EIGENBRODT®

ENVIRONMENTAL MEASURMENT SYSTEMS

METEOROLOGICAL SENSORS

Meteorological sensors made by EIGENBRODT® are well known all over the world since 1952.

The instruments are in use worldwide and all year round under several climatic conditions at the measurement sites of our customers. (Universities, Environmental Departments, Weather Services, Research Institutes, Industrial Companies)

Lamellar Shelter LAM 630 with temperature and humidity sensors

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Germany

UNIT OVERVIEW – CONTENTS

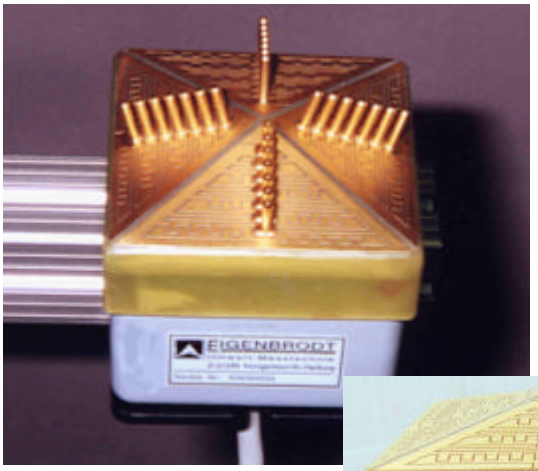
EIGENBRODT®

ENVIRONMENTAL MEASURMENT SYSTEMS

PRECIPITATION SENSOR RS 85 / RS 85 OP / NRS 80

PRECIPITATION SENSOR RS 85

for establishing start and end of precipitation



RS 85

RS 85 OP

- **large sensitive sensor surfaces (approx. 60 cm²), gold plated**
- **vertical pins in four directions (RS 85 only)**
- **adjustable, proportionally controlled heating of the sensor surfaces in two levels**
- **cut out delay adjustable**

PRECIPITATION SENSOR NRS 80

for establishing start and end of precipitation

- **sensitive sensor surfaces (approx. 40 cm²), gold plated**
- **adjustable, proportionally controlled heating of the sensor surface in two levels**
- **cut out delay adjustable**

TECHNICAL DESCRIPTION RS 85

The precipitation sensor RS 85 is employed for controlling closure settings, collection apparatuses and status monitoring. The electronics are enclosed in a substructure housing made of weatherproof polyester. The electronic heating and the sensor surfaces are integrated into the cover which may unscrewed. The sensor surfaces are arranged in a pyramid of 15° to ensure that the rain water readily runs off. On each of the four sensor surfaces are vertical pins to capture snowflakes for melting. As protection against
corrosion both the sensor surfaces and the pins are gold plated. . The built in 2-step electronic heating is proportionally controlled and can be adjusted to the needs of the user. The lower step is active in basic operation. The second more powerful heating-step is activated as soon as there is a rain signal, so the fluid on the surface can evaporate faster.

TECHNICAL DESCRIPTION RS 85 OP

Configuration like RS 85, but without snow catching pins.

TECHNICAL DESCRIPTION NRS 80

The precipitation sensor NRS 80 is employed for controlling closure settings, collection apparatuses and status monitoring. The electronics are enclosed in a substructure housing made of weatherproof polyester. The electronic heating and the sensor surfaces are integrated into the cover which may unscrewed. An optional holding device angles the sensitive surface to 30° to ensure that the rain water readily runs off. The sensor surfaces are gold plated as protection against corrosion. The built in 2-step electronic heating is proportionally controlled and can be adjusted to the needs of the user. The lower step is active in basic operation. The second more powerful heating-step is activated as soon as there is a rain signal, so the fluid on the surface can evaporate faster.
Sensitivity:

PRINCIPLE OF MEASUREMENT

When it rains the water enables an electrical connection between the individual electrodes on the sensor surface. This activates an electronic switch which closes a relay. The sensitivity of the operating threshold may be adjusted by the user to fit his needs. After the sensor surfaces have dried, the relay is switched off. The point in time at which the switch-off occurs is determined by the following factors: present temperature for the sensor, environmental factors, temperature, humidity, wind, etc…

SPECIFICATIONS RS 85 / RS 85 OP

Power supply total half wave sufficient	24 V DC / AC, max 20 Watt
Range of measurement	
precipitation	yes/no
switch on	without delay
switch off	with delay, adjustable 0 to 270 sec in 30 sec steps. (not with collectors)
Sensitivity:	0,05 mm/h
Sensitive surface	approx. 60 cm²
Outlet signal	
Opener/closer	potential free
Switch supply	max. 100 V DC / 250 V AC
Switch current	max. 5 A
Switch power	max. 1250 VA
Heating proportionally controlled 24 V DC	
Dimensions	83 x 83 x 85 mm
weight	700 g
system of protection	IP 65

SPECIFICATIONS NRS 80

Power supply total half wave sufficient	24 V DC / AC, max. 700 mA
Range of measurement	
precipitation	yes/no
switch on	without delay
switch off	with delay, adjustable 0 to 270 sec in 30 sec steps. (not with collectors)
Sensitivity:	0,05 mm/h
Sensitive surface	approx. 40 cm²
Outlet signal	
Opener/closer	potential free
Switch supply	max. 100 V DC / 250 V AC
Switch current	max. 5 A
Switch power	max. 1250 VA
Heating proportionally controlled 24 V DC	
Dimensions	80 x 75 x 60 mm
weight	400 g
system of protection	IP 65

OPTION RS 85

- power supply in aluminium housing 220-230 V AC / 24 V DC
- Mast (made out of galvanized steel) height approx. 1,5 m
- flange for mounting onto the mast (aluminium, anodised).

OPTION NRS 80

- power supply in aluminium housing 220-230 V AC / 24 V DC
- mast (made out of galvanized steel) height approx. 1,5 m
- holding device
- flange for mounting onto the mast (aluminium, anodised).

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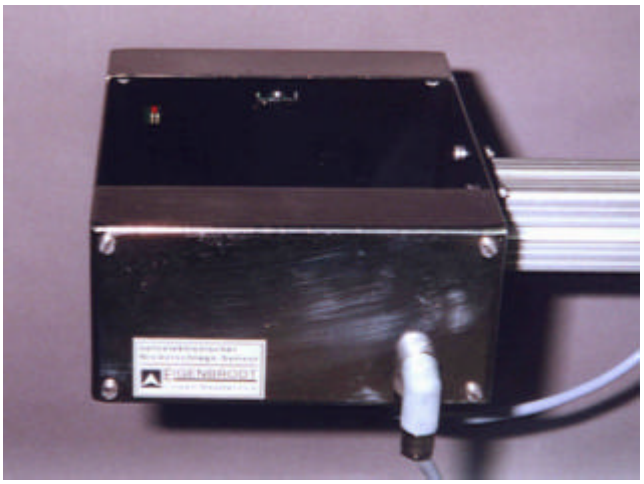
EIGENBRODT®

ENVIRONMENTAL MEASURMENT SYSTEMS

PRECIPITATION SENSOR IRSS 88

opto electronically precipitation sensor for establishing the start and end of precipitation



- **fast response**
- **interval length and minimum number of events are selectable (with optional drop evaluation)**
- **low power consumption**
- **rugged, stainless steel case**
- **water proof**
- **high reliability**

TECHNICAL DESCRIPTION AND PRINCIPLE OF MEASUREMENT

The sensor IRSS 88 (infra-red rain sensor) applies advanced opto-electronical technology for detection of all kinds of atmospherically precipitation.
Two high intensity infra-red beams are generating an active sensing area of about 120 * 25 mm. The size of this area exhibits reliable detection even of low density and small sized particle precipitation.
The applied opto-electronical system provides fast response to particles hitting the sensing area. The high sensitivity infra-red receivers offer noise rejection to all kinds of ambient light, even to high intensity sunlight. The metal case provides shielding against RF-EMI.
The weighted time interval (30 sec to 300 sec) and the minimum number of events (1 to 9) can be selected for optimised adaptation to the following applications.
Manufactured in advanced SMD-technology and housed in a rugged, waterproof, stainless steel case this sensor was designed for use in extreme environment applications. Even dirt or ice does not affect the function. In case of continuously interrupted IR-field for more than 4 seconds or extremely contamination a necessarily maintenance or clean-up of the IR-windows will be indicated to the user by a red LED on the sensor.
A wide supply voltage range and the low power dissipation of the IRSS 88 allows the use of extremely long cables for long distance connections.

SPECIFICATIONS IRSS 88

Power supply total	12 V DC / Approx. 80mA
Range of measurement	
precipitation	yes/no
switch on	without delay
switch off	without delay
Preset drop detection:	5 drop within 90 seconds
Sensing principle	dual-beam IR sensor
Sensitive surface	approx. 120 x 25 mm
dimensions	275 x 185 x 85 mm
weight	approx.2 kg
Case	stainless steel
System of protection	IP 65

Output signal

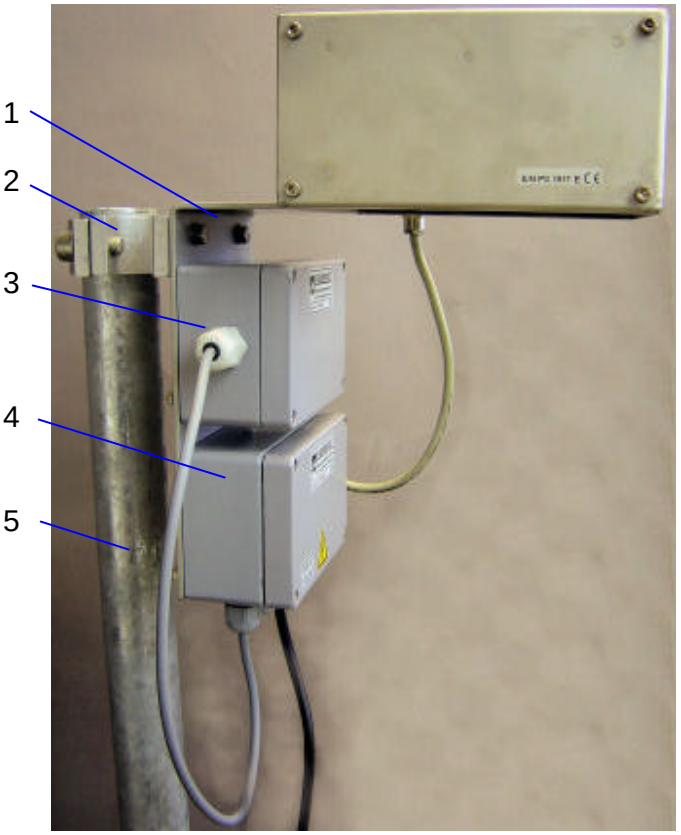
closer	potential free
switch supply	max. 50 V AC
switch current	max. 500 mA
switch power	max. 120 VA

OPTIONS

- PS 008x: Power supply in aluminum housing 220-230 V AC / 12 V DC
- DEU (drop evaluation unit):
  - select able events 1…9
  - selectable interval length 30…300 sec in 30 second steps
- Mounting steel
- Pipe clip for mounting at mast (aluminum).
- Mast (made out of galvanized steel) height approx. 1,5 m
- Snow catcher

IRSS 88 including the following options:

- 1 mounting steel
- 2 pipe clip
- 3 DEU
- 4 power supply
- 5 mast



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EIGENBRODT®

ENVIRONMENTAL MEASURMENT SYSTEMS

AUTOMATIC RAIN GAUGE ANS 410

for measuring precipitation amount and intensity, based on pressure sensing system

- **electronic weighing/pressure measurement system**
- **high resolution**
- **slender form**
- **TTL-Impuls output signal or reed relay**
- **without any mechanical measuring system**
- **also available with heating system**

TECHNICAL DESCRIPTION

The precipitation sensor type ANS 410 serves for measuring the amount and the intensity of rain by using a pressure measurement system. The pressure sensing element measures the collected rainwater height in a column. An electronic module changes the output signal of the pressure transmitter to a TTL-compatible "reed switch" signal. A magnetic valve replaces the siphoning device of a Hellmann Rain Gauge and allows a continuous operation without the need of manually emptying the column.

This instrument features an excellent linearity up to an intensity rate of 10 mm / min, the maximum intensity possible with 0,01 mm resolution is higher than 20 mm/min. The TTL-output signal allows the operation in place of tipping bucket rain gauge systems. The orifice of this unit is 200 cm² and corresponds to the standards of the German Meteorological service.

The measurement system allows a slender form like a champagne-cup, how suggested by Sevruk (1986) and Folland (1988), which leads to an advantageous behavior in the wind field.

For winter operation there is a built-in heating system available, which also measures solid precipitation (snow, hail) within a temperature range down to -25° C. The heating elements in funnel, shank and electronic housing are electronic controlled.

SPECIFICATIONS

Collection surface	200 cm² (after Hellmann – WMO standard)
Collection height	1 m (standard height)
diameter capillary	20 mm (optional 15 mm with 0,005 mm resolution)
intensity	>20 mm / min
resolution	0,01 mm precipitation (0,1 mm precipitation and 0,005 mm precipitation optional)
output signal	1TTL-impulse (50 ms) according to 0,005 - 0,1 mm precipitation
Power supply distribution voltage – unit	12 V DC controlled (max. 2 A), internally converted from 24 V DC
Heating (optional), electronic controlled distribution voltage capacity	24 V DC, 6 A max. 150 watt total
Materials Funnel ring collection funnel housing – unit housing – electronic	stainless steel / PE aluminium, eloxed plastics aluminium standard housing, IP 65
Dimensions	approx. 350 mm x 350 mm x 790 mm
Weight	approx. 9 kg
Working temperature	0...+70 °C -25...+70 °C (heating, optional)

OPTIONS

- Heating
- self supporting pole
- power supply for unit without heating
- power supply for unit with heating
- data logger system, RS232 output possible optional
- output: 0…10 V; 0…20 mA or 4…20 mA, potential free closer, RS232

EIGENBRODT®

ENVIRONMENTAL MEASURMENT SYSTEMS

SHIP RAIN GAUGE SRM 450

precipitation measurement on ships, buoys etc.
design Prof. Dr. Lutz Hasse

- **precipitation measurement on moving ships**
- **horizontal orifice and vertical collector**
- **automatic data recording (optional)**
- **seawater proof**

IMET 455

- **complete unit for calculation of rain rate, including incoming Anemometer data.**
- **data output on analogue output**
- **or RS232-interface**

PRINCIPLE OF MEASUREMENT

The ship gauge is designed to enable rain fall measurements from a moving ship. The high relative flow velocities at a cruising ship in a wind field at sea may carry the rain almost horizontally over the ship. By measuring the amount of water that is collected by a vertical surface, a correction for the wind effect is possible. It is evident that the local relative wind speed at the site of the instrument should be measured simultaneously.
Rain is collected at the horizontal orifice (arrows) and at the vertical collector (shaded). There are five vertical T-bars at the circumference of the vertical collector that hinder rain water to wander around the cylinder and be blown off in lee.

TECHNICAL REALISATION

In our design, the horizontal orifice of a conventional rain gauge has been supplemented by a cylindrical vertical collecting surface. The water amount from both surfaces is collected separately, and measured by forming and counting drops of calibrated size. The aerodynamic shape of the instrument was designed to reduce the under catch resulting from flow distortion by the gauge itself.

THEORY

The horizontal orifice measures rainfall like any land based conventional rain gauge. The vertical collecting surface measures liquid water content in the volume of air defined from the cross-section of the gauge and the relative wind speed. From the liquid water content of the air, the rainfall rate can be estimated by assuming a raindrop size distribution. From the information of the two collecting surfaces, considering local flow velocity, an empirical calibration of the instrument is feasible.

SITING

The measurement of the liquid water content is independent of local up- or downdrafts. The catch by the horizontal orifice can be influenced by local up-/or downdrafts, depending on the drop-size distribution. This requires to place the instrument high up above the superstructure of the ship in order to minimize influence of local ship induced velocities. In order to deal with ship roll motions in a sea state, the instrument is suspended to swing freely around an axis parallel to the ships long axis. The instrument has been tested against an optical disdrometer during several cruises at research vessels and since 1991 is routineously operated at R. V. Meteor.

RECORDING

The instrument output provides counts of calibrated drops from the top and from the side. Typically, these are recorded together with the counts of a cup anemometer (and auxiliary data like date, time, position of ship) on PC. Basic recording time unit is two minutes. For this time , rainfall rates are calculated for the top and the side separately and a corrected rain fall rate is obtained as a wind speed dependent weighted average.

SPECIFICATIONS

Collection surface	
horizontal	200 cm² (following DIN 58666)
vertical	106,6 cm²
resolution	0,1 mm
Dimensions	
Diameter funnel	185 mm
Diameter housing	100 mm
height	485 mm
weight	approx. 4 kg
Power supply	
gauge electronics	24 V DC, extern
output signal	5 V DC, low active
Heating (optional), electronically controlled	
funnel	24 V DC, 50 W, extern
drain	24 V DC, 25 W, extern
power supply in case (optional)	230 V AC, 12 / 24 V DC
output: heating of rain gauge	80 VA
output: heating Anemometer	20 VA

CONTENS OF DELIVERED PROGRAM

- Housing consisting of:
funnel with horizontal collection surface
upper housing cylinder with vertical collection surface
lower housing cylinder
- inlet funnel with drop counter
rain gauge electronics

OPTION

- funnel and drain heating
- power supply in case
- semi cardanics
- cardanics
- counter board for value recording on a PC, including software
- IMET 455
- data logger for value recording, including software

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OPTICAL DISDROMETER ODM 470

drop size distribution measurement on ships, buoys and for land applications

- **optimised for use in high wind speeds**
- **minimal detectable size of droplets is 0,5 mm (0,5…6mm range)**
- **drop size distribution can be calculated with a resolution of 0.05 mm (0,5…6 mm range)**
- **seawater proof housings**

OBJECTIVE

There has been an interest to measure rain drop-size distributions for a long time. Introduction of precipitation radars has even strengthened interest into the use of disdrometers, because remote sensing techniques need to be calibrated with aid of measured drop-size distributions. For open ocean research it is necessary to have a disdrometer capable of ship borne operation.
Since commonly used disdrometers are not suitable for this purpose, a new optical disdrometer has been developed that is optimised for use on board of moving ships, where relative wind speed may easily exceed 20 m/s.

TECHNICAL DESCRIPTION

The principle of operation is light extinction of rain drops or solid hydrometeors passing through a cylindrical sensitive volume of 120 mm length and 22 mm diameter. The optical signal is proportional to the cross sectional area of the object.
The light source of the disdrometer is a 150 mW IR-LED (Infra Red Light Emitting Diode), emitting light of 880 nm wavelength. In order to achieve a homogeneously illuminated sensitive volume, collector lenses and an optical blend are used.
Thus , only the portion of light that is parallel to the optical axis can reach the receiver diode. The optical signal is converted into an electric pulse. Depth of pulse and duration are proportional to the cross-section area and the residence time of the drop in the active volume. Thus the disdrometer measures simultaneously the size and velocity of the drops. Minimal detectable size of droplets is 0.5 mm in diameter.
The sensitive volume is kept perpendicular to the local flow direction by aid of a wind vane. The cylindrical form makes measurements independent from the incidence angle of the raindrops.

DETERMINATION OF THE RAINRATE

From the available information, the drop-size distribution can be calculated with a resolution of 0.05 mm in diameter either by evaluation of the residence time of the drops or by drop counting knowing the local wind. Experience shows that using the measured residence time leads to better results. Rain rates can be determined from droplet spectra by assuming terminal fall velocity of the drops according to their size.

EVALUATION OF SPECTRA

An optical disdrometer may be though of as an absolute instrument. However, since rain-drops fall in a random pattern, it may happen that the sensitive volume is occupied by two or more drops at the same time or that drops graze the volume only partially. Double or multiple occupancies (called coincidences) and grazing incidence is a feature that affects all types of disdrometer inevitably. Coincidences are the consequence of the nearly exponential shape of drop spectra: There are many small and few large drops. Hence a compromise is necessary to have a sufficient probability to sample large drops and to avoid too many coincidences. The impact of coincidences are accounted for by an inverse technique.

APPLICATIONS

Optical disdrometer OMD 470 have been operated on various ships since 1992. They were used to calibrate ship rain gauges and to determine drop-size spectra of tropical rainfall on board R/Vs POLARSTERN and RON BROWN.

SPECIFICATIONS

Range	0.5 – 6 mm diameter
	0.8 – 20 mm diameter (optional)
noise equivalent to	0.5 mm diameter
Voltage	24 VDC
Power use	0.30 A without IRSS 88
	0.38 A with IRSS 88
Power Supply	230 VAC, ca. 20 W
Dimensions	
weight	9.5 kg
height	60 cm
width	60 cm
length including wind vane	60 cm

OPTIONS

- The use of an opto-electronical precipitation sensor, model IRSS 88 is to lengthen the live period of the IR-LED

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EIGENBRODT®

ENVIRONMENTAL MEASURMENT SYSTEMS

OPTICAL FOG DETECTOR ONED 250

optical detection of fog based on IR-beam

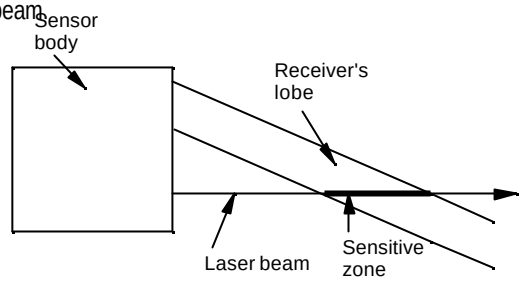
- **RS232 output giving the calculated visibility in meters (optional)**
- **Potential free contact that opens when the visibility is below a chosen value (default is 1000 meters)**
- **Electrical heating of optics**
- **Low power consumption**
- **Works in combination with Fog-Sampler NES 210**

DESCRIPTION

ONED is a sensor for visibility. It measures the amount of particles – primarily water particles respectively fog in the air that limits the visibility.

WORKING PRINCIPLE

A narrow beam of red laser light comes out of an opening on the front. A detector behind a lens in another opening is sensitive for incoming laser light in a narrow lobe that overlaps the transmitter beam.



If there are fog particles in the overlap zone light will be scattered back and reach the detector causing a signal on the sensor raw signal output. The sensitive zone is located about 30 cm ahead of the sensor and its volume is less than 1 cubic centimeter.

ELECTRICAL SIGNAL

The raw signal is analog and it is a measure of the amount of backscattered light from the overlap zone. So the more fog in the overlap zone the more signal.

Signal processing:

The following expression can be derived for the visibility:

$$V = \frac{konst}{VIS}$$

V	is the measured raw signal level.
konst	is a calibration constant.
VIS	is the visibility in meters.

In the specifications the limit is set to 3000 meters. Though processed outputs saturate at 5000 meters visibility but the accuracy is limited above 3000 meters. In order to get a value of the visibility as experienced by the eyes, mean values of samples from about one minute from the output are taken and processed.

DIGITAL OUTPUT (OPTIONAL)

The calculated visibility is presented in digital form as an ASCII string on the RS232 output, 1200 baud 8N1, that is transmitted "streaming" every minute. Polling action can also be delivered. At good visibility the string is "5000," and if the calculated visibility is for instance 1000 meters the string is simply "1000,". This string can be received by many loggers with RS232 inputs but also by a PC with a terminal program.

The microprocessor also controls a potential free semiconductor switch that is opened when the calculated visibility is below a certain value (default is 1000 meters). And the switch is closed when the visibility is higher than that value.

MICROPROCESSOR CONTROLLED ANALOGUE OUTPUT (OPTIONAL)

The microprocessor also controls the analogue output giving the visibility directly (VIS =1 km gives 1 Volt, and VIS = 500 meters gives 0.5 Volt etc). This output is updated every minute. During the first minute of operation after switch-on the signal on the analog output will therefore be zero. (This may be a bit confusing at setup)

SPECIFICATIONS

Sensing principle	beam laser sensor
Power Supply	
Voltage	11-15 VDC
current consumption	200 mA
	60 mA without heating
Laser output power	less than 54 mW
Laser wavelength	650 nm
Dimensions:	120 x 120 x 90 mm
Weight:	approx. 1,3 kg
Working temperature	-20...+50 °C
Warm up time	approx. 1 min
System of protection	IP 65
Visibility range	20 … 3000 m
Output	RS232 1200 baud 8N1 (optional) analogue 0-5 Volt switch that changes state at 1000 meters visibility

OPTIONS

- control of the air temperature via a PT 1000
- combination with fog sampler NES 210
- power supply unit
- supporting base

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EIGENBRODT®

ENVIRONMENTAL MEASURMENT SYSTEMS

EIGENBRODTÒ SENSORS FOR PRESSURE, HUMIDITY AND TEMPERATURE

COMPACT BAROMETER KBG 800

- precision measurement of barometric pressure
- compact design
- especially designed for outside applications (IP 67)
- other voltage output on request

COMPACT BAROMETER KBG 820

- precision measurement of barometric pressure
- rod type
- modified for the use in lamellar shelter LAM 630
- especially designed for outside applications (IP 67)
- other voltage output on request

SPECIFICATIONS KBG 800 / KGB 820

measurement range:	800 – 1200 hPa	accuracy:	± 0,5%
linear output signal:	0 – 5 V DC	power supply:	12...30 V DC
operating temperature:	–20 °C - +40 °C	system of protection	IP 67

RELATIVE HUMIDITY AND TEMPERATURE PROBE VAISALA, TYPE HMP 45 D

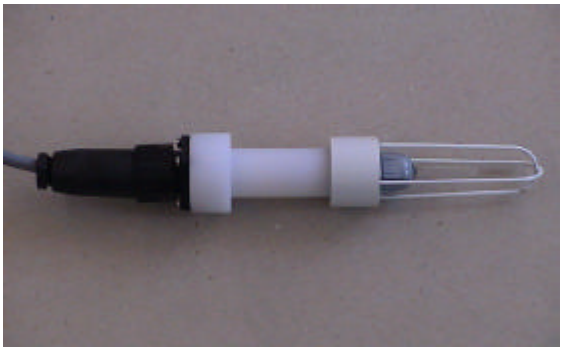
- precise humidity and temperature probe with excellent long time stability
- standard humidity probe of German Weather Service, used in lamellar shelter LAM 630
- without plug, 3,5 m cable length

SPECIFICATIONS

measurement range humidity:	0,8 - 100 % rh	temperature measurement:	Pt 100 with calibration certificate
output signal rel. humidity:	0...100 %rh equals 0...1 V	signal output temperature:	4-wire, passive
power supply:	7...35 V DC		or 0...1 V, active (optional)
operating temperature:	–40 °C - +60 °C		

AIR TEMPERATURE SENSOR LTS 2000

- specification German weather service
- precision measurement of ambient temperature
- rod type
- modified for the use in lamellar shelter LAM 630
- with protection basket for near ground temperature measurement



METEOROLOGICAL SPECIFICATIONS

Type:	Pt-100 (DIN EN 60751, IEC 751 ± 0,1 K bei0 °C)
measurement range:	-40 °C...50 °C
operating range:	-30 °C...40 °C
accuracy:	0,2 K
time lag (90 %):	≤ 1 min
reaction time:	~25 s bei 1m/s wind speed
resolution	< 0,1 K

TECHNICAL SPECIFICATIONS

sensor design:	Pt-glass temperature sensor, type Degussa P 6
output signal:	electrical resistance
signal range:	ca. 80...120 Ω
level of peak load:	> 500 kΩ
limit deviation:	0,3 °C + 0,005*(t) °C (t= absolut temperature)
tolerance class:	1/3 class B

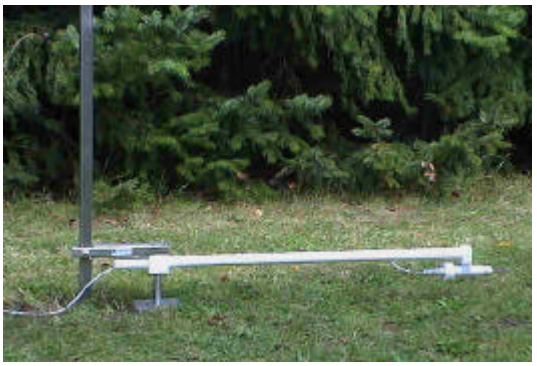
Specification are subject to change without prior notice, E & OE.

SENSOR HOLDER E + 5 CM SHE 850

- specification German weather service
- sensor holder for measurement of ambient temperature
- 5 cm above ground
- use for e.g. with air temperature sensor LTS 2000
- variations in height possible

SENSOR HOLDER E/B + 5 CM SHE 850/B

- specification German weather service
- sensor holder for measurement of ambient temperature
- 5 cm above ground
- application for mountain station higher than 650 m
- use for e.g. with air temperature sensor LTS 2000
- variations in height possible



LAMELLAR SHELTER LAM 630

a lamellar shelter to hold temperature and humidity sensors

MODELL DEUTSCHER WETTERDIENST (GERMAN WEATHER SERVICE)

- **incorporation of up to four temperature and humidity sensors for a continuous quality check in automatic weather stations**
- **protection against weather and radiation by an optimal design using new type of laminated synthetic material**
- **reduce the build-up of heat in the shelter by an artificial ventilation**

LAMELLAR SHELTER LAM 630 / R

LAM 630 including the Integration of various environmental parameters:

- **radiation**
- **temperature**
- **humidity**
- **pressure**
- **CO_2**
- **precipitation „yes/no“**

TECHNICAL DESCRIPTION

The shelter serves to protect sensors for the outdoor measurement of temperature and humidity from weather and radiation. It is known that the measurement of the above mentioned meteorological parameters is very critical in the presence of sun radiation and modest ventilation of air because of the generation of a separate climate by a warming up of the air in the shelter it comes to a distortion of measuring results. To prevent from this warm up an artificial ventilation was installed which does not exceed a defined level of cooling down.

PRINCIPLE OF MEASUREMENT

The design of the shelter corresponds to the well known lamellar shelter showing seven plates arranged on top of each other. The four lower ones form the space of measurement which is covered by a fifth with the built-in fan. The sixth and seventh plate serve to protect from radiation the diameter of the top plate being larger by 50 mm so that an additional protection against radiation and wetting is guaranteed by the overlay.
The plates are manufactured with a special co-extruded ABS synthetic material the top layer of which is of high solid, weather-proof und gleaming white acryl-glass which makes an effective conservation. The black ABS layer under the plates compensates for the effect of warming the space of measurement caused mainly by the long wave radiation from the ground.
The space of measurement is closed at the bottom by a plastic washer and a mounting of V_4A (stainless steel), white powder coated. Arrangements are made to screw together and to fasten up to four sensors in the shelter.

SPECIFICATIONS

Power supply	
operating voltage - axial fan	12 V DC
current consumption - axial fan	100 mA
range of temperature	- 30°C .... 70°C
Dimensions:	
top plate	∅ 290 mm
bottom plate	∅ 250 mm
height of the shelter	215 mm
Fastening:	
mast with spigots	∅ 12 mm
(other kinds of fastenings are possible)	
total height with mount	440 mm
Weight:	
shelter without regulation	3,0 kg
shelter with regulation	3,3 kg

CONTENS OF DELIVERED PROGRAM

Shelter with:
- seven plates
- axial fan
- ground plate (washer)
- four screw together units
- mounting
- spacer
- adapter for a mast with connecting screws
- hanger screws with nuts

OPTIONAL

- power supply for the axial fan
- regulation of the axial fan with brightness control
- control of the axial fan speed range
- mast for installation of the shelter in a 2 m height
- sensors for:
  - temperature
  - humidity
  - pressure
  - radiation
  - CO_2
  - precipitation “yes/no”
  - Data Logger