

ENERGY STARTUP USES DATA LOGGER TO MONITOR INNOVATIVE SOLAR TRACKING DEVICE

DATA TAKER DT85 ACTS AS MINI WEATHER STATION



In the solar industry, system validation is a critical step to bringing new technology to market. CAS DataLoggers provided the device and environmental monitoring solution for [Sulas Industries](#), a solar energy startup that has patented an innovative passive solar tracking device that works without using any motors, gears or electronics. This unique system works by mimicking heliotropism, the ability of flowers to follow the sun across the sky.

Sulas' patented HelioDrive technology replaces the entire drive and control mechanism used by current electronic-based systems with a simpler and more cost-effective solution. The HelioDrive connects to large arrays of solar panels and uses a small amount of specially engineered paraffin wax (acting as a hydraulic actuator) encased in a copper cylinder with a piston inserted in the bottom. The entire assembly—called the Receiver—is then insulated with a glass insulator. The Receiver is positioned on top of a lower assembly consisting of a tube with helical cuts anchored to the ground. These two assemblies are connected via a torque tube and a pin going through the cut.

A Parabolic Concentrator adds heat to the Receiver and provides the tracking function. As the sun enters the angle of incidence on the parabolic concentrator, the wax is heated within the Receiver, hydraulically pushing the entire upper assembly upward while also rotating it westward to follow the sun across the sky. In contrast, when the sun sets, the wax cools and the entire assembly rotates back down to face east.

This thermal-powered tracking actuator is anchored in the ground and mechanically attached to a large array of PV panels. Acting as a large hydraulic piston, the HelioDrive can be used to rotate a collection of photovoltaic (PV) panels, allowing an entire solar array of hundreds of connected solar panels to follow the sun and increase the energy yield. This is all achieved using only one moving part requiring no computers or electricity!

The Sulas team needed a combined environmental and performance-monitoring data logger to act as a weather station and device component monitor by connecting it to many different types of sensors. They also needed remote communications capability to enable real-time monitoring and to automatically push various data sets with varying time elements over the company's network via FTP. They also needed the device to be durable enough to log data unattended in the field under harsh weather conditions for their solar tracking device.

INSTALLATION

Last year CAS DataLoggers supplied Sulas Industries with a [dataTaker DT85 Universal Data Logger](#) which has since been installed, configured and connected to a wide range of sensors. Fin Doyle, Sulas Industries Founder, Owner and Engineer, explains: “When you’re planning a new process, you know you need to gather enough data: all the information benefits your company in a multitude of ways. We’re building

a 15 kW test field with various versions of the technology we’re running, where we’re using the dataTaker for multiparameter data collection and process validation.

“We have three thermocouple temperature sensors measuring ambient air temperature around the HelioDrive. We’re also monitoring the internal paraffin wax temperature and using another three sensors to monitor the hydraulic cylinder pressure in the device.

Since this is Colorado, the wax temperature can range from freezing up to 150°F so we’re keeping track of it. Meanwhile our pyranometer measures solar radiation while our anemometer measures wind speed and direction. We’ve also connected tilt sensors to track solar panel angle to the sun.”

The dataTaker DT85 is installed in an enclosure rated NEMA 5 for solid protection from harsh weather. For additional protection, the dataTaker also boasts a ruggedized design that can stand up to extreme temperatures and rough handling. The DT85 features a maximum of 48 universal analog sensor channels connected to several weather and environmental sensors measuring nearly every aspect of this solar energy process. External ports in the enclosure enable the dataTaker to connect to the sensor cabling, recording the analog signals from all these sensors and automatically scaling the data into engineering units.



USAGE

Using the dataTaker's alarm capability, the Sulas team can set up automatic triggers for high pressures on the HelioDrive during its hydraulic operation: "In future we may decide to set an alarm to catch problem temperatures that could overheat the system. For example we might set an alarm to notify us over the network if the temperature ever goes up to 250°F. Our solar panels have microinverters monitoring them, but if we decide to in future, the dataTaker could monitor the PV cells too."

The DT85 has its own 10 million-point internal memory to store the high data volume. Here users have also set the dataTaker to automatically transmit its readings to selected recipients via E-mail. This was simply a matter of connecting the logger's Ethernet communication port to the network hub at the test field site and configuring a few network parameters.

The team has also configured their dataTaker to generate and send out a nightly report containing the last 24 hours of recorded data. Every night at midnight the DT85 sends the latest one to Fin Doyle and CEO Jeff Bloszies who later analyze the data in detail and compare it to the solar field electricity output.

SOFTWARE

The dataTaker's built-in graphical interface dEX software allows for quick logger setup and configuration. Users can directly view data remotely online in real-time from a web browser, in this case through the DT85's Ethernet communications port. The data logger can also be accessed using its USB and RS-232 ports.

Using automatically-uploaded data files, users can create customized tables, charts and graphs illustrating the collected environmental data. Regarding the software, Fin Doyle comments, "We've been working with the software for a while now. We're fans of the dEX interface: it's intuitive so it's easy to set up a sensor and a logging schedule. We view the data in dashboard mimic form so it's all there at a glance."

BENEFITS

The dataTaker DT85 serves this application as a single solution monitoring all the required device operational parameters, weather and environmental values for their solar tracking device. Fin Doyle explains: “The dataTaker plays a key role in our validation process, collecting information on our solar process and giving us hard data for our proof of scale. The DT85’s data is also a sales tool for us to show to customers and other third parties. The DT85 monitors every environmental parameter we’re interested in, and the software is easy to get the hang of. We’re considering sourcing another dataTaker in the near future, maybe another DT85 if we need the high channel count.”

Brent Irwin, Technical Support Specialist for CAS DataLoggers, helped get the application quickly up and running. “This green energy project is an interesting use of the dataTaker because the team is simultaneously logging so many weather values. It also highlights the importance of data capture for startups, especially those with a new device or process to monitor.”

See the innovative HelioDrive system in action on [YouTube](#)

For more information on the [dataTaker DT85 Universal Data Logger](#), an innovative solar tracking device or to find the ideal solution for your application-specific needs, contact a CAS DataLogger Application Specialist at **(800) 956-4437** or www.DataLoggerInc.com.