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Оренбург (3532)37-68-04  
Пенза (8412)22-31-16  
Россия (495)268-04-70  
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Томск (3822)98-41-53  
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Тюмень (3452)66-21-18  
Ульяновск (8422)24-23-59  
Уфа (347)229-48-12  
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Череповец (8202)49-02-64  
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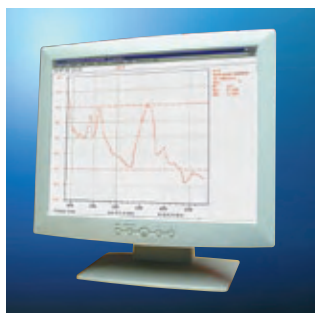
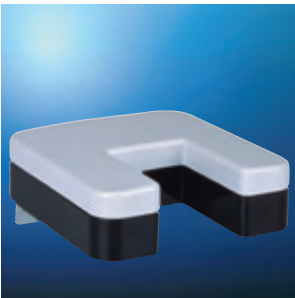


## Каталог продукции

### Радиация

# THE WORLD OF WEATHER DATA

## Measurement and Documentation: Thies' range of service for meteorology, environmental protection and industry



Today more than ever the measurement, processing and analysis of meteorological data requires a high degree of measurement instrument precision and an optimal adaptation of the data acquired to the task at hand.

For more than 60 years, we have been developing, producing and supplying practical instruments and systems for the analysis of weather data. Today, we are one of the world's largest suppliers of such equipment.

Our close cooperation with scientific institutions and governmental agencies in many countries guarantees a constant and up-to-date flow of information about all aspects of individual national problems and projects and the rapid implementation of state-of-the-art developments and measurement techniques. Our instruments and systems fulfil in all respects both to the requirements of national weather services as well as those of the World Meteorological Organization in Geneva.

Meteorological observations without computer-aided measurement and documentation systems are unthinkable today.

THIES develops complete ready-for-use-systems which include precision data transmitters, data loggers, power supply units and personal computers with adapted software.





# Radiation Glossary

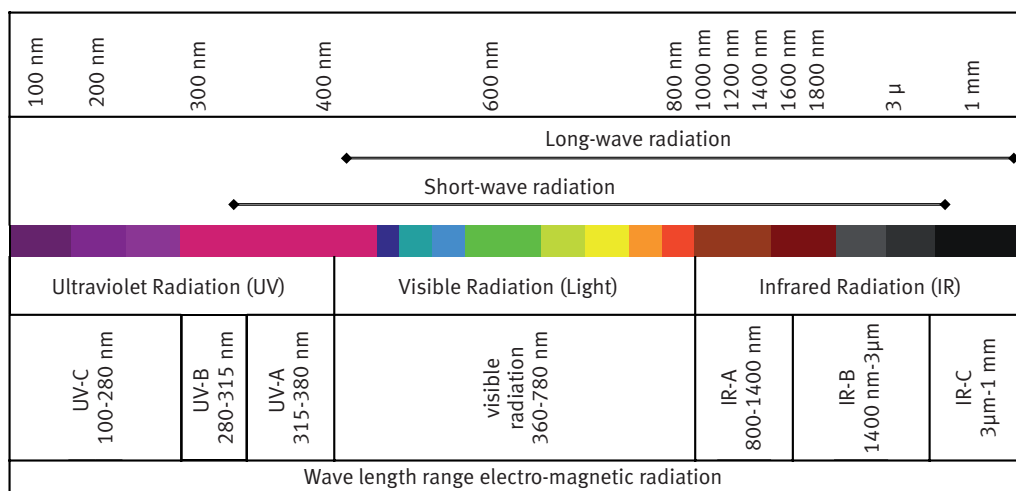
<b>PAR</b>	Photo-synthetically active radiation in the spectral range 400-700 nm. It is an essential factor for plant growth (Forming of chlorophyll). (PAR = Photo-synthetically Active Radiation)
<b>Pyrradiometer</b>	Instrument for the measurement of the radiation balance in the total spectrum (short- and long-wave range) of the solar radiation 300 - > 60 000 nm. Two separate thermo-elements acquire the infalling and reflected radiation and output them as electric voltage. The reference temperature is measured by a Pt100.
<b>Pyranometer</b>	Instrument for the measurement of the short-wave. The sensor consists of thermo-elements. The acquired spectral range is approx. between 300 und 2800 nm.
<b>Silicon Pyranometer</b>	The sensor-element of this instrument is a special silicon-photodiode. The acquired spectral range is approx. between 350 und 1000 nm.
<b>Silicon Photodiode</b>	Semi-conductor diodes, converting visible light, or IR-, UV as well, into electric power.
<b>Visible Radiation</b>	The light perceived by the human eye in the spectral range 360 ... 780 nm
<b>Solar Constant</b>	Radiation power of the solar radiation out of atmosphere. Mean value determined by WMO : 1367 W/m <sup>2</sup>
<b>Sunshine Duration</b>	Time period of the direct solar radiation in a certain place.
<b>Solar Radiation</b>	The solar radiation is the radiation of the sun. The maximum power of the electro-magnetic radiation is the visible light, however, comprises also other electro-magnetic waves from X-rays and UV- radiation up to radio waves.
<b>Radiation Balance</b>	Difference from infalling global radiation and the reflected radiation of the ground.
<b>Radiation Balance Meter</b>	Two contra-connected thermopiles form a difference: the global radiation infalling from above, and the radiation of the ground reflected from below. The difference is the radiation balance and is output as electric voltage.
<b>Radiation Intensity</b>	Radiation flux density (W/m <sup>2</sup> )
<b>Thermopile</b>	Consisting of blackened area and thermo-elements, which are affiliated with each others. Radiation is converted into heat and is output as thermo-voltage.
<b>UV Radiation</b>	Ultra-violet radiation, below the visible radiation. The ultra-violet spectrum comprises wave-lengths from 1 nm to 380 nm

**UV-A Radiation**                      Radiation in the spectral range 380-315 nm.  
It is essential for the strengthening of the human immunity system, and is responsible for the sun tan of the skin.

**UV-B Radiation**                      Radiation in the spectral range 280-315 nm  
It is dangerous for irreversible damages of the human skin (cancer of the skin).

**WMO**                                      World Meteorological Organization

**Units**                                       $1 \text{ cal cm}^{-2} \text{ min}^{-1} = 697.8 \text{ Wm}^{-2}$   
 $1 \text{ Wm}^{-2} = 0.001433 \text{ cal cm}^{-2} \text{ min}^{-1}$   
 $1 \text{ cal cm}^{-2} \text{ d}^{-1} = 0.0116 \text{ kWh m}^{-2}$



# Radiation

## Model Brief

### Sunshine

#### Sunshine Recorder acc. to Campbell-Stokes



Registers the sunshine duration for one entire day. A cut glass sphere focuses the sun's rays and leave an image line on the strip chart. The length of the image line corresponds to the duration of sunshine. The shipment includes the following strip charts  
140 sheets for summer  
140 sheets for winter  
100 sheets for spring and autumn

Recording charts for:  
7.1400.10.000  
7.1405.10.000

#### Silicon Sunshine Indicator SDE 9.1



Instrument to measure the global radiation and the sunshine duration.

The threshold of sunshine duration is stated by the German Weather Service (DWD) with  $120 \text{ W/m}^2$ . The sensor delivers a digital Yes-/No-information for the sunshine duration and a voltage as information for the global radiation. The measurement is cos-corrected.

Delivery includes calibration certificate.

#### Sunshine Duration Sensor CSD 3



Instrument to measure the sunshine duration and direct radiation.

The sunshine duration is defined as period, in which the direct solar radiation exceeds the threshold of  $>120 \text{ W/m}^2$ .

The sensor sends a digital Yes/No-information for the sunshine duration, and a voltage as information for the direct radiation.

Connectable heating avoids a possible dewing on the instrument.

Delivery includes a test certificate.

## Order No.

7.1400.10.000

7.1405.10.000

205210

205213

7.1420.00.000

7.1421.03.000

## Technical Data

North. and southern hemisphere, latitude	0-40°
North. and southern hemisphere, latitude	25-60°
Measuring value	sunshine duration
Degree of latitude	adjustable
Recording period	1 day per strip chart
Dimensions	205 x 185 x 145 mm
Weight	5 kg

Measuring range	0 - ca. $1300 \text{ W/m}^2$
Spectral range	380-1100 nm
max. spectr. sensitivity	780 nm
Ambient temp.	-20 °C ... +60 °C
Linearity	$< \pm 5\%$
Cos-correction	error f2 $< 3\%$
Absolute error	$< \pm 10\%$
Signal output	0-5 V (global rad.)
Sunshine duration	yes 4.5 V-5.0 V no 0 V-0,6 V
Threshold	$120 \text{ W/m}^2$
Operating voltage	9 V-24 V DC
Diffusor	PTFE
Dome	optical glass
Sensor type	silicon photo diode
Connection	plug with 5 m cable
Dimensions	$\varnothing 80 \text{ mm}$ , 82 mm high
Weight	0.3 kg

Meas. value 1	Sunshine duration
Sunshine	yes @ $> 120 \text{ W/m}^2$ no @ $< 120 \text{ W/m}^2$
Electr. output	yes $1 \pm 0.1 \text{ V DC}$ no $0 \pm 0.1 \text{ V DC}$
Accuracy of the sunshine hours	$\pm 10\%$ per month

Meas. value 2	Direct radiation
Meas. range	0... $1000 \text{ W/m}^2$
Electr. output	$1 \text{ mV per } \text{W/m}^2$
Accuracy	$\pm 10\%$ @ $1000 \text{ W/m}^2$

General spectral range	400-1100 nm
Ambient temperature	-30 °C ... +70 °C
Operating voltage	
W/o heating	9-15 V DC / 0.1 W
Heating level 1	9-15 V DC / 1 W
Heating level 2	9-15 V DC / 10 W
Connection	plug with 15 m cable
Dimensions	approx. $304 \times 131 \text{ mm}$
Weight	approx. 1.2 kg

## Model Brief

### Brightness

#### Brightness Transmitter

The instrument serves for the acquisition of the illumination intensity of the daylight, and is adapted to the sensitivity of the human eye.

The linearized electrical output signal can be used for the control of shading devices, heating systems, and irrigation plants.

#### Brightness Transmitter

The instrument serves for the acquisition of the illumination intensity of the daylight.

The electrical output can be used for the control of shading devices, heating systems, and irrigation plants.

The acquisition is carried out in the upper part (dome) of the instrument. The acquisition angle is  $\pm 90$  degree.

The model with „heating“ avoids a possible dewing on the dome.

#### Brightness Transmitter

Description ref. to 7.1414.40.1xx however, without heating

## Order No.

7.1414.10.xxx  
7.1414.12.xxx  
7.1414.15.xxx  
7.1414.22.xxx  
7.1414.25.xxx  
.040  
.041  
.061

7.1414.40.102  
.112  
.141  
.152

7.1414.40.002

## Technical Data

Meas. range	0-100 000 lux 0- 20 000 lux 0- 5 000 lux 0- 2 000 lux 0- 50 000 lux
Electr. output	0-20mA (600 $\Omega$ ) 4-20 mA (600 $\Omega$ ) 0-10 V (max. 10 mA)
Accuracy	$\pm 3\%$ of meas.range.
Spectral range	420-675 nm
Half angle	$\pm 55^\circ$
Operating voltage	24 V AC/DC
Ambient temperature	-30 ... +70 $^\circ\text{C}$
Connection	clamp connection, screwed cable gland
Protection	IP 65
Dimension	80 x 82 x 65 mm
Weight	0.15 kg

Meas. range:	electr. output
0-100 000 lux	0-10 V DC
0- 10 000 lux	0-10 V DC
0- 1 000 lux	4-20 mA
0- 5 000 lux	0-10 V DC
Spectral range	420-675 nm
Acquisition angle	
Elevation	0 ... $90^\circ$
Azimuth	0 ... $360^\circ$
Accuracy	$\pm 2\%$ of calibration standard
Operating voltage	
Electronics	15-28 V DC or 24 V AC, 10 mA (10 mA + I out)
Heating	24 V AC/DC, 300 mA
Ambient temperature	-30 ... +70 $^\circ\text{C}$
Connection	clamp connection, screwed cable gland
Protection	IP 65
Dimensions	80 x 82 x 112 mm (B x H x T)
Weight	0.15 kg

Meas. range	0-100 000 lux
Operating voltage	15-28 V DC or 24 V AC, 10 mA
Electr. output	0-10 V DC





# Radiation



## Model Brief

### Brightness Transmitter

**Brightness Transmitter**  
The instrument serves for the acquisition of the illumination intensity of the daylight, depending on the position of the sun.

The illumination intensity of model 7.1414.60.000 is acquired by eight independent photo diodes, which are arranged in 45°-segments. (N, NE, E, SE, S, SW, W, NW).

The illumination intensity of model 7.1414.61.000 is acquired by three independent photo diodes, which are arranged in 90°-segments (East, South, West).

The connected electronics converts the light into voltage signals and provides them for further processing to the 8 (3) individual outputs.

The model with "heating" avoids a possible dewing on the dome.



### Brightness Transmitter

**Brightness Transmitter**  
Measuring sensor for the acquisition of the illumination intensity.

It can be used for the regulation of shading devices, heating- and irrigation plants in automatically controlled green houses or as twilight sensor.

There are two analogue outputs available: output 1 offers different, selectable measuring ranges. Output 2 is used as fixed measuring range, particularly for the twilight range. The output signals can be delivered as voltage or current.

### Brightness Transmitter

Description and more techn. details ref. to 7.1414.51.150

## Order No.

7.1414.60.xxx  
7.1414.61.xxx  
.000  
.040  
.041

7.1414.51.150

7.1414.51.550

## Technical Data

Design	8 channel 3 channel
Electr. output each channel	0-10 V DC 0-20 mA 4-20 mA
Meas. range	0-100 000 lux
Spectral range	400-1 100 nm
Acquisition angle	
Elevation	0 ... 90°
Azimuth	8 x ±22.5° (360°)
Azimuth	3 x ±45° (270°)
Accuracy	±2% of calibration standard
Operating voltage	12-28 V DC or 24 V AC
Power consumption	
7.1414.6x.000	max. 200 mA
7.1414.6x.040/041	200 mA + I out
Load	
Voltage output	>1 000 Ω
Current output	400 Ω
Ambient temperature	-30 ... +70 °C
Connection	clamp connection, screwed cable gland
Protection	IP 65
Dimensions	80 x 82 x 96 mm (B x H x T)
Weight	0.15 kg

Measuring range	
Output 1	0-150 000 lux
programmable	0-100 000 lux 0- 50 000 lux 0- 10 000 lux
Measuring range	
Output 2	0-1000 lux
Electr. output	0-20 mA (350 Ω)
programmable	4-20 mA (350 Ω) 0-10 V
Spectral range	350-820 nm
Accuracy	±3% v. Mb.
Acquisition angle	
Elevation	0 ... 90°
Azimuth	0 ... 360°
operating voltage	15-36 V DC oder 15-24 V AC
Temp. range	-30 ... +70 °C
Protection	IP 65
Connection	cable, 5 m long
Dimensions	Ø 70 x 73 mm
Weight	0.15 kg (w/o cable)

Measuring range	
Output 1	0-750 / 500 /
programmable	250 / 50 lux
Measuring range	
Output 2	0-5 lux
Connection	cable, 12 m long



## Model Brief

### Global Radiation

#### Pyranometer CMP 11

For the measurement of the global radiation on plane surfaces. The global radiation results from the sum of direct radiation and diffuse radiation.

The WMO-recommended measuring value transmitter meets the ISO 9060 -classification "Secondary Standard"

Adjustable feet and a level allow an easy horizon-adjustment.

Delivery includes calibration certificate.

#### Pyranometer CMP 6

For the measurement of the global radiation on plane surfaces. The global radiation results from the sum of direct radiation and diffuse radiation.

The WMO-recommended measuring value transmitter meets the ISO 9060 -classification "First class"

Adjustable feet and a level allow an easy horizon-adjustment.

Delivery includes calibration certificate.

#### Pyranometer CMP 3

For the measurement of the global radiation on plane surfaces. The global radiation results from the sum of direct radiation and diffuse radiation.

The WMO-recommended measuring value transmitter meets the ISO 9060 classification "second class"

Adjustable feet and a level allow an easy horizon-adjustment.

Delivery includes calibration certificate.

## Order No.

7.1415.01.001

7.1415.02.002

7.1415.03.003

## Technical Data

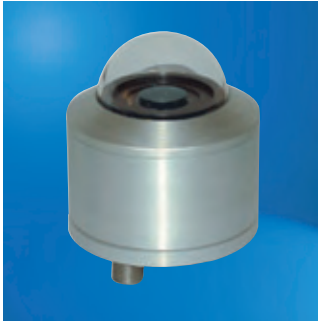
Meas. range	max. 4 000 W/m <sup>2</sup>
Sensitivity	7-14 μV/W/m <sup>2</sup>
Typ. signal output	0-15 mV
Spectral range	310-2 800 nm
Non-linearity	< 0.2% (< 1000 W/m <sup>2</sup> ) <sup>2</sup>
Internal resistance	10-100 Ω
Response time	< 1.7 sec @ 63% < 5 sec @ 95% of final value
Sensor type	thermo-element with 32 single elements
Ambient temperature	-40 ... +80 °C
Connection	Plug with 10 m cable
Dimensions	Ø 150 x 92 mm
Weight	0.9 kg

Meas. range	max. 2000 W/m <sup>2</sup>
Sensitivity	5-15 μV/W/m <sup>2</sup>
Typ. Signal output	0-15 mV
Spectral range	310-2800 nm
Non-linearity	< 1% (< 1000 W/m <sup>2</sup> )
Internal resistance	20-200 Ω
Response time	< 6 sec @ 63% < 18 sec @ 95% of final value
Sensor type	thermo-element with 64 single elements
Ambient temp..	-40 ... +80 °C
Connection	plug with 10 m cable
Dimension	Ø 150 x 92 mm
Weight	0.9 kg

Meas. range	max. 2000 W/m <sup>2</sup>
Sensitivity	5-20 μV/W/m <sup>2</sup>
Typ. Signal output	0-15 mV
Spectral range	310-2800 nm
Non-linearity	< 2.5% (< 1000 W/m <sup>2</sup> )
Internal resistance	20-200 Ω
Response time	< 18 sec @ 95% of the final value
Sensor type	thermo-element
Ambient temp..	-40 ... +80 °C
Connection	plug with 10 m cable
Dimension	Ø 110 x 92 mm
Weight	0.9 kg



# Radiation



## Model Brief

### Pyranometer GSM 10.7

Electrical measuring instrument to measure the global radiation.

The measurement is cos-corrected.

Delivery includes calibration certificate.

## Order No.

7.1415.05.xxx  
.040  
.041  
.051  
.061

## Technical Data

Measuring range	0-1300 W/m <sup>2</sup>
Electrical output	0-20 mA 4-20 mA 0-5 V 0-10 V
Sensor type	thermocouples
Spectral range	380-2800 nm
max. spectr. sensitivity	380-2500 nm
Cos - correction	error f2 < 3%
Linearity	< ±5%
Abs. error	< ±10%
Diffuser	PTFE
Dome	optical glass
Ambient temp.	-20 ... +60 °C
Operating voltage	+9 ... +24 V DC
for output 10 V	+14 ... +24 V DC
Connection	plug with 5 m cable
Dimensions	Ø 80 x 86 mm
Weight	0.3 kg



### Silicon Pyranometer SP-Lite

Electrical measuring instrument to measure the global radiation.

The sensor element consists of a silicon-photodiode; it delivers a voltage signal in direct proportion to the radiation.

Delivery includes calibration certificate.

## Order No.

7.1415.08.000

Measuring range	0-2000 W/m <sup>2</sup>
Measuring element	silicon photo diode
Spectral range	400-1100 nm
Sensitivity	60-10µV/W/m <sup>2</sup>
Typ. signal output	0-0,2 V
Cos-error	< 10%
Temperature error	0.15% / °C
Ambient temp.	-30 ... +70 °C
Response time	< 1 esc
Typ. internal resistance	50 Ω
Impedance	50 Ω
Connection	cable, 5 m long
Dimensions	Ø 54 x 34 mm
Weight	0.15 kg



### Silicon Pyranometer GSM 3.3

Electrical measuring instrument to measure the global radiation.

The measurement is cos-corrected.

Delivery includes calibration certificate.

## Order No.

7.1415.09.xxx  
.040  
.041  
.051  
.061

Measuring range	0-1300 W/m <sup>2</sup>
Electrical output	0-20 mA 4-20 mA 0-5 V 0-10 V
Sensor type	silicon photo diode
Spectral range	380-1100 nm
Max. spectr. sensitivity	780 nm
Cos-correction	error f2 < 3%
Linearity	< ±5%
Abs. error	< ±10%
Diffuser	PTFE
Dome	PMMA
Ambient temp.	-20 ... +60 °C
Operating voltage	9-24 V DC
for output 10 V	14-24 V DC
Connection	plug with 5 m cable
Dimensions	Ø 80 x 95 mm
Weight	0.3 kg

## Model Brief

### Net Radiation

#### Net Radiation Transmitter

For the direct measurement of the net radiation in the short-wave and long-wave range. Two identical contra-connected thermopiles measure the global- and the reflex-radiation; they output the difference as measuring value.

The instrument comes up to "First Class" acc. to WMO.

Delivery includes calibration certificate.

#### Pyrradiometer

For the measurement of the net radiation in the short-wave and long-wave range. The measuring values of the global- and reflex-radiation are output separately. The instrument has the status "First class" acc. to WMO. Incl. PT100 sensor for the measurement of the block temperature.

Delivery includes calibration certificate.

#### Albedometer CMA 6

For the measurement of the global radiation and/or the Albedo on different surfaces. The upper Pyranometer measures the infalling global radiation, and the lower instrument the radiation reflected by the surface. The Albedo is to be calculated from both measurements.

The Albedometer consists of two Pyranometers in one case with mounting rod for mast-mounting. The electrical signals of both instruments are output separately.

The WMO-recommended measuring value transmitter meets the ISO 9060 –classification "First Class".

Delivery includes calibration certificate.

## Order No.

7.1415.10.000

7.1415.20.000

7.1415.25.001

## Technical Data

Meas. range	-300-1500 W/m <sup>2</sup>
Sensitivity	approx. 15 µV/ W/m <sup>2</sup>
Spectral range	300-100 000 nm
Internal resistance	5 Ω
Time constant	25 sec at 95%
Linearity	±2% (0,5-1 330W/m <sup>2</sup> )
Dome	Lupolene
Sensor type	thermo elements
Temp. range	-40 ... +60 °C
Connection	cable, 10 m long
Dimensions	127 x 50 x 35 mm
Weight	0.35 kg

Meas. range	2 x 0-1500 W/m <sup>2</sup>
Sensitivity	approx. 15 µV/W/m <sup>2</sup>
Spectral range	300-100 000 nm
Internal resistance	190 Ω each per sensor
Time constant	< 2%
Linearity	(0,5-1330 W/m <sup>2</sup> )
Response time	25 sec at 95% 45 sec at 99%
Sensor type	thermo elements
Temp. range	-40 ... +60 °C
Connection	cable, 5 m long
Dimensions	Ø 90 x 88 mm
Weight	1.25 kg

Meas. range	max. 2 x 2000 W/m <sup>2</sup>
Sensitivity	5-15 µV/W/m <sup>2</sup>
Typ. signal output	0-15 mV
Spectral range	310-2 800 nm
Non-linearity	< 1% (< 1000 W/m <sup>2</sup> )
Internal resistance	20-200 Ω
Response time	< 6 sec @ 63% of final value < 18 sec @ 95% of final value
Sensor type	thermo-element with 64 single elements
Ambient temperature	-40 ... +80 °C
Connection	1 x plug with 10 m cable
Dimensions	Ø 150 x 114 mm
Weight	1.2 kg



# Radiation



## Model Brief

### Net Radiometer NR Lite

Instrument for the measurement of the net radiation, that means the instrument forms the difference between the global radiation from above (solar radiation and long-wave atmospheric counter radiation) and the global radiation from below (short-wave and long-wave reflection radiation of the earth) The output signal is in proportion to the net radiation, and can be interpreted as radiation energy which is absorbed from the earth's surface.

## UV Radiation

### Silicon UVAB Sensor E 1.1

The sensor acquires the radiations UV-A and UV-B independently from each other.

The measuring results correspond to the erythem-curve acc. to DIN 5050. They give direct information about the medically and biologically relevant correlation of these radiation fields.

The measurement is cos-corrected. Delivery includes calibration certificate.



### Silicon UVB Sensor E 1.c

Measuring transmitter for short-wave radiation, which can cause irreversible damages of the human skin.

The relative spectral sensitivity of the sensor is especially suited to the erythem-curve acc. to DIN 5050. This sensor determines exactly the skin-damaging components of the spectral range. Delivery includes calibration certificate.



## Order No.

7.1415.40.000

7.1416.10.040  
.041  
.051  
.061

7.1416.20.040  
.041  
.051  
.061

## Technical Data

Measuring range	-2000 ... +2000 W/m <sup>2</sup>
Sensitivity	10 μV/W/m <sup>2</sup>
Spectral range	200-100 000 nm
Typ. signal output	-25 ... +24 mV
Response time	20 sec
Sensor type	thermocouple
Ambient temp.	-30 ... +70 °C
Connection	cable, 15 m long
Dimensions	Ø 80 mm
Support Arm	Ø 120 x 400 mm
Weight	0.26 kg

Electrical output	0-20 mA 4-20 mA 0-5 V 0-10 V
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<b>UV-B</b>	
Measuring range	0- approx. 0.7 W /m <sup>2</sup>
Spectral range	265-315 nm
max. sensitivity	297 nm

<b>UV-A</b>	
Measuring range	0- approx. 100 W /m <sup>2</sup>
Spectral range	310-400 nm
max. sensitivity	335 nm

Dome	glass
Sensor type	silicon photo diode
Operating voltage	9-24 V DC
for output 10 V	14-24 V DC
Ambient temp.	-30 °C ... +60 °C
Switch on time	< 1 sec
Switch off time	< 12 sec
Cos-correction	error f2 < ±2%
Linearity	< ±3%
Absolute error	< ±10%
Temp. coeff.	< 0,2% /K
Connection	plug with 5 m cable
Dimensions	Ø 80 x 82 mm
Weight	0.3 kg

Electrical output	0-20 mA 4-20 mA 0-5 V 0-10 V
-------------------	---------------------------------------

Measuring range	0- approx. 0.5 W /m <sup>2</sup>
Spectral range	265-315 nm
Max. spectr.	
sensitivity	297 nm

Ambient temp.	-20 °C ... +60 °C
Switch on time	< 1 sec
Switch off time	< 12 sec
Cos-correction	error f2 < ±6%
Linearity	< ±5%
Absolute error	< ±10%
Dome	plastics
Sensor type	silicon photo diode
Operating voltage	9-24 V DC
for output 10 V	14-24 V DC
Connection	5 m cable

## Model Brief

### Silicon PV Sensor

The silicon PV sensor serves for the measurement of the solar radiation in  $W/m^2$  and the temperature. The output signal is delivered as voltage proportionally to the measuring range. The efficiency factor of a photovoltaic system can be determined in correlation with the system-yield.

The measurement of the solar radiation is done by a precision silicon photo diode. The measurement of the surface temperature is carried out by means of a blackbody (full radiator) and a PT 100.

## Photo Synthesis

### Silicon Sensor PAR 5.3

With the PAR-sensor the photochemical growth processes of outdoor- and greenhouse-plants can be optimized. The sensitivity corresponds to the optimal degree of effect of chlorophyll. The measuring results make it possible to assess reliably the developmental conditions of the plants. Delivery includes calibration certificate.

## Heat Flux

### Heat Flux Plate CN 3

Measures the temperature balance through a surface. Consists of 250 Cu-CuNi thermocouples between two stainless steel plates. Delivery includes calibration certificate.

## Order No.

7.1419.00.061

7.1418.00.040  
.041  
.051  
.061

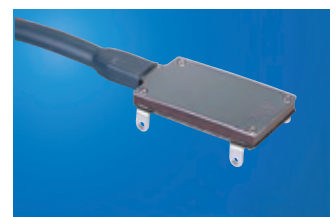
7.1417.00.000

## Technical Data

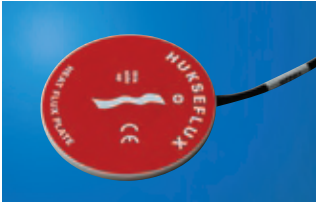
Solar radiation	
Measuring range	0 ... 1400 $W/m^2$
Electrical output	0 ... 10 V
Spectral range	380 ... 1100 nm
Sensor type	Silicon photo diode
Accuracy	$\pm 2\%$ of m.r.
Temperature	
Measuring range	-20 ... +80 $^{\circ}C$
Electrical output	0 ... 10V
Sensor type	PT100
Accuracy	$\pm 0.3$ $^{\circ}C$ @ 25 $^{\circ}C$ $\pm 1.5$ $^{\circ}C$ @ 80 $^{\circ}C$
General	
Acquisition angle	
Elevation	0 ... 90 $^{\circ}$
Azimut	0 ... 360 $^{\circ}$
Operating voltage	12 ... 28 V DC
Power consumption	5 mA
Load	$\geq 10$ k $\Omega$
Ambient temperature	-30 ... +80 $^{\circ}C$
Connection	Clamp connection, screwed cable gland
Protection	IP 65
Dimensions	80 x 82 x 56 mm
Weight	0.15 kg

Electrical output	0-20 mA 4-20 mA 0-5 V 0-10 V
Measuring range	0-500 $W/m^2$
Spectral range	(0 ... 2255 $\mu mol/sm^2$ )
Max. spectr. sensitivity	380-700 nm 420-600 nm
Switch on time	< 1 sec
Switch off time	< 12 sec
Cos-correction	error f2 < 3%
Linearity	< $\pm 5\%$
Abs. error	< $\pm 10\%$
Dome	PMMA
Sensor type	silicon photo diode
Ambient temp.	-30 $^{\circ}C$ ... +60 $^{\circ}C$
Operating voltage	9-24 V DC
for output 10 V	14-24 V DC
Connection	plug with 5 m cable
Dimensions	$\varnothing 80$ x 95 mm
Weight	0.3 kg

Sensitivity	20 $\mu V/W/m^2$
Impedance	20 $\Omega$
Accuracy	$\pm 5\%$
Time response	30 s in air (95%)
Temp. coeff.	0,2% / $^{\circ}C$
Connection	cable, 2 m long
Dimensions	48 x 33 x 6 mm
Weight	0.22 kg



# Radiation



## Model Brief

### Heat Flux Plate HFPO1

Measures the temperature balance in a wall or in the earth.

## Transducer

### Preamplifier

Instrument for transforming small mV-signals from the radiation sensor into a standardized voltage signal.

Suited for:  
Pyranometer CMP 11 / 6 / 3



### Universal Solar Amplifier

The Universal Solar Amplifier serves for the connection of different radiation sensors and measuring value transmitters, respectively. It transforms the measuring value signals into  
- analogue output parameters  
and into  
- serial data telegrams

The individual calibration constant of the applied sensor as well as the output parameter of the universal amplifier are settable via the serial interface. The serial number and the calibration date can be stored additionally.

For ex. suitable for:

7.1415.01.001  
7.1415.02.002  
7.1415.03.003  
7.1415.08.000  
7.1415.10.000  
7.1415.20.000  
7.1415.25.001  
7.1417.00.000  
7.1417.10.000



## Order No.

7.1417.10.000

7.1415.00.100  
7.1415.00.061

7.1415.00.200

## Technical Data

Measuring range	+2 000 ... -2000 W/m <sup>2</sup>
Sensitivity	50 μV/W/m <sup>2</sup>
Typ. signal output	-10 ... +75 mV
Sensor type	thermocouples
Impedance	2 Ω
Time response	±4 min.
Temp. coeff.	0.1% / °C
Ambient temp.	-30 ... +70 °C
Connection	5 m cable
Dimension	Ø 80 x 5 mm
Weight	0.2 kg

Electr. output	0-5 V (0-1300 W/m <sup>2</sup> ) 0-10 V (0-1300 W/m <sup>2</sup> )
----------------	---

Electr. input	mV, acc. to certificate of the sensor
Ambient temp.	-30 °C ... +50 °C
Operating voltage	6-18 V DC resp. 13-18 V DC

Protection	IP 65
Connection	3 m cable, connected
Dimension	58 x 35 x 64 mm
Weight	0.18 kg

Electr. output	4 x analogue, 1 x serial
Output parameter (selectable)	0 ... 1.2 V / 0 ... 5 V / 0 ... 10V / 0 ... 20mA / 4 ... 20mA
Serial interface	RS 422 / RS 485

Electr. input	4 x analogue
Input parameter (selectable)	-100mV ... +10V 0 ... 20mA Pt100 / Pt1000 / NTC / PTC

Operating voltage	7 ... 35 V DC
Current consumption	Typ. 5 mA (+ I out)
Ambient temperature	-40 °C ... +80 °C
Protection	IP 65
Connection	Terminal strip, screwed cable gland
Dimension	120 x 80 x 55 mm
Weight	0.25 kg



## Model Brief

### Solar Transmitter Type: ST 10

Instrument for transforming small mV-signals from the radiation sensor into a standardized measuring value signal.

Suited for:  
Pyranometer CMP 11 / 6 / 3

### Sensor Signal Amplifier Type: AMPBOX

Instrument for transforming small mV-signals from the radiation sensor into a standardized measuring value signal.

Suited for Pyranometer:  
CMP 3 / 6 / 11 / 21 / 22

## Digital Displays

### Digital Indicator S for Installation

Flat-section indicator for connection to available radiation data transmitters or measuring transducer. The measured value is indicated digitally with red LED digits. Designed for installation in switch panels or front panels.

The background of the indicator is black to facilitate reading.

## Order No.

7.1415.01.200

7.1415.01.541

7.1044.10.xxx

7.1044.11.xxx

.040

.041

.061

## Technical Data

Electr. output 4-20 mA  
Electr. input (0-1300 W/m<sup>2</sup>)  
Operating voltage mV, acc. to certificate of the sensor  
10-34 V DC  
Ambient temp. -30 °C ... +50 °C  
Protection IP 65  
Connection terminal strip  
screwed cable gland  
75 x 80 x 57 mm  
Dimension  
Weight 0.35 kg

Electr. output 4-20 mA (0-1600 W/m<sup>2</sup>)  
Electr. input -12 ... +150 mV, acc. to certificate of the sensor  
Operating voltage 7,2-35 V DC  
Ambient temp. -40 °C ... +85 °C  
Protection IP 66  
Connection terminal strip  
screwed cable gland  
98 x 64 x 34 mm  
Dimension  
Weight 0.25 kg

Display range 0-1300 W/m<sup>2</sup>  
-300-1000 W/m<sup>2</sup>

Electrical Input 0-20 mA  
4-20 mA  
0-10 V

Resolution ±1 digit  
Display LED, red, 13 mm high  
Operating voltage 230 V / 50 Hz  
Model switch panel  
installation

Protection IP 20  
Dimensions 96 x 48 x 135 mm  
Weight 0.3 kg





# Radiation

## Model Brief

### Accessories



#### Hanger 1 m

The hanger is used for laterally mounting of a radiation- or brightness transmitter onto a mast

An adapter, included in delivery, connects the holder with the measuring value transmitter.

Suitable for:

7.1414.10/12/15/22/25.0xx  
 7.1414.60/61.000  
 7.1415.01.001  
 7.1415.02.002  
 7.1415.03.003  
 7.1415.08.000  
 7.1415.09.000  
 7.1415.05.0xx  
 7.1416.10.0xx  
 7.1418.00.0xx  
 7.1419.00.061



#### Traverse

For mounting of 2 radiation transmitters or respectively 2 brightness transmitters together onto a mast.

The optional adapter 506345 connects the traverse with the measuring value transmitter



#### Traverse, short

For mounting of a radiation transmitter or respectively a brightness transmitter onto a mast.

The optional adapter 506345 connects the traverse with the measuring value transmitter



#### Traverse 0,8 m

For mounting of a Pyranometer CMP11 / 6 / 3 And a sunshine duration sensor-CSD3 onto a mast.

## Order No.

4.3185.xx.009  
 .00.  
 .01.  
 .02.

4.3171.30.000  
 .31.

4.3171.40.000  
 .41.

4.3171.40.002

## Technical Data

Clamp range for masts  
 Ø 60-132 mm  
 Ø 40-80 mm  
 Ø 48-58 mm

Length approx. 1 m  
 Tube diameter 50 mm  
 Material Aluminium  
 Weight 1.8 kg

Clamp range for masts  
 Ø 48-102 mm  
 Ø 116-200 mm  
 Sensor distance 0.8 m  
 Material Aluminium / stainless steel  
 Weight 0.35 kg

Clamp range for masts  
 Ø 48-102 mm  
 Ø 116-200 mm  
 Sensor distance 0,4 m from mast  
 Material Aluminium / stainless steel  
 Weight 0.35 kg

Clamp range for masts  
 Ø 48-102 mm  
 Sensor distance 0.8/0.4 m from mast  
 Material Aluminium / stainless steel  
 Weight 1 kg

# Radiation

## Model Brief

### Holder „compact“

The holder serves for mounting a radiation transmitter or brightness transmitter onto a mast.

The optional adapter 506345 connects the holder with the measuring value transmitter.

### Adapter

The adapter serves for mounting a radiation transmitter or brightness transmitter onto a traverse (4.3171.30.000, 4.3171.40.000) or holder (506 347).

Adaptation for:

7.1414.10/12/15/22/25.0xx  
 7.1414.60/61.000  
 7.1415.01.001  
 7.1415.02.002  
 7.1415.03.003  
 7.1415.08.000  
 7.1415.09.000  
 7.1415.05.0xx  
 7.1416.10.0xx  
 7.1418.00.0xx  
 7.1419.00.061

### Shadow Ring CM 121 B

Serves for shading the Pyranometer from direct solar radiation. Thus, only the diffuse solar radiation is measured.

Suitable sensors :  
 Pyranometer CMP 11  
 Pyranometer CMP 6

Remark:  
 Pyranometer not included in delivery

## Order No.

506347

506345

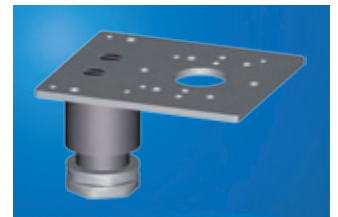
7.1415.01.121

## Technical Data

Clamp range	Ø 35-50 mm
For masts	
Sensor distance	80 x 150 mm
Material	Stainless steel non-corrosive
Weight	0.35 kg

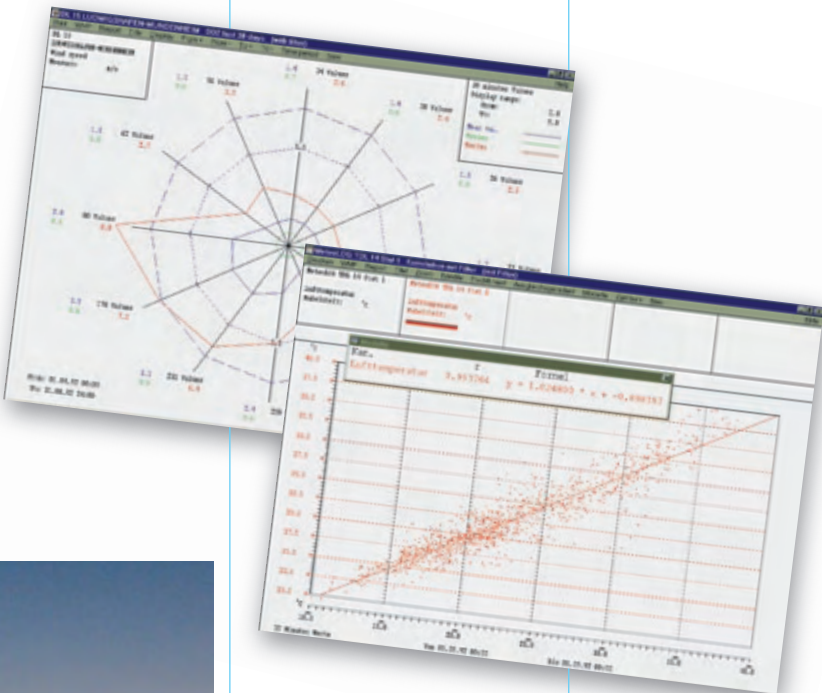
Material	Aluminium, anodized
Dimensions	100 x 115 x 65 mm
Weight	0.5 kg

Material	Aluminium
Height (max.)	800 mm
Ring outer	Ø 620 mm
Ring width	
Ring width /	55 mm
Ring radius ratio	0.185
Cover bracket	10,6°
Weight	6 kg



# Your Notice

**THIES –**  
as versatile as require  
the international tasks



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