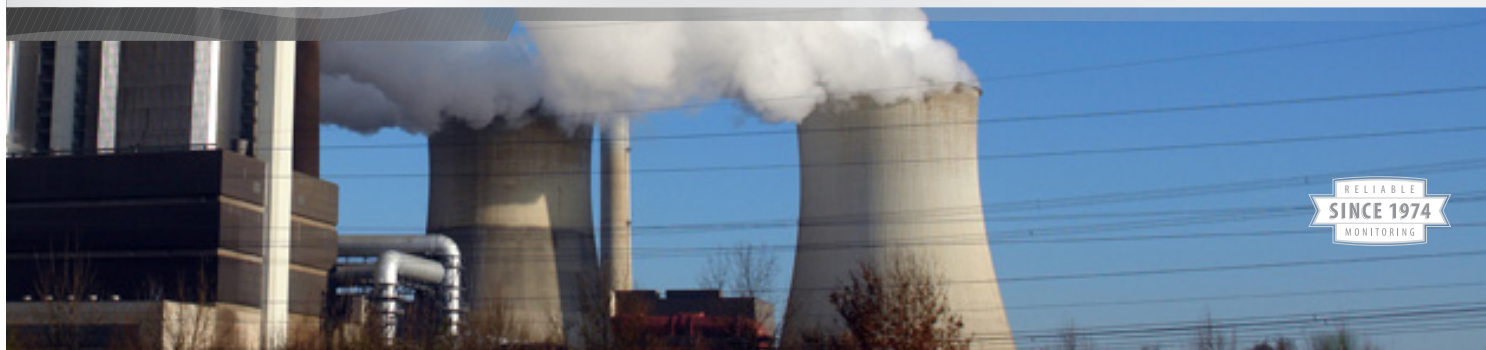




Geothermal Energy

Geothermal Measurement Instruments



RELIABLE
SINCE 1974
MONITORING

Campbell Scientific packages for geothermal resource assessment and energy monitoring can accurately and reliably measure direct-use plants. They monitor flow and temperature, and measure on-site meteorological parameters, ground-water level and temperature,

thermal gradient profile, well casing temperature and integrity, and water quality and flow in open or closed systems. Each system can be customized for the plant's unique needs, and can integrate data into existing SCADA systems.

MAJOR SYSTEMS

UTILITY-MET100

Utility-Grade Weather Station for SCADA Operations



Measurements		Datalogger	Power	Communications
Typical	Optional			
air temperature, relative humidity, wind speed, wind direction, precipitation, barometric pressure, solar radiation	back-of-solar panel temperature	CR1000	AC, DC, or solar	Modbus, multidrop, cellular, TCP/IP, fiber optic, radio, satellite, Wi-Fi

Custom Systems

We offer a variety of products that can be used to create custom Geothermal Energy systems. Please don't hesitate to let us help you configure a full system that meets your exact needs.

Dataloggers

Our monitoring stations are based around a programmable datalogger that measures the sensors, then processes, stores, and transmits the data. Our low-power dataloggers have wide operating temperature ranges, programmable execution intervals, on-board instructions, and ample input channels for commonly used sensors. Wind vector, vapor pressure, wet-bulb temperature, BTU or KWh production, and sample on maxima or minima are standard in the datalogger instruction sets. Our dataloggers interface directly to most sensors, eliminating external signal conditioning.



Data are typically output in the units of your choice (e.g., wind speed in mph, knots, m/s). Measurement rates and data recording intervals are independently programmable, allowing calculation of 15-minute, hourly, and daily data values from 1-minute or 1-second measurements. Our dataloggers can also control external devices, such as valves and samplers, based on time or conditional events. Atypical events can trigger alarms and cause additional data to be recorded. Channel capacity can be expanded using multiplexers.

More info: 435.227.9120

campbellsci.com/geothermal



Sensors



Almost any sensor can be measured by our dataloggers, allowing the geothermal energy system to be customized for each application. Almost any meteorological sensor can be used, including sensors that measure wind speed and direc-

tion, solar radiation, temperature (air, water, equipment), relative humidity, dew point, precipitation, and barometric pressure. Advanced geothermal systems provide independent turbine and pump performance monitoring with sensors that measure electrical current, voltage, wattage, power quality, stress, torque, electric field, lightning potential, vibration, strain, load, temperature, tilt, flow, and pressure.

Communications

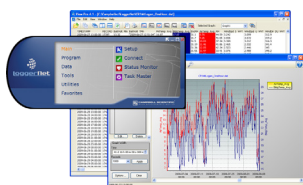
Multiple telemetry and on-site options for retrieving data or reporting site conditions allow our systems to be customized to meet exact needs. Communication options include serial, radio, telephone, cellular phone, voice-synthesized phone, satellite, field display, fiber optic, Wi-Fi, and Ethernet. Systems can be pro-

grammed to send alarms or report site conditions by calling out to computers or phones. Compatible communication protocols include PakBus, Modbus, DNP3, TCP/IP, FTP, SMTP, and CanBus.



Software

Our PC-based support software simplifies the entire data acquisition process, from programming to data retrieval to data display



and analysis. Our software automatically manages data retrieval from networks or single stations. Robust error-checking ensures data integrity. We can even help you post your data to the Internet.

Benefits of Our Systems

- › Proven reliability, even in harsh environments
- › Long-term, stand-alone monitoring
- › Support for nearly every available sensor
- › SCADA, DNP3, and ModBus compatible
- › Multiple communication options: Wi-Fi, Ethernet, radio, satellite, phone, cellular phone,
- › Research-grade measurement quality
- › Unmatched customer support

Typical Systems

- › Weather stations
- › Groundwater measurement
- › Direct-use BTU measurement
- › Independent pump-performance monitoring
- › Turbine performance monitoring



815 W 1800 N | Logan, UT 84321-1784 | 435.227.9120 | www.campbellsci.com
USA | AUSTRALIA | BRAZIL | CANADA | CHINA | COSTA RICA | FRANCE | GERMANY | SE ASIA | SOUTH AFRICA | SPAIN | UK

© 2009, 2017
Campbell Scientific, Inc.
August 23, 2017