EOL ZENITH DATA LOGGER

FOR WIND AND SOLAR RESOURCE ASSESSMENT

KINTECH ENGINEERING

Wind Resource Assessment

Solar Resource Assessment

Cold Climate Wind Resource Assessment

Wind Farm Monitoring

Meteorology

The assessment of wind resources is one of the most important phases in the development of a wind farm. The EOL Zenith data logger is designed for wind resource assessment as well as monitoring of wind farms.

Gathering data on radiation and meteorological data is crucial for estimating and simulating prospective energy yields. The EOL Zenith data logger is designed for solar resource assessment as well as monitoring of solar plants.

THE EOL ZENITH DATA LOGGER

The EOL Zenith collects data in compliance with IEC 61400-12 for high quality wind assessment campaigns.

The EOL Zenith is suitable to work in all climates (from the north of Norway to the desert in Saudi Arabia). This is thanks to the carefully designed electronics, the robustness and reliability as well as the low power consumption (something very important when you are operating equipment in remote areas and unique to the EOL Zenith data logger).

The EOL Zenith is the 3rd generation data logger from Kintech Engineering. The EOL Zenith features 1 Hz sampling rate (complying with IEC 61400-12), extended turbulence calculation (TI30), st. dev., max. and min. for all input channels and advanced sensor error diagnosis (e.g. wind vane st. dev.). Real time data together with the Tower Management Tool (TMT) helping you to keep track of all your wind assessment sites.

GPS

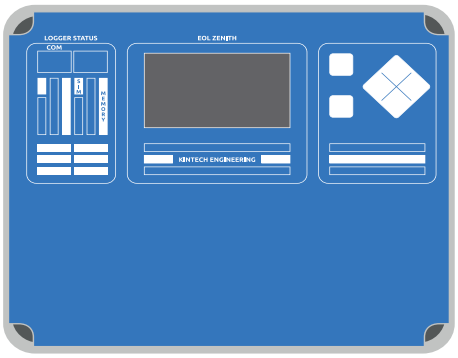
The EOL Zenith includes a GPS module, providing perfect timing, accurate positioning of the met mast for micrositing as well as simplifying site management and supervision. The GPS module also allows the user to view their mast position(s) directly in Google Earth.

GSM / GPRS Communication

The EOL Zenith includes a GSM/GPRS modem for communicating remotely with the data logger. Download data, collect real-time values and refine the logger settings remotely.

Output Format

The output format of the wind data files is in text and excel format and includes specific site identification, GPS position and timestamp. The data can be imported directly into the most common programs in the wind energy sector for further analysis (WASP, Windsim etc.). The output format can be modified using our post processing tool (Python).



The EOL Zenith data logger offers a wide range of possibilities and serves as a hub for your wind measurement campaign. The EOL Zenith data logger is standard equipped with GSM/GPRS communication and because of the very low energy consumption just a single 10 W solar panel is sufficient for standard operation.

Do you want to be completely up to date on all your wind measurement campaigns 24/7?

With the ability to connect to the EOL Zenith data logger via the internet you have complete control over all your sites. The EOL Manager helps you to keep track of all your site from just a single dashboard.

INPUT CHANNELS AND STANDARD FEATURES

Frequency (anemometers)	**10**
Wind vanes (7 analog and 2 digital)	**9**
Analog sensors (temperature, pressure, etc.)	**13**
Data sampling rate	**1 Hz**
Recording intervals	**1 min / 5 min /10 min**
GPS positioning	**YES**
GPS controlled clock + sync.	**YES**
EOL Manager + EOL Charting	**YES**

DATA STORAGE AND TRANSFER

Memory capacity (SD/MMC) 5 years of data	**1 GB**
Modify settings remotely	**YES**
GPRS telemetry and real time data	**YES**
Satellite telemetry and real time data (option)	**YES**

All input channels are compatible with all class 1 anemometers without the use of interface cards.

The EOL Zenith data logger is designed and built around the end user. It comes with several standard features such as GSM communication, GPS for precision timing, RAW data files, 1 Hz data sampling and “direct connect” for all standard sensors in wind measurement campaigns.

EXTRA MODULE

Since many of our users have different needs, a range of extra modules and add on’s can be added to the data logger.

Satellite Module

The Satellite Module provides coverage in remote areas without access to the regular GSM network. It was designed for use with the Iridium constellation however recently also extended to cover the Inmarsat (BGAN) system. The satellite module includes a preinstalled satellite modem, satellite antenna and all the wiring needed.

Ultrasonic Module

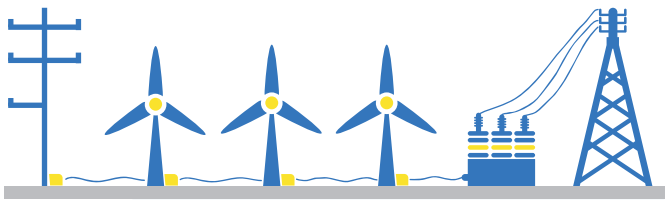
The ultrasonic module for the EOL Zenith data logger allows for easy connection and data retrieval from ultrasonics. An ultrasonic sensor is not affected by its inertia. It will measure a change in wind direction or a high gust immediately and is well suited for cold and icy environments.

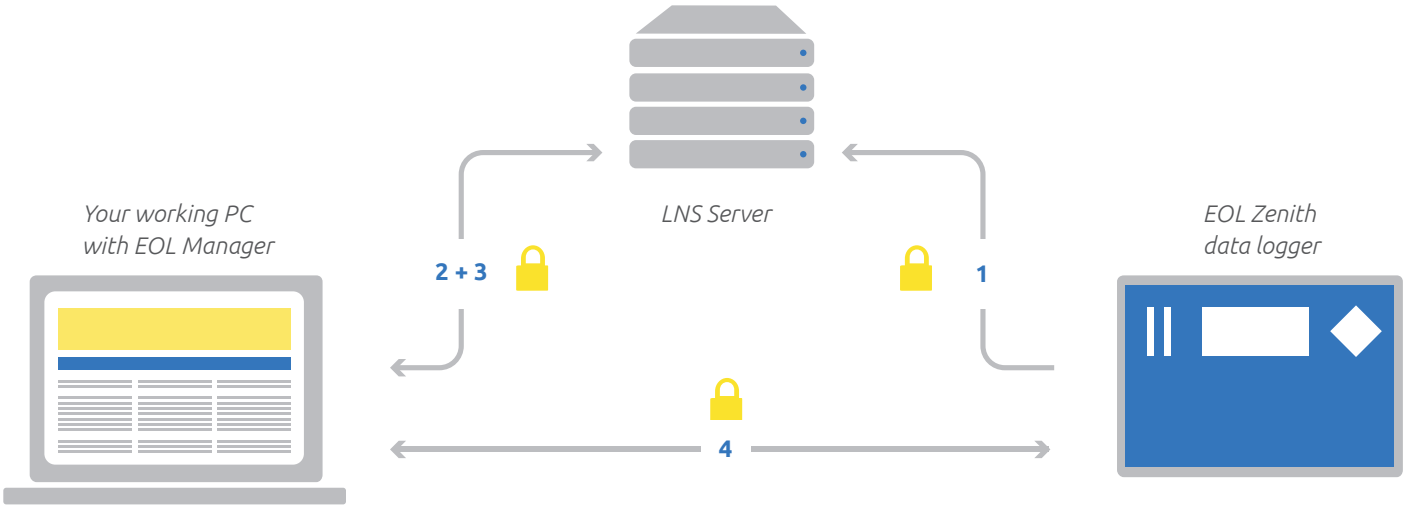
Wiring Panel

The Wiring Panel for the EOL Zenith data logger is designed to protect the data logger from electrostatic discharges and make it even easier to connect lots of sensors. In case of a lightning strike the Wiring Panel diverts the energy to the GND/EARTH and thereby protects the data logger.

Windfarm Monitoring Module

The EOL Zenith wind data logger has an option for adding a Modbus communications port which lets the logger easily connect to SCADA systems via Modbus. Modbus is the most common protocol and one of the most supported industrial serial communications protocols used in modern SCADA systems.





1

The data logger sends its IP address to the LNS server. No other data is transferred.

2

Your PC request the IP address from the LNS server.

3

The LNS server replies back with its current IP address.

4

Your PC connects and downloads the RAW data. Data are not stored on the LNS server.

CONNECTING TO YOUR DATA LOGGERS

When the data logger is powered on, it automatically goes through a start up process to be ready for you to establish a connection from your PC. The GSM/GPRS network allows connections to the internet through the APN (Access Point Name). The APN is unique to each GSM operator and is the link between the GSM network and the internet.

Since the IP address of the data logger may be unpredictably changing, Kintech Engineering has developed a comprehensive infrastructure to make it as easy as possible for the end user to download data and monitor wind measurement campaigns.

RAW DATA FORMAT

The EOL Zenith data logger stores raw data. The calibration factors are applied by the EOL Manager, meaning that any user error picked up during the data campaign can be addressed easily by passing the data through the software with the corrected factors.

ENCRYPTION AND PASSWORD

We are well aware that your wind data are sensitive and very valuable to you. That is why all the data are encrypted and password protected and therefore only readable to those possessing the correct password. No data are stored between your PC and the data logger.

There are 2 levels of password protection. Full access and “access to realtime data”. Access to real time data lets your installer check that everything has been properly connected.

DATA FORMATS

Every time data are downloaded by EOL Manager automatically creates the following 3 files:

- “.log” is the encrypted binary RAW data
- “.txt” is the status and event report
- “.wnd” is the output wind data

MANAGE EVERYTHING FROM A SINGLE DASHBOARD

The software and remote monitoring system developed for the EOL Zenith data logger, EOL Manager, ensure reliable and easy access to wind data and logger status and forms an integral part of the data acquisition system.

Download data, collect real-time values, refine logger settings remotely and keep all your wind data organized. EOL Manager automatically downloads all your wind data from an unlimited number of wind assessment masts.

- Everything from a single dashboard
- Automatic status messages on sensors
- Connect in real time to the loggers
- Edit logger settings OTA

The EOL Manager has been visually enhanced with several powerful features, including advanced graphics for more accurate wind data trouble shooting as well as enhanced control of multiple wind assessment sites with automatic and real time connectivity.

The software introduces several new features including advanced graphics for data analysis (Weibull "best fit", shading analysis charts etc.) and makes it easier to keep track of all your different wind assessment sites.

EOL MANAGER

The software offers 'at a glance' status of all loggers in the field with easy identification of sensor faults. It also allows for configuration of the data loggers, sensors connected to the data loggers, modem type, how to download the wind data and the frequency of the automatic downloads.

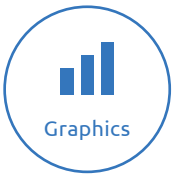
EOL CHARTING

With the EOL Charting you can create graphs and analytical data and check that all your sensors are working as they should. EOL Charting provides a wide range of graphs. The time series graph allows you to zoom in and out, scroll forwards or backwards in time.

EOL Manager automatically downloads all the wind data for you. You just set the time and date.

With the graphics tool you can check the quality with just a single click.

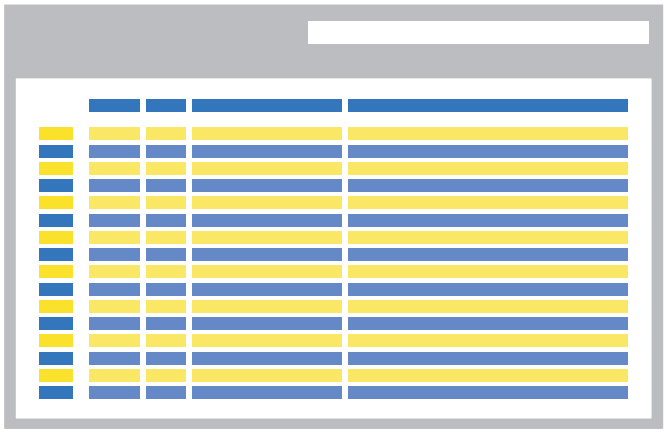
GPS timing and exact GPS coordinates.



Go into details and make sure all your sensors are working correctly.

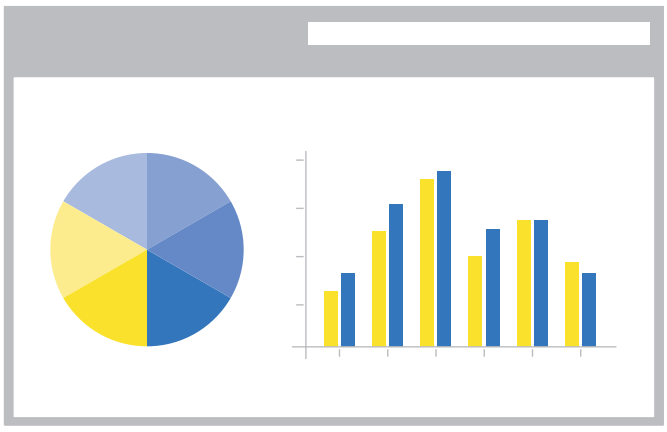
Connect in real time to the data logger and get an instant glimps on your sensors.

EOL MANAGER



From a single dashboard you can control all your loggers.

EOL CHARTING



EOL Charting provides a wide range of graphs. From here you can check that all your sensors are working as they should.

Anemometers				Wind Vanes		Analog inputs				
1	2	3	4	1	2	1	2	3	4	
1	2	3		1	2	1	2	3	4	5
1	2	3		1	2	1	2	3	4	5
1	2	3		1	2	1	2	3	4	5

EOL MANAGER IN DEPTH

The new and improved EOL Manager is designed to make it even easier for our customers to manage all their sites from a single dashboard. Monitor your wind & solar resource assessment campaigns and get automatic instant feedback on potential sensor malfunctions.

- New design and layout
- Several new features
- Reduced clutter that lets you focus on the important things

Fresh colors and new icons
We have made a re-fresh of the colors with warning flags now going from light pink to dark pink whereas e.g. real sensor malfunctions continue to be displayed in red.

Configure your data loggers remotely
Refine your logger setup remotely with the latest settings and features.

Download and organize your data
Have EOL Manager download your data automatically. Download several data loggers at once.

Connect in real time
Get live real-time data from your loggers (bi-directional communication). Available 24 hours a day.

Smart file size - minimizing costs
Smart file compression by only transmitting actual data (nothing else). No wasted satellite minutes here!

Intelligent onsite tracking
Would you like to know when somebody has touched your data loggers onsite? Now you can.
Keypad and logger on/off tracking.

Smart sensor diagnosis
We have updated the way EOL Manager detects sensor anomalies and malfunctions. User configurable and now even more intelligent.

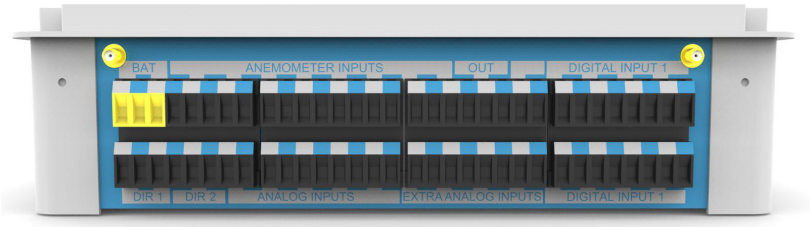
Latest Data Encryption
We have implemented the latest symmetric data encryption methods to keep your data absolutely secure. All data transfers are encrypted and password protected and no data are stored between your PC and data logger. Raw and decoded data are digitally signed using SHA512.

How are you connected?
This feature helps you to keep track of how you connect to all your different data loggers.

- Blank means connection via GPRS
- IRDM means connection via Iridium satellite system
- BGAN means connection via Inmarsat satellite system

Get your boom orientation right
Now you can insert the individual boom orientation for all your sensors installed on the mast.

Sharing data intelligently
Once data are downloaded from the data logger, EOL Manager can automatically forward the data with e.g. your colleagues, external consultants or your met mast installation company.



INPUTS	Anemometers	10 anemometers (synchr. generator, push-pull, reed contact or hall effect)
	Wind vanes	2+5 analog (potentiometer) and 2 digital
	Analog	13 inputs (temperature, humidity, pressure, radiation, up flow wind etc…)
OUTPUTS	Digital outputs	3 outputs
	Sampling rate	1 Hz (according to IEC 61400-12)
	Recording interval	1, 5 or 10 minutes
	Time accuracy	GPS precision, always syncroniced
	Recorded values / channel	10 minutes: average, st. dev. (config.), min. (config.), max. (config.)
	Turbulence and gusts	TI 30 sec. (ANE channels 1 and 2), st. dev. 10 min., max. and min.: gust 1 to 3 sec.
	Geographical coordinates	Records the site coordinates according to the GPS
RESOLUTION AND ACCURACY	Speed resolution	16 bits (<0.01 m/s)
	Gust precision	0.05 m/s
	Standard deviation precision	0.01 m/s
	Wind vane resolution	10 bits (0.35º)
	Analog resolution	12 bit (1.22 mV) (temperature, humidity, pressure, radiation, etc…)
POWER	Voltage	5...30 VDC Reverse polarity protection, solar power supply available
	Modem power	User configurable and smart management by logger
RECORDED DATA	Memory card	SD/MMC card 1 GB
	Storage period	>5 years
WARRANTY	2 years	2 years against manufacturing defects and material flaws
NORM	IEC	IEC 61400
DATA DOWNLOAD	Download options	Telemetry, MMC reading
	Data encryption	All data are encrypted and password protected (config.)
	Output file format	.txt, MS-Excel and configurable data columns
		Regional config. for the output data file (config.)
		Raw data, decoded data and download report
	Digital signature	By GPS for data modification prevention
TELEMETRY	Communication system	CSD, SMS, Internet (GPRS), CDMA, Satellite and RS232 cable
	Connection register	Remote connections + keyboard access with date and time of the event
	Antennas	GSM & GPS
CONNECTIONS	Terminals	Removeable plugs
	Memory card	SD/MMC 1 GB
	Modem	GSM/GPRS/GPS quad band internal modem (3G optional)
FRONT PANEL	Screen	LCD w/ 64x128 resolution
	Keyboard	6 buttons keyboard
	Communication slots	2 serial ports
	Memory slots	2 memory slots
	LEDs	GPS, GSM, CPU
	Sensor configuration	Telemetry, by inserting MMC memory into logger or by keyboard
	Firmware configuration	OTA configuration and by MMC insertion
	Display activity register	Every time a technician press a key and turns on the display, the event is registered and recorded in the MMC memory with time and date

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