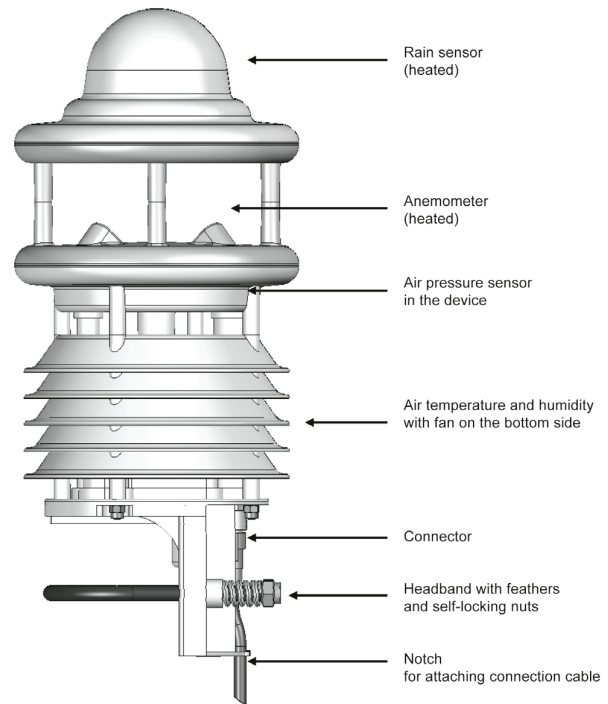


## Compact meteorological transducer for professional use - FMD760

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



### Technical data and functions

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

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

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

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

#### For professional applications

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

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

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

#### Wind

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

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

#### Precipitation, rainfall

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

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

#### Air temperature and atmospheric humidity

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

#### Atmospheric pressure

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

#### Measured values

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

## Technical data

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

## Accessories

## Order no.

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

**ZB9760AK20**  
**ZB9760USP**

## Variants

## Order no.

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

**FMD760**

DAkS / DKD or factory calibration for digital sensors, see chapter "Calibration certificates".  
The DAkS / DKD calibration meets the requirements of DIN EN ISO/IEC 17025 for test equipment.

## Other versions:

**Digital meteorological transmitter FMD7 70****Compact transmitter for professional use****Digital sensors for global radiation and further measured variables****such as wind, precipitation, air temperature, humidity, atmospheric pressure.****new****Technology and function****Global radiation**

The global radiation is measured with the pyranometer mounted in the cap of the transmitter.

For further measured quantities and general functions see FMD7 60.

**Technical data****Global radiation**

Measuring method	thermopile pyranometer
Spectral range	300 ... 1100 nm
Measuring range	0 ... 2000 W/m <sup>2</sup>
Resolution	< 1 W/m <sup>2</sup>
Measuring rate	10 seconds
ALMEMO® D7 range:	Actual value

For technical data on the other measured variables and general functions, see FMD7 60

**Features**

Digital meteorological sensor for wind, precipitation, air temperature, humidity, atmospheric pressure and global radiation. Ventilated radiation protection, built-in heater, mounting bracket for mast mounting. Sensor with built-in plug, including sensor connection cable, length = 10 m, mounted in the connection box. Power supply unit 24 V ZB1024NA2, mounted in the connection box, ALMEMO® connection cable, mounted in the connection box, length = 2 m with ALMEMO® D7 connector

**Order no.****FMD770****Digital meteorological transmitter FMD7 20****Compact transmitter for professional use****Digital sensors for wind. Maintenance-free measuring method.****new****Technology and function****Wind**

Technology for wind measurement and general functions see FMD7 60

**Technical data**

For technical data on wind and general functions see FMD7 60

**Features**

Digital meteorological transmitter for wind. Built-in heater, mounting bracket for mast mounting. Sensor with built-in plug, including sensor connection cable, length = 10 m, mounted in the connection box. Power supply unit 24 V ZB1024NA2, mounted in the connection box, ALMEMO® connection cable, mounted in the connection box, length = 2 m with ALMEMO® D7 connector

**Order no.****FMD720**

**Mobile weather station**  
**Digital meteorological sensor and measuring heads for radiation with ALMEMO® V7 data logger**

10/2021 • We reserve the right to make technical changes.



Professional weather station for mobile use to measure all relevant meteorological parameters. Quick and easy to install, robust design, compatible with various ALMEMO® V7 data loggers.

**Applications**

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

**The mobile weather station comprises :**

- Digital meteorological sensor including mobile tripod
- Probe head for measuring optical radiation
- ALMEMO® V7 data logger choice of ALMEMO® 202 / 204 / 710 / 809



FMD7 60



FMD7 70



FMD7 20



**Digital meteorological sensors**

Digital sensor incl. 10 m sensor connection cable, connection box with power supply and 2 m ALMEMO® connection cable with ALMEMO® D7 plug. Technical data see chapter Meteorology.

Sensor for wind, precipitation, air temperature, Air humidity, air pressure	<b>FMD760</b>
Transducer as FMD760, but additionally for global radiation	<b>FMD770</b>
Transmitter for wind (wind direction and wind speed)	<b>FMD720</b>

**Mobile tripod**, extendable up to approx. 4.4 meters including set of anchoring fixtures, comprising three karabiners, three guy lines (4 meters long), three ground pegs **ZB9760ST**

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

**Probe head for measuring global radiation, illuminance, photosynthesis, and UVA, UVB and UVE radiation**

Measuring head with 1.5 m ALMEMO® connection cable. Technical data see chapter meteorology	
<i>new</i> : <b>Measurement of erythema-active UV radiation (UVE)</b> up to 0.3 W/m <sup>2</sup> , UV index, dose (MED, SED). Digital measuring head with ALMEMO® D7 connector.	<b>FLD733UVE</b>
Probe head with cable, 1.5 meters long	
<b>Measuring of global radiation</b> up to 1200 W/m <sup>2</sup> ,	<b>FLA633GS</b>
<b>Measuring of illuminance</b> up to 170 kLux,	<b>FLA633VLM</b>
<b>Measuring of photosynthetically active radiation</b> up to 3000 µmol/m <sup>2</sup> s,	<b>FLA633PSM</b>
<b>Measuring of UVA radiation</b> up to 3 mW/cm <sup>2</sup> ,	<b>FLA633UVA</b>
<b>Measuring of UVB radiation</b> up to 50 µW/cm <sup>2</sup> ,	<b>FLA633UVB</b>
Option of probe head with longer cable Total length = 5 meters	<b>OA9613K05</b>
<b>Probe head holder</b> to tripod Length = approx. 0.5 meters, for one radiation probe head FLA613-GS / -VLM / -PSM / -UVA / -UVB	<b>ZB9510MH</b>

**Advisory note**

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



## Weather-proof housing for ALMEMO® 202 / 204 / 710 / 809 devices and meteorological sensor FMD7 60 / FMD7 70 / FMD7 20

### Technical data and functions

The sensor connection cable, mains unit ZB 1024 NA2 (for heating, ventilation, and sensor supply), the junction box, and the sensor's ALMEMO® connection cable are all permanently fitted in the weather-proof housing. (Sensor FMD7 60 / FMD7 70 / FMD7 20 should be ordered separately.)

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

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

When using devices ALMEMO® 202 / 204 / 710, any short-term failures to the supply voltage are bridged; in the case of ALMEMO® 202 / 204, this is by means of batteries and in the case of ALMEMO® 710, by means of the integrated rechargeable battery.

The ALMEMO® device cannot be operated in sleep mode.

### Further variants on request:

For information on protective housing ZB9015AGU for various ALMEMO® measuring instruments performing general applications without meteorological sensor FMD7 xx.



## Weather-proof housing AG2 for ALMEMO® 202 / 204 and meteorological sensor

### Weather-proof housing for ALMEMO® 202 / 204,

lockable transparent door, mast fixture

integrated rail for fastening ALMEMO® 202 / 204 device

including mains unit ZA 1312 NA9 for supplying the device

permanently fitted sensor connection cable for sensor FMD7 xx

integrated mains unit for supplying sensor heating and sensor ventilation

Option of weather-proof housing for sensor FMD7 60 / FMD7 70 / FMD7 20

**OM9760AG2**

## Data logger ALMEMO® 202 / 204 with accessories

### ALMEMO® 202 professional measuring instrument

2 measuring inputs, graphics display, keypad controls, batteries

**MA202**

### ALMEMO® 204 professional measuring instrument

4 measuring inputs, internal data logger,

graphics display, keypad controls, batteries

**MA204**

### DIN rail holder for the measuring instrument

**ZB2490HS**

### Memory connector with micro SD

**ZA1904SD**

### USB data cable

**ZA1919DKU**



**Weather-proof housing AG7 for ALMEMO® 710 and meteorological sensor**

**Weather-proof housing for ALMEMO® 710,**  
 lockable transparent door, mast fixture  
 integrated rail for fastening ALMEMO® 710WG device  
 including mains unit ZA 1312 NA9 for supplying the device  
 permanently fitted sensor connection cable for sensor FMD7 xx  
 integrated mains unit for supplying sensor heating and sensor ventilation  
 Option of weather-proof housing for sensor FMD7 60 / FMD7 70 / FMD7 20  
**OM9760AG7**

**Data logger ALMEMO® 710 with accessories**

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

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



**Weather-proof housing AG8 for ALMEMO® 809 and meteorological sensor**

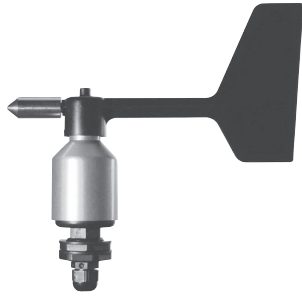
**Weather-proof housing for ALMEMO® 809,**  
 lockable transparent door, mast fixture  
 integrated rail for fastening ALMEMO® 809 device  
 including mains unit ZB 1212 NA9 for supplying the device  
 permanently fitted sensor connection cable for sensor FMD7 xx  
 integrated mains unit for supplying sensor heating and sensor ventilation  
 Option of weather-proof housing for sensor FMD7 60 / FMD7 70 / FMD7 20  
**OM9760AG8**

**Data logger ALMEMO® 809 with accessories**

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

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

## 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.

! A calculation channel is required in the WinControl measuring software to calculate the mean value of the wind direction (averaging is not possible in the ALMEMO® measuring device).

### Technical Data

Measuring range:	0 to 360°	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.
Accuracy:	±5°	Installation:	e.g. pole tube with holding thread PG21 / drilling 29mm Ø
Resolution:	11.25° (5 bit Gray code)	Weight	1100 g
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 0.25mm <sup>2</sup>		

### Type

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

### Order no.

FVA614

### Accessories for wind direction and wind velocity sensors

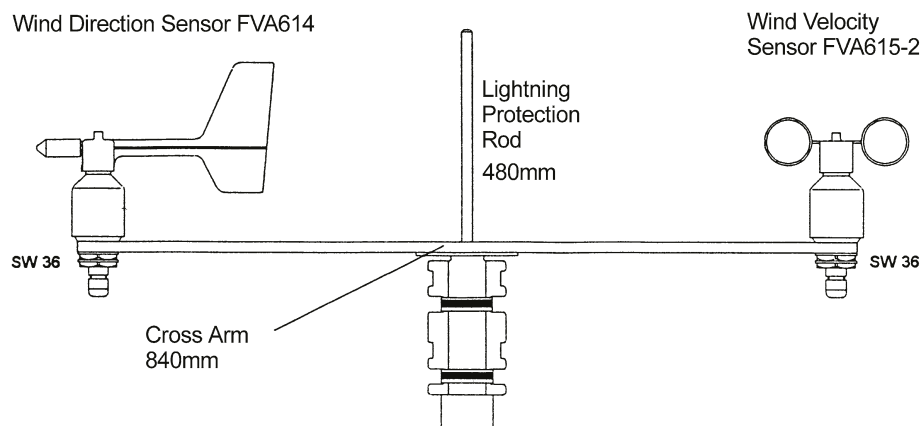
### Order no.

Cross-arm for separate wind direction and wind velocity sensors inclusive assembly utilities 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	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.
Accuracy:	±0.5m/s ±3% of meas. value	Installation:	e.g. pole tube with holding thread PG21 / drilling 29mm Ø
Resolution:	0.1m/s	Weight	750 g
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 0.25mm <sup>2</sup>		

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### Type

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

### Order no.

**FVA6152**



## Global Radiation Probe Head FLA 633 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:	0.4 to approx. 1200W/m <sup>2</sup>	Cos correction:	error f2 < 3%
Spectral sensitivity:	400nm to 1100nm	Linearity:	< 1%
Maximum spectral sensitivity:	780nm	Absolute error:	< 10%
Signal output:	0V to 2V	Residual voltage: (E = 0)	< 10mV
Power supply:	+5V to +15V	Nominal temperature:	22°C ±2°C
Mounting:	2 screws M4, in base plate	Operating temperature:	-20°C to +60°C
Cable passage:	downwards	Dimensions:	Dome diameter: 40 mm Housing diameter 80 mm Height 53 mm +10 mm (conical ring) +20 mm (dome)
Housing:	anodized aluminium	Weight:	approx. 300 g
Diffusor:	PTFE		
Dome:	PMMA		

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	FLA633GS
Factory calibration KL90xx radiation for sensor (see chapter Calibration certificates)	

## Illuminance measuring head FLA 633 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 :	0.05 to 170 klux (approx. 250 W/m <sup>2</sup> )	Cos correction :	error f2 <3%
Spectral sensitivity :	360 to 760 nm	Linearity :	<1%
Max. spectral sensitivity :	550 nm	Absolute error :	< 10 %
Signal output	0 to 2 V	Residual voltage (E = 0) :	<10 mV
Power supply :	+5 to +15 V	Nominal temperature :	22 ± 2 °C
Mounting :	2 screws, M4, in base plate	Operating temperature :	-20 to +60 °C
Cable passage :	downwards	Dimensions :	Dome diameter: 40 mm Housing diameter 80 mm Height 53 mm +10 mm (conical ring) +20 mm (dome)
Housing :	anodized aluminum	Weight :	approx. 300 g
Diffusor :	PTFE		
Dome :	PMMA		

Type (including test protocol)	Order no.
Weather-resistant measuring head for measuring the illuminance including cable, 1.5 m, and ALMEMO® connector	FLA633VLM
Factory calibration KL90xx radiation for sensor (see chapter Calibration certificates)	

## UVA Radiation Probe Head FLA 633 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:	0.03 to approx. 100 W/m <sup>2</sup>	Cos correction:	error f2 < 3%
Spectral sensitivity:	310 to 400nm	Linearity:	< 1%
Maximum spectral sensitivity:	355nm	Absolute error:	< 10%
Signal output:	0V to 2V	Residual voltage: (E = 0)	< 10mV
Power supply:	+5V to +15V	Nominal temperature:	22°C ±2°C
Mounting:	2 screws M4, in base plate	Operating temperature:	-20°C to +60°C
Cable passage:	downwards	Dimensions:	Dome diameter: 40 mm Housing diameter 80 mm Height 53 mm +10 mm (conical ring) +20 mm (dome)
Housing:	anodized aluminium	Weight:	approx. 300 g
Diffusor:	PTFE		
Dome:	PMMA (transparent to UV)		

### Type (including test protocol)

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

Factory calibration KL90xx radiation for sensor (see chapter Calibration certificates)

### Order no.

**FLA633UVA**

## UVB Radiation Probe Head FLA 633 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:	0.02 to approx. 50mW/cm <sup>2</sup>	Cos correction:	error f2 < 3%
Spectral sensitivity:	265 to 315nm	Linearity:	< 1%
Maximum spectral sensitivity:	297nm	Absolute error:	< 10%
Signal output:	0V to 2V	Residual voltage: (E = 0)	< 10mV
Power supply:	+5V to +15V	Nominal temperature:	22°C ±2°C
Mounting:	2 screws M4, in base plate	Operating temperature:	-20°C to +60°C
Cable passage:	downwards	Dimensions:	Dome diameter: 40 mm Housing diameter 80 mm Height 53 mm +10 mm (conical ring) +20 mm (dome)
Housing:	anodized aluminium	Weight:	approx. 300 g
Diffusor:	PTFE		
Dome:	PMMA (transparent to UV)		

### Type (including test protocol)

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

Factory calibration KL90xx radiation for sensor (see chapter Calibration certificates)

### Order no.

**FLA633UVB**

## Digital measuring head for erythema effective UV radiation (UVE) FLD7 33-UVE with ALMEMO® D7-connector. Weatherproof housing for outdoor use

Monitoring of UVE-radiation hazardous for human skin.

Stationary measurements in meteorological applications. Supplement to the weather station FMD7 60.

For connection to current measuring instruments ALMEMO® V7 : ALMEMO® 500, 710, 809, 202, 204



ALMEMO® UVE-measuring head in a weatherproof housing for outdoor use, FLD7 33-UVE

### Erythema effective UV radiation

The natural UV radiation of the sun or the UV radiation of artificial sources has different effects to human skin dependant on the wavelength range.

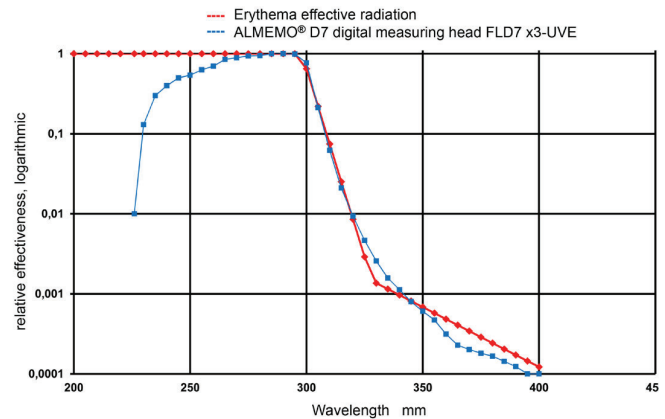
- The long-wave UV radiation (more than 313 nm, UVA) tans the skin and supports the human immune system.
- The short-wave UV radiation (less than 313 nm, UVB/UVE) may cause irreversible damage.

In the recommendation of the CIE ( Commission Internationale de l'Éclairage) all spectral effect functions which can have a negative effect on the human skin are summarized. This recommendation is described in the DIN 5050 resp. ISO/CIE 17166 and valuated as a directive.

### UVE-measuring head FLD7 03-UVE

The measuring head records the erythema effective UV radiation. The spectral sensitivity of the measuring head complies with the standards DIN 5050 and ISO/CIE 17166 and the Ordinance on Protection against the Harmful Effects of Artificial Ultraviolet Radiation (UV-Schutz-Verordnung - UVSV, published in the Federal Law Gazette 2011 Part I No. 37). The measurement results provide direct information about medically and biologically relevant correlations in this radiation range. DIN 5050 specifies four different skin types: Skin type I to IV. The UV Protection Ordinance - UVSV extends by two further skin types: skin type V and VI. The guideline for these six skin types are taken into account in the calculation of the various parameters. The measuring head is used in areas of medical and biological research, for the measurement of

UV radiation equipment (for cosmetic purposes, medical treatments or other human applications), in weather information and forecasting systems, in climate research and for general population information.. A popular measure of „sunburn sensitivity“ is



the UV index „UVI“, which is determined by the German Weather Service.

The measuring head FLD7 33-UVE has a weatherproof, eloxated aluminium housing. The device dome consists of UV-transparent, ground quartz glass. The measurement is cos-corrected. The measuring head is suitable for continuous operation or control measurements outdoors.

### Digital measuring head with ALMEMO® D7-connector

The measuring head works with its own AD converter. Extension cables and the ALMEMO® measuring instrument/data logger have no influence on the accuracy of the measurement..From the measured irradiance, all relevant measured variables are calculated and output to the ALMEMO® instrument. Different measuring channels can be selected and the measured variables can be displayed :

- UV-index: relative irradiance related to 25 mW/m<sup>2</sup>
- UVE irradiance (erythema-effective) in mW/m<sup>2</sup>.
- Dose (erythema effective irradiation) in J/m<sup>2</sup>: sum of irradiance over the irradiation period (energy).
- Relative minimum erythema-effective dose (MED): Dose related to 1 MED (= erythema-effective threshold irradiation) of the set skin type according to DIN 5050 and UVSV. Example: 1 MED for skin type 2 (light-skinned European skin type) = 250 J/m<sup>2</sup>.
- Remaining time of irradiation in minutes until the dose 1 MED of the selected skin type is reached.
- Current, predicted maximum irradiation time in minutes until the dose 1 MED of the selected skin type is reached.
- Relative standard erythema effective dose (SED): Dose related to 1 SED (100 mW/m<sup>2</sup>) according to ISO 17166.

## Technische Daten

Measuring range UVE:	0,1 ... 300 mW/m <sup>2</sup>
Resolution:	0,1 mW/m <sup>2</sup>
Sensor system:	SiC / interference filter
Spectral sensitivity:	230 ...400 nm
Erythema effective spectral range:	250 ... 298 ... 328 nm
Max. spectral sensitivity:	295 nm
Diffuser:	PTFE
Cos-correction:	error f <sub>2</sub> < 3 %
Linearity:	better 1 %
Absolute error:	< 7 %
Nominal temperature:	23 °C ±3 K
Operating temperature:	-30 ... +60°C
Switch-on time:	< 1 s
Switch-off time:	< 1 s

Dimensions:	
diameter	33 mm,
height	ca. 29 mm
Mounting:	2 screws M2
Weight (without cable)	approx. 50 g
ALMEMO® connecting cable: fixed attached cable, 1,5 m, with ALMEMO® D7-connector	
<b>ALMEMO® D7 connector</b>	
Refresh rate:	1 s for all channels
Settling time:	3 s (for data logger operation in sleep mode a sleep delay of 3 s has to be programmed)
Power supply voltage:	from 6 V from ALMEMO® instrument
Power consumption:	approx. 5 mA

Erythema effective radiation	0,3 W/m <sup>2</sup>	UV- Index	12	UV radiation exposure	extreme
			11		
			10		very high
			9		
	0,2 W/m <sup>2</sup>		8		high
			7		
			6		medium
			5		
	0,1 W/m <sup>2</sup>		4		low
			3		
			2		
			1		

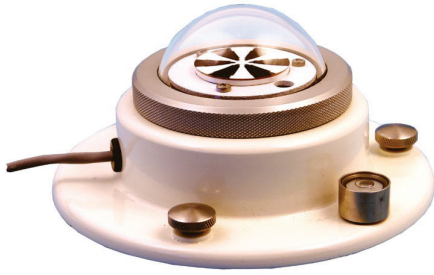


Version for measurements in dry surroundings  
FLD7 03-UVE  
Data sheet see chapter optical radiation

Intensity of Irradiation and UV-Index

<b>Versions</b> (incl. works test certificate)	<b>Order no.</b>
Digital measuring head for UVE radiation in a weatherproof housing for outdoor use. Sensor with built-in connector, incl. ALMEMO® connecting cable, 1,5 m, with ALMEMO® D7-connector.	<b>FLD733UVE</b>
Digital measuring head for UVE radiation, for measurements in dry surroundings. Sensor with permanently attached cable, 1,5 m, with ALMEMO® D7-connector Data sheet see chapter optical radiation.	<b>FLD703UVE</b>

## 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 <sup>2</sup>	Nominal temperature:	22°C ±2°C
Resolution:	0.1W/m <sup>2</sup>	Linearity:	<0.5% (0.5 to 1330W/m <sup>2</sup> )
Spectral range:	0.3 to 3µm	Stability:	<1% of the meas. range per year
Output:	approx. 15mV/Wm <sup>2</sup>	Settling time:	25s (t <sub>95</sub> )
Impedance:	approx. 35ohms	Dimensions:	160mm Ø, 75mm high, hole circle: 134mm Ø, holes: 8mm Ø
Operative range:	-40 to +60°C	Weight:	1 kg
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)		

### Type (including test protocol)

Star pyranometer including 3m cable with ALMEMO® connector and programmed calibration value  
Factory calibration KL90xx radiation for sensor (see chapter Calibration certificates)

### Order no.

**FLA628S**

### 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-C4AG in protective all-weather housing with ALMEMO® D6 plug**

10/2021 • We reserve the right to make technical changes.



- All relevant ambient parameters are measured with one sensor.
- Suitable for mounting on a wall or a mast
- Sensor cable up to 100 meters long, clamped in terminal box
- All sensors in 1 multi-sensor module: capacitive digital sensor for humidity and temperature, digital atmospheric pressure sensor. Additional EEPROM data storage medium in the sensor module
- The sensor module is thoroughly adjusted. All sensor characteristic and adjustment data are stored in the data storage medium of the sensor module itself. In the process of readjusting the individual sensors, the adjustment values are directly saved in the data storage medium of the sensor module.
- Replacement sensor modules are inexpensive: The sensor module is pluggable and can be simply exchanged on-site. Full accuracy without any adjustment, especially with calibrated sensors. The ALMEMO® connecting cable and the ALMEMO® measuring instrument have no influence on the calibration.
- **new:** The atmospheric pressure is measured directly at the measuring point in the sensor tip. Hence, the atmospheric pressure dependent humidity variables are automatically pressure compensated.
- 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.
- Humidity variables: Absolute humidity in g/m³.
- The humidity variables are calculated from the three primary measuring channels (real measurable variables): temperature, humidity and atmospheric pressure.
- Four measuring channels are programmed (ex factory): temperature (°C, T,t), relative humidity (%H, RH, Uw), dew point (°C, DT, td), atmospheric pressure (mbar, AP, p). Alternatively further humidity variables are selectable. Mixture (g/kg, MH, r), absolute humidity (g/m³, AH, dv), vapor pressure (mbar, VP, e), enthalpy (kJ/kg, En, h). The configuration is performed on the ALMEMO® V7 measuring instrument or directly on the PC using the USB adapter cable ZA1919AKUV (Chapter "Network technology").

**On request**

Temperature sensor Pt100 in protective all-weather housing

FPA930AG

**Technical Data**

<b>Operative range</b>	-30 to +60 °C, 5 to 98 % RH	<b>Digital atm. pressure sensor</b> (integrated in the multi-sensor module)	Measuring range	700 to 1100 mbar
<b>Digital temperature / humidity sensor</b> (including A/D converter)			Accuracy	±2.5 mbar (at 23 °C ±5 K)
<b>Humidity</b>		<b>ALMEMO® connecting cable</b>	PVC, for available lengths see variants with ALMEMO® D6 plug	
Measuring range	0 to 98 % RH	<b>ALMEMO® D6 plug</b>	Refresh time	1 second for all four channels
Sensor	CMOSens® technology		Supply voltage	6 to 13 VDC
Accuracy	±2.0 % RH in range 10 to 90 % RH ±4.0 % RH in range 5 to 98 % RH at nominal temperature		Current consumption	12 mA
Hysteresis	typical ±1 % RH	<b>Mechanical design</b>	Sensor tube	Plastic, diameter 12 mm
Nominal temperature	+23 °C ±5 K		Filter cap	PTFE-Sinterfilter, SK6
Sensor operating pressure	Atmospheric pressure		All-weather protection	Ø 105 mm, height approx. 110 mm
<b>Temperature</b>			Terminal box	51 x 53 x 36 mm
Sensor	CMOSens® technology		Screw-fit cable gland	Splash-protected
Accuracy	typical ±0.2 K at 5 to 60 °C maximum ±0.4 K at 5 to 60 °C maximum ±0.7 K at -20 to +80 °C			
Reproducibility	typical ±0.1 K			

## Accessories

## Order no.

ALMEMO® transmitter 2490-1R02U with double analog output 10 V or 20 mA  
 (For other data, options, accessories, see chapter 01 Measuring instruments)

MA24901R02U

## 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

**FHAD46C4AGL05**

Length = 10 meters

**FHAD46C4AGL10**

Length = 20 meters

**FHAD46C4AGL20**

Length = 40 meters

**FHAD46C4AGL40**

Length = 100 meters

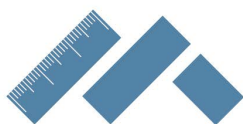
**FHAD46C4AGL100**

Replacement multi-sensor module, digital, adjusted, plug-in

**FH0D46C**

DAkkS or factory calibration KH9xxx, temperature, humidity, and KD92xx, atmospheric pressure, for digital sensor (see chapter Calibration certificates).

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



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