

# OneView<sup>®</sup> Foundation Monitor



ONE-STOP SHOPPING



ENGINEERED TO ORDER



OFF-THE-SHELF SOLUTIONS



SURVEILLANCE AND SUPPORT



# Foundation Monitor

The patented Foundation Monitor Kit from SCADA International is a unique invention that delivers reliable early warning signals about emerging foundation problems for on-shore and off-shore wind turbines. The solution delivers the ability to spot those turbines that show abnormal vertical movement and need to be stopped and/or have a physical inspection. The movement will occur in case of defective foundations or foundations that are not properly anchored into the ground.

## How it works

The logic of the system is to measure the vertical movement (tilt) of the tower by using the principal of pendulum. A cylinder enclosed pendulum is mounted to the tower wall and three sensors in the bottom of the OneView® Foundation Monitoring Kit measure the vertical movement. To reduce the effect of tower vibrations and other "noise", a minor amount of oil is added to the bottom of the solution.

When installing the system, a tower specific calibration is carried out in order to make it possible to rule out any construction born tilt. An algorithm placed in PLC program, based on the input from the three sensors, defines the vertical movement of the tower. A central main PLC is placed in one of the towers, and it monitors foundation movements locally, but also monitors additional distributed I/O modules in other towers via a local network.

## Interface to SCADA system

The combination of a pendulum, three separate sensors, a strong logarithm program and a central main PLC placed locally secures accurate and timely data. The data are highly accessible through a standard interface.

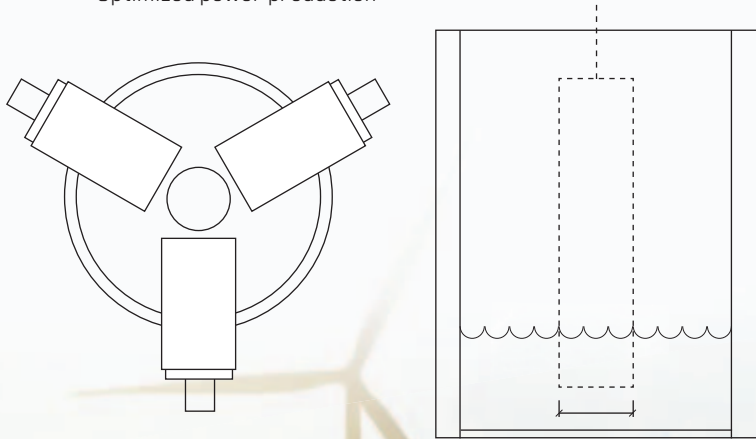
The monitoring system can be connected via interface to SCADA International's OneView® SCADA system or another SCADA system preferred by the customer.

## Features

- Continuous monitoring of the vertical movement by pendulum and 3 sensors
- Algorithm placed in PLC program, defines the vertical movement of the tower
- Central PLC is physically placed in one of the towers but also additionally distributed I/O modules in other towers via network
- Via standard interface connect to hosted OneView® SCADA system of customers' SCADA system
- Ability to use Predictor and Virtual Events from OneView® to detect high risk towers and set up automatic alarms

## Benefits

- Unique patented invention
- Accurate and timely data
- Reliable early warning signals
- Data accessible through standard interface
- Preventive maintenance and reduced service costs
- Optimized power production



## Turning data to decision support

If data from the Foundation Monitor are explored by the Predictor and Virtual Event modules in OneView® SCADA they are turned into decision supporting information. The Predictor module can monitor tower tilt for comparable turbines and detect tilt outliers and automatically send alarms to relevant persons.

By adding the Virtual Events module in the OneView® SCADA system, a turbine or turbine type specific alarm setup can be configured. The Virtual alarm setup can take into account all tilt relevant information in the SCADA system e.g. the turbine physics, the soil where the tower stands, power production, wind speed and wind direction and data from various sensors. All this combined with easy installation means that the patented Foundation Monitor delivers a high value for the investment involved.



## We share your passion for wind

Since its foundation in 2006, SCADA International has grown to be a leading solution provider within the global wind industry. With an extensive track record and deep roots in the Danish wind heritage our services span the entire value chain including SCADA systems, SCADA application solutions, Park Network Solutions and Energy Power Control.

Headquartered in Denmark, SCADA International employs close to 100 wind and SCADA specialists at offices in Germany, Poland, Ukraine, United Kingdom and USA. The company is certified according to ISO 9001, ISO 14001 and OHSAS 18001.

## Why our customers choose SCADA International

An increasing number of companies in the wind sector in Europe and North America choose SCADA International as their partner when it comes to wind farm systems and SCADA installation, surveillance, support and maintenance.

**When choosing SCADA International you get solutions that are:**

- Made for the wind sector
- Customized
- Scalable
- Open
- Reliable
- And support your business model

## Company references

- |                              |                      |                      |                         |
|------------------------------|----------------------|----------------------|-------------------------|
| • Aldesa Nowa Energia        | • Enel               | • Nordex             | • Siemens               |
| • Boreas Energie             | • Energia Renewables | • Ostwind            | • STEAG New Energies    |
| • Centrica Renewables Energy | • Eneria             | • PGE Energia Natury | • Suzlon Energy         |
| • DONG Energy                | • ESB International  | • RegEnPro           | • TransAlta Corporation |
| • E.ON                       | • Eurowind Energy    | • ScottishPower      | • Vestas                |
| • EDF Energies Nouvelles     | • GE Wind Energy     | • SEMCO Maritime     | • Volkswind             |
|                              | • Nexus Energie      | • Senvion            | • WKN AG                |

### Denmark (HQ)

SCADA International A/S  
Holstebrovej 5  
DK-7490 Aulum  
Tel: +45 9641 9200

### Germany

SCADA International GmbH  
Flensburger Chaussee 62  
DE-25813 Husum  
Tel: +49 4841 96396 0

### Poland

SCADA International Sp.z o.o.  
ul. Mokronoska 2  
PL-52-407 Wrocław  
Tel: +48 71 324 16 54

### United Kingdom

SCADA International UK  
Inovo, 121 George St, Suite F  
UK - Glasgow G1 1RD  
Tel: +44 (0) 77 8338 6695

### USA

SCADA International Inc.  
319 SW Washington St, Suite 1000  
US-Portland, OR 97204  
Tel: +1 503 922 4723

Mail: [scada@scada-international.com](mailto:scada@scada-international.com) • Follow us on Twitter and LinkedIn