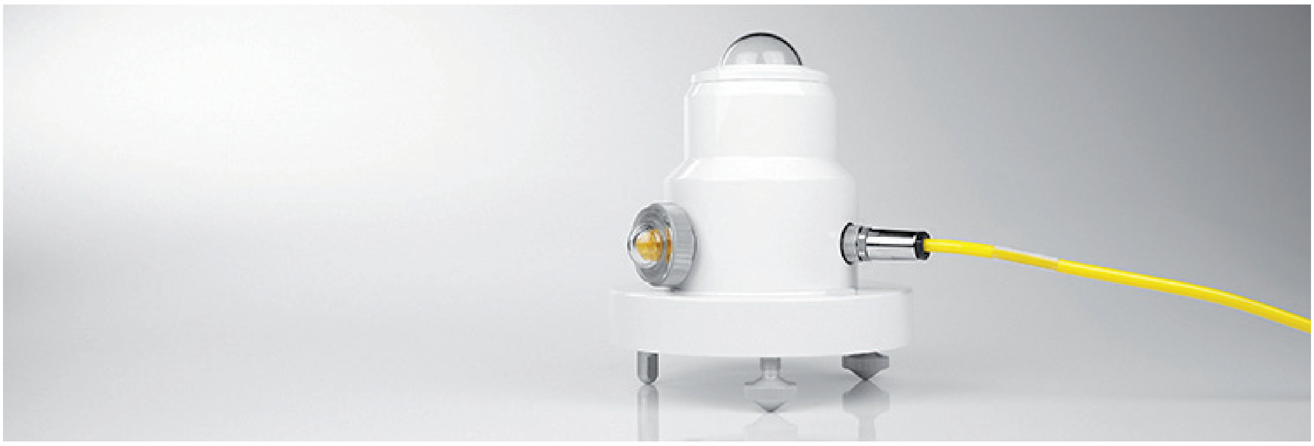
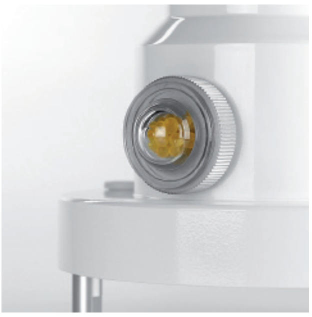
KIPP & ZONEN
SINCE 1830





Instruction Manual

UVS Series • UV Radiometers

Important user information

Dear customer, thank you for purchasing a Kipp & Zonen instrument. It is essential that you read this manual completely for a full understanding of the proper and safe installation, use, maintenance and operation of your new UV Radiometer.

We understand that no instruction manual is perfect, so should you have any comments regarding this manual we will be pleased to receive them at:

Kipp & Zonen B.V.
Delftechpark 36, 2628 XH Delft, - or
P.O. Box 507, 2600 AM Delft,
The Netherlands

+31 15 2755 210
support@kippzonen.com
www.kippzonen.com

Warranty and liability

Kipp & Zonen guarantees that the product delivered has been thoroughly tested to ensure that it meets its published specifications. The warranty included in the conditions of delivery is valid only if the product has been installed and used according to the instructions supplied by Kipp & Zonen.

Kipp & Zonen shall in no event be liable for incidental or consequential damages, including without limitation, lost profits, loss of income, loss of business opportunities, loss of use and other related exposures, however incurred, rising from the faulty and incorrect use of the product.

Modifications made by the user may affect the instrument performance, void the warranty, or affect the validity of the CE declaration or other approvals and compliances to applicable International Standards.

Kipp & Zonen reserves the right to make changes to this manual, brochures, specifications and other product documentation without prior notice.

Manual document number: 800-0354899-40
Publication date: 1st January 2016

EC Declaration of Conformity

Kipp & Zonen B.V.
Delftechpark 36, 2628 XH Delft
P.O. Box 507, 2600 AM Delft
The Netherlands

declares under our sole responsibility that the product

UVS-A-T, UVS-B-T and UVS-E-T

to which this declaration relates is in conformity with European Harmonised Standards as published in Official Journal of the EC

The compliance of the product has been based on the following standard

EN 61326-2-3:2013	[EMC - Emissions]
EN 61326-2-3:2013	[EMC - Immunity]
Title 47CFR part 15	[EMC - FCC]

following the provisions of the directives
EMC-directive **2014/30/EU**

Delft, 1st January 2016

E. van Houten - CFO
Kipp & Zonen B.V.

Table of Contents

Using this table

Click on any item in the table of contents to be taken directly to the relevant page.
Click on the bottom of any page to be taken back to the table of contents.

1 Introduction

Throughout this manual the following symbols are used to indicate to the user important information.

General warning about conditions, other than those caused by high voltage electricity, which may result in physical injury and/or damage to the equipment or cause the equipment to not operate correctly.

Note Useful information for the user

1.1 Product overview

The radiometers of the UVS Series (UVS-A-T, UVS-B-T and UVS-E-T) are designed for precise measurements of atmospheric ultraviolet radiation in three different spectral ranges. All models measure global UV radiation, i.e. the sum of direct solar radiation and the radiation which has been scattered by particles or molecules in the air. The angular response follows the cosine of the zenith angle as with an ideal Lambertian surface.

The internal filter optics, detector and electronic preamplifier of the UVS Series are thermo-electrically controlled at a temperature of +25°C, independent of the external temperature. This eliminates variations of the spectral sensitivity caused by changing ambient temperatures. In order to allow monitoring of the internal temperature, an analog voltage output is available, generated by an independent control circuit.

The spectral sensitivity of the UVS-E-T corresponds to that of the human skin with regard to the Erythemal Action Spectrum ISO 17166:1999 / CIE S 007/E-1998. This is the response required by the United Nations, World Health Organisation and World Meteorological Organisation for measurement of radiation according to the Global Solar UV Index (UVI). The analog output voltage is a direct measure of the erythemally active UV irradiance in W/m^2. This irradiance can also be expressed in UV Index by multiplying with the constant 40 m^2/W.

The UVS-A-T and UVS-B-T radiometers allow precise measurements of atmospheric UV-A and UV-B irradiance. The analog output voltage is proportional to the irradiances in W/m^2.

2 Installation

When installing the radiometer you must consider:

1. The radiometer should be installed as high as possible to minimize obscuration by trees, buildings, etc. This includes the obscuration of the indirect, scattered radiation coming from the whole upper hemisphere. A large portion of the received UV radiation does not reach the radiometer directly from the sun, but is scattered by molecules and particles. Ideally the view should be clear to the horizon in all directions.

2. The radiometer should be carefully levelled in the horizontal plane. Use the built-in spirit level to find the correct position.

3. The installation of the radiometer must ensure natural ventilation to reduce heating of the housing caused by solar radiation and electrical power dissipation. If the housing becomes too hot, damage may occur.

2.1 Pin connections of all UV versions

Pin connection scheme of the connector [color of wire in yellow connection cable]:

1 - V+: [red]	positive supply for signal circuit, 7 to 18 V, 1 W
2 - HEAT-GND: [blue]	heater ground
3 - UV-X-OUT: [green]	UV-B or UV-E output, 0 to 3 V not connected in UVS-A-T
4 - TEMP-OUT: [yellow]	internal temperature output see table in Appendix II
5 - GNDA: [grey]	ground for signal outputs
6 - HEAT V+: [brown]	positive supply voltage for heater 7 to 18 V, 8 W
7 - UV-A-OUT: [white]	UV-A output, 0 to 3 V not connected in UVS-B-T or UVS-E-T
8 - GNDA: [black]	ground for signal circuit

Voltage drop over connection wires:
For correct operation of the sensor it is required that the power supply and the connection cable have a total resistance which does not exceed a critical value R_{max}. This is to prevent voltage drop over the connection wires that will reduce the supply voltage beyond the lower operating limit of the radiometer electronics.

The formula for Rmax is:

R_{max} = ([VT+] - 6 V) / 1.2 A

where [VT+] is the supply voltage and R_{max} is the sum of the total wire resistance and the internal resistance of the power supply.

Example 1:
The supply voltage is 12 VDC. The internal resistance of the power supply is 1 Ω (i.e. voltage drop of 1 V at 1 A load). Then the allowable total wire resistance (sum of positive and negative supply wire) is 4 Ω.

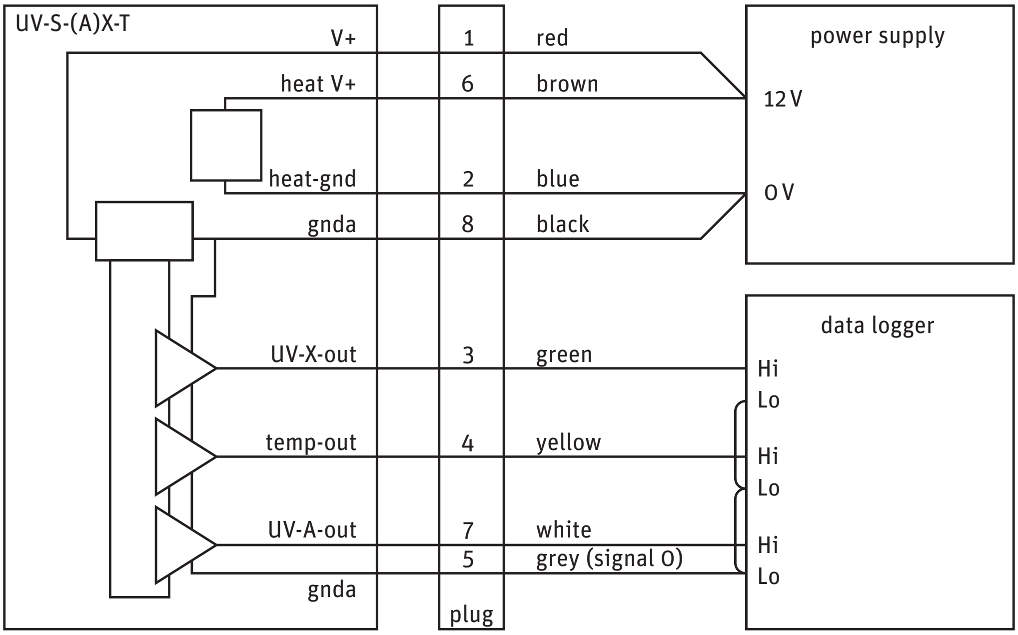
Example 2:
To calculate the minimum voltage that is required for correct operation of the radiometer with the standard cable of 10 m length, the above equation has to be reformulated as follows:

[VT+] = 1.2A • R_{tot} + 6V

where R_{tot} is the sum of the resistances (internal resistance of the power supply and total wire resistance). With the wire resistance of 0.15 Ω/m a total wire resistance of 2 x 1.5 Ω = 3 Ω for the standard 10 m cable is obtained. With an internal resistance of 1 Ω (power supply) the sum of the resistances is 4 Ω (equals R_{tot}). To compensate for the voltage drop over the wires and power supply, the voltage supply [VT+] must be at least 10.8 V. Hence, with a power supply (internal resistance 1 Ω) that provides at least 10.8 V the radiometer will operate correctly.

Data logger input channels:
To prevent earth loops that influence the quality of the data from the radiometer it is recommended to use floating inputs to measure the output voltage signals. If the input of the data logger is not floating it may be useful to test the radiometer signal for noise due to earth loops over the data logger input channels.

2.2 Connection scheme UV series



Note Pin 3 [green wire] is the UV-B or UV-E output

Note For UV-B and UV-E instruments, pin 7 [white wire] is not connected

Note The analog ground, pin 5 [grey wire], should not be grounded. This can cause ground loops and offsets, especially when the 0 Volt of the power supply is grounded.

3 Accessories and cables

Part number	Instrument
0354920-002	UVS-A-T UV Radiometer • 10 m cable
0354920-004	UVS-A-T UV Radiometer • 25 m cable
0354920-000	UVS-A-T UV Radiometer • no plug, no cable
0354925-002	UVS-B-T UV Radiometer • 10 m cable
0354925-004	UVS-B-T UV Radiometer • 25 m cable
0354925-000	UVS-B-T UV Radiometer • no plug, no cable
0354930-002	UVS-E-T UV Radiometer • 10 m cable
0354930-004	UVS-E-T UV Radiometer • 25 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	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	

Part number	
2523146	Waterproof 8-pin plug only
0362621	10 m cable • pre-wired with waterproof 8-pin plug
0362623	25 m cable • pre-wired with waterproof 8-pin plug
Note: Cable length for UVS is limited to 25 m of this type of cable because of voltage drop on the temperature control power supply wires	

4 Calibration and UVIATOR software

From late 2007 the specially developed Kipp & Zonen UVIATOR software is included with all new UVS radiometers. The use of the UVIATOR is explained in the UVIATOR manual. In this chapter the benefits and the principles are explained.

Why use UVIATOR software

To improve the quality and relevance of measured UV irradiance data from UVS radiometers by taking into account the spectral properties of the radiometer and of the atmosphere at the time and location of the measurement.

Theoretical Background

Atmospheric ultraviolet radiation measurements are difficult to perform due to the drastic decrease of UV-B irradiance towards shorter wavelengths, caused by the strong stratospheric Ozone absorption. Besides the extinction of UV radiation due to Ozone, Rayleigh scattering also affects the radiation, especially in the UV-B spectral region.

As UV radiation represents only a small portion of the solar spectrum, broadband UV radiometers contain filters and use signal amplifiers to measure the UV irradiance in the appropriate spectral region. Filters are used to measure the UV irradiance in the UV-A or UV-B spectral region, or to match as closely as possible a specific theoretical weighting function, such as UV-E.

As the actual radiometer spectral response functions do not correspond exactly to the theoretical weighting functions, even for the radiometers measuring only UV-A or UV-B irradiances, the measurements are affected by a systematic error caused by spectral mismatch.

The UVS Series is suitable for the measurement of UV irradiance according to theoretically defined UV-A, B and E spectra. In general all broadband filter instruments have limited performance due to the intrinsic spectral mismatch of each sensor with respect to the theoretical definitions of UV-A, B and E.

By knowing the spectral mismatch in detail, one can compensate the instrument effects for different measurement conditions. Kipp & Zonen has developed a unique software program for post-processing and analysis of UVS data. The UVIATOR program performs automatically a number of UV measurement corrections and thereby improves the measurement quality significantly.

The spectral mismatch error correction is based on the correction method described in the WMO Report No. 141 [Ref. 2]. Further explanations and discussions of the spectral mismatch error are presented in a number of publications listed at the end of this section.

4.1 UV radiometer calibration and correction method

To achieve the most accurate measurement result with broadband UV radiometers, the raw signals must be transformed into UV irradiances using two ‘Calibration Steps’ (A and B), and an ‘Adjustment Step’.

Calibration Step A:

The raw signal of the instrument (in units of Volts) has to be transformed into an irradiance (in units of W/m^2). To achieve this transformation a so-called ‘radiometric calibration factor’, denoted as ρ (in units of $V/W/m^2$), has to be determined.

Calibration Step B:

The irradiances have to be corrected for the spectral mismatch error with ‘conversion factors’, denoted as γ (no units). These conversion factors are determined using modelled UV irradiances as a function of various total Ozone column densities and solar zenith angles.

Adjustment Step:

The corrected UV measurements are obtained by multiplying the raw UV radiometer reading under outdoor measurement conditions with an appropriate 'adjustment factor', χ, defined as $1/(\rho \cdot \gamma)$. The appropriate adjustment factor has to be chosen according to the measurement conditions at the time of the UV radiometer reading.

The Adjustment Step which provides the final, corrected, UV irradiance (in units of W/m^2) is carried out by the UVIATOR program for each individual UVS radiometer reading. Before the broadband UVS radiometer can be used in the field, it must be factory calibrated according to Calibration Steps A and B, which provide the calibration and correction factors for a particular instrument.

The next two paragraphs describe Calibration Steps A and B as they are performed at Kipp & Zonen. The final paragraph of this chapter describes the Adjustment Step as implemented in the UVIATOR program.

4.1.1 Calibration Step A: determination of the radiometric calibration factor

The radiometric calibration of the broadband UVS radiometers is performed with a Xenon lamp, a monochromator and a calibrated Silicon photo-diode detector. The photo-diode and the test UVS radiometer are mounted behind the exit slit of the monochromator.

They are exposed to spectral irradiances between 280 nm and 400 nm (step increments 1 nm, slit width 2 nm at FWHM). The spectral measurements are performed sequentially as the monochromator has one exit slit only. Nevertheless, identical monochromator output signals can be achieved for the photo-diode and the UVS radiometer by positioning the sensitive surfaces of both detectors at the same distance from the exit slit.

A calibration factor is defined as the ratio between the radiometer output and the radiation input, i.e. the radiometer reading divided by the UV irradiance. To obtain the radiometric calibration factor, ρ, in the laboratory, the UV radiometer output and the UV irradiance input are determined using the monochromatic measurements.

The broad-band UV radiometer output can be calculated according to:

$$U_{UVS} = \int u_{UVS}(\lambda) \bullet d\lambda$$

where $u_{UVS}(\lambda)$ are the spectrally measured test UVS readings. $u_{UVS}(\lambda)$ is also referred to as the spectral response function. The index UVS denotes the variable of a broad-band UVS radiometer. The radiometer-weighted UV irradiance input, can be calculated as:

$$E_{UVS} = \frac{\int e_{Si}(\lambda) \bullet s_{UVS}(\lambda) \bullet d\lambda}{A_{eff}}$$

where $e_{Si}(\lambda)$ is the irradiance (in units of W/nm) of the monochromator output (measured with the photo-diode), $s_{UVS}(\lambda)$ is the normalized spectral response function of the test UVS radiometer (i.e. $u_{UVS}(\lambda)/\max(u_{UVS}(\lambda))$, and A_{eff} is the effective area (in m^2) of the UVS radiometer detection surface. Finally, the radiometric calibration factor is obtained from the two monochromator-based measurements (U_{UVS} and E_{UVS}) according to $\rho=U_{UVS}/E_{UVS}$. The units of ρ are $V/(W/m^2)$.

4.1.2 Calibration Step B: determination of the conversion factor table

Without any measurement correction, a broadband UV radiometer can provide results that deviate by a factor of 2 or more from the true values. The magnitude of the deviation depends mainly on the extent of the spectral mismatch and the measurement conditions.

The measurement conditions for which correction factors are calculated are obtained by varying the solar zenith angle, Θ_o, and the total Ozone column density, $[O_3]$ in the radiative transfer model TUV [Ref. 3]. Other atmospheric parameters affecting UV irradiances, such as extinction due to aerosols, are not explicitly included as they are assumed to be comparatively small.

The modelled UV spectra are used to determine the conversion factors, $\gamma\ (\Theta_0,O_3)$, which are defined as:

$$\gamma = T_{UVS} / T_{UVX}$$

where T_{UVS} and T_{UVX} denote the normalized spectral response function-weighted irradiance and the 'true' irradiance, respectively:

$$T_{UVS}(\Theta_0,O_3) = \int e_{TUV}(\lambda,\Theta_0,O_3)\, s_{UVS}(\lambda)\, d\lambda$$

and

$$T_{UVX}(\Theta_0,O_3) = \int e_{TUV}(\lambda,\Theta_0,O_3)\, s_{UVX}(\lambda)\, d\lambda$$

where $e_{TUV}(\lambda, \Theta_0,O_3)$ denotes the TUV modelled irradiance as a function of the variable input parameters Θ_0 and O_3. Note, that the 'true' irradiance, TUVX, represents the modelled irradiance weighted with a theoretical spectral response function, $s_{UVX}(\lambda)$. Such a theoretical spectral response function could be the Erythemal weighting function CIE-1987 [Ref. 4]. The conversion factors calculated with the Erythemal weighting function provide the corrections for the UVS-E-T radiometer.

The solar zenith angles, Θ_0, are varied between 0° and 85° (using steps of 5°) and the Ozone column densities, [O_3] are varied between 200 Dobson Units (DU) and 500 DU (using steps of 10 DU), yielding 18 x 31 = 558 conversion factors. If UV irradiances have to be measured with broadband UV radiometer under exceptional conditions, it is recommended to calculate new conversion factors using model parameters that are representative for the exceptional condition (e.g. snow-covered land surface at a location which is mostly snow-free).

4.2 Adjustment Step: UVIATOR correction method

To obtain the most accurate UV irradiances using broad band UV radiometers, the readings ('raw radiometer output') must be multiplied with the adjustment factor, χ. This is a combined correction factor, composed of the radiometric calibration factor, ρ, and the conversion factor, γ, i.e. $\chi=1/(\rho\bullet\gamma)$.

The UVIATOR program performs the required selection of the appropriate conversion factor automatically and corrects an instantaneous UVS measurement according to the conditions at the time and location of the measurement. For the selection of the conversion factor, the parameters Θ_0 and O_3 have to be determined according to the measurement conditions at the time of the UV radiometer reading.

The UVIATOR program calculates the solar zenith angle, Θ_0, for each measurement as a function of the measurement location (latitude and longitude) and the GMT of the reading. The total Ozone column density, O_3, is automatically retrieved from the OMI or TOMS satellite data archives. Note, that TOMS data are daily mean values only. UVIATOR offers plug-ins to allow the use of other Ozone column observation data, such as from the Kipp & Zonen Brewer.

Finally, the UVIATOR program corrects the UVS measurements using the appropriate solar zenith angles and Ozone column densities and makes a new data file.

References:

[1] WMO/GAW Report No. 120: WMO - UMAP Workshop on Broad-Band UV Radiometers, Garmisch-Partenkirchen, Germany, 1996. WMO TD - No. 894

[2] WMO/GAW Report No. 141: Report of the LAP/COST/WMO Intercomparison of Erythemal Radiometers, Thessaloniki, Grece, 1999. WMO TD - No. 1051

[3] TUV discrete ordinate radiative transfer model, Madronich et al. 1998, www.acd.ucar.edu

[4] McKinley, A.F. and B.L. Diffey, 1987: A reference action spectrum for ultraviolet induced erythema in human skin. CIE J., 6, 17-22.

[5] Schreder, J., J. Gröbner, A. Los, and M. Blumthaler, 2004: Intercomparison of monochromatic source facilities for the determination of the relative spectral response of erythemal broadband filter radiometers. Optics Letters, 29(13).

5 Maintenance and re-calibration

The quartz dome should be cleaned regularly. You may use a mild window cleaning agent which must be generously rinsed with clear water and wiped dry with a cleaning cloth.

The quartz dome can be replaced when damaged. In order to replace the dome, loosen the 6 screws in the outer ring and remove the ring and dome. Take care not to touch the white diffuser. Clean the surface of the housing and check the condition of the O-ring and replace it when necessary. Reassemble using the new dome and mounting ring in the reverse order.

Another periodic check is to ensure that the instrument is level and that the silica gel is still coloured orange. When the orange silica gel in the drying cartridge is turned completely transparent (normally after several months), it must be replaced by fresh silica gel as supplied in the small refill packs. The content of one pack is sufficient for one complete refill.

Periodic re-calibration of the sensors is recommended and provided by Kipp & Zonen. We recommend a re-calibration interval of 12 months.

6 Specifications

	UVS-A-T	UVS-B-T	UVS-E-T
Optical			
UV irradiance measured	UV-A	UV-B	Erythemally Active UV-E
Nominal spectral response	315 to 400 nm	280 to 315 nm	ISO 17166:1999 / CIE S 007/E-1998
Response at >400 nm	< 0.1% of output		
Cosine response	< 2.5% between 0° and 70° solar zenith angle		
Electrical			
Nominal output 0 to 3 V	0 to 90 W/m²	0 to 6 W/m²	0 to 0.6 W/m²
Output of internal temperature	2.5 V ~ 25 °C (see Appendix II)		
Operating temperature	-25 °C to +50 °C, full specification -40 °C to +50 °C, reduced specification		
Power supply	7 to 18 VDC, 8 W		
Mechanical			
Materials	Housing: protected aluminium, polyester coated Dome: UV-grade quartz		
Connector	Binder 712 Series, 8 pole		
Height	145 mm		
Diameter	122 mm		
Weight	< 1 kg		

7 Customer support

If you require any support for your Kipp & Zonen product please contact your local representative in the first instance. The information can be found in the 'Contact' section (home tab) of our website at **www.kippzonen.com**

Alternatively, you can contact us directly at **www.kippzonen.com/support**

Please include the following information:

- Instrument model
- Instrument serial number
- Details of the fault or problem
- Examples of data files
- Readout device, data acquisition system and operating system
- Interfaces and power supplies
- History of any previous repairs or modifications
- Pictures of the installation
- Overview of the local environment conditions

Kipp & Zonen guarantees that your information will not be shared with other organisations.

Appendix I: Erythemal action spectrum according to CIE 1987 (DIN 5050)

λ[nm]	Weighting	λ[nm]	Weighting	λ[nm]	Weighting
290	1.000E+00	327	0.188E-02	364	0.422E-03
291	1.000E+00	328	0.151E-02	365	0.407E-03
292	1.000E+00	329	0.141E-02	366	0.394E-03
293	1.000E+00	330	0.136E-02	367	0.380E-03
294	1.000E+00	331	0.132E-02	368	0.367E-03
295	1.000E+00	332	0.127E-02	369	0.355E-03
296	1.000E+00	333	0.123E-02	370	0.343E-03
297	1.000E+00	334	0.119E-02	371	0.331E-03
298	1.000E+00	335	0.115E-02	372	0.320E-03
299	0.805E+00	336	0.111E-02	373	0.309E-03
300	0.649E+00	337	0.107E-02	374	0.299E-03
301	0.522E+00	338	0.104E-02	375	0.288E-03
302	0.421E+00	339	0.100E-02	376	0.279E-03
303	0.339E+00	340	0.966E-03	377	0.269E-03
304	0.273E+00	341	0.933E-03	378	0.260E-03
305	0.220E+00	342	0.902E-03	379	0.251E-03
306	0.177E+00	343	0.871E-03	380	0.243E-03
307	0.143E+00	344	0.841E-03	381	0.234E-03
308	0.115E+00	345	0.813E-03	382	0.226E-03
309	0.925E-01	346	0.785E-03	383	0.219E-03
310	0.745E-01	347	0.759E-03	384	0.211E-03
311	0.600E-01	348	0.733E-03	385	0.204E-03
312	0.483E-01	349	0.708E-03	386	0.197E-03
313	0.389E-01	350	0.684E-03	387	0.191E-03
314	0.313E-01	351	0.661E-03	388	0.184E-03
315	0.252E-01	352	0.638E-03	389	0.178E-03
316	0.203E-01	353	0.617E-03	390	0.172E-03
317	0.164E-01	354	0.596E-03	391	0.166E-03
318	0.132E-01	355	0.575E-03	392	0.160E-03
319	0.106E-01	356	0.556E-03	393	0.155E-03
320	0.855E-02	357	0.537E-03	394	0.150E-03
321	0.689E-02	358	0.519E-03	395	0.145E-03
322	0.555E-02	359	0.501E-03	396	0.140E-03
323	0.447E-02	360	0.484E-03	397	0.135E-03
324	0.360E-02	361	0.468E-03	398	0.130E-03
325	0.290E-02	362	0.452E-03	399	0.126E-03
326	0.233E-02	363	0.437E-03	400	0.122E-03

Appendix II: Conversion of output voltage for internal temperature

Relation between the voltage at the temperature output [connector pin 4, yellow wire] and the internal temperature for the models UVS-A-T and UVS-B-T.

V	°C
0.5	-23
0.6	-19
0.7	-16
0.8	-13
0.9	-10
1.0	-7
1.1	-5
1.2	-2
1.3	0
1.4	2
1.5	5
1.6	7
1.7	9
1.8	11
1.9	13
2.0	15
2.1	17
2.2	19
2.3	21
2.4	23
2.5	25
2.6	27
2.7	29
2.8	31
2.9	34
3.0	36

Appendix III: Re-calibration service

Kipp & Zonen solar radiation measurement instruments comply with the most demanding international standards. In order to maintain the specified performance of these instruments, Kipp & Zonen recommends calibration of their instruments every two years. The exception to this is the UVS Series of UV Radiometers, where re-calibration is recommended annually.

re-calibration can be carried out at Kipp & Zonen to the original factory procedures using traceable methods. Here, re-calibration to the highest standards can be performed at low cost. re-calibration can usually be performed within four weeks. Urgent re-calibration may be possible in a shorter time, subject to production scheduling restrictions.

Please contact your local Kipp & Zonen representative or send an e-mail to the Kipp & Zonen customer and product support department at: **services@kippzonen.com**.

Our customer support remains at your disposal for any maintenance or repair, calibration, supplies and spares.

Für Servicearbeiten und Kalibrierung, Verbrauchsmaterial und Ersatzteile steht Ihnen unsere Customer Support Abteilung zur Verfügung.

Notre service 'Support Clientèle' reste à votre entière disposition pour tout problème de maintenance, réparation ou d'étalonnage ainsi que pour les accessoires et pièces de rechange.

Nuestro servicio de atención al cliente esta a su disposición para cualquier actuación de mantenimiento, reparación, calibración y suministro de repuestos.

HEAD OFFICE

Kipp & Zonen B.V.
Delftechpark 36, 2628 XH Delft
P.O. Box 507, 2600 AM Delft
The Netherlands

+31 15 2755 210
info@kippzonen.com
www.kippzonen.com

SALES OFFICES

Kipp & Zonen France S.A.R.L.
88 Avenue de l'Europe
77184 Emerainville
France

T: +33 (0) 1 64 02 50 28
F: +33 (0) 1 64 02 50 29
kipp.france@kippzonen.com

Kipp & Zonen Asia Pacific Pte. Ltd.
10 Ubi Crescent Lobby E
#02-93 Ubi Techpark
Singapore 408564

T: +65 (0) 6748 4700
F: +65 (0) 6748 6098
kipp.singapore@kippzonen.com

Kipp & Zonen USA Inc.
125 Wilbur Place
Bohemia NY 11716
United States of America

T: +1 (0) 631 589 2065
F: +1 (0) 631 589 2068
kipp.usa@kippzonen.com

Go to www.kippzonen.com for your local distributor or contact your local sales office

Passion for Precision