Fulcrum 3D
precision sensing

Fulcrum3D Solar Monitoring | simply better

versatile and bankable solar monitoring

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solar monitoring with a difference

The Fulcrum3D solar monitoring systems are fully automated and stand-alone, designed to operate in the remote and harsh environments common at solar power station sites.

Fulcrum3D's system has been designed for either temporary or permanent installation, with various mounting and connection options available:

▸ a portable stand-alone system can be provided with its own mounting tripod (including anchors), solar power supply and remote communications system;

▸ a permanent system can be post- or wall-mounted and can include its own remote communications and solar power supply or make use of existing connections on site.

typical configuration

Fulcrum3D's solar monitoring system is based around its FDL1 datalogger platform and includes a temperature and humidity sensor, and GPS receiver as standard equipment, as well as a variety of additional sensors to suit the application.

All measurements are time-stamped to internet time protocol. Logger sampling frequencies can be set from as high as several hundred samples per second, with default sampling at 1 second. All parameters are also aggregated into 10 minute statistics.

A typical configuration includes both horizontal and tilted pyranometers, for measurement of both global irradiance and the solar resource available to fixed-tilt solar systems.

Further sensors (pyranometers, pyrheliometers with tracking mounts, or reference cells) can be integrated for more detailed investigations via RS-232, RS-485, USB and Ethernet interfaces.

The system is also fully compatible with Fulcrum3D's *CloudCAM™* cloud detection and solar forecasting system.

applications

Fulcrum3D's solar monitoring systems are designed with the high accuracy required by engineering experts in the solar energy industry. The highest class instruments are used in combination with a robust logging system to maximise data quality.

The data provided is fully bankable and has been used by Independent engineers for financial grade assessments.

The system can be used in any industry where quality environmental measurements are required, including in meteorology, agriculture, water and land management, and general environmental monitoring.
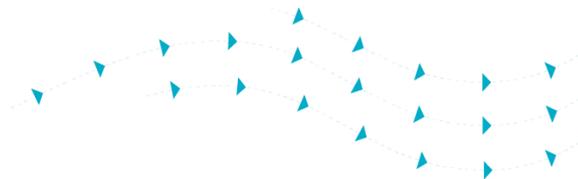
Typical solar energy applications include:

▸ site prospecting and resource assessment

▸ bankable energy assessment

▸ operating plant performance monitoring

▸ high frequency data capture for system design and integration based on typical cloud events etc.

Its versatility allows detailed investigations to be carried out, including:

▸ transient analysis resulting from rapid changes in solar input;

▸ cloud event analysis including typical event duration, lead time to event onset; and onset ramp rates; and

▸ solar power station performance analysis including correlations between irradiance, temperature, wind conditions and power output.

data access via Flightdeck™

The Fulcrum3D Solar Monitoring system is fully supported by Fulcrum3D's *Flightdeck™*, an online data delivery and analysis tool allowing Fulcrum3D clients to access, download and analyse solar and other meteorological and noise data via the web.

To take a tour visit https://flightdeck.fulcrum3d.com.

key benefits

accurate data

- A Fulcrum3D solar monitoring system provides the highest quality solar data to ensure projects are bankable. There is no better alternative to high quality on-site data.

unique design

- The high sampling rate of the FDL1 datalogger allows accurate measurement of rapid changes in solar output.
- The system can take multiple additional measurements to maximise the utility of the data collected, ensuring all data is collected with the same timestamp.
- The FDL1 datalogger is locked to internet time protocol ensuring no timestamp drift, guaranteeing accuracy.
- A Fulcrum3D solar monitoring system with *CloudCAM™* is the only fully integrated monitoring system allowing monitoring of solar, weather and cloud parameters.

proven performance

- A Fulcrum3D solar monitoring system uses industry standard instruments with calibration available on request.
- The Fulcrum3D system also integrates the proven FDL1 high speed datalogger system with its always-on telemetry.

Australian design, support & manufacture

- our global partners can supply and install systems tailored to your requirement, and our technical experts are on hand to deliver customised solutions as required.

versatility

additional sensors

The system can accept a variety of sensors measuring:

- solar module temperature
- module or system power output
- air pressure, wind speed and direction
- rainfall (tipping bucket or capacitive plate)

Sensors can be supplied with or without calibration certificates.

solar array soiling analysis

Fulcrum3D can provide an optional module soiling test station to assess the impact of dust and other contaminants on solar module performance. This test station includes two standard PV modules, one of which is regularly cleaned to provide a differential analysis of soiling losses over time to help optimise module cleaning protocols.

cloud detection with CloudCAM™

Fulcrum3D's solar monitoring system can be expanded to provide a full cloud detection system. Fulcrum3D's *CloudCAM™* detects individual clouds, setting a flag when clouds are present, and measures the percentage cloud cover in real time, allowing:

- control of power systems including solar power generators;
- assessment of likely impacts of cloud events; and
- broader meteorology, environmental monitoring and land management including evaporation analysis.

cloud and solar forecasting

CloudCAM™ can also forecast cloud locations and the location of cloud shadows on the ground, typically up to 15 minutes ahead. *CloudCAM™* can then provide forecasts of both cloud cover and solar irradiance at the measurement location and over a nearby area of interest (e.g. a solar power station).

Cloud and solar forecasts are useful for:

- solar energy control systems (managing solar power output; ramp rates; and spinning reserve);
- energy market bidding systems; and,
- plant management including optimal charge and discharge of local energy storage.

Further details on *CloudCAM™* are available from Fulcrum3D.

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Who is Fulcrum3D?

Fulcrum3D combines the strengths of Fulcrum Energy's firsthand renewable energy project experience with the specialist technical design and manufacturing expertise of Orang-utan Engineering.

The result is unique technology designed specifically to support the renewable energy sector.

Our range of remote sensing products includes:

▶ Wind monitoring using our compact beam Sodar

▶ Cloud tracking and solar forecasting using *CloudCAM™*

▶ Solar monitoring

▶ Integrated noise and weather monitoring

Our technology platform is based on robust telemetry, designed for maintenance-free operation in remote environments.

All data is available for web download via our *Flightdeck* portal.

We look forward to providing you with great Australian technology supported by first class service and support.

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