

# UV Radiometers

## For solar ultraviolet radiation measurement

The Ultraviolet (UV) part of the solar spectrum has several beneficial effects for human biology, but too much can be very harmful. The UV region covers the wavelength ranges 100-280 nm (UVC), 280-315 nm (UVB) and 315-400 nm (UVA). Almost all UVC, and approximately 90% of UVB, from the sun is absorbed by the Earth's atmosphere. UVA radiation at the Earth's surface is normally 15-20 times greater than UVB.

UV radiation helps to produce Vitamin D, but it can also burn the skin and cause cancers, melanoma and cataracts. UV radiation measured with a similar response to the human skin is termed Erythemally Active UV irradiance (UVE) and must be used to calculate the Global Solar UV Index (UVI) for public health information. Our UVS range measures solar ultraviolet radiation with specific models for UVA, UVB and UVE. Dual-band models are available to measure two components in one convenient instrument.

### UVIATOR

People are very sensitive to small changes in the amount of UVB/UVE radiation and this depends upon altitude, the height of the sun in the sky, the amount of Ozone in the

atmosphere and cloud cover. UVS radiometers are calibrated for a typical air-mass (solar zenith angle) and Ozone column concentration.

Kipp & Zonen UVIATOR is a unique Windows™ software programme that imports the calibration and data files for UVS radiometers. It works out the solar zenith angle from the date, time and location information and goes online to find the relevant Ozone Monitoring Instrument (OMI) satellite data. The corrected output file has the best accuracy available for a broadband UV radiometer.

For many applications it is only necessary to monitor the 'total UV' irradiance, which represents the combined UVA and UVB components. CUV5 is a passive radiometer optimised for the measurement of total UV outdoors from natural sunlight. The Smart SUV5 has temperature correction and linearization, for measurement of high intensity artificial UV light sources.

For the ultimate in direct and global solar ultraviolet radiation measurements there is the Kipp & Zonen Brewer MkIII Spectrophotometer.

# CUV5



CUV5 shares features with the CMP range of pyranometers and can be used with the same accessories. It measures the total UV irradiance of the UVA and UVB components.

It is suitable for use in all environments. Adjustable feet and a bubble level are used to ensure that the radiometer is horizontal and a snap-on sun shield provides protection. The instrument is kept dry internally by an easily removable desiccant cartridge.

CUV5 has a glass dome with very good UV transmission and a specially shaped diffuser to provide excellent directional response. The waterproof connector has gold-plated contacts and is fitted with 10 m of high quality signal cable as standard. The detection system includes optical filters and a photo-diode and CUV5 does not require power to operate.

CUV5 is optimised for the measurement of total UV outdoors, under natural sunlight, where the irradiance is not likely to exceed 100 W/m<sup>2</sup>. It is not possible to derive the separate components of UVA and UVB from CUV5 measurements, for this the UVS models are required.

Specifications	
Spectral range (50% points)	300 to 385 nm
Spectral range (overall)	280 to 400 nm
Spectral selectivity (312 to 382 nm)	< 20%
Sensitivity	300 to 500 µV/W/m <sup>2</sup>
Impedance	Typically 10 KΩ
Expected output range (0 to 100 W/m <sup>2</sup> )	0 to 50 mV
Maximum UVA/UVB irradiance	400 W/m <sup>2</sup>
Response time (95%)	< 1 s
Non-stability (change/year)	< 5%
Non-linearity (0 to 100 W/m <sup>2</sup> , ref. 50 W/m <sup>2</sup> )	< 1%
Directional response (up to 70° with 100 W/m <sup>2</sup> UV beam)	< 5%
Temperature response	< 0.3%/°C
Field of view	180°
Accuracy of bubble level	< 0.1°
Detector type	Photo-diode with filter
Operational temperature range	-40°C to +80°C
Storage temperature range	-40°C to +80°C
Humidity range	0 to 100% non-condensing
Ingress Protection (IP) rating	67

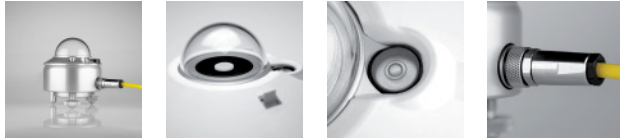
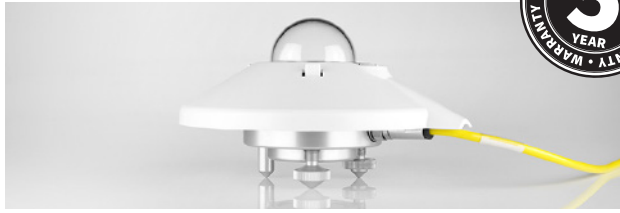
Part number	Instrument
0364910-002	CUV5 Broadband UV Radiometer • 10 m cable
0364910-000	CUV5 Broadband UV Radiometer • no plug, no cable
0364910-702	CUV5 Broadband UV Radiometer • METEON • 10 m cable
0364910-700	CUV5 Broadband UV Radiometer • METEON • no plug, no cable
0364910-802	CUV5 Broadband UV Radiometer • AMPBOX • 10 m cable
0364910-800	CUV5 Broadband UV Radiometer • AMPBOX • no plug, no cable

Note: AMPBOX is adjusted so that 4 to 20 mA output = 0 to 100 W/m<sup>2</sup>  
For measurements in test chambers, 0 - 240 W/m<sup>2</sup> can be specified

Part number	Accessories
2643960	Desiccant Refill Pack Contains 10 sachets
See accessories	CVF4 Ventilation Unit Recommended to reduce offsets and frequency of dome cleaning
0362700	CMF1 Mounting Fixture For 1 or 2 unventilated radiometers (1 upper / 1 lower) Diameter 88 mm. Mounting rod 350 mm long x 16 mm ø
0362703	CMF4 Mounting Fixture For 1 or 2 ventilated or unventilated radiometers (1 upper / 1 lower) Length 375 mm, width 280 mm. Mounting rod 350 mm long x 20 mm ø
0369701	CMB1 Mounting Bracket In combination with mounting rod for easy attachment to a pole or a wall
0346900	CM121B Shadow Ring for unventilated radiometers Manually adjusted device provides diffuse sky irradiance measurement Note: CM121B can not be used with CVF4 Ventilation Unit
0346901	CM121C Shadow Ring for ventilated radiometers Manually adjusted device provides diffuse sky irradiance measurement Mounts the radiometer at the correct height when used with a CVF4

(\*) This product will need to be registered by the end-user within 6 months of purchase to activate the warranty extension.

# SUV5



SUV5 is the Smart version of CUV5. Internal temperature correction gives the SUV5 better performance than the CUV5 and linearization allows monitoring of the high UV irradiances used in material stress and ageing tests, and in solar simulators.

The high quality dome and diffuser give optimized directional response. An optical filter provides sensitivity to combined UVA and UVB irradiance, as shown in the graph below. The photodiode generates a voltage output linearly proportional to the UV intensity.

SUV5 is not suitable for the measurement of specific parts of the UV spectrum such as UVA, UVB or UVE / UV Index. For measurement of these individual parameters our UVS Series is required.

A waterproof plug and socket cable connection facilitates easy installation. The snap-on sun shield protects the connector and allows viewing of the integrated bubble level.

The SUV5 has Modbus® interface, amplified analogue output, fast response time and temperature corrected measurement data. The wide and low power supply range from 5 to 30 VDC makes integration in meteorological and industrial application easy. The SUV5 is extremely robust and comes with 5 years warranty (\*).

Thanks to standardised output and connections of every SUV5, exchanging instruments for recalibration is easy. SmartExplorer Windows™ software for data logging, display of data and Modbus® address setting is provided as standard.

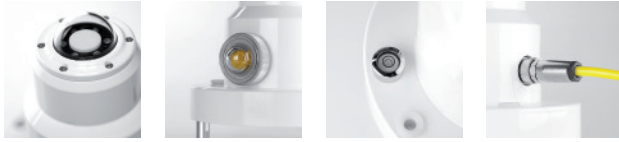
Part number	Instrument
0377900-102	SUV5-V Smart UV Radiometer • 0 to 1 V version • 10 m cable
0377900-100	SUV5-V Smart UV Radiometer • 0 to 1 V version • no plug, no cable
0377900-202	SUV5-A Smart UV Radiometer • 4 to 20 mA version • 10 m cable
0377900-200	SUV5-A Smart UV Radiometer • 4 to 20 mA version • no plug, no cable

Specifications	
Analogue output • V-version	0 to 1V
Analogue output range	-100 to 400 W/m <sup>2</sup>
Analogue output • A-version	4 to 20 mA
Analogue output range	0 to 400 W/m <sup>2</sup>
Serial output	RS-485 Modbus®
Serial output range	0 to 400 W/m <sup>2</sup>
Response time (95%)	< 1 s
Spectral range (50% points)	300 to 385 nm
Spectral range (overall)	280 to 400 nm
Spectral selectivity (312 to 382 nm)	< 20%
Non-stability (change/year)	< 5%
Non-linearity (0 to 400 W/m <sup>2</sup> , ref. 100 W/m <sup>2</sup> )	< 1.5%
Directional response (up to 70° with 1000 W/m <sup>2</sup> beam)	< 5 W/m <sup>2</sup>
Temperature response	< 2% (-20°C to +50°C)
Field of view	180°
Accuracy of bubble level	< 0.1°
Power consumption (at 12VDC)	V-version: 55 mW A-version: 100 mW
Software, Windows™	Smart Sensor Explorer Software, for configuration, test and data logging
Supply voltage	5 to 30 VDC
Detector type	Photodiode with filter
Operating temperature range	-40°C to +80°C
Storage temperature range	-40°C to +80°C
Humidity range	0 to 100%
Ingress Protection (IP) rating	67

Part number	Accessories
See accessories	CVF4 Ventilation Unit Recommended to reduce offsets and frequency of dome cleaning
0362700	CMF1 Mounting Fixture For 1 or 2 unventilated radiometers (1 upper / 1 lower) Diameter 88 mm. Mounting rod 350 mm long x 16 mm ø
0362703	CMF4 Mounting Fixture For 1 or 2 ventilated or unventilated radiometers (1 upper / 1 lower) Length 375 mm, width 280 mm. Mounting rod 350 mm long x 20 mm ø
0369701	CMB1 Mounting Bracket In combination with mounting rod for easy attachment to a pole or a wall
0346900	CM121B Shadow Ring for unventilated radiometers Manually adjusted device provides diffuse sky irradiance measurement Note: CM121B can not be used with CVF4 Ventilation Unit
0346901	CM121C Shadow Ring for ventilated radiometers Manually adjusted device provides diffuse sky irradiance measurement Mounts the radiometer at the correct height when used with a CVF4

(\* ) This product will need to be registered by the end-user within 6 months of purchase to activate the warranty extension.

# UVS-A-T



UVS instruments have a precision quartz dome and specially shaped diffuser to provide class-leading directional response. The detection system includes optical filters, a very sensitive phosphor and a photo-diode. The system is temperature stabilised at +25 °C (±2 °C) to prevent changes in spectral response and sensitivity with variations in the ambient conditions. The signal output is amplified and the internal stabilisation temperature can be monitored.

Power and signal connections are via a waterproof plug with high quality UV resistant cable and the instrument is kept dry internally by an easily removable desiccant cartridge. UVS radiometers are supplied with comprehensive calibration files and the unique Kipp & Zonen UVIATOR software.

UVIATOR software is included as standard and increases the accuracy of UV measurements by correcting error sources. When the calibration file for a particular UVS is imported, along with correctly formatted measurement data, UVIATOR automatically makes corrections for total column Ozone concentration (using online satellite data) and for air-mass.

## UVS-A-T Radiometer

UVS-A-T has a spectral response optimised for precise measurements of atmospheric UVA irradiance.

Part number	Instrument
0354920-002	UVS-A-T UV Radiometer • 10 m cable
0354920-000	UVS-A-T UV Radiometer • no plug, no cable

Note: Cable length is limited to 25 m because of voltage drop on the temperature stabilisation power supply wires

Part number	2 single band instruments
0354950-002	UVS-A-T + UVS-B-T • 2 x 10 meter cable
0354950-000	UVS-A-T + UVS-B-T • no plug, no cable

Part number	2 single band instruments
0354955-002	UVS-A-T + UVS-E-T • 2 x 10 meter cable
0354955-000	UVS-A-T + UVS-E-T • no plug, no cable

Specifications	
Spectral range	315 to 400 nm
Sensitivity	30 ±3 W/m <sup>2</sup> /V
Maximum operational irradiance	90 W/m <sup>2</sup>
Analogue output range	0 to 3 V
Response time (63%)	< 0.6 s
(95%)	< 1.8 s
Non-linearity (100 to 1000 W/m <sup>2</sup> )	< 1%
Directional response (up to 70° solar zenith angle)	< 2.5%
Temperature response	Temperature stabilized at +25 °C, ±2 °C
Field of view	180°
Accuracy of bubble level	0.5°
Temperature sensor output	2.5 V @ +25 °C
Supply voltage	7 to 18 VDC
Power consumption	8 W
Detector type	Photo-diode
Windows™ compatible software	UVIATOR, corrects for air-mass and Ozone column
Operational temperature range	-40 °C to +50 °C
Storage temperature range	-40 °C to +50 °C
Humidity range	0 to 100% non-condensing
Ingress Protection (IP) rating	67

Part number	Accessories
2643960	Desiccant Refill Pack Contains 10 sachets
0362703	CMF4 Mounting Fixture For 1 or 2 ventilated or unventilated radiometers (1 upper / 1 lower) Length 375 mm, width 280 mm. Mounting rod 350 mm long x 20 mm ø
0369701	CMB1 Mounting Bracket In combination with mounting rod for easy attachment to a pole or a wall
0349401	CVP2 Power Supply 115 / 230V AC Power adaptor with 12 VDC output

Note: CVP2 is not suitable for unprotected outdoor use

# UVS-B-T



## UVS-B-T Radiometer

UVS-B-T has all the features of the UVS range and a spectral response optimised for precise measurements of atmospheric UVB irradiance.

Specifications	
Spectral range	280 to 315 nm
Sensitivity	2 ±0.2 W/m <sup>2</sup> /V
Maximum operational irradiance	6 W/m <sup>2</sup>
Analogue output range	0 to 3 V
Response time (63%)	< 0.6 s
(95%)	< 1.8 s
Non-linearity (100 to 1000 W/m <sup>2</sup> )	< 1%
Directional response (up to 70° solar zenith angle)	< 2.5%
Temperature response	Temperature stabilized at +25 °C, ±2 °C
Field of view	180°
Accuracy of bubble level	0.5°
Temperature sensor output	2.5 V @ +25 °C
Supply voltage	7 to 18 VDC
Power consumption	8 W
Detector type	Photo-diode
Windows™ compatible software	UVIATOR, corrects for air-mass and Ozone column
Operational temperature range	-40 °C to +50 °C
Storage temperature range	-40 °C to +50 °C
Humidity range	0 to 100 % non-condensing
Ingress Protection (IP) rating	67

Part number	Instrument
0354925-002	UVS-B-T UV Radiometer • 10 m cable
0354925-000	UVS-B-T UV Radiometer • no plug, no cable

Note: Cable length is limited to 25 m because of voltage drop on the temperature stabilisation power supply wires

Part number	2 single band instruments
0354950-002	UVS-A-T + UVS-B-T • 2 x 10 meter cable
0354950-000	UVS-A-T + UVS-B-T • no plug, no cable

Part number	Accessories
2643960	Desiccant Refill Pack Contains 10 sachets
0362703	CMF4 Mounting Fixture For 1 or 2 ventilated or unventilated radiometers (1 upper / 1 lower) Length 375 mm, width 280 mm. Mounting rod 350 mm long x 20 mm ø
0369701	CMB1 Mounting Bracket In combination with mounting rod for easy attachment to a pole or a wall
0349401	CVP2 Power Supply 115 / 230V AC Power adaptor with 12 VDC output

Note: CVP2 is not suitable for unprotected outdoor use

# UVS-E-T



## UVS-E-T Radiometer

UVS-E-T has a spectral response function close to the Erythral (sunburn) action spectrum of the human skin (ISO: 17166:1999 / CIE S 007/E-1998). UVE includes some UVA radiation and a high response in the UVB band. For this reason a UVB radiometer should not be used to measure UVE and to calculate the Global Solar UV Index.

Specifications	
Spectral rangex	ISO 17166:1999 CIE S007/E-1998 Erythral response spectrum
Sensitivity	0.2 ±0.02 W/m <sup>2</sup> /V
Maximum operational irradiance	0.6 W/m <sup>2</sup>
Analogue output range	0 to 3 V
Response time (63%) (95%)	< 0.6 s < 1.8 s
Non-linearity (100 to 1000 W/m <sup>2</sup> )	< 1%
Directional response (up to 70° solar zenith angle)	< 2.5%
Temperature response	Temperature stabilized at +25°C, ±2°C
Field of view	180°
Accuracy of bubble level	0.5°
Temperature sensor output	2.5 V @ +25°C
Supply voltage	7 to 18 VDC
Power consumption	8 W
Detector type	Photo-diode
Windows™ compatible software	UVIATOR, corrects for air-mass and Ozone column
Operational temperature range	-40°C to +50°C
Storage temperature range	-40°C to +50°C
Humidity range	0 to 100% non-condensing
Ingress Protection (IP) rating	67

Part number	Instrument
0354930-002	UVS-E-T UV Radiometer • 10 m cable
0354930-000	UVS-E-T UV Radiometer • no plug, no cable

Note: Cable length is limited to 25 m because of voltage drop on the temperature stabilisation power supply wires

Part number	2 single band instruments
0354955-002	UVS-A-T + UVS-E-T • 2 x 10 meter cable
0354955-000	UVS-A-T + UVS-E-T • no plug, no cable

Part number	Accessories
2643960	Desiccant Refill Pack Contains 10 sachets
0362703	CMF4 Mounting Fixture For 1 or 2 ventilated or unventilated radiometers (1 upper / 1 lower) Length 375 mm, width 280 mm. Mounting rod 350 mm long x 20 mm ø
0369701	CMB1 Mounting Bracket In combination with mounting rod for easy attachment to a pole or a wall
0349401	CVP2 Power Supply 115 / 230V AC Power adaptor with 12 VDC output

Note: CVP2 is not suitable for unprotected outdoor use