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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

Hello to the Kipp & Zonen Community

It is with great pleasure that I write this column to introduce myself to you. As of September 1st I am serving as CEO of our great company and I very much look forward to work with our team, business partners and other stakeholders. Teamwork in open exchange with people optimizing the balance with our climate has been the professional environment I looked for. It makes me feel very much at home at Kipp & Zonen.

At present the range and quality of Kipp & Zonen products and services are worthy of a technology market leader, but the pipeline of innovations is absolutely exciting. In my perspective innovation and reliability are important company core-values, so fulfilling market trends with new, advanced products should go hand in hand with adherence to our renowned reliability and quality standards.

Present and near-future products allow us to provide customers with comprehensive solutions and I truly look forward to exploring them with all the interested parties. With this aim I will be visiting countries and exhibitions in many regions in the months to come, which will hopefully give us a chance to meet face to face. In the end, market contacts determine our technology advances, so mapping our ambitions with your requirements are among the first topics to pursue. Solutions that enable you to achieve your goals are what we aim for.

In this newsletter we will be introducing the RaZON+, which transforms solar radiation measurement instruments into a complete intelligent system. All our offices have demonstration units and upon its recent introduction key distributors also ordered the RaZON+, so we invite you to contact them and explore the new range of possibilities.

Enjoy the articles in this newsletter and be inspired to experience the reliability, quality and innovation of Kipp & Zonen.

Erik Valks
CEO Kipp & Zonen

Norway's Largest Solar Energy Plant

The trading company ASKO Food Logistics is the owner of the largest solar power plant in Norway. In their journey to become energy neutral they already have 2,500 square meters of solar cells on their warehouse in Vestby and 4,500 m² at ASKO Adger. Once the construction of the new solar plant in Våler, South of Oslo, is finished it will cover 8,000 m², which is a record for Norway.

The Norwegian solar energy industry

Norway produces about 56% of its energy requirements, including for transport, from renewable sources. The market, however, is dominated by hydroelectric power. The Norwegian solar industry is not so well developed, but the interest in solar energy is growing. Norway has no special financial incentives for solar PV installations, but the interest is driven by the building industry. The market for rooftop solar PV electricity generation is slowly developing.

About ASKO

ASKO is Norway's largest wholesaler and supplier of groceries and delivers to the stores of parent company NorgesGruppen ASA. ASKO includes 13 regional companies with central warehouses, a cross-docking terminal at Vestby in Akershus, and 8 Storcash locations. With 600 trucks on the road every day ASKO is one of Norway's biggest transport companies. ASKO has the ambition to become sustainable and climate neutral. They focus on energy efficiency initiatives and renewable resources.

Info on the power plant

ASKO needs a continuous supply of large amounts of electricity for its logistics and cold storage centres. The customized PV plant for self-consumption is a step closer towards their important goal; shifting entirely to renewable energies in order to become a climate neutral organisation.

With this pilot photovoltaic project, ASKO positions itself within Norway as a pioneer in the field of solar energy plants. The company uses the power particularly efficiently, with a self-consumption rate of 100%. The company also benefits from the ability to plan their electricity costs long-term.

The installed capacity of the plant is 370.5 kilowatts peak (kWp) with an expected production of 300 MWh per year. In 2017 they will expand the facility to an estimated annual production of 3.4 GWh.

How do they monitor the efficiency?

ITAS - Scanmatic Instrument Technology AS, the local Kipp & Zonen distributor, supplied the ASKO project with a full weather station including CMP10 pyranometers ventilated with the CVF4. The CMP10 is especially suitable for solar energy applications as it meets the ISO requirements for a Secondary Standard pyranometer and its maintenance demand is low. The ventilation unit was chosen to minimize maintenance (removing dust, dew and snow). The station also includes a Lufft V200A ultrasonic wind sensor, two Campbell Scientific 110PV thermistor to measure the rear of panel temperature and a Sommer SSR 200S snow load scale.

Since the solar industry is still at its beginning in Norway, the need for monitoring the panel efficiency is in focus. The department of Mathematical Sciences and Technology at the Norwegian University of Life sciences (10 km to the North) are working together with ASKO to monitor how well the plant is performing and comparing results with their own local references.

The plant will be completed by the end of the year and will provide 25 percent of the energy needed for the daily operations of the building ■

New Member of our Scintillometer Family; X-LAS MkII

With a path length from 1 km to 12 km, our new X-LAS MkII is the extra-large aperture scintillometer that customers have been looking forward to for research into heat fluxes over longer paths than the 4.5 km maximum of the LAS MKII. The instrument was introduced to attendees of the AMS Boundary Layer and Turbulence Conference in Salt Lake City from 20th to 24th June this year, where it attracted a lot of attention and favourable comments and is the successor of the current X-LAS.

The LAS method is very straight forward. The measurement technique is based on the scintillation phenomenon, in which heat fluxes between the surface and the atmosphere cause variations in the refractive index of the air. The scintillometer measures these variations using a pulsed beam of infrared light which is emitted by the transmitter and detected by the receiver. From these readings, the characteristics of the measurement site and user-entered meteorological variables the sensible heat flux is calculated and stored by the receiver.

With the advantages of low maintenance, no moving parts, low power consumption, integral data logging and no requirement for recalibration, Kipp & Zonen large aperture scintillometers are a reliable and user-friendly way to measure heat fluxes on a landscape scale. The LAS MkII path length is comparable to the pixel size of satellite instruments, whereas the X-LAS MkII relates to the spatial resolution of weather models, making the scintillometers ideal for ground-truthing applications.

So, what's new about the new X-LAS MkII?

The only part that the new instrument shares with the original X-LAS is the nominally 300 mm diameter glass window and Fresnel lens. A completely new housing has been designed using carbon fibre parts to reduce the size and weight, increase rigidity and make it more watertight.

Temperature can vary greatly outdoors, but the carbon fibre ensures this has minimal impact on the optical alignment, and results in very reliable data. The mounting of the internal optics are improved for stability, and are resistant to shocks during transport. The lower weight of 18 kg allows easier installation in the field or on towers.

The rear panels of the X-LAS MkII transmitter and receiver and the associated electronics and optics are the same as the well-proven units in the LAS MkII, with digital electronics and on-board data processing and logging. The two models are the same in functionality and both can be used with an updated version of our EVATION software package and the complete evapo-transpiration (ET) system.

Features

- The only scintillometers available with built-in display and control-pad
- No calibration is required after installation
- Fast and continuous real-time measurements over path lengths from 1 to 12 km
- Low maintenance, no moving parts
- Integrated window heater to avoid freezing or condensation on the window
- Low power; transmitter 6 W, receiver 3 W; plus heater when needed
- Integral data logging accurately time-synchronised by GPS receiver
- Both digital output for direct PC connection and analogue outputs
- EVATION software for downloading and processing measured data provided free
- Optional meteorological sensor kit (wind speed, air temperature and pressure sensors) plugs into the receiver for better accuracy sensible heat flux calculations
- Operates over the C_n^2 measurement range from 1x10-17 to 1x10-11 (6 orders of magnitude)

And, there is more

The X-LAS MkII can be easily combined with a microwave scintillometer to provide direct measurements of both sensible heat and latent heat fluxes (evapo-transpiration) averaged over a large area.

To improve an existing X-LAS, or the earlier LAS 300, there is an upgrade service available to customers to convert the instrument into a X-LAS MkII with all the benefits of the new version (digital electronics with an internal microprocessor and flash data storage, integral display and keyboard, plus new internal optics with increased range). The main difference to a new LAS MkII is that the original large aluminium housing with pan and tilt mount is retained.

Contact **services@kippzonen.com** for more information ■

The Nitty-Gritty on our New RaZON+

No matter what business you are in, measuring solar irradiance is not just measuring solar irradiance; it varies according to the specific requirements. What is the desired accuracy? In what circumstances do you want to deploy your measurement set-up? What standards apply? How do you want to process the data? Moreover, what is the available budget?

Affordable indeed

Our new solar monitoring station RaZON+ is developed to be the best affordable solution for monitoring direct, diffuse and global solar radiation when the budget is low, but there's still a requirement for professional quality solar radiation measurement. As it turns out, the RaZON+ is not only competitively priced, but the accuracy is even more impressive. It is the perfect monitoring system for when you want to move forward or expand your network, but are limited by resources.

Impressive accuracy

Our development team's initial testing already showed the good accuracy of RaZON+. Now, with the production models of the Smart sun tracker and specially designed Smart sensors ready, we are happy to confirm the accuracy of the measured DNI and DHI components and of the internally calculated GHI. For global horizontal irradiance the accuracy is comparable to, or better than a SMP21, depending upon the sky conditions.

Our physicist Marc Korevaar evaluated the tracking accuracy and made a comparison of the RaZON+ with other solutions on the market for providing direct, diffuse and global solar radiation data. Marc used state of the art analysis in meteorology(*) which showed that RaZON+ performs better than the competition.

Sunshine duration

Did you know that RaZON+ also provides sunshine duration data? Sunshine duration is defined by the World Meteorological Organisation as the number of hours in a day when the direct solar radiation is above 120 W/m². Because RaZON+ measures direct radiation with a real pyrheliometer, this results in much more accurate data than stand-alone sunshine duration sensors.

One of the best features, ALL-IN-ONE

What you may not realise is that RaZON+ has all the ingredients for a complete Solar Monitoring Station. It tracks the sun, a pyrheliometer measures direct normal irradiance, a shaded pyranometer measures diffuse horizontal irradiance and the system calculates the global horizontal irradiance and sunshine duration automatically. What's even better, data logging is integrated. No more external loggers and the data is ready to use over Ethernet and RS-485 ports in Modbus® or ASCII formats; both in real-time and in stored files to download.

More great features

- GPS - for time, date and location accuracy
- Current sun position available
- Maintenance-free, long-life, gear drive sun tracker
- ISO 9060:1990 second class Smart radiometers
- Fast response thermopile detectors with wide spectral range
- Additional Modbus® input for Smart radiometers (POA) or a compact weather station
- Accessory Wi-Fi adaptor - system set-up and check by smartphone, tablet or laptop
- Mounting options - RaZON+ tripod, SOLYS tripod, adaptor for table or flange on a pole

Upgrade with SHP1 and SMP10

Normally, the RaZON+ comes fitted with the new soiling-resistant PH1 pyrheliometer and PR1 pyranometer, both of which are ISO 9060 second class instruments. If you require secondary standard, it's possible to upgrade to the Smart SHP1 pyrheliometer and SMP10 pyranometer. With this upgrade, RaZON+ reaches a level of accuracy that comes close to a high quality SOLYS sun tracker based system.

(*) L. Vuilleumier, M. Hauser, C. Félix, N. Sommer, D. Ruffieux and B. Calpini, 'Performance Evaluation of Radiation Sensors for the Solar Energy Sector', MACC-II Open Science Conference Brussels Belgium, 2014.

For more information and RaZON+ news updates please visit **www.kippzonen.com/RaZON**

Nor-Cal Controls' Tahoe® Met Station uses only the Best; Kipp & Zonen Instrumentation

By Sean Keven, Technical writer / Proposal Coordinator, Nor-Cal Controls ES, Inc - Diamond Springs, California, 2016 - New solar PV farm projects require the use of meteorological (MET) weather stations to achieve and maintain efficiencies critical to power and revenue generation. Nor-Cal Controls ES, Inc. has meticulously engineered the Tahoe® MET station to meet and exceed the exacting demands of this new industry.

Additionally, a critical issue with renewable energy is the variability in power generation that it provides. Knowing how much power a given location may produce is critical to revenue generation and the timely availability of energy to the electrical grid. Therefore, Independent System Operators (ISO's) are required to incorporate certain weather sensing devices into their project, as well as ensure that the information captured is reported appropriately and accurately.

From project planning to project completion, as well as throughout the life of a utility-grade solar facility, the Tahoe® MET station can help participating ISO's to determine the following for their project:

- Forecast potential solar availability and generation for prospective project locations
- Confirm stability of power generation through time
- Detail increasing or decreasing efficiencies based on weather patterns

Nor-Cal Controls' fully customizable Tahoe® MET station uses state of the art sensor technology manufactured by Kipp & Zonen to monitor solar radiation. The exacting demands of the solar power industry rely on the durability, manageability and sensitivity of Kipp & Zonen instrumentation. As Nor-Cal's client base relies on our engineering and integration expertise, we have come to rely on Kipp & Zonen for all of our MET station instrumentation builds.

Our standard MET Station build-out for PV projects includes two Kipp & Zonen SMP11-A pyranometers, to measure plane of array (POA) and global horizontal irradiance (GHI). Not just because of the good quality and its ISO classification (Secondary Standard), but also because customers select Kipp & Zonen for reliability.

Nor-Cal Controls ES, Inc. is a full service controls and monitoring integration company for the renewable and traditional power generation industries. Services offered include engineering and programming expertise in a wide range of programmable logic controllers and SCADA/DCS platforms and accompanying instrumentation.

Find out more about the Tahoe® Meteorological (MET) Station and download the brochure at:
norcalcontrols.net/Products/TahoeMeteorologicalStation.aspx

Fairs & Events

Meteorological Technology World Expo • Madrid • Spain	27 - 29 September
WETEX • Dubai • UAE	04 - 06 October
Intersolar India • Mumbai • India	19 - 21 October
Solar Asset Management • Milan • Italy	09 - 10 November
AGU • San Francisco • CA • USA	12 - 16 December
AMS • Seattle • WA • USA	22 - 26 January

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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