

SOLAR RESOURCE ASSESSMENT **MDI, MHP** PLANT MONITORING **MHP**

Meteorological Measurement Systems for CSP Projects



Automatic weather stations specialized for DNI (direct normal beam irradiance) measurement are used for site analysis before and during project development as well as during operation of a solar power plant. For these different applications, and depending on the available maintenance and data transmission technology, different systems are available from CSP Services. They are adapted specifically according to client requirements with appropriate type of DNI sensor, solution of solar or grid power supply and connections for data transmission. Furthermore, CSP Services offers daily data evaluation with surveillance of equipment operation to secure highest data quality, as well as other related expert services.

Irradiation Measurement

- MDI station with rotating shadowband irradiometer (RSI)
- MHP station with pyrheliometer on tracker, sun sensor, pyranometers with shading ball assembly

Optional Additional Sensor Equipment

- ambient air temperature
- relative humidity
- barometric pressure
- wind speed and direction
- precipitation
- visibility
- soiling detection
- sunshape

Power Supplies

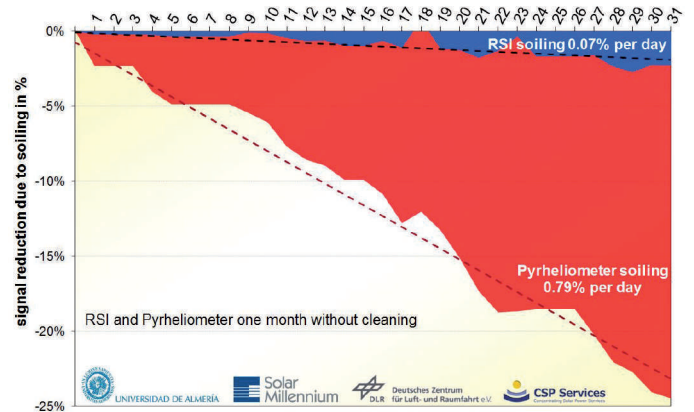
- PV panel with solar battery
- Grid connection with UPS

Data Transmission

- Cell phone modem (GSM/GPRS)
- Satellite modem
- Ethernet

All our weather stations provide highest measurement accuracy and maximum reliability. This is possible with the combination of high quality instrumentation and our operation and monitoring concept with daily data reception and continuous supervision of the sensors.

An important influence on DNI measurement accuracy is soiling by dust in combination with humidity. Soiled sensors show too low readings, in particular in case of pyrhe-liometers which are very sensitive to soiling (see graph for comparison). Thus, on remote sites we suggest using RSI sensors.



Comparative sensor soiling characteristics for one month in Almería

Our Services

- Design, configuration and delivery of meteorological equipment according to client requirements
- Installation and commissioning of the equipment on site
- Daily data monitoring including data retrieval, check of correct equipment operability and data quality
- Regular inspection visits on site, assistance in local maintenance
- Data analysis and data treatment for enhanced accuracy, sensor soiling correction
- Graphically illustrated summary reports on daily, monthly and annual basis
- Full service for site-specific solar resource assessments, including evaluation of satellite data
- Due diligence reports and expertise



MDI station with rotating shadowband irradiometer

MHP station with pyrhe-liometer on sun tracker

Application and purpose	solar resource assessment (at remote sites and without local professional surveillance)	plant monitoring or solar resource assessment (under local professional surveillance)
DNI uncertainty	single values: usually < 4% annual sum: usually < 2% (with proper calibration)	1-2% (under typical field conditions with frequent cleaning)
Maintenance	weekly to monthly inspection	daily cleaning (site-dependent)
Power supply	small PV panel and battery	grid access or extended PV system
Optional	sunshape measurement	mirror soiling measurement (TraCS)

COLOGNE

CSP Services GmbH
 Friedrich-Ebert-Ufer 30
 51143 Cologne, Germany
 Phone +49 2203 959 0030

ALMERIA

CSP Services España, S.L.
 Paseo de Almería 73
 04001 Almería, Spain
 Phone +34 950 274350

info@cspservices.de
 www.cspservices.de