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KIPP & ZONEN
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Contact

If you have a news item for the newsletter or want to share your experiences with Kipp & Zonen applications and contribute to our next issues, please e-mail the editor: kelly.dalu@kippzonen.com

Where new meets old

Every day we are challenged to survive in a rapidly changing world. Seeking for new solutions to accommodate demand and driving change by developing fundamental new technologies.

A good example of the latter is our recent launch of DustIQ: a unique instrument that helps solar energy customers identify to a 1% accuracy how much transmission loss they incur from soiling on their panels.

At the upcoming MTX exhibition in Amsterdam, we will all be updated on the latest meteorology innovations and Kipp & Zonen is proudly presenting a range of new technologies.

Fundamental change is presented with our new UV radiometer range, providing better performance without increasing cost for our customers. This is an innovation resulting in improved value for money. Important steps are being made with our RaZON$^+$ and we invite all visitors to review the latest updates and the amazingly accurate data NREL collected with our new all-in-one system.

To further explore our innovation roadmap, we invite visitors at the MTX to participate in the Kipp & Zonen irradiation workshops. We will organize several workshops during the MTX for which you may register at **www.kippzonen.com/MTX**. All you wanted to know about irradiation measurement is addressed during the workshop. In addition we will give you a sneak preview of fundamental new technologies we will launch in the future for our pyranometers, while we will use the opportunity to explore your needs.

In the end, this is where old meets new; people with long-term experience in the market determining what should be made for our future.

Do not forget to register right away, so we'll be sure to meet each other at exhibition in Amsterdam!

Erik Valks
CEO Kipp & Zonen

New Generation of UV Radiometers UVA, UVB and UVE

After more than 15 years of setting the standard in UV measurements, our well-known UVS series of Radiometers are being replaced with a new generation; the SUV series. Based on the established SUV5 'total' UV radiometer, there is now a family of broadband UV radiometers for the measurement of specific types of ultraviolet radiation. This new range has models to measure UVA, UVB and UVE; alongside the existing SUV5 total UV version.

Advantages of the new SUV series

The SUV series has improved specifications over the UVS, plus the benefits of an RS-485 Modbus® digital output and a very low power consumption. Due to the all-new optical detection systems for UVA, UVB and UVE with digital data processing the new SUV Radiometers do not need power-hungry temperature stabilization; they have a very accurate polynomial function temperature correction over a wider operating temperature range, from -40 °C to +70 °C.

The wide supply voltage range and low power requirements make the SUV series very suitable for use in remote areas where power is scarce. Like all our Smart radiometers the Modbus® output provides not only the irradiance value in W/m², but also body temperature, power supply voltage, status info, model and serial number plus calibration history.

The SUV housings are identical in dimensions to Kipp & Zonen double-dome pyranometers; making it simple to use all our radiometer accessories (such as mounting, shading, ventilation and tilting). Another improvement over the UVS is that the SUV series has no external drying cartridge to inspect, the internal desiccant will last at least 10 years.

As with our other Smart instruments, the standard 2-year factory warranty will be extended free of charge to 5 years after registering the purchase through our website.

UV Index

The Global Solar UV Index (UVI) was developed in an international effort by the WHO in collaboration with WMO, UNEP and ICNIRP. The 'harmful' UV radiation level at the Earth's surface is measured by an instrument with a spectral response that represents a 'standard' human skin. This Erythemal irradiance, UVE in W/m², is measured by the SUV-E and multiplied by 40 m²/W to convert the value to the UV Index. UVI serves as an important means to raise public awareness and to alert people about the need to adopt protective measures when exposed to harmful UV radiation.

Analogue output

Our Smart instruments also have an analogue output derived from the digital data and the SUV continues this feature with a 0 to 1 V range. For the SUV-A, SUV-B and SUV5 it is the irradiance in W/m², for the SUV-E it is the UV Index.

Improved measurements with updated UVIATOR

The new SUV models are supplied with individually measured response characteristics for use with our UVIATOR software. UVIATOR makes corrections for total Ozone column concentration and air-mass (solar zenith angle) to increase the accuracy of the measured data. In the updated UVIATOR, Suomi NPP satellite Ozone data has been included. Using UVIATOR typically reduces the measurement uncertainty by a factor of two. UVIATOR software is available as a free download from our website.

The new SUV series is coming soon

SUV-A, SUV-B and SUV-E will all be available as of October 2017 and officially launched at the Meteorological Technology World Expo 2017 in Amsterdam, the Netherlands ■

Vintage pyranometer in pursuit of South African solar energy

By Anro le Roux, Stellenbosch University and Riaan Meyer, GeoSUN Africa

In the hunt for the oldest Kipp & Zonen pyranometer still in regular use one of the entries that stood out was a CM10 installed in Stellenbosch, South Africa. The CM10 was only made for a short time and was a CM11 without the sun shield, which at that time was white painted aluminium and quite expensive.

The 1982 CM10 at Stellenbosch University

This 35 year old instrument is part of the research into solar thermal energy carried out by Stellenbosch University.

Stellenbosch was the second town founded by the Dutch after they arrived in Cape Town in 1652. It's a beautiful place and known for its wine, mountains and university. Stellenbosch University has a long history of research in Solar Thermal energy with an outdoor test laboratory for solar water heaters, CSP concepts and many other energy technologies.

There is a large quantity of Kipp & Zonen equipment installed in the Southern African Universities Radiometric Network (SAURAN). SAURAN is an initiative of the Centre for Renewable and Sustainable Energy Studies (CRSES) at Stellenbosch University and the Group for Solar Energy Thermodynamics (GSET) at the University of KwaZulu-Natal (UKZN).

SAURAN provides free solar and meteorological data from stations across Southern Africa located at, or managed by, Universities. Historical data is available from 21 locations, but some stations have been relocated, resulting in 18 sites with current data for DNI, GHI and DHI. Nearly all the stations in the network use Kipp & Zonen equipment.

*Go to **www.sauran.net** for the station locations and data*

UKZN, located on the East coast in the city of Durban, has the lowest annual irradiance in South Africa, yet seems to have a fascination with solar measurements - there are three SAURAN stations located in Durban at two different tertiary education

institutes. The University hosts one of the oldest solar measurement stations in South Africa and also owns an absolute cavity radiometer (ACR).

The Sonbesie solar measurement station on the roof of the engineering complex at Stellenbosch University is a member of SAURAN. The station has a SOLYS2 sun tracker with CHP1 pyrheliometer(s) for DNI, a CMP11 for GHI, a shaded CMP11 for DHI and a UVS-AB-T radiometer; plus a CMP6 with CM121B shadow ring for DHI back-up. Apart from the SAURAN station, a number of CMP11 (and some older CM10/11) pyranometers are used for specific test setups and experiments at the University; including the CM10 entered in the pyranometer hunt competition. You can find live data at **weather.sun.ac.za**.

The data from the SAURAN stations, along with some additional data shared voluntarily by solar power developers, were used to produce a validated solar energy resource map of South Africa. This project was funded by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and executed by CRSES.

The Sonbesie SAURAN Station

The modelling and mapping work was executed by Solargis (formally GeoModel Solar), a company specialising in satellite-derived data and based in Slovakia. Measurement data can be downloaded from the SAURAN station map at **www.sauran.net** and the resource maps from Solargis or GeoSUN Africa, **www.geosun.co.za** ■

Stellenbosch University

Taking the Romanian solar platform to the next level

By Arcadiu Munkácsi, General Manager at ECHIPOT S.R.L. interviewing Dr. Marius Paulescu of the Solar Energy Research Group at the West University of Timişoara, Romania.

SMP10 smart pyranometer fitted with CVF4 ventilation and heating unit and CM121C shadow ring

Q: In May 2017 you purchased SMP10 smart pyranometers fitted with ventilation and heating units. What is the purpose of these acquisitions, and why did you choose Kipp & Zonen products?

A: In 2008, at the West University of Timişoara, Romania a radiometric station was set up. This is the Solar Radiation Monitoring Station, which is a component of the Solar Platform. It is the sole radiometric station in Romania outfitted for the systematic monitoring of solar radiation from various spatial directions. The purpose of this acquisition is to replace the existing instruments (First Class according to ISO 9060) with higher performance ones (ISO Secondary Standard).

We chose Kipp & Zonen pyranometers because all of the references we have gathered recommend them as reliable and of high quality. Currently, the sampling rate on the Solar Platform is four samples per minute. Due to a response time below two seconds, the new Kipp & Zonen pyranometers will enable us to increase the sampling rate by almost eight times, to 30 samples per minute. In this way we will get additional information in our research linked to the reconstruction of cloud fields using radiometric measurements. Another advantage of these instruments is the internal desiccant, which needs replacing only once in 10 years.

Q: How will you install the instruments which you have just bought?

A: The SMP10 pyranometers will be installed on the Solar Platform of the University and will be fitted with ventilation units with heaters, which we have also purchased from Kipp & Zonen. This will enable us to measure solar irradiance precisely in harsh environmental conditions; rain, snow, frost. Regarding the installation of the instruments, we have received all the details we need from the Kipp & Zonen representative in Romania, ECHIPOT S.R.L.

Q: Who will benefit from the measurements by the radiometric station?

A: The radiometric database created at the solar platform is used for three main purposes:

1. A source of data to be used in the educational process. By that I mean the students from the Faculty of Physics, who use the data to prepare their theses and dissertations;
2. The second category is that of engineers working in the photovoltaic industry, where data are used for sizing PV and solar-thermal systems;
3. But, the most important use of the radiometric data is in research. The data have been used in research connected with the quantification of the solar radiative regime and the estimation and forecasting of the solar energy collected at ground level. Our results have been published by various journals in the atmospheric science and energy fields; such as Atmospheric Research, Solar Energy, Energy, or Energy Conversion and Management. Further information on the research conducted by the group I coordinate can be accessed at **solar.physics.uvt.ro**.

Q: Please tell us something about the website and your plans for future features that will be launched. How can this site make measurement results available to the public, and what is the public usefulness of solar radiation measurements?

A: The website of the Solar Platform can be accessed at solar.-physics.uvt.ro/srms and it provides real-time solar radiation measurements and meteorological information. A section of the site includes data which can be freely accessed by anyone interested. These data can be downloaded in monthly packages and they include the hourly values of the solar irradiance components, in the horizontal plane and in four other spatial directions, as well as the hourly averages of the main meteorological parameters.

It should be mentioned that all measurements are taken simultaneously. We recently launched a new version of the site, which will include more information; for instance, short term forecasts of the solar irradiation levels. We will also provide online samples with instantaneous solar irradiation measurements taken at high frequency with the new Kipp & Zonen pyranometers.

Q: Please describe some of the future plans for the research activities of the Solar Platform.

A: Niels Bohr is thought to have said, “It is difficult to make predictions, especially about the future”. Given the dynamics of the current economic and social life, determined by the explosive development of technology and communications, any perspective on research development should be filtered through Bohr’s paradigm!

First of all, our research focuses on solar irradiance prediction at different time horizons. Within this segment we carry out several projects, including one called PV Power Forecasting Toolkit for Smart Grid Management (PN-III-P2-2.1-PED-2016-0592), which ensured the funding for the replacement of the radiometric equipment of the Solar Platform. From another perspective, we would like to expand our research in the area of solar radiation assessment and forecasting in narrow spectral bands, especially in the ultraviolet ■

Dutch solar energy growth - more pyranometers!

By Vasco Verlaan, Sales Engineer, Bakker & Co.

The photovoltaic (PV) market is currently showing a rapid growth in the Netherlands. This is partly caused by the change in mindset of private house owners, who are beginning to put PV panels on their rooftops. But, the major part is initiated by new utility-scale PV parks supported by the Dutch government with funding.

One of the largest PV parks in the Netherlands, on the island of Ameland, installed by Solarcentury Benelux B.V.

With the SDE+ (Stimulering Duurzame Energieproductie) operating grant for Encouraging Sustainable Energy Production, subsidies for newly installed PV parks are guaranteed a commercial electricity feed-in price for up to 15 years. These subsidies have been initiated to aim towards an energy transition where the country will be much less reliable on conventional energy sources. For the Netherlands this must result in a decrease of CO_2 emissions by 43% in 2030 and at least 80% by 2050, compared to 1990. This can only be achieved when the installed base of solar energy parks increases.

Not only the number of PV parks is increasing, there is also a clear trend that the projects are getting larger in yield. A few years ago 6 MW was the largest installed solar park in the Netherlands. Today the largest park is 30 MW and plans are being developed for solar parks of 50 to 100 MW for the coming years. Consequently, the need for reliable data to correlate the yield to the incoming solar radiation increases. Kipp & Zonen pyranometers are perfectly suited for this.

There are 2 main reasons why pyranometers are needed at PV parks:

1. For such large scale PV projects a reliable financial partner is an important stakeholder. They will only invest based on a reasonably achievable return on investment. These parties often ask for an independent reference measurement to correlate the yield of the PV panels to the local solar radiation energy received.

2. Many PV companies are nowadays offering some sort of guaranteed efficiency on their delivered systems. The only way to check and prove this guarantee is to install an independent radiation sensor on-site at that specific PV park.

The most commonly recommended and used independent measurement technique to correlate the incoming solar radiation with the PV park yield is pyranometers. PV panels (and silicon photodiode reference cells) transform an incoming photon to an electrical current, but not all the photons of all frequencies from the sun. Pyranometers measure all the radiant solar energy absorbed on a precisely engineered and manufactured blackened surface. Through a high-end system of reliable calibration this can be accurately correlated to the absolute value of the incoming irradiance.

This principle is optimized by Kipp & Zonen engineers for the PV market, resulting in highly accurate and reliable instruments. Especially, the low maintenance Smart SMP10 digital pyranometer; this exceeds the highest PV technical requirements and interfaces with plant data networks.

Concluding, in a rapidly developing PV market, accurate and reliable data about the amount of local solar radiation at the installation site is crucial for efficiency and performance ratio monitoring. Kipp & Zonen provides a wide range of high quality pyranometers to provide such a solution for every solar park ■

About Bakker & Co.

Bakker & Co. has extensive experience with high quality meteorological sensors and systems (hardware and software) and supplies customised engineering solutions; from single instruments to complete weather stations, warning, process control and measurement systems. The company also provides related calibration and repair services in their own workshop.

Bakker & Co. has implemented these solutions in meteorology and a broad variety of industrial applications; such as petro-chemical plants, marine installations, crane operations and renewable energy (solar, wind and biogas). Since 2010 Bakker & Co. has been the Kipp & Zonen distributor for the Netherlands.

www.bakker-co.com

A tilted pyranometer on a roof in Etten-Leur, the Netherlands, a project of SolarAccess Sustainable Energy B.V.

Kipp & Zonen calibration around the world

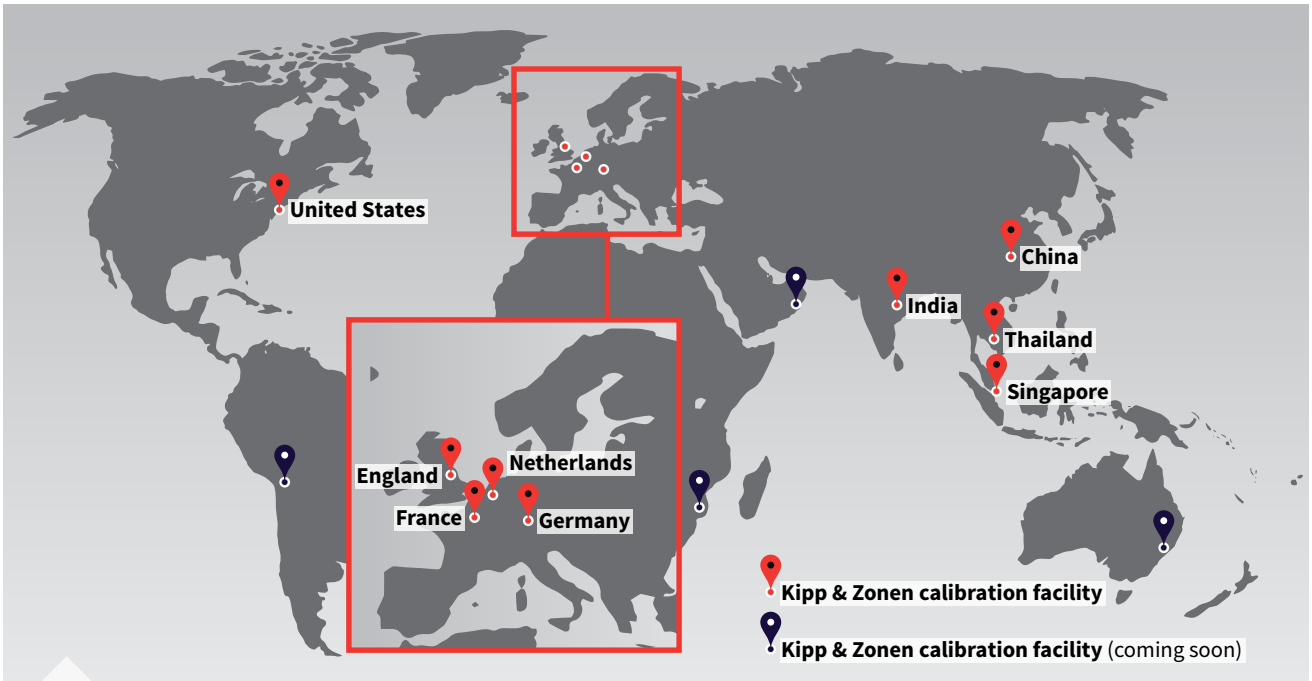
The individual sensitivity of a Kipp & Zonen radiometer is determined under the measurement conditions stated on its calibration certificate and is valid at the date of first use. However, the physical properties of any optical radiometer change over time in operation due to solar radiation (primarily ultraviolet) affecting diffusers, optical filters, photodiodes, and the black absorber coating of thermopile detectors.

This ageing affect is specified as 'non-stability (change/year)' and, in general, it will take about 2 years to noticeably affect the accuracy of measurements. It is for this reason that we recommend you calibrate your radiometers at least once every two years. Kipp & Zonen operates a network of calibration facilities around the world; at the factory, at our regional offices and at key distributors.

The network has recently expanded with the opening of our Indian Calibration Facility for Radiometers at Gurugram (Gurgaon) near New Delhi. Our customers in India can now have their pyranometers calibrated locally, without the additional costs and downtime of shipping to the Netherlands.

All of our facilities can calibrate the most popular CM, CMP and Smart SMP pyranometer models in addition, our offices are able to calibrate albedometers, some pyrgeometers and the CNR4 net radiometer. Pyrheliometers, CG4/CGR4, CSD, UV radiometers and some specialised products can only be calibrated at the factory in Delft.

The automated calibration equipment at all the facilities is the same as that in Delft and operates through the factory calibration server, software and database. Radiometers are inspected, cleaned, desiccant replaced and tested before being recalibrated.



To find your nearest Kipp & Zonen calibration facility go to www.kippzonen.com/customer-services/calibration-locations

IEC 61274-1 PV monitoring, calibration interval for pyranometers		
Class A	High Accuracy	Once per year
Class B	Medium Accuracy	Once every 2 years
Class C	Basic Accuracy	As per manufacturer's requirements

Industrial customers using our products in testing, quality or process control (including solar energy) may have internal QA/QC procedures that require annual calibration. The international standard IEC 61274-1, March 2017 Photovoltaic system performance - Part 1: Monitoring, specifies calibration intervals for pyranometers used in PV solar energy plants. It covers both fixed axis and tracking systems and both flat plate and concentrator type arrays

Next generation LOGBOX available now

By Donald van Velsen, Kipp & Zonen Product Manager - With the ongoing innovations in our range of instruments, it was time to update the popular LOGBOX SD data logger with some smart features. The all-new LOGBOX SE replaces the SD model and has many benefits compared to its predecessor. For accurately recording measurement data from small solar monitoring systems at a fixed station, or for portable use in field research, LOGBOX SE is the compact, low power, user-friendly and economical choice.

The new LOGBOX SE data logger

Wireless remote data access

LOGBOX SE has an internal GSM/GPRS quad-band 2G cellular modem that accepts a full-size SIM card and the supplied antenna plugs into the weather-proof logger enclosure. It can send the logged data at a selectable interval, from 1 to 24 hours, to a designated e-mail address or FTP server. Very helpful when you can't visit the site easily and need to access the data remotely.

Perfect all-in-one solution for remote locations

When solar radiation measurements need to be logged at remote locations there is often no power infrastructure available. LOGBOX SE can store up to 2 years of data on the included internal SD card. Thanks to its low power consumption the data logger runs for over 2 months on 6 x AA batteries fitted inside the cover, depending upon the modem usage. You can also choose to power it from a separate DC power supply or from a solar panel and battery; LOGBOX SE has the charger and regulator electronics built in.

A data logger that can handle both analogue and Smart instruments

LOGBOX SE has 4 differential, 4 single-ended and 4 digital inputs that suit the analogue or switched signals from all of our solar radiation instruments. In addition, you can connect up to 8 of our Smart Modbus® radiometers. LOGBOX SD can only store single values taken at the selected logging interval, the shortest period being 10 seconds. Whereas, the SE can sample every second and store the average, minimum, maximum and standard deviation of the measurement values over the logging interval, usually 1 minute.

LOGBOX SE is ideal for many fixed and field applications, including in solar energy. It replaces the LOGBOX SD and is available right now. Go to **www.kippzonen.com/logbox** to find out more and to request a quote ■

Fairs & Events

Meteorological Technology World Expo Amsterdam • Netherlands	10 - 12 October
WETEX • Dubai • United Arab Emirates	23 - 25 October
Asia Clean Energy Summit • Singapore	24 - 26 October
Solar Asset Management Europe • Milan • Italy	7 - 8 November
Intersolar India • Mumbai • India	5 - 7 December
AGU fall meeting • New Orleans • LA • USA	11 - 15 December

Passion for Precision

Kipp & Zonen is the leading company in measuring solar radiation and atmospheric properties. Our passion for precision has led to the development of a large range of high quality instruments, from all-weather radiometers to complete measurement systems.

We promise our customers guaranteed performance and quality in; Meteorology, Climatology, Hydrology, Industry, Renewable Energy, Agriculture and Public Health.

We hope you will join our passion for precision.

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