

# ALMEMO® MEASURING INSTRUMENTS

## The ALMEMO® System

Since the first ALMEMO® instrument, we have continuously improved the fascinating ALMEMO® system with its infinite possibilities for sensor connection, data processing and device networking. As a result, a wide range of all types of measuring instruments is now available; from 1-channel transmitters to data acquisition systems with more than 1000 measuring points.

The measuring instruments of the ALMEMO® series only differ from each other with regard to their enclosure (handheld instruments, desktop instruments, 19" systems, switchboard instruments, transmitters etc.), the number of measuring inputs (1 to 250), the display, output and operating controls, and the power supply. By means of the intelligent ALMEMO® connector, when connecting the sensors and interface cables, the instruments will be completely programmed up to the time-oriented sequential control. They provide a uniform function range and configurable options. Furthermore, all parameters can be accessed via the interface and can also be modified as the memory devices built into the connectors can be repeatedly overwritten.

### ► The ALMEMO® Principle: Only One Instrument For All Sensors:

There is a wide range of transducers, sensors and signals that, when using the patented ALMEMO® connector system, can be connected to any measuring input of any measuring instrument. No programming is required as all sensor data is contained in the connector plug, enabling the measuring instrument to be automatically configured as soon as it is connected. By means of the sensor data memory (EEPROM) all sensors can be calibrated, scaled and identified with a uniquely defined designation. This individual sensor designation allows for a neat arrangement of the measurement setup and avoids confusion. Sensor errors can be corrected within the connector, i.e. simple sensors become precision transducers. Standard signals can be displayed with their original dimension. For multi sensors, e.g. temperature and humidity, generally, only one shared connector will be required. The programming can be protected by a graded locking function. Conclusion: Highest possible precision at minimum expenditure; faulty measurements do not occur.

### ► You Will Not Need Any New Sensors To Use ALMEMO® Instruments!

We will provide you with the matching connector for your own existing sensors, which are very easy to connect. Furthermore, you can program ALMEMO® connectors on your own via keypad, terminal or software. The memory devices within the connector can be repeatedly overwritten.

### ► ALMEMO® Instruments Can Be Used Universally!

All instruments contain the same test input circuitry. More than 60 standard measuring ranges are available for branch-independent applications, e.g. for measuring the following:- Temperature, humidity, flow, heat flow, pressure, rotational speed, frequency, resistance, current, voltage, force, wire strain gauges, displacement, pH values, redox potential, conductivity, O<sub>2</sub>, CO<sub>2</sub>, CO, O<sub>3</sub> etc. Maximum and minimum values will be automatically stored. Measured values can be averaged over single measurements, over the output cycle or over the total duration of the measurement; limit values can be monitored by programming max/min values. Measured values can be corrected with regard to the zero point and slope (gain) and can be scaled by factor, exponent and dimension.

### ► ALMEMO® Instruments Are Nevertheless Individual!

ALMEMO® instruments automatically identify the characteristic data of the connected sensor. Specific functions will only be activated if the corresponding connector, interface cable or module are present. With humidity sensors the dew point, mixture ratio, vapour pressure and enthalpy will be automatically calculated. For measurements with psychrometers, Pitot tubes and probes for solute oxygen, the latest atmospheric pressure data can be entered or automatically compensated using pressure sensors. The influence of temperature can be compensated when measuring dynamic pressure, pH value, solute oxygen and conductivity. For volume flow measurements the cross section can be entered for flow sensors. Connectors with an integrated interface circuitry are available for special sensors.

► **ALMEMO® Instruments Meet The Most Demanding Requirements!**

16-bit or 24-bit A/D converter, digital linearization (for Pt100 sensors according to the new ITS 90 temperature scale), digital calibration. Optimal cold junction compensation is ensured by using precision thermistors in the socket spring. Measuring inputs, power supply and interfaces are electrically isolated from each other.

► **The ALMEMO® Data Acquisition Adapts To Your Requirements!**

Data loggers have a 512-KB memory (sufficient for 100,000 measured values), expandable up to 32 MB, and configurable as linear memory or ring memory. Data logger memories can be selectively read out according to time or number. The switchover between measuring points is electrically isolated using semiconductor relays that are totally wear-resistant. This permits continuous measuring point scanning at 10 or 50 measuring operations per second; this can even be performed on a permanent basis. Measuring point scans can be individually programmed. Measuring cycles and output cycles can be selected independently; and measured values, average values, and maximum / minimum values can be either output or saved to memory. The start and stop of each measuring point scan can be controlled, as required, via keypad or interface, by date and time-of-day, by limit value, or by means of an external signal. All measuring instruments can be addressed via the interface and can, therefore, be networked. Up to 100 instruments can be easily linked by using network cables. The output of measured values of all instruments in the whole network can be performed from any instrument. RS422 drivers and distributors are available for longer distances. This system minimises the equipment required, cabling costs and EMC problems, and can be extended as required.

► **ALMEMO® Instruments Accept Any Peripheral Equipment At Optimal Data Transmission!**

Analog or digital interfaces are not installed in the instruments but in the connectors and connecting cables. Depending on the requirements it is possible to connect the most varied peripheral devices, e.g.: Analog outputs, various interfaces (RS232, RS422, optic fiber, current loop, Ethernet, Bluetooth), alarm signal transmitters or trigger inputs. For remote enquiries with a maximum baud rate of 9600Bd data can be also transmitted via a standard communication line (analog or ISDN) or mobile radiocommunication modems.

► **ALMEMO® Instruments Allow For A Convenient Evaluation Of Measuring Data!**

Matching output formats are provided for printer or spreadsheet software. Various AMR software packages are available for the graphical presentation and evaluation of measuring data.

► **ALMEMO® Instruments Can Be Easily Programmed!**

The software protocol and the instruction list are identical for all instruments. Only one terminal is required to program all parameters and scan the measuring data. Free WINDOWS™ configuration software AMR-Control with terminal is available for this purpose.

## ALMEMO® Measuring Functions

Some important ALMEMO® measuring functions are described on the following page. Listing all the measuring functions and application options would be beyond the scope of this catalogue. Please ask for our detailed ALMEMO® Manual!

# ALMEMO® MEASURING INSTRUMENTS

## Humidity Measurement:

The humidity sensors provide 4 channels, which can be optionally programmed for the variables temperature, relative humidity, dew point, mixture ratio, partial vapour pressure or enthalpy. The first 4 variables are available as standard. All measuring and programming functions (max, min, limit values) can be applied to all channels.

In addition, the function atmospheric pressure will be activated for psychrometers and allows for entering and compensating a strongly deviating atmospheric pressure (e.g. for high elevations above MSL).

A special moisture probe is set with the base value to the most varied materials within the material groups: construction materials, wood and paper.

## Flow Measurement:

When using flow sensors, rotating vanes or dynamic pressure sensors the universal instrument ALMEMO® 2590-2 allows for activating averaging functions, volume flow, as well as cross sectional area or diameter of a channel. The volume flow is calculated over the cross sectional area by net measurements with averaged single values or continuous averaging. An automatic temperature compensation is available as the calculation of the flow velocity in Pitot tubes strongly depends on the air temperature. Furthermore, an attenuation filter with selectable time constant can be set so that undisturbed measured values can be used for critical measuring points within a channel.

## Infrared Measurement with Emission Factor and Background Temperature:

For infrared temperature measurements it is essential to consider the emission factor and background temperature. These two functions will be also activated and parameters will be stored in the connector when connecting IR probes.

## Wet Bulb Globe Temperature Measurement:

The Wet Bulb Globe Temperature (WBGT) is used for evaluating the heat stress at a working place. It is calculated from the dry temperature TT, the natural humid temperature HT and the globe temperature GT, by means of a psychrometer with disengageable ventilator and a globe thermometer:

$$WBGT = 0.1\mu TT + 0.7\mu HT + 0.2\mu GT$$

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

## Measurement of Heat Flow, Temperature Coefficient and U Value:

For each heat flow plate the calibration value is stored in the connector as factor allowing for heat flow measurements without requiring a setting of the calibration value. Furthermore, it is possible to use function channels to determine the average heat flow value, a temperature difference with an average value, and a temperature coefficient from the quotient of both average values. Depending on the arrangement of the temperature sensors the heat transfer coefficient  $\alpha$ , the heat conductivity coefficient  $\Lambda$  or the heat transition coefficient U (U value) can be determined.

## Force Measurement including Adjustment of Zero Point and Final Value:

Force transducers allow to adjust the constant load (tare) and to enter the final value as nominal value.

The correction value will be automatically calculated from this. A connector that switches on this resistor for the adjustment is available for force transducers with integrated reference resistor.

## Adjustment and Temperature Compensation of pH Probes:

pH probes are subject to ageing and, therefore, must be periodically re-calibrated. The calibration of zero point and slope (gain) can be performed by the push of a button using the standard reference buffer solutions. A big advantage is the fact that the calibration setting will be stored in the connector so the probe can also be operated with other instruments. It is even possible to use several probes with individual calibrations.

The temperature compensation function can be automatically performed by using a combined temperature/pH value probe, or manually, by entering the temperature of the medium.

## Conductivity Measurement with Temperature Compensation:

By using the conductivity probe the temperature of the medium is measured and the conductance referred to 25°C will be calculated.

## General Technical Specifications

### Inputs:

Channel switching between input sockets	4-contact with photo-MOS relay Potential separation : Maximum 50 V (for measuring modules with higher potential separation, see Chapter 03) Offset voltage : <5 µV
Cold junction compensation :	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
Check functions	Automatic sensor and sensor breakage detection

### A/D converter:

#### Delta-sigma, 15-bit resolution (ALMEMO® 2450, THERM 2420)

Measuring rate	2.5 mops
Common-mode input range	-0.26 to +2.6 V Overload -4 to +5 V
Input current	<2 nA
System accuracy	±0.1 % of measured value ±3 digits
Temperature drift	0.01 %/K

#### 16-bit resolution

	Multi-slope, integrating (ALMEMO® 6290)	Delta-sigma (ALMEMO® 2490, 2590, 8390)
Measuring rate :	2.5 or 10 measuring operations per second	per second
Common-mode input range:	-4...+4 V overload ± 5V	-2.0...+5 V overload -2 ...+5V
Input current:	< 50 nA	< 20 nA
Measuring current	Pt 100: appr. 1 mA Pt 1000: appr. 0,1 mA	Pt100, Pt1000 0.3 mA
System accuracy:	±0.03% of measured value ±2 digits (at 2.5 measuring operations per second)	
Temperature drift:	0.005 % / K	

#### Delta-sigma 24-bit resolution (ALMEMO® 2690, 2890, 4390, 5690, 8490, 8590, 8690)

Measuring rate	2.5 / 10 / 50 / 100 mops with option SA0000Q4 400 mops (see below)
Common-mode input range	-3 to +3 V in DC range (2.6 V) -2.0 to +1.7 V in all other measuring ranges
Overload	maximum ±12 V
Input current	500 nA in DC range (2.6 V) 500 pA in all other measuring ranges
Measuring current	Pt100 approx. 1 mA; Pt1000 approx. 0.1 mA
System accuracy:	0,02% ±1 digit at 2.5 und 10 measuring operations per second 0,05% ±3 digit at 50 measuring operations per second
Temperature drift:	0,003 % / K
Functional restrictions	Impaired sensor breakage detection and higher interference - at 50 mops and above caused by : mains hum (suppression no longer possible, can be remedied by using twisted wiring)

#### 24-bit resolution Delta-sigma, low power (ALMEMO® 2690-8A new variant)

Technical data as above, but:	
Measuring rate	2.5 / 10 / 50 / 100 mops With option SA0000Q5 500 mops (see below)
Common-mode input range	-2.0 to +2.9 V in DC voltage range (2.6 V) -1.1 to +1.8 V in all other measuring ranges
Input current	100 pA in all measuring ranges

#### New 400 mops measuring rate Option SA0000Q4 or

#### 500 mops measuring rate Option SA0000Q5 Only with 24-bit delta-sigma converter, low power

It is also possible, in addition to the standard conversion rates, to set 400 or 500 mops (measuring operations per second). It is thus possible to save 1 selected measuring channel at the rate of 400 or 500 mops. This can only be used with sensors with voltage or current ranges or with NTC sensors. Changing channels in the course of such a measuring operation is not permitted. The resolution, the accuracy, and the 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 working environment is free from interference and that the sensor lines are kept short. Data can only be output to a micro-SD card. Accessory 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).

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## Measuring Ranges

Type of Sensor	Model	Meas. Range	Dim.	Resol.	Linearisation Accuracy	Connector Progr.
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### Resistance-based temperature sensors:

Pt100/1000-1 4-conductor	FP Axxx	-200.0 ... +850.0	°C	0.1 K	±0.05 K ±0.05 % of meas.v.	ZA 9030-FS1 / 4
Pt100/1000-2 4-conductor	FP Axxx	-200.00 ... +400.00*	°C	0.01 K	±0.05 K	ZA 9030-FS2 / 5
Pt100-3 4-conductor	FP Axxx	8.000 ... +65.00*	°C	0.001 K	±0.002 K	ZA 9030-FS7
Ni100/1000 4-conductor		-60.00 ... +240.00	°C	0.1 K	±0.05 K	ZA 9030-FS3 / 6
Ntc type N	FN Axxx	-50.00 ... +125.00	°C	0.01 K	±0.05 K	ZA 9040-FS

### Thermocouples:

NiCr-Ni (K)	FT Axxx	-200.0 ... +1370.0	°C	0.1 K	±0.05 K ±0.05 % of meas.v.	ZA 9020-FS
NiCroSil-Nisil (N)		-200.0 ... +1300.0	°C	0.1 K	±0.05 K ±0.05 % of meas.v.	ZA 9021-FSN
Fe-CuNi (L)		-200.0 ... +900.0	°C	0.1 K	±0.05 K ±0.05 % of meas.v.	ZA 9021-FSL
Fe-CuNi (J)		-200.0 ... +1000.0	°C	0.1 K	±0.05 K ±0.05 % of meas.v.	ZA 9021-FSJ
Cu-CuNi (U)		-200.0 ... +600.0	°C	0.1 K	±0.05 K ±0.05 % of meas.v.	ZA 9000-FSU
Cu-CuNi (T)		-200.0 ... +400.0	°C	0.1 K	±0.05 K ±0.05 % of meas.v.	ZA 9021-FST
PtRh10-Pt (S)		0.0 ... +1760.0	°C	0.1 K	±0.3 K	ZA 9000-FSS
PtRh13-Pt (R)		0.0 ... +1760.0	°C	0.1 K	±0.3 K	ZA 9000-FSR
PtRh30-PtRh6 (B)		+400.0 ... +1800.0	°C	0.1 K	±0.3 K	ZA 9000-FSB
AuFe-Cr		-270.0 ... +60.0	°C	0.1 K	±0.1 K	ZA 9000-FSA

### Electrical and digital signals:

Millivolt DC		-10.0 ... +55.0	mV	1 µV	-	ZA 9000-FS0
Millivolt 1 DC		-26.0 ... +26.0	mV	1 µV	-	ZA 9000-FS1
Millivolt 2 DC		-260.0 ... +260.0	mV	0.01 mV	-	ZA 9000-FS2
Volt DC		-2.6 ... +2.6*	V	0.1 mV	-	ZA 9000-FS3
Volt DC		-26 ... +26	V	1 mV	-	ZA 9602-FS
for measuring bridges, supply 5V (example)		-26.0 ... +26.0	mV	1 µV	-	ZA9650FS1V
for potentiometer, supply 2.5V		-2.6 ... +2.6*	V	0.1 mV	-	ZA9025FS3
Volt AC (50Hz...2kHz) (example)		0 ... +26	V	0.1 V	-	ZA 9603-AK3
Volt AC (11Hz...250Hz) (example)		0 ... +400	V	1 V	-	ZA 9903-AB5
Ampere AC (11Hz...250Hz) (example)		0 ... +10.00	A	0.01 A	-	ZA 9904-AB2
Volt DC (sampling rate 1kHz) (example)		0 ... +400	V	1 V	-	ZA 9900-AB5
Ampere DC (sampling rate 1kHz) (example)		0 ... +10.00	A	0.01 A	-	ZA 9901-AB4
Milliampere DC		-32.0 ... +32.0	mA	1 µA	-	ZA 9601-FS1
Percent (4-20mA DC)		0.0 ... 100.0	%	0.01 %	-	ZA 9601-FS2
Ohm		0.00 ... 500.00*	Ω	0.01 Ω	-	ZA 9003-FS
Ohm		0.0 ... 5000.0*	Ω	0.1 Ω	-	ZA 9003-FS2
Frequency		0 ... 15000	Hz	1 Hz	-	ZA 9909-AK1U
Pulses/measuring cycle		0 ... 65000			-	ZA 9909-AK2U
Digital interface		0 ... 65000			-	ZA 9919-AKxx
Digital input		0.00... 100.00	%		-	ZA 9000-ES2

### Capacitive humidity sensors:

Relative humidity	FH A646	5.0 ... 98.0	%H	0.1 %	-	
Relative humidity with TC	FH A646-R/C	5.0 ... 98.0	%H	0.1 %	±0.5 %	
Dew point temperature		-25.0 ... 100.0	°C	0.1 K	±0.2 K	
Mixture ratio		0.0 ... 500.0	g/kg	0.1 g/kg	±0.5 % of meas.v.	
Partial vapour pressure		0.0 ... 1013.2	mbar	0.1 mbar	±0.1mbar ±0.1 % of meas.v.	
Enthalpy		0.0 ... 400.0	kJ/kg	0.1 kJ/kg	±0.5 % of meas.v.	
Psychrometer	FN A846					ZA 9846-AK
Humid temperature		0.00 ... +100.00	°C	0.01 K	±0.05 K	
Relative humidity		0.0 ... 100.0	%H	0.1 %	±1.0 %H	
Dew point temperature		-25.0 ... 100.0	°C	0.1 K	±0.2 K	
Mixture ratio		0.0 ... 500.0	g/kg	0.1 g/kg	±0.5% of meas.v.	
Partial vapour pressure		0.0 ... 1013.2	mbar	0.1 mbar	±0.1mbar ±0.1% of meas.v.	
Enthalpy		0.0 ... 400.0	kJ/kg	0.1 kJ/kg	±0.5% of meas.v.	

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

## Measuring Ranges

Type of Sensor	Model	Meas. Range	Dim.	Resol.	Linearisation Accuracy	Connector Progr.
<b>Flow sensors:</b>						
Rotating vane, normal	FV A915-S120	0.30 ... 20.00	m/s	0.01 m/s	±0.1 m/s ±0.2% of meas.v.	ZA 9915-AKS1
Rotating vane, normal	FV A915-S140	0.40 ... 40.00	m/s	0.01 m/s	±0.2 m/s ±0.2% of meas.v.	ZA 9915-AKS2
Rotating vane, micro	FV A915-S220	0.50 ... 20.00	m/s	0.01 m/s	±0.1 m/s ±0.2% of meas.v.	ZA 9915-AKS3
Rotating vane, micro	FV A915-S240	0.60 ... 40.00	m/s	0.01 m/s	±0.2 m/s ±0.2% of meas.v.	ZA 9915-AKS4
Rotating vane, macro	FV A915-MA1	0.10 ... 20.00	m/s	0.01 m/s	±0.1 m/s ±0.2% of meas.v.	ZA 9915-AK5
Water turbine	FV A915-WM1	0.00 ... 5.00	m/s	0.01 m/s	±0.1 m/s ±0.2% of meas.v.	ZA 9915-AK6
Dyn. pressure sensor	FD A602-S1K	0.5 ... 40.0	m/s	0.1 m/s	±0.1 m/s	
Dyn. pressure sensor	FD A602-S6	1.8 ... 90.0	m/s	0.1 m/s	±0.1 m/s	
Thermoanemometer	FV A935-TH4	0 ... 2.000	m/s	0.001 m/s	–	
Thermoanemometer	FV A935-TH3	0 ... 20.00	m/s	0.01 m/s	–	
Thermoanemometer	FV A605-TA1	0.01 ... 1.000	m/s	0.001 m/s	–	
Thermoanemometer	FV A605-TA5	0.15 ... 5.00	m/s	0.01 m/s	–	
<b>Chemical probes:</b>						
Conductivity	FY A641-LF	(e.g.) 0.0 ... 20.000	mS	0.001 mS	±0.2% of meas.v.	
O <sub>2</sub> dissolved, saturation	FY A640-O2	0 ... 260	%	1%	–	
O <sub>2</sub> dissolved, concentration	FY A640-O2	0.0 ... 40.0	mg/l	0.1 mg/l	±0.2 mg/l	
O <sub>2</sub> in gases	FY 9600-O2	1 ... 100	%	1%	–	
O <sub>3</sub> in gases	FY 9600-O3	0 ... 300	ppb	20 ppb	–	
CO probe	FY A600-CO	(e.g.) 0 ... 300	ppm	1 ppm	–	
CO <sub>2</sub> in gases	FY A600-CO2	(e.g.) 0.000 ... 0.500	%	0.01 %	±0.2 % of meas.v.	
pH-probe	FY 96PH-Ex	0.0 ... 14.00	pH	0.01 pH	–	ZA 9610-AKY4W
Redox probe	FY 96RX-Ex	0.0 ... 2600.0	mV	0.1 mV	–	ZA 9610-AKY5W
<b>Optical radiation (examples):</b>						
Lux measuring probe	FL A613-VL	0 ... 260000	lux	1 lux	–	
Lux measuring probe	FL A603-VL2	0.05 ... 12500	lux	0.01 lux	–	
Lux measuring probe	FL A603-VL4	1 ... 250000	lux	1 lux	–	
UV measuring probe	FL A613-UV	0 ... 87.00	W/m <sup>2</sup>	0.01 W/m <sup>2</sup>	–	
UVA measuring probe	FL A603-UV24	0.0004 ... 100	mW/cm <sup>2</sup>	0.1 μW/cm <sup>2</sup>	–	
Radiometric meas. head	FL A603-RW4	0.00004 ... 10	mW/cm <sup>2</sup>	0.01 μW/cm <sup>2</sup>	–	
Photosynthesis meas. head	FL A603-PS5	0.0002 ... 100	mmol/m <sup>2</sup> s	0.1 μmol/m <sup>2</sup> s	–	
<b>Further transducers that can be connected (examples):</b>						
Heat flow plates	FQ Axxx	-260.0 ... +260.0	mV	0.01 mV	–	ZA 9007-FS
Moisture sensor for materials	FH A696-MF	0 ... 50.0	%	0.1%	–	
Differential pressure	FD A612-SR	0 ... 1000	mbar	0.1 mbar	–	
Barometer	FD A612-SA	0.0 ... 1050	mbar	0.1 mbar	–	
Pressure transducers	FD-A602xx	(e.g.) 0.00 ... 10.00	bar	0.01 bar	–	
Force transducer	FK Axxx	(e.g.) 0.0 ... 50.00	kN	0.01 kN	–	
Displacement transducers	FW Axxx	(e.g.) 0.0 ... 150.00	mm	0.01 mm	–	
Tachometer	FU A919-2	8 ... 30000	rpm	1 rpm	–	ZA 9909-AK4U
<b>Function values:</b>						
Difference					–	
Max. value					–	
Minimum value					–	
Average value over time					–	
Average value over meas. pt.					–	
Sum over measuring points		0 ... 65000			–	
Total number of pulses	ZA 9909-AK2U	0 ... 65000			–	
Pulses/print cycle	ZA 9909-AK2U	0 ... 65000			–	
Alarm value		0.0 ... 100.00	%		–	
Thermal coefficient	M (q) / M (ΔT)				–	
Wet bulb globe temp.	(0.1TT+0.7HT+0.2GT)				–	
<b>Measuring value:</b>						
Cold junction temperature			°C		–	
Number of average values					–	
Volume flow		0 ... 65000	m <sup>3</sup> /h	m <sup>3</sup> /h		

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

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## Outputs:

ALMEMO® socket A1	Digital interface	Baud rates: 150, 300, 600, 1200, 2400, 4800, 9600 baud, 57.6, 115.2 kbaud Data : 8 bit serial, 1 start bit, 1 stop bit, no parity ALMEMO® data connection via USB, RS232, Ethernet, or wireless with Bluetooth or RS422 see Chapter 05, ALMEMO® networking technology
	Analog output	ALMEMO® analog cable and analog interface see Chapter 04 ALMEMO® output modules
ALMEMO® socket A2	Networking	ALMEMO® network cable or wireless with Bluetooth see Chapter 05, ALMEMO® networking technology
	Saving data	ALMEMO® memory connector with memory card see Chapter 04 ALMEMO® output modules
	Analog output	ALMEMO® analog cable and analog interface see Chapter 04 ALMEMO® output modules
	Trigger input	ALMEMO® trigger cable and trigger interface see Chapter 04 ALMEMO® output modules
	Relay output	ALMEMO® relay cable and relay interface see Chapter 04 ALMEMO® output modules3

### Measuring instrument:

Interface to all

ALMEMO® connectors/modules: I<sup>2</sup>C bus

Operating temperature: -10 to +60°C

Storage temperature: -30 to +60°C

Humidity range: 10 to 90% (non-condensing)

Electromagnetic compatibility: IEC 61 326, IEC 61 000-6-1, IEC 61 000-6-3, IEC 61 000-4-2, IEC 61 000-4-3, IEC 61 000-4-4

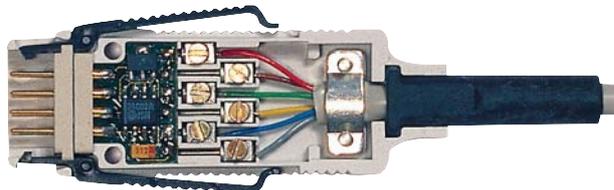
**Mains adapter and DC power supply cable see page 07.05**

# ALMEMO® MEASURING INSTRUMENTS

01

## Up to Four Measuring Channels On One Measuring Input

Depending on the sensor and measuring instrument the ALMEMO® measuring system allows for acquiring a varying number of measuring channels at any measuring input. The reason for this advantage is the patented ALMEMO® connector system:



Inside the patented ALMEMO® connector 6 screw terminals are located: 2 for sensor power supply and 4 for the measuring signal of the sensor. If Pt100 sensors with 4-conductor circuit are used, all of the 4 free connectors will be required for the measuring signal. Therefore, only one sensor of this type can be connected for each measuring input. Electrical signals only require 2 terminals for the measuring signal. As a result, one connector allows to acquire two different measuring signals with one single measuring channel. For example, humidity sensors also often combine a temperature sensor. The corresponding operands (e.g. dew point, mixture ratio, partial vapour pressure, enthalpy) are programmed within the connector as additional measuring channels. However, one measuring input allows for an output of four measuring channels at maximum.

## Document, Acquire, Evaluate!

ALMEMO® instruments allow you to perform a wide range of measuring tasks. The option to document series of measurements and to perform a decentralised (local) data acquisition and computer-aided evaluation of the measuring results is often a must for metrology users in the most varied industrial fields.

01/2011 We reserve the right to make technical changes.

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01.09

# ALMEMO® MEASURING INSTRUMENTS

## Measuring ranges ALMEMO® 2450, 2490, 2590

Type of sensor / Meas. ranges	Designation	MA2450-x	MA2490-x	MA2590-x
<b>Temperature</b>				
<b>Thermocouples:</b>				
NiCr-Ni Typ K (NiCr)	FTAxxx	X	X	X
NiCroSil-NiSi Typ N (NiSi)		X	X	X
Fe-CuNi Typ L/J (FeCo/IrCo)		X	X	X
Cu-CuNi Typ U/T (CuCo/CoCo)		X	X	X
PtRh10-Pt Typ S (Pt10)		X	X	X
PtRh13-Pt Typ R (Pt13)		range	X	X
PtRh30-PtRh6 Typ B (EL18)		range	X	X
AuFe-Cr (AuFe)		range	X	X
<b>Resistor-based temperature sensor:</b>				
Pt100/1000 (P104, P204)	FPAxxx	range	X	X
Ni100/1000 (N104)		range	X	X
NTC Typ N (NTC)	FNAxxx	X	X	X
<b>Heat flow</b>	FQAxxx	X	X	X
<b>Air humidity</b>				
Capacitive with NTC	FHA646xxx	X	X	X
Digital humidity/temperature	FHAD 46x	X	X	X
Digital humidity/temperature	FHAD 36 Rx	X	X	X
Psychrometric with NTC	FNA846, FNA8463, FNA8463	range	X	X
Psychrometric with Pt100	FPA8363	range	X	X
<b>Dew-point</b>				
Digital dew-point sensor	FHA646DTC1	X	X	X
Dew-point detector	FHA9461	X	X	X
<b>Moisture</b>				
Water detector probe	FHA936WD	X	X	X
Moisture sensor	FHA696MF	function	function	
Wood moisture sensor	FHA636MF	X	X	X
Material moisture sensor for granulates	FHA696GF1	X	X	X
Tensiometer for moisture in the soil	FDA602TM1	X	X	X
<b>air flow</b>				
Rotating vanes for air and gases	FVA915xxx, FVA915MA1	X*	X*	X
Pilotes tubes for differential pressure	FDA602S1K, FDA602S6K	adjustment	X*	X
Thermo-anemometer probe	FVA935THxx	X*	X*	X
Thermoelectric flow sensor	FVA605TAXx	X*	X*	X
* no average channel for flow measurement possible (no start of a continuous or cyclic measurement possible), only possible for MA2590				
<b>Pressure</b>				
Pressure transducer for liquid and gaseous substances	FDA602Lxx	X	X	X
Temp.-compensated pressure sensors	FD8214	X	X	X
Differential transmitter	FDA602D	X	X	X
Pressure sensor for wall mounting	FD8612DPS/APS/DPT	X	X	X
Barometric pressure	FDA612SA	range	X	X
Connector for differential pressure	FDA612SR, FDA602SxK	range	X	X
<b>Force</b>				
Tension and compression	FKA xxx	X*	X*	X
* only temporary zero-correction possible (no final value adjustment)				
<b>Rotational speed sensor</b>				
Rotational speed sensor	FUA9192	X	X	

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## Measuring ranges ALMEMO® 2450, 2490, 2590

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Type of sensor / Meas. ranges	Designation	MA2450-x	MA2490-x	MA2590-x
<b>Displacement</b>				
Displacement sensor, potentiometric	FWAxxxT	X*	X*	X
Displacement tracer, potentiometric	FWAxxxTR	X*	X*	X
* only temporary zero-correction possible (no final value adjustment)				
<b>Flow</b>				
Axial turbine flowmeter for liquids	FVA915VTHxxx	X	X	X
Flow sensor with temperature	FVA645 GVCx	X	X	X
<b>Elektrical variables</b>				
Split-core	FEA6042, FEA604MN, FEA6044N	X	X	X
<b>Almemo® measuring modules for</b>				
DC voltage, DC current	ZA9900ABx, ZA9901ABx, ZA9903ABx, ZA9904ABx	X	X	X
AC voltage, AC current		function	function	X
Optical probes for current meters	FUA919SZ			X
<b>Meteorology</b>				
Meteo-multisensor	FMA510, FMA510H	function	X	X
Wind velocity sensor	FVA615-2	X	X	X
Wind direction sensor	FVA614	X	X	X
Rainfall sensor	FRA916, FRA916H	function	function	X
Precipitation detector	FRA616D	X	X	X
Radiation probe	FLA613x	X	X	X
Star paranometer	FLA628S	X	X	X
<b>Room air conditions</b>				
Globe thermometer	FPA805GTS	range	X	X
<b>Optical radiation</b>				
Radiation probe	FLA 603 x	X	X	X
Radiation probe	FLA 613 x	X	X	X
Radiation probe	FLA 623 x	X	X	X
<b>Water analysis</b>				
pH one bar measuring chain	FY96PHx	adjustment	X	X
Redox one bar measuring chain	FY96RXEK	adjustment	X	X
Conductivity probe	FYA641LFxxx	range/adjustment	X	X
Oxygen sensor	FYA64002	adjustment	X	X
<b>Gas concentration in air</b>				
Carbon dioxide sensor, hand held	FYA600CO2H	X	X	X
Carbon dioxide probe	FYA600CO2	range	X	X
Carbon monoxide probe	FYA600CO	X	X	X
Oxygen probe	FYA600O2	adjustment	X	X
Ozone measuring, meas. transducer	FYA600O3	X	X	X
Gas probes	FYA600Ax	X	X	X
<b>Infrared temperature measurement</b>				
ALMEMO® infra-red probe head	FIA908CS, FIA628, FIA 844	X	X	X
IR probe head	MR 7838, MR 7842	X	X	X
Hand-held IR device	MR 781420 SB	X	X	X

### Conditions that lack for a correct functioning :

- **range:** lacking or limited measuring range > measured value cannot be displayed
- **function:** lack of function, in order to show sensor-specific measuring data (e.g. average / cycle) or to make necessary programming
- **adjustment:** no measuring-value adjustment of the sensor possible (pressure, force, displacement, O<sub>2</sub>, pH, conductivity)

# ALMEMO® MEASURING INSTRUMENTS

**ALMEMO® 2450-1L**  
**compact measuring instrument,**  
**more than 35 measuring ranges with just one**  
**measuring input**



**Technical features :**

- ▶ Handy display device with 1 ALMEMO® input socket and 4 channels.
- ▶ Generously dimensioned 2-row static 7 / 16 segment display including units.
- ▶ Easy and convenient to operate by means of 7 keys.
- ▶ More than 35 measuring ranges for thermocouple and NTC sensors; ready-to-use connectors are available for customer-specific thermocouple sensors (see Chapter 08), Capacitive humidity sensors, dew-point sensors, moisture detection probes, moisture in wood, FHA636MF (see Chap. 09), Pressure transducers, FDA602L/D, FD8214, FD8612, speed transducers, turbine flow meters (see Chapter 11), Split-core type transformers FEA604, voltage and current measuring modules ZA990xAB (see Chapter 12), Meteorological radiation probe head FLA613 (see Chapter 13), Carbon dioxide sensor, hand-held, FYA600CO2H, carbon monoxide probe, ozone probe (see Chapter 16), Infra-red temperature sensor FIA908CSH (see Chapter 18).
- ▶ Support for ALMEMO® connectors with multi-point calibration.
- ▶ 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.

**Extent of the delivery**

Measuring instrument ALMEMO® 2450-1L  
1 measuring input for ALMEMO® sensors, LC display, 7 keys including 3 AA alkaline batteries and operating instructions including manufacturer's test certificate

**Order no. MA24501L**

**Technical data :**

Measuring input	1 ALMEMO® socket
Channels	Maximum 4 (sensor-type-specific, measuring and function channels)
A/D converter	delta-sigma, 15-bit resolution technical data see page 01.05
Measuring ranges	(see pages 01.06 / 01.07) NiCr-Ni (K), NiCroSil-Nisil(N), Fe-CuNi (L), Cu-CuNi (U), Cu-CuNi (T), PtRh10-Pt (S), NTC, Fe-CuNi (J) -200 to +950 °C Voltage -26 to +26 mV, -260 to +260mV, 0 to +2.6 V Current 0 to 32 mA, 4 to 20 mA Double connectors with 2 x differential voltage / differential current (input D - B) are not possible.
Humidity, capacitive	0 to 100 % r. H.(%rH, HcrH, HrH)
Dew point, mixture ratio, partial vapor pressure, enthalpy, digital input (0/100 %), rotating vanes, frequency, pulse, rotational speed, digital	
Resolution	see pages 01.06 / 01.07
Linearization accuracy	see pages 01.06 / 01.07
Connector supply	Battery: 9 V, max. 0.5 A
Outputs	none
Standard equipment	
LC display 7 segments	Measured value 5 char., 15 mm Function 4½ char., 9 mm
16 segments	Units 2 characters, 9 mm 9 symbols
Keypad	7 silicone keys
Power supply	
Battery	3 AA alkaline batteries
Current consumption	10 mA without input modules
Housing	ABS (maximum 70 °C) (LxWxH) 127 x 83 x 42 mm
Operating temperature	-10 to +60 °C
Atmospheric humidity (ambient)	10 to 90 % r. H. (non-condensing)

**Option**

IP54 protection (if water-proof connectors are used) OA2450W

**Accessories**

Top hat rail mounting  ZB2490HS

Rubberized impact protection, gray  ZB2490GS2

Magnetic fastening  ZB2490MH

Instrument case  ZB2490TK

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**ALMEMO® 2450-1**  
compact measuring instrument with  
more than 35 measuring ranges with just one  
measuring input, interface  
and option analog output (internal)



### Technical features :

- ▶ Handy display device with 1 ALMEMO® input socket and 4 channels.
- ▶ Generously dimensioned 2-row static 7 / 16 segment display including units.
- ▶ Easy and convenient to operate by means of 7 keys.
- ▶ More than 35 measuring ranges for thermocouple and NTC sensors; ready-to-use connectors are available for customer-specific thermocouple sensors (see Chapter 08), Capacitive humidity sensors, dew-point sensors, moisture detection probes, moisture in wood, FHA636MF (see Chap. 09), Pressure transducers, FDA602L/D, FD8214, FD8612, speed transducers, turbine flow meters (see Chapter 11), Split-core type transformers FEA604, voltage and current measuring modules ZA990xAB (see Chapter 12), Meteorological radiation probe head FLA613 (see Chapter 13), Carbon dioxide sensor, hand-held, FYA600CO2H, carbon monoxide probe, ozone probe (see Chapter 16), Infra-red temperature sensor FIA908CSH (see Chapter 18).
- ▶ Support for ALMEMO® connectors with multi-point calibration.
- ▶ 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.

### Measuring instrument 2450-1 with ALMEMO® interface:

- ▶ 2 ALMEMO® output sockets for all interface cables, network cables, trigger / relay cables
- ▶ Complete sensor and device programming
- ▶ ALMEMO® socket DC for mains adapter.
- ▶ **Option with electrically isolated internal RS485:** via ALMEMO® socket DC.
- ▶ **Option with electrically isolated internal analog output :** ALMEMO® socket P0 for analog output (see Chapter 02 ALMEMO® transmitters ).

### Extent of the delivery

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

**Order no. MA24501**

### Technical data :

Measuring input	1 ALMEMO® socket
Channels	Maximum 4 (sensor-type-specific, measuring and function channels)
A/D converter	delta-sigma, 15-bit resolution technical data see page 01.05
Measuring ranges	(see pages 01.06 / 01.07) NiCr-Ni (K), NiCroSil-Nisil(N), Fe-CuNi (L), Cu-CuNi (U), Cu-CuNi (T), PtRh10-Pt (S), NTC, Fe-CuNi (J) -200 to +950 °C Voltage -26 to +26 mV, -260 to +260mV, 0 to +2.6 V Current 0 to 32 mA, 4 to 20 mA Double connectors with 2 x differential voltage / differential current (input D - B) are not possible. Humidity, capacitive 0 to 100 % r. H.(%rH, HcrH, HrH) Dew point, mixture ratio, partial vapor pressure, enthalpy, digital input (0/100 %), rotating vanes, frequency, pulse, rotational speed, digital
Resolution	see pages 01.06 / 01.07
Linearization accuracy	see pages 01.06 / 01.07
Connector supply	Battery / mains: 9 V, max. 0.5A Option U 9 V, maximum 70 mA
Outputs	2 ALMEMO® sockets for all interface cables with option OA24501 RS485 interface internal, electrically isol., via socked DC with option OA2450Rx only 1 ALMEMO® socket P0 for internal analog output
Standard equipment	
LC display 7 segments	Measured value 5 char., 15 mm Function 4½ char., 9 mm
16 segments	Units 2 characters, 9 mm 9 symbols
Keypad	7 silicone keys
Power supply	10 ... 30V DC not electr. isol.
Battery	3 AA alkaline batteries
Current consumption	10 mA without input modules
Mains adapter :	ZA1312NA8 230 VAC to 12 VDC, 1A, electrically isolated, via ALMEMO® socket DC
Housing	ABS (maximum 70 °C) (LxWxH) 127 x 83 x 42 mm
Operating temperature	-10 to +60 °C
Atmospheric humidity (ambient)	10 to 90 % r. H. (non-condensing)

### Options

Power supply, electr. isol., 9 to 30 VDC, 80 mA, including ALMEMO® connector for socket 10...30V DC OA2450U  
RS485 interface, built-in, including Option U OA2450I  
Analog outputs, electrically isolated , built-in see Chapter 02 ALMEMO® transmitters  
IP54 protection (if water-proof connectors are used) OA2450W

### Accessories

Top hat rail mounting ZB2490HS  
Rubberized impact protection,gray ZB2490GS2  
Magnetic fastening ZB2490MH  
Mains adapter 12 V, 1A, with ALMEMO® connector ZA1312NA8  
DC adapter cable  
10 to 30 VDC, 12 V / 0.25 A, electrically isolated ZA2690UK  
Analog output cable, -1.25 to +2.0 V, 0.1 mV / digit, V6 ZA1606RK  
V24 data cable, electrically isolated, maximum 115.2 KB ZA1909DK5  
USB data cable, electr. isol., maximum 115.2 KB ZA1919DKU  
Ethernet data cable, electr. isol., maximum 115.2 KB ZA1945DK  
Instrument case ZB2490TK

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**ALHORN**  
www.alhorn.com

**SUPPLYLAB**  
www.supplylab.pt

# ALMEMO® MEASURING INSTRUMENTS

**ALMEMO® 2490-1L**  
compact measuring instrument with  
more than 65 measuring ranges, with just one  
measuring input, with memory for 100  
measured values

**ALMEMO® 2490-2L**  
with 2 measuring inputs



**Technical features :**

- ▶ Universal measuring instrument with 1 or 2 ALMEMO® input sockets, 8 channels, 4 internal function channels (e.g. differential values)
- ▶ Memory sufficient for 100 measured values, can be called up and viewed in the display
- ▶ High-resolution A/D converter, 16-bit, 10 mops
- ▶ More than 65 standard measuring ranges
- ▶ Support for ALMEMO® connectors with multi-point calibration, special linearization, and special measuring ranges
- ▶ Generously dimensioned 2-row static 7 / 16 segment display including units
- ▶ Easy and convenient to operate by means of 7 keys
- ▶ Measuring functions : Measured value, zero-setting, sensor adjustment, saving of maximum / minimum values, memory for 100 measured values, cold junction compensation, and temperature compensation
- ▶ Test functions : Segment monitoring, range monitoring, sensor breakage indication, battery voltage check and display

**Extent of the delivery**

Includes 3 AA alkaline batteries, operating instructions, and manufacturer's test certificate

Universal measuring instrument ALMEMO® 2490-1L  
1 measuring input, memory for 100 measured values, LC  
display, 7 keys **Order no. MA24901L**

Universal measuring instrument ALMEMO® 2490-2L  
like 2490-1L, plus 2 measuring inputs **Order no. MA24902L**

**Technical data :**

Measuring inputs	
2490-1L	1 ALMEMO® input socket
2490-2L	2 ALMEMO® input sockets
electrically isolated with semiconductor relays 50V	
Channels	Per sensor, max. 4 channels (sensor-type-specific, measuring and function channels), only 2490-2L, plus 4 internal function chan.
A/D converter	delta-sigma, 16-bit For technical data see page 01.05.
Measuring ranges	as on page 01.06, but
Volts DC	-2.0 to +2.6 V
Milliamperes DC	-26 to +26 mA
Connector supply	Battery 9 V, max. 0.5A
Outputs	none
Standard equipment	
LC display 7 segments	Measured value 5 char., 15 mm Function 4½ characters, 9 mm
16 segments	Units 2 characters, 9 mm 9 symbols
Keypad	7 silicone keys
Power supply	
Battery	3 AA alkaline batteries
Current consumption	approx. 20 mA without input modules
Housing	ABS (maximum 70 °C) (LxWxH) 127 x 83 x 42 mm

Other general data see Technical Data, page 01.05

**Option**

IP54 protection (if water-proof connectors are used) OA2490W

**Accessories**

Top hat rail mounting ZB2490HS



Rubberized impact protection, green ZB2490GS1



Magnetic fastening ZB2490MH



Instrument case ZB2490TK

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# ALMEMO® MEASURING INSTRUMENTS

01

**ALMEMO® 2490-1**  
compact measuring instrument  
with more than 65 measuring ranges, with just  
one measuring input, with memory for 100  
measured values, plus interface and option with  
internal analog output

**ALMEMO® 2490-2**  
with 2 measuring inputs



## Technical features :

- ▶ Universal measuring instrument with 1 or 2 ALMEMO® input sockets, 8 channels, 4 internal function channels (e.g. differential values)
- ▶ Memory sufficient for 100 measured values, can be called up and viewed in the display
- ▶ High-resolution A/D converter, 16-bit, 10 mops
- ▶ More than 65 standard measuring ranges
- ▶ Support for ALMEMO® connectors with multi-point calibration, special linearization, and special measuring ranges
- ▶ Generously dimensioned 2-row static 7 / 16 segment display including units
- ▶ Easy and convenient to operate by means of 7 keys
- ▶ Measuring functions : Measured value, zero-setting, sensor adjustment, saving of maximum / minimum values, memory for 100 measured values, cold junction compensation, and temperature compensation
- ▶ Test functions : Segment monitoring, range monitoring, sensor breakage indication, battery voltage check and display

### Universal measuring instrument ALMEMO® 2490 with ALMEMO® interface :

- ▶ 2 ALMEMO® output sockets for all interface cables, network cables, trigger / relay cables
- ▶ Complete sensor and device programming.
- ▶ ALMEMO® socket DC for mains adapter.
- ▶ **Option with electrically isolated internal RS485:** via ALMEMO® socket DC.
- ▶ **Option with electrically isolated internal analog output :** ALMEMO® socket P0 for analog output (see Chapter 02 ALMEMO® transmitters).

### Extent of the delivery

Includes 3 AA alkaline batteries, operating instructions, and manufacturer's test certificate

Universal measuring instrument ALMEMO® 2490-1  
1 measuring input, memory for 100 measured values, LC display, 7 keys, interface via 2 ALMEMO® output sockets A1, A2, and 1 ALMEMO® socket DC for mains adapter

**Order no. MA24901**

Universal measuring instrument ALMEMO® 2490-2  
like 2490-1, plus 2 measuring inputs

**Order no. MA24902**

## Technical data :

Measuring inputs	
2490-1	1 ALMEMO® input socket
2490-2	2 ALMEMO® input sockets electrically isolated with semiconductor relays 50V
Channels	Per sensor, max. 4 channels (sensor-type-specific, measuring and function channels), only 2490-2: plus 4 internal function chan.
A/D converter	delta-sigma, 16-bit For technical data see page 01.05.
Measuring ranges	as on page 01.06, but
Volts DC	-2.0 to +2.6 V
Milliamperes DC	-26 to +26 mA
Connector supply	Battery / mains: 9 V, max. 0.5A
Option U	9 V, maximum 70 mA
Outputs	2 ALMEMO® sockets for all interface cables, version V6 RS485 interface internal, electrically isol., via socket DC
with option OA2490I	1 ALMEMO® socket P0 for internal analog output
with option OA2490Rx only	
Standard equipment	
LC display 7 segments	Measured value 5 char., 15 mm
16 segments	Function 4½ characters, 9 mm
	Units 2 characters, 9 mm
	9 symbols
Keypad	7 silicone keys
Power supply	10 ... 30V DC not electr. isol.
Battery	3 AA alkaline batteries
Current consumption	approx. 20 mA without input modules
Mains adapter	ZA1312NA8 230 VAC to 12 VDC, 1A
Housing	ABS (maximum 70 °C) (LxWxH) 127 x 83 x 42 mm
Other general data see Technical Data, page 01.05	

## Options :

Power supply, electrically isolated, 9 to 30 VDC, 80 mA, including ALMEMO® connector for socket DC OA2490U  
RS485 interface, built-in, including Option U OA2490I  
Analog outputs, electrically isolated, built-in, see Chapter 02 ALMEMO® transmitters  
IP54 protection (if water-proof connectors are used) OA2490W

## Accessories (see ALMEMO® 2490-1L/-2L page 01.14)

Top hat rail mounting	ZB2490HS
Rubberized impact protection, gray	ZB2490GS2
Magnetic fastening	ZB2490MH
Mains adapter 12 V, 1A, with ALMEMO® connector	ZA1312NA8
DC adapter cable	
10 to 30 VDC, 12 V / 0.25 A, electrically isolated	ZA2690UK
Analog output cable, -1.25 to +2.0 V, 0.1 mV / digit, V6	ZA1606RK
V24 data cable, electr. isol., maximum 115.2 KB	ZA1909DK5
USB data cable, electr. isol., maximum 115.2 KB	ZA1919DKU
Ethernet data cable, electr. isol., maximum 115.2 KB	ZA1945DK
Instrument case	ZB2490TK

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# ALMEMO® MEASURING INSTRUMENTS

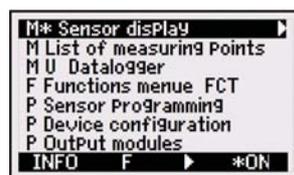
**ALMEMO® 2590-2, 2590-3S, 2590-4S compact universal measuring instruments with 2, 3, or 4 measuring inputs, with measured value memory either internal or with memory card, and 2 outputs USB, RS232, Ethernet, analog**



## Technical features :

- ▶ Modern, compact housing (IP54 option is available on request)
- ▶ 2, 3, or 4 input sockets, electrically isolated, for all ALMEMO® sensors, 4 additional internal function channels
- ▶ 2 ALMEMO® output sockets for digital interfaces, analog output, trigger input, alarm contacts, memory card
- ▶ High-resolution A/D converter, 16-bit, 10 mops
- ▶ 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 for 99 measured values, average value over time / individual values / measuring points, smoothing, easy and convenient volume flow with centre measuring, two-point adjustment, scaling, data logger with configuration menus
- ▶ Option VN: volume flow with array measuring per DIN EN 12599
- ▶ Programming menus ensuring clear and easy-to-understand sensor programming, range, units, designation, right through to special functions, configuration of device parameters and of output modules
- ▶ Multi-point calibration and special ranges in the ALMEMO® connector, e.g. 50.000 Ω, 100 kΩ, NTC -5.000 to 46.000 °C
- ▶ Choice of languages : German, English, French (other options also available)
- ▶ Type 2590-3S and 2590-4S with EEPROM with capacity for 7 ... 12000 measured values, internally configurable as linear or ring memory
- ▶ Memory connector with pluggable micro SD card
- ▶ Sleep mode for long-term recording

Menu selection



Function menus



## Technical data :

<b>Measuring inputs:</b>	<b>2590-2</b>	2 ALMEMO®-input sockets
	<b>2590-3S</b>	3 ALMEMO®-input sockets
	<b>2590-4S</b>	4 ALMEMO®-input sockets
Electrically isolated	Semiconductor relay (50 V)	
Channels	4 channels / connector for double sensors and function channels, 4 internal channels (e.g. differential)	
A/D converter	Delta-sigma 16-bit, 2.5 or 10 mops (see Technical data, page 01.05)	
Sensor power supply	Battery 9, maximum 0.5A; mains adapter, 12 V, maximum 1A	
<b>Outputs</b>	2 ALMEMO® sockets for all output modules (analog, data, trigger, relay cables, memory etc.)	
<b>Standard equipment</b>		
Display	Graphics, 128 x 64 pixels, 8 rows illumination : 2 white LEDs	
Keypad	7 silicone keys (of which 4 soft-keys)	
Date and time-of-day	Real-time clock, buffered with internal battery	
Internal memory	2590-xS only: 59-KB EEPROM (7 ... 12000 meas.values)	
<b>Power supply</b>		
Battery	3 AA alkaline batteries	
Mains adapter	ZA1312NA8 230 VAC to 12 VDC, 1A, electrically isolated	
DC adapter cable, electr. isol.	ZA2690-UK 10 to 30 V, 250 mA	
Current consumption	active mode approx. 20 mA without lighting approx. 40 mA	
Input and output modules	Sleep mode approx. 0.05 mA	
Housing	(LxWxH) 127 x 83 x 42 mm, ABS (maximum 70 °C), 290 g	

Other general data see Technical Data, page 01.05

## Product overview :

**Universal measuring instrument ALMEMO® 2590-2**  
2 inputs, 2 outputs, cascadable interface, LCD graphics screen, 7 keys, real-time clock, manufacturer's test certificate MA25902

**Universal measuring instrument ALMEMO® 2590-3S**  
like the ALMEMO® 2590-2, but with 3 inputs and 59-KB EEPROM MA25903S

**Universal measuring instrument ALMEMO® 2590-4S**  
like the ALMEMO® 2590-2, but with 4 inputs and 59-KB EEPROM MA25904S

### Options:

Volume flow with array measuring per DIN EN 12599 OA2590VN  
Temperature ranges for 8 coolants SB0000R2  
IP54 protection (if water-proof connectors are used) OA2590W

### Accessories:

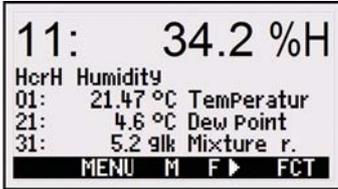
Top hat rail mounting ZB2590HS  
Rubberized impact protection, green ZB2490GS1  
Magnetic fastening ZB2490MH  
Mains adapter 12V/1A ZA1312NA8  
DC adapter cable, 10 to 30 V DC, 12 V / 0.25 A, electr. isol. ZA2690UK  
Memory connector with micro SD card (see p. 04.03), including USB card reader ZA1904MMC  
Analog output cable, -1.25 to 2.0 V, 0.1 mV / digit ZA1601RA  
Trigger and relay cable (2 relays, 1 ohm, 0.5A, 50 V) ZA1006EKC  
USB data cable, electr. isol., maximum 230.4 KB ZA1919DKU  
V24 data cable, electr. isol., maximum 115.2 KB ZA1909DK5  
Ethernet data cable, electr. isol., maximum 115.2 KB ZA1945DK  
Network cable, electr. isol., max. 115.2 KB ZA1999NK5  
Instrument case ZB2490TK  
Network technology, Bluetooth modules, see Chapter 05

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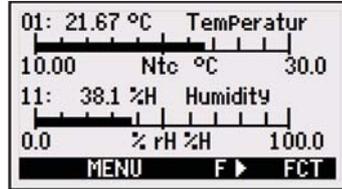


## Measured Value Display (Examples):

Sensor reading with large measured value. For each sensor type further important measurable variables or parameters are also displayed automatically:



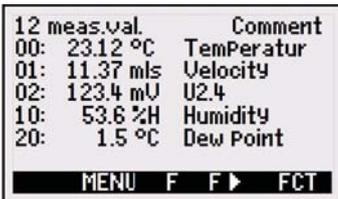
Humidity Display with further humidity variables, e.g. temperature, dew point, mixture ratio



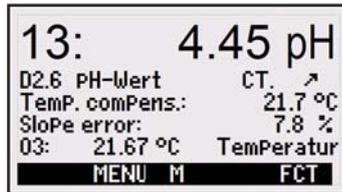
Temperature / humidity display in bar chart form



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



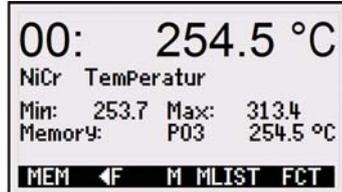
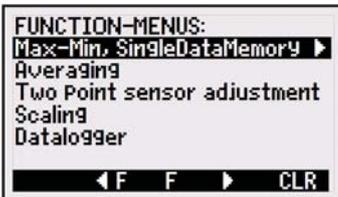
List of measuring points providing a complete and clearly understandable overview of all sensors connected



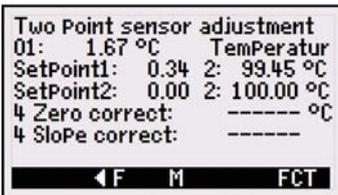
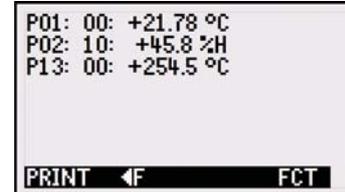
pH-Display, measured value with automatic temperature compensation

## Function Menus:

Each measured value reading can be linked to 1 function menu :



Temperature Display with 100 Points Memory for Single Values

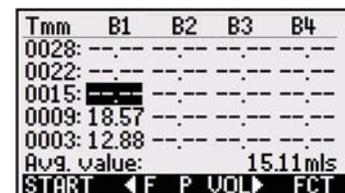
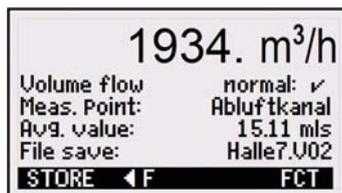
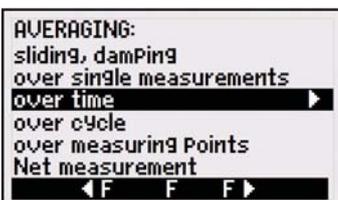


Two-point adjustment for purposes of correcting sensors (e.g. temp., force)



Data logger function for cyclic saving

## Selecting the average value function:



Option VN : Volume flow with array measuring in the flow channel

# ALMEMO® MEASURING INSTRUMENTS

**new!**

## ALMEMO® 2690-8A *new variant*

**Multi-function measuring instrument and data logger with 5 measuring inputs, 2 outputs for USB, RS232, Ethernet, analog**



### ALMEMO® 2690-8A - new functions

- ▶ High-resolution AD converter, delta-sigma, 24-bit, low power, up to 100 mops (with SD memory card)
- ▶ Improved cold junction compensation with 2 sensors
- ▶ Option: Electrical isolation between measuring inputs and power supply (device ground), higher measuring quality, indispensable where supply is not electrically isolated
- ▶ Integrated atmospheric pressure sensor, for automatic pressure compensation inter alia for pitot tube flow measurement and humidity variables
- ▶ Internal EEPROM measured value memory, capacity now for 200,000 measured values, configurable as linear or ring memory
- ▶ Operation powered by rechargeable batteries (3 AA NiMH cells), high-speed charging (2.5 hours) inside device by means of mains unit (included in delivery)

### Other technical features

- ▶ Modern housing with rubberized impact protection and folding stand, splash-proof
- ▶ 5 ALMEMO® input sockets, electrically isolated, for 5 ALMEMO® sensors, 20 sensor channels, 4 additional internal function channels
- ▶ 2 ALMEMO® output sockets for digital interfaces, analog output, trigger input, alarm contacts, memory card
- ▶ High-quality display with large, brightly illuminated graphics
- ▶ Easy to operate by means of 4 soft-keys and cursor block, menu-guided with wizards and context-sensitive help windows
- ▶ 9 measuring menus (3 can be freely configured by the user from a range of 50 functions)
- ▶ Measured values can be displayed graphically in line chart or bar chart form and from 1 to 20 measured values can be displayed numerically in various sizes.
- ▶ Measuring functions, programming menus, and wizard menus (as with ALMEMO® 2890), (see 01.19)
- ▶ Option KL: Multi-point calibration, calibration data management, user-defined linearization, special ranges in the ALMEMO® connector, e.g. 0.000 to 50.000 W, NTC -5.000 to 46.000 °C, YSI 400
- ▶ Choice of languages : German, English, French (other options also available)
- ▶ Memory connector with micro-SD and standard file format
- ▶ Sleep mode for long-term recording
- ▶ Device software update via interface

### Technical data

Measuring inputs:	5 ALMEMO® input sockets, electr. isol., with semiconductor relay (50 V)
Channels	5 primary channels, maximum 19 additional channels for double sensors and function channels (e.g. differential)
A/D converter	<b>New</b> Delta-sigma, 24-bit, low power, 100 mops see Technical data, p. 01.05
Sensor power supply	Rechargeable battery pack 6 / 9 / 12 V, maximum 0.5 A Mains adapter 12 V, maximum 0.5 A
Outputs	2 ALMEMO® sockets for all output modules (analog, data, trigger, relay cable, memory, etc.)
<b>Standard equipment</b>	
Display	Graphics display, 128 x 128 pixels, 16 rows, illumination 5 white LEDs, 3 brightness levels
Keypad	9 tactile silicone keys (4 soft-keys)
Memory	1-MB EEPROM (200,000 meas. values)
Date and time-of-day	Real-time clock, buffered with battery
<b>New</b> Atm. press. sensor	Integrated Measuring range 700 to 1100 mbar Techn. data as for FDAD12SA s. p. 11.12
Power supply	<b>New</b> Rechargeable battery pack, 3 AA NiMH rechargeable batteries or integr. alkaline, high-speed charging (2.5 hours)
Mains adapter	ZA1312NA8, 230 VAC to 12 VDC, 1 A electr. isolated, DC adapter cable electr. isol., ZA2690-UK2 10 to 30 V, 1 A
Current consumption (without input and output modules)	Active mode approx. 17 mA with illumination approx. 25 to 140 mA Sleep mode approx. 0.05 mA
Housing	(LxWxH) 209 x 107 x 54 mm ABS (maximum +70 °C), 570 g
Protection	IP54 (if water-proof connectors / sensors are used)
Other general data see Technical Data, page 01.05	

### Standard delivery (including manufacturer's test certificate)

- Data logger set ALMEMO® 2690-8A, including 3 AA NiMH rechargeable batteries, connector mains unit ZA1312NA8, USB data cable ZA1919DKU, Case **MA26908AKSU**
- Data logger set ALMEMO® 2690-8A, including 3 AA NiMH rechargeable batteries, connector mains unit ZA1312NA8, RS232 data cable ZA1909DK5, Case **MA26908AKS**
- Option Measuring module, electr. isolated OA2690GT
- Option KL (see 01.17 and 03.03)
- Multi-point calibration, Special measuring ranges OA2690KL
- Option R (see 11.08)
- Temperature ranges for 8 refrigerants SB0000R2
- Option Q5: 500 mops measuring rate (s. 01.05) SA0000Q5
- Top hat rail mounting OA2290HS

### Accessories

- DC adapter cable, 10 to 30 VDC, 12 V / 1 A, electrically isolated ZA2690UK2
- Memory connector with micro-SD card, including USB card reader (see page 04.03) ZA1904SD
- Ethernet data cable, electr. isol., max. 115.2 kbaud ZA1925DK
- Transport case, large, aluminum (see Chapter 07) ZB2590TK2
- Output modules (analog, relay, trigger) (see Chapter 04)
- Network technology, Bluetooth modules (see Chapter 05)



## ALMEMO® 2890-9

**Multi functionally measuring instrument and data logger with 9 measuring inputs, 2 outputs, for USB, RS232, Ethernet, analog**



### Technical features

- ▶ 9 ALMEMO® input sockets, electr. isol., for 9 ALMEMO® sensors 36 sensor chann., 4 additional internal function chann.
- ▶ 2 ALMEMO® output sockets for digital interfaces, analog output, trigger input, alarm contacts, memory card.
- ▶ High-speed, high-resolution A/D converter, 24-bit, 50 measuring operations per second  
Electr. isolated between measuring inputs and supply  
New measuring ranges Pt100, 0.000 to 65.000 °C.
- ▶ Ideal display with large, brightly illuminated graphics.
- ▶ Easy and convenient operation by means of 4 soft-keys, cursor block, and thumb-wheel Comprehensive menu system with wizards and help windows.
- ▶ 9 measuring menus (3 can be freely configured by user from range of 50 functions).
- ▶ Measured values can be displayed graphically in line diagram or bar chart form and from 1 to 20 measured values can be displayed numerically in various sizes.
- ▶ Measuring functions : Measured value, zero-setting, setpoint adjustment, maximum and minimum values stored with date and time-of-day, smoothing, average values over time or measuring points, limit value monitoring, cold junction compensation, temperature compensation, and atmospheric pressure compensation.
- ▶ 8 programming menus for easy-to-understand parametrization of cycles, times, memory, output modules, and power supply. Sensor programming with range, units, comments, scaling, error correction, etc.
- ▶ Option KL : Multi-point calibration, calibration data management, user-defined linearization, special ranges in the ALMEMO® connector, e.g. 0.000 to 50.000 Ω, NTC -5.000 to 46.000 °C, YSI 400, etc.
- ▶ 10 wizards for quickly and easily mastering otherwise complex configurations : Sensor scaling, two-point adjustment, calculation functions, and reference channels; Sensor programming for determining thermal coefficients and wet-bulb globe temperature (WBGT), alarm relay assignment, scaling, and analog output assignment.
- ▶ Choice of languages : German, English, French.
- ▶ EEPROM with capacity for 100,000 measured values, internally configurable as linear or ring memory.
- ▶ SLEEP mode for long-term recording.
- ▶ Memory connector with micro SD card and standard file format.
- ▶ Device software update via interface.

### Technical data

Measuring inputs	9 ALMEMO® input sockets, electr. isol. with semiconductor relay (50 V)
Channels	9 primary chann., maximum 32 additional chann. for double sensors and function chann. (e.g. differential values)
A/D converter	Delta-sigma 24-bit, 50 mea. op. p. sec, electr. isol. see Technical data, page 01.05
Sensor power supply	Recharg. battery 9 or 12 V, max. 0.5A Mains adapter 12 V, max. 0.3A
Outputs	2 ALMEMO® sockets for all output modules (analog, data, trigger, relay cables, memory, etc.)
<b>Standard equipment</b>	
Display	Graphics, 128x128 pixels, 16 rows Lighting, 5 white LEDs, 3 levels
Keypad	9 membrane keys (4 soft-keys), thumb-wheel
Memory	512-KB EEPROM (100,000 meas. values)
Date and time-of-day	Real-time clock, buffered with battery
<b>Power supply</b>	
Rechargeable batt. pack	6 NiMH rechargeable batteries, 1600 mA 2.5-hour high-speed charging, internal circuit
Mains adapter	ZB1112NA8 230V AC to 12 V DC, 1A, electrically isolated DC adapter cable, electrically isolated ZB2590-UK, 10 to 30 V, 1 A
Current consumption without input and output modules	
Active mode	approx. 37 mA
with lighting	approx. 45 to 100 mA
SLEEP mode	approx. 0.05 mA
Housing	(LxWxH) 204 x 109 x 44 mm ABS (maximum 70 °C), 550 g

Other general data see Technical Data, page 01.05

### Extent of the delivery

Data logger ALMEMO® 2890-9 in case including rechargeable battery pack and mains adapter for charging unit, Operating instructions, ALMEMO® Manual, manufacturer's test certificate, AMR-Control software **MA28909**

Option KL (see pages 01.17 and 03.03)	Order no.
Multi-point calibration, special ranges	OA2890KL
Option R (see page 11.08)	
Temperature ranges for 8 coolants	SB0000R2
Option Q4 : 400 mops measuring rate (see 01.05)	SA0000Q4

### Accessories

DC adapter cable, 10 to 30 V DC, 12 V / 1 A, electrically isolated	ZB2590UK
Memory connector with micro SD card, including USB card reader (see page 04.03)	ZA1904SD
Analog output cable, -1.25 to 2.0 V, 0.1 mV / digit	ZA1601RK
Trigger and relay cable (2 relays, 1 ohm, 0.5A, 50 V)	ZA1006EKG
V24 data cable, electr. isol., max. 115.2 KB	ZA1909DK5
Ethernet data cable, electr. isol., max. 115.2 KB	ZA1945DK
Network cable, electr. isol., max. 115.2 KB	ZA1999NK5
Transport case, large (aluminum), see Chapter 07	ZB2590TK2
Network technology, Bluetooth modules, see Chapter 05	
Other general data see Technical Data, page 01.05	

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# ALMEMO® MEASURING INSTRUMENTS

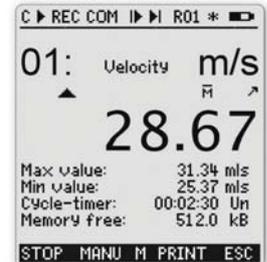
New menu system on data loggers ALMEMO® 2690-8 and 2890-9  
Quick and easy navigation thanks to the brightly illuminated display

## 1. Measurement menus

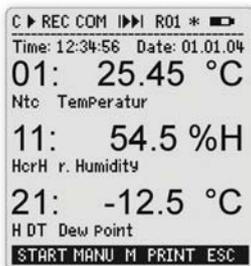
- ▶ Variable display of measured values:
  - numerically in 3 sizes,
  - 1 to 20 channels per menu,
  - in line diagram or bar chart form.
- ▶ Languages:
  - German, English, French.
  - Other languages are available on request.



Menu selection



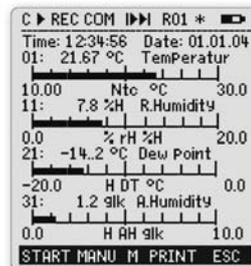
Standard display



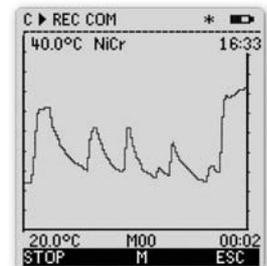
Multi-channel display



Measuring points list

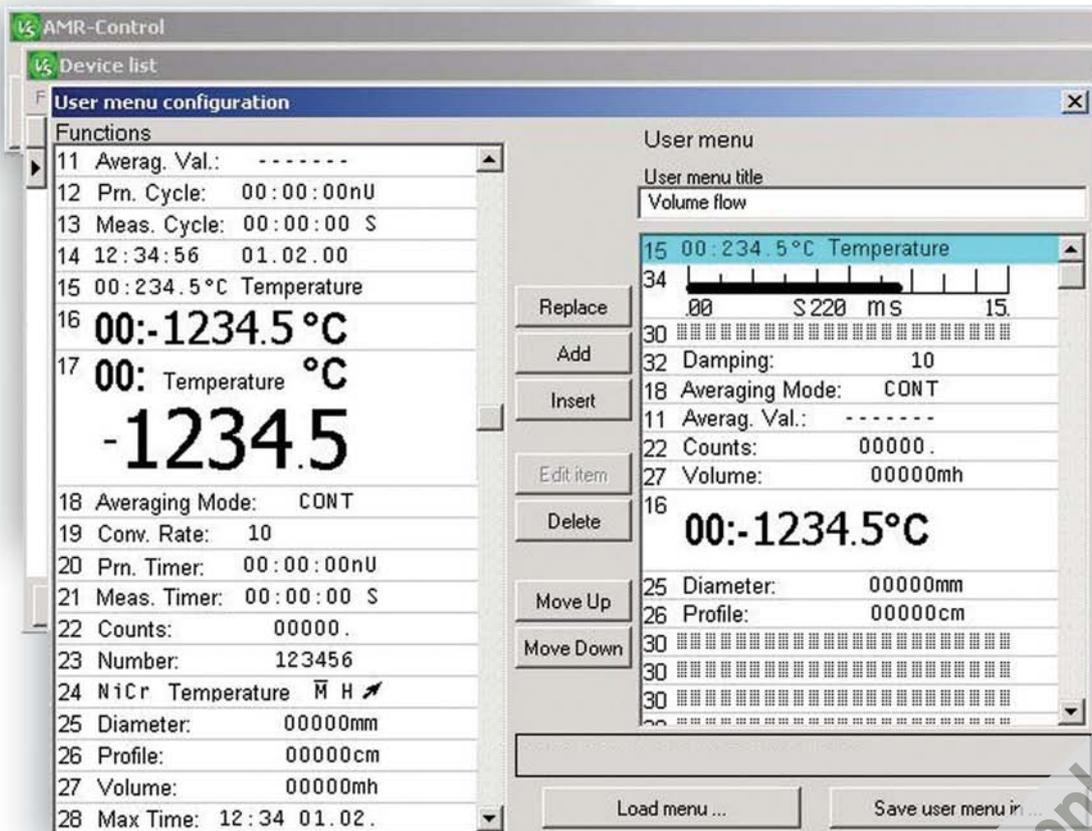


Bar chart



Line diagram

- ▶ Users can, using the AMR-Control software, by simple mouse click, freely configure their own menus from a range of 50 functions. The menu files can be saved and loaded via a PC.



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## 2. Programming menus

- ▶ All device and sensor functions can be programmed in full.
- ▶ Clear and easy-to-understand arrangement of functions.
- ▶ New functions for even easier operation:
  - display of available memory time,
  - stop measuring after settable measuring period,
  - file name when saving to MMC card.
- ▶ Power supply menu for selecting sensor supply or charging current for rechargeable battery.



Menu selection



Recording to memory

## 3. Wizard menus

- ▶ Help provided for more complex tasks.
- ▶ Interactive user guidance.
- ▶ Additional advisory notes provided via the information box.



Menu selection



Average value selection



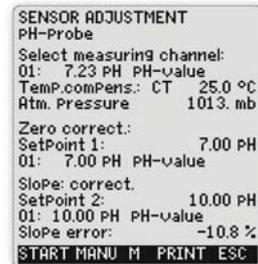
Channel and function selection



Measured data acquisition



Sensor scaling



Sensor adjustment

## 4. Calibration data management



Calibration data

- ▶ Automatic reminder as and when calibration period expires.

## 5. Multi-point sensor correction, user-defined linearization

see page 03.03

Test protocol				
Flow velocity measurement				
Sensor / Cal. No.:	Reference value m/s	Display m/s	Deviation m/s	Meas. uncertainty m/s
FV A605-TA10 Q031239	0,3	0,33	0,03	0,05
	0,45			
	1,00			
	2,00			

Point	Reference / setpoint	Display / actual value
1.	0.30	0.33
2.	0.45	0.49
3.	1.00	1.04

- ▶ A measurement protocol or a linearization table can be transferred to a table in the AMR-Control software.
- ▶ A correction curve can be programmed to the EEPROM on the sensor connector.

# ALMEMO® MEASURING INSTRUMENTS

## ALMEMO 8590-9, 8690-9A

**Data acquisition module with 9 inputs, 2 outputs for RS232, Ethernet, analog Memory with external connector and micro SD card or internal 512-KB EEPROM (option S)**



### Technical Features:

- ▶ 9 ALMEMO® input sockets, electrically isolated, for 9 ALMEMO® sensors, 36 sensor channels, 4 additional internal function channels.
- ▶ 2 ALMEMO® output sockets for digital interfaces, analog output, trigger input, alarm contacts, memory card.
- ▶ High-speed, high-resolution A/D converter, 24-bit, 50 measuring operations per second.  
*New* Electrically isolated between measuring inputs and supply.
- ▶ Programming of sensor parameters in the connector, can be modified via interface using the supplied AMR-Control software.
- ▶ Measuring functions : Measured value, zero-setting, sensor adjustment, maximum / minimum values stored with date, time-of-day, smoothing, average values over time or measuring points, limit value monitoring, temperature compensation, atmospheric pressure compensation.
- ▶ *New* Cold junction measuring with 2 NTCs and interpolation Ranges : Pt100 0.000 to 65.000°C, timer 6500.0 seconds.
- ▶ *New* Special ranges in the ALMEMO® connector, provided as standard, e.g. 0.000 to 50.000 ohms, NTC -5.000 to 46.000 °C, YSI 400 etc.
- ▶ *New* Option KL Multi-point calibration, calibration data management, user-defined linearization.
- ▶ 5 LEDs for indicating various operating states.
- ▶ Data logger with memory connector and micro SD card, recording in standard FAT16 file format, transmission to PC using card reader.
- ▶ Option : EEPROM with capacity for 100,000 measured values, internally configurable as linear or ring memory.
- ▶ Sleep mode for long-term recording.
- ▶ Device programming using the supplied AMR-Control software, i.e. date and time-of-day, cycle, start and end of measuring, measuring rate, etc.
- ▶ Key for switching on, start / stop measuring.
- ▶ Variant with rechargeable battery system, 8 AA-type NiMH batteries, high-speed charging.
- ▶ *New* Device software update via interface.
- ▶ *New* Trigger variants, process control using command macros.

### Technical Data:

<b>Measuring inputs</b>	9 ALMEMO® input sockets, electr. isol, with semiconductor relays (50 V)
Channels	9 primary channels, max. 32 additional channels for double sensors and function channels (e.g. differential values)
A/D converter	Delta-sigma, 24-bit, 50 measuring operations per second, electr.isolated For technical specifications, see p. 01.05.
Sensor power supply	Mains adapter, 12 V, max. 0.5A Rechargeable bat., 9 to 12 V, max. 0.5A

**Outputs:** 2 ALMEMO® sockets for all output modules (analog, data, trigger, relay cables, memory etc.)

### Standard equipment:

Operation :	1 key
Memory :	External memory connector ZA1904-MMC
Option S :	Internal 512-KB EEPROM (100,000 meas. val.)
Date and time-of-day	Real-time clock, buffered with lith. battery

### Power supply:

Mains adapter	230 VAC to 12 VDC, electrically isolated 1000 mA ZB1212NA8 2.5A ZB1212NA9
DC adapter cable	10 to 30 V, 250 mA, electr. isolated 250mA ZB3090UK 1.25A ZB3090-UK2
Rechargeable battery	8 NiMH rechargeable batteries, 1600mAh pack (8690-9A only) 2.5-hour high-speed charging, internal Current consumption without input and output modules :
Active mode	approx. 25 mA
Sleep mode	approx. 0.05 mA

### Housing:

8590-9 : (LxWxH)	180 x 49 x 137 mm, polystyrene Weight 490 gr
8690-9A : (LxWxH)	218 x 77 x 145 mm, polystyrene

For further general data, see technical specifications, page 01.05.

### Product overview:

<b>Data acquisition module ALMEMO 8590-9,</b> 8-DU housing, without bus, 9 inputs, 2 outputs, real-time clock, mains adapter 1000 mA	<b>MA85909</b>
<b>Data acquisition module ALMEMO 8690-9A,</b> 12-DU housing, shielded, with bus, 2 plug-in slots, 9 inputs, 2 outputs, real-time clock, with rechargeable battery pack and mains adapter for charging, 2.5A	<b>MA86909A</b>
Option S: Internal data memory, 512-KB EEPROM	OA8590S
Option KL: (see pages 01.17 and 03.03) Multi-point calibration, linearization	OA8590KL
Option R: (see page 11.08) Temperature ranges for 8 coolants	SB0000R2
Option Q4 : 400 mops measuring rate (see 01.05)	SA0000Q4
Top hat rail mounting	OA2290HS

### Accessories:

DC adapter cable, 10 to 30 VDC, 12 V / 250 mA, electr. isolated 250mA	ZB3090UK
1.25mA	ZB3090UK2
Memory connector with micro SD card and USB card reader (see page 04.03)	ZA1904SD
Analog output cable, -1.25 to 2.0 V, 0.1 mV / digit	ZA1601RK
Trigger and alarm cable (2 relays, 1 Ω, 0.5A, 50 V)	ZA1005EK
V24 data cable, electr. isol., maximum 115.2 KB	ZA909DK5
Ethernet data cable, electr. isol., maximum 115.2 KB	ZA1945DK
Network cable, electr. isol., maximum 115.2 KB	ZA1999NK5
Network technology, Bluetooth modules, see Chapter 05	

01/2011 We reserve the right to make technical changes.



**ALMEMO® 8490-TH and 8490-KS**  
**data acquisition modules in 4-DU housing**  
**with 10 measuring inputs, 2 outputs for RS232,**  
**Ethernet, analog, memory**  
**with external connector, and micro SD card**  
**or internal 512-KB EEPROM (option S)**



inputs

outputs

## Technical Features:

- ▶ Type TH : 10 electrically isolated inputs for 10 sensors with thermocouples
- Type KS : 10 electrically isolated inputs with clamp connectors
- Type KSU : ditto, for 10-V signals
- Type KSI : ditto, for 20-mA signals
- ▶ 2 ALMEMO® output sockets for digital interfaces, analog output, trigger input, alarm contacts, memory card
- ▶ High-speed, high-resolution A/D converter, 24-bit, 50 mops  
**New** Electrically isolated between measuring inputs and supply
- ▶ Programming of sensor parameters in the device, can be modified via interface using the supplied AMR-Control software
- ▶ Measuring functions : Measured value, zero-setting, sensor adjustment, maximum / minimum values stored with date and time-of-day, smoothing, average values over time or measuring points, limit value monitoring, temperature compensation, atmospheric pressure compensation
- ▶ Cold junction measuring with 2 NTCs and interpolation (Type TH)
- ▶ New measuring ranges :  
 Timer 6500.0 seconds, PT100 0.000 to 65.000 °C (Type KS)
- ▶ 4 LEDs for indicating various operating states
- ▶ Data logger with memory connector and micro SD card, recording in standard FAT16 file format, transmission to PC using card reader
- ▶ Option :  
 EEPROM with capacity for 100,000 measured values, internally configurable as linear or ring memory
- ▶ Sleep mode for long-term recording
- ▶ Device programming using the supplied AMR-Control software, i.e. date and time-of-day, cycle, start and end of measuring, measuring rate, etc.
- ▶ Key for switching on and start / stop measuring

## Technical Data:

<b>Measuring inputs</b>	
Type TH	10 inputs with miniature thermal sockets
Type KS	10 inputs with clamp connectors
Channels	10 primary channels, maximum 30 additional channels for double sensors and function channels (e.g. differential values)
Selector	electrically isolated, with semiconductor relays (50 V)
A/D converter	delta-sigma, 24-bit, 50 mops, electrically isolated see technical data, page 01.05
<b>Outputs</b>	
2 ALMEMO® sockets for all output modules (analog, data, trigger, relay cables, memory etc.)	
<b>Standard equipment</b>	
Operation	1 key
Memory	Ext. memory connector ZA1904MMC
Option S	Internal 512-KB EEPROM (100,000 measured values)
Date and time-of-day	Real-time clock, buffered with lithium battery
<b>Power supply</b>	
Mains adapter	ZB1112NA8 230 VAC to 12 VDC, 1A, electrically isolated
DC adapter cable	10 to 30 V, 250 mA ZB2290-UK electrically isolated
Current consumption without active mode	approx. 25 mA
Input and output modules Sleep mode	approx. 0.05 mA
<b>Housing</b>	
(LxWxH)	174 x 29 x 137 mm, polystyrene
Weight	435 g

For further general data, see technical specifications, page 01.05.

## Product overview :

### Data acquisition module 8490-TH

4-DU housing, 10 inputs for all thermocouples with miniature thermal connectors and mV ranges, 2 outputs, real-time clock, and mains adapter 1A

**MA8490TH**

Option S Internal data memory, 512-KB EEPROM

**OA8490S**

### Data acquisition module 8490-KS

4-DU housing, 10 inputs with clamp connectors (included), without sensor supply, ranges PT100, Ni100, NTC, ohms, 2.6 V, 260 mV, 55 mV, 26 mV, thermocouples with external cold junction, 2 outputs only, real-time clock, mains adapter 200 mA

**MA8490KS**

ditto, 10 inputs with 100/1 divider for 10-V signals only

**MA8490KSU**

ditto, 10 inputs with shunt for 20-mA signals only

**MA8490KSI**

Option S Internal data memory, 512-KB EEPROM

**OA8490S**

Option Q4 : 400 mops measuring rate (see 01.05)

**SA0000Q4**

## Accessories

DC adapter cable, 10 to 30 VDC, 12 V / 250 mA, electrically isolated

ZB2290UK

Clamp connectors for ES5690UKS, 1 set (= 2 socket strips)

ZB5600KS

for connecting 10 sensors

Memory connector with micro SD card (see p. 04.03)

ZA1904SD

Analog output cable, -1.25 to +2.0 V, 0.1 mV / digit

ZA1601RK

Socket strips (2 pieces) including dust cover for

MA8490KS

Trigger and alarm cable (2 relays, 1 Ω, 0.5A, 50 V)

ZA1006EKG

V24 data cable, electr. isolated, maximum 115.2 KB

ZA1909DK5

Ethernet data cable, electr. isol., max. 115.2 KB

ZA1945DK

Network cable, electr. isolated, maximum 115.2 KB

ZA1999NK5

Network technology, Bluetooth modules, see Chapter 05

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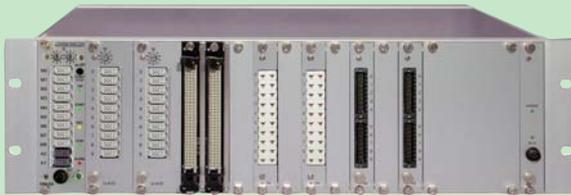
# ALMEMO® MEASURING INSTRUMENTS

## ALMEMO® data acquisition systems

Versions and options:

- ▶ The system (ALMEMO® 5690-xM09) and the CPU system (ALMEMO® 5690-xCPU)
- ▶ For the CPU system only - 2 options XU - more than 100 measuring inputs, option XM - more than 100 measuring inputs and high-speed measuring operations
- ▶ ALMEMO 5690-1 (version without display); ALMEMO 5690-2 (version with display and operating controls)
- ▶ 3 housing sizes - desktop housing TG3, TG8, and sub-rack BT8 (also desktop housing TG1 - but only with ALMEMO 5690-1, the version without display)
- ▶ **New** Wall-mounted housing WG3 for ALMEMO® 5690-2 systems (with display). The slide-in modules have their connections showing downwards. Wall mounting is by means of the housing's backplate.
- ▶ **New** Data acquisition system in protected industrial housing (see 01.34)

### System ALMEMO® 5690-1M09 and 5690-2M09



ALMEMO® 5690-1M09 BT8



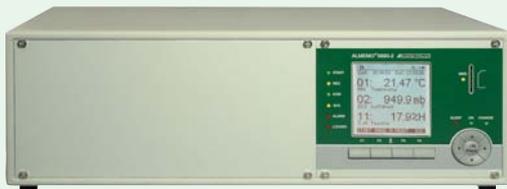
ALMEMO® 5690-2M09 TG3



ALMEMO® 5690-2M09 IG2

- ▶ Desktop housing / sub-rack with master measuring circuit and 9 ALMEMO® inputs
- ▶ Up to 99 measuring inputs / up to 99 measuring channels (9 selector switch boards each with 10 inputs); up to 9 connectors with special measuring range / multi-point calibration / linearization (on the master measuring circuit only)
- ▶ Online operation via PC
- ▶ Data logger operation (without PC) with microSD memory card (accessory for ALMEMO® 5690-1M09, integrated drive as standard on ALMEMO® 5690-2M09) or with integrated EEPROM (option)

### CPU system ALMEMO® 5690-1CPU and 5690-2CPU



ALMEMO® 5690-2CPU TG8



ALMEMO® 5690-1CPU TG3



ALMEMO® 56902 CPUWG3

- ▶ Desktop housing / sub-rack with CPU (integrated measuring circuit) without inputs
- ▶ 5 ALMEMO® output sockets for expanding the periphery
- ▶ Socket P0 for integrated relay / trigger / analog outputs (option)
- ▶ Up to 100 measuring inputs (10 selector switch boards MU, clamp / thermal connectors) or Up to 90 measuring inputs (9 selector switch boards, ALMEMO® single connectors) up to 100 measuring channels
- ▶ Online operation via PC
- ▶ Data logger operation (without PC) with integrated RAM or with microSD memory card (accessory for 5690-1CPU, integrated drive as standard on 5690-2CPU)

#### With option XU - up to 190 inputs

- ▶ Up to 190 measuring inputs / 250 measuring channels (19 selector switch boards selector switch boards each with 10 inputs, MUs, or clamp connectors) Up to 190 ALMEMO® connectors with special meas. range / multi-point calibration / linearization

#### With option XM - up to 190 inputs and high-speed measuring operations

- ▶ With active measuring circuit boards (instead of selector switch boards) Up to 190 measuring inputs / 250 measuring channels (19 selector switch boards selector switch boards each with 10 inputs, MUs, or clamp connectors) Up to 190 ALMEMO® connectors with special measuring range / multi-point calibration / linearization
- ▶ The measuring circuit boards operate in parallel thus ensuring short scanning times for a large number of channels (see next page).

## ALMEMO® data acquisition systems - a comparison

01/2011 We reserve the right to make technical changes.

### Functions

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	CPU board (without measuring inputs)		
ALMEMO® outputs	Sockets A1 und A2	Sockets A1 to A5 for expanding the periphery, optional socket P0 (relay / trigger / analog outputs)		
Selector switch boards	up to 9	up to 9	up to 19	none
Active measuring circuit boards	none	none	none	up to 19
Measuring inputs	up to 99	up to 100	up to 190	up to 190
Number of channels	up to 99	up to 100	up to 250	up to 250
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 chann. in total = 10/19 meas. circuit boards each with 10 channels
at conversion rate 10 Hz	0,1 ... 10 seconds	0,1 ... 10 seconds	0,1 ... 19 seconds	... 1,1/1,1 seconds*
at conversion rate 50 Hz	0,02 ... 2 seconds	0,02 ... 2 seconds	0,02 ... 4 seconds	... 0,3/0,5 seconds* *systems without display
ALMEMO® connectors with special measuring range / multi-point calibration, linearization	up to 9 ALMEMO® connectors (master measuring circuit)	up to 100 ALMEMO®-connectors	up to 190 ALMEMO®-connectors	up to 190 ALMEMO®-connectors

### Modes

Type	5690-1M09	5690-2M09	5690-1CPU	5690-2CPU
Online operation with PC	yes		yes	
Display and operating controls	no	yes	no	yes
Data logger	Accessory ZA1904SD, memory connector, including microSD card	Integrated microSD drive as standard, including microSD card	Accessory ZA1904SD, memory connector, including microSD card	Integrated microSD drive as standard, including microSD card
Internal memory	512 kB EEPROM (option)		2-MB RAM, battery-buffered (as standard) or 2-MB FeRAM, non-volatile (option)	

### Technical features common to all ALMEMO® 5690 data acquisition systems

- ▶ High-speed, high-resolution A/D converter, 24-bit, 2.5 to 50 mops (measuring operations per second)
- ▶ **New** Electrically isolated between measuring inputs and power supply
- ▶ Sleep mode for long-term recording
- ▶ Measuring functions Measured values, zero-setting, setpoint adjustment, maximum and minimum value saving with date and time-of-day, smoothing, average values over time or measuring points, limit value monitoring, cold junction compensation, temperature compensation, atmospheric pressure compensation
- ▶ ALMEMO® system sensor programming in the connector
- ▶ **New** Cold junction measuring with 2 NTCs / insert and interpolation
- ▶ **New** Ranges Pt-100, -8,000 to 65.000 °C, timer 6500.0 seconds
- ▶ **New** Special ranges in the ALMEMO® connector, provided as standard, e.g. 0.000 to 50.000 ohms, NTC, -5.000 to 46.000 °C, YSI 400 etc.
- ▶ **New** Option KL User-defined linearization, multi-point calibration, and calibration management (see pages 01.17 and 03.03)
- ▶ **New** Option Q4 : 400 mops measuring rate Saves 1 measuring channel at 400 mops to MMC card (see 01.05). This is not possible simultaneously with option XM.
- ▶ 5 LEDs for displaying the operating status of the measuring circuit and the CPU
- ▶ Accessories Rechargeable battery module with 8 AA-type NiMH batteries, high-speed battery charging
- ▶ **New** Device software updates via interface, programming software package AMR-Control included as standard
- ▶ Devices are EMC-tested to industrial standard.

# ALMEMO® MEASURING INSTRUMENTS

## ALMEMO® 5690-1M

**Data acquisition system with master measuring board 9 to 99 measuring inputs, 2 outputs for RS232, Ethernet, analog, Memory with drive for micro SD card or internal 512-KB EEPROM (option S)**



Our data acquisition systems are modular and can be individually configured for your specific measuring task. We look forward to providing you with competent, personal advice. Please feel free to ask for a demonstration and let our specialists introduce you to the large number of options regarding the application and configuration.

### Technical features common to all ALMEMO® 5690-1M09 and 5690-2M09 systems

- ▶ Master measuring board, 9 ALMEMO® input sockets, electrically isolated, for 9 ALMEMO® sensors, 31 additional channels (maximum), (of which 4 internal function channels).
- ▶ Up to 9 ALMEMO® connectors with special measuring ranges / multi-point calibration / linearization (on the master measuring circuit only)
- ▶ Extendible up to 99 inputs with various selector switch boards and maximum 99 meas. channels.
- ▶ 2 ALMEMO® output sockets for digital interfaces, analog outputs, trigger input, and alarm contacts.
- ▶ Option EEPROM with capacity for 100,000 measures values, internally configurable as linear or ring memory.

### Technical features common to all ALMEMO® 5690-1 systems without display

- ▶ Data logger with external memory connector and micro SD card (accessory), recording in standard FAT16 file format, transfer to PC via USB card reader

### Technical features common to all ALMEMO® 5690 systems see page 01.27

### Types and ordering information

Master measuring circuit with 9 inputs, up to 99 measuring inputs via selector switch boards (to be ordered extra, see page 01.30)  
 2 output sockets, cascading interface, real-time clock, 1 key, mains adapter 12 VDC, 2.5 A  
 19" desk-top housing 12 DU, shielded, Dimensions: 77 x 145 x 218 mm (WxHxD), 1 slot  
 19" desk-top housing 32 DU, shielded, Dimensions: 179 x 158 x 232 mm (WxHxD), 6 slots  
 19" desk-top housing 84 DU, shielded, Dimensions: 444 x 158 x 232 mm (WxHxD), 19 slots  
 19" sub-rack 84 DU, Dimensions: 483 x 132 x 273 mm (WxHxD), 19 slots

### Options for all ALMEMO® 5690-1M09 and 5690-2M09 systems

- S: Internal EEPROM with capacity for 100,000 measures values
- KL: Linearization, multi-point calibration, and calibration data management (see 01.17 / 03.03)
- R: Temperature ranges for 8 coolants (see page 11.08)
- Q4: 400 mops measuring rate for 1 measuring channel (see 01.05)

### Accessories for all ALMEMO® 5690-1 systems without display

Memory connector with micro SD card and USB card reader (see page 04.03)

**Order no. MA56901M09TG1**  
**Order no. MA56901M09TG3**  
**Order no. MA56901M09TG8**  
**Order no. MA56901M09BT8**

**Order no. OA5690S**  
**Order no. OA5690KL**  
**Order no. SB0000R2**  
**Order no. SA0000Q4**

**Order no. ZA1904SD**

# ALMEMO® MEASURING INSTRUMENTS

01

**ALMEMO® 5690-2M09**  
**Data acquisition systems with graphics display**  
**Master measuring circuit with 9 to 99 measuring inputs**  
**2 outputs for RS232, Ethernet, analog,**  
**Memory with drive for micro SD card**  
**or internal 512-KB EEPROM (option S)**

**new!**



Wall-mounted housing WG3

**Technical features common to all ALMEMO® 5690-1M09 and 5690-2M09 systems**  
 see catalog, ALMEMO® 5690-1M09

## Technical features common to all ALMEMO® 5690-2 systems with graphics display

- ▶ Ideal display with large, brightly illuminated graphics
- ▶ Easy and convenient to operate by means of 4 soft-keys and cursor block; comprehensive menu system with wizards and context-sensitive help windows
- ▶ Choice of languages : German, English, French (others also available)
- ▶ 9 measuring menus (3 can be freely configured by the user from a range of 50 functions)
- ▶ Measured values can be displayed graphically in line chart or bar chart form and from 1 to 20 measured values can be displayed numerically in various sizes.
- ▶ 8 programming menus for easy-to-understand parametrization of cycles, times, memory, device locking, output modules, and power supply Sensor programming with range, units, designation, scaling, error correction, etc.
- ▶ 9 LEDs for indicating various operating states
- ▶ Data logger with micro SD card, provided as standard, recording in standard FAT16 file format, transfer to PC via USB card reader

**Technical features common to all ALMEMO® 5690 systems** see page 01.27

## Types and ordering information

Graphics display with illumination, 9 keys, master measuring circuit with 9 inputs, up to 99 measuring inputs via selector switch boards (to be ordered extra, see page 01.30), micro SD card memory and USB card reader, 2 output sockets, cascable interface, real-time clock, 1 key, mains adapter 12 VDC, 2.5 A

19" desk-top housing 32 DU, shielded, Dimensions: 179 x 158 x 232 mm (WxHxD), 6 slots

19" desk-top housing 84 DU, shielded, Dimensions: 444 x 158 x 232 mm (WxHxD), 19 slots

19" sub-rack 84 DU, Dimensions: 483 x 132 x 273 mm (WxHxD), 19 slots

**New** In Wall-mounted housing, 32 DUs. The slide-in modules have their connections showing downwards. For wall-mounting there are 4 holes (5.3 mm) on the left and right sides of the housing's backplate (which cannot itself be removed). Dimensions (WxHxD) 209 x 207 x 153 mm (width includes fastening strip), 6 plug-in slots

**Order no. MA56902M09TG3**

**Order no. MA56902M09TG8**

**Order no. MA56902M09BT8**

**Order no. MA56902M09WG3**

## Options for all ALMEMO 5690-1M09 and 5690-2M09 systems

- S: Internal EEPROM with capacity for 100,000 measures values
- KL: Linearization, multi-point calibration, and calibration data management (see 01.17/03.03)
- R: Temperature ranges for 8 coolants (see page 11.08)
- Q4: 400 mops measuring rate for 1 measuring channel (see 01.05)

**Order no. OA5690S**

**Order no. OA5690KL**

**Order no. SB0000R2**

**Order no. SA0000Q4**

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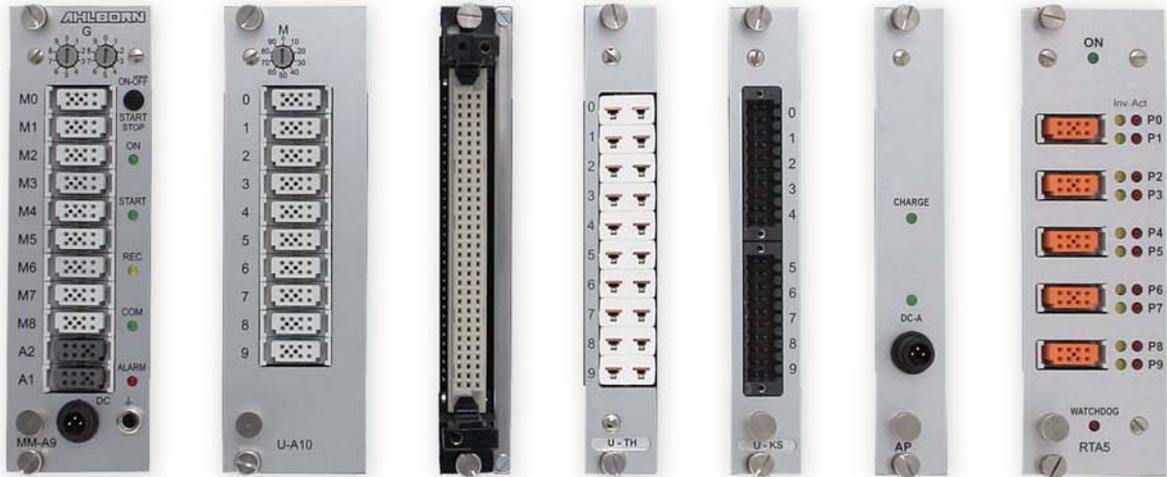
**AHLBORN**  
 www.ahlaborn.com

**SUPPLYLAB**  
 www.supplylab.pt

# ALMEMO® MEASURING INSTRUMENTS

## Master measuring board, Selector switch boards and expansions for the ALMEMO 5690-1M09 und 5690-2M09 systems

Our data acquisition systems are modular and can be individually configured for your specific measuring task.



Master meas. board  
MM-A9

U-A10

U-MU

U-TH

U-KS (U/I)

AP

RTA5

### Technical Data and ordering information

#### Master measuring board

Channels

A/D converter  
Supply current

9 ALMEMO® input sockets, electr. isol., with semiconductor relays  
9 primary channels, 27 additional channels for double sensors and function channels,  
4 internal function channels  
delta-sigma, 24-bit, 2.5 / 10 / 50 measuring operations per second, electrically isolated  
For system boards and sensor supply. Entire system, max. 2.5 A, per board max. 0.5 A

#### Selector switch boards:

**U-A10** 10 electrically isolated inputs for ALMEMO® flat connectors, 10 to 40 channels, with sensor supply, 2 plug-in slots

**Order no. ES5690UA10**

**U-MU** 10 electrically isolated inputs, sensor connection with 10x MU connector, 10 to 40 channels, without sensor supply, ranges only, for all thermocouples, Pt100, Ni100, NTC, ohms, 2.6 V, 260 mV, 55 mV, 26 mV, 1 plug-in slot

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

ALMEMO® 10-fold connector (see page 03.15)

**U-TH** 10 electr. isol. inputs for all thermocouples with miniature thermal connector, 10 to 40 channels, 1+1 plug-in slots (dummy panel needed)

**Order no. ES5690UTH**

**U-KS** 10 electr. isol. inputs, sensor connection with clamp connector, 10 to 40 channels, without sensor supply, ranges only, Pt100, Ni100, NTC, ohms, 2.6 V, 260 mV, 55 mV, 26 mV, incl. clamp connector, 1 plug-in slot

**Order no. ES5690UKS**

**U-KSU** 10 electrically insulated inputs, sensor connection with clamp connector, 10 to 40 channels, without sensor supply, one slot  
**U-KSI** all inputs for 10 V with 100:1 divider, incl. clamp connector  
all inputs for 20 mA with shunt, ranges mA and % (4 to 20 mA)

**Order no. ES5690UKSU**  
**Order no. ES5690UKSI**

#### Expansion:

**AP** Rechargeable battery pack (8 cells NiMH, 1600mAh),  
1 free slot with intelligent high-speed charging (3.5h) Supply current: Entire system max. 1.5A

**Order no. ES5690AP**

**RTA5** Relay / trigger / analog module (see page 04.08) 2 slots  
Per system up to 7 slide-in modules RTA5 are supported.

**Order no. ES5690RTA5**

## Technical data

### For all ALMEMO® 5690-1M09 and 5690-2M09 systems

Memory (option S)	Internal 512-KB EEPROM (100,000 measured values)
Date and time-of-day	Real-time clock, buffered with lithium battery
<b>Outputs</b>	2 ALMEMO®-sockets for all output moduls (analog, data, trigger, relais cable etc.) internal alarm transmitter
<b>Power supply</b>	Mains adapter ZB1212NA9 90 ... 260 VAC, 12 VDC, 2.5 A DC adapter cable, electrically isolated ZB3090-UK2 10 to 30 VDC, 12 VDC, 1.25 A Rechargeable battery module (8 NiMH cells, 9 to 11 V, 1600 mAh) with intelligent high-speed charging (3.5 hours)

For further general data, please refer to the technical specifications, page 01.05

### For all ALMEMO® 5690-1 systems without display

Operation:	1 key, 5 LEDs, 2 coding switches
------------	----------------------------------

### For all ALMEMO® 5690-2 systems with display

Display	Graphics display, 128 x 128 pixels, 16 rows, illumination 5 white LEDs, 3 brightness levels
Operation	9 keys (4 soft-keys and cursor block), 9 status LEDs on the front panel
Memory	micro SD card and USB card reader

## Accessories for all ALMEMO® 5690 systems

Micro SD card, (see page 04.03)

ALMEMO® 10x connector (64-pin) for connecting 10 sensors (see page 03.15)\*

Socket terminal strips (2x) including dust covers for system board KS(U/I)

DC power cable, 10 to 30 V, 12 V / 1.25 A, electrically isolated

Trigger and alarm cable (2 relays, 1 Ω, 0.5 A, 50 V)

USB data cable, electrically isolated, maximum 115.2 kilobaud

V24 data cable, electrically isolated, maximum 115.2 kilobaud

Ethernet data cable, electrically isolated, maximum 115.2 kilobaud

Network cable, electrically isolated, maximum 115.2 kilobaud

Carry case, aluminum profile frame / ABS (acrylonitrile butadiene styrene) for ALMEMO 5690 (see 07.07)

Rack case with carrying handle for ALMEMO 5690xxBT8 in 19-inch sub-rack (see page 07.07)

For more accessories, please refer to main catalog, "Output modules and network technology".

**Order no. ZB1904SD**  
**Order no. ZA5690MU**  
**Order no. ZB5600KS**  
**Order no. ZB3090UK2**  
**Order no. ZA1006EKG**  
**Order no. ZA1919DKU**  
**Order no. ZA1909DK5**  
**Order no. ZA1945DK**  
**Order no. ZA1999NK5**  
**Order no. ZB5600TK3**  
**Order no. ZB5090RC**

\* The current MU connector version, ZA5690MU, can only be used in conjunction with the new ALMEMO® 5690 systems.

The old MU connector version, ZA5590MU, can of course be used in conjunction with the old ALMEMO® 5590/5990 systems but is subject to certain restrictions with the current 5690 systems (e.g. only 1 measuring channel per input, no multi-point adjustment or connector linearization).



Carry case, universal, high, aluminum profile frame for ALMEMO® 5690-1M/-2M  
 Order no. ZB5600TK3



Rack case with carrying handle, for ALMEMO® MA5690xxBT8 measuring systems, in 19-inch sub-rack  
 Order no. ZB5090RC

# ALMEMO® MEASURING INSTRUMENTS

## CPU system ALMEMO® 5690-1CPU

### Data acquisition system with CPU board

Up to 190 measuring inputs / up to 250 measuring channels

5 outputs for RS232, Ethernet, networking, relays, triggers

Integrated relay / trigger / analog outputs (option)

Internal 2-MB RAM, expandable up to 1 GB, (or FeRAM option)

With external connector and micro SD card (accessory)

Our data acquisition systems are modular and can be individually configured for your specific measuring task. We look forward to providing you with competent, personal advice. Please feel free to ask for a demonstration and let our specialists introduce you to the large number of options regarding the application and configuration.



### Technical features common to all ALMEMO® 5690-1CPU and 5690-2CPU systems

- ▶ CPU board (measuring circuit without measuring inputs)
- ▶ Up to 100 measuring inputs (via selector switch boards MU, clamp / thermal connectors) or up to 90 measuring inputs (via selector switch boards, ALMEMO® single connectors) up to 100 measuring channels
- ▶ Up to 100 ALMEMO® connectors with special measuring ranges / multi-point calibration / linearization
- ▶ **New** Option OA5690XU Up to 190 measuring inputs / 250 measuring channels (19 selector switch boards MU or clamp connectors each with 10 inputs)
- ▶ **New** Option OA5690XM For active measuring circuit boards, up to 190 measuring inputs / up to 250 measuring channels (19 active measuring circuit boards MU or clamp connectors each with 10 inputs) The measuring circuit boards operate in parallel thus ensuring short scanning times for a large number of channels. Example An arrangement with 10 / 19 measuring circuit boards and 10 measuring channels per board (= 100 / 190 channels in total) ensures a scanning time of approx. 1.1 / 1.1 seconds at a conversion rate of 10 Hz (plus 0.2 seconds for thermocouples) or approx. 0.3 / 0.5 seconds at a conversion rate of 50 Hz (plus 0.1 seconds for thermocouples). The scanning time is determined by the measuring circuit board with the highest number of active measuring channels - or, at a conversion rate of 50 Hz and with 9 to 19 measuring circuit boards, by the processing time of the CPU (approx. 2.5 ms per measured value of the systems without display).
- ▶ **New** 5 ALMEMO® output sockets for digital interfaces, analog outputs, triggers, alarm contacts Socket P0 for integrated relay / trigger / analog outputs (option)
- ▶ Internal 2-MB RAM, battery-buffered, with capacity for up to 400000 measured values, configurable as linear or ring memory 2-MB FeRAM, non-volatile (option)

### Technical features common to all ALMEMO® 5690-1 systems without display

- ▶ Data logger with external memory connector and micro SD card (accessory), recording in standard FAT16 file format, transfer to PC via USB card reader

### Technical features common to all ALMEMO® 5690 systems see page 01.27

### Types and ordering information

CPU board (measuring circuit without inputs), up to 100 measuring inputs via selector switch boards (to be ordered extra, see page 01.xx), Internal 2-MB RAM data memory, 5 output sockets Cascadable interface, real-time clock, 1 key, mains adapter 12 VDC, 2.5 A

19-inch desktop housing, 12 DUs Dimensions 77 x 145 x 218 mm (WxHxD) PS shielded, 1 slot

19-inch desktop housing, 32 DUs Dimensions 179 x 158 x 232 mm (WxHxD) PS shielded, 6 slots

19-inch desktop housing, 84 DUs Dimensions 444 x 158 x 232 mm (WxHxD) PS shielded, 19 slots

19" sub-rack, 84 DUs Dimensions 483 x 132 x 273 mm (WxHxD) 19 slots

**Options for all CPU systems ALMEMO 5690-1CPU and 5690-2CPU:** see next page

### Accessories for all ALMEMO® 5690-1 systems without display

Memory connector with micro SD card and USB card reader (see page 04.03)

**Order no. MA56901CPUTG1**

**Order no. MA56901CPUTG3**

**Order no. MA56901CPUTG8**

**Order no. MA56901CPUBT8**

**Order no. ZA1904SD**

# ALMEMO® MEASURING INSTRUMENTS

01

## CPU system ALMEMO® 5690-2CPU

### Data acquisition system with graphics display

With CPU board up to 190 measuring inputs / 250 channels

5 outputs for RS232, Ethernet, networking, relays, triggers

Integrated relay / trigger / analog outputs (option)

Internal 2-MB RAM, expandable up to 1 GB, (or FeRAM option)

with micro SD card drive (option)

**new!**



### Technical features common to

all ALMEMO® 5690-1CPU and 5690-2CPU systems see catalog, ALMEMO® 5690-1CPU

Wall-mounted housing WG3

### Technical features common to all ALMEMO® 5690-2 systems with graphics display

- ▶ Ideal display with large, brightly illuminated graphics
- ▶ Easy and convenient to operate by means of 4 soft-keys and cursor block; comprehensive menu system with wizards and context-sensitive help windows
- ▶ Choice of languages : German, English, French (others also available)
- ▶ 9 measuring menus (3 can be freely configured by the user from a range of 50 functions)
- ▶ Measured values can be displayed graphically in line chart or bar chart form and from 1 to 20 measured values can be displayed numerically in various sizes.
- ▶ 8 programming menus for easy-to-understand parametrization of cycles, times, memory, device locking, output modules, and power supply Sensor programming with range, units, designation, scaling, error correction, etc.
- ▶ 9 LEDs for indicating various operating states
- ▶ Data logger with micro SD card, provided as standard, recording in standard FAT16 file format, transfer to PC via USB card reader

Technical features common to all ALMEMO® 5690 systems see page 01.27

### Types and ordering information

Graphics display with illumination, 9 keys, CPU board (measuring circuit without inputs), up to 100 measuring inputs via selector switch boards (to be ordered extra, see page 01.xx), micro SD card memory and USB card reader, internal 2-MB RAM, 5 output sockets, cascadable interface, real-time clock, mains adapter 12 VDC, 2.5 A

19-inch desktop housing, 32 DUs, 179 x 158 x 232 mm (WxHxD) polystyrene shielded, 6 slots

19-inch desktop housing, 84 DUs, 444 x 158 x 232 mm (WxHxD) polystyrene shielded, 19 slots

19-inch sub-rack, 84 DUs Dimensions 483 x 132 x 273 mm (WxHxD) 19 slots

**New** In Wall-mounted housing, 32 DUs. The slide-in modules have their connections showing downwards. For wall-mounting there are 4 holes (5.3 mm) on the left and right sides of the housing's backplate (which cannot itself be removed). Dimensions (WxHxD) 209 x 207 x 153 mm (width includes fastening strip), 6 plug-in slots

**Order no. A56902CPUTG3**

**Order no. MA56902CPUTG8**

**Order no. MA56902CPUBT8**

**Order no. MA56902CPUWG3**

### Options for all ALMEMO® 5690-1CPU and 5690-2CPU systems

SF	Internal 2-MB FeRAM, non-volatile (instead of battery-buffered RAM)	Order no. OA5690SF
XU	Up to 190 measuring inputs / up to 250 measuring channels (maximum 19 selector switch boards MU or clamp connectors)	Order no. OA5690XU
XM	For active measuring circuit boards, up to 190 measuring inputs / up to 250 measuring channels (maximum 19 active measuring circuit boards MU or clamp connectors)	Order no. OA5690XM
KL	Programming for multi-point calibration / linearization (see 01.17 and 03.03)	Order no. OA5690KL
R	Temperature ranges for 8 refrigerants (see page 11.08)	Order no. SB0000R2
Q4:	400 mops measuring rate for 1 measuring channel (see 01.05) This is not possible simultaneously with option XM.	Order no. SA0000Q4

### Options for output socket P0 (only 1 option possible)

SH2	2 semiconductor relays (normally open) internal, 1 W, 0.5 A, 50 V	Order no. OA5690SH2
OH2	2 additional relays, normally closed, for option SH2 (are so 2 changeover)	Order no. OA5690OH2

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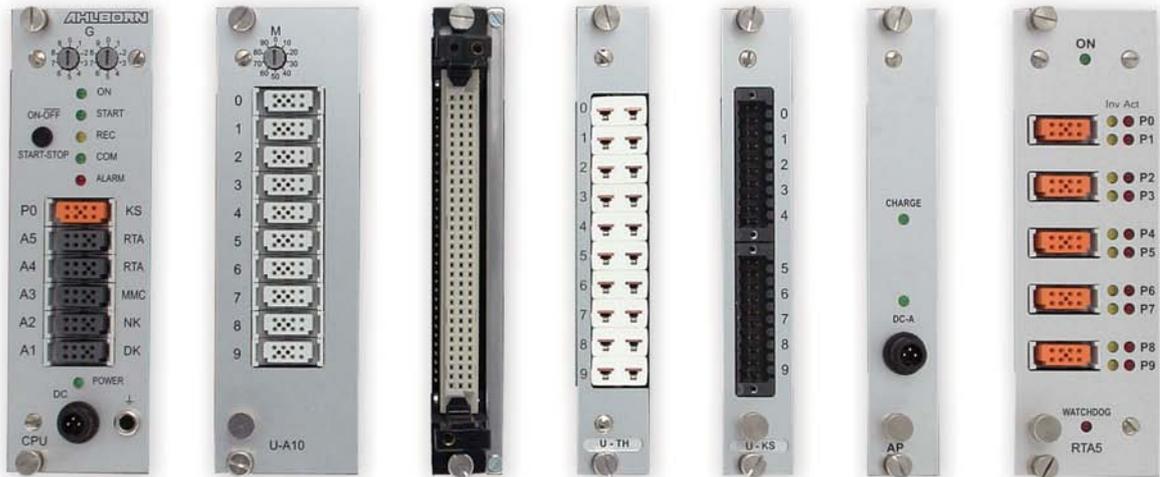
**SUPPLYLAB**  
www.supplylab.pt

01.31

# ALMEMO® MEASURING INSTRUMENTS

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

The modular design of all our data acquisition systems ensures that they adapt perfectly to your individual measuring tasks.



CPU                      U-A10                      U-MU                      U-TH                      U-KS (U/I)                      AP                      RTA5  
M-A10                      M-MU                      M-TH                      M-KS (U/I)

### Technical data and ordering information

#### CPU board with measuring circuit

A/D converter: Delta-sigma, 24-bit, 2.5 / 10 / 50 mops, electrically isolated; for technical data see page 01.05  
Supply current For system boards and sensor supply. Entire system, max. 2.5 A, per board max. 0.5 mA

#### Active measuring circuit board

A/D converter, like CPU

		<b>Selector switch boards</b> (for all systems without XM option) <b>Order no.</b>	<b>Active measuring circuit board</b> (for CPU systems with XM option) <b>Order no.</b>
<b>A10</b>	10 inputs, electr. isol., for ALMEMO® flat connectors, 10 to 40 channels, with sensor power supply, 2 slots	<b>ES5690UA10</b>	<b>ES5690MA10</b>
<b>MU</b>	10 inputs, electr. isol., sensor connection with 10x MU connector, 10 to 40 channels, without sensor supply, only ranges, for all thermocouples, Pt100, Ni 100, NTC, ohms, 2.6V, 260mV, 55mV, 26mV, 1 slot ALMEMO® 10x MU connector (see page 03.15)	<b>ES5690UMU</b>  <b>ZA5690MU</b>	<b>ES5690MMU</b>  <b>ZA5690MU</b>
<b>TH</b>	10 inputs, electrically isolated, for all thermocouples with miniature thermal connector, 10 to 40 channels, 1+1 slots (dummy panel needed)	<b>ES5690UTH</b>	<b>ES5690MTH</b>
<b>KS</b>	10 inputs, electr. isol., sensor connection with clamp connector, 10 to 40 channels, without sensor supply, only ranges Pt100, Ni100, NTC, ohms, 2.6V, 260mV, 55mV, 26mV, including clamp connector, 1 slot	<b>ES5690UKS</b>	<b>ES5690MKS</b>
<b>KSU</b> <b>KSI</b>	10 inputs, electr. isol., sensor connection with clamp connector, 10 to 40 channels, Without sensor supply, including clamp connector, 1 slot, All input s with 100:1 divider for 10 V All inputs with shunt for 20 mA, ranges mA and %(4 to 20 mA)	<b>ES5690UKSU</b> <b>ES5690UKSI</b>	<b>ES5690MKSU</b> <b>ES5690MKSI</b>
<b>Expansions:</b>		for all systems	
<b>AP</b>	Rechargeable battery module (8 NiMH cells, 1600 mAh), 1 slot 1 free slot with intelligent high-speed charging (3.5h) Supply current: Entire system max. 1.5A	<b>Order no. ES5690AP</b>	
<b>RTA5</b>	Relay / trigger / analog module (see page 04.08) 2 slots Per system up to 4 slide-in modules RTA5 are supported.	<b>Order no. ES5690RTA5</b>	

01/2011 We reserve the right to make technical changes.

## Technical data

### For all ALMEMO® 5690-1CPU and 5690-2CPU systems

Internal memory	2-MB RAM, battery-buffered, with capacity for up to 400000 measured values, configurable as linear or ring memory 2-MB FeRAM, non-volatile (option)
Date and time-of-day	Real-time clock, buffered with lithium battery
<b>Outputs</b>	5 ALMEMO® output sockets suitable for all output modules (data, / analog / trigger / relay cable, MMC, etc.) Alarm signal transmitter, internal Socket P0 for integrated relay / trigger / analog outputs (option)
<b>Power supply</b>	Mains adapter ZB1212NA9 90 ... 260 VAC, 12 VDC, 2.5 A DC adapter cable, electrically isolated ZB3090-UK2 10 to 30 VDC, 12 VDC, 1.25 A Rechargeable battery module (8 NiMH cells, 9 to 11 V, 1600 mAh) with intelligent high-speed charging (3.5 hours)

For further general data, please refer to the technical specifications, page 01.05

### For all ALMEMO® 5690-1 systems without display

Operation:	1 key, 5 LEDs, 2 coding switches
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### For all ALMEMO® 5690-2 systems with display

Display	Graphics display, 128 x 128 pixels, 16 rows, illumination 5 white LEDs, 3 brightness levels
Operation	9 keys (4 soft-keys and cursor block), 9 status LEDs on the front panel
Memory	micro SD card and USB card reader

### Accessories for all ALMEMO® 5690 systems

Micro SD card, (see page 04.03)

ALMEMO® 10x connector (64-pin) for connecting 10 sensors (see page 03.15)\*

Socket terminal strips (2x) including dust covers for system board KS(U/I)

DC power cable, 10 to 30 V, 12 V / 1.25 A, electrically isolated

Trigger and alarm cable (2 relays, 1 Ω, 0.5 A, 50 V)

USB data cable, electrically isolated, maximum 115.2 kilobaud

V24 data cable, electrically isolated, maximum 115.2 kilobaud

Ethernet data cable, electrically isolated, maximum 115.2 kilobaud

Network cable, electrically isolated, maximum 115.2 kilobaud

Carry case, aluminum profile frame / ABS (acrylonitrile butadiene styrene) for ALMEMO 5690 (see 07.07)

Rack case with carrying handle for ALMEMO 5690xxBT8 in 19-inch sub-rack (see page 07.07)

For more accessories, please refer to main catalog, "Output modules and network technology".

**Order no. ZB1904SD**

**Order no. ZA5690MU**

**Order no. ZB5600KS**

**Order no. ZB3090UK2**

**Order no. ZA1006EKG**

**Order no. ZA1919DKU**

**Order no. ZA1909DK5**

**Order no. ZA1945DK**

**Order no. ZA1999NK5**

**Order no. ZB5600TK3**

**Order no. ZB5090RC**

\* The current MU connector version, ZA5690MU, can only be used in conjunction with the new ALMEMO® 5690 systems.

The old MU connector version, ZA5590MU, can of course be used in conjunction with the old ALMEMO® 5590/5990 systems but is subject to certain restrictions with the current 5690 systems (e.g. only 1 measuring channel per input, no multi-point adjustment or connector linearization).



Carry case, universal, high, aluminum profile frame for ALMEMO® 5690-1/ -2  
Order no. ZB5600TK3

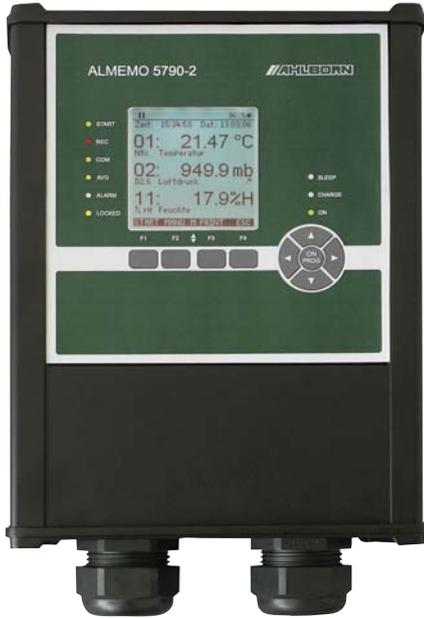


Rack case with carrying handle, for ALMEMO® MA5690xxBT8 measuring systems, in 19-inch sub-rack  
Order no. ZB5090RC

# ALMEMO® MEASURING INSTRUMENTS

**new!**

**ALMEMO® 5790**  
**Data acquisition system, in industrial housing, IP65, with graphics display, up to 29 or 20 measuring inputs**



ALMEMO® 5790-2M09 IG2  
View from below, floor open  
(Example: master measuring circuit with relay card ES5690RTA5)



CPU system ALMEMO® 5790-2CPU IG2  
View from below, floor open  
(Example : CPU board with 2 selector switch boards (10 ES5690MU)

### Technical data

Power supply:

Mains unit ZB1212NA6, installed on a fixed basis, 100 to 240 VAC, connected via appliance socket, including safety connecting cable

Housing:

Dimensions (WxHxD) 233 x 350 x 121 mm, 19-inch system; Plastic insert, 16 DU; Weight approx. 6 kg; Protection type IP65

Screwed cable glands:

Plastic, 2 PGs with multiple inserts, slotted, 24 holes for cables d= 4 mm, 2 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

Wall attachment: 4 thread M4 incl. 2 aluminum supports

### Types and ordering information ALMEMO® 5790-2M09IG2

Graphics display with illumination, 9 keys; Master measuring circuit with 9 inputs; up to 29 measuring inputs via selector switch boards (to be ordered extra, see page 01.28), 2 output sockets, cascadable interface, real-time clock, mains adapter build in

19-inch industrial housing, 16 DU, 2 slots

Option S: Internal data memory, 512-KB EEPROM

Option Power supply via rechargeable battery module

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

Other options, accessories extensions and technical data see system ALMEMO® 5690-2M09, page 01.27

(except micro SD card memory, not built in, memory connector available as accessory, see below )

**Order no. MA57902M09IG2**

**Order no. OA5690S**

**Order no. OA5790A**

**Order no. ES5690AP**

### Types and ordering information CPU system ALMEMO® 5790-2CPUIG2

Graphics display with illumination, 9 keys, CPU board (measuring circuit without inputs) Up to 20 measuring inputs via selector switch boards (to be ordered extra, see page 01.32) Internal data memory, 2-MB RAM, 5 output sockets, cascadable interface, real-time clock, mains adapter build in, 19-inch industrial housing, 16 DU, 2 slots

Option Power supply via rechargeable battery module

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

Other options, accessories extensions and technical data see CPU system ALMEMO® 5690-2CPU, page 01.31 (except micro SD card memory, not built in, memory connector available as accessory, see below )

**Order no. MA57902CPUIG2**

**Order no. OA5790A**

**Order no. ES5690AP**

### Accessories suitable for all systems in industrial housing

Memory connector with micro SD card and USB card reader

DC cable, 10 to 30 VDC, 12 V, 1.25 A, electrically isolated

**Order no. ZA1904SD**

**Order no. ZB3090UK2**

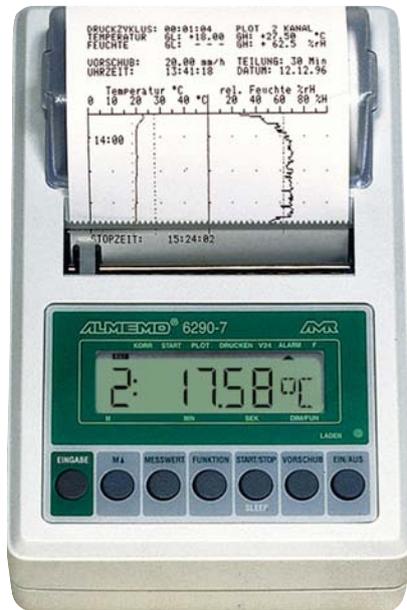
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# ALMEMO® MEASURING INSTRUMENTS

01

## ALMEMO® 6290-7B2

### Meas. Instrument with Built-In Printer and Data Logger with Ring Memory



#### Technical Features:

- ▶ Measuring instrument and / or data logger with built-in printer for mains or rechargeable battery operation.
- ▶ More than 65 standard measuring ranges.
- ▶ 2 ALMEMO® input sockets, electrically isolated, for 2 ALMEMO® sensors.
- ▶ Two output sockets for analog output, digital interface, trigger input, alarm contacts.
- ▶ Easy-to-read 8½ digit, 12mm LCD display.
- ▶ Key switch for protection against unauthorised access.
- ▶ Printout: 2 diagrams side-by-side, optionally 2 lines in a diagram or list printout, time, date, limit values, paper feed in mm or print cycle, start/stop of measurement via keypad, 25-digit printout headline, programmable via software and data cable. Data cable allows for PC online measurements.
- ▶ Data logger functions: All cyclic acquired data will be stored and can be subsequently provided, completely or in extracts, as output in different formats; plotting with free selectable parameters, printout of lists and alarm values, data transfer to PC. Function 'Daily Printout', triggered by the change of the date, can be selected instead of the cyclic printout.

#### Accessories:

Temperature sensitive paper 10 rolls	Order no. ZB1040TP10
DC voltage adapter cable 10 to 30VDC, 12V/1.25A electr. isol.	Order no. ZB2590UK
ALMEMO® data cable V24 interface, electr. isol.	Order no. ZA1909DK5

#### Technical Data:

<b>Measuring inputs:</b>	2 ALMEMO® input sockets, electrically isolated, for 2 ALMEMO® sensors
<b>Channels:</b>	per sensor, maximum 4 chann. (sensor-type-specific, meas. and function channels).
<b>Sensor power supply:</b>	mains adapter: 12V, maximum 100 mA rechargeable battery: 9V, maximum 100 mA
<b>Equipment:</b>	
<b>Display:</b>	1½ digits, 7-segment: channel 5 digits, 7-segment: meas. val. 2 digits, 16-segment: dimens.
<b>Keypad:</b>	7 keys with key switch
<b>Memory:</b> (only 6290-7B2AS)	512kB (approx. 100000 val.) buffered with lithium battery
<b>Time and date:</b>	real time clock buffered with lithium battery
<b>Built-in printer:</b>	thermal, dot matrix (7x5)
<b>Character size:</b>	2.4 x 1.1mm
<b>Number of columns:</b>	40 characters/line
<b>Print speed:</b>	0.6 lines/s
<b>Paper:</b>	Jujo Paper Co. TP50K5-A width 80mm, diameter 40mm
<b>Outputs:</b>	2 ALMEMO® sockets
<b>Power supply:</b>	
mains adapter:	230V AC on 12V DC 1A, electrically isolated ZB1112NA8
DC-Adaptercable:	10 ... 30V DC on 12V 1.25A electrically isolated ZB2590UK
rechargeable battery: (6290-7B2A /-B2AS)	5 NiMH-batterys 6V 1.6A charging time approx. 3.5h
<b>Current consumption:</b>	OFF: approx. 0.04mA ON without print: appr. 11mA ON with print: approx. 500mA
<b>Operating time</b>	
normal:	140hrs without printing
in sleep mode:	alphanumerical: 10 000 cycles graphical: 30 000 cycles
<b>Power supply control:</b>	automatic, with visual alarm
<b>Housing:</b>	H180 x W115 x D70 mm synthetic material

#### Extent of the delivery

Incl. mains adapter ZB1112NA8 12V/1A,  
2 rolls temperature sensitive paper, operating instructions,  
ALMEMO® Manual including software AMR-Control

Meas. instr. with built-in printer ALMEMO® 6290-7B2  
(without rechargeable battery, without data memory)

**Order no. MA62907B2**

Meas. instr. with built-in printer ALMEMO® 6290-7B2A  
with rechargeable battery (without data memory)

**Order no. MA62907B2A**

Meas. instr. with built-in printer ALMEMO® 6290-7B2AS  
with rechargeable battery, with data memory

**Order no. MA62907B2AS**

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