Content

Compact Glossary of Meteorological Terms

Response value	The wind velocity at which the cup or the wind vane starts to move.
Barometer	General term for the device measuring the atmospheric pressure.
Barometric pressure	Pascal [Pa] = Newton per square meter [N/m^2]; 1hPa=1mbar; 1 bar=10^{5}Pa
Beaufort	Classification for certain wind velocity ranges: bft m/s bft m/s bft m/s bft m/s bft m/s bft m/s 0 0 - 0.2 1 0.3- 1.5 2 1.6- 3.3 3 3.4- 5.4 4 5.5- 7.9 5 8.0-10.7 6 10.8-13.8 7 13.9-17.1 8 17.2-20.7 9 20.8-24.4 10 24.5-28.4 11 28.5-32.6 12 32.7-36.9 13 37.0-41.4 14 41.5-46.1 15 46.2-50.9 16 51.0-56.0 17 56.1-61.2
Damping ratio	Measure for the damping of wind vanes. It is the ratio of successive damped deflection amplitudes (e.g. 3rd to 1st amplitude) in one direction.
Distance constant	Is the distance that has been passed by the wind and which is reached when, after a sudden change of the wind velocity, the velocity has reached 63% of the final value.
Gray code	One step digital code used for the wind direction.
Altitude formula	Mathematical reduction of the barometric air pressure to a reference altitude, at minimum to sea level (QFF). Example: with each altitude increase of 8m the pressure decreases by approximately 1hPa.
Detection limit	The lowest value of the wind velocity and wind direction where a stable measured value is established.
Normal pressure	The barometric normal pressure (1013.25hPa) that, according to DIN ISO 2533, serves as base value for the ´high pressure´ and ´low pressure´ data.
QFE	The atmospheric pressure that has been reduced to the elevation of an airport runway.
QFF	Designation used in aviation for the barometric air pressure that has been reduced to sea level (0m). Also serves as a common base for the barometric air pressure comparison of different weather stations with different elevations of the stations and it is the base for the presentation of the isobars in weather maps.
QNH	Designation commonly used in aviation for the barometric air pressure, which has to be entered into an altimeter as an initial value so the altimeter can indicate the altitude above sea level.
Altitude of station	The local elevation regarding the installation of the measuring station incl. the barometer above sea level.
Variation	The range in which the wind direction has been changing within the preceding 10 minutes (acc. to ICAO).
Wind velocity	Usual practical units: 1m/s = 3.6km/h = 1.9455knots
Wind direction	Specification of which direction the wind comes from. The specification is based on a clockwise setup starting from North to East (90°), South (180°) and West (270°) to North (360°).
Wind travel	Is the distance travelled by the wind during a certain period.

Meteo-Multisensor FMA 510

Meteo multisensor is a compact and light-weight multi-sensor system for measuring all important meteorological variables. The system can be freely configured to measure temperature, relative humidity, atmospheric pressure, wind velocity, wind direction, and rainfall.

- Eight essential weather parameters all combined in one device.
- Stable and accurate measured results.
- No moving parts.
- Low power consumption.
- Compact and light-weight.
- Quick and easy to set up.
- Low maintenance requirements.

! This sensor is connected to two input sockets. To the output of the sensor values a cycle must have started (in the measuring instrument or in the software). The functions of this sensor supported by the devices V6 2590, 2690, 2890, 8590-9 8690-9, 5690-1 2 and devices V5 (only with the function pressure/measuring cycle).

Operation with the device in SLEEP mode is not possible!

Technical Data

Wind direction	
Azimuth	0 to 360 °,resolution: 1°, with average value
Accuracy	±3°
Wind velocity	
Range	0,5 to 60 m/s, resolution: 0,1 m/s, with max. value and average value
Accuracy	0 to 35 m/s ± 0,3 m/s or ± 3%, whichever is the largest 36 to 60 m/s ± 5%,
Barometric Pressure	
Range	600 to 1100 mbar, resolution: 0,1 mbar
Accuracy	±0,5 mbar at 0 to 30 °C ±1 mbar at -52 to +60 °C
Air temperature	
Range	-52 to 60 °C, resolution: 0,1 K
Accuracy	± 0,3 K at 20 °C (sensor element)
Relative humidity	
Range	0 to 100 % r.H., resolution: 0,1% r.H.
Accuracy	± 3% r.H. at 0 to 90 % r.H., ± 5% r.H. at 90 to 100 %
Rainfall - quantity	
Surface area measured: 60 cm², resolution: 0,01 mm with sum value	
Accuracy*	±5% of daily total, depending on weather conditions

Rainfall-intensity	
Range	0 to 200 mm/h, resolution: 0,01 mm/h with maximum value
Dimensions	
Height	240 mm
Diameter	120 mm
Weight	620 g
Cable	Sensor cable, fixed, 12 m long with 2 ALMEMO®digital input cable, 0.3 m
Powersupply	6 to 12V, 22mA from the ALMEMO® device
Heating (only FMA510H)	12 V DC max. 1.1A or 24 V DC/AC max. 0.6A
Mounting	
direct	mounted on cross arm or tube with external diameter Ø 30mm and internal diameter >= Ø 24mm
with adapter ZB9510MA27 mounted on tube with external diameter Ø 27 or Ø 30 mm	

* Due to the of the phenomenon, deviations caused by spatial variations may exist in precipitation readings, especially in short time scale. The accuracy specification does not include possible wind induced error.

Accessorie	Order no.
Mounting adapter (mobile weather station see 12.04)	**ZB9510MA27**

Types (incl. factory test certificate)	Order no.
Meteo-Multisensor FMA510, sensor cable, fixed, 12 m long with 2 ALMEMO®digital input cable, 0.3 m	**FMA510**
Meteo-Multisensor FMA510, sensor cable, fixed, 12 m long with 2 ALMEMO®digital input cable, 0.3 m with heating incl. cable, fixed, 12 m long (mains adapter not included)	**FMA510H**

Factory calibration KH92xx temperature, humidity, atmospheric pressure for digital sensor (see chapter Calibration certificates)

Mobile weather station

Universal mobile weather station for measuring a wide array of meteorological data, e.g. wind direction, wind velocity , relative atmospheric humidity, temperature, atmospheric pressure, rainfall quantity and intensity, and global radiation Quick and easy to install, robust design, and various power supply options (rechargeable battery, solar cell, car adapter)

Applications :

- Vehicle test tracks
- Racing tracks
- Sporting events
- Site evaluation for wind power plants
- Mobile helicopter landing fields
- Tracing industrial emissions
- Disaster control (tracing clouds of poisonous gas, observing local weather developments)
- Agricultural trials

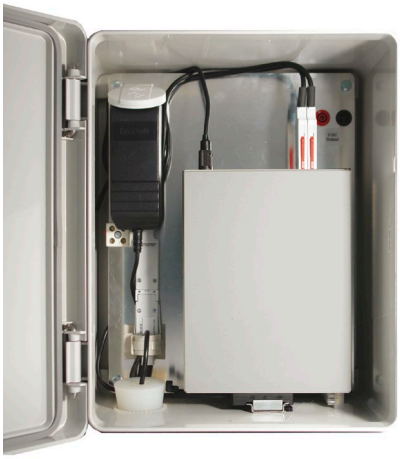
Mobile weather station with data logger ALMEMO® 2690-8A

Components

- ALMEMO® 2690-8A data logger (New resolution, integrated atmospheric pressure sensor and NiMH rechargeable battery pack) including connector mains unit 90 to 260 VAC .
- Weather-proof housing with lockable transparent door, Data logger mounted on DIN rail, Continuous power supply for data logger and Meteo sensor via external supply voltage Supply 230 VAC : Integrated socket with connecting cable led out, approx. 1.7 meters, for 230 V, with safety plug Power supply 10 to 30 VDC Two integrated banana sockets, wired to clamp terminal inside housing (cable to external mains unit / rechargeable battery - to be provided by customer) Short-term bridging in the event of power supply failure by means of internal rechargeable battery in ALMEMO® 2690-8A (New variant).
- For supply 10 to 30 V : ALMEMO® supply cable ZA2690UK, electrically insulated, for external rechargeable battery / battery 9 to 12 V, ALMEMO® supply cable ZA1012AK, not electrically insulated.

Types	Order no.
Meteo sensor for measuring wind direction, wind velocity , relative humidity, temperature, atmospheric pressure, rainfall quantity and intensity, plus 12 meters cable, with 2 ALMEMO® plug-in connectors	**FMA510**
Probe head for measuring global radiation, 0 to 1200 W/m², with 1.5 meters cable	**FLA613GS**
Longer cable, total length 5 meters	**OA9613K05**
Mobile tripod stand, extendable up to 3.5 meters, with mountable adapter for Meteo sensor FMA510, including set of guys and anchoring fixtures (comprising 3 spring-snap hooks, guy lines (4 meters), and ground pegs) Dimensions (non-extended) approx. 1.6 x 0.15 meters - weight approx. 11 kg	**ZB9510ST**
Holder for 1 radiation probe head FLA613GS / VLM / UVA / UVB - length approx. 0.5 meters	**ZB9510MH**
Carry case (with space for 1 tripod stand including accessories and up to 2 probe head holders)	**ZB9510TT**
Data logger set ALMEMO® 2690-8A (New variant) including connector mains unit and USB data cable	**MA26908AKSU**
ALMEMO® memory connector, with micro SD card including USB card reader	**ZA1904SD**
ALMEMO® supply cable, 10 to 30 VDC, output 12 VDC 1 A, electrically insulated	**ZA2690UK**
ALMEMO® supply cable, 9 to 12 VDC, not electrically insulated	**ZA1012AK**
Weather-proof housing with lockable transparent door, cable bushings and mast fixture, supply cable led out, approx. 1.7 m, for 230 V, with safety plug, including ALMEMO® 2690-8 data logger installed on DIN rail (must be ordered separately) Housing material ABS (acrylonitrile butadiene styrene), 300 x 250 x170 mm (excluding mast fixture), weight (including measuring instrument) approx. 3.5 kg	**ZB9015AGA**
Carry case, universal, spacious, robust Exterior dimensions (WxHxD) approx. 51 x 35 x 30 cm	**ZB5600TK3**

Mobile weather station with ALMEMO® 8590-9 measuring module



Components

- Data logger ALMEMO® 8590-9 including connector mains unit 90 to 260 VAC.
- Weather-proof housing with lockable opaque door, Data logger mounted on DIN rail, Continuous power supply for data logger and Meteo sensor via external supply voltage
  Supply 230 VAC : Integrated socket with connecting cable led out, approx. 1.7 meters, for 230 V, with safety plug
  Power supply 10 to 30 VDC : 2 integrated banana sockets, wired to clamp connector inside housing (cable to external mains unit / rechargeable battery - to be provided by customer).
- For supply 10 to 30 V : ALMEMO® supply cable ZB3090UK, electrically insulated, for external rechargeable battery / battery 9 to 12 V, ALMEMO® supply cable ZB5090EK, not electrically insulated.
- Weather-proof housing, with solar power supply, available on request.

Types	Order no.
Meteo sensor for measuring wind direction, wind velocity , relative humidity, temperature, atmospheric pressure, rainfall quantity and intensity, plus 12 meters cable, with 2 ALMEMO® plug-in connectors	**Order no. FMA510**
Probe head for measuring global radiation, 0 to 1200 W/m², with 1.5 meters cable	**FLA613GS**
Longer cable, total length 5 meters	**OA9613K05**
Mobile tripod stand, extendable up to 3.5 meters, with mountable adapter for Meteo sensor FMA510, including set of guys and anchoring fixtures (comprising 3 spring-snap hooks, guy lines (4 meters), and ground pegs) Dimensions (non-extended) approx. 1.6 x 0.15 meters - weight approx. 11 kg	**ZB9510ST**
Holder for 1 radiation probe head FLA613GS / VLM / UVA / UVB - length approx. 0.5 meters	**ZB9510MH**
Carry case (with space for 1 tripod stand including accessories and up to 2 probe head holders)	**ZB9510TT**
ALMEMO® 8590-9 measuring instrument, including connector mains unit 90 to 260 VAC	**MA85909**
ALMEMO® memory connector, with micro SD card including USB card reader	**ZA1904SD**
ALMEMO® supply cable, 10 to 30 VDC, output 12 VDC 0.2 A, electrically insulated	**ZB3090UK**
ALMEMO® supply cable, 9 to 12 VDC, not electrically insulated	**ZB5090EK**
Weather-proof housing with lockable opaque door, cable bushings and mast fixture, supply cable led out, approx. 1.7 meters, for 230 V, with safety plug, including ALMEMO® 8590-9 data logger installed on DIN rail (must be ordered separately) Housing material ABS (acrylonitrile butadiene styrene), 300 x 250 x170 mm (excluding mast fixture), weight (including measuring instrument) approx. 3.5 kg	**ZB9015AGB**
Carry case, universal, spacious, robust Exterior dimensions (WxHxD) approx. 51 x 35 x 30 cm	**ZB5600TK3**

Mobile weather station

Wind Direction Sensor FVA 614

- Wind direction sensor for measuring the horizontal wind direction.
- Wind vane made from robust plastic, electronics in weather-resistant aluminum housing, rotating mechanism on friction bearings.
- A special labyrinth reliably protects without friction and guards against water penetrating into the housing.
- Electronically controlled heating for operation in winter conditions to prevent bearings and external rotating parts from freezing.

Technical Data

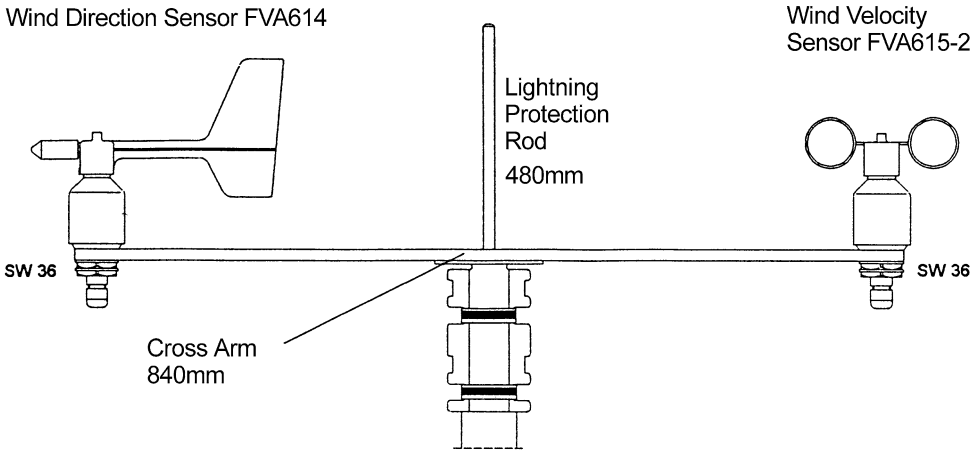
Measuring range:	0 to 360°
Accuracy:	±5°
Resolution:	11.25° (5 bit Gray code)
Measuring principle:	optoelectronically (slotted disk)
Sensor power supply:	9–30VDC through ALMEMO® device
Heating:	24VAC/DC max. 20W
Operative range:	-30 to +70 °C, with heating
Cable:	12m long, LiYCY 6 x 0.25mm²

Connection:	Adapter cable with ALMEMO® connector including supply cable for heating (length 1.5 m, free ends) A mains supply unit must be provided by the user on site.
Installation:	e.g. pole tube with holding thread PG21 / drilling 29mm Ø
Weight	1100 g

Type	Order no.
Wind vane including ALMEMO® connector (0–2V) with 12m cable	**FVA614**

Accessories for wind direction and wind velocity sensors

	Order no.
Cross-arm for separate wind direction and wind velocity sensors inclusive assembly utilitis for mast Ø 48 to 102 mm	**ZB9015TC**
Lightning protection rod	**ZB9015BS**



Wind Velocity Sensor FVA 615 2

- Wind velocity sensor for measuring the horizontal wind velocity.
- Cup-type made from robust plastic, electronics in weather-resistant aluminum housing, rotating mechanism on friction bearings.
- A special labyrinth reliably protects without friction and guards against water penetrating into the housing.
- Electronically controlled heating for operation in winter conditions to prevent bearings and external rotating parts from freezing.

Technical Data

Measuring range:	0.5 to 50m/s
Accuracy:	±0.5m/s ±3% of meas. value
Resolution:	0.1m/s
Measuring principle:	optoelectronically (slotted disk)
Sensor power supply:	9–30VDC through ALMEMO® device
Heating:	24VAC/DC max. 20W
Operative range:	-30 to +70 °C, with heating
Cable:	12m long, LiYCY 6 x 0.25mm2

Connection:	Adapter cable with ALMEMO® connector including supply cable for heating (length 1.5 m, free ends) A mains supply unit must be provided by the user on site.
Installation:	e.g. pole tube with holding thread PG21 / drilling 29mm Ø
Weight	750 g

Type	Order no.
Cup-type anemometer including ALMEMO® connector (0–2V) with 12m cable	**FVA6152**

Rainfall Sensor FRA 916

- Rainfall sensor according to the tipping scale principle with electronic counting of the table tilts and direct conversion into the amount of rainfall.
- Rainfall sensor with sieve bar for protection against insects or other contaminations.

Technical Data

Measuring range:	0.2mm/pulse
Resolution:	0.2mm
Capture cross section:	400cm²
Heating :	24 V DC/AC, max. 30 W
Operating range :	0 to +50 °C, with heating -30 to +50 °C
Cable :	12 m
Connection :	Adapter cable with ALMEMO® connector including supply cable for heating (length 1.5 m, free ends) A mains supply unit must be provided by the user on site.
Material of housing:	corrosion-proof metal
Material of tipping scale:	weather-resisting plastic
Dimensions:	280mm high, 240mm Ø
Weight:	2,4 kg

Accessories	Order no.
Push-in/put-up stand with mounting flange	**ZB9916AF**

Types	Order no.
Rainfall sensor without heating including ALMEMO® connector with 12m cable	**FRA916**
Rainfall sensor with heating in insulated metal housing incl. ALMEMO® connector with 12m cable	**FRA916H**

Precipitation detector, FRA 616 D and FR 8616 D

- The sensor reacts to precipitation in the form of either rain or snow within just a few seconds.
- It detects even very slight precipitation.
- The precipitation detector reacts by switching a relay. It does not provide a continuous measuring signal; it operates with a step function :
  If it detects precipitation, display in ALMEMO® measuring instrument : 1.0000,
  if it does not detect precipitation, display in ALMEMO® measuring instrument : 0.0000.
- The precipitation detector is designed for use for example in automatic ventilation or shading systems, or in automatically controlled greenhouses, etc.

Technical Data

Voltage connection	230 V AC ±10% 6 VA (50/60 Hz)
Power draw	
Electronics	3 VA
Preheating	1 VA
Total heating	3 VA
Admissible ambient temperature	-30 to +60 °C
Storage temperature	-30 to +70 °C
Relative humidity	0 to 100 %
Relay drop-out delay	5 minutes ± 15%
Test voltage	
Terminals L or N → Electronics	1.5 kV
Electronics → Relay contacts	1.5 kV
Electromagnetic	EN50081-1; EN50082-2;
compatibility	EN61010-1

Relay output	250 V AC, max. 4 A, 300 VA inductive
Duty classification	approx. 1 million operations
Housing	
Material	polycarbonate, gray
Protection system	IP65
Mounting system	Tubular steel pole, diameter approx. 25 to 50 mm
Weight	approx 0.8 kg (incl. mounting materials)
Connection	
FR8616D	with connecting terminals
FRA616D	with ALMEMO® connector and 12-meter connection cable

Types	Order no.
Precipitation sensor including mounting materials	**FR8616D**
Precipitation sensor including mounting materials, ALMEMO® connector, and 12-meter cable	**FRA616D**

Global Radiation Probe Head FLA 613 GS

- Measuring head in anodized aluminium housing with a plastic dome that is transparent to UV light.
- Rain and splash-proof system, additionally with desiccant to prevent dome from inside condensation.
- Particularly suitable for outdoor measurements, e.g. in medical and biological research, weather information and forecast systems, climatology, agriculture and for general public information.

Technical Data

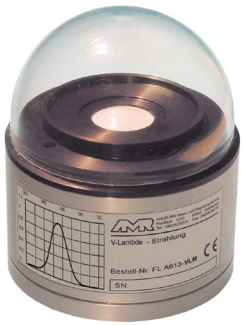
Measuring range:	0 to approx. 1200W/m²
Spectral sensitivity:	400nm to 1100nm
Maximum spectral sensitivity:	780nm
Signal output:	0V to 2V
Power supply:	+5V to +15V
Mounting:	2 screws M4, in base plate
Cable passage:	downwards
Housing:	anodized aluminium
Diffusor:	PTFE
Dome:	PMMA

Cos correction:	error f2 < 3%
Linearity:	< 1%
Absolute error:	< 10%
Residual voltage: (E = 0)	< 10mV
Nominal temperature:	22°C ±2°C
Operating temperature:	–20°C to +60°C
Dimensions:	housing: 55 mm high dome 40 mm high diameter: 80 mm
Weight:	approx. 300 g

Option	Order no.
Longer cable Total length = 5 meters	OA9613K05

Type (including test protocol)	Order no.
Weather-proof measuring head for measuring the global radiation, incl. ALMEMO® connector with 1.5m cable	**FLA613GS**
Factory calibration KL90xx radiation for sensor (see chapter Calibration certificates)	

Illuminance measuring head FLA 613 VLM



- Measuring head in anodized aluminum housing, with UV-transparent plastic dome.
- Rain-proof, splash-protected system, with desiccant to prevent condensation forming on the inside of the dome.
- Especially suitable for measuring operations outdoors, e.g. in medical, biological, and climate research, in weather information forecast systems, in agriculture, and for the purposes of general information for the public.
- The spectral sensitivity of the receiver corresponds approximately to that of the human eye.

Technical Data

Measuring range :	0 to 170 klux (approx. 250 W/m²)
Spectral sensitivity :	360 to 760 nm
Max. spectral sensitivity :	550 nm
Signal output	0 to 2 V
Power supply :	+5 to +15 V
Mounting :	2 screws, M4, in base plate
Cable passage :	downwards
Housing :	anodized aluminum
Diffusor :	PTFE
Dome :	PMMA

Cos correction :	error f2 <3%
Linearity :	<1%
Absolute error :	< 10 %
Residual voltage (E = 0) :	<10 mV
Nominal temperature :	22 ± 2 °C
Operating temperature :	-20 to +60 °C
Dimensions :	Housing : 55 mm high Dome : 40 mm high Diameter : 80 mm
Weight :	approx. 300 g

Type (including test protocol)	Order no.
Weather-resistant measuring head for measuring the illuminance including cable, 1.5 m, and ALMEMO® connector	**FLA613VLM**
Factory calibration KL90xx radiation for sensor (see chapter Calibration certificates)	

UVA Radiation Probe Head FLA 613 UVA

- Measuring head in anodized aluminium housing with a plastic dome that is transparent to UV light.
- Rain and splash-proof system, additionally with desiccant to prevent dome from inside condensation.
- Particularly suitable for outdoor measurements, e.g. in medical and biological research, weather information and forecast systems, climatology, agriculture and for general public information.

Technical Data

Measuring range:	0 to approx. 3mW/cm²
Spectral sensitivity:	310 to 400nm
Maximum spectral sensitivity:	335nm
Signal output:	0V to 2V
Power supply:	+5V to +15V
Mounting:	2 screws M4, in base plate
Cable passage:	downwards
Housing:	anodized aluminium
Diffusor:	PTFE
Dome:	PMMA (transparent to UV)

Cos correction:	error f2 < 3%
Linearity:	< 1%
Absolute error:	< 10%
Residual voltage: (E = 0)	< 10mV
Nominal temperature:	22°C ±2°C
Operating temperature:	–20°C to +60°C
Dimensions:	housing: 55 mm high dome 40 mm high diameter: 80 mm
Weight:	approx. 300 g

Type (including test protocol)	**Order no.**
Weather-proof measuring head for measuring the UVA radiation including cable, 1.5 m, and ALMEMO® connector	**FLA613UVA**
Factory calibration KL90xx radiation for sensor (see chapter Calibration certificates)	

UVB RadiationProbe Head FLA 613 UVB

- Measuring head in anodized aluminium housing with a plastic dome that is transparent to UV light.
- Rain and splash-proof system, additionally with desiccant to prevent dome from inside condensation.
- Particularly suitable for outdoor measurements, e.g. in medical and biological research, weather information and forecast systems, climatology, agriculture and for general public information.

Technical Data

Measuring range:	0 to approx. 50mW/cm²
Spectral sensitivity:	265 to 315nm
Maximum spectral sensitivity:	297nm
Signal output:	0V to 2V
Power supply:	+5V to +15V
Mounting:	2 screws M4, in base plate
Cable passage:	downwards
Housing:	anodized aluminium
Diffusor:	PTFE
Dome:	PMMA (transparent to UV)

Cos correction:	error f2 < 3%
Linearity:	< 1%
Absolute error:	< 10%
Residual voltage: (E = 0)	< 10mV
Nominal temperature:	22°C ±2°C
Operating temperature:	–20°C to +60°C
Dimensions:	housing: 55 mm high dome 40 mm high diameter: 80 mm
Weight:	approx. 300 g

Type (including test protocol)	**Order no.**
Weather-proof measuring head for measuring the UVB radiation including cable, 1.5 m, and ALMEMO® connector	**FLA613UVB**
Factory calibration KL90xx radiation for sensor (see chapter Calibration certificates)	

Star Pyranometer FLA 628 S

- Star pyranometer, according to Dirmhirn, for measuring the global radiation, the sky radiation and the short-wave radiation.
- Independent from ambient temperature through differential temperature measurement.
- Cut precision glass cupola for shielding from external environmental effects.
- Levelling by 3 setting screws and an integrated bubble

Technical Data

Measuring range:	0 to 1500W/m^2
Resolution:	0.1W/m^2
Spectral range:	0.3 to 3µm
Output:	approx. 15mV/Wm^{-2}
Impedance:	approx. 35ohms
Operative range:	–40 to +60°C
Accuracy:	cosine effect + azimuth effect + temperature influence
Cosine effect:	<3% of measured value (0 to 80° inclination)
Inclination azimuth effect:	< 3% of meas. val.
Temperature influence:	< 1% of meas. val. (–20 to +40°C)

Nominal temperature:	22°C ±2°C
Linearity:	<0.5% (0.5 to 1330W/m^2)
Stability:	<1% of the meas. range per year
Settling time:	25s (t_{95})
Dimensions:	160mm Ø, 75mm high, hole circle: 134mm Ø, holes: 8mm Ø
Weight:	1 kg

Accessories	Order no.
Shadow belt with stand	ZB9628SB

Type (including test protocol)	Order no.
Star pyranometer including 3m cable with ALMEMO® connector and programmed calibration value	**FLA628S**
Factory calibration KL90xx radiation for sensor (see chapter Calibration certificates)	

Other variants are available on request

Probe for measuring global radiation FLA 613 T1B11, 3-mode sensor : It measures UVA, VIS, IRA radiation.

Spectral sensitivity from 315 to 1100 nm

Probe for measuring global radiation FLA 613 GS-SDEK, This measures the global, direct, and diffused solar radiation (integrated shadow bar).

Spectral sensitivity from 380 to 1100 nm

Digital sensor for temperature, humidity, atmospheric pressure FHAD 46-4AG in protective all-weather housing with ALMEMO® D6 plug

- ***new:*** All relevant ambient parameters are measured with one sensor.
- Suitable for mounting on a wall or a mast
- ***new*** Sensor cable up to 100 meters long, clamped in terminal box
- Digital capacitive humidity sensor with integrated signal processor
- All sensor characteristics and adjustment data are stored in the humidity sensor element itself.
- Humidity sensor element, plug-in
- Spare elements are inexpensive; a replacement can be fitted on site quickly and easily by virtually anyone; it will be fully accurate and need no special adjustment.
- ***new*** Automatic atmospheric pressure compensation is provided for pressure-dependent humidity variables by means of a digital atmospheric pressure sensor integrated in the terminal box.
- ***new*** Humidity calculation on the basis of formulae as per Dr. Sonntag and the enhancement factor as per W. Bögel (correction factor fw(t,p) for real mixed gas systems) This substantially widens the measuring range and improves the accuracy of humidity variable calculations.
- ***new*** Humidity variable, Absolute humidity in g/m³
- The humidity variables are calculated from the three primary measuring channels (real measurable variables) : Temperature, relative humidity. and atmospheric pressure.
- Four measuring channels are programmed (at our factory): Temperature (°C, T,t), Relative humidity (%H, RH, Uw), Dew point (°C, DT, td), Atmospheric pressure (mbar, AP, p), Other humidity variables can also be selected: Mixture (g/kg, MH, r), Absolute humidity (g/m³, AH, dv), Vapor pressure (mbar, VP, e), Enthalpy (kJ/kg, En, h). This device can be configured on a PC using USB adapter cable ZA 1919 AKUV. (see “General accessories for ALMEMO® D6 sensors” page 04.05).

On request

new: Temperature sensor Pt100 in protective all-weather housing FPA930AG

Technical Data

Operative range	-30 to +60 °C, 5 to 98 % RH
Digital temperature / humidity sensor (including A/D converter)	
Humidity	
Measuring range	0 to 100 % RH
Sensor	CMOSens® technology
Accuracy	±1.8 % RH in range 10 to 90 % RH at nominal temperature
Hysteresis	typical ±1 % RH
Nominal temperature	25 °C
Sensor operating pressure	Atmospheric pressure
Temperature	
Sensor	CMOSens® technology
Accuracy	±0.3 K at +25 °C ±0.4 K at +10 to +40 °C ±1.3 K at -20 to +80 °C
Reproducibility	typical ±0.1 K

Digital atmospheric pressure sensor (integrated in the terminal box)	
Measuring range	700 to 1100 mbar
Accuracy	±2.5 mbar (at 0 to +65 °C)
ALMEMO® connecting cable	
PVC, for available lengths see variants with ALMEMO® D6 plug	
ALMEMO® D6 plug	
Refresh time	2 second for all four channels
Supply voltage	6 to 13 VDC
Current consumption	12 mA
Mechanical design	
Sensor tube	Plastic, diameter 12 mm
Filter cap	Metal-mesh filter, SK7
All-weather protection	Ø 105 mm, height approx. 110 mm
Terminal box	51 x 53 x 36 mm
Screw-fit cable gland	Splash-protected

Accessories	Order no.
ALMEMO® transmitter 2450-1 with double analog output 10 V or 20 mA	MA24501R02
(For other data, options, accessories, see page 01.50)	

Standard delivery	Order no.
Digital sensor for temperature, humidity, atmospheric pressure in protective all-weather housing with connecting cable and ALMEMO® D6 plug, manufacturer's test certificate, 2 fixtures for mounting on a mast	
Connecting cable	
Length = 5 meters	**FHAD464AGL05**
Length = 10 meters	**FHAD464AGL10**
Length = 20 meters	**FHAD464AGL20**
Length = 40 meters	**FHAD464AGL40**
Length = 100 meters	**FHAD464AGL100**
Replacement sensor element, digital, adjusted, plug-in	**FH0D46**
DAkkS / DKD or factory calibration KH9xxx, temperature, humidity, and KD92xx, atmospheric pressure, for digital sensor (see chapter Calibration certificates)	

Comfort Index Measurement

Technical features

- Thermal comfort and air-conditioning calculations using WinControl software with add-on module for comfort index measurement as per DIN ISO 7730 and DIN EN 13779 (formerly DIN 1946)
- Independent measuring sequence in real-time mode
- Various display and output options Real-time mode, memory access to offline measuring operations
- Graphical presentation of measured data and calculated data in a format with data export options
- Comprehensive, clear, meaningful evaluation.

Operative range

It is possible with this measuring setup to measure all the physical parameters needed for assessing and evaluating thermal comfort simultaneously on three levels. It reliably evaluates the performance of heating and ventilating systems. The data acquired from the series of measuring operations for operative temperature (globe temperature), room temperature, and room air flow and humidity, and the necessary input parameters (e.g. clothing factor, activity level, mechanical output) is used together to calculate the PMV (predicted mean vote) and PPD (predicted percent dissatisfied) values (as per DIN ISO 7730) and the degree of turbulence (as per DIN EN 13779, formerly DIN 1946 Part 2); these values are calculated either online or offline using the AMR WinControl software in conjunction with the add-on module for comfort index measurement.

The software

The averaging number is preset at 200 measuring points but this is variable and can be modified. The PMV and PPD values and the degree of turbulence can be displayed and documented in y/t or x/y diagrams either each one separately or together with other measurable variables. A software wizard is available to guide the user step-by-step through the various settings. If measuring is started online, the first value is indicated after completion of the first 200 measuring operations (as per DIN ISO 7730). These values continue to be calculated, updated, and displayed, and - optionally - also saved and / or exported. (see Chapter 05)

Types (sensor set for one level)	**Order no.**
Globe thermometer	**FPA805GTS**
Humidity / temperature sensor	**FHAD4641**
Thermo-anemometer, up to 1 m/s, without smoothing, response time 100 ms, including carry case	**FVA605TA1OU**
Stand for measuring operations at heights of 0.1 to 1.7 meters, including 1 set of instrument holders for 1 level (traverse including traverse holder and sensor fastening), including carry case	**ZB1001PPD**
Set of instrument holders for extra levels (as above)	**ZB1001MH**
optional for assessing air quality Digital carbon dioxide sensor to 10.000 ppm, with handle	**FYAD00CO2B10**
Device selection	
ALMEMO® 2690-8A (new variant) hand-held data logger, 5 inputs, including mains unit and data cable, USB can be used for 1 measuring level (see page 01.22)	**MA26908AKSU**
ALMEMO® 2890-9 hand-held data logger, 9 inputs, including mains unit, can be used for 3 measuring levels (see page 01.24)	**MA28909**
ALMEMO® data cable, USB, electrically insulated	**ZA1919DKU**
PC link via Ethernet, RS232, or wireless with Bluetooth see Chapter 04, ALMEMO® networking technology.	
Software:	
WinControl for 20 measuring points / 1 device	**SW5600WC1**
including additional module for comfort index measurement	**SW5600WCZM1**
Accessories:	
Carry case, universal, spacious, robust, for globe thermometer, humidity sensor, and data logger Exterior dimensions (WxHxD) approx. 51 x 35 x 30 cm	**ZB5600TK3**
DAkkS / DKD or factory calibration temperature, humidity, air flow, carbon dioxide for sensor (see chapter Calibration certificates)	

WBGT Measurement

Application Range
The wet bulb globe temperature (WBGT) is the decisive parameter for evaluating the work stress at heat-exposed working places and the operation and cool-off times involved. Temperature, radiation and relative humidity are determined by measuring the dry temperature, the natural humid temperature of a psychrometer and the globe temperature of a globe thermometer. These are all combined as WBGT.

Note:
For WBGT measurements the use of a psychrometer with a disengageable ventilator is compulsory

Technical Data

Accuracy:	Class B (DIN/IEC 751)
Sensor:	Pt100 4-conductor, arranged in the center
Globe thermometer:	matt black copper globe with suspension
Diameter:	approx. 150mm
Operating temperature:	–50 to 200°C
Cable length	3 m

Types	Order no.
Globe thermometer (Pt100 4L)	**FPA805GTS**
Psychrometer with disengageable ventilator	**FNA846WB**

DAkkS / DKD or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)

On request:
Sound Level Meter MA 86193 with ALMEMO®- cable for measured value recording

NTC-sensor FNA 305

For Indoor air measurements

Meas. element	NTC
Measuring tip	Operative range -10 to +60 °C (non-condensing) Protective tube in stainless steel Diameter = 3.0mm, length = 50 mm mounted directly on ALMEMO® connector
T_{90}	8 s
L = 50 mm (No variants available)	**Order no. FNA305**