

METEOROLOGY

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/m²]; 1hPa=1mbar; 1 bar=10⁵Pa																																																
Beaufort	Classification for certain wind velocity ranges: <table><tr><td>bft</td><td>m/s</td><td>bft</td><td>m/s</td><td>bft</td><td>m/s</td><td>bft</td><td>m/s</td><td>bft</td><td>m/s</td><td>bft</td><td>m/s</td></tr><tr><td>0</td><td>0 - 0.2</td><td>1</td><td>0.3- 1.5</td><td>2</td><td>1.6- 3.3</td><td>3</td><td>3.4- 5.4</td><td>4</td><td>5.5- 7.9</td><td>5</td><td>8.0-10.7</td></tr><tr><td>6</td><td>10.8-13.8</td><td>7</td><td>13.9-17.1</td><td>8</td><td>17.2-20.7</td><td>9</td><td>20.8-24.4</td><td>10</td><td>24.5-28.4</td><td>11</td><td>28.5-32.6</td></tr><tr><td>12</td><td>32.7-36.9</td><td>13</td><td>37.0-41.4</td><td>14</td><td>41.5-46.1</td><td>15</td><td>46.2-50.9</td><td>16</td><td>51.0-56.0</td><td>17</td><td>56.1-61.2</td></tr></table>	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
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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.																																																

Table m/s related to km/h and Wind Intensity, Wind Intensity Designation


Wind intensity	Wind scale	meters / sec	km / hour	knots
Calm	0			<1
Light air	1	0.3 to 1.5	1 to 5	1 to 3
Light breeze	2	1.6 to 3.3	6 to 11	4 to 6
Gentle breeze	3	3.4 to 5.4	12 to 19	7 to 10
Moderate breeze	4	5.5 to 7.9	20 to 28	11 to 16
Fresh breeze	5	8.0 to 10.7	29 to 38	17 to 21
Strong breeze	6	10.8 to 13.8	39 to 49	22 to 27
Near gale	7	13.9 to 17.1	50 to 61	28 to 33
Gale	8	17.2 to 20.7	62 to 74	34 to 40
Strong gale	9	20.8 to 24.4	75 to 88	41 to 47
Storm	10	24.5 to 28.4	89 to 102	48 to 55
Violent storm	11	28.5 to 32.6	103 to 117	56 to 63
Hurricane	12	more than 32.7	more than 118	>64

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 cm ² , 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.

Accessories:

Mounting adapter (mobile weather station see 14.04)

Type:

Meteo-Multisensor FMA510, sensor cable, fixed, 12 m long with 2 ALMEMO® digital input cable, 0.3 m

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)

Order no. ZB9510MA27

Order no. FMA510

Order no. FMA510H

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METEOROLOGY

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 :

Meteo sensor for measuring wind direction, wind velocity, relative atmospheric humidity, temperature, atmospheric pressure, rainfall quantity and intensity, plus 12 meters cable, with 2 ALMEMO® plug-in connectors

Probe head for measuring global radiation, 0 to 1200 W/m², with 1.5 meters cable

Longer cable, total length 5 meters

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

Holder for 1 radiation probe head FLA613GS / VLM / UVA / UVB - length approx. 0.5 meters

Carry case (with space for 1 tripod stand including accessories and up to 2 probe head holders)

Data logger set ALMEMO® 2690-8A (New variant) including connector mains unit and USB data cable

ALMEMO® memory connector, with micro SD card (at least 32 MB) including USB card reader

ALMEMO® supply cable, 10 to 30 VDC, output 12 VDC 1 A, electrically insulated

ALMEMO® supply cable, 9 to 12 VDC, not electrically insulated

Weather-proof housing with lockable transparent door, cable bushings and mast fixture, supply cable led out, approx. 1.7 meters, for 230 V, with safety plug, including ALMEMO® 2690-8 data logger installed on DIN rail (must be ordered specially)

Housing material ABS (acrylonitrile butadiene styrene), 300 x 250 x 170 mm (excluding mast fixture), weight (including measuring instrument) approx. 3.5 kg

Carry case, universal, spacious, robust Exterior dimensions (WxHxD) approx. 51 x 35 x 30 cm

Order no. FMA510

Order no. FLA613GS

Order no. OA9613K05

Order no. ZB9510ST

Order no. ZB9510MH

Order no. ZB9510TT

Order no. MA26908AKSU

Order no. ZA1904SD

Order no. ZA2690UK

Order no. ZA1012AK

Order no. ZB9015AGA

Order no. 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 ZA3090UK, electrically insulated, for external rechargeable battery / battery 9 to 12 V, ALMEMO® supply cable ZA5090EK, not electrically insulated.
- ▶ Weather-proof housing, with solar power supply, available on request.

Types :

Meteo sensor for measuring wind direction, wind velocity, relative atmospheric humidity, temperature, atmospheric pressure,

rainfall quantity and intensity, plus 12 meters cable, with 2 ALMEMO® plug-in connectors

Probe head for measuring global radiation, 0 to 1200 W/m², with 1.5 meters cable

Longer cable, total length 5 meters

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

Holder for 1 radiation probe head FLA613GS / VLM / UVA / UVB - length approx. 0.5 meters

Carry case (with space for 1 tripod stand including accessories and up to 2 probe head holders)

ALMEMO® 8590-9 measuring instrument, including connector mains unit 90 to 260 VAC

ALMEMO® memory connector, with micro SD card (at least 32 MB) including USB card reader

ALMEMO® supply cable, 10 to 30 VDC, output 12 VDC 0.2 A, electrically insulated

ALMEMO® supply cable, 9 to 12 VDC, not electrically insulated

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® 8690-9 data logger installed on DIN rail (must be ordered specially)

Housing material ABS (acrylonitrile butadiene styrene), 300 x 250 x 170 mm (excluding mast fixture), weight (including measuring instrument) approx. 3.5 kg

Carry case, universal, spacious, robust Exterior dimensions (WxHxD) approx. 51 x 35 x 30 cm

Order no. FMA510

Order no. FLA613GS

Order no. OA9613K05

Order no. ZB9510ST

Order no. ZB9510MH

Order no. ZB9510TT

Order no. MA85909

Order no. ZA1904SD

Order no. ZB3090UK

Order no. ZB5090EK

Order no. ZB9015AGB

Order no. ZB5600TK3

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Mobile weather station



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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.

Type:

Cup-type anemometer including ALMEMO® connector (0–2V) with 12m cable

Order no. FVA6152

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:	750g

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.

Type:

Wind vane including ALMEMO® connector (0–2V) with 12m cable

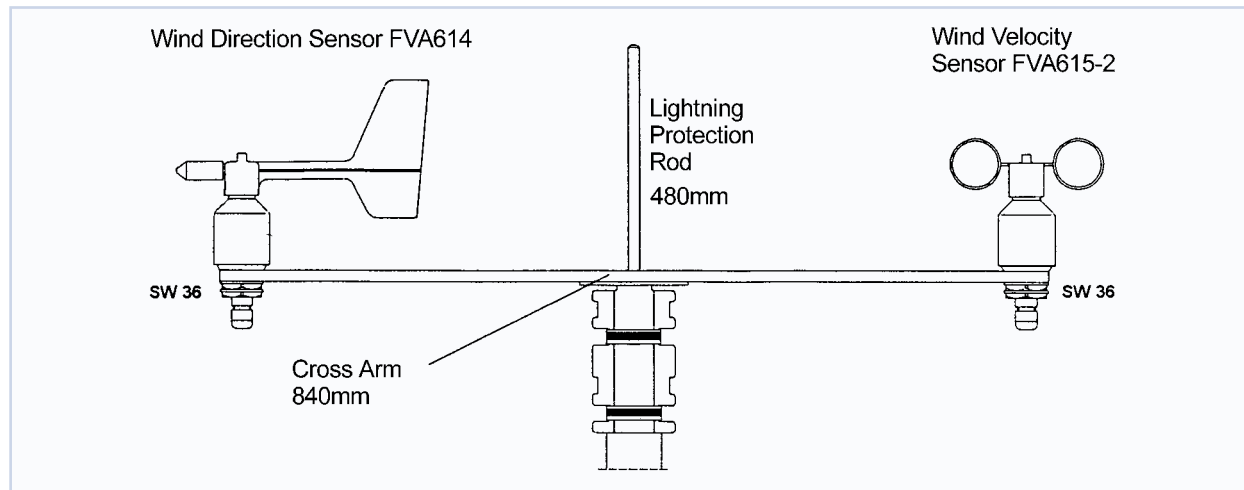
Order no. FVA614

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:	1100g

Accessories for wind direction and wind velocity sensors

Example - fitted to mast



Cross-arm for separate wind direction and wind velocity sensors
inclusive assembly utilitis for mast Ø 48 to 102 mm
Lightning protection rod

Order no. ZB9015TC

Order no. ZB9015BS

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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.

Types:

Rainfall sensor without heating
including ALMEMO® connector
with 12m cable

Order no. FRA916

Rainfall sensor with heating in insulated
metal housing incl. ALMEMO® connector
with 12m cable

Order no. FRA916H

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:	2.4kg

Accessories:

Push-in/put-up
stand with mounting flange

Order no. ZB9916AF

Longer cable, please specify length (L)

Order no. ZB9060K(L)

METEOROLOGY

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.

Option:

Precipitation detector
designed for connection to 24 V AC Order no. OR8616U6

Technical data :

Voltage connection	230 V AC $\pm 10\%$ 6 VA (50/60 Hz) Optional 24 V AC
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 $\pm 15\%$
Test voltage	
Terminals L or N --- Electronics	1.5 kV
Electronics --- Relay contacts	1.5 kV
Electromagnetic compatibility	EN50081-1; EN50082-2; 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 :

Precipitation sensor including mounting materials

Precipitation sensor including mounting materials, ALMEMO® connector, and 12-meter cable

Order no. FR8616D

Order no. 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.

Type (including test protocol)

Weather-proof measuring head for measuring the global radiation, incl. ALMEMO® connector with 1.5m cabler

Order no. FLA613GS

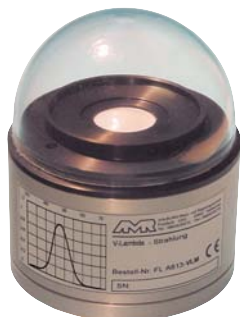
Technical Data:

Measuring range:	0 to approx. 1200W/m ²
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:

Longer cable Total length = 5 meters Order no. OA9613K05

Radiation 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.

Types (including test protocol)

Weather-resistant measuring head for measuring the radiation intensity including cable, 1.5 m, and ALMEMO® connector

Order no. FLA613VLM

Technical Data:

Measuring range :	0 to 170 klux (approx. 250 W/m ²)
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

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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.

Type (including test protocol)

Weather-proof measuring head for measuring the UVA radiation including cable, 1.5 m, and ALMEMO® connector

Order no. FLA613UVA

Technical Data:

Measuring range:	0 to approx. 3mW/cm ²
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

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.

Type (including test protocol)

Weather-proof measuring head for measuring the UVB radiation including cable, 1.5 m, and ALMEMO® connector

Order no. FLA613UVB

Technical Data:

Measuring range:	0 to approx. 50μW/cm ²
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

Star Pyranometer FLA 628S



- Star pyranometer, according to Dirmhirm, 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.
- Delivery including a factory calibration certificate.

Type (including test protocol)

Star pyranometer including 3m cable with ALMEMO® connector and programmed calibration value

Order no. FLA628S

Technical Data:

Measuring range:	0 to 1500W/m ²
Resolution:	0.1W/m ²
Spectral range:	0.3 to 3μm
Output:	approx. 15μV/Wm ²
Impedance:	approx. 35Ω
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 (t95)
Dimensions:	160mm Ø, 75mm high, hole circle: 134mm Ø, holes: 8mm Ø
Weight:	1 kg

Accessories:

Shadow belt with stand

Order no. ZB9628SB

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

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

METEOROLOGY

ALMEMO® temperature / humidity sensor in protective all-weather housing FHA 646 AG



- ▶ Power supply Via ALMEMO® device
- ▶ Sensor cable connected via screw terminals, optionally up to 30 meters
- ▶ for mounting on a wall or a mast
- ▶ On request
New Temperature sensor Pt100 in protective all-weather housing FPA930AG

Variants including manufacturer's test certificate

Temperature / humidity sensor in protective all-weather housing including ALMEMO® connecting cable, 2 meters, and fixture for mounting on a mast **Order no. FHA646AG**

Technical data

Operative range -30 to +60 °C/ 0 to 90 % RH.
non-condensing

Humidity measuring circuit

Sensor	Capacitive thin-film sensor
Measuring range	0 to 100% RH
Accuracy	±2% RH in the range <90% RH at nominal temperature
Reproducibility	±1% RH at nominal temperature
Nominal temperature	25 ±3 °C

Temperature measuring circuit

Sensor	NTC type N
Accuracy	NTC -20 to 0 °C ±0.4 °C 0 to +60 °C ±0.1 °C
Reproducibility	0.1 °C

Dimensions

All-weather protection	Ø 105 mm, H approx. 110 mm
Electronics box	80 x 80 x 25 mm
Cable(s)	2 meters, with ALMEMO® connector Longer cable (up to 30 meters) on request

Accessories

ALMEMO® transmitter 2450-1 with double analog output 10 V or 20 mA **Order no. MA24501R02**

(For other data, options, accessories, see Chapter 02)

Pressure measuring connector for barometric pressure FDA 612 SA, FDAD 12 SA



FDA 612 SA

- ▶ Compact design - can be plugged directly onto measuring instrument.
- ▶ Piezo-resistive pressure sensor - ensures high measuring accuracy.

Accessories

Connecting cable, 0.2 meters	Order no. ZA9060AK1
Extension cable, 4 meters	Order no. ZA9060VK2
Extension cable, 4 meters	Order no. ZA9060VK4

Variants (including manufacturer's test certificate)

Pressure measuring connector for barometric pressure

with pressure terminal sleeve **Order no FDA612SA**
New without press. terminal sleeve* **Order no FDAD12SA**

* Factory calibration only possible for 1 point (current ambient pressure)

Technical data

Pressure meas. connector FDA612SA with pressures terminal

Measuring range	700 to 1050 mbar (total range 0 to 1050 mbar)
Overload capacity	Maximum - 1.5 times final value
Accuracy	±0.5 % of final value
Nominal temperature	25 °C
Temperature drift	<±1 % final value at 0 to +70 °C
Hose terminals	Ø 5 mm, 12 mm long
Sensor material	aluminum, nylon, silicone, silica gel, brass

Pressure measuring connector FDAD12SA

Measuring range	700 to 1100 mbar (total range 300 to 1100 mbar)
Accuracy	±2.5 mbar at 0 to 65 °C

Common technical data

Operating range	-10 to +60 °C, 10 to 90% RH, non-condensing
Dimensions	90 x 20 x 7.6 mm

Comfort Index Measurement

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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 06)

Types: (sensor set for one level)

Globe thermometer

Humidity / temperature sensor

Thermo-anemometer, up to 1 m/s, without smoothing, response time 100 ms, including carry case

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

Set of instrument holders for extra levels (as above)

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 01.18)

ALMEMO® 2890-9 hand-held data logger, 9 inputs, including mains unit, can be used for 3 measuring levels (see page 01.19)

ALMEMO® data cable, USB, electrically insulated

PC link via Ethernet, RS232, or wireless with Bluetooth see Chapter 05, ALMEMO® networking technology

Software

WinControl for 20 measuring points / 1 device, including additional module for comfort index measurement

Accessories

Carry case, universal, spacious, robust, for globe thermometer, humidity sensor, and data logger

Exterior dimensions (WxHxD) approx. 51 x 35 x 30 cm

Order no. FPA805GTS

Order no. FHA646E1

Order no. FVA605TA10U

Order no. ZB1001PPD

Order no. ZB1001MH

Order no. MA26908AKSU

Order no. MA28909

Order no. ZA1919DKU

Order no. SW5600WC1

Order no. SW5600WCZM1

Order no. ZB5600TK3

AHLBORN

www.ahlborn.com

ROOM AIR CONDITIONS

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.

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:	3m

Types:

Globe thermometer (Pt100 4L)

Order no. FPA805GTS

Psychrometer with disengageable ventilator

Order no. FNA846WB

Note:

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

NTC sensor FNA 305



for room air measurements

new!

Meas. element	NTC*
Measuring tip	Operative range -10 to +60 °C (non-condensing) Protective tube in stainless steel Diameter = 2.4mm, length = 50 mm mounted directly on ALMEMO® connector
T ₉₀	8 s
L = 50 mm	Order no FNA305
(No variants available)	

Thermo Hygrogaph SK 3015



- Proven device for continuous recording of temperature and humidity data in rooms with air conditioning, e.g. in museums, galleries, computer rooms etc.
- Stable, white lacquered aluminium diecast housing with handle for transportation.
- The clear Macrolon panoramic hood guarantees a convenient monitoring of the measured values.

Technical Data:

Measuring range, humidity:	0 to 100% r.H.
Operating range:	10 to 97% r.H.
Accuracy:	±2.5% of entire measuring range
Measuring ranges, temperature:	
Type 3015-1:	-35 to +45°C (hair harp)
Type 3015-2:	-20 to +60°C (hair harp)
Type 3015-3:	0 to +40°C (synthetic harp)
Type 3015-4:	0 to +80°C (synthetic harp)
Accuracy:	±2.5% of entire measuring range
Drum size:	93.3mm Ø
Writing height:	2 x 82mm
Dimensions:	280 x 138 x 260mm
Weight:	2.75kg
Standard version:	with electronic switch clock for 7/31 days and 24 hr with 100 recording stripes for 7 days

Types:

Type SK 3015-1 incl. 100 recording stripes for 7 days -35 to +45°C
 Type SK 3015-2 incl. 100 recording stripes for 7 days -20 to +60°C
 Type SK 3015-3 incl. 100 recording stripes for 7 days 0 to +40°C
 Type SK 3015-4 incl. 100 recording stripes for 7 days 0 to +80°C

Order no. SK30151
Order no. SK30152
Order no. SK30153
Order no. SK30154

Option:

Optionally the following versions are available free of charge (please specify the required option when ordering):

mechanical clock for 7 days (1.67mm feed)

Order no. OK3015MT

electrical clock for 7 days (1.67mm feed)

Order no. OK3015ET

mechanical clock for 24 hours (11.5 mm feed)

Order no. OK3015MH

electrical clock for 24 hours (11.5 mm feed)

Order no. OK3015EH

At additional charge: mechanical switch clock 7 days/24h

Order no. OK3015MTH

Accessories:

100 sheets recording stripes for 7 days for type SK 3015-1

Order no. ZK3015PT1

100 sheets recording stripes for 7 days for type SK 3015-2

Order no. ZK3015PT2

100 sheets recording stripes for 7 days for type SK 3015-3

Order no. ZK3015PT3

100 sheets recording stripes for 7 days for type SK 3015-4

Order no. ZK3015PT4

100 sheets recording stripes for 24 hours for type SK 3015-1

Order no. ZK3015PH1

100 sheets recording stripes for 24 hours for type SK 3015-2

Order no. ZK3015PH2

100 sheets recording stripes for 24 hours for type SK 3015-3

Order no. ZK3015PH3

100 sheets recording stripes for 24 hours for type SK 3015-4

Order no. ZK3015PH4

100 sheets recording stripes for 31 days for type SK 3015-1

Order no. ZK3015PM1

100 sheets recording stripes for 31 days for type SK 3015-2

Order no. ZK3015PM2

100 sheets recording stripes for 31 days for type SK 3015-3

Order no. ZK3015PM3

100 sheets recording stripes for 31 days for type SK 3015-4

Order no. ZK3015PM4

1 set stylus violet (2 pieces)

Order no. ZK3015FS

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