

Meteorological Sensors and Instruments



- Rain sensors
- Rain gauges
- Disdrometer
- Temperature sensors
- Radiation shields
- Devices for radiation measurements:
 - Automatic shading ring
 - Ventilation unit for radiation sensors

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Eigenbrodt GmbH & Co. KG

Baurat-Wiese-Straße 68

D-21255 Königsmoor

Tel. 04180-732

Fax 04180-259

Email: goto@eigenbrodt.de

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Eigenbrodt meteorological Sensors and Instruments

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Meteorological sensors made by EIGENBRODT® are world wide known 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)

Detecting Precipitation

PRECIPITATION SENSORS (DETECTORS)

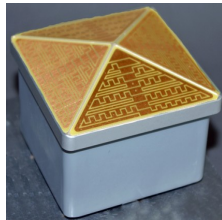
Different types of Precipitation Sensors, specially adopted to various applications and local conditions.

RS 85



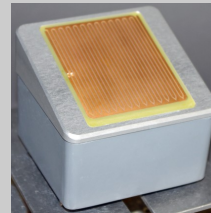
Standard Precipitation Sensor for almost all climatic conditions. The snow catching pins allow a very good detection also of snow events.

RS 85 OP



Like the RS 85, but without the snow catching pins. This sensor is suitable for areas with few or no snow. The pyramid shape allows a good detection to all 4 directions.

NRS 80



Suitable for the use in areas few snowfall, for instance in maritime climatic conditions.

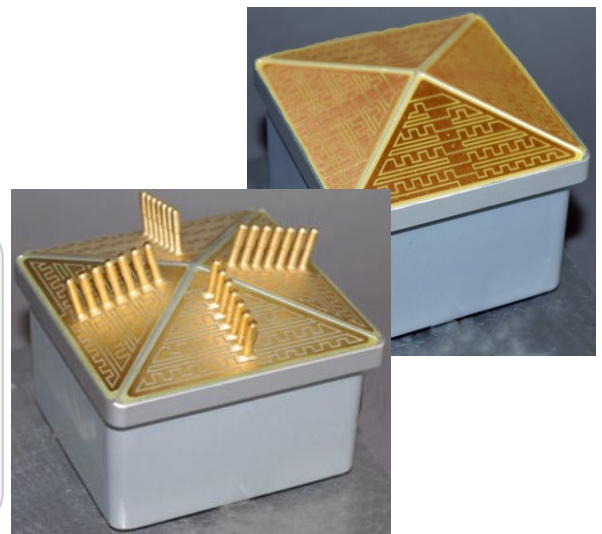
IRSS 88



For high polluted areas or close to the sea we recommend the use of the Precipitation Sensor IRSS 88. The measurement principle is opto-electronic.

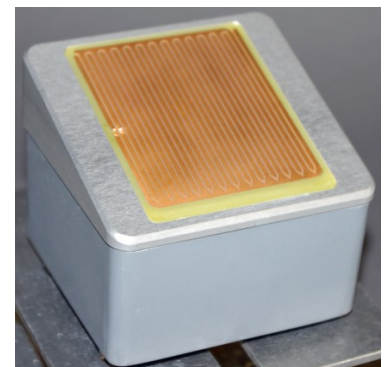
RS85 and RS85 OP

- ✓ large sensitive sensor surfaces (approx. 60 cm²), gold plated against corrosion
- ✓ sensitivity of 0,05mm/h
- ✓ pyramid shape allowing good detection to 4 directions
- ✓ vertical pins to catch and melt down snow (RS 85 only)
- ✓ adjustable, proportionally controlled heating of the sensor surfaces in two heating steps
- ✓ cut-off delay adjustable



NRS80

- ✓ sensitive sensor surfaces (approx. 40 cm²), gold plated against corrosion
- ✓ sensitivity of 0,05mm/h
- ✓ adjustable, proportionally controlled heating of the sensor surfaces in two heating steps
- ✓ Cut-off delay adjustable



TECHNICAL DESCRIPTION RS 85

The precipitation sensor RS 85 is used for controlling closure settings, collection apparatuses and status monitoring. The electronics are enclosed in a housing made of weatherproof polyester. The electronic for heating and the sensitive surfaces are integrated into the sensor head.

The sensor surfaces are arranged in a pyramid of 15° to ensure that the rain water instantly runs off. Vertical pins placed on each of the four sensor surfaces allow capturing snowflakes for melting.

As protection against corrosion both the sensor surfaces and the pins are gold plated.

A 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 RS 85 is used for controlling closure settings, collection apparatuses and status monitoring. The electronics are enclosed in a housing made of weatherproof polyester. The electronic for heating and the sensitive surfaces are integrated into the sensor head.

The sensitive surface is under an angle of 30° to ensure that the rain water instantly runs off. The sensor surface is gold plated as protection against corrosion. A 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.

PRINCIPLE OF MEASUREMENT

In case of a rain event the water bridges an electrical connection between the individual electrodes of 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 been 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 24 V DC / AC, max 20 Watt
half wave sufficient

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 cm ²

Output 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 weights 700 g

system of protection IP 65

OPTIONS RS 85

- power supply in aluminum housing 220-230 V AC / 24 V DC
- Mast (made out of galvanized steel) approx. 1,5 m high
- Mast and wall mounting accessories

SPECIFICATIONS NRS 80

Power supply total 24 V DC / AC, max. 700 mA
half wave sufficient

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 cm ²

Output 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 weights 400 g

system of protection IP 65

OPTIONS NRS 80

- power supply in aluminum housing 220-230 V AC / 24 V DC
- mast (made out of galvanized steel) approx. 1,5 m high
- Mast and wall mounting accessories

IRSS 88

PRECIPITATION SENSOR

Opto-electronical precipitation sensor for establishing the start and end of precipitation

TECHNICAL DESCRIPTION AND PRINCIPLE OF MEASUREMENT

The sensor IRSS 88 (infra-red rain sensor) applies advanced technology for detection of all kinds of atmospheric 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.

Optional: 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.

SPECIFICATIONS IRSS88

Power supply total	12 V DC / Approx. 100mA
Sensing principle	dual-beam IR sensor
Sensitive surface	approx. 120 x 25 mm
Case	stainless steel
dimensions	275 x 185 x 85 mm
weight	approx. 2 kg
System of protection	IP 65

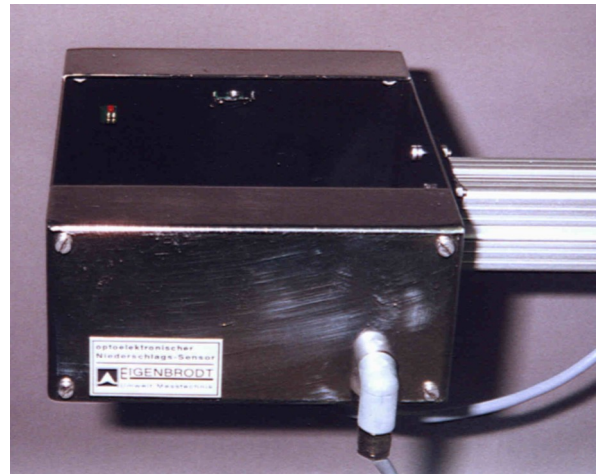
Range of measurement

precipitation	yes/no
switch on	without delay
switch off	without delay
Preset drop detection:	5 drop within 90 seconds

Output signal

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

- ✓ fast response
- ✓ low power consumption
- ✓ rugged, stainless steel case
- ✓ water proof
- ✓ high reliability
- ✓ Optional: interval length and minimum number of events are selectable (DE unit)



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 30...300 sec in 30 second steps
- Mast mounting to vertical/horizontal mast
- Mast (galvanized steel) height approx. 1,5 m
- Snow catcher



ONES 250 and miniOFS

- ✓ 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

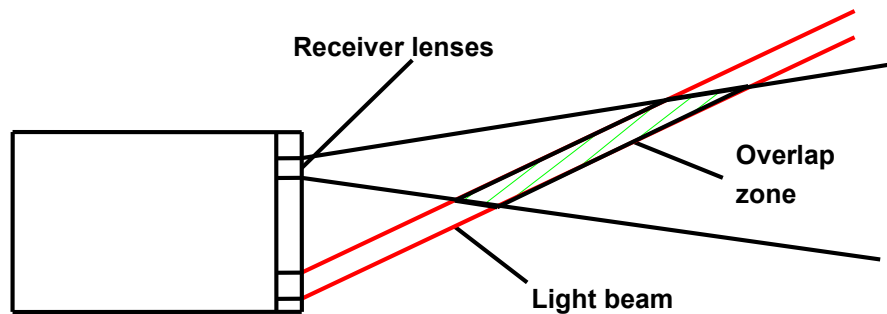
FOG DETECTORS / VISIBILITY SENSORS

optical fog detection based on backscattering technology
(IR-light @ miniOFS, low power Laser @ ONED250)

PRINCIPLE OF MEASUREMENT

Both types measure the amount of particles – primarily water particles respectively fog in the air that limits the visibility.

A narrow light beam (red laser at ONED250, IR-light at miniOFS) is emitted to the front. A detector is located behind a lens right next to the emitter. It is sensitive for incoming light in a narrow bandwidth that overlaps the transmitter beam. If there are e.g. fog particles in the overlap zone, light will be scattered back and reach the detector causing a signal. The sensitive zone is located about 25-30 cm ahead of the sensor and its volume is less than 1 cubic centimetre. The sensor is heated to a few degree above ambient temperature in order to avoid moisture built up on the lenses.



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 arises for the visibility:

$$V = \frac{\textit{konst}}{VIS} \quad \begin{array}{l} V \text{ is the measured raw signal level.} \\ \textit{konst} \text{ is a calibration constant.} \\ VIS \text{ is the visibility in meters.} \end{array}$$

In order to receive values of the visibility as experienced by eyes, mean values of samples are taken in minute intervals.

DIGITAL OUTPUT (OPTIONAL)

The calculated visibility is available as ASCII string on the RS232 output (with 1200 baud 8N1), that is transmitted (push mode only) every minute (1/2 minute with miniOFS). This string can be received by many loggers with RS232 inputs but also by a PC with a terminal program.

ONED250 only: microprocessor controlled switch, that opens above a preset visibility. The default is 1000m. Other values are available when stated with the order.



MICROPROCESSOR CONTROLLED ANALOGUE OUTPUT (OPTIONAL)

The analogue signal is a 0...5 V proportional to the visibility (e.g. 1 Volt → VIS =1 km 1 Volt, and 0,5 → Volt VIS = 500 meters). This output is updated every minute (1/2 minute with miniOFS). Warm up time prior to the first signal is approx. 1 minute with 0V.

SPECIFICATIONS ONED 250

Power supply total 24 V DC / AC, max 20 Watt

SPECIFICATIONS

Power Supply

Voltage 11...15 VDC

current consumption 200 mA @ 12V

Sensing principle beam laser sensor

Emitter class <5mW,
eyesafe laser, safety class 3R

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 ... 9000 m

Output
- RS232 1200 baud 8N1
- analogue 0-5 Volt
- switch that changes state at
1000 meters visibility

SPECIFICATIONS miniOFS

Power supply total 24 V DC / AC, max 20 Watt

SPECIFICATIONS

Power Supply

Voltage 8...14 VDC

current consumption 100 mA @ 12 V

Sensing principle IR

Emitter class 3mW from IR LED,
eyesafe laser, safety class 3R

IR wavelength 850 nm

Dimensions: 68 x 45 x 34 mm

Weight: approx. 0,2 kg

Working temperature -20...+50 °C

Warm up time approx. 1 min

Update time approx. 0,5 min

System of protection IP 65

Visibility range 20 ... 4000 m

Output
- RS232 1200 baud 8N1 (optional)
- analogue 0-5 Volt

OPTIONS ONED250

- combination with fog sampler NES 210
- power supply unit
- supporting base and mounting accessories

OPTIONS miniOFS

- combination with fog sampler NES 210
- power supply unit
- supporting base and mounting accessories



⇒ **WORKS WELL TOGETHER WITH
THE FOG SAMPLER ANES 220**



ODM 470

- ✓ built for use at high wind speeds
- ✓ designed in closed cooperation with former IFM, University of Kiel, Prof. Dr. Lutz Hasse
- ✓ minimal detectable size of droplets is 0,5 mm (0,5... 22mm range, log scale)
- ✓ optimized for maritime applications, like buoys, ships or research vessels

OPTICAL DISDROMETER FOR MARITIME AND WIND EXPOSED SITES

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

OBJECTIVE

There is an interest to measure long term rain drop-size distributions. 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.

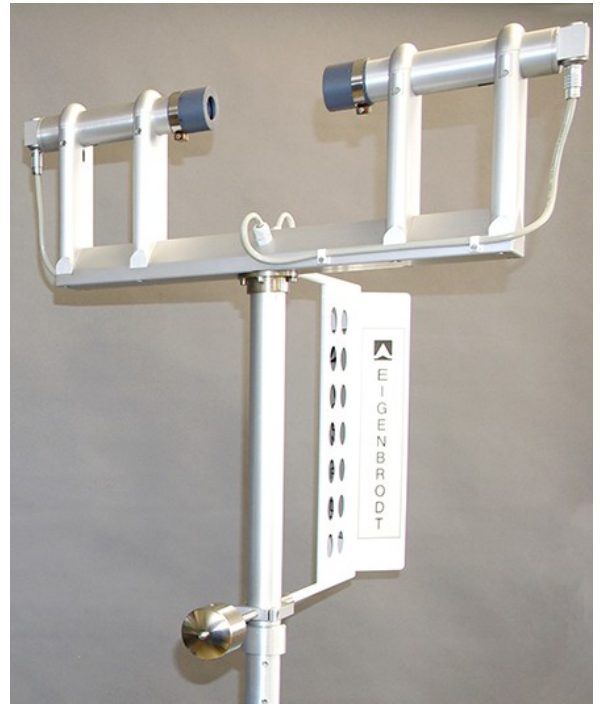
Since commonly used disdrometers are not suitable for this purpose, a new optical disdrometer has been developed that is optimized for use on board of moving ships, where relative wind speed may easily exceed 20 m/s.

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. Minimal detectable size of droplets is 0.5 mm in diameter. Two data sets are being provided simultaneously, one optimized for rain and one for snow. It may be up to the user to choose taking e.g. other meteorological data into account. 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.



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, METEOR, ACADEMIC IOFFE, RON BROWN and others.





RAIN RATE DETERMINATION

From the available information, the drop-size distribution can be calculated with a log-scale resolution either by evaluation of the residence time of the drops or by drop counting knowing the local wind. Rain rates can be determined from droplet spectra by assuming terminal fall velocity of the drops according to their size

SPECIFICATIONS

Drops

classes	0.5 – 22 mm log scale
noise equivalent to	0.5 mm diameter
number drop size classes	128

EXTERNAL POWER

Power Supply	110...230 VAC, 50/60Hz, approx. 20 W (may vary with connected wind speed sensor)
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Dimensions

weight	9.5 kg
height	60 cm
width	60 cm
length including wind vane	60 cm

OPTIONS

- IRSS88 upgrade kit: The use of an opto-electronical precipitation sensor, model IRSS 88 the live period of the IR-LED can be extended to the time of no rain detected.
- Signal input of wind speed for data processing
- Wind speed sensor
- Mountings (brackets, etc.)



SRM 450

- ✓ built for use in high wind speeds
- ✓ horizontal orifice and vertical collector
- ✓ automatic data recording (optional)
- ✓ seawater proof
- ✓ optimized for maritime applications, like buys, ships or research vessels

RELIABLE PRECIPITATION MEASUREMENT ON SHIPS, BUOYS

DESIGN PROF. DR. LUTZ HASSE, FORMER IFM, UNIVERSITY OF KIEL,

PRINCIPLE OF MEASUREMENT

The ship rain gauge is designed to measure rain fall on moving ships or buoys. The high relative flow velocities on a cruising vessel 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. Evidently the local relative wind speed at the monitoring site of the instrument is to be measured simultaneously.

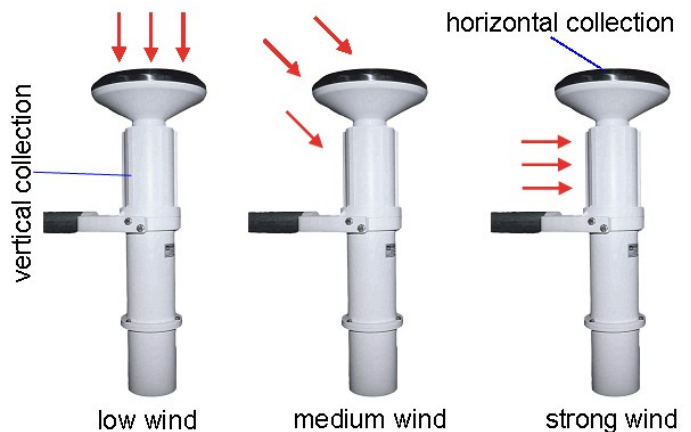
Rain is collected at the horizontal orifice and at the vertical collector. There are five vertical T-bars at the circumference of the vertical collector that hinder rain water to wander around the cylinder and to be blown off in lee.

TECHNICAL REALISATION

This special design features a horizontal orifice of a conventional rain gauge and a vertical collecting surface. The water amount from both surfaces is collected separately, and measured by forming and counting drops of calibrated size. The aerodynamic “champagne-cup” 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 assum-



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 shall be suspended to swing freely around an axis parallel to the ships long axis. The instrument has been tested during several cruises at research vessels and since 1991 is routinely operated at RV Meteor or RV Polarstern for example.

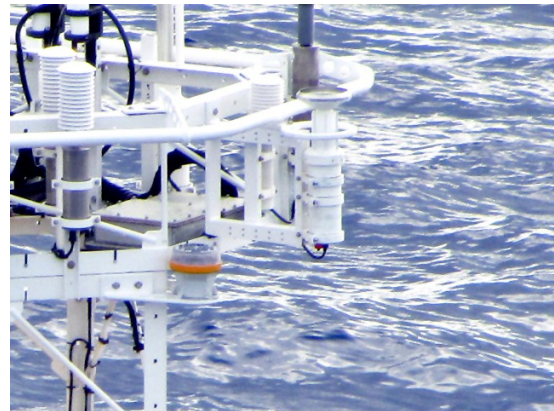


RECORDING

The instrument output provides counts of calibrated drops from the top and from the side. Typically, these are to be recorded together with the counts of a cup anemometer (and auxiliary data like date, time, ship position) on PC or special recording solutions, like the IMET. Basic recommended 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.

HEATING

The SRM 450 is available as a heated version and as a extra heated version. The built in heating is meant to prevent the inside electronics and drain from freezing. Certain heating capacity is also supplied to the collection funnel as well as to the vertical collection area melting down snow and hail. Never the less the heating is limited to certain chilling effects on moving vessels combined with freezing temperatures.



IMET 455

⇒ complete unit for calculation of rain rate with correction based on anemometer data.

⇒ data as analogue output or via RS232-interface / LAN (optional)

SRM 450 with optional items: IMET 455,
power supply and wind speed sensor.
(Design may vary)



SPECIFICATIONS

Collection surface

horizontal	200 cm ² (following DIN 58666)
vertical	106,6 cm ²
resolution	0,1 mm precipitation

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
electronics and drain	24 V DC, 25 W, extern

external power supply (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 with rain gauge electronics and drop counter systems

OPTIONS

- electronics, collection surfaces and drain heating
- external power supply
- gimbal suspension / half gimbal suspension
- IMET 455 (correlating wind speed data to counter pulses)
- wind speed sensor

ANS 410

- ✓ electronic weighing/pressure measurement system
- ✓ high resolution
- ✓ slender shape
- ✓ TTL-Impuls output signal or reed relay
- ✓ no mechanical measuring system like tipping bucket

AUTOMATIC RAIN GAUGE

for measuring precipitation amount and intensity, based on pressure sensing 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 cm ² (after Hellmann – WMO standard)
Collection height	1 m (standard height)
diameter capillary mm resolution)	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 24 V DC, 6 A max.
capacity 150 watt total

Materials

Funnel ring stainless steel / PE
collection funnel aluminium, eloxed
housing – unit plastics
housing – electronic 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, LAN



SBS580/A

- ✓ Automatic shading for radiation sensors throughout the year
- ✓ Rugged and reliable servomotors for long-term operation
- ✓ Digital failure signal
- ✓ Bi-directional RS232 interface - optional LAN
- ✓ Temperature compensated real time clock
- ✓ Suitable for most sites in northern/southern hemisphere

AUTOMATIC SHADOW RING FOR RADIATION SENSORS

TECHNICAL DESCRIPTION

The manual shading ring SBS 580 for radiation sensors has been in operation for many decades and proven its quality and long term reliability in various climate conditions - though adjustments to compensate the declination of the sun throughout the year to are to be made manually. This SBS580/A motorised shadow ring was built to compensate the declination of the sun automatically.

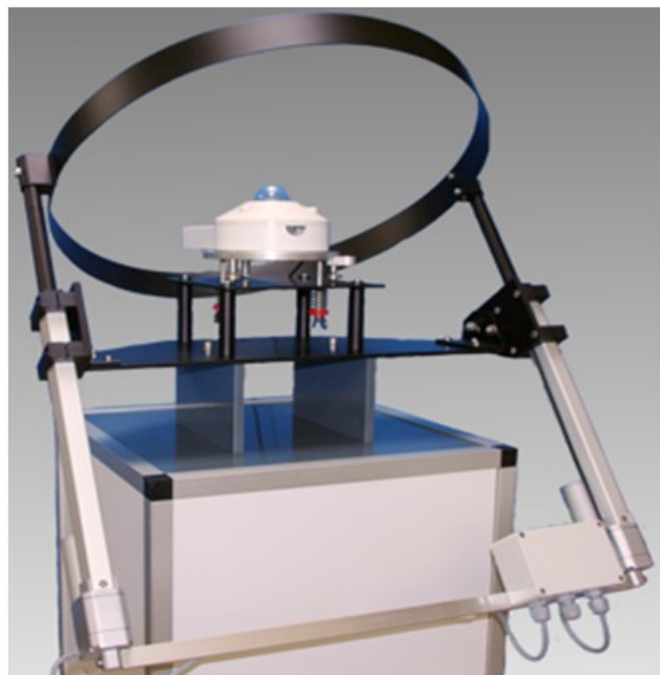
The shading ring is designed to hold the Eigenbrodt ventilation SBL 510 and SBL 480. But also adaptation to other types ventilation and single radiation sensors easily is possible.

The SBS 580/A is suitable for most latitudes of the northern and southern hemisphere and of course to most climate conditions.

Ventilations and radiation sensors are to ordered extra.

As the correction typically is performed at night time, no GPS is required as the built real time clock ensures an accuracy of approx. +/-2 min within the operating temperatures.

A built in monitoring system continuously observes position of the shading ring and provides a failure status signal, if necessary.

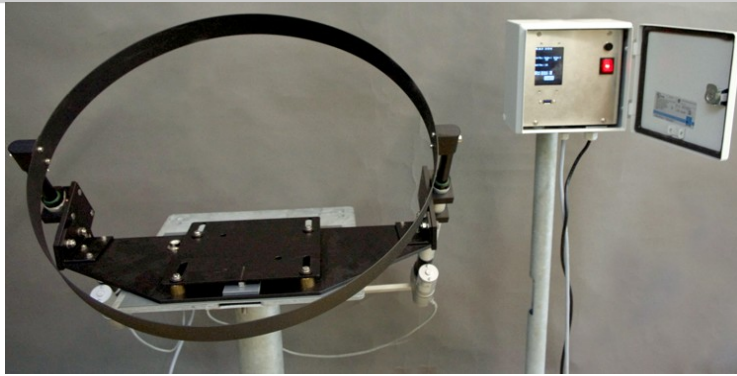


CONTENTS OF DELIVERED PROGRAM

- Shadow ring with basic frame
- Mounting plate for ventilation
- 2x powerful servomotors
- Control unit with LCD-Display, serial communication interface and temperature compensated real time clock.
- Fixed installation steel for latitude set up (1x per unit)

OPTIONS

- Levelling-unit for shading ring SBS580
- Stand pipe to hold levelling-unit and shading ring
- Compass with distance bar for SBS580/A
- Adapting kits for different ventilations or radiation sensors
- Fixed installation steel for latitude set up
- Adjustable installation tool for latitude set up
- LAN (Ethernet) interface



TECHNICAL SPECIFICATIONS

External power	100....240 VAC, 50/60Hz (alt. 2x12V DC—separated for drives and electronics)
Power consumption	30W
Max Load drive	2,4 kN
Operating temperature	-25...+65 °C
Clock accuracy	+/-2min/year @ -25.....+65°C
Operating latitudes	0°... 65°

Dimensions /Weights Shadow ring

Weights shadow ring	9 kg
Heights (max)	815 mm
Width	680 mm
Depth (max)	740 mm

Mounting Shadow ring

though-hole diam. 11mm , pitch diameter 180mm 4x90°

Dimensions /Weights Control unit

Weights shadow ring	4 kg
Heights	230 mm
Width	200 mm
Depth (excl. mounting)	170 mm

Mounting Control unit

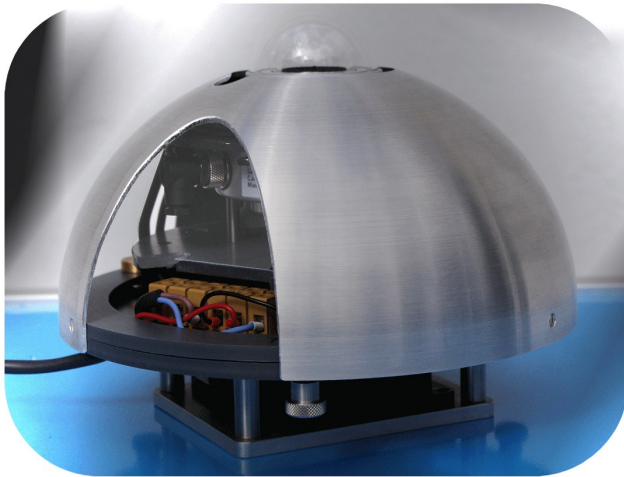
square tube 26-27mm, 20-22mm, 31-33mm or circular tube diameter 20-52mm



SBL 480

VENTILATION UNIT FOR RADIATION SENSORS

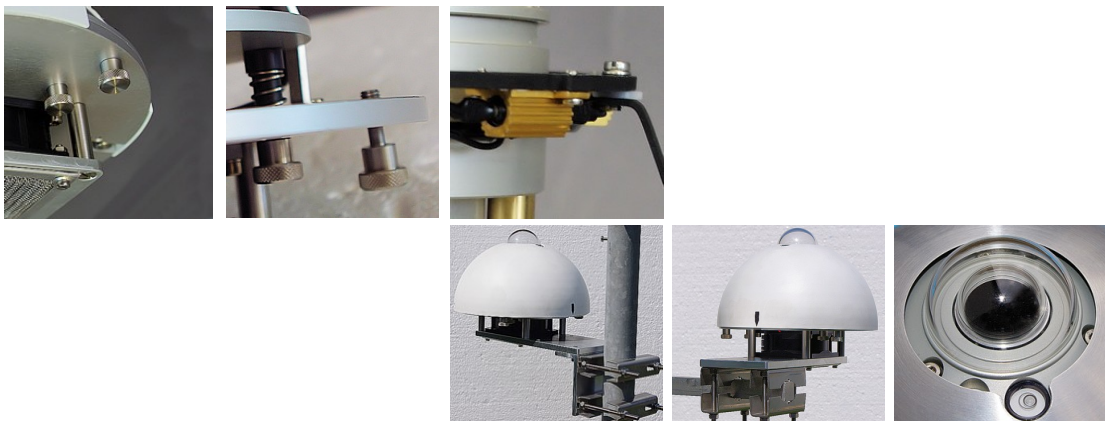
- ✓ High quality material applied (e.g. Stainless steel, industry standard fan especially modified for outdoor use)
- ✓ Easy mounting possible to horizontal / vertical rods with optional mounting kits (square-type tube or circular tube).
- ✓ 2 heating steps built in. Low power heating for regular applications and high power for challenging locations like the high mountains
- ✓ User-friendly and easy to maintain (levelling with the housing dome mounted is possible - detail solutions making the difference)
- ✓ Minimal heating-up of radiation sensor through advantageous design of the heating elements



TECHNICAL DESCRIPTION

Measuring solar radiation under certain circumstances like rain, dew, snow or frost can be quite challenging, because debris falsifies the results. Reliability and accurateness of solar measurements is being enhanced by the use of the SBL 480 van, since the debris can be reduced or even completely avoided. A continuously and equally heated dome additionally allows reducing the cooling effects throughout the night as well as the glass dome heating up through direct sun radiation - This allows maintaining the ambient temperature level.

This particular ventilation-unit SBL 480 is built also to withstand the harsh conditions of the alps – and therefore can be operated on the most climate conditions throughout the world. Details, like captive screws for fastening the dome allow removing the housing-dome also under adverse conditions without any concerns of losing screws.

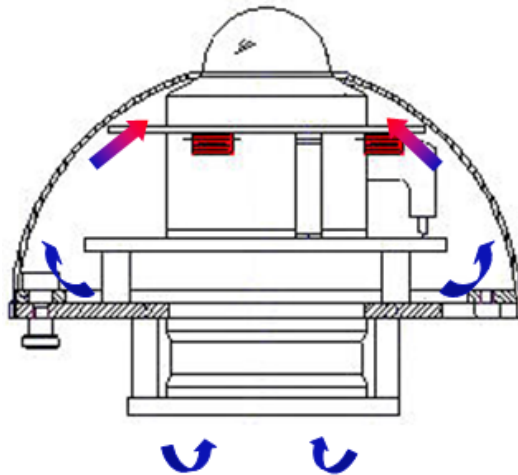


TECHNICAL SPECIFICATIONS

External power	24 AC/DC, 1,2A @ 25W heating
Ventilator	1,6W
Heating:	10W / 25W
Tacho signal	open collector, 2 pulses per revolution
Ambient conditions	-40...+70°C
Height:	135mm,
Diameter:	203mm
Weight	1,7kg

INSTALLATION

- horizontal plate with 68 x 68 mm thread holes M6 – Standard
- Vertical rod (square-type tube 26-27mm, 20-22mm, 31-33mm or circular tube diameter 20-52mm) - Optional
- Horizontal rod (square-type tube 26-27mm, 20-22mm, 31-33mm or circular tube diameter 20-52mm) - Optional



CONTENTS OF DELIVERED PROGRAM

- electronic controlled van,
- main housing with a special advantageous shape of the dome,
- heating elements aligned almost at the height of the glass dome,
- base plate for the lots of commercially available radiation sensors,
- industrial industry standard fan especially modified for outdoor use,
- tacho signal, open collector 2 pulses each rotation

OPTIONS

- Horizontal mounting SBL 480
- Vertical mounting SBL 480
- Power supply 24 V
- Power supply 100-230V AC to 24 VAC
- Connector for external power supply and signal cable, including plug.
- Adapter kit for Eigenbrodt sensors type 1
- Adapter kit for Eigenbrodt sensors type 2 and 3
- Bubble level, mounted onto base plate
- Cable
 - Inlet-filter, set of 5 pieces
 - Connector (IP67) instead of open wire connection for external signal/power-line for easy disconnection
- Adapting kits for different ventilations or radiation sensors
- Fixed installation steel for latitude
- Adjustable installation tool for latitude



LAM 630

ASPIRATED RADIATION SHIELD

- ✓ 4 places to hold rod type sensors, like temperature or humidity probes
- ✓ protection against weather and radiation by an optimal design using new type of laminated synthetic material
- ✓ reducing the build-up of heat inside the screen by artificial ventilation
- ✓ Low temperature error



TECHNICAL DESCRIPTION AND PRINCIPLE OF MEASUREMENT

The radiation shield 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.

The design of the shelter corresponds to the well known radiation shields 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 is 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 acrylic glass which makes an effective conservation.

The black ABS layer underneath 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 V4A (stainless steel), white powder coated. Arrangements are made to screw together and to fasten up to four sensors in the shelter.

TECHNICAL SPECIFICATIONS

External power approx. 100mA @ 12 V DC
 Operating temperature -30...+50 °C

Dimensions /Weights

Weights with/without STEG 3,3/3,0 kg
 Diameter 290mm (top plate)
 250mm (other plates)
 Heights (screen/total) 215 / 440 mm
 Accommodates sensors: rod type diam. 18...25mm

Mounting

mast with spigots diam. 12 x 60mm long
 vertical pipe: diam. 30...35mm

OPTIONAL

- Control unit with alarm signal and LED at unit, voltage reduction for fan.
- Power supply 100...240VAC to 12 V DC
- Mast

LAM 630 / R

ASPIRATED RADIATION SHIELD + SENSORS



Optional SENSORS

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

LAM 620

- ✓ a natural aspirated radiation/weather screen for operation of meteorological sensors
- ✓ Created for shipboard and buoy operation with resistive materials, like colour coated mounting plate and clamps

RADIATION SHIELD (FOR MARITIME APPLICATIONS)

TECHNICAL DESCRIPTION

The radiation shield operates as radiation and weather shield for humidity and temperature sensors. The LAM 620 has 9 vertical plates – with the 6 plates on the bottom are providing the measuring “chamber” and the plate 7 to 9 is acting as insulation plate.

The plates are made out of special coextruded ABS-plastics with a thin layer of highly-resistant and weatherproof and UV protected high-gloss PMMA-plastics. This material reflects radiation very well.

The lower ABS acts as stabilizer for the composite. Also the warming from reflected long wave radiation is being reduced.

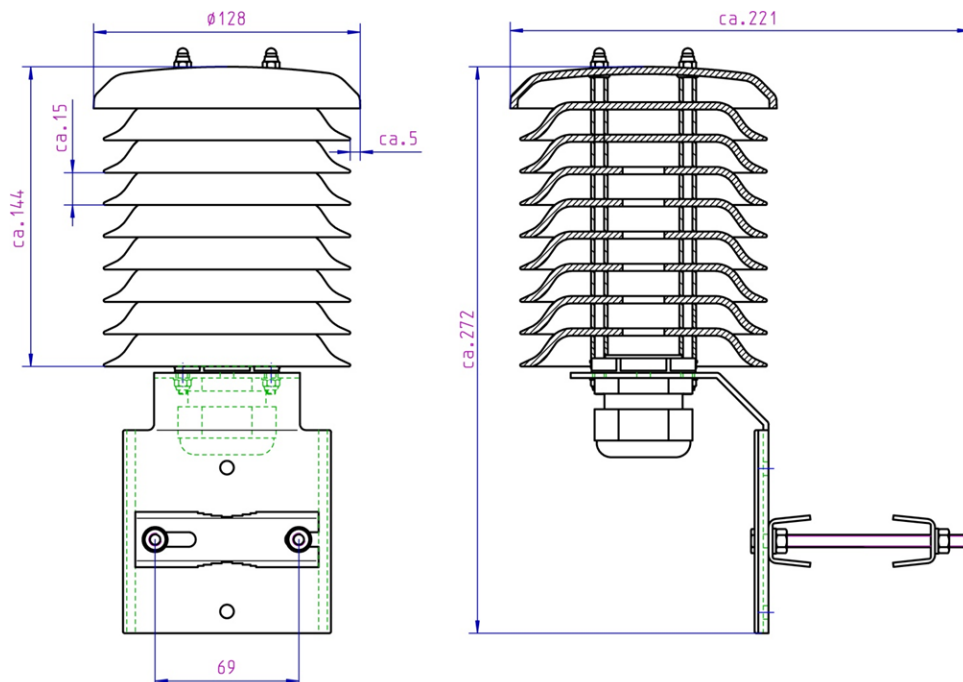


TECHNICAL SPECIFICATIONS

Operational temperature	-50 ... + 80 °C
Weights	approx. 0,9 kg (exclusive mast metal holder/ mast mounting)
Material plates	PMMA /ABS
Accommodates sensors (PG29)	16...25 mm
Materials stainless steel components	1.4571
Radiation error	≤1 K

Mounting

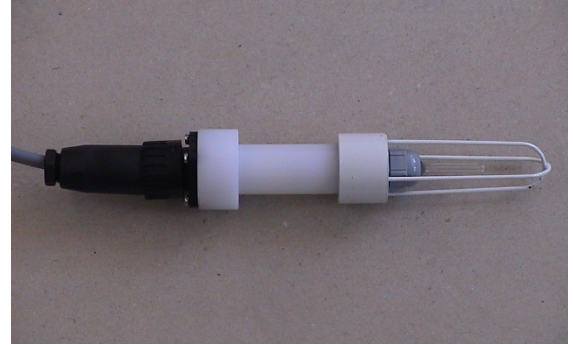
Vertical/horizontal pipe diam. 21...50mm



LTS 2000

AIR TEMPERATURE SENSOR

- ✓ 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)
measurement range:	-40 °C...50 °C
operating range:	-30 °C...40 °C
accuracy:	0,2 K
time lag (90 %):	approx. 1 min
reaction time:	~25 s at 1m/s wind speed
resolution	< 0,1 K

TECHNICAL SPECIFICATIONS

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

SHE 850—SHE 850/B

SENSOR HOLDER FOR AIR TEMPERATURE SENSOR



Sensor holder E/B + 5 cm SHE 850/B



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
- ✓ application for mountain station higher than 650 m (SHE850/B—only)

Important legal notes

TECHNICAL ALTERATIONS

- The technical description corresponds to the current products. Alterations because of technical improvements are possible. Requested functions or features are only binding, if confirmed in a contract in written form.
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THIS CATALOGUE IS PUBLISHED BY:

Eigenbrodt GmbH & Co. KG

Baurat-Wiese-Straße 68

D-21255 Königsmoor

Tel. 04180-732

Fax 04180-259

Email: goto@eigenbrodt.de

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Eigenbrodt GmbH & Co. KG
Baurat-Wiese-Straße 68
D - 21255 Königsmoor
Tel. 04180-732 Fax 04180-259
Email: goto@eigenbrodt.de
Web: www.eigenbrodt.de

