Technical notes about accuracy of wind monitoring systems for wind energy applications

TOTAL SYSTEM -ACCURACY OF WIND MONITORING SYSTEMS

ACCURACY DATA of the WINDLOGGER EKO 20B

Thanks to many years research of the MAX40+ anemometer in wind tunnels the **exact calibration curve** of the anemometer is programmed in the instrument.By using a special technique the resolution of the stored average values is **only 0.01** m/s.
The **total system-accuracy is typ. 0.2 m/s**, using the MAX40+ anemometer.
This has been achieved by an **excellent** anemometer calibration, the right way of signal conditioning & sampling.

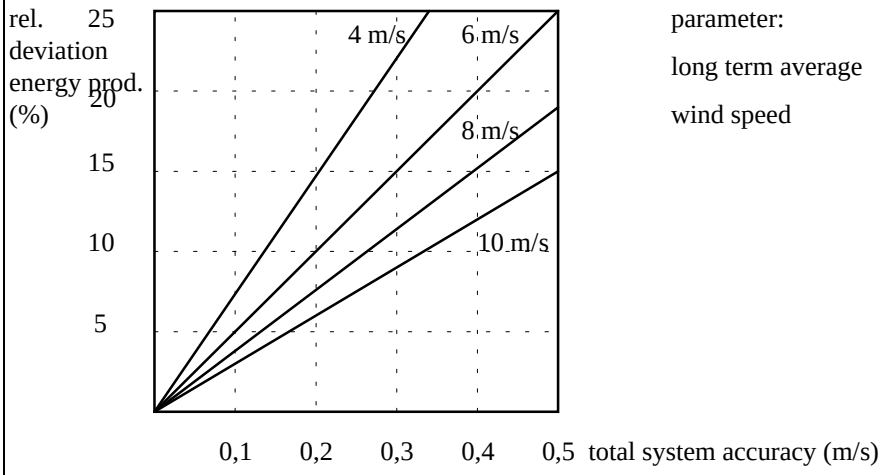
An optional **individual** calibration certificate **with 0.1 m/s calibration accuracy** (including calibration report) can be supplied, according to the latest European MEASNET procedure. This certificate is a guarantee for the high accuracy, but is not required in all cases, as the standard accuracy is typ 0.2 m/s. The EKO 20B meets all the accuracy recommendations of IEA, IEC, WMO and AWEA (refer datasheet EKO 20B).

Other suppliers of ("low-cost") wind monitoring systems simplify the calibration curve to a "straight line" **without offset**, which result in deviations of sample values up to appr. **0.5 m/s** . Moreover the resolution for puls counting inputs is appr **0.7 m/s** (1 pulse during sample interval of 1 second). This will highly affect the accuracy of the recorded values and the recorded turbulence intensity! In this cases requiered high accuracy cannot be achieved and measurements with this kind of equipment are less valuable.

ACCURACY OF THE ENERGY PREDICTION

As the energy production of a wind turbine is proportional to the cube of the long-term average wind speed (v^3), a small deviation in wind speed will highly affect the calculation of the energy production.
Refer also to the article: " **The truth about wind speed and wind power measurements" (refer to our website)**.

The relative deviation of the expected energy production is equal to: 3*total system accuracy / average wind speed



For example: when the average wind speed is 6 m/s, measured with a system accuracy of 0.5 m/s, the error in the prediction of the energy production is approx. 25%.
As a valuable feasibility study should give the energy prediction within appr 5-10 %, the required system- accuracy should be in the range of 0.1 to 0.2 m/s when the long term average wind speed is < 10 m/s.

CONCLUSIONS:

For wind energy feasibility studies accurate measurements with total system accuracy of 0.1 to 0.2 m/s is required.
Especially in areas with low or moderate average wind speed it is important to measure the wind accurately as the economic feasibility of windpower may be critical in that case. The EKO 20B may be some more expensive than less accurate instruments, but it can save a lot of money as it can prevent wrong decisions for investments in wind energy projects!
The **EKO 20B is an appropriate sytem for feasibility studies, the evaluation of wind energy projects and even as a low-cost system for scientific wind-research projects and meteorological studies.**