

DWP is a **monitoring system for the diagnostics of operation of wind-power plants**, which enables:

- ♦ **permanent measurement and monitoring of all necessary physical values** which are important for specification of the qualitative status of the movable parts of the wind-power plant, and specification of the failure of operating statuses
- ♦ **evaluation of the status** of the wind-power plant and the ability **to hand over** this information by means of alarm messages of the control system of the plant to enable possible disconnection of the power plant
- ♦ **storage of measured values**, including alarm statuses in temporary memory and consequently to **send them** to the central data server
- ♦ **communication interface Ethernet with central data system**
- ♦ **handing over through central data server of diagnostic data** to the remote computer and **control** of the diagnostic system from the remote computer on the Internet



Concept of DWP system

DWP is a compact monitor in the independent box located in the basket of the wind-power plant. The monitor consists of diagnostic modules MMPS (AURA), which measure necessary physical values. The set of modules is connected to the communication computer located also in the box DWP.

Signals are connected to the monitor box from all sensors in the basket.

The output signals are relay contacts and communication interface Ethernet.

Relay contacts signal the correct function and operating statuses of the wind-power plant.

The communication interface Ethernet is a monitor connected to the central data server which collects data from the DWP diagnostic systems of the whole group of power plants.

DWP monitor is permanently connected to distribution networks 230V/50Hz.

Sensors of the DWP system

Sensors recommended for monitoring of important operating values on the wind-power plant Vensys with slow-running generator are displayed in Fig.1 with the legend:

- 1 Stator of the generator
- 2 Rotor of the generator
- 3 Blades of the turbine
- 4 Rotor of the turbine
- 5 Sensors of rotation and start up
- 6 Toothed comb for turning sensors
- 7 Hollow central shaft
- 8 Servo-inclinometers – sensors of acceleration and inclination
- 9 Bearing of the generator
- 10 Bearing of the turbine
- 11 Sensor of vibrations and temperature on the bearing of the generator
- 12 Sensor of vibrations and temperature on the bearing of the turbine
- 13 DWP box with modules MMPS AURA

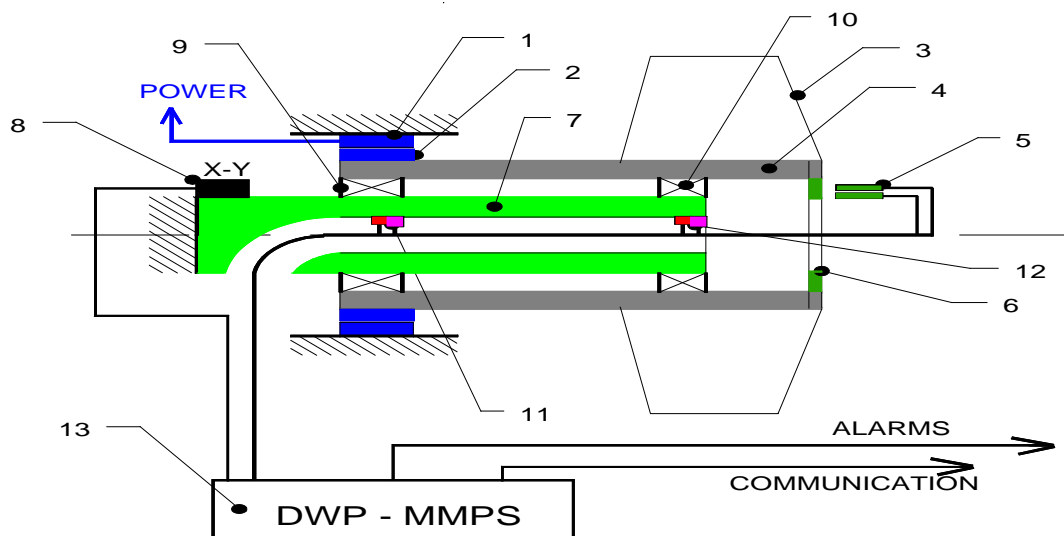


Fig.1

Storage of measured values in DWP monitor

DWP monitor stores in a standard manner all measured values into built-in memory (buffer). From the memory, the central data server reads these values through communication on the Ethernet.

Central data server and communication possibilities

DWP monitors of individual wind-power plants located in the group are connected through Ethernet communication to a central data server.

The central data server is usually located in the main control room of the group of wind-power plants; in the case of independent installation of the wind-power plant, the data server is the part of monitor and is located in the base of the wind-power plant. It is possible to expand the installation of the monitor by module of communication interface for connection to an outside network or data transfer (package transfer GPRS, GSM, modem, etc..)

The data server ensures the storage of data from DWP monitors into the data archive. During the reading of data, its validity is checked, and consequently conditions are automatically evaluated for predictive diagnostics of the function of the wind-power plant. In the case of ascertainment of a problem (increased value above permitted limits), notification is automatically displayed on the monitor for operators of the wind-power plant and a warning message is automatically sent through SMS /email to the service technician responsible for the specific part of the machine. Configuration of the system can be modified during running, to change limit values for evaluation of failures, etc. All archived measured data from DWP monitors is transferred by the central server by means of web interface onto the Internet, with the possibility of being viewed on any remote computer with Internet browser.

In the case of wider systems of wind-power plants which are linked through Ethernet communication, the central server also implements diagnostics of the computer/optical network.

Variability of the DWP system

Thanks to the modular concept of MMPS modules, it is possible to create DWE variants for the specific type of wind-power plants. Modifications of DWE may differ according to input values, as well as output. In inputs, it is possible to modify the number and the type of input values. It is possible to modify outputs according to the requirements and possibilities of the operator and properties of the control system (e.g. relay contacts can be replaced with voltage outputs, etc.)

TAB.1 Approximate technical parameters of DWP system

Supply		
	Supply voltage	AC 230V \pm 10%, 50 Hz
	Consumption of current	max. 1 A
Outputs		
	Contact relays	6 x, loading 230V/50Hz, 2A
	Ethernet	communication port according to IEEE 802.3
Measured values (no. of item in Fig. 1)		
No. of item	Sensor	Value
8	servo-inclinometer x, y	acceleration and inclination
11,12	accelerometer	vibration, status of bearing
11,12	thermometer	temperature
5	proximity switch	revolutions, mark of start up
Construction of DWP monitor box		
	Covering	IP54
	Working temperature	-25 \div +60°C
	Dimensions	600 x 300 x 200 mm (width x height x thickness)

