



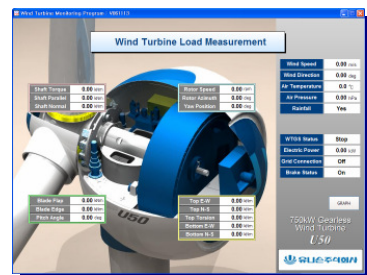
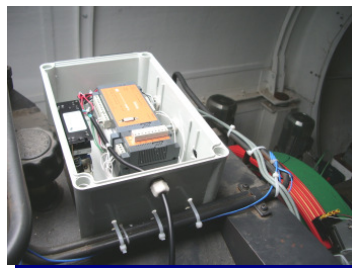
## UNISON Corporation

### Load Measurement System of Wind Turbines

Unison Co. Ltd. is the a leading company in the field of new and renewable energy. That means wind energy, photovoltaic and bio energy. At this application a lot of measurement quantities at wind turbines are monitored. The measurements are weather quantities like humidity, air pressure, ambient temperature, rain, wind direction and -speed, electrical quantities like the generated 3 phase voltage, current, frequency and the resulting power, as well as the mechanical quantities like material strain in the flap fixings, in the rotating shaft and in the lower and upper part of the tower, acceleration at the shaft, torque and RPM of the shaft, the azimuth angle of the flaps and the position of the turbine head.

Over distances of more than 100 meter in total 4 frequency signals, 9 voltages, 1 Pt100-signal, 14 strain signals, 2 signals of strain gauge sensors and 2 incrementale signals are recorded, conditioned and transmitted.

The remote detected and conditioned data are transmitted via the test controller e.gate to a PC. The results are used to controll the wind turbine. So it is possible to controll the power feed into the net or to deactivate the system in case of heavy weather and storm.



The challenge is beside the required accuracy and the high temperature stability (outdoor in summer and winter) the synchronized measurement in a remote setup with a frequency response of 100 Hz. A further argument for the e.series is the easy installation of the modules on the rotating shaft in the generator and the high flexibility regarding the connectivity of sensores and regarding the configuration.

The calibration of the strain measurement was done by loading the flaps with real death loads which was applied by a crane. The calibration was done in vertical direction and with a diverter pulley in horizontal direction.

