measuring inputs. 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. Digital D6 / D7 sensors can be configured directly via the touchscreen.

**New digital ALMEMO® D7 sensors**

With these digital ALMEMO® D7 sensors the ALMEMO® system is enhanced by many new functions.

They operate via an all-digital interface to the ALMEMO® 710 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 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. These all work in parallel at their sensor-specific sampling rate. D7 sensors thus attain very high measuring speeds in dynamic measuring operations. Scanning times on the ALMEMO® 710 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**

With 3 ALMEMO® output sockets it is possible to connect simultaneously a PC / network, an ALMEMO® output interface with relays and analog output, and an SD memory card.

The ALMEMO® 710 incorporates an atmospheric pressure sensor to ensure automatic pressure compensation for measuring operations involving inter alia air flow or humidity variables.

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 connector (analog or DIGI), ALMEMO® D6 and D7 plugs..



**ALMEMO® 710**

**Precision measuring instrument, latest V7 generation, 10 measuring inputs  
Data logger with internal memory or external memory connector (accessory)**

**Technical data**

<b>Measuring inputs</b>	10 ALMEMO® input sockets for ALMEMO® sensors, all generations analog sensors, D6 and D7 sensors	<b>Standard equipment</b>	
<b>Precision class</b>	AA (see page 01.05)	<b>Display</b>	
<b>Measuring rate for analog sensors, D6 sensors</b>	2.5 / 10 / 50 / 100 mops (measuring operations per second)	Graphics display	5.7-inch TFT LCD VGA, 640 x 480 pixels
<b>Electrical isolation for analog sensors</b>	with semiconductor relays (50 V) Additional electrical isolation between measuring inputs and power supply (device ground)	Illumination	white LED, dimmable
<b>Channels</b>	Up to 100 measuring channels per device	Keypad	Capacitive touchscreen and 3 additional touch keys
<b>Sensor power supply</b>	6 / 9 / 12 V, maximum 2 x 400 mA for supply via mains adapter 12 V, maximum 2 x 400 mA	<b>Memory</b>	8-MB flash memory (400,000 up to 1.5 million meas. values)
<b>Atmospheric pressure sensor</b>	Integrated, meas. range 700 to 1100 mbar	<b>Date and time-of-day</b>	Real-time clock (4.7 ppm) buffered with lithium battery
<b>Accuracy</b>	±2.5 mbar (at 0 to 65 °C)	<b>Power supply</b>	
<b>Outputs</b>	3 ALMEMO® sockets, suitable for all output modules (data / analog / trigger / relay cables, memory connector, etc.)	Rechargeable battery/ies	2 rechargeable lith. batteries, total 15.6 Ah Integrated, high-speed charging (3 hours) ZA1312NA9
		Mains adapter	230 VAC to 12 VDC, 2.5 A, electr. isol.
		<b>Current consumption (without input and output modules)</b>	
		Active mode	approx. 300 to 500 mA
		Sleep mode	approx. 0.05 mA
		<b>Housing</b>	222 x 169 x 61 mm (WxDxH) 1200 g ABS / TPE, 2-shot technology with rubberized impact protection
		ALMEMO® 710	with folding stand
		ALMEMO® 710 WG	with DIN rail fixture for wall-mounting, connections facing downwards

**Accessories**

	<b>Order no.</b>
Memory connector with micro SD, including USB card reader (see chapter „General accessories“)	<b>ZA1904SD</b>
Large carry case, aluminum profile frame / ABS, inside dimensions 48 x 35 x 6+6 cm (WxDxH)	<b>ZB2590TK2</b>

**Connecting cables**

	<b>Order no.</b>
Ethernet data cable, electrically isolated	<b>ZA1945DK</b>
USB data cable with 5V device supply from PC not electrically isolated	<b>ZA1919DKU5</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>

Note on WinControl measuring software

As measuring software WinControl is suitable for current version 7 and above. For version 6 or earlier a WinControl update is required.

Variants and description (see chapter „Software“).

**Options**

	<b>Order no.</b>
Multi-point adjustment and / or linearization can - with all ALMEMO® plug versions - be programmed by users themselves	<b>OA710KL</b>
Sampling rate 500 measuring operations per second (mops) for 1 analog measuring channel with voltage or current ranges or NTC sensors	<b>OA710Q5</b>

**Standard delivery**

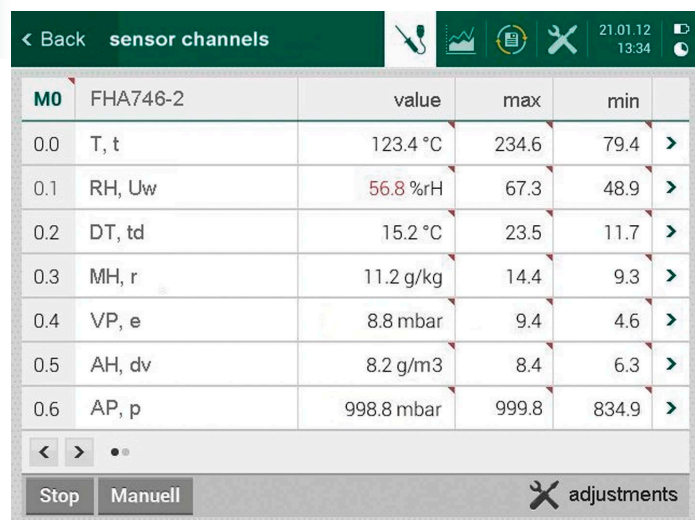
	<b>Order no.</b>
USB data cable ZA1919DKU, Mains unit 12 V / 2.5 A ZA1312NA9, Manufacturer's test certificate	
Mobile device with folding stand, in case ZB9710TK <b>Precision measuring instrument ALMEMO® 710</b>	<b>MA710</b>
Stationary device with wall-mounting, <b>Precision measuring instrument ALMEMO® 710WG</b>	<b>MA710WG</b>

DAkkS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“).

DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

## ALMEMO® 710 Clear, precise display - easy and convenient touchscreen operation

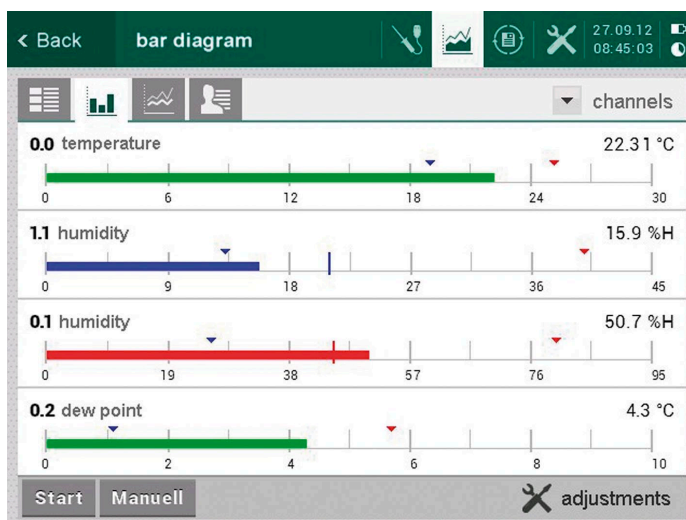
10/2013 • We reserve the right to make technical changes.



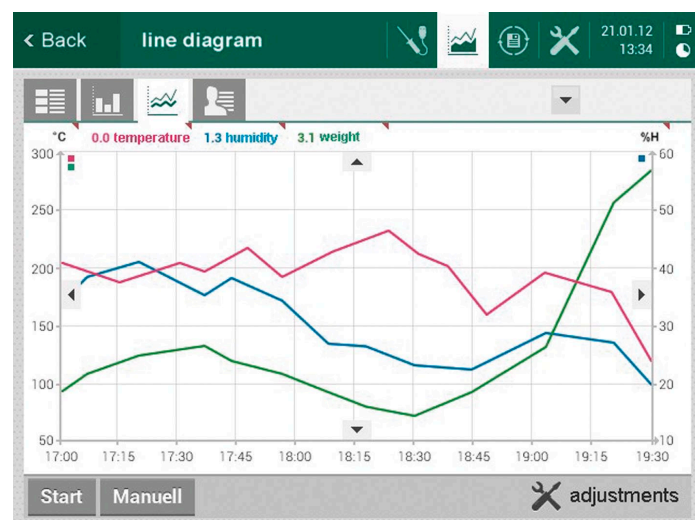
M0	FHA746-2	value	max	min
0.0	T, t	123.4 °C	234.6	79.4
0.1	RH, Uw	56.8 %rH	67.3	48.9
0.2	DT, td	15.2 °C	23.5	11.7
0.3	MH, r	11.2 g/kg	14.4	9.3
0.4	VP, e	8.8 mbar	9.4	4.6
0.5	AH, dv	8.2 g/m3	8.4	6.3
0.6	AP, p	998.8 mbar	999.8	834.9

Stop Manuell adjustments

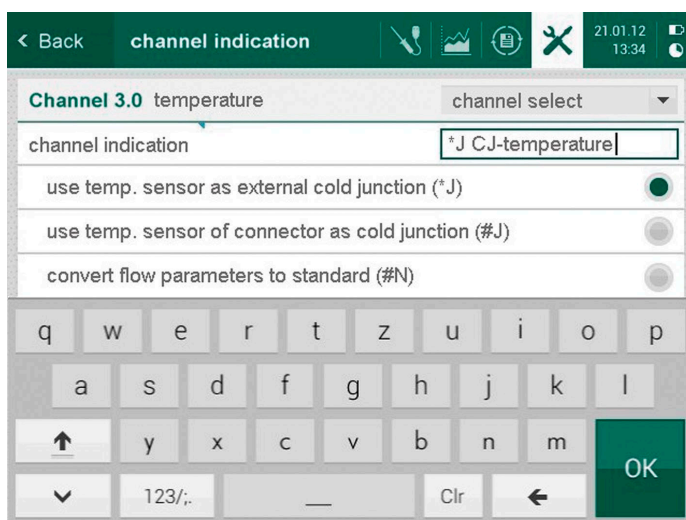
List of active measuring channels



Display of measured values as a bar chart



Display of measured values as a line graph



Channel 3.0 temperature channel select

channel indication \*J CJ-temperature

use temp. sensor as external cold junction (\*J) ☒

use temp. sensor of connector as cold junction (#J) ☐

convert flow parameters to standard (#N) ☐

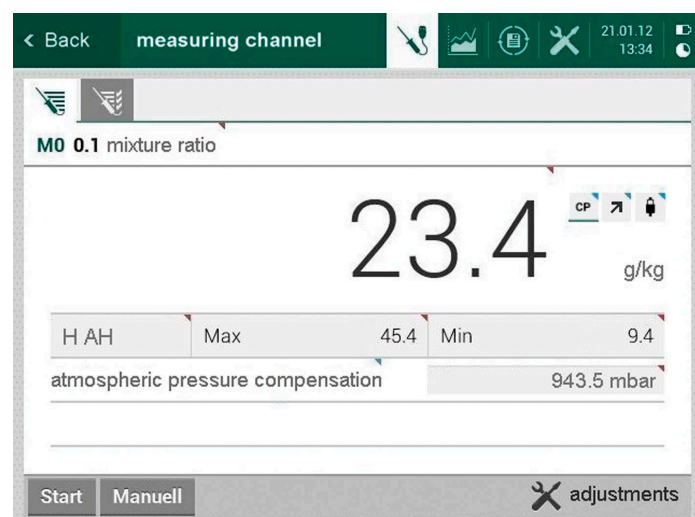
q w e r t z u i o p

a s d f g h j k l

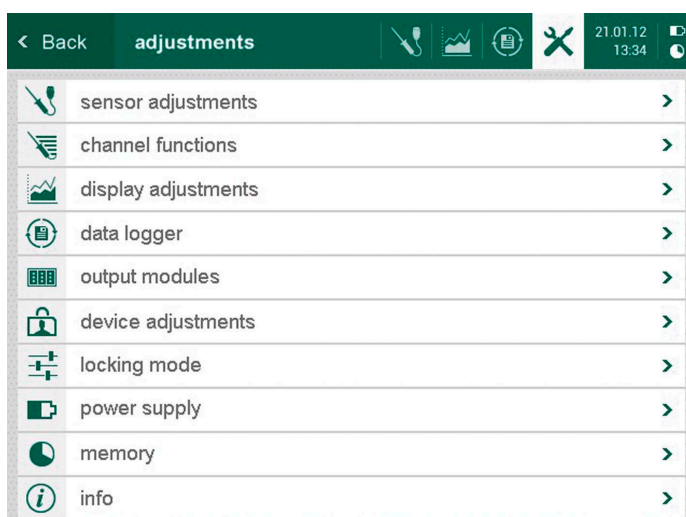
↑ y x c v b n m

123/., \_ Clr ← OK

Keypad for programming



Generously dimensioned display of measured values



Back adjustments

- sensor adjustments
- channel functions
- display adjustments
- data logger
- output modules
- device adjustments
- locking mode
- power supply
- memory
- info

Settings for all sensor and device parameters



## ALMEMO® 8590 /8690 series



**ALMEMO® precision measuring instrument for measured data acquisition, with data logger function. Comprehensive range of functions for all application areas. Increased measuring accuracy, fast measuring rate 9 measuring inputs. Operates as data logger or PC interface, also with rechargeable batteries.**

### Technical data and functions, ALMEMO® 8590 /8690

- Increased measuring accuracy and stability
- Fast measuring rate, up to 50 measuring operations per second  
With SD memory card, up to 100 mops, optional for 1 channel up to 400 mops
- 9 measuring inputs, electrically isolated
- Over 65 standard measuring ranges
- Support for ALMEMO® plugs with multi-point adjustment, special linearization, and special measuring ranges
- Option KL for independent multi-point adjustment or special linearization programmable in 30 points and management of calibration data saved in the sensor connector and the measuring instrument
- Higher measuring quality thanks to electrical isolation between measuring inputs and device power supply (device ground)
- Improved cold junction compensation with 2 sensors
- Data logger option
- Internal EEPROM sufficient for 100,000 measured values (option S) configurable as linear or ring memory - or memory connector with micro SD (accessory)
- Sleep mode for long-term recording
- 2 ALMEMO® output sockets, suitable for digital interfaces, analog output, trigger input, alarm contacts, memory card
- 5 LEDs for indicating various operating states
- Key for switching on and start / stop measuring
- Complete sensor and device programming by means of AMR-Control software (included in delivery).

### Technical data ALMEMO® 8590 /8690

Precision class	AA (see page 01.05)	Operation	1 key, 5 LEDs, 2 coding switches
Measuring rate	2.5 / 10 / 50 / 100 mops	Internal memory (option S)	Internal EEPROM sufficient for 100,000 measured values, configurable as linear or ring memory
Measuring inputs	9 ALMEMO® input sockets	External memory (accessory)	ALMEMO® memory connector with micro SD card
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, buffered with lithium battery
Additional channels	4 function channels, device-internal	Current consumption (without input and output modules)	
Outputs	2 ALMEMO® sockets, suitable for all output modules (analog / data / trigger / relay cables, memory, etc.)	Active mode	approx. 25 mA
		Sleep mode	approx. 0.05 mA

### ALMEMO® 8590 /8690, accessories

#### Order no.

Memory connector with micro SD, including USB card reader (see chapter „General accessories“)  
DC adapter cable, 10 to 30 VDC, 12 V / 1 A, electrically isolated

**ZA1904SD**  
**ZB3090UK2**

### ALMEMO® 8590 /8690, connecting cable

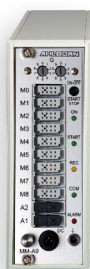
#### Order no.

USB data cable, electrically isolated  
V24 data cable, electrically isolated  
Ethernet data cable, electrically isolated  
Analog output cable, -1.25 to +2.0 V, 0.1 mV / digit  
Trigger and alarm cable (2 relays, 0.5 A, 50 V)  
Network technology, Bluetooth modules (see chapter „Networking“)

**ZA1919DKU**  
**ZA1909DK5**  
**ZA1945DK**  
**ZA1601RK**  
**ZA1006EKG**

# ALMEMO® Measuring Instruments

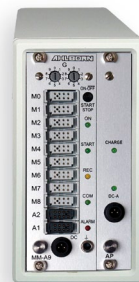
## ALMEMO® 8590-9



**Precision measuring instrument, 9 measuring inputs**

**Data logger option with internal memory or external memory connector (accessory)**

## ALMEMO® 8690-9A



**Precision measuring instrument, 9 measuring inputs**

**Data logger option with internal memory or external memory connector (accessory)**

**Runs on rechargeable batteries, charging via the device itself**

### Technical data and functions

- Technical data and functions, as for ALMEMO® 8590 / 8690

### Technical data

Technical data, as for ALMEMO® 8590 / 8690

Sensor power supply	Mains adapter 12 V, maximum 0.5 A
Power supply	
Mains adapter	ZB1212NA7 230 VAC to 12 VDC, 1 A, electrically isolated
DC adapter cable	ZB3090UK2 10 to 30 VDC, 1 A, electrically isolated
Housing	180 x 49 x 137 mm (LxWxH) Polystyrene (PS) Weight approx. 490 g

### Technical data and functions

- Technical data and functions, as for ALMEMO® 8590 / 8690
- Runs on rechargeable batteries, high-speed charging in the device itself using mains unit, included in delivery

### Technical data

Technical data, as for ALMEMO® 8590 / 8690

Rechargeable battery pack	8 rechargeable NiMH batteries, 9 to 11 V, 1600 mAh With intelligent high-speed charging (3.5 hours)
Sensor power supply	
Mains adapter	12 V, maximum 0.5 A
Runs on rechargeable batteries	9 to 11.5 V, maximum 0.5 A
Power supply	
Mains adapter	ZB1212NA9
DC adapter cable	90 to 260 VAC, 12 VDC, 2.5 A electrically isolated ZB3090-UK2 10 to 30 VDC, 12 VDC, 1 A
Housing	218 x 77 x 145 mm (LxWxH) Polystyrene (PS) Weight approx. 1.2 kg

### Options

#### Order no.

Internal data memory sufficient for 100,000 values	<b>OA8590S</b>
Multi-point adjustment, special linearization, management of calibration data	<b>OA8590KL</b>
Temperature ranges for 8 refrigerants (see 10.08)	<b>SB0000R2</b>
Measuring rate for 1 measuring channel, 400 mops (SD card required)	<b>SA0000Q4</b>
DIN rail mounting	<b>OA2290HS</b>

### Standard delivery

#### Order no.

Mains plug assembly ZB1212NA7, operating instructions, manufacturer's test certificate	
<b>Precision measuring instrument ALMEMO® 8590-9 for measured data acquisition</b>	<b>MA85909</b>

### Options

#### Order no.

Internal data memory sufficient for 100,000 values	<b>OA8590S</b>
Multi-point adjustment, special linearization, management of calibration data	<b>OA8590KL</b>
Temperature ranges for 8 refrigerants (see 10.08)	<b>SB0000R2</b>
Measuring rate for 1 measuring channel, 400 mops (SD card required)	<b>SA0000Q4</b>
DIN rail mounting	<b>OA2290HS</b>

### Standard delivery

#### Order no.

Rechargeable batteries, mains plug assembly ZB1212NA9, Operating instructions, manufacturer's test certificate	
<b>Precision measuring instrument ALMEMO® 8690-9A for measured data acquisition</b>	<b>MA86909A</b>

DAkkS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“).  
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.



## Data acquisition systems ALMEMO® 5690 und 5790



ALMEMO® 5690-1M09  
fully equipped (example)



ALMEMO® 5690-2  
with graphics display



ALMEMO® 5690-1CPU  
fully equipped (example)

## ALMEMO® 5690 data acquisition system



**ALMEMO® precision measuring instrument for measured data acquisition, with data logger function. Comprehensive range of functions for all application areas. Increased measuring accuracy, fast measuring rate. Up to 99 / 190 measuring inputs. Operates as data logger or PC interface, also with generously dimensioned graphics display.**

## Technical data and functions, ALMEMO® 5690 and 5790 series

- Multi-functional data acquisition systems with up to 99 or 190 measuring inputs (applies to ALMEMO® 5690-xCPU with option XU or XM)
- Increased measuring accuracy and stability
- Fast measuring rate, up to 50 measuring operations per second  
With SD memory card, up to 100 mops, optional for 1 channel up to 400 mops (does not apply to ALMEMO® 5690-xCPU with option XM)
- Measuring rate increased to over 100 channels / second with several measuring circuit boards (applies to ALMEMO® 5690-xCPU with option XM)  
The measuring circuit boards operate in parallel, thus ensuring short scanning times for a large number of channels.
- Over 65 standard measuring ranges
- Option KL for independent multi-point adjustment or special linearization programmable in 30 points and management of calibration data saved in the sensor connector and the measuring instrument
- Higher measuring quality thanks to electrical isolation between measuring inputs and device power supply (device ground)
- Improved cold junction compensation with 2 sensors per input card
- Operates as data logger (internal EEPROM / RAM or SD memory card, sleep mode for long-term recording) or as interface for PC online operation
- ALMEMO® 5690-1 (variant without display), ALMEMO® 5690-2 (variant with display and operating controls)
- 5 LEDs for displaying the operating status of the measuring circuit and the CPU
- 8 rechargeable NiMH batteries with high-speed battery charging (accessory)
- Relay / trigger / analog interface as plug-in board (accessory) for output of alarm and control signals
- ALMEMO® output sockets, suitable for digital interfaces, analog output, trigger input, alarm contacts, memory card
- Housing in several variants: Desktop housing TG1, TG3, TG8  
Wall-mounted housing WG3, Rack housing BT8  
Protected industrial housing IG2.

## Technical data, ALMEMO® 5690 and 5790 series

Precision class	AA (see page 01.05)	Power supply	
Measuring rate	2.5 / 10 / 50 / 100 mops	Mains adapter	ZB1212NA9 90 to 260 VAC, 12 VDC, 2.5 A
Electrical isolation for analog sensors	with semiconductor relays (50 V) Additional electrical isolation between measuring inputs and power supply (device ground)	DC adapter cable	electrically isolated ZB3090-UK2 10 to 30 VDC, 12 VDC, 1 A
Date and time-of-day	Real-time clock, buffered with lithium battery	Rechargeable battery pack	8 rechargeable NiMH batteries, 9 to 11 V, 1600 mAh With intelligent high-speed charging (3.5 hours) Supply current Entire system maximum 1.5 A
Supply current	For system boards and sensor supply Entire system, max. 2.5 A, per board max. 0.5 A		

## ALMEMO® 5690 and 5790 series, accessories



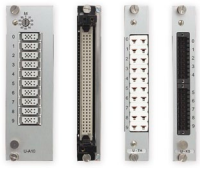
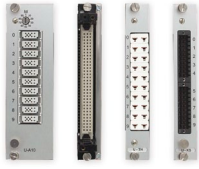
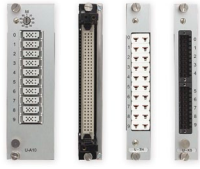
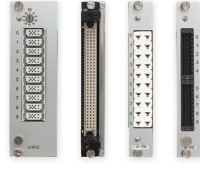
	Order no.
Rechargeable batteries, 1600 mAh, 1 slot	ES5690AP
DC cable, 10 to 30 VDC, 12 VDC, 1.25 A	ZB3090UK2
Relay / trigger / analog board (see chapter „Output modules“) 2 slots	ES5690RTA5
Carry case, aluminum profile frame / ABS, suitable for ALMEMO® 5690 in desktop housing TGx	ZB5600TK3
Rack case with handle, suitable for ALMEMO® 5690 in rack housing BT8	ZB5090RC

## ALMEMO® 5690 and 5790 series, connecting cables





	Order no.
USB data cable, electrically isolated	ZA1919DKU
Ethernet data cable, electrically isolated	ZA1945DK
Trigger and relay cable (2 relays, 0.5 A, 50 V)	ZA1006EKG
Analog output cable, -1.25 to +2.0 V, 0.1 mV / digit	ZA1601RK
V24 data cable, electrically isolated	ZA1909DK5
Network technology, Bluetooth modules (see chapter „Networking“) Relay trigger analog adapter (see chapter „Output modules“)	

## ALMEMO® data acquisition systems - a comparison

### Function

System type	5690-xM09	5690-xCPU	5690-xCPU with option XU	5690-xCPU with option XM
				
Measuring circuit	Master measuring circuit board with 9 measuring inputs	Measuring circuit CPU board (without measuring inputs)		
Measuring inputs	up to 99 inputs	up to 100 inputs	up to 190 inputs	up to 190 inputs
Number of channels	up to 99 channels	up to 100 channels	up to 250 channels	up to 250 channels
Expansions Selector switch boards	up to 9 	up to 10 	up to 19 	None
Expansions Active measuring circuit boards	None	None	None	up to 19 
Scanning time (approx.)	For 1 to 99 channels in total	For 1 to 100 channels in total	For 1 to 190 channels in total	For 100 / 190 channels in total = 10/19 measuring circuit boards with 10 channels each
At conversion rate 10 Hz	0.1 to 10 seconds	0.1 to 10 seconds	0.1 to 19 seconds	... 1.1 / 1.1 seconds*
At conversion rate 50Hz	0.02 to 2 seconds	0.02 to 2 seconds	0.02 to 4 seconds	... 0.3 / 0.5 seconds* *for systems without display
ALMEMO® plug with special measuring range / multi-point calibration, linearization	Up to 9 ALMEMO® plugs (master measuring circuit)	Up to 100 ALMEMO® plugs	Up to 190 ALMEMO® plugs	Up to 190 ALMEMO® plugs
ALMEMO® outputs	Sockets A1 and A2	Sockets A1 to A5 for expanding the periphery, optional socket P0 (relay / trigger / analog outputs)		

### Operating modes

System type	5690-1M09	5690-2M09	5690-1CPU	5690-2CPU
				
Online operation via PC	yes		yes	
Display and operating controls	no	yes	no	yes
Data logger	Accessory ZA1904SD Memory connector including micro SD	Micro SD drive, integrated, including micro SD (as standard)	Accessory ZA1904SD Memory connector including micro SD	Micro SD drive, integrated, including micro SD (as standard)
Internal memory	512-KB EEPROM (option)		2-MB RAM, battery-buffered (standard) or 2-MB FeRAM, non-volatile (option)	

## ALMEMO® 5690-1M09

### Technical data and functions

- Technical data and functions, as for ALMEMO® 5690 series
- Master measuring circuit, 9 ALMEMO® input sockets, electrically isolated, suitable for 9 ALMEMO® sensors
- Up to 9 ALMEMO® connectors; special ranges / multi-point calibration / linearization possible (only on master measuring circuit)
- Expansion up to 99 inputs by means of various selector switch boards, maximum 99 measuring channels
- Data logger option with internal EEPROM or external ALMEMO® memory connector with micro SD card

### Technical data

Technical data, as for ALMEMO® 5690 series		as linear or ring memory	
Measuring inputs	9 ALMEMO® input sockets Expansion up to 99 inputs by means of selector switch boards	External memory (accessory)	ALMEMO® memory connector with micro SD card
Measuring channels	Expansion up to maximum 99 measuring channels	Outputs	2 ALMEMO® sockets, suitable for all output modules (analog / data / trigger / relay cables, etc.) Alarm signal transmitter, internal
Internal memory (option S)	Internal EEPROM sufficient for 100,000 measured values, configurable	Operation	1 key, 5 LEDs, 2 coding switches

### Accessories

Memory connector with micro SD, including USB card reader (see chapter „General accessories“)	<b>ZA1904SD</b>
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### Expansions

Selector switch boards U-A10, U-MU, U-TH, U-KS	(see page 01.40)
Relay / trigger / analog board, 2 slots Per system up to 7 boards are supported. (see chapter „Output modules“)	<b>ES5690RTA5</b>

### Optionen

Internal data memory sufficient for 100,000 values	<b>OA5690S</b>
Multi-point adjustment, special linearization, management of calibration data	<b>OA5690KL</b>
Temperature ranges for 8 refrigerants (see 10.08)	<b>SB0000R2</b>
Measuring rate for 1 measuring channel, 400 mops (SD card required)	<b>SA0000Q4</b>

### Standard delivery

Precision measuring instrument, data acquisition system with master measuring circuit board MM-A9, mains plug assembly ZB1212NA9, Operating instructions, manufacturer's test certificate

DAkkS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“).  
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.



# ALMEMO® Measuring Instruments

## ALMEMO® 5690-1M09TG1



Dimensions:  
77 x 145 x 218 mm  
(WxHxD)

Data acquisition system in desktop housing TG1, 9 inputs,  
1 free slot  
**MA56901M09TG1**  
Expansion with  
1 U-MU board or U-TH or U-KS (10 inputs)

## ALMEMO® 5690-1M09TG3



Dimensions:  
179 x 158 x 232 mm  
(WxHxD)

Data acquisition system in desktop housing TG3, 9 inputs,  
6 free slots  
**MA56901M09TG3**  
Expansion with  
3 U-A10 boards or U-TH (30 inputs)  
or 6 U-MU boards or U-KS (60 inputs)  
or 3 RTA5 boards

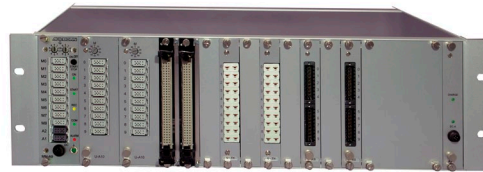
## ALMEMO® 5690-1M09TG8



Dimensions:  
444 x 158 x 232 mm  
(WxHxD)

Data acquisition system in desktop housing TG8, 9 inputs,  
19 free slots  
**MA56901M09TG8**  
Expansion with  
9 U-A10 boards or U-TH or U-MU or U-KS (90 inputs) or 7  
RTA5 boards

## ALMEMO® 5690-1M09BT8



Dimensions:  
483 x 132 x 273  
mm (WxHxD)

Data acquisition system in 19-inch rack housing, 9 inputs,  
19 free slots  
**MA56901M09BT8**  
Expansion with  
9 U-A10 boards or U-TH or U-MU or U-KS (90 inputs)  
or 7 RTA5 boards



Carry case, aluminum profile frame ZB5600TK3  
for ALMEMO® 5690-1/-2



Rack case with handle ZB5090RC  
for ALMEMO® 5690-xxBT8 in 19-inch rack housing

## ALMEMO® 5690-2M09

### Technical data and functions

- Technical data and functions, as for ALMEMO® 5690 series
- Master measuring circuit, 9 ALMEMO® input sockets, electrically isolated, suitable for 9 ALMEMO® sensors
- Up to 9 ALMEMO® connectors; special ranges / multi-point calibration / linearization possible (only on master measuring circuit)
- Expansion up to 99 inputs by means of various selector switch boards, maximum 99 measuring channels
- Generously dimensioned graphics display, bright illumination, large display of measured values
- Measured values can be displayed graphically in line chart or bar chart form or numerically in various sizes.
- 3 user-defined menus can be freely configured from a range of 50 functions.
- Easy to operate by means of 4 soft-keys and cursor block, menu-guided with wizards and context-sensitive help windows
- Choice of languages : German, English, French (other options also available)
- Data logger with micro SD (standard)
- Option, internal EEPROM.

### Technical data

Technical data, as for ALMEMO® 5690 series		Outputs	2 ALMEMO® sockets, suitable for all output modules (analog / data / trigger / relay cables, etc.) Alarm signal transmitter, internal
Measuring inputs	9 ALMEMO® input sockets Expansion up to 99 inputs by means of selector switch boards	Display	
Measuring channels	Expansion up to maximum 99 measuring channels	Graphics display	128 x 128 pixels, 16 rows
Memory	Micro SD card, integrated drive	Illumination	5 white LEDs, 3 brightness levels
Internal memory (option S)	Internal EEPROM sufficient for 100,000 measured values, configurable as linear or ring memory	Operation	9 keys (4 soft-keys and cursor block) 9 status LEDs on front panel

### Expansions

Selector switch boards U-A10, U-MU, U-TH, U-KS	(see page 01.40)
Relay / trigger / analog board, 2 slots Per system up to 7 boards are supported. (see chapter „Output modules“)	<b>ES5690RTA5</b>

### Options

Internal data memory sufficient for 100,000 values	<b>OA5690S</b>
Multi-point adjustment, special linearization, management of calibration data	<b>OA5690KL</b>
Temperature ranges for 8 refrigerants (see 10.08)	<b>SB0000R2</b>
Measuring rate for 1 measuring channel, 400 mops (SD card required)	<b>SA0000Q4</b>

### Standard delivery

Precision measuring instrument, data acquisition system with graphics display and operating controls, master measuring circuit board MM-A9, micro SD card, USB card reader, mains plug assembly ZB1212NA9, operating instructions, manufacturer's test certificate

DAkkS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“).  
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

# ALMEMO® Measuring Instruments

## ALMEMO® 5690-2M09TG3



Dimensions:  
179 x 158 x 232 mm  
(WxHxD)

Data acquisition system in desktop housing TG3, 9 inputs,  
6 free slots  
**MA56902M09TG3**  
Expansion with  
3 U-A10 boards or U-TH (30 inputs)  
or 6 U-MU boards or U-KS (60 inputs)  
or 3 RTA5 boards

## ALMEMO® 5690-2M09WG3



Dimensions:  
209 x 207 x 153 mm (WxHxD)  
(width includes fastening strips)

Data acquisition system in wall-mounted housing WG3,  
9 inputs, 1 free slot  
**MA56902M09WG3**  
Expansion with  
3 U-A10 boards or U-TH (30 inputs)  
or 6 U-MU boards or U-KS (60 inputs)  
or 3 RTA5 boards  
The boards have their connections facing downwards. To facilitate wall-mounting four holes (5.3 mm) are provided on the protruding strips to the left and right of the housing's backplate (which cannot itself be removed).

## ALMEMO® 5690-2M09TG8



Dimensions:  
444 x 158  
x 232 mm  
(WxHxD)

Data acquisition system in desktop housing TG8, 9 inputs,  
19 free slots  
**MA56902M09TG8**  
Expansion with  
9 U-A10 boards or U-TH or U-MU or U-KS (90 inputs)  
or 7 RTA5 boards

## ALMEMO® 5690-2M09BT8



Dimensions:  
483 x 132  
x 273 mm  
(WxHxD)

Data acquisition system in 19-inch rack housing, 9 inputs,  
19 free slots  
**MA56902M09BT8**  
Expansion with  
9 U-A10 boards or U-TH or U-MU  
or U-KS (90 inputs) or 7 RTA5 boards

### Technical data and functions

- Technical data and functions, as for ALMEMO® 5690 series
- Robust aluminum housing, protective class IP65
- Master measuring circuit, 9 ALMEMO® input sockets, electrically isolated, suitable for 9 ALMEMO® sensors
- Up to 9 ALMEMO® connectors; special ranges / multi-point calibration / linearization possible (only on master measuring circuit)
- Expansion up to 29 inputs by means of various selector switch boards
- Generously dimensioned graphics display, bright illumination, large display of measured values
- Measured values can be displayed graphically in line chart or bar chart form or numerically in various sizes.
- 3 user-defined menus can be freely configured from a range of 50 functions.
- Easy to operate by means of 4 soft-keys and cursor block, menu-guided with wizards and context-sensitive help windows
- Choice of languages : German, English, French (other options also available)
- Data logger option with internal EEPROM or external ALMEMO® memory connector with micro SD card

### Technical data

Technical data, as for ALMEMO® 5690 series		9 status LEDs on front panel	
Measuring inputs	9 ALMEMO® input sockets Expansion up to 29 inputs by means of selector switch boards	Power supply	Mains unit ZB1212NA6, installed on a fixed basis, 100 to 240 VAC, connected via appliance socket, including safety connecting cable
Measuring channels	Expansion up to maximum 99 measuring channels	Screwed cable glands	Plastic, with multiple inserts, slotted 24 drilled holes for cables d= 4 mm 2 drilled holes for cables d= 7 mm for all supply lines (sensor cables, output cables, e.g. data cable, mains supply cable) including dummy plugs for all holes
Internal memory (option S)	Internal EEPROM sufficient for 100,000 measured values, configurable as linear or ring memory	Housing	Aluminum
External memory (accessory)	ALMEMO® memory connector with micro SD card	Dimensions	233 x approx. 350 x 121 mm (WxHxD) (height includes PGs) 19-inch design Plastic insert, 16 DUs
Outputs	2 ALMEMO® sockets, suitable for all output modules (analog / data / trigger / relay cables, etc.) Alarm signal transmitter, internal	Weight	approx. 6 kg
Display		Protective class	IP65
Graphics display	128 x 128 pixels, 16 rows	Wall-mounting	4 x M4 thread, including 2 aluminum profiles
Illumination	5 white LEDs, 3 brightness levels		
Operation	9 keys (4 soft-keys and cursor block)		

### Accessories

### Order no.

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

**ZA1904SD**

### Expansions

### Order no.

Selector switch boards U-A10, U-MU, U-TH, U-KS

(see page 01.40)

Relay / trigger / analog board, 2 slots, maximum 1 board (see chapter „Output modules“)

**ES5690RTA5**

### Options

### Order no.

Internal data memory sufficient for 100,000 values

**OA5690S**

Multi-point adjustment, special linearization, management of calibration data

**OA5690KL**

Temperature ranges for 8 refrigerants (see 10.08)

**SB0000R2**

Measuring rate for 1 measuring channel, 400 mops (SD card required)

**SA0000Q4**

Power supply via rechargeable battery module

**OA5790A**

Rechargeable battery set (8 NiMH cells, 1600 mAh), 1 slot

**ES5690AP**

### Standard delivery

Precision measuring instrument, data acquisition system with graphics display and operating controls, master measuring circuit board MM-A9, mains unit ZB1212NA6 installed on a fixed basis, safety connecting cable, operating instructions, manufacturer's test certificate

DAkKS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“).

DAkKS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.



## ALMEMO® 5790-2M09IG2



Dimensions:  
233 x approx. 350 x 121mm  
(WxHxD)  
(with PGs)

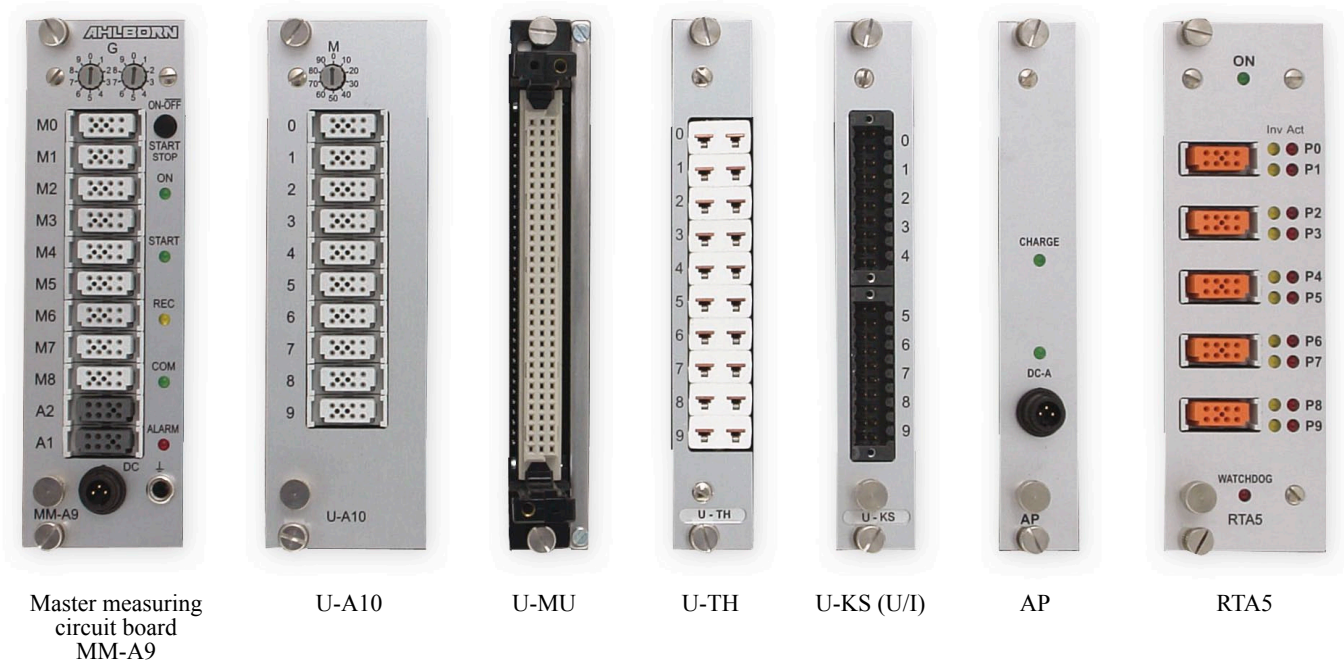
Data acquisition system in industrial housing, 9 inputs, 2 free slots  
Expansion with 1 U-A10 board U-TH or 2 U-MU boards U-KS or 1 RTA5 board

**MA57902M09IG2**

# ALMEMO® Measuring Instruments

Master measuring circuit board, selector switch boards, and expansions for the ALMEMO® 5690-1M09 and 5690-2M09 systems

10/2013 • We reserve the right to make technical changes.

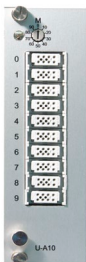


## Selector switch boards for ALMEMO® 5690-1M09 and 5690-2M09

### Technical data and functions of selector switch boards

- Selector switch boards for expanding the ALMEMO® 5690-1M09 and 5690-2M09 systems by additional inputs
- There are several design variants for different installations / input plugs.

#### Selector switch boards U-A10



**10 inputs for ALMEMO® single connectors**  
**For flexible applications with individual sensors and measuring signals.**

#### Technical data

Measuring inputs	10 ALMEMO® input sockets, electrically isolated
Measuring ranges	All ranges (see page 01.06)
Sensor supply	12 V, max. 0.3 A (per system max. 2.5 A)
Footprint	2 slots

#### Standard delivery

Selector switch board U-A10

**Order no.**  
**ES5690UA10**

ALMEMO® connector must be ordered separately.

#### Selector switch boards U-MU



**10 inputs for ALMEMO® 10 MU connectors**  
**For permanently installing groups of 10, especially temperature sensors.**

#### Technical data

Measuring inputs	10 inputs, electrically isolated, socket strip for ALMEMO® 10-way MU connector
Measuring ranges	all thermocouples, Pt100, Ni100, ohms, 2.6 V, 260 mV, 55 mV, 26 mV
Sensor supply	None
Footprint	1 slot

#### Standard delivery

Selector switch board U-MU  
ALMEMO® 10-way MU connector

**Order no.**  
**ES5690UMU**  
**ZA5690MU**

## Selector switch boards U-TH



**10 inputs for miniature thermal connectors**  
**For any individual thermocouple temperature sensors with miniature thermal connector.**

### Technical data

Measuring inputs	10 miniature thermal sockets, electr. isolated ALMEMO® sensor parameters are saved in the measuring instrument.
Measuring ranges	all thermocouples
Sensor supply	None
Footprint	2 slots

### Standard delivery

Selector switch board U-TH

Miniature thermal connectors must be ordered separately.

### Order no.

**ES5690UTH**

## Selector switch boards U-KS



**10 inputs, electrically isolated, sensor connection via socket block**  
**For permanently installing groups of 10.**

### Technical data

Measuring inputs	10 inputs, electrically isolated, male strip connector for socket block ALMEMO® sensor parameters are saved in the measuring instrument.
Measuring ranges	Pt100, Ni100, NTC, ohms, 2.6V, 260mV, 55mV, 26mV
Sensor supply	None
Footprint	1 slot

### Standard delivery

Selector switch board U-KS  
 including socket block  
 Socket block (spare)

### Order no.

**ES5690UKS**  
**ZB5600KS**

## Selector switch boards U-KSU



**10 inputs, electrically isolated, sensor connection via socket block**  
**For permanently installing groups of 10 with voltages 10 V**

### Technical data

Measuring inputs	10 inputs, electrically isolated, male strip connector for socket block ALMEMO® sensor parameters are saved in the measuring instrument.
Measuring ranges	Voltage -26 to +26 V (integrated divider)
Accuracy, divider	±0.1 % of measured value
Sensor supply	None
Footprint	1 slot

### Standard delivery

Selector switch board U-KSU  
 including socket block  
 Socket block (spare)

### Order no.

**ES5690UKSU**  
**ZB5600KS**

## Selector switch boards U-KSI



**10 inputs, electrically isolated, sensor connection via socket block**  
**For permanently installing groups of 10 with currents 20mA**

### Technical data

Measuring inputs	10 inputs, electrically isolated, male strip connector for socket block ALMEMO® sensor parameters are saved in the measuring instrument.
Measuring ranges	Current -32 to +32 mA (integrated shunt)
Accuracy, shunt	±0.1 % of measured value
Sensor supply	None
Footprint	1 slot

### Standard delivery

Selector switch board U-KSI  
 including socket block  
 Socket block (spare)

### Order no.

**ES5690UKSI**  
**ZB5600KS**

### Technical data and functions

- Technical data and functions, as for ALMEMO® 5690 series
  - CPU board with measuring circuit (without measuring inputs) and output sockets
  - Up to 100 measuring inputs / 100 measuring channels via selector switch boards
  - Option XU - up to 190 measuring inputs / 250 measuring channels via selector switch boards
  - Option XM - high-speed measuring operations, up to 190 measuring inputs / 250 measuring channels via active measuring circuit boards
- The measuring circuit boards operate in parallel, thus ensuring

short scanning times for a large number of channels. The scanning time is determined by the measuring circuit board with the highest number of active measuring channels - or, at conversion rate 50 Hz, also by the processing time of the CPU.

- Option - 5 ALMEMO® output sockets for digital interfaces, analog outputs, trigger, alarm contacts, socket P0 for integrated relay outputs
- Data logger with internal RAM (standard) or FeRAM (option) or external ALMEMO® memory connector with micro SD card

### Technical data

Technical data, as for ALMEMO® 5690 series		External memory (accessory)	ALMEMO® memory connector with micro SD card
CPU board	Measuring circuit (without measuring inputs), input boards (see page 01.48)	Outputs	5 ALMEMO® sockets, suitable for all output modules (analog / data / trigger / relay cables, etc.) . Alarm signal transmitter, internal Socket P0 for integrated relay outputs (option) Or trigger and analog output (by request)
Measuring inputs / measuring channels		Operation	1 key, 5 LEDs, 2 coding switches
Standard	up to 100 inputs / 100 meas. channels via selector switch boards		
Option XU	up to 190 inputs / 250 meas. channels via selector switch boards		
Option XM	up to 190 inputs / 250 meas. channels via active measuring circuit boards		
Memory, internal	sufficient for 400,000 values, linear or ring memory		
Standard	RAM (buffered by battery)		
Option SF	FeRAM (non-volatile)		

### Accessories

Memory connector with micro SD, including USB card reader (see chapter „General accessories“)	ZA1904SD
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### Input boards / expansions

	Order no.
Option XM - selector switch boards and active measuring circuit boards	(see page 01.48)
Relay / trigger / analog board, 2 slots Per system up to 4 boards are supported. (see chapter „Output modules“)	ES5690RTA5

### Options

	Order no.
Up to 190 measuring inputs / 250 measuring channels	OA5690XU
For active measuring circuit boards, up to 190 measuring inputs / 250 measuring channels	OA5690XM
Data memory, internal FeRAM, non-volatile (instead of battery-buffered RAM)	OA5690SF
Multi-point adjustment, special linearization, management of calibration data	OA5690KL
Temperature ranges for 8 refrigerants (see 10.08)	SB0000R2
Measuring rate for 1 measuring channel, 400 mops (SD card required) This cannot be combined with option XM.	SA0000Q4
For output socket P0	
SH2 2 semiconductor relays (normally open) internal, 0.5 A, 50 V	OA5690SH2
OH2 2 additional relays (normally closed) for option SH2 (thus 2 changeover relays)	OA5690OH2

### Standard delivery

Precision measuring instrument, data acquisition system with CPU board  
 Measuring circuit (without measuring inputs) Input boards must be ordered separately. (see page 01.48)  
 Mains plug assembly ZB1212NA9, Operating instructions, manufacturer's test certificate

DAkKS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“).  
 DAkKS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

# ALMEMO® Measuring Instruments

## ALMEMO® 5690-1CPUTG1



Dimensions:  
77 x 145 x 218 mm  
(WxHxD)

Data acquisition system in desktop housing TG1  
CPU board, 1 free slot  
**MA56901CPUTG1**  
Messeingänge über:  
Measuring inputs via 1 MU / TH / KS board (10 inputs)

## ALMEMO® 5690-1CPUTG3



Dimensions:  
179 x 158 x 232 mm  
(WxHxD)

Data acquisition system in desktop housing TG3  
CPU board, 6 free slots  
**MA56901CPUTG3**  
Measuring inputs  
via three A10 or TH boards (30 inputs)  
or 6 MU or KS boards (60 inputs)  
or three RTA5 output boards

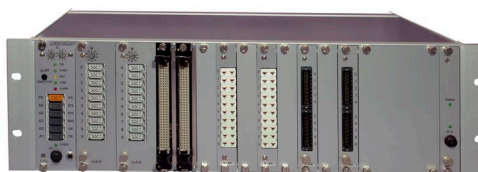
## ALMEMO® 5690-1CPUTG8



Dimensions:  
444 x 158  
x 232 mm  
(WxHxD)

Data acquisition system in desktop housing TG8  
CPU board, 19 free slots  
**MA56901CPUTG8**  
Measuring inputs  
via nine A10 or TH boards (90 inputs)  
or 19 MU or KS boards (190 inputs)  
or four RTA5 output boards

## ALMEMO® 5690-1CPUBT8



Dimensions:  
483 x 132  
x 273 mm  
(WxHxD)

Data acquisition system in 19-inch rack housing  
CPU board, 19 free slots  
**MA56901CPUBT8**  
Measuring inputs  
via nine A10 or TH boards (90 inputs)  
or 19 MU or KS boards (190 inputs)  
or four RTA5 output boards



Carry case, aluminum profile frame ZB5600TK3  
for ALMEMO® 5690-1/-2



Rack case with handle ZB5090RC  
for ALMEMO® 5690-xxBT8 in 19-inch rack housing



### Technical data and functions

- Technical data and functions, as for ALMEMO® 5690 series
  - CPU board with measuring circuit (without measuring inputs) and output sockets
  - Up to 100 measuring inputs / 100 measuring channels via selector switch boards
  - Option XU - up to 190 measuring inputs / 250 measuring channels via selector switch boards
  - Option XM - high-speed measuring operations, up to 190 measuring inputs / 250 measuring channels via active measuring circuit boards
- The measuring circuit boards operate in parallel, thus ensuring short scanning times for a large number of channels. The scanning time is determined by the measuring circuit board with the highest number of active measuring channels - or, at conversion rate 50 Hz, also by the processing time of the CPU.
- Option - 5 ALMEMO® output sockets for digital interfaces, analog outputs, trigger, alarm contacts, socket P0 for integrated relay outputs
  - Generously dimensioned graphics display, bright illumination, large display of measured values
  - Measured values can be displayed graphically in line chart or bar chart form or numerically in various sizes.
  - 3 user-defined menus can be freely configured from a range of 50 functions.
  - Easy to operate by means of 4 soft-keys and cursor block, menu-guided with wizards and context-sensitive help windows
  - Choice of languages : German, English, French (other options also available)
  - Data logger with internal RAM (standard) or FeRAM (option) and with micro SD card (standard).

### Technical data

Technical data, as for ALMEMO® 5690 series		Memory	Micro SD card, integrated drive
CPU board	Measuring circuit (without meas. inputs) Input boards (see page 01.48)	Outputs	5 ALMEMO® sockets, suitable for all output modules (analog / data / trigger / relay cables, etc.) Alarm signal transmitter, internal Socket P0 for integrated relay outputs (option) Or trigger and analog output (by request)
Measuring inputs / measuring channels		Display	
Standard	up to 100 inputs / 100 measuring channels via selector switch boards	Graphics display	128 x 128 pixels, 16 rows
Option XU	up to 190 inputs / 250 measuring channels via selector switch boards	Illumination	5 white LEDs, 3 brightness levels
Option XM	up to 190 inputs / 250 measuring channels via active measuring circuit boards	Operation	9 keys (4 soft-keys and cursor block) 9 status LEDs on front panel
Memory, internal			
Standard	sufficient for 400,000 values, linear or ring memory		
Option SF	RAM (buffered by battery) FeRAM (non-volatile)		

### Input boards / expansions

#### Order no.

Option XM - selector switch boards and active measuring circuit boards	(see page 01.48)
Relay / trigger / analog board, 2 slots Per system up to 4 boards are supported. (see chapter „Output modules“)	<b>ES5690RTA5</b>

### Options

#### Order no.

Up to 190 measuring inputs / 250 measuring channels	<b>OA5690XU</b>
For active measuring circuit boards, up to 190 measuring inputs / 250 measuring channels	<b>OA5690XM</b>
Data memory, internal FeRAM, non-volatile (instead of battery-buffered RAM)	<b>OA5690SF</b>
Multi-point adjustment, special linearization, management of calibration data	<b>OA5690KL</b>
Temperature ranges for 8 refrigerants (see 10.08)	<b>SB0000R2</b>
Measuring rate for 1 measuring channel, 400 mops (SD card required) This cannot be combined with option XM.	<b>SA0000Q4</b>
For output socket P0	
SH2 2 semiconductor relays (normally open) internal, 0.5 A, 50 V	<b>OA5690SH2</b>
OH2 2 additional relays (normally closed) for option SH2 (thus 2 changeover relays)	<b>OA5690OH2</b>

### Standard delivery

Precision measuring instrument, data acquisition system with graphics display and operating controls, CPU board  
Measuring circuit (without measuring inputs) Input boards must be ordered separately. (see page 01.48) Micro SD card,  
USB card reader, mains plug assembly ZB1212NA9, Operating instructions, manufacturer's test certificate.

DAkKS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“).  
DAkKS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

## ALMEMO® 5690-2CPUTG3



Dimensions:  
179 x 158 x 232 mm  
(WxHxD)

Data acquisition system in desktop housing TG3  
CPU board, 6 free slots **MA56902CPUTG3**  
Measuring inputs  
via three A10 or TH boards (30 inputs)  
or 6 MU or KS boards (60 inputs)  
or three RTA5 output boards

## ALMEMO® 5690-2CPUWG3



Dimensions:  
209 x 207 x 153 mm  
(WxHxD)  
(width includes fastening strips)

Data acquisition system in wall-mounted housing WG3  
CPU board, 6 free slots **MA56902CPUWG3**  
Measuring inputs  
via three A10 or TH boards (30 inputs)  
or 6 MU or KS boards (60 inputs)  
or three RTA5 output boards  
The boards have their connections facing downwards. To facilitate wall-mounting four holes (5.3 mm) are provided on the protruding strips to the left and right of the housing's backplate (which cannot itself be removed).

## ALMEMO® 5690-2CPUTG8



Dimensions:  
444 x H158  
x T232 mm  
(WxHxD)

Data acquisition system in desktop housing TG8  
CPU board, 19 free slots **MA56902CPUTG8**  
Measuring inputs  
via nine A10 or TH boards (90 inputs)  
or 19 MU or KS boards (190 inputs)  
or four RTA5 output boards

## ALMEMO® 5690-2CPUBT8



Dimensions:  
483 x 132  
x 273 mm  
(WxHxD)

Data acquisition system in 19-inch rack housing  
CPU board, 19 free slots **MA56902CPUBT8**  
Measuring inputs  
via nine A10 or TH boards (90 inputs)  
or 19 MU or KS boards (190 inputs)  
or four RTA5 output boards

### Technical data and functions

- Technical data and functions, as for ALMEMO® 5690 series
- Robust aluminum housing, protective class IP65
- CPU board with measuring circuit (without measuring inputs) and output sockets
- Up to 20 measuring inputs / 80 measuring channels via selector switch boards
- Option XM - high-speed measuring operations, up to 20 measuring inputs / 80 measuring channels via active measuring circuit boards  
The measuring circuit boards operate in parallel, thus ensuring short scanning times for a large number of channels. The scanning time is determined by the measuring circuit board with the highest number of active measuring channels - or, at conversion rate 50 Hz, also by the processing time of the CPU.
- Option - 5 ALMEMO® output sockets for digital interfaces, analog outputs, trigger, alarm contacts, socket P0 for integrated relay outputs
- Generously dimensioned graphics display, bright illumination, large display of measured values
- Measured values can be displayed graphically in line chart or bar chart form or numerically in various sizes.
- 3 user-defined menus can be freely configured from a range of 50 functions.
- Easy to operate by means of 4 soft-keys and cursor block, menu-guided with wizards and context-sensitive help windows
- Choice of languages : German, English, French (other options also available)
- Data logger with internal RAM (standard) or FeRAM (option) or external ALMEMO® memory connector with micro SD card

### Technical data

Technical data, as for ALMEMO® 5690 series		Operation	9 keys (4 soft-keys and cursor block) 9 status LEDs on front panel
Measuring inputs / measuring channels		Power supply	Mains unit ZB1212NA6, installed on a fixed basis, 100 to 240 VAC, connected via appliance socket, including safety connecting cable
Standard	up to 20 inputs / 80 measuring channels via selector switch boards	Screwed cable glands	2 PGs with multiple inserts, slotted 24 drilled holes for cables d= 4 mm 2 drilled holes for cables d= 7 mm for all supply lines (sensor cables, output cables, e.g. data cable, mains supply cable) including dummy plugs for all holes
Option XM	up to 20 inputs / 80 measuring channels via active measuring circuit boards	Housing	Aluminum
Memory, internal	sufficient for 400,000 values, linear or ring memory	Dimensions	233 x approx. 350 x 121 mm (WxHxD) (height includes PGs)
Standard	RAM (buffered by battery)	19-inch design	Plastic insert, 16 DUs
Option SF	FeRAM (non-volatile)	Weight	approx. 6 kg
External memory (accessory)	ALMEMO® memory connector with micro SD card	Protective class	IP65
Outputs	5 ALMEMO® sockets, suitable for all output modules (analog / data / trigger / relay cables, etc.) Alarm signal transmitter, internal Socket P0 for integrated relay outputs (option) Or trigger and analog output (by request)	Wall-mounting	4 x M4 thread, including 2 aluminum profiles
Display			
Graphics display	128 x 128 pixels, 16 rows		
Illumination	5 white LEDs, 3 brightness levels		

### Accessories

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

**ZA1904SD**

### Input boards

Option XM - selector switch boards and active measuring circuit boards

**Order no.**

see page 01.48

## ALMEMO® 5790-2CPUIG2



Dimensions:  
233 x approx.350 x 121mm  
(WxHxD),  
(with PGs)

Data acquisition system in industrial housing, CPU board, 2 free slots  
Measuring inputs  
via one A10 or TH board (10 inputs) or two MU or KS boards (20 inputs)

**MA57902CPUIG2**

### Options

### Order no.

for active measuring circuit boards, up to 20 inputs / 80 channels  
Data memory, internal FeRAM, non-volatile (instead of battery-buffered RAM)  
Multi-point adjustment, special linearization, management of calibration data  
Temperature ranges for 8 refrigerants (see 10.08)  
Measuring rate for 1 measuring channel, 400 mops (SD card required) This cannot be combined with option XM.  
For output socket P0  
SH2 2 semiconductor relays (normally open) internal, 0.5 A, 50 V  
OH2 2 additional relays (normally closed) for option SH2 (thus 2 changeover relays)  
Power supply via rechargeable battery module  
Rechargeable battery set (8 NiMH cells, 1600 mAh), 1 slot

**OA5690XM**  
**OA5690SF**  
**OA5690KL**  
**SB0000R2**  
**SA0000Q4**  
  
**OA5690SH2**  
**OA5690OH2**  
**OA5790A**  
**ES5690AP**

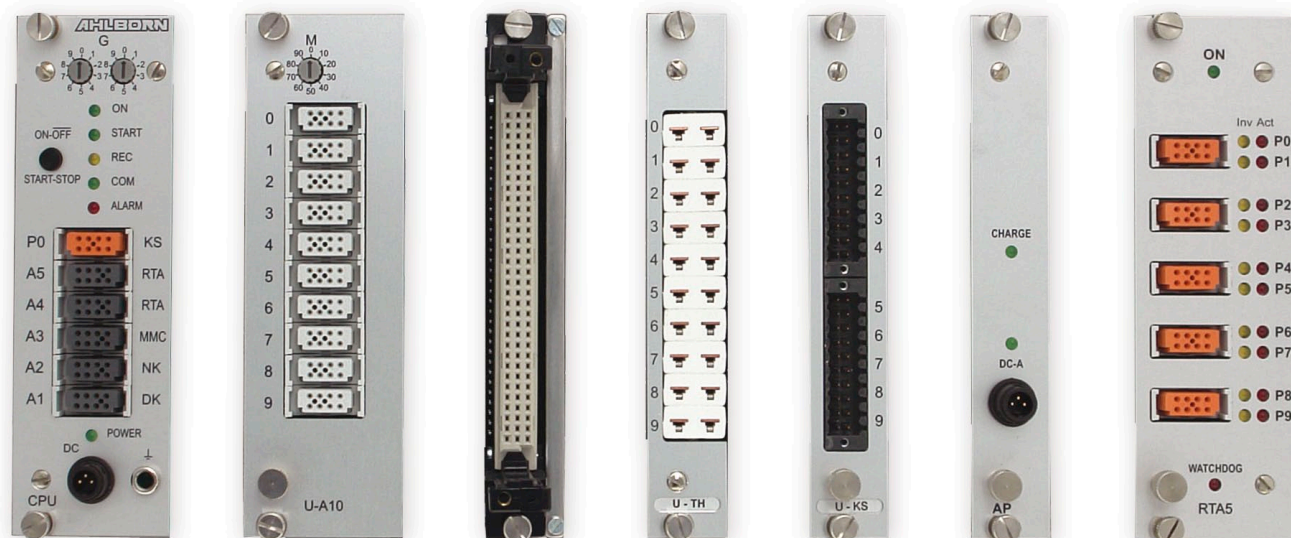
### Standard delivery

Precision measuring instrument, data acquisition system with graphics display and operating controls, CPU board  
Measuring circuit (without measuring inputs) Input boards must be ordered separately. (see page 01.48)  
Integrated mains unit ZB1212NA6, safety connecting cable, Operating instructions, manufacturer's test certificate

DAkKS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“).  
DAkKS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

# ALMEMO® Measuring Instruments

CPU board, selector switch boards, active measuring circuit boards and expansions for CPU systems ALMEMO® 5690-1CPU and 5690-2CPU



CPU

U-A10  
M-A10

U-MU  
M-MU

U-TH  
M-TH

U-KS (U/I)  
M-KS (U/I)

AP

RTA5

## Input boards for ALMEMO® 5690-1CPU and 5690-2CPU

### Technical data and functions

- Selector switch boards U-xx for CPU systems without options XU / XM or with option XU
- Active measuring circuit boards M-xx with own A/D converter for CPU systems with option XM
- There are several design variants for different installations / input plugs.

### Input board U-A10 / M-A10



**10 inputs for ALMEMO® single connectors.**  
**For flexible applications with individual sensors and measuring signals.**

### Technical data

Measuring inputs	10 ALMEMO® input sockets, electrically isolated
Measuring ranges	All ranges (see page 01.05)
Sensor supply	12 V, maximum 0.3 A (per system max. 2.5 A)
Footprint	2 slots

### Standard delivery

Selector switch board U-A10  
Active measuring circuit board M-A10  
(for CPU system with option XM)

### Order no.

ES5690UA10

ES5690MA10

### Input board U-MU / M-MU



**10 inputs for ALMEMO® 10 MU connectors.**  
**For permanently installing groups of 10, especially temperature sensors.**

### Technical data

Measuring inputs	10 inputs, electrically isolated, socket strip for ALMEMO® 10-way MU connector
Measuring ranges	all thermocouples, Pt100, Ni100, ohms, 2.6 V, 260 mV, 55 mV, 26 mV
Sensor supply	None
Footprint	1 slot

### Standard delivery

Selector switch board U-MU  
Active measuring circuit board M-MU  
(for CPU system with option XM)  
ALMEMO® 10-way MU connector

### Order no.

ES5690UMU

ES5690MMU

ZA5690MU



## Input board U-TH / M-TH



**10 inputs for miniature thermal connectors.**  
**For any individual thermocouple temperature sensors with miniature thermal connector.**

### Technical data

Measuring inputs	10 miniature thermal sockets, electr. isolated ALMEMO® sensor parameters are saved in the measuring instrument.
Measuring ranges	all thermocouples
Sensor supply	None
Footprint	2 slots

### Standard delivery

Standard delivery	Order no.
Selector switch board U-TH	ES5690UTH
Active measuring circuit board M-TH (for CPU system with option XM)	ES5690MTH
Miniature thermal connectors must be ordered separately	

## Input board U-KS / M-KS



**10 inputs, electrically isolated, sensor connection via socket block.**  
**For permanently installing groups of 10**

### Technical data

Measuring inputs	10 inputs, electrically isolated, male strip connector for socket block ALMEMO® sensor parameters are saved in the measuring instrument.
Measuring ranges	Pt100, Ni100, NTC, ohms, 2.6 V, 260 mV, 55 mV, 26 mV
Sensor supply	None
Footprint	1 slot

### Standard delivery

Standard delivery	Order no.
Selector switch board U-KS including socket block	ES5690UKS
Active measuring circuit board M-KS including socket block (for CPU system with option XM)	ES5690MKS
Socket block (spare)	ZB5600KS

## Input board U-KSU / M-KSU



**10 inputs, electrically isolated, sensor connection via socket block.**  
**For permanently installing groups of 10 with voltages 10 V.**

### Technical data

Measuring inputs	10 inputs, electrically isolated, male strip connector for socket block ALMEMO® sensor parameters are saved in the measuring instrument.
Measuring ranges	Voltage -26 to +26 V (integrated divider)
Accuracy, divider	±0.1 % of measured value
Sensor supply	None
Footprint	1 slot

### Standard delivery

Standard delivery	Order no.
Selector switch board U-KSU including socket block	ES5690UKSU
Active measuring circuit board M-KSU including socket block (for CPU system with option XM)	ES5690MKSU
Socket block (spare)	ZB5600KS

## Input board U-KSI / M-KSI



**10 inputs, electrically isolated, sensor connection via socket block.**  
**For permanently installing groups of 10 with currents 20 mA.**

### Technical data

Measuring inputs	10 inputs, electrically isolated, male strip connector for socket block ALMEMO® sensor parameters are saved in the measuring instrument.
Measuring ranges	Current -32 to +32 mA (integrated shunt)
Accuracy, shunt	±0.1 % of measured value
Sensor supply	None
Footprint	1 slot

### Standard delivery

Standard delivery	Order no.
Selector switch board U-KSI including socket block	ES5690UKSI
Active measuring circuit board M-KSI including socket block (for CPU system with option XM)	ES5690MKSI
Socket block (spare)	ZB5600KS

Universal ALMEMO® transmitter 2450 / 2490



- 1 or 2 measuring inputs
- Various outputs - digital, analog
- Various power supplies

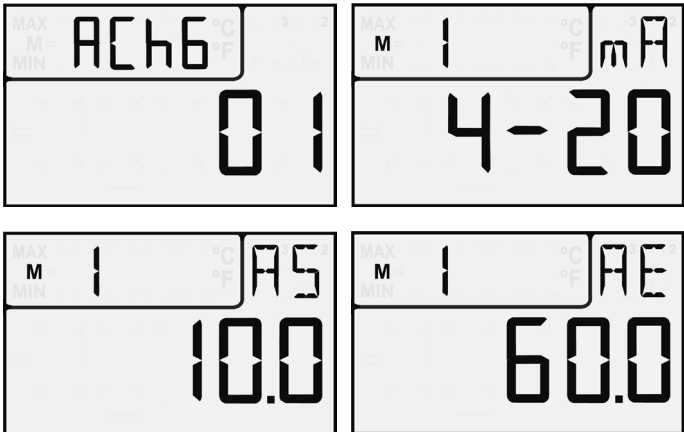
ALMEMO® transmitter - a comparison

	ALMEMO® 2450 Compact measuring instrument	ALMEMO® 2490 Basic measuring instrument
Measuring ranges (see Table, page 01.10 / 01.11)	Over 35 measuring ranges, inter alia thermocouples, NTC, temperature / humidity, capacitive	Over 65 measuring ranges, inter alia Pt100, Pt1000, thermocouples, NTC temperature / humidity, capacitive temperature / humidity, psychrometric
Precision class technical data (see page 01.05)	C	B
Measuring inputs	ALMEMO® 2450-1x 1 measuring input	ALMEMO® 2490-1x 1 measuring input ALMEMO® 2490-2x 2 measuring inputs
Other technical data	(see ALMEMO® 2450, page 01.12)	(see ALMEMO® 2490, page 01.14)

Common technical data

Analog outputs	10 V or 20 mA (programmable) 16-bit DAC, electrically isolated	Standard equipment	LCD screen, keypad
0.0 to 10.0 V	0.5 mV / digit, load >100 kilohms	Housing	ABS (maximum 70 °C) 127 x 83 x 42 mm (LxWxH)
0.0 / 4.0 to 20.0 mA	0.1 mA / digit, load <500 ohms	Operating temperature	-10 to +60 °C
Accuracy	0.1% of meas. v. +0.1% of final v.	Atmospheric humidity	10 to 90 % RH (non-condensing)
Temperature drift	10 ppm / K		
Time constant	100 ms		

Programming the analog output (Example)



Analog - start

Analog - end

## Compact measuring instrument ALMEMO® 2450-1x Universal transmitter with display for a wide variety of ALMEMO® sensors

### Technical data

Measuring input ALMEMO® 2450-1x	1 ALMEMO® socket
Measuring ranges	(see Table, page 01.10 / 01-11) Over 35 measuring ranges, inter alia  Thermocouples, NTC, temperature, humidity, capacitive
Other common data (see page 01.50)	

### Variants

#### Digital transmitter

Measuring input for ALMEMO® sensors, LCD screen, 7 keys, with interface via 2 ALMEMO® output sockets A1, A2, and 1 ALMEMO® DC socket for mains adapter including 3 AA alkaline batteries, operating instructions, manufacturer's test certificate, **Compact measuring instrument ALMEMO® 2450-1**  
1 measuring input **MA24501**

Analog transmitter, like the digital transmitter described above, plus integrated analog output via socket P0, electrically isolated (scaling via keypad), including ALMEMO® clamp connectors 2 analog outputs (common ground), electrically isolated, 10 V or 20 mA (programmable)

**Compact measuring instrument ALMEMO® 2450-1**,  
1 Messeingang **MA24501R02**

### Option

Protective class IP54  
(if water-proof plugs are used) **OA2450W**  
Option U Power supply, electrically isolated **OA2450U**  
Option I RS485 interface **OA2450I**

## Basic measuring instrument ALMEMO® 2490-1x / -2x Universal transmitter with display for all ALMEMO® sensors

### Technical data

Measuring input ALMEMO® 2490-1x ALMEMO® 2490-2x	1 ALMEMO® socket 2 ALMEMO® sockets
Measuring ranges	(see Table, page 01.10 / 01-11) Over 65 measuring ranges, inter alia Pt100, Pt1000, thermocouples, NTC Temperature / humidity, capacitive Temperature / humidity, psychrometric
Other common data (see page 01.50)	

### Variants

#### Digital transmitter

Measuring input for ALMEMO® sensors, LCD screen, 7 keys, with interface via 2 ALMEMO® output sockets A1, A2, and 1 ALMEMO® DC socket for mains adapter including 3 AA alkaline batteries operating instructions, manufacturer's test certificate **Basic measuring instrument ALMEMO® 2490-1**  
1 measuring input **MA24901**

**Basic measuring instrument ALMEMO® 2490-2**  
2 measuring inputs **MA24902**

Analog transmitter, like the digital transmitter described above, plus integrated analog output via socket P0, electrically isolated (scaling via keypad), including ALMEMO® clamp connectors 2 analog outputs (common ground), electrically isolated, 10 V or 20 mA (programmable)

**Basic measuring instrument ALMEMO® 2490-1**  
1 measuring input **MA24901R02**  
**Basic measuring instrument ALMEMO® 2490-2**  
2 measuring inputs **MA24902R02**

### Option

Protective class IP54  
(if water-proof plugs are used) **OA2490W**  
Option U Power supply, electrically isolated **OA2490U**  
Option I RS485 interface **OA2490I**

DAkKS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“)  
DAkKS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

## Accessories, options

(please order separately)	
<b>Power supply</b>	<b>Limit value contact</b> (see chapter „Output modules“)
230 VAC via desktop mains unit 12 V, 1 A	(Programming via digital interface, see above)
10 to 30 VDC, maximum 80 mA, electrically isolated, integrated	2 normally open contacts, 50 VDC / 500 mA
including ALMEMO® clamp connector	(can also be programmed as inverted)
10 to 30 VDC, maximum 200 mA, electrically isolated,	via ALMEMO® relay cable, V6, clamped connection
via DC adapter cable, with banana plugs	ALMEMO® limit value cable with banana plugs
10 to 30 VDC, not electrically isolated (not suitable for thermocouple	(for electrical socket adapter)
measuring) including ALMEMO® clamp connector	Electrical safety socket adapter, 250 V / 6 A
	(for ALMEMO® limit value cable)
<b>Digital interface</b> (see chapter „Networking“)	<b>Installation</b>
USB interface via ALMEMO® USB cable	DIN rail
Ethernet interface via ALMEMO® Ethernet cable	Magnet
RS232 interface via ALMEMO® RS232 cable	
RS485 interface, integrated	
including ALMEMO® clamp connector	

## ALMEMO® 4390-2



**ALMEMO® precision measuring instrument in fitted panel design with data logger function.**  
**Comprehensive range of functions for all application areas**  
**Increased measuring accuracy, fast measuring rate, 1 measuring input, 2 limit value relays, integrated. Option with double analog output.**

## Technical data and functions

- Increased measuring accuracy and stability
- Fast measuring rate, up to 50 measuring operations per second  
 With SD memory card, up to 100 mops, optional for 1 channel up to 400 mops
- 1 ALMEMO® input socket, suitable for all ALMEMO® sensors
- or 6-contact clamp connector socket, also for 26 V and 20 mA
- More than 65 standard measuring ranges
- Support for ALMEMO® plugs with multi-point adjustment, special linearization, and special measuring ranges
- Higher measuring quality thanks to electrical isolation between measuring inputs and device power supply (device ground)
- Data logger with internal EEPROM, sufficient for 16,000 measured values, configurable as linear or ring memory
- Memory connector with micro SD (accessory)
- As standard 2 limit value relays can also be driven via interface
- Option with double analog output can also be driven via interface
- 2 ALMEMO® output sockets, suitable for digital interfaces, analog output, trigger input, alarm contacts, memory card
- 8-character alphanumeric 14-segment display
- **new:** Programming functions displayed in normal text (3 languages)
- **new:** 5 programming menus  
 Measuring function, memory, sensor, device, output
- Measuring functions  
 Measured value, dual display, smoothing, zero-setting, setpoint adjustment, maximum / minimum / average values, temperature compensation, atmospheric pressure compensation
- Sensor programming: Measuring range, measured value correction, scaling, units, limit value monitoring, graduated locking of functions, scaling of analog output
- Device programming: Conversion rate, real-time clock with date, output cycle, baud rate, choice of languages

## Technical data

Precision class	AA (see page 01.05)	Option with double analog output 10 V or 20 mA (programmable)
Measuring rate	2.5 / 10 / 50 / 100 mops	16-bit DAC, electrically isolated
Measuring inputs	1 ALMEMO® input socket, suitable for all ALMEMO® sensors or 6-contact screw connector with input for 26 V (integrated divider) or 20 mA (integrated shunt)	0.0 to 10.0 V 0.0 to 20.0 mA Accuracy Temperature drift Time constant
Accuracy	Divider / shunt $\pm 0.1$ % of measured value	0.5 mV / digit, load >100 kilohms 0.1 mA / digit, load <500 ohms 0.1 % of final value 10 ppm / K 100 $\mu$ s
Channels	4 channels for double sensors and function channels	Standard equipment
Electrical isolation for analog sensors	between measuring input and power supply (device ground)	Display Keypad Date and time-of-day Memory, internal EEPROM sufficient for 16,000 measured values
Sensor power supply	12 V / 0.1 A; 9 V / 0.15 A; 6 V / 0.2 A	Power supply
Outputs	2 ALMEMO® sockets, suitable for all output modules (analog / data / trigger / relay cables, memory, etc.)	Mains operation Option U
2 limit value relays	Mechanical changeover, 230 V, 2 A	90 to 250 VAC, 50 / 60 Hz 10 to 30 V, 0.5 A, electrically isolated
		Housing
		Standard plastic housing 96 x 48 x 132 mm (WxHxD)
		Panel opening
		90 x 42.5 mm

## Accessories

	Order no.
Memory connector with micro SD, including USB card reader (see chapter „Output modules“)	ZA1904SD

## Options

	Order no.
Measuring rate 400 mops (SD card required)	SA0000Q4
Power supply 10 to 30 VDC, electrically isolated	OA4390U
2 analog outputs (common ground), electrically isolated 10 V or 20 mA (programmable)	OA4390R02
Temperature ranges for 8 refrigerants	SB0000R2

## Standard delivery

	Order no.
Operating instructions, manufacturer's test certificate, <b>Precision measuring instrument ALMEMO® 4390-2</b>	MA43902

DAkKS or works calibration KE90xx, electrical, for measuring instrument (see chapter „Calibration certificates“).  
 DAkKS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

# Reference Measuring Instruments



## High-precision measuring

The new reference measuring instruments ensure very high levels of resolution, precision, and linearity. They are thus ideally suitable as reference instruments in calibration laboratories and quality assurance procedures. They measure with resolution up to 0.001 K. These devices are offered

in a set including sensor. They come in a compact design (with an optional variant with protective class IP54), an illuminated graphics display, and easy and convenient operation by soft-keys and the cursor block. There are two output sockets which can be used for connection to a PC

or for networking. There is also a plug-on measured value memory available as an option. Delivery includes evaluation software, data cable, temperature sensor, DAkkS calibration certificate, mains unit, and measuring instrument case.



# Reference Measuring Instruments

10/2013 • We reserve the right to make technical changes.

## ALMEMO® 1030-2



**Reference measuring instrument for temperature.**  
**High-precision measuring with Pt100 sensors**  
**Resolution 0.001 K**

- Temperature measurement with very high resolution, precision, and linearity, using Pt100 sensors
- Suitable as reference device in calibration laboratories and quality assurance procedures
- Very high accuracy thanks to multi-point adjustment of the Pt100 temperature sensor
- 2 electrically isolated measuring inputs for Pt100 sensors
- Resolution can be set to 0.001 or 0.01 K.
- Units °C, °F, K
- High-resolution A/D converter, delta-sigma, 24-bit, 1.25 mops (measuring operations per second)
- Two output sockets for digital interface, ALMEMO® memory connector
- Compact, modern, ergonomic design
- Graphics display, illuminated with white light
- Easy and convenient to operate by means of 4 soft-keys and cursor block
- Measured value display 2 measured values and differential
- Measuring functions: Zero-setting, smoothing, maximum / minimum values, individual value memory for 100 values
- Data logger with ALMEMO® memory connector (accessory)
- Sensor programming: Smoothing, designation, units, resolution
- Device configuration: Illumination, contrast, device address, baud rate
- Choice of language: German, English, French

### Technical data

<b>Measuring inputs</b>	2 ALMEMO® input sockets for Pt100 sensors	<b>Power supply</b>	Battery set 3 AA alkaline batteries
Electrical isolation	Semiconductor relay (50 V)	Mains adapter	ZA1312NA7 230 VAC to 12 VDC, 1 A, electrically isolated
A/D converter	Delta-sigma, 24-bit, 1.25 mops	Current consumption (without input and output modules)	approx. 20 mA
Measuring range	Pt100, -200 to +400 °C	With illumination	approx. 40 mA
Resolution	0.001 K or 0.01 K	Housing	127 x 83 x 42 mm (LxWxH) ABS (maximum 70 °C) 290 g
Measuring current	1 mA	<b>Pt100 temperature sensor FPA923L0250</b>	
Accuracy	±0.010 K ±1 digit in range -50 to +400 °C	Measuring element	Pt100 as per DIN EN 60751
Nominal conditions	23 °C ±2 K, 1013 mbar, battery mode	Class	1/10 B (DIN EN 60751) at 0 °C
Temperature drift	typical 2 ppm / K	Measuring tip	Operative range -50 to +400 °C
<b>Outputs</b>	2 ALMEMO® sockets for interface cable and ALMEMO® memory connector	Response time T <sub>90</sub>	5 seconds
<b>Standard equipment</b>		Nominal length	250 mm
Display	Graphics display, 128 x 64 pixels, 8 rows	Shaft	Stainless steel, diameter 3 mm
Illumination	2 white LEDs	Connecting cable	2 meters, FEP / silicone
Keypad	7 silicone keys (of which 4 soft-keys)	ALMEMO® plug	Resolution 0.001 K
Date and time-of-day	Real-time clock, buffered by device battery	Other sensor designs are available on request.	
Individual value memory, internal	100 measured values		

Accessories	Order no.	Order no.
Ethernet data cable	ZA1945DK	Rubberized impact protection, gray ZB2490GS2
ALMEMO® memory connector with micro SD	ZA1904SD	DIN rail mounting ZB2490HS

Standard delivery	Order no.
<b>Reference measuring instrument for temperature measurement with accessories, evaluation software, and Pt100 temperature sensor. Complete set including DAkkS calibration certificate:</b>	
Reference measuring instrument ALMEMO® 1030-2 including 3 AA alkaline batteries, Desktop mains unit ZA1312NA7, USB data cable ZA1919DKU, Instrument case, evaluation software ALMEMO® View SW5500AV (see page 06.06) and Pt100 temperature sensor FPA923L0250 with DAkkS calibration certificate (2 temperature points at 0 and 100 °C, including adjustment)	<b>SP10302D</b>

## ALMEMO® 1020-2



**Reference measuring instrument for temperature**  
**High-precision measuring by means of thermocouples**  
**Types N, S, R, B**  
**Resolution 0.01 K, up to 1800 °C**

### Technical features

- Temperature measurement with very high levels of resolution, precision, and linearity, using thermocouples Types N, S, R, B
- Suitable as reference device in calibration laboratories and quality assurance procedures
- Very high accuracy thanks to multi-point adjustment of the thermocouple temperature sensor
- Each temperature sensor has its own cold junction stored in the ALMEMO® plug or externally. The cold junction temperature in the ALMEMO® plug is measured to a very high resolution of 0.001 K by means of an NTC sensor.
- Two electrically isolated measuring inputs for thermocouples, types N, S, R, B
- Resolution 0.01 K
- Units °C, °F, K
- High-resolution A/D converter, delta-sigma, 24-bit, 1.25 mops (measuring operations per second)
- Two output sockets for digital interface, ALMEMO® memory connector
- Compact, modern, ergonomic design
- Graphics display, illuminated with white light
- Easy and convenient to operate by means of 4 soft-keys and cursor block
- Measured value display : 2 measured values, differential, measuring point list, cold junction temperature
- Measuring functions : Zero-setting, smoothing, maximum / minimum values, individual value memory for 100 values
- Data logger with ALMEMO® memory connector (accessory)
- Sensor programming : Smoothing, designation, units
- Device configuration : Illumination, contrast, device address, baud rate
- Choice of language : German, English, French

### Technical data ALMEMO® 1020-2

Measuring inputs	2 ALMEMO® input sockets for thermocouples	Outputs	2 ALMEMO® sockets for interface cable and ALMEMO® memory connector
Electrical isolation	Semiconductor relay (50 V)	<b>Standard equipment</b>	
A/D converter	Delta-sigma, 24-bit, 1.25 mops	Display	Graphics display, 128 x 64 pixels, 8 rows
Measuring ranges		Illumination	2 white LEDs
NiCrSi-NiSi Type N	-200 to +1300 °C	Keypad	7 silicone keys (of which 4 soft-keys)
PtRh10-Pt Type S	-50 to +1768 °C	Date and time-of-day	Real-time clock, buffered by battery
PtRh13-Pt Type R	-50 to +1768 °C	Individual value memory, internal	100 measured values
PtRh30-PtRh6 Type B	+250 to +1820 °C	<b>Power supply</b>	
Resolution	0.01 K	Battery set	3 AA alkaline batteries
Accuracy	±0.1 K ± 1 digit in range	Mains adapter	ZA1312NA7 230 VAC to 12 VDC, 1 A, electrically isolated
Type N	-200 to +1300 °C	Current consumption (without input and output modules)	approx. 20 mA
Type S	+50 to +1760 °C	With illumination	approx. 40 mA
Type R	+100 to +1760 °C	Housing	127 x 83 x 42 mm (LxWxH)
Type B	+500 to +1800 °C		ABS (maximum 70 °C), 290g
Nominal conditions	23 °C ±2 K, 1013 mbar, battery mode		
Temperature drift	typical 10 ppm / K		
Cold junction temperature	Measuring operations with 0.001 K resolution		

### Accessories

Ethernet data cable  
 ALMEMO® memory connector with micro SD  
 Rubberized impact protection, gray  
 DIN rail mounting

### Order no.

ZA1945DK  
 ZA1904SD  
 ZB2490GS2  
 ZB2490HS

# Reference Measuring Instruments

## Variants

**Complete set comprising reference measuring instrument for temperature plus accessories, evaluation software, thermocouple sensor, with DAkkS calibration certificate**

Reference measuring instrument ALMEMO® 1020-2, including 3 AA alkaline batteries, desktop mains unit ZA1312NA7, USB data cable ZA1919DKU, instrument case, and evaluation software ALMEMO® View SW5500AV (see page 06.16)

### Set with high-precision sheathed thermocouple sensor type N



#### Set

with sheathed thermocouple sensor type N FTAN926L0500P2  
with DAkkS calibration certificate at 0 / 100 / 500 / 1000 °C,  
including adjustment

#### Order no.

**SP10202ND**

#### Technical data:

Sheathed thermocouple sensor type N FTAN926L0500P2	
Measuring element	NiCrSi-NiSi, type N, class 1
Measuring tip	Mineral-insulated sheathed line, d = 6 mm, L = 500 mm
Operative range	-200 to +1150 °C
Connecting cable	1.5 meters, thermal line (stranded wire) FEP / silicone (-50 to +200 °C)
ALMEMO® plug	Resolution 0.01 K with integrated cold junction compensation sensor

### Set with high-precision thermocouple sensor type S



#### Set

with thermocouple sensor type S FTAS917L0700P2  
replacement ceramic protective tube, case for sensors  
ZB9000TK2 with DAkkS calibration certificate  
at 500/1000/1200 °C, including adjustment

#### Order no.

**SP10202S1D**

#### Technical data:

Thermocouple sensor type S FTAS917L0700P2	
Measuring element	PtRh10-Pt, Type S, Class 1
Measuring tip	Thermowire, d = 0.5 mm in ceramic protective tube diameter = 7 mm, length = 700 mm
Operative range	up to +1400 °C
Connection head	ceramic protective tube, screwed
Connecting cable	1.5 meters, compensation line FEP / silicone (-50 to +200 °C)
ALMEMO® plug	Resolution 0.01 K with integrated cold junction compensation sensor

### Set with precision thermocouple sensor type S, with external cold junction



#### Set

with thermocouple sensor type S, with external cold junction  
FTAS907L0700P2, replacement ceramic protective tube,  
Case for sensors ZB9000TK2 with DAkkS calibration certificate  
at 500 / 1000 / 1200 °C,  
including adjustment

#### Order no.

**SP10202S2D**

#### Technical data:

Thermocouple sensor type S, with external cold junction FTAS907L0700P2	
Measuring element	PtRh10-Pt, Type S, Class 1
Measuring tip	Thermowire, d = 0.5 mm in ceramic protective tube diameter = 7 mm, length = 700 mm
Operative range	up to +1600 °C
Connection head	ceramic protective tube, screwed
Connecting cable	0.75 meters, insulated, thermo-wires PtRh10-Pt as far as cold junction
Cold junction	Stainless steel protective tube diameter = 5 mm, length = 250 mm
Connecting cable	2 meters, stranded copper wire
ALMEMO® plug	Resolution 0.01 K

## Certificates

### Calibration certificate for ALMEMO® 1020-2 with precision sheathed thermocouple sensor type N (Example)

**Kalibriergegenstand** 1 Thermoelementfühler NiCrSi-NiSi, Typ N, Ø 6 mm Länge 760 mm, angeschlossen an ein Temperaturanzeigergerät ALMEMO 1020-2, Serien-Nr. H12070031

**Object of calibration** 1 thermocouple probe NiCrSi-NiSi, type N, Ø 6 mm length 760 mm, connected with one temperature measuring device ALMEMO 1020-2, Serial-No. H12070031

**Messergebnisse / Test Result**

Kanal Channel	Serien-Nr. Serial No.	Prüftemperatur Test Temperature °C	Anzeige Indication °C	Abweichung Deviation K	Messunsicherheit Uncertainty K
M0	-	1150,00	1150,00	0,00	3,0
		1000,00	1000,00	0,00	1,5
		500,00	500,00	0,00	1,0
		100,00	100,00	0,00	0,3

Die Werte beziehen sich auf die Internationale Temperaturskala von 1990 (ITS-90).  
The values are based on the International Temperature Scale of 1990 (ITS-90).

### Calibration certificate for ALMEMO® 1020-2 with precision thermocouple sensor type S, with external cold junction (Example)

**Kalibriergegenstand** 1 Thermoelementfühler Pt10%Rh-Pt, Typ S, Schutzrohr: Keramik, Ø 8,2 mm, Länge 500 mm, mit externer Vergleichsstelle, angeschlossen an ein Temperaturanzeigergerät ALMEMO 1020-2, Serien-Nr. H12070031

**Object of calibration** 1 thermocouple probe Pt10%Rh-Pt, type S, Sheath tube: ceramics, Ø 8,2 mm, length 500 mm, with external cold-junction, connected with one temperature measuring device ALMEMO 1020-2, Serial-No. H12070031

**Messergebnisse / Test Result**

Kanal Channel	Serien-Nr. Serial No.	Prüftemperatur Test Temperature °C	Anzeige Indication °C	Abweichung Deviation K	Messunsicherheit Uncertainty K
M0	12050001	1200,00	1200,00	0,00	1,5
		1000,00	1000,00	0,00	1,0
		500,00	500,00	0,00	0,5

Die Werte beziehen sich auf die Internationale Temperaturskala von 1990 (ITS-90).  
The values are based on the International Temperature Scale of 1990 (ITS-90).

**Die Korrektur der Messkette erfolgte über die Mehrpunktjustage-Funktion!**  
The correction of the measuring system was realized by the multiple point function!

**Bedingungen während der Kalibrierung**  
Calibration Conditions

Other certificates for measuring instruments and sensors (see chapter „Calibration certificates“)



# Reference Measuring Instruments

## ALMEMO® 1036-2



Reference measuring instru-  
ment for humidity  
High-precision measuring  
with Pt100 psychrometer  
Resolution Temperature 0.001 K  
Relative humidity 0.01 %  
Dew point 0.01 K

### Technical features

- Humidity measurement with very high resolution, precision, and linearity, using Pt100 psychrometer
- Suitable as reference device in calibration laboratories and quality assurance procedures
- Very high level of accuracy using the Pt100 psychrometer thanks to multi-point adjustment of the two temperature sensors
- Pt100 psychrometer optimized for measuring operations involving high humidity levels performed over long periods
- **new:** Automatic atmospheric pressure compensation is provided for pressure-dependent humidity variables by means of a digital atmospheric pressure sensor integrated in the ALMEMO® device.
- **new:** Humidity calculation 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.
- Resolution : Temperature Pt100 0.001 K, Relative humidity 0.01%, Dew point 0.01 K
- The humidity variables are calculated from the three primary measuring channels (real measurable variables). Dry temperature (°C), humid temperature (°C), atmospheric pressure (mbar)
- Three humidity variables displayed simultaneously, freely selectable : Relative humidity (%), dew point (°C), mixture (g/kg),

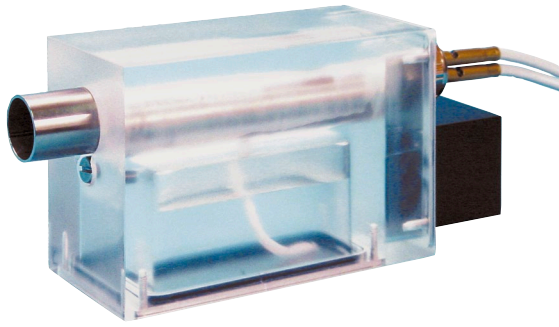
- new:** Absolute humidity (g/m³), vapor pressure (mbar), enthalpy (kJ/kg)
- Two electrically isolated measuring inputs for Pt100 sensors
- High-resolution A/D converter, delta-sigma, 24-bit, 1.25 mops (measuring operations per second)
- Two output sockets for digital interface, ALMEMO® memory connector
- Compact, modern, ergonomic design
- Graphics display, illuminated with white light
- Easy and convenient to operate by means of 4 soft-keys and cursor block
- Measured value display : Sensor display (up to 4 measured values), measuring points list, atmospheric pressure
- Measuring functions : Zero-setting, smoothing, maximum / minimum values, individual value memory for 100 values
- Data logger with ALMEMO® memory connector (accessory)
- Sensor programming : Smoothing, designation, measuring range selection, locking
- Device configuration : Illumination, contrast, device address, baud rate, atmospheric pressure
- Choice of language : German, English, French
- Humidity measurement in temperature range -100 to +200 °C, with precision digital capacitive temperature / humidity sensors FHAD 36 Rx, with ALMEMO® D6 connector (Accessories, see chapter „Atmospheric humidity“). Configuration of ALMEMO® D6 sensors on ALMEMO® device itself

### Technical data ALMEMO® 1036-2

Measuring inputs	Two ALMEMO® input sockets for Pt100 psychrometer FPA 836-3P3 or Precision digital capacitive temperature / humidity sensors FHAD 36 Rx Semiconductor relay (50 V)	Outputs	Two ALMEMO® sockets for interface cable and ALMEMO® memory connector
Electrical isolation		Standard equipment	
A/D converter	Delta-sigma, 24-bit, 1.25 mops	Display	Graphics display, 128 x 64 pixels, 8 rows Illumination 2 white LEDs
Measuring range	Pt100, -200 to +400 °C	Keypad	7 silicone keys (of which 4 soft-keys)
Resolution	0.001 K	Date and time-of-day	Real-time clock, buffered by battery
Measuring current	1 mA	Individual value memory, internal	100 measured values
Accuracy	±0.010 K ±1 digit in range -50 to +400 °C	Power supply	
Nominal conditions	23 °C ±2 K, 1013 mbar, battery mode	Battery set	3 AA alkaline batteries
Temperature drift	typical 2 ppm / K	Mains adapter	ZA1312NA7 230 VAC to 12 VDC, 1 A, electrically isolated
Calculated humidity quantities	Analytic equation (not an approximation)	Current consumption (without input and output modules)	approx. 20 mA
Digital atmospheric pressure sensor (integrated in the device)		With illumination	approx. 40 mA
Measuring range	700 to 1100 mbar	Housing	127 x 83 x 42 mm (LxWxH)
Accuracy	±2.5 mbar (at 0 to +65 °C)		ABS (maximum 70 °C), 290g



# Reference Measuring Instruments



Psychrometer FPA 836-3P3

## Technical data Pt100 psychrometer FPA 836-3P3

Operating temperature	up to +90 °C (no ice)	Dimensions	175 x 50 x 75 mm (LxWxH)
Humidity measuring range	approx. 10 to 100 % RH	Ventilator power supply	12 VDC via mains unit cable, approx. 1.5 meters (included in delivery)
Measuring system	psychrometric	Connecting cables	2 cables, each 5 meters, FEP / silicone
Accuracy	< ±1 % RH under nominal conditions	ALMEMO® plug	Pt100, resolution 0.001 K
Nominal conditions	23 °C ±2 K, 1013 mbar, 50 % RH		
Temperature sensors	2 x Pt100, class B, ALMEMO® adjusted		
Housing	Plastic PMMA		

## Accessories

### Order no.

Ethernet data cable	ZA1945DK
ALMEMO® memory connector with micro SD	ZA1904SD
Rubberized impact protection, gray	ZB2490GS2
DIN rail mounting	ZB2490HS
Spare wicks (2 pieces)	ZB98462ED
Extension cable for mains units, 3-pin bayonet coupling, length 5 meters	ZB5090VK05

## Variants

### Order no.

**Reference measuring instrument for humidity measurement with accessories, evaluation software, and Pt100 psychrometer, Complete set including DAkKS calibration certificate**

Reference measuring instrument ALMEMO® 1036-2, with integrated digital atmospheric pressure sensor including 3 AA alkaline batteries, desktop mains unit ZA1312NA7, USB data cable ZA1919DKU, instrument case, and evaluation software ALMEMO View SW5500AV (see page 06.16) and Pt100 psychrometer FPA 836-3P3 including mains unit, water bottle, pair of wicks with DAkKS calibration certificate  
Temperature at approx. +25 °C, relative humidity at approx. 30 % / 70 % RH, and atmospheric pressure in range 700 to 1100 mbar (5 points)

**SP10362D**

