

SOLAR PROJECTS AT LUFFT

The global cooperation with system partners requires a wide variety of different variants and interfaces. Lufft environmental sensors, whether stationary or mobile, can be integrated via many different protocols in new or existing applications. Through the low power consumption, the use of the WS compact weather sensor family from Lufft is very possible in the area of solar assessment as well as monitoring. Here, in particular the low installation and assembly effort is appreciated.



WS301



WS504



WS501



WS510

Different compact weather sensors with integrated pyranometer (2nd Class and Secondary Standard)

But How did Lufft Started to Evolve Sensors for the Solar Industry?

In the beginning nineties Lufft used the radiation sensors from Haenni, Switzerland, to build into the first automatic weather stations. The silicon radiation sensor "Solar 130" was the first one to be used for the weather sensors. This specimen served as predecessor of the Lufft-own silicon pyranometer. In the meantime Haenni stopped the solar radiation sensor production and Lufft has started to work with Kipp & Zonen sensors – the world's leading pyranometer manufacturer.

The weather sensor family has grown and consists of a wide range of all-in-one solutions suitable for different customer needs. Four of the 18 WS versions include a pyranometer with different quality levels: WS301, WS501 and WS503 include a thermopile second class CMP3 pyranometer from Kipp & Zonen, WS310 and WS510, which was introduced this year, are equipped with a CMP10 Secondary Standard pyranometer from Kipp & Zonen and the WS304, WS502, WS504 and WS700-UMB measure the solar radiation with the help of a Lufft own silicon solution which was evolved on base of the Haenni sensor. The silicon radiation sensor has a 5% accuracy, whereas the CMP10 (WS510-UMB) is 0.2% accurate and the CMP3 (WS501-UMB) sensor has a precision of 1.5%. The pyranometers from Kipp & Zonen are WMO conform and cover all international classification levels (second class, first class and secondary standard). Therefore the WS510 and WS310 are perfect matches for utility scale photovoltaic power plants – for both solar assessment and site monitoring tasks. Renowned references for the WS all in one devices are Meteocontrol, Siemens, Solar-Log und EKO, SMA. The special feature about these sensors is the multifunctionality. They not only include the pyranometer but also many other probes. Therefore the WS510-UMB for example comes with the possibility to measure

temperature, relative humidity, air pressure, wind direction as well as wind speed in addition to the solar radiation. The fact that only one cable is needed for data and power connection lets the operators save a lot of installation and maintenance effort.

Especially the new WS510-UMB was made for utility scale solar power plants. It is not only equipped with a Kipp & Zonen pyranometer of the secondary standard but also unites a variety of meteorological individual sensors in a single all-in-one device for the first time. However, only one cable is necessary for power and data transfer – as for every WS family member. All single sensors of the WS510-UMB feature the highest possible quality level as well as accuracies. Also an external sensor for module temperature can be connected to the weather sensor. All measured values are communicated via a single digital interface and adjustable data logs to the data logger or SCADA system.

In the monitoring of large photovoltaic (Utility Scale) or in assessing potential sites (Solar-assessment) finally counts the maximum of energy which can be generated. Of course this depends on the locally dominant solar radiation (global radiation) in the first place. But other meteorological parameters such as air temperature, wind and rainfall influence on the yield and efficiency of the Photovoltaic modules (Performance Ratio). WS510-UMB also meets the demands of the world meteorological organization (WMO) through the active ventilating at air temperature measurement and the inertia- and maintenance-free measurement of wind speed and wind direction on the ultrasonic principle. By using an external module, temperature sensors or a precipitation sensor can be connected in addition. Before its market introduction, the highest standard for thermopile Kipp & Zonen radiation sensors was the Second Class CMP3 Kipp & Zonen version. The WS510-UMB is like the other weather sensors from Lufft equipped with an RS485 interface and transmits the data in various open communication protocols (e.g. Modbus). Thus, the

implementation is very easy into the monitoring systems on the market.

In summary, the WS510-UMB is particularly convenient in installation and reliable to use. It is ideal for large solar installations.

Moreover the WS600-UMB, with built-in temperature, relative humidity, air pressure, wind direction and wind speed probes as well as sensors for precipitation intensity, type and quantity turned out to be a preferred system when it comes to precipitation detection. The radar measurement principle gives information about the cleaning effects on the photovoltaic modules through the rain. In turn, this efficiency can be enforced, monitored and explained. Additionally it checks whether the performance is influenced by snow layers.

But the other WS "family members" have also much to offer. "Even the quality of the Lufft own silicon sensor's cell turned out to be quite persistent in the long run, which was proven by several tests", was explained by Axel Schmitz-Hübsch, Head of Development at Lufft. "The silicon pyranometer is appropriate for solar power plants, of which the outcome is more decisive than the efficiency (input-output-ratio of solar irradiance). These concern plants in price sensitive markets such as India or Africa", adds wind and weather sales manager Udo Kronmüller.

For Lufft, the United States and America in general turned out to be an attractive sales area for solar related products. There, the awareness and the demand for reliable sources of renewable energy are growing. Therefore the U.S. Solar industry achieved a record year in 2014 with a growth of 34% compared to 2013 amounting over 6,200 megawatts of capacity. Within these developments were led by the residential and utility segments (due to Solar Energy Industry Association data 2014). Reduced entry barriers and an advantageous political climate are helping to



1 Lufft WS500 weather sensor in the foreground with the installation array behind

grow solar power around the country. Companies as well as the state organizations are recognizing the benefits to installed solar capacity on their rooftops. On the one hand, it helps to power the homes and shops that adopt it but on the other hand also customers in remote locations can get access to the renewable energy source.

One actual example is the non-utility scale project of Virginia National Guard 183rd Regiment decided to complete a solar installation at their Regional Training Institute (RTI) at Fort Pickett, VA. The project, a \$2.2 million, 488 kilowatt solar array that



Increased efficiency with accurate weather data on side.

measures 10,000 square yards and consists of nearly 2,000 individual solar panels, provides the RTI with nearly 80 percent of its daytime energy needs. This field is estimated to produce 712,000 kilowatt hours per year and was installed adjacent to the RTI campus. The Lufft weather sensor provides wind speed, wind direction, temperature, humidity and air pressure. The weather station and pyranometer together provide weather and solar radiation data from the field that is then integrated into a Schneider Electric BAS (Building Automation System) and display on the customer's energy management dashboard. Evergreen Solar was the installer on the job with oversight from Schneider Electric. Lufft provided the weather sensor that for data collection of the solar plant.

But not only are the pyranometer equipped weather sensors useful; also the wind sensors are important to be used for photovoltaic plants. The V200A for example is a standard wind sensor for many California solar power projects. Ultrasonic wind sensing is preferred now so this has become the standard for many projects. Recently Lufft USA finished a small 1MW rooftop installation for the city hall building of Harlingen in Texas. It only powers the building and the surrounding area. For this a WS501 was installed at six feet above the array to provide weather data and transfer it into the Schneider Electric control system. The weather data is compared with the project production data. It also was given to the utility as a report to measure the efficiency of the solar project based on the current solar radiation at any given time. Also a V200A is used to inform on the actual wind situation (air pressure, wind direction, wind speed and virtual temperature).

Another project Lufft USA worked on was on a small date palm farm in Meca, California. The farm located in this hot desert oasis was far away from the power grid and required the solar plant to greatly lower the price of electricity. The WS501 again provides weather data with solar radiation information that fed reports into the California independent systems operator (CAISO). The harsh environment is no match for the WS501.



PV Monitoring: Lufft weather station W5501 in use on a PV farm in California, USA

About G. Lufft Mess- und Regeltechnik GmbH:

Since their founding in 1881, Lufft has been a leading developer and producer of climatological measuring equipment – true to the motto “tradition meets innovation.”

Lufft's capacity for innovation and quality has helped to establish the solid reputation they enjoy around the world.

Their products are applied wherever variables such as pressure, temperature, humidity and other environmental factors require monitoring.

With their subsidiaries in the U.S. and China, Lufft has 105 employees.

Since January 2016 they belong to the OTT Hydromet Group. Together, they offer solutions for the whole water cycle.

More at www.lufft.com

Author Contact Details

Udo Kronmüller. G. Lufft GmbH • Germany • Tel: +49 711 518 22 0 • Email: news@lufft.de • Web: www.lufft.com

Read, Print, Share or Comment on this Article at: Envirotech-Online.com/Articles   