



Newsletter 15

Kogan Creek Solar Boost Project
Data Acquisition Solutions for Any Installation
Comparison of Pyrheliometers in Switzerland
KIER invests in a Calibration Facility
A CHP 1 on Every Concentrix Solar CPV Plant

Content

January 2011

P2: Ben's Column

A New Year has begun

P3: News update

International Sales Meeting a Big Success
Kipp & Zonen sponsors the 2010 Moon Regan
Transantarctic Expedition

P4: Kogan Creek Solar Boost Project

P5: Data Acquisition Solutions for Any Installation

P6: Comparison of Pyrheliometers in Switzerland

P8: KIER invests in a Calibration Facility for its
Pyranometer Network in Korea

P9: A CHP 1 on Every Concentrix Solar CPV Plant

P10: CMP 11 on 'Smartsol' Solar Station

P11: Surface Temperature Sensor from Mierij Meteo
Nice to meet you: Gene Phay
Fairs & Events

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

© All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, without permission in written form from the company.

Kipp & Zonen B.V. - 2011

A New Year has begun

By the time you will read this column 2011 will have begun, which seems unreal right now when I am writing this article in my hotel room on Long Island during a visit to our US office in Bohemia. The wind is howling, the rain patters on the windows and it is cold. With this weather it is hard to imagine that the driving force in our market today is the huge interest in solar energy!

However, it is the reality that in 2010 we booked many new applications with many new customers in this market. Kipp & Zonen instruments are used with various solar energy conversion technologies. The expectations for the solar energy market in 2011 are still very good, and for the coming years as well. Supported by the national weather agencies, and adopted by international testing and certifying institutes, our equipment has gained a high level of recognition.

One of the leading magazines in the solar energy industry, Photon, is continuously testing products, including sensors for measuring solar radiation. These tests are independent, thorough and respected. Our products, such as CMP 3 and CMP 11 pyranometers have come out very well, as has our hand-held data logger. You can contact our sales and marketing department for detailed information.

Last quarter we introduced the PQS 1 PAR Quantum Sensor for measurement of Photosynthetically Active Radiation. The response from the market was very good and we are specifically praised for the accurate spectral response. With all our products we strive for optimal quality and performance and we will continue to do so in the coming years.

In the meantime the pattering rain is mixed with sleet and I have to go out into it now! I would like to thank all the users of Kipp & Zonen products for the trust that you have put in us by deploying our instruments.

I wish all of you a successful 2011, both personally and in your business, and that you stay in good health and continue to enjoy our products.

Thank you and best regards,



Ben Dieterink, President
Kipp & Zonen B.V.



International Sales Meeting in Rome a Big Success

In October 2010 more than 30 Kipp & Zonen distributors came together in Italy for our International Sales Meeting. This event is a 3-day get-together to share experiences and future plans and developments. We welcomed colleagues from all over the world; from Greece to Japan, from Chile to Sweden and from Hungary to Canada. The beautiful and historic city of Rome provided a very nice setting for our meeting.

We are very grateful to the Eurelectronica team for their hard work in organising the accommodation and conference facilities, selecting the restaurants and looking after us during late night excursions to the centre of Rome. We all



enjoyed the Italian cuisine very much, including the wines and Limoncello! We can all agree that they have great taste!

The meeting had a completely new format and focus, and the interaction between the different nationalities

was well stimulated by the challenging program and group sessions. The effort and work put into the team assignments was greater than we expected.

The new format during the International Sales Meeting in Rome was a great success which we hope to continue at our next meeting, in the Asia-Pacific region in this year! ■



Our representatives at the International Sales Meeting in Rome

Kipp & Zonen sponsors the 2010 Moon Regan Transantarctic Expedition



The Expedition aims to cross the entire Antarctic continent in wheeled vehicles while undertaking scientific research for its partner Imperial College London. The route is from the west coast at Patriot Hills, to the South Pole, retracing the steps of the famous Fuchs and Hillary crossing, and then heading north to McMurdo through the Trans-Antarctic Mountain Range. When they arrive in McMurdo they will turn around and journey back to Patriot Hills!

3

The Expedition is expected to spend some 40 days on the ice and travel about 3,600 miles. Kipp & Zonen has offered assistance with the maintenance and installation of the pyranometers and pyrgeometers - essential kit for the atmospheric studies which the team hopes to undertake to better understand the links between solar radiation, atmospheric pollution and activity in the ionosphere.

The Expedition comprises 10 men travelling in three vehicles; two 6-wheeled Science Support Vehicles, which also act as mobile laboratories, and the single-driver Winston Wong Bio-Inspired Ice Vehicle, which the team hope will be the first vehicle to reach the South Pole on bio-fuel. The Expedition has been taking place this winter, summer in Antarctica, in temperatures of around minus 30 degrees centigrade.

The scientific findings of the Expedition will be released in early 2011 and you can follow the team's progress at www.transantarcticexpedition.com ■

Passion for Precision

Kogan Creek Solar Boost Project

Australian electricity generator CS Energy has installed a Kipp & Zonen sun tracker and instruments at their Kogan Creek Power Station, to develop a detailed understanding of the local solar resource.



Kogan Creek Power Station in Queensland is a 750 MW supercritical dry-cooled coal-fired power station, and is Australia's largest single unit. CS Energy is developing 'Solar Boost', a 44 MW solar thermal augmentation of the existing coal-fired power station, which would be the largest coal-solar hybrid power station in the world. The project will use Areva's Compact Linear Fresnel Reflector (CLFR) technology to turn feedwater into superheated steam, supplementing the steam generation from the coal-fired boiler. This solar addition will enable the Kogan Creek Power Station to produce more electricity with the same amount of coal and reduce the station's greenhouse intensity.



4

generation from the coal-fired boiler. This solar addition will enable the Kogan Creek Power Station to produce more electricity with the same amount of coal and reduce the station's greenhouse intensity.

CS Energy is also developing two large (150-250 MW) standalone solar thermal power stations in the Kogan Creek area, having been shortlisted within two consortia for funding under the Federal Government's Solar Flagship Program.

Dr. Ben McGarry, renewable energy engineer at CS Energy, said the design and deployment of high quality monitoring hardware for the solar resource assessment was pivotal to establishing the business cases for all three solar thermal projects. The solar resource assessment campaign is contributing to the design and sizing of the solar thermal technology as well as the revenue side of the business model. Dr McGarry said "Raw renewable energy may be free, but the technology required to convert sunlight to useful electricity requires a relatively large capital expenditure

upfront. The electricity and revenue produced from that investment depends heavily on the local solar resource, so we needed to use the best available instruments to minimise uncertainty. Where there are hundreds of millions of potential investment dollars riding on the data, you want to be able to sleep at night."



The system comprises a Kipp & Zonen SOLYS 2 sun tracker with CHP 1 Pyrheliometer, 2 x CMP 21 Pyranometers and a third party legacy pyranometer carried over from a previous installation. Dr McGarry said the Kipp & Zonen equipment was an easy choice - "When I started researching the instruments that were out there, it quickly became clear that we couldn't go past Kipp & Zonen in terms of accuracy and reliability. As a mechanical engineer, I was impressed by the mechanical design of the tracker and instruments, and I'm comfortable that it will withstand the tough site conditions." ■

Data Acquisition Solutions for Any Installation

Finding the right data acquisition system for your valuable measurement data can be very time consuming. The system needs to be able to accurately read the output signals from our instruments, apply calibration factors, convert measurements to ‘engineering units’, store the results and offer protection from varying environmental conditions.

Kipp & Zonen has made this task easy for you by offering a wide range of data acquisition solutions. They are designed to work with our instruments and offer the functionality you need for virtually any type of installation. In addition to the METEON and LOGBOX SD, we have recently added a new modular data acquisition system to our product range based on the latest version of the advanced COMBILOG data logger.

Each COMBILOG data acquisition system is enclosed in a stainless-steel weatherproof enclosure. This offers excellent protection from the elements. The enclosures are lockable, to offer even more protection for your equipment, and are pre-fitted with mast clamps making it easier than ever to install the system to meteorological towers and stations.

Lightning can have a damaging effect on measurement equipment. Even if it does not strike your equipment directly, voltage spikes can be induced and potentially feed into your data acquisition system. Each of our new COMBILOG data logger systems is fitted with extensive over-voltage protection to keep your equipment safe.

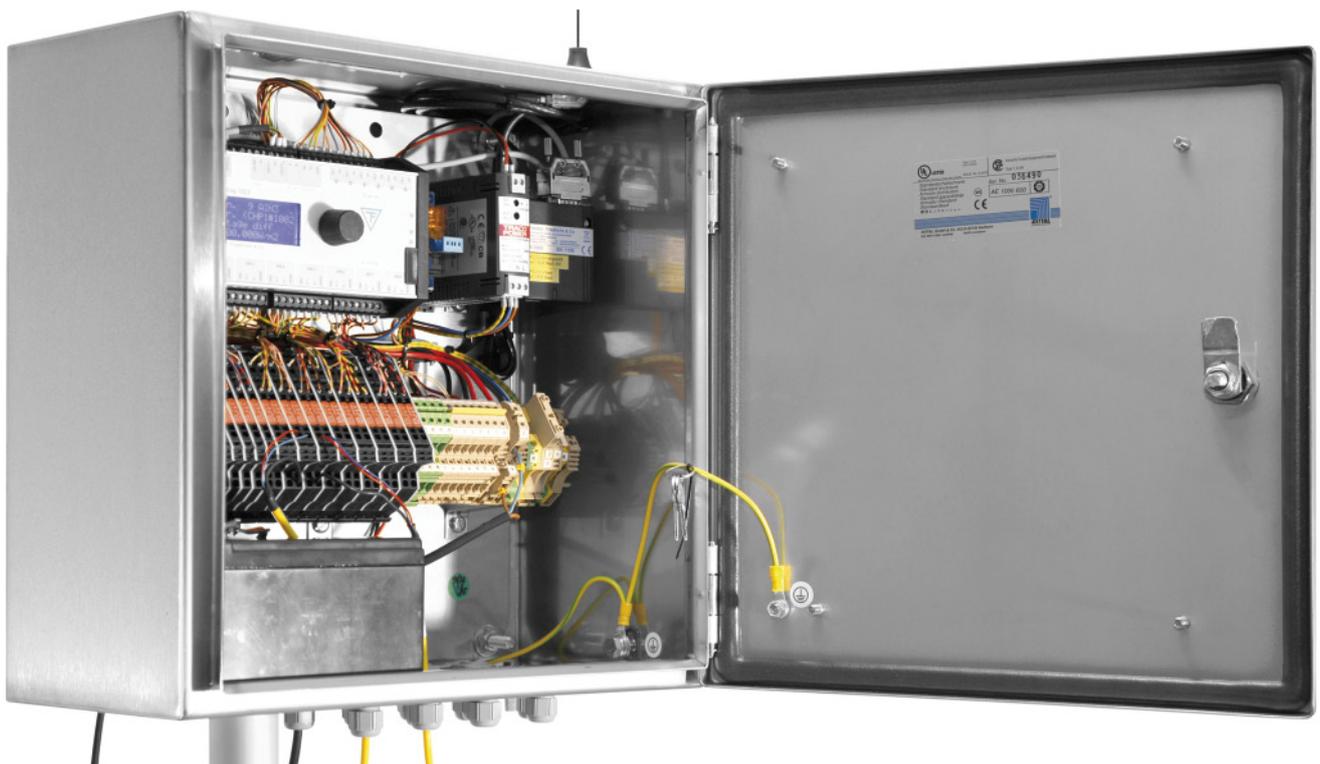
Data retrieval can be challenging when systems are installed in remote places. For this reason, the optional GSM

communication module offers full remote control of the system. For less remote installations, the system also offers as standard communication using USB, Ethernet, RS-232 and RS-485. This way you can access your measurement data across the globe from behind the comfort of your desk.

The COMBILOG comes with 7MB of memory as standard and this can be further expanded with a SD memory card. You will never have to worry about losing data due to storage capacity. Do you have an installation site where there is no power available? No need to worry, the data logger system can be fitted with a solar panel and backup battery. This way you can be sure that the system will collect data independent from external power.

Each COMBILOG data logger system is delivered including software and is pre-configured and ready to measure. It has never been easier to collect the data from your instruments, store, and retrieve them for your applications.

If you would like to learn more about this new data logger system, please visit the data logger product page on our website or contact info@kipzonen.com ■



Comparison of Pyrheliometers in Switzerland

The International Pyrheliometer Comparison (IPC) is an event that takes place every 5 years where specialists working in the field of solar radiation measurements come to Davos in Switzerland to compare their reference instruments to the World Standard Group (WSG).



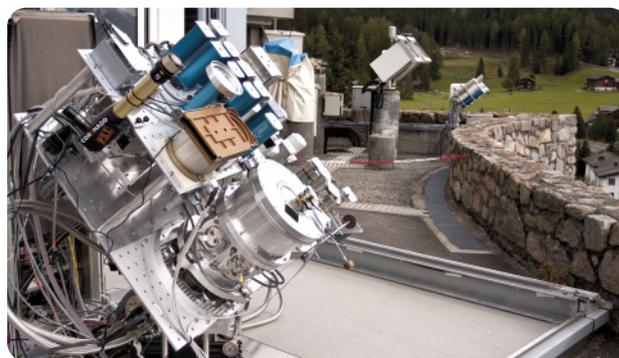
Our CHP 1 Pyrheliometer directed to the sun in Davos

The WSG is a group of instruments for the measurement of direct solar radiation that form the World Radiometric Reference (WRR), which is the measurement standard representing the SI unit of irradiance. This standard was established by the World Meteorological Organisation (WMO) in 1977 to guarantee world-wide homogeneity of radiation measurements.

The WMO is based in Geneva and the Swiss government offered to operate the World Radiation Center (WRC) as a contribution to the World Weather Watch program. The Center is located at the Physikalisch-Meteorologisches Observatorium Davos (PMOD). Aside from the WSG for direct solar radiation the Center also has a standard group of instruments for infrared radiation (WRC-IRS) and reference instruments for diffuse solar radiation.

The WSG consists of six electrically self-calibrated absolute cavity radiometers of different types. The WRR is calculated from the group as a whole and has an estimated uncertainty of 0.3%. The instruments are continuously compared to

each other and to other absolute cavity radiometers from regional radiation centers. The instruments should give readings that are consistent with each other, and differences should be within a narrow margin.



The World Standard Group

When larger deviations are found to be persistent over time that cause an increase in the uncertainty of the WRR, the instruments are inspected for possible (technical) failure and in the worst case, it may be decided to remove an instrument

from the group. When a new type of absolute cavity radiometer is developed and compared for a long time to the group and is found to behave well, it can be considered for addition to the group.

An absolute cavity radiometer has a lot in common with the pyrhelimeter. Both instruments need to be mounted on a tracker and pointed continuously at the sun and the viewing geometry of both instruments should be the same. Therefore these types of instruments can be compared to each other. However, a cavity radiometer has no window and is therefore sensitive to the entire solar spectrum from 200nm to beyond 5µm (5,000nm), whereas a pyrhelimeter is limited by the transmission of the quartz window to about 4µm in the near infrared.

The downside of having no window during measurements is that an absolute cavity has to be taken inside in adverse weather conditions, or needs weather protection, and the instrument cannot measure reliably when there is some axial wind. A deviation of one of the radiometers of the WSG some years back, was found to be caused by an insect that flew into the open cavity.

The absolute cavity radiometer is electrically self-calibrating. This works as follows; solar radiation is absorbed inside a blackened cavity, which results in a voltage output from a thermopile similar to a pyrhelimeter. Next, a shutter is closed and the sunlight is blocked. Now, the solar power is replaced by electrical power to maintain the thermopile voltage. If the dissipated electrical power (Watts) and the area of the aperture of the cavity radiometer (m²) are accurately known, the instrument can be calibrated. One of the few things that can cause a drift over time is the absorption coefficient of the black paint of the cavity.



The International Pyrhelimeter Comparison

Every five years experts from regional radiation centers, national meteorological organisations, metrological institutes, manufacturers and other users of absolute cavity radiometers or pyrhelimeters come to Davos to compare their instruments

directly to the WSG. For IPC XI, in October this year, over 70 people from more than 35 countries attended the comparison. Most regional radiation centers brought both an absolute cavity and a 'reference' pyrhelimeter (often a CH 1 or a CHP 1), as did Joop Mes and Ilja Staupe of Kipp & Zonen.



7

The absolute cavities normally give readings within 0.5% of the WSG, with the pyrhelimeters showing slightly larger deviations due to their construction. At the regional radiation centers the calibrated absolute cavity radiometers and pyrhelimeters from the IPC are used to transfer the calibration to the test or field instruments.

At Kipp & Zonen, the newly recalibrated PM06 cavity radiometer will be used to check the sensitivity of our reference CH 1 and CHP 1 pyrhelimeters, and will be also used for accurate outdoor comparisons of all kinds of radiometers.

For more information on PMOD-WRC, the World Standard Group, and pictures from the IPC please visit www.pmodwrc.ch ■

KIER invests in a Calibration Facility for its Pyranometer Network in Korea

In August we met Mr. Chang-Yeol Yun of the Korea Institute of Energy Research at the head office of Kipp & Zonen. During his visit we took the opportunity to ask him a few questions.

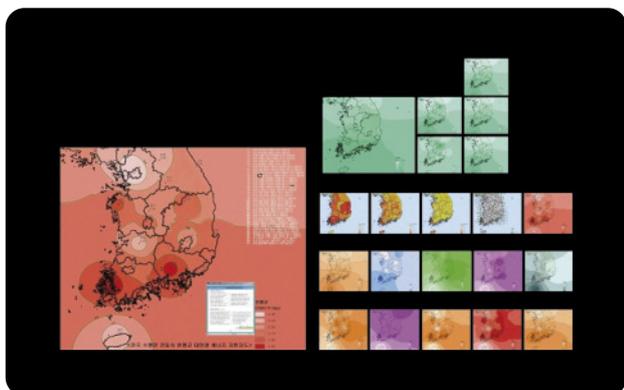
What brings you to our head office in Delft, the Netherlands?
“The Korea Institute of Energy Research (KIER) recently took delivery of a CFR calibration facility. Before, we always outsourced the calibration of our pyranometers, but with the growing number of measurement sites we have decided to start calibrating ourselves. Since I will be responsible for operating the calibration facility, I’m here for education and training by the experts of Kipp & Zonen.”

KIER already has another CFR, purchased several years ago, for research purposes and a growing number of Kipp & Zonen sun trackers and solar radiation instruments.

Can you tell us more about KIER?

“The Korea Institute of Energy Research is a leading green energy R&D establishment to realize the national development goal of Low Carbon, Green Growth. We study solar energy, wind energy, biomass energy, small hydro-energy and geothermal energy. With our studies we contribute to national economic growth by developing industrial core energy technologies and deploying the outcomes.”

8



Solar Energy Map

What do you do at KIER?

“I’m occupied with remote sensing and the Geographic Information System (GIS) of the New and Renewable Energy Research Division of KIER. We are creating a Renewable Energy Resource Map for Korea. This is a high-resolution map for the evaluation and use of renewable energy in Korea, and a contribution to the realization of ‘Green-Growth’ and the goal of 11% renewable energy production in our country by 2030. The solar radiation data comes from models, satellites and ground-based measurements.”



“Over the last years the demand for high quality solar radiation data from the government has increased. Therefore we have expanded and improved our network of measurements points. We have 16 measuring sites and each of them is connected to the online observation networking system that is free to access for national businesses and government agencies. Each site includes Kipp & Zonen instruments ranging from a sun tracker set-up with CHP1 pyr heliometer, CMP pyranometers and CGR pyrgeometer, to a POM sky radiometer. With the new calibration facility we can now do the calibration of the radiometers in-house. In the future KIER would like to expand the number of measurement points and the instrument range.”

What are your impressions of the 3 days training at the Kipp & Zonen head office?

“I really felt the years of experience at Kipp & Zonen. It is impressive to meet the product managers and talk to them one-on-one. They have taught me a lot and have been a great help. The passion for the measurement techniques is remarkable. Thank you so much for your kindness and making my stay in the Netherlands a wonderful experience.” ■



KIER thanks **B&P International Co. Ltd.** of Seoul for their support and good service. They respect their expertise in meteorology and appreciate their expert advice.

B&P International Co. Ltd. has been the exclusive Kipp & Zonen distributor in Korea for many years and can provide full installation, maintenance and support services for our products.

A CHP 1 on Every Concentrix Solar CPV Plant

Concentrix Solar's concentrated photovoltaic (CPV) power plants use lenses to focus direct sunlight onto small, extremely efficient solar cells. To check that the output is optimal a CHP 1 pyrheliometer is mounted directly onto the frame of the tracking panel.

Concentrix Solar is a leading supplier of concentrated photovoltaic (CPV) equipment for the installation of power plants in high irradiation regions. The company was founded in February 2005 as a spin-off of the world-renowned Fraunhofer Institute for Solar Energy Systems ISE, which developed the basic principles of the technology over more than ten years. At present about 80 people are employed at Concentrix Solar, which became a division of the Soitec Group (listed on Euronext Paris) in December 2009. As the world's leading innovator and provider of engineered substrate solutions, Soitec's products serve as the foundation for today's most advanced microelectronics.



CPV is a very innovative technology which is revolutionizing the solar power industry. It uses a completely different concept from conventional photovoltaic (PV) technology. CPV systems use a concentrating optic - for example, mirrors or lenses - to bundle the sunlight and focus it onto very small solar cells which convert the light into electrical energy. By concentrating the sunlight, the required active area of the solar cell is reduced to only a small fraction of the area normally required by conventional solar cells. As a result, it is economically viable to use high quality solar cells with very high efficiencies.

The CPV technology of Concentrix uses special highly efficient solar cells which were designed to power satellites and which are now being used for the first time on Earth. These III-V based triple-junction solar cells consist of three different types of cells stacked on top of each other. Each cell type is sensitized to convert a certain spectral region of the solar radiation; short wave, medium wave and the infrared range. The Fresnel lens on top of each cell concentrates the solar radiation by up to 500 times. This technology is very well suited for use in areas with high direct radiation and high temperatures.

The best efficiency is achieved when the concentrators are exactly facing the sun. The two-axis tracking system ensures that the focal point of the concentrated sunlight is right on the cells at every moment during the day, following the sun with a very high accuracy of 0.1°. The Concentrix tracking system is outstandingly robust. Even in high wind speeds, the trackers follow the sun without incurring losses.

With this technology, Concentrix Solar achieves AC system efficiencies of 25 percent, which are almost twice as high as those achieved by conventional silicon technologies. The Kipp & Zonen CHP 1 pyrheliometer is a vital component for checking and proving the efficiency of the system. For research and on installed solar power plants the accurate measurement of DNI (Direct Normal Irradiance) is crucial.

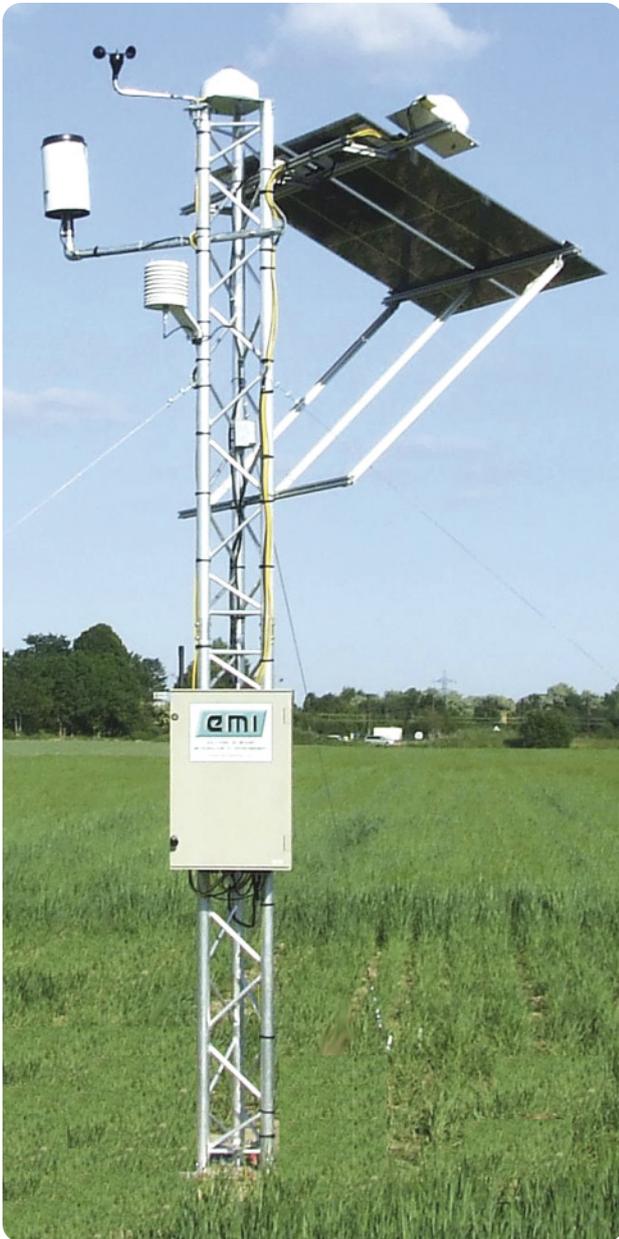
For more information visit www.concentrix-solar.de ■



Passion for Precision

CMP 11 on 'Smartsol' Solar Station

The new Smartsol weather station from the EMI division of EMI-SEPAME SA near Tours in France is dedicated to solar energy prospecting and monitoring solar energy power installations. Smartsol delivers accurate real-time information about solar radiation, wind, humidity, and other meteorological parameters in accordance with the IEC 61724 standard for photovoltaic system performance monitoring.



10

Smartsol is equipped with tilt and 'door open' sensors that transmit alerts in case of intrusion, is solar powered and completely autonomous. A surface temperature sensor is mounted on the back of the PV panel in order to monitor the panel's temperature and to notify operators about power output issues due to temperature change. The Smartsol weather station contains a similar alert system that activates in the case of out-of-limits differences between the solar irradiance and the panel's output. This system uses two ventilated Kipp & Zonen CMP 11 pyranometers.

A tilted CMP 11 measures the 'global tilted' radiation, as received by the panels. A horizontal CMP 11 measures the global radiation as given by meteorological stations and available from historical data. The domes of the Pyranometers are less affected by dirt than the flat surfaces of the PV panels. Moreover, the CVF 3 ventilation units reduce errors caused by pollution, dew, rain and frost. As a result, the pyranometers give a high accuracy measurement of the available incoming solar radiation. Comparing this to the panel's output can indicate the need for cleaning the panels, or faults with the panels or control system.

According to EMI, adding horizontal and tilted CMP 11 pyranometers with CVF 3 ventilation units was a top priority to enhance the weather station capabilities. As a result, Smartsol delivers the exact and reliable information needed to keep customers updated and responsive to the conditions around their PV power installations.

Find out more about EMI products at www.emi-sa.fr ■



New Surface Temperature Sensor from Mierij Meteo

Mierij Meteo has developed a new sensor for the accurate measurement of the temperature of an object's surface.



The main driver for the development of this sensor is requests from the Solar Energy market. When the temperature of a photo-voltaic (PV) cell increases the efficiency (and thus, the output power) decreases. Therefore, the temperature of the back of the PV panels must be measured for accurate calculation of the efficiency and output power. The new MT 32 Surface Temperature Sensor is ideal for this application.

The MT 32 has a self-adhesive mounting which enables a quick installation. The flush-mounted PT-100 element is according to DIN EN 60751 class B and is situated close to the adhesive surface to ensure good thermal conduction and provide a fast response time for the measurement.

You can order the MT 32 Surface Temperature Sensor with 3 different cable lengths; 2, 5 or 10 meters. As an option the MT 85 Junction Box can be used for cables. For applications with long leads, or to suit industrial control systems that do not have a Pt-100 input capability, the MT 81 Temperature Transmitter can be supplied, which has a 4-20mA output ■



Nice to meet you: Gene Phay

We are proud to introduce our new Sales & Marketing Manager for the Asia Pacific office in Singapore, Mr. Gene Phay. He officially started in November but he was already 'in business' when he joined us for Kipp & Zonen's International Sales Meeting in Rome in October. Since then he has put his full effort into mastering our product information.

In November Gene visited the headquarters in Delft for two weeks to learn more about our instruments and their applications. He has undergone extensive training by our product specialists and got to know his new colleagues along the way.

Who is Gene? Well, he is not completely new to our field of interest. In fact he has quite some experience in the international sales of laboratory equipment, which is where Kipp & Zonen started back in 1830. The focus on solar radiation instruments is new to Gene, but after the factory training we can be sure that his knowledge level is up to speed.



Gene is our new man in Singapore and his main approach will be focused on industry, particularly solar energy. There is a big potential to develop business and grow markets in the Asia Pacific region. He has started his activities with a round trip to visit our Asian representatives, starting with India. In the coming months he will continue his trips and looks forward to meeting customers and distributors and to hosting the Asian Sales Meeting in 2011 ■

Fairs & Events

91 st AMS Annual Meeting Seattle, Washington, USA	23 - 27 January 2011
EGU General Assembly 2011 Vienna, Austria	3 - 8 April 2011

Passion for Precision

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.

HEAD OFFICE

Kipp & Zonen B.V.

Delftechpark 36, 2628 XH Delft
P.O. Box 507, 2600 AM Delft
The Netherlands

T: +31 (0) 15 2755 210
F: +31 (0) 15 2620 351
info@kippzonen.com

SALES OFFICES

Kipp & Zonen France S.A.R.L.

7 Avenue Clément Ader
ZA Ponroy - Bâtiment M
94420 Le Plessis Tréville
France

T: +33 (0) 1 49 62 41 04
F: +33 (0) 1 49 62 41 02
kipp.france@kippzonen.com

Kipp & Zonen Asia Pacific Pte. Ltd.

81 Clemenceau Avenue
#04-15/16 UE Square
Singapore 239917

T: +65 (0) 6735 5033
F: +65 (0) 6735 8019
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

