

# Newsletter **30**

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Solar Farm Weather Monitoring in Ontario

CMP 11 in Automatic Weather Stations in Mexico



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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](mailto:kelly.dalu@kippzonen.com)

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Kipp & Zonen B.V. - 2014

# Kipp & Zonen in the Post- Ben Dieterink Era

Ben Dieterink was 'Mr. Kipp & Zonen' and Kipp & Zonen was Ben Dieterink. Now Ben has retired, but Kipp & Zonen is still here. We will always remember Ben and what he has done for Kipp & Zonen, but we have the responsibility now to continue the company and the business, and the current Kipp & Zonen team is eager and ready to do so!

As you probably know, I've taken over the position of CEO from Ben. That means we need a new Business Development Manager. As our international activities will continue to increase, we are also looking for an experienced CFO, to support us with the increasing complexity of local and international financial regulations.

Our primary external focus is on the market. One of our most important goals is to increase the business, mainly in the growth market of solar energy. We cannot look into the future, but discussions are ongoing on more distributors in more countries, opening sales offices in regions of the World where this is feasible, and closer sales and marketing cooperation between our business managers, our distributors and end users. Our revenues through solar energy have grown considerably and consequently now we are becoming more 'dependent' upon the solar energy business. Although these revenues are good, this is also a risk! Somehow we must diversify to mitigate this risk.

Internally we will focus more on R&D. We have an excellent R&D team, and there are many innovations we want to implement as soon as possible. We want to improve delivery times, and in production we can still increase our efficiency. Sales and Business Development will work closer with our customers (distributors, sales offices and end users) to increase our knowledge of the market to be able to better support our customers. Services will also be further developed.

Summarizing, there will be some internal changes. Our focus on the market will continue to improve and we are continuously working on improvements in production. Quality remains equally important, services will be more comprehensive and



improved, and in the end our customers, whom we are doing all this for, should be very satisfied with Kipp & Zonen, our products and our services.

Foeke Kuik - C.E.O.  
Kipp & Zonen B.V.

# SMP10, Smarter Measurement with Low Maintenance

*By Ruud Ringoir, Kipp & Zonen* - We have combined the best of both worlds in the new SMP10. This pyranometer has all the advantages of the Smart interface and no need to regularly inspect a drying cartridge or change desiccant. The design of the SMP10 enables the internal drying agent to last for at least 10 years.

The Smart interface provides the advantages of an industry standard RS-485 Modbus® connection and digital signal processing for enhanced performance. There is also digital to analogue conversion incorporated. SMP10-V has both Modbus® and 0 to 1 Volt outputs, SMP10-A has Modbus® and 4 to 20 mA outputs.

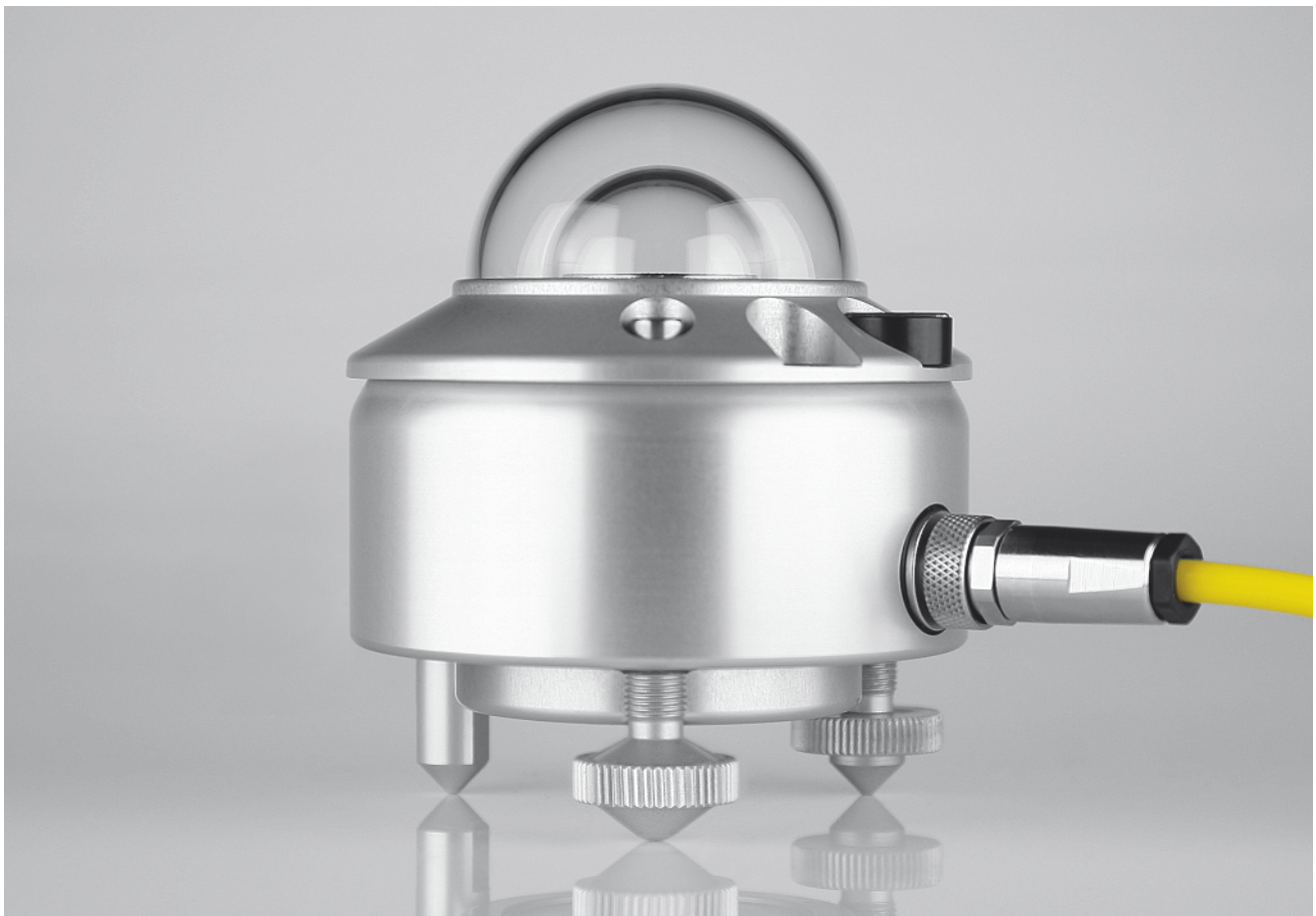
The serial data output presents the measured irradiance directly in Watts per square meter ( $W/m^2$ ), and includes the pyranometer temperature, power supply voltage, instrument type and serial number. The calibration history can also be accessed.

The standardized analogue outputs make the exchange of pyranometers much easier, for example after calibration, because they all have the same scaling from voltage or current to irradiance. No re-adjustments to a data logger or software need to be done. This saves time and prevents mistakes.

In Solar Energy, especially for remotely located solar monitoring stations, low maintenance is a major advantage. Combining SMP10 with the new CVF4 ventilation unit provides a low maintenance and high accuracy measurement solution. The swirling airflow greatly reduces soiling of the dome of a pyranometer and keeps it free from dew and precipitation. Using the in-built heater can remove frost and snow. CVF4 extends the cleaning interval, and improves the data quality from the pyranometer.

SMP10 is supplied with the all-new Smart Sensor Explorer software for comprehensive configuration and communication using a computer with a RS-485 to USB converter or a TCP/IP interface and also provides data logging to a computer.

SMP10 is the next logical step in further improving the accuracy and lowering maintenance of the most widely used pyranometers in the world ■



# A Solar Atlas for Saudi Arabia

By Kamal Sabra, Kipp & Zonen France - In August 2014, Kipp & Zonen C.E.O. Foeke Kuik and I visited the King Abdullah City for Atomic and Renewable Energy (K.A.CARE) in Riyadh.

*Kamal Sabra, Foeke Kuik, Mr. Shibli and Mr. Gasim*



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K.A.CARE was established by Royal Decree A/35 of H. M. King Abdullah bin Abdulaziz Al Saud on 17<sup>th</sup> April 2010 with the fundamental aim of building a sustainable future for Saudi Arabia by developing a substantial alternative energy capacity fully supported by world-class local industries.

In the light of the enormous solar energy potential of Saudi Arabia, with an average of 3,000 hours of sunshine per year, one of the first technical programs undertaken by K.A.CARE is the Renewable Resource Monitoring and Mapping (RRMM) Program to develop a highly accurate Solar Atlas for the Kingdom of Saudi Arabia. 59 solar resource monitoring stations will be deployed in 2014 and 2015 to capture the spatial and temporal variability over the Kingdom. The majority of these stations are equipped with Kipp & Zonen instruments.

The main objective of our visit was to establish a long-term relationship with the customer and to review progress on the implementation of the solar monitoring stations. The first day started with a visit to the Al Uyaynah site near Riyadh, accompanied by Mr. Shibli and Mr. Gasim of K.A.CARE. The site hosts a 'Tier 1 Research Station' that complies with the measurement practices described in the World Meteorological Organization (WMO) Baseline Surface Radiation Network (BSRN) Operations Manual.

There are over 20 Tier 1 research stations currently in the process of being commissioned and validated. These stations include a SOLYS 2 sun tracker equipped for the measurement of direct, diffuse, global and down-welling far infrared radiation. Instrumentation includes two CMP 21 or CMP 22 pyranometers and a CGR 4 pyrgeometer, all fitted with the CVF4 ventilation unit, and a CHP 1 pyrheliometer. 12 of the stations have POM-02 sky radiometers for aerosol optical depth measurements.

Tier 1 installations also include UVS-AB-T and PQS 1 radiometers, a ventilated pyranometer for tilted global radiation and an automatic weather station. Most sites also have a pyranometer and pyrgeometer for reflected solar and up-welling far infrared radiation. More information on the station tiers and instrumentation can be found on the K.A.CARE website at [rratlas.kacare.gov.sa/RRMMPublicPortal/?q=en/Solar/StationTiers](http://rratlas.kacare.gov.sa/RRMMPublicPortal/?q=en/Solar/StationTiers)

Foeke and I were very impressed with the excellent quality of the construction of the platform at Al Uyaynah and the execution of the project to provide ideal and safe measurement conditions. The platform is big enough to host a large set of high-level equipment for measuring solar radiation, meteorological parameters and atmospheric properties, and it is high enough that most wind-driven sand will pass underneath.

Mr. Shibli and Mr. Gasim appreciated the value of Kipp & Zonen's instruments and involvement. They clarified that equipment will be maintained and cleaned from dust on a regular basis. The platform systems will be powered with a gasoline generator, as Al Uyaynah is a remote site and solar power would have required a huge number of solar panels and batteries.

On the second day there was a meeting at K.A.CARE with Messrs. Shibli, Gasim and other colleagues. The theme of the meeting was to establish how Kipp & Zonen can help K.A.CARE to ensure long-term operability of the Kipp & Zonen instruments in the network through service and calibration. The meeting also featured discussions on future requirements and strengthened the established relationship between K.A.CARE and Kipp & Zonen.

On behalf of Kipp & Zonen, we would like to thank K.A.CARE, Mr. Shibli and his colleagues for their warm welcome, time and great hospitality. This brief, yet rich, experience illustrated so much positivity ■

# Data Acquisition Specifically Designed for Utility Scale Solar Farm Weather Monitoring

By Collin Quarrie, Measurement Specialist, Industrial Group, Campbell Scientific Canada - With climate change and pollution becoming important issues globally, it is important for governments and industry to continually respond to changes in technology and the environment. The government of Ontario has made a commitment to renewable energy and has therefore created the Feed in Tariff (FIT) program under the Green Energy and Green Economy Act (2009) to encourage the development of renewable technology and its implementation in Ontario. The FIT program is North America's first comprehensive guaranteed pricing structure for renewable energy production and it standardizes many aspects of renewable energy installations. The government target for renewable energy is 10,700 MW by 2018 (which includes energy from solar, wind, and biomass, but excludes hydroelectric power) and they are well underway to achieving their target.



*An automated weather station for solar farm performance monitoring. This turnkey system was customized by Campbell Scientific to meet the specific requirements for Ontario solar farms.*

## The Problem - Variance in consistency

One of the major issues with renewable energy is the variability in power generation it provides. As we all know, the wind does not always blow and the sun does not always shine. This can be problematic for electrical grid operators, as it is difficult to predict the weather variance that may occur throughout the course of a day. This variance greatly affects the energy output of installations and therefore, the supply of power to its customers.

## The Solution - Monitor weather to optimize power generation

To gain information about current weather conditions at these types of installations, the Independent Electrical System Operator (IESO) requires that all wind and solar installations above a certain size must have weather stations with specific parameters being measured. In the case of solar energy, this applies to any installations larger than 5 MW in size. Each solar farm must have a minimum of two weather stations, and each station must measure global horizontal and plane of array irradiance, air temperature, wind speed, wind direction, barometric pressure, and back of module temperature. The sensors are mounted within the solar field to provide weather information that is as accurate and as close to the power generation itself as possible. Each site must report the current

weather conditions to the IESO every 30 seconds for the life of the project. A secondary purpose of the stations is to provide site performance data to the owner to ensure their site is performing as expected during the life of the project.

The CR1000 datalogger is currently being used in numerous large scale solar projects to support these requirements. The CMP 11 pyranometer and CVF4 ventilator from Kipp & Zonen have quickly become the standard radiation sensors on many of the solar weather stations in this application because of their superior accuracy. The datalogger communicates directly with the site Supervisory Control And Data Acquisition (SCADA) system and provides real-time measurements. In some applications historical information is available. The CR1000 typically communicates to the SCADA via Modbus protocol via the NL120 Ethernet module. The SCADA operator is able to see the real-time and historical values in their Human Machine Interface (HMI) to examine current and past weather and to detect any faults present in the weather station system.

As the renewable energy sector grows in Ontario and across the country, so does the importance of monitoring current weather which benefits all users of the electrical grid ■



*On various sites, services including installation, commissioning, and maintenance are handled through Campbell Scientific's Field Services.*

Passion for Precision

# CMP 11 in Automatic Weather Stations in Mexico

By Ing. Víctor L. Hernández, Director de la División de Meteorología, Rossbach de México - Mexico is a country that possesses almost every climatic condition existing on Earth. Glaciers, tropical jungles, prairies and hot and arid deserts are all represented in its vast 2 million square kilometers! The task of the Meteorología of Servicio Meteorológico Nacional (SMN) is to monitor and analyze the meteorological parameters in this large and complex system.

Nowadays, the amount of good data necessary for analysis and prediction of climatic changes requires much more than basic data on temperature and precipitation. Solar radiation is one of the key parameters of the weather and climate which affects many processes on the Earth's surface and in the atmosphere, and it needs to be measured in modern meteorological networks.

Solar radiation is also an important factor for many biologists and agronomists, physicists and material scientists, architects and public health professionals. All of them need precise data on solar radiation to perform their work and research. For others, the special importance of solar radiation is due to growing interest in implementing renewable energy sources.

SMN has a network of Automatic Weather Stations (AWS) which are distributed over the whole of Mexican territory. Each of the 136 weather stations includes a Kipp & Zonen CMP 11 pyranometer to measure global horizontal solar irradiance. The data from the AWS are transmitted every 10 minutes via the Geostationary Operational Environmental Satellite (GOES), operated by the National Oceanic and Atmospheric Administration (NOAA) of the USA.

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In order to keep this network and its valuable data reliable, regular calibration of the sensors is essential. This is why the Secretaría de Energía de México (SENER) funded a project for calibration and maintenance of the pyranometers in the national network to ensure reliable surface measurements for the initial assessment of the solar energy resource of the country. These ground data are also used for the fine tuning of different radiative transfer models for analyzing the data derived from meteorological satellite images.

Calibration of the pyranometers is performed by the Solar Radiation Section (SRS) of the Instituto de Geofísica of the Universidad Nacional Autónoma de México (UNAM) near Mexico City. The Section has over 50 years of experience in the measurement of solar radiation and is one of the three Regional Radiation Centers of the World Meteorological Organization (WMO) for Region IV (North America, Central America and the Caribbean).

The specialists at SRS take care of the preventive and corrective maintenance and calibration of the CMP 11 pyranometers of the SMN AWS network. The calibration is performed according to the international standard ISO-9846:1993 Solar energy - Calibration of a pyranometer using a pyr heliometer. For this, SRS has a reference Eppley HF absolute cavity radiometer (ACR) that regularly participates in International Pyr heliometer Comparisons (IPC) at the World Radiation Center in Davos, Switzerland.

The calibration of the reference absolute cavity radiometer is transferred to a reference pyranometer using a SOLYS 2 sun tracker, according to the ISO-9846:1993 'sun-shade' method. This method requires lengthy observations and specific environmental conditions such as clear skies and a stable atmosphere, circumstances that determine the site and season of the calibration.

The reference pyranometer is used exclusively for calibrations of the field pyranometers of the SNM network and guarantees traceability of the field pyranometer calibration to the World Radiation Reference (WRR) ■



CMP 11 field pyranometers for AWS being calibrated at UNAM

# Brewer Intercomparison in Arosa

By Alexander Visser, Kipp & Zonen - The 9<sup>th</sup> Regional Brewer Calibration Center for Europe (RBCC-E) intercomparison was held at the Arosa Lichtklimatisches Observatorium (LKO) of MeteoSwiss during the period July 14-25, 2014.



RBCC-E was established within the World Meteorological Organization (WMO) Global Atmosphere Watch (GAW) programme in 2003 at the Izaña Atmospheric Research Centre. This is located in the Canary Islands and managed by the Agencia Estatal de Meteorología (AEMET) of Spain. RBCC-E maintains a triad of reference Brewer MkIII instruments, including the Regional Primary Reference Spectrophotometer (B156) and the Regional Travelling Reference Spectrophotometer (B185).

Brewer intercomparisons are held annually, alternating between Arosa in Switzerland and the El Arenosillo Sounding Station of the Instituto Nacional de Técnica Aeroespacial (INTA) at Huelva in the south of Spain. The aim is for a number of Brewers from invited organisations to collect simultaneous ozone data so that their calibration constants can be adjusted to give the same data values, when processed, as the reference instruments. This year's intercomparison was also linked to the EUBREWNET COST ES1207 Action, [www.eubrewnet.org/cost1207](http://www.eubrewnet.org/cost1207).

The visiting Brewers included the Kipp & Zonen traveling reference (B158), the Kipp & Zonen factory reference (B212) and the travelling reference from Canada (B017). All were installed on the roof of the observatory next to three Brewers belonging to MeteoSwiss. The LKO also has a unique triad of automated Dobson spectrophotometers and an ozone measurement history dating back to 1926.

Both our new Kipp & Zonen Brewer team members, Alexander Visser and Pavel Babal, were present for their

first intercomparison campaign. After a rare full week of sun, the data from all the systems was processed and compared providing a high quality calibration of the Kipp & Zonen reference instruments.

We would like to thank MeteoSwiss for their hospitality and AEMET, especially Alberto Redondas from Izaña, for their support and organization ■

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## Fairs & Events

EMS Annual Meeting, 2014 Reading • United Kingdom	6 - 9 October
Solar Power International 14 Las Vegas • NV • USA	20 - 23 October
Meteorological Technology World Expo 2014 Brussels • Belgium	21 - 23 October
Intersolar India • Mumbai • India	18 - 20 November
AGU Fall Meeting • San Francisco • CA • USA	15 - 19 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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