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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

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Kipp & Zonen B.V. - 2017

Breakthrough technology launched at Intersolar

In a rapidly growing market, less obvious improvements may lag behind. When suppliers focus on demand fulfilment and matching commodity prices, innovation generally takes place inside the industry's black box. Now, Kipp & Zonen breaks through this black box from the outside, with a fundamental new technology.

DustIQ for PV Soiling Monitoring

A very visible improvement that enables optimisation of the yield of every PV plant is our unique new DustIQ, based on Kipp & Zonen's very smart Optical Soiling Measurement (OSM) technology.

Investors, EPC's and SCADA suppliers participated in the final design stage of the development of the product, turning the new DustIQ into a breakthrough to solve the problems in monitoring PV panel soiling. A product that combines seamlessly with other smart Kipp & Zonen solar irradiation instruments, through robust design and Modbus® digital communication.

Commercial rooftop sites and PV power plants will benefit from the moment of installation, based on real-time insights into light transmission loss caused by soiling. The worlds' most renowned solar plant monitoring software suppliers have integrated the data registers, so O&M companies and stakeholders will not be limited in their access to this breakthrough innovation.

To stay informed, subscribe to the DustIQ News Feed at www.kippzonen.com/DustIQ.

Global challenges, Dutch solutions!



Erik Valks
CEO Kipp & Zonen

RT1: affordably measure solar irradiation and panel temperature for rooftop PV installations

By Donald van Velsen, Kipp & Zonen Product Manager - Solar energy PV installations on building roofs are really taking off in many parts of the world. On apartment buildings, car parks, sports facilities and smaller industrial sites. No land purchase or leasing is needed and the power is available on-site, where needed, for example powering air conditioners when the solar energy and heat input are greatest. If excess power is available it can be stored in batteries or (if feed-in tariffs are favourable) sold back to the grid operator.



The RT1 Smart Rooftop Monitoring System

Even though a commercial rooftop installation is much smaller than surface-based utility-scale solar energy parks, it is still vital to be able to check if your equipment is performing the way it should. How often do you go up on the roof for cleaning or repair?

Most maintenance decisions are based on the calculation of the actual power generated, for the incoming solar energy, compared to what it should theoretically generate. This is termed the Performance Ratio (PR) of the PV panels and is, in effect, the operating efficiency of the installation. For this calculation the incoming solar irradiation and the PV panel temperature are key parameters.

At Kipp & Zonen we listened to our distributors and customers and had a close look at the currently available instrumentation and decided to develop a new product that would be easy to install, easy to use, be resistant to soiling and still be affordable. Our answer to this problem is a brand-new smart rooftop monitoring system, the RT1.

Easy Mounting and Connection

RT1 has a robust housing that fits snugly to the corner of a PV panel and only takes one clamp screw to install; an adapter enables fitment to the side or top sections of a panel. A 20 m long cable connects power to the RT1 and provides data in the solar industry standard MODBUS® digital protocol via RS-485.

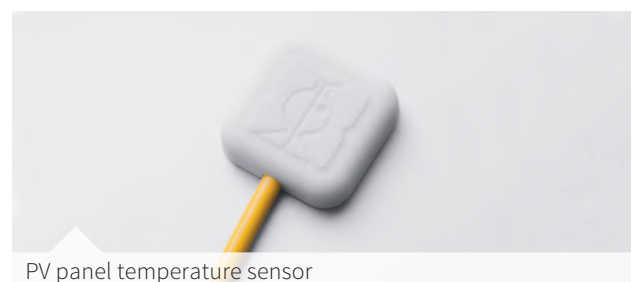
MODBUS® is available on many inverters and SCADA systems and assists in making the collected data available in the cloud or on a dedicated server.

A PV panel temperature sensor is a standard part of the RT1 and plugs into the housing, so that it can be easily removed if needed, for example to recalibrate it.

Low Maintenance

The conical diffuser of the RT1 is similar to the well-proven design of the SP Lite2 with its self-cleaning and soiling-resistant properties, aided by wind and rain, that are superior to those of the conventional flat surfaces used in reference cells and other photodiode radiation sensors. RT1 has a 5-year warranty and does not need recalibrating for 5 years.

Keep up-to-date by registering at www.kippzonen.com/RT1 to receive the latest information available ■



PV panel temperature sensor

A new way to measure the soiling ratio of PV panels: DustIQ

By Donald van Velsen, Kipp & Zonen Product Manager - Solar parks are financial investments, so they need to have the highest Return on Investment (ROI) possible and the most commonly used indicator for this around the World is the Performance Ratio (PR), which is usually expressed as a percentage.

$$\text{Performance Ratio} = \frac{\text{final yield}}{\text{reference yield}} \times 100\%$$



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The final yield of AC power generated is easily measured with high accuracy at the grid connection. The reference yield is the theoretical power produced by irradiance on the PV panels; the solar energy received by the panels multiplied by the efficiency of the conversion to electrical energy. 100 % is rarely achievable (even when the plant is new) due to installation, operational and environmental variables; typical PR's are in the 75 % to 90 % range.

An important factor in the PR is the amount of electrical energy production lost because of deposits on the surface of the PV panels that reduce the transmission of light through to the solar cells. This can be due to dust, sand, pollen, soot, ash, sea salt or even bird droppings; generically called 'soiling'.

This effect is expressed as the Soiling Ratio (SR) and runs from 1 (completely clean) to 0 (completely obscured). However, (like PR) this is often given as a percentage of 'cleanliness' from 100 % all the way down to 0 %.

Until now, measuring the loss of light transmission due to soiling has relied on systems where a reference PV panel is kept clean whilst a similar panel is getting dirty. The cleaning regime may be manual or (more expensively) automatic, and rely on water, brushes, machinery, power and regular scheduling.

These systems are expensive and are often only installed at one location in a solar park, whereas the panel soiling varies across the site, due to varying wind directions and the shielding effect of leading panel rows on those further back.

Breakthrough Solution

That is why the Innovation & Technology department at Kipp & Zonen spent a lot of time and effort in researching alternative and novel solutions and came up with our unique Optical Soiling Measurement (OSM) technology. This uses an internal light source to measure the loss of transmission of a transparent material caused by soiling of its surface, it does not rely on sunlight and can operate day and night.

The first product featuring OSM was recently launched at Intersolar Munich, the DustIQ PV Soiling Monitor. DustIQ does not rely on a clean reference surface, it should be cleaned at the same time as the PV arrays that it is monitoring. This reduces the operating costs of the soiling measurement system substantially. DustIQ has two spatially separated sensors to cover a representative area.

Multiple Locations

Because of the compact size, simple installation and cost-effectiveness of DustIQ it is easy to integrate into PV arrays to form a network of monitors at multiple locations and heights, providing the O&M team with a 'soiling map' of the solar park. This allows panel cleaning schedules to be optimised across the site, reducing costs.

These features mean that it is also possible to attach DustIQ to tracking PV panels or CPV systems.



Optimize maintenance schedules, minimize yield losses, know exactly when and where to clean.

We hope you're as excited as we are about this revolutionary new way of monitoring the soiling ratio of PV panels and we recommend that you register at www.kippzonen.com/dustiq to receive the latest updates ■

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What's really new about DustIQ?

- Patented Optical Soiling Measurement technology
- Compact and rugged, no moving parts and no water
- Mounts to the top or side of PV panels, or between them, for representative soiling measurements
- No specific maintenance, clean it when you clean the panels
- Dual-sensors for statistically sound soiling measurement
- Very low power consumption
- Self-calibrating
- Optional back-of-panel temperature sensor
- Modbus® RS-485 digital communication
- Cost-effectiveness allows for multiple measurement points



DustIQ

Know exactly when and where to clean!

www.kippzonen.com/DustIQ

Passion for Precision

Measurement of UV radiation added to Antarctic site of the LES solar measurement network

By Dr. Gonzalo Abal, Laboratorio de Energía Solar, Centro Universitario Regional Norte, Salto, Uruguay.

The Solar Energy Laboratory (LES) of Uruguay has recently conducted its first measurement campaign to assess UVA, UVB and UVE (Erythemal) radiation in the Antarctic Summer. The Base Científica Antártica Artigas (BCAA) of the Uruguayan Antarctic Institute is located at latitude 62°11'(S) and longitude 58°52'(W) at Collins Harbour on King George Island (the largest of the South Shetland Islands), about 100 km from the Antarctic peninsula.



UVS radiometers at Collins Harbour in the Antarctic summer of 2016-2017

These measurements are of particular interest, since the base is located within the southern 'Ozone hole' area of influence. The main instruments were a new Kipp & Zonen UVS-B-T radiometer calibrated at the factory in June 2016 and a UVS-AE-T last calibrated at the PMOD laboratory in Switzerland (World Radiation Center, Davos).

These instruments are thermally stable due to their internal heaters, which maintain the electronics and optics at +25°C. Auxiliary instruments for global horizontal irradiance measurement and ambient temperature were calibrated at our laboratory. Both the UV instruments performed as expected and a preliminary analysis of the data shows rather higher UVB than expected as a fraction of broadband irradiance.

The Solar Energy Laboratory also operates an outdoor calibration facility, the only one available in Uruguay. More than 100 radiometers have been calibrated against our secondary standard Kipp & Zonen CMP22 pyranometer, following standard ISO 9847:1992 'Calibration of field pyranometers by comparison to a reference pyranometer'.

At LES we have also operated and maintained (with support from the local Ministry of Energy) a continuous solar radiation measurement network since 2010. This network currently has eight sites distributed over Uruguayan territory. All the sites have a Kipp & Zonen secondary standard pyranometer (CM11 or CMP10) as the main GHI measurement. A redundant GHI measurement using photodiode radiometers and an ambient

temperature measurement based on a calibrated Pt1000 RTD is also included.

At some sites, diffuse radiation or tilted radiation is also measured. This quality-controlled data has contributed to the development of several large photovoltaic projects in the country. Currently (as of 2016) Uruguay generates 98.6 % of its electricity from renewable sources (solar, wind, biomass and hydropower) and is exporting its surplus electrical energy to its largest neighbours, Argentina and Brazil. To contextualize, the worldwide average for the renewable share of electrical generation is close to 20 %.

LES also maintains a solar radiation monitoring station for DNI, DHI and GHI comprising a SOLYS2 sun tracker with sun sensor and shading ball assembly, pyrheliometer and ventilated pyranometers. The unventilated CMP10 shown is fitted for comparison purposes. The details of the LES solar measurement network can be found at www.les.edu.uy ■



Calibration of pyranometers at LES

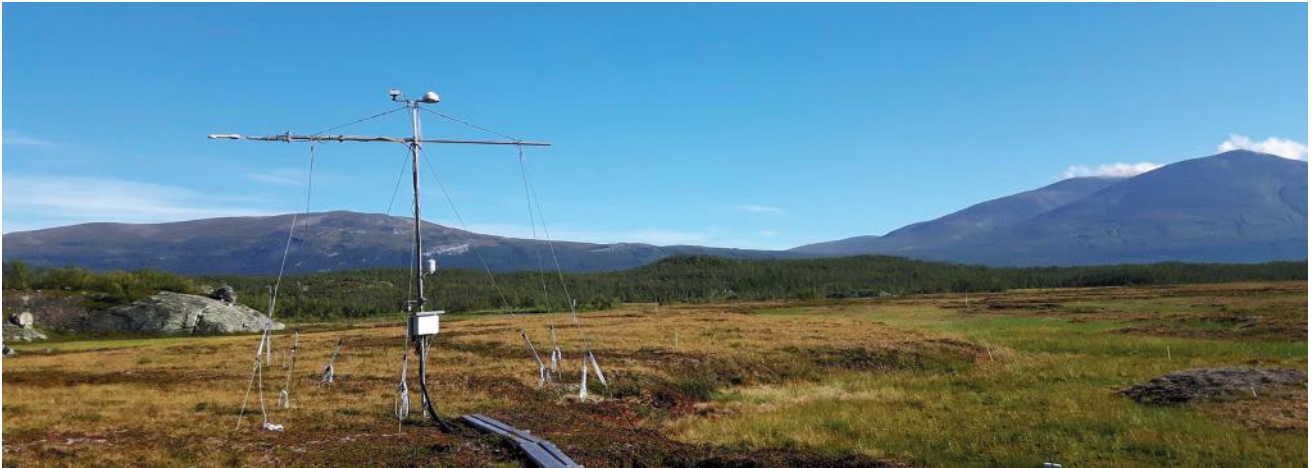


Continuous irradiance measurements with radiometers mounted on a SOLYS2 sun tracker at LES

Kipp & Zonen radiometers help Swedish researchers to understand global warming

By Ulf Mäkitalo, Head of Sales, In Situ Instrument

Climate change and global warming are amongst the most discussed topics in the world today, in one way or another it affects every citizen of our planet. There is a broad consensus in the research community that unusually rapid rises in global temperatures are caused by man-made emissions of greenhouse gases.



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In order to better understand the forces behind climate change, long-term measurements with high accuracy are of crucial importance. A lot of research has been done in this field but the quality, consistency, and accessibility of the data sets are still insufficient in many cases.

The need to harmonize research methods, measurement data and the analysis of results led to the start of ICOS - the Integrated Carbon Observation System. ICOS is a European research infrastructure that provides harmonized and high precision research data in order to understand the greenhouse gas balance of the European continent and nearby areas. ICOS consists of measuring stations in 17 European countries. All the stations are equipped according to a common protocol of either specified sensors or standardised sensor specifications.

In the Swedish implementation of ICOS, Kipp & Zonen radiometers were selected exclusively. The CNR4 net radiometer with CNF4 ventilation unit is used in all the stations as part of the Eddy Covariance flux system. To achieve high standards of global horizontal irradiance measurement ICOS has chosen a ventilated CMP21 pyranometer.

Kipp & Zonen radiometers were the natural choice because many of the researchers behind ICOS in Sweden are familiar with the instruments and have great confidence in them. It is also practical and cost-effective to use the same equipment on all sites.

The Swedish distributor of Kipp & Zonen, In Situ Instrument AB (www.insitu.se), has been part of the design and development of the ICOS concept and has also installed all of the ICOS systems in Sweden. Here, special emphasis was placed upon durability and performance under harsh climatic conditions, with lightning protection, power back-up, documentation and traceability.

In some cases this was a challenging task in remote locations with no power or communication facilities. However, during the operational years so far the Kipp & Zonen instruments have performed as expected and led to a high degree of satisfaction within ICOS.

Find out more about ICOS at www.icos-ri.eu ■



Welcome to Kipp & Zonen Tim and Perumal!

Kipp & Zonen is happy to introduce you to our new team members; Tim Kessels and Perumal Pillai. Tim is our new Finance Manager and works from the head office in the Netherlands. Perumal, however, will be working from Mumbai as our Sales Manager for India. Welcome to the team!



Tim Kessels

Tim Kessels:

"I'm very pleased to introduce myself as the new Finance Manager within the Kipp & Zonen group. Following last year's changes within the organization, I was recruited to complete the management team.

After starting my career in accountancy, I switched to 'finance management' where I found my passion. In my last assignment I was Manager Finance & Control at Luzac Opleidingen, a company comparable to Kipp & Zonen in size. At this company, it was my goal to bring the finance department to a higher level. When this goal was achieved, I started looking for a similar size company with the same kind of goals, but in a totally different business area.

And then Kipp & Zonen showed up! I love working at this company because of the strong product range, the market leading position and the innovative product-ideas which will undoubtedly further strengthen the company. As part of the team, I aim to once again bring the finance department to a higher level, this time including other company functions under my responsibility, managing the supply chain and ICT. With our strong hands-on mentality, I'm convinced we will be able to manage this successfully as a company."

Perumal Pillai:

"I'm very excited to be part of such a strong global organisation as Kipp & Zonen, being leaders in the industry. As Sales Manager India, I will be supporting the Kipp & Zonen partners and driving the OEM sales performance to strengthen our brand's position, grow the Indian market in commercial solar energy projects and in research institutions at large. I will be working closely with Gene Phay, Sales Director of Kipp & Zonen Asia Pacific.

I bring years of valuable experience in the sales of industrial products and gained a lot of knowledge of the Indian solar panel business. I look forward to working closely with the growing solar EPC industry, key accounts, partners and meteorological institutions aligned with achieving targets of the government's renewable energy mission.

With a command of over 5 diverse Indian languages, I will be undertaking extensive travel within the 29 States and 7 Union Territories that make up India" ■



Perumal Pillai

Fairs & Events

EMS Annual Meeting • Dublin • Ireland	4 - 8 September
Asian/Pacific region Brewer workshop Darwin • Australia	4 - 8 September
Solar Power International • Las Vegas • USA	10 - 13 September
Renewable Energies Cuba • Havana • Cuba	19 - 21 September
Renewable Energy India Expo • New Dehli • India	20 - 22 September
EU PVSEC • Amsterdam • Netherlands	25 - 29 September
Meteorological Technology World Expo Amsterdam • Netherlands	10 - 12 October
Asia Clean Energy Summit • Singapore	24 - 26 October

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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